A practical treatise on the diseases of the testis, and of the spermatic cord and scrotum / by T.B. Curling.

Contributors

Curling, Thomas Blizard, 1811-1888.

Publication/Creation

London : John Churchill and Sons, 1866.

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A

PRACTICAL TREATISE

ON THE

DISEASES OF THE TESTIS,

ETC.

BY THE SAME AUTHOR.

OBSERVATIONS

ON THE

DISEASES OF THE RECTUM.

Third Edition, Revised and Enlarged, 8vo, cloth, 7s. 6d.

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A

PRACTICAL TREATISE

ON THE

DISEASES OF THE TESTIS,

AND OF THE

SPERMATIC CORD AND SCROTUM.

By T. B. CURLING, F.R.S.,

SURGEON TO THE LONDON HOSPITAL, ETC.

WITH NUMEROUS WOOD ENGRAVINGS.

Third Edition, Revised and Enlarged.



LONDON:

JOHN CHURCHILL AND SONS, NEW BURLINGTON STREET.

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PREFACE

TO

THE THIRD EDITION.

Ten years have passed since the publication of the second edition of this Treatise, during which period I have continued to take advantage of the many opportunities afforded me of improving my acquaintance with the diseases of the testicle and its appendages. The work has been thoroughly revised, and additions have been made to most of the chapters. Some new subjects have been introduced — viz., Inguinal Hydrocele; Sterility; Congenital Vascular Tumours of the Scrotum.

Until about the middle of this century the malformations and diseases of the testicle had attracted comparatively little attention from French pathologists, but since that time several able men in France have advanced our knowledge of this branch of Surgery. Amongst those to whose labours I shall have occasion to refer, I must particularly notice two: M. Gosselin, Professor of Surgical Pathology in the Faculty of Medicine of Paris, and M. Godard.

M. Gosselin, the author of some excellent papers on the pathology of the testicle, did me the honour to

translate into French the second edition of this work. The translation appeared in Paris in 1857, with some valuable additions and remarks, which have been of great service to me in preparing this edition. My lamented friend, Ernest Godard, was remarkable for a rare energy and perseverance in pathological pursuits, and his researches on the teratology of the seminal apparatus of man have led to many interesting additions to our knowledge of this subject. His zeal for the improvement of his profession caused him to make a journey to the East to gather information on certain defects and diseases common in those countries. Unhappily he was seized with fever, and died at Jaffa, in 1862, at the early age of thirty-six, having left a name which will be remembered with honour as a successful cultivator of pathological science.

My warm acknowledgments are due to several friends for their kind assistance in this work, especially to Mr. Crompton, of Birmingham, Mr. Symonds, of Oxford, and to Mr. Hamilton and Dr. Fleming, of Dublin, for valuable cases and communications.

39, Grosvenor-street,
April 1866.

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DISEASES OF THE TESTIS.

CHAPTER I.

CONGENITAL IMPERFECTIONS AND MALFORMATIONS.

SECTION I.

NUMERICAL EXCESSES AND DEFECTS.

Supernumerary Testicles. — Cases of supernumerary testicles are mentioned in the writings of the old authors, and persons have been described with four or five of them, accompanied with a proportionate increase in the venereal appetite. Nearly all these cases are of a fabulous character, the observations during life not having been confirmed by dissection after death. Such must be remarked of the case of πεντόρχος, or man with five testicles, mentioned by Schaarf,[1] and with that of a man with four testicles, alluded to by Blegny.[2] Blasius, an old writer not unworthy of credit, has given an account of the examination of the body of a man, thirty years of age, and otherwise well formed, who had two testicles on the right side, of the same size and shape as that on the left, which is illustrated by a small engraved

[1] Eph. Nat. Cur. Dec. iii. Ann. v. vi. Obs. 89, p. 175.

[2] Zodiaque Français. Ann. 11. Most of the reputed cases of *Triorchides* are quoted by Arnaud in his Mémoires de Chirurgie, Mém. iii. part 1.

figure representing a distinct artery from the aorta, and vein from the vena cava proceeding to each of the two testicles on the right side.[1] This is the only case of supernumerary testicle recorded by the old authors which has any semblance of authenticity. Neither Morgagni, Haller, nor Meckel met with a single example, and they questioned the existence of such a condition. Two cases of the kind have recently been recorded, but they were not verified by examination after death. One is related by Blümener,[2] the other by Dr. Macann, a British army surgeon.[3]

A fatty or fibrous tumour in the scrotum, or an encysted hydrocele of the cord or testicle, especially the latter, might readily be mistaken for an additional testicle. Morgagni mentions that he was once deceived by a portion of omentum. In the pathological collection at St. Thomas's Hospital is preserved the testicle of the eccentric Dr. Monsey, who appeared during life to be supplied with three of these glands. The supposed additional testicle consists of an indurated fibrous tumour, attached apparently to the tunica vaginalis. Several persons have consulted me, supposing that they had a supernumerary testicle in the scrotum, but in every instance I have been able to recognise without difficulty one of the tumours just mentioned. In addition to the ordinary characters of the particular swelling, the absence of the testicular pain on pressure will materially assist the diagnosis, as is shown in the following case :—A medical friend brought to me a young gentleman supposed to have three testicles. He had been examined some years before by Sir A. Cooper, who,

[1] Ger. Blasius, Obs. Med. Anat. Obs. 20, p. 60.
[2] Rust's Magazin für die Gesammte Heilkunde, for 1824.
[3] Provincial Medical Journal, Nov. 5, 1842, p. 113.

it was stated, was inclined to believe that this was the case. On examination I found the left testicle of its full size and in proper position. On the right side I felt two bodies; one, the larger of the two, was about half the size of the left testicle. The spermatic cord could be traced to it, and compression produced the usual sickening sensation experienced from pressure on the testicle. Below this, but distinct from it, and quite free in the scrotum, was an oval-shaped body, the size of a small walnut, which was tense and elastic, and felt very much like a small testicle; the two bodies on the right side being about equal in volume to the left testicle. Something like a vas deferens even could be traced to the lower tumour, but compression of it produced scarcely any uneasiness. On taking the patient into a dark room, and examining the part by transmitted light, I plainly perceived that the supposed third testicle was a cyst, containing fluid, an encysted hydrocele of the testicle.

Absence of one or both Testicles.—Many instances of *monorchides*, or persons having only a single testicle, are mentioned by the old authors; but as the data are very imperfect, and as little was known respecting the transition of the testicle at the time these cases were recorded, they cannot be regarded as authentic. They may have been cases in which one of the glands was either retained within the abdomen, or from some cause had been completely atrophied. This imperfection has, however, been observed in many instances, and I am disposed to agree with Godard,[1] that some of the cases which have been published as examples of atrophy of the testicle, were really instances of congenital absence.

[1] Note sur l'absence congéniale du testicle. Gazette Médicale de Paris, 1860, p. 435.

The testicle may be wanting on one side or on both. The gland alone may be deficient, the epididymis and vas deferens being present and in the scrotum; or the testicle and epididymis may be absent whilst the vas deferens is developed alone. More rarely the whole of the seminal apparatus is wanting. Godard in his note refers to nearly all the recorded instances of these various defects.

That the absence of the testicle occurs as a congenital defect has been thoroughly established by accurate observations made on the fœtus and on the bodies of infants soon after birth. MM. Le Gendre and Bastien carefully examined the body of an infant born at the full period, and found a complete absence of the testicle and epididymis on both sides, and a regular formation of the vasa deferentia, vesiculæ seminales, and all the other parts of the genito-urinary organs.[1] Le Gendre also met with an absence of the left testicle in the dissection of an infant who had lived between two and three months. Godard found the testicle absent in a fœtus about the term of four months. The right testicle was in the iliac fossa, as usual at that early period, but the left testicle was wanting. The epididymis however existed, and presented the same appearance as on the right side. I am indebted to Godard for showing me this interesting specimen. Mr. Thurnam has given an account of the dissection of an infant who died at the age of four months. In addition to an atrophied condition of the right kidney, and a remarkable malformation of the ureters, it was found that neither of the testicles had descended. The right lay in the abdominal cavity, just above the inguinal canal. On the left side no testicle would appear to have been

[1] Gazette Médicale de Paris, 1860, p. 217.

formed; the spermatic vessels on this side terminated in a little mass of fat; the vas deferens, however, was present, and was apparently as well developed as that of the perfect testicle.[1] Blandin, an accurate anatomist, in a most scrupulous dissection of a male subject could find no testicle on one side the abdomen, and no trace of the corresponding cord, vas deferens, and vesicula seminalis; nor was there any mark of a wound in the scrotum.[2] A case of monstrosity is related by Dr. Friese in Casper's "Wochenschrift."[3] The child lived only half an hour: in addition to the absence of the external genital organs, there were neither testes, vasa deferentia, nor vesiculæ seminales. Cases, however, in which the whole of the genital apparatus is deficient or irregularly formed do not come within the scope of this work.

Mr. Page, of Carlisle, communicated to me the case of a lad, aged seventeen, who died on his way to the Cumberland Infirmary from injuries received in a steam-sawing machine. Only the right testicle, greatly hypertrophied, was in the scrotum. A careful examination in the course of the left testicle satisfied him that no such organ existed. Blandin's case and this are satisfactory examples of *monorchis*, and that the latter was an original defect is confirmed by a remarkable hypertrophy of the existing gland. Dr. Fisher, of Boston, has recorded a case of absence of both testicles. The deficiency was remarked from birth, and the subject of the malformation was regarded as a natural eunuch, and died at the age of forty-five.[4]

[1] London Medical Gazette, vol. xx. p. 717.

[2] Anatomie Topographique, p. 411.

[3] Dec. 25, 1841, quoted in the British and Foreign Medical Review for April, 1842, p. 527.

[4] American Journal of the Medical Sciences, vol. xxiii. p. 352.

Godard examined and interrogated four men whose testicles were supposed to be congenitally defective. Individuals in this condition exhibit the physical characters of the eunuch mutilated in early life. They have no passion for women, and are incapable of erections and emissions. In a congenital monorchis the characters of the male and the sexual functions become developed at the usual period.

In arriving at a conclusion respecting the cause of the absence of the testicle, we must constantly bear in mind its liability to wasting at all periods of life. Atrophy of the gland has been recognised even during intra-uterine existence. An interesting example of it is referred to in a note at page 67.

Union of the Testes.—Geoffroy St. Hilaire has recorded the following remarkable, and, I believe, unique case of union of the testicles in the abdomen. It was communicated to him by M. Breton, of Grenoble. An infant was born at Vizille in 1812: several physicians consulted respecting the child's sex were of different opinions; they decided, however, to inscribe it in the registers as a girl. It died at the age of eighteen months, and was dissected by Dr. Breton, who recognised a complete hypospadias. The scrotum was bifid and empty; and the two subrenal capsules, as well as the two kidneys and the two testicles, were joined together upon the median line. The spermatic arteries and veins, vesiculæ seminales, and vasa deferentia, exhibited nothing remarkable, each half of the double testicle receiving its particular vessels.[1] Sedillot also detected an apparent fusion of the testicles in the examination of a recruit, otherwise well formed.[2]

[1] Hist. des Anomal. de l'Organ. t. i. p. 542.
[2] Journal Générale de Médecine. Paris, 1813, t. xlvi. p. 348.

SECTION II.

DEFICIENCIES AND IMPERFECTIONS OF THE VAS DEFERENS.

The vas deferens is sometimes partially or wholly wanting, and occasionally it terminates as a cul-de-sac, instead of communicating with the urethra. Mr. Paget showed me a preparation in the Museum of St. Bartholomew's Hospital, taken from a man, fifty years of age, who died of strangulated hernia. A piece of intestine was strictured by a band of adhesion connected with the mesentery, and the testicle was detained in the upper opening of the ring. On a recent and careful dissection of the parts, the vas deferens was found to terminate near the testicle in a cul-de-sac. The gland was very small, and its structure appeared granular, like the undeveloped testicle of a youth. There was no trace of the epididymis. Dr. Turner has recently described an instance of a left testicle retained in the abdomen of an adult with the vas deferens closed at both ends, having no connexion with the testicle at the epididymis, and possessing no opening into the urethra at its lower end.[1] Similar imperfections have been observed after the testicle has entered the scrotum. Mr. Hunter, in dissecting a male subject, found the vasa deferentia not only deficient near the testicles, but terminating below in a single irregularly formed vesicula seminalis, and having no communication with the urethra.[2] Gosselin, in the dissection of a man about twenty years of age, found the vas deferens wanting on the right side from the epididymis to the upper part of the bladder.[3] There are a few other cases on record in which the vas deferens has been defective at

[1] Edin. Med. Journal, Jan. 1865.

[2] Works by Palmer, vol. iv. p. 23. There is a preparation in the Hunterian Museum at Glasgow (65 S) of two testicles which exactly agree with John Hunter's description, and are doubtless the organs dissected by him.

[3] Archives Générales de Médecine, 4e série, t. xiv. p. 408.

the extremity which joins the ejaculatory canal. Thus Tenon, in the dissection of the infant affected with extroversion of the bladder, found that the vasa deferentia terminated separately at the bottom of the pelvis in two white tubercles : the scrotum, testes, and vesiculæ seminales were in a natural state.[1] But besides these imperfections at its two extremities, this duct has been found wanting throughout nearly its whole extent. Brugnone mentions, that in dissecting the parts of generation in a robust man, from twenty-six to twenty-seven years of age, he found the right epididymis almost entirely absent, the only part remaining being the head, which formed nodules filled with semen. The rest of the epididymis and the vas deferens were wanting, without any mark of disease. The testicle was perfectly sound, and nearly of the same size as the left one. On examining the corresponding vesicula seminalis he found at its anterior extremity a portion of the canal of the vas deferens about an inch in length, and properly formed. The vesicula seminalis itself was flaccid and quite empty, whilst the left was full of semen. He remarks, that although this vicious conformation was to all appearances congenital, nevertheless the vesicula seminalis and ejaculatory canal had preserved their natural cavities.[2] In a case related by Bosscha, the left vas deferens of a robust man terminated in a blind extremity near the testicle, the rest of the canal being wanting. There was the rudiment of a left vesicula seminalis in the form of a blindly-ending canal running tortuously in the shape of the letter S. The left testicle was sound.[3]

[1] Mém. sur quelques Vices de Voies Urinaires, &c., in Mém. de l'Acad. Roy. des Sciences à Paris, 1761, p. 115.

[2] Observ. Anat. sur les Vésicules Séminales. Mém. de l'Acad. Roy. des Sciences à Turin, 1786, and 1787, p. 625.

[3] Diss. sistens Obs. de vesiculæ seminalis sinistræ defectu, integris testi-

Mr. Paget has happily explained the origin of these several defects in the vas deferens, by reference to the mode of development of the special organs of generation. He observes,[1] after Müller and Valentin, that, in the normal course of human development, the proper genital organs are in either sex developed in two distinct pieces: namely, the part for the formation of the generative substance, the testicle or ovary, and the part for the conveyance of that substance out of the body, the seminal duct or ovi-duct. The testicle or ovary, as the case may be (and in their earliest periods they cannot be distinguished), is formed on the inner concave side of the corpus Wolffianum, and the seminal or ovi-duct, which is originally an isolated tube closed at both extremities, passes along the outer border of that body from the level of the formative organ above to the cloaca or common sinus of the urinary, genital, and digestive systems below. The perfection of development is attained only by the conducting tube acquiring its just connexions at once with the formative organ, and, through the medium of the cloaca, with the exterior of the body. The sexual character is first established, when, in the male, the formative and conducting organs become connected by the development of intermediate tubes which constitute the epididymis; or when in the female a simple aperture is formed at the upper extremity of the conducting tube, and is placed closely adjacent to the formative organ. In both sexes alike, the lower extremities of the conducting tubes first open into the common cloaca, and subsequently, when that cavity is partitioned into bladder and rectum, or bladder, vagina, and rectum, they acquire in each their

bus, vase vero deferente clauso, quoted by Dr. Vrolik, Handboek der Ontleedkundige Ziektekunde, 1st Deel. p. 210.

[1] Loc. cit. p. 818.

just connexions, and become in the male the perfect vasa deferentia, and in the female Fallopian tubes and uterus.

Now in Brugnone's case, and in Bosscha's, we have examples of one of the male conducting tubes being developed in only a very small portion of its natural extent. These, therefore, clearly confirm the description just given; for they prove that the testicles may be formed quite independently of the vasa deferentia. In the other cases the vas deferens was probably formed originally in its whole length; but it seems to have failed of acquiring its due connexion in the one series of defects at the end next to the testicle, and in the other at the end next to the bladder.

The inquiry is not without interest,—what influence have these congenital deficiencies and imperfections in the vas deferens on the evolution and subsequent condition of the testicle? In the case of the adult which occurred at St. Bartholomew's Hospital, the gland was small, and its structure appeared granular, like the undeveloped testicle of a youth; but as it had not passed into the scrotum, and was combined with hernia, there may have been other causes impending its due evolution. In Mr. Hunter's case, the testicles which were in the scrotum were very sound, and appeared to me in a recent examination of good size. In Gosselin's case, the testicle was of proper size, and healthy in structure, and the canal of the epididymis was dilated and distended with a yellow fluid containing a large quantity of dead spermatozoa. In the case of the man related by Brugnone, the testicle on the side corresponding to the defective vas deferens was perfectly sound, and nearly of the same size as the other. So also in Bosscha's case, it is stated that the testicle was sound. Although either of these defects in the vas deferens renders the gland an useless

organ, and if it occurred on both sides of the body would necessarily cause sterility, these cases, nevertheless, tend to show that the absence or imperfection of the excretory duct does not prevent the development of the testicle at the proper period, and has no direct influence in causing it to waste. In cases of closure of the excretory duct from disease also, the nutrition of the gland is generally preserved. In several dissections of testicles, in which an obliteration had taken place at the commencement of the vas deferens, I observed no wasting of the organ. Gosselin, in the paper containing the case above noticed, has adduced several observations in which the duct was obliterated in the tail of the epididymis, both with and without dilatation of the tube in this part, the gland preserving its normal appearance. These observations are fully confirmed by experiments on animals. Sir A. Cooper relates, that in 1823 he divided, upon a dog, the vas deferens upon one side, and the spermatic artery and vein on the other. The testicle upon that side on which the artery and vein were divided gangrened, and sloughed away. The testicle on the other side became somewhat larger than natural. He kept the dog for six years; during that time he was twice seen *in coitu*, but the female did not produce. This was in 1827. In 1829 he killed the dog, and found the vas deferens below the division excessively enlarged, and full of semen, and entirely stopped, with some separation of its extremities; but it was open from the place of division to the urethra.[1]—February 23rd, 1842, I divided the vas deferens and a small artery running close to it (not the spermatic) on the left side, and excised a small piece of the vas deferens on the right.

[1] Anatomy of the Testis, p. 51. The testicle is represented in the plate, of full size.

The dog afterwards evinced a partiality for a bitch in a neighbouring house. He was killed the 26th of April following. The abdominal aorta was injected. The right testicle was healthy, and of good size; its epididymis was hard, and clogged with a thick white substance which contained abundance of spermatozoa. The divided ends of the ducts were separated and closed. The right spermatic artery was of its normal size. The left testicle was atrophied, and presented no trace of its natural structure. The parts composing the cord were matted together, and extremely indistinct at the point where the vas deferens had been divided. This duct was reduced to a mere cord. The left spermatic artery appeared obliterated, for no injection had passed into it, and the vessel was scarcely perceptible. These changes on the left side, I suspect, were the result of inflammation induced by the operation.—April 9th, 1842, in a young bull terrier I excised a small portion of the vas deferens on the left side, and on the right tied a ligature tightly round all the parts composing the cord, except the vas deferens, and divided the included parts below the ligature. The dog was killed on the 25th of June following. The left testicle was of its natural size, and contained spermatozoa. The right testicle was completely atrophied, a small epididymis attached to the end of the vas deferens being all that remained of the gland.—April 26th, 1842, in a large young dog, whose testicles had not acquired their full size, I exposed the cord, and made a simple division of the vas deferens on the left side. The dog was killed on the 25th of June following. The two testicles were exactly of the same size, but the left was loaded with fluid containing spermatozoa. The ends of the divided vas deferens were separated and closed.—June 29th, 1842, in a kitten eight weeks old I

divided the vas deferens on each side, and separated the cut extremities of the ducts. He grew a remarkably fine cat; and in the following February became restive and noisy, and evinced a disposition to rove from the house. On the 24th of the month I excised the testicles. They were plump, and filled with fluid which was found to contain abundance of lively spermatozoa.[1]

The foregoing cases and experiments show, then, that the testicles may be properly developed, though a physical obstacle to the elimination of their secretion is present from birth; and that so long as the testicles exist entire, though to no purpose, the individual acquires and preserves all the marks of the male sex; the secreting alone appearing to be the special organs of generation upon which the sexual characters depend. The engorgement of the seminal ducts with sperm is liable, it is true, to cause inflammation of the testicle, which may end in atrophy, but this is only a secondary and indeed a rare effect of the interruption in the excretory duct.

SECTION III.

IMPERFECT TRANSITION OF THE TESTICLE.

It occasionally happens that at birth one or both testicles have not passed into the scrotum, being detained either in the abdomen near the groin, in the inguinal canal, or in the groin, just outside the external ring. In other instances the testicle, instead of passing into the scrotum, becomes lodged in the perineum, or escaping at the crural ring rests at the upper part of the thigh.[2]

[1] Gosselin has since performed two similar experiments on dogs. One was killed and examined ten months, the other four months after section of the vas deferens. In both the testicle was of normal size. (Archives Générales de Médecine, Sept. 1853.)

[2] The French writers describe the abnormal position of the testicle as an *inclusion*, and mention successively the *pelvic*, *inguinal*, *perineal*, and *scrotal* inclusion.

Detention of the Testicle.—In a table of 103 male infants, examined by Wrisberg at the time of birth, it appears that seventy-three had both testicles in the scrotum; in twenty-one, one or both were in the groin. Of these five had both, seven the right, and nine the left in the groin; in twelve, four had both, three the right, five the left, only in the abdomen.[1] According to this table, the imperfection occurs rather more frequently on the left side than on the right, in the proportion of seven to five. In twenty-five cases examined at different ages, varying from five to sixty—sixteen of which came under my own observation, the remainder being taken from the recorded experience of others—in thirteen the imperfection was on the right side, and in twelve on the left.[2] Dr. Marshall states that in the examination of 10,800 recruits he had found five in whom the right, and six in whom the left testicle was not apparent. In two of these cases there was inguinal hernia on the side where the testicle had not descended.[3] He met with but one instance in which both testicles had not appeared.[4] The testicle sometimes remains permanently fixed in the situation in which it is placed at birth;[5] but in some instances the passage, though delayed, is completed at some period previous to puberty, and often within a few weeks after birth. Mr. Hunter was of opinion that this completion most frequently happens between the years of two and ten. Of the twelve cases mentioned by Wrisberg, in which one or both testicles were retained in the abdomen, in one the descent took

[1] Commentatio Soc. Reg. Scient. Goetting. 1778.

[2] Of thirty-six cases of monorchides observed by M. Godard, in twenty-two the arrest was on the left side, and in fourteen on the right. Lib. cit. p. 36.

[3] Hints to Young Medical Officers in the Army, p. 83. [4] Ibid. p. 207.

[5] Persons whose testicles had not made their appearance were called κρυψόρχιδες, or *testicondi*, by the ancients.

place the day of birth, in three on the day after, in three others on the third day, in two instances on the fifth day, and in one on the twenty-first day: in the other cases the testicles had not appeared at the fourth or fifth week after parturition. My own observations lead me to believe, that if the evolution does not take place within a twelvemonth after birth, it is rarely fully and perfectly completed afterwards, without being accompanied with rupture. For the causes which operate at this late period tend as much to promote the formation of hernia as the transition of the testicle. In cases where the testicle makes no appearance before puberty, uneasiness is often experienced at that period, owing to the enlargement of the gland being restrained, by the rings and parts composing the inguinal canal. At the same time also, it is often protruded outside the external ring by the movements of the abdomen in respiration.

When a testicle is detained in the inguinal canal, it is most commonly surrounded by a sac which communicates with the abdomen, and this condition is very frequently complicated with a protrusion of bowel, adherent or non-adherent to the testicle. In some instances the communication with the abdomen is found to be closed, the testicle being isolated in a distinct sac. This is more often observed in cases where the testicle has emerged from the canal and been lodged outside the abdominal ring.

Considerable doubt long prevailed respecting the mode and agency by which the passage of the testicle into the scrotum is effected. Several years ago I carefully investigated this subject;[1] and as it is impossible to

[1] Vide Observations on the Structure of the Gubernaculum, and of the Descent of the Testis in the Fœtus, by the author, in London Medical Gazette, April 10, 1841, or in the Lancet, of the same date.

treat satisfactorily of the causes of a failure in the transition, without describing the process itself, I must premise a short account of the change, and of the parts concerned in effecting it.

Attached to each testicle whilst in the abdomen is a peculiar body, termed by Mr. Hunter the *gubernaculum*, as it was supposed to serve as a guide to the testicle in its passage. It is a soft, solid, projecting body, of a conical form, which varies somewhat in shape and size at different periods of the transition of the testicle, becoming shorter and thicker as the gland approaches the abdominal ring. It is situated in front of the psoas muscle, to which it is connected by a reflexion of peritoneum. Its upper part is attached to the inferior extremity of the testicle, lower end of the epididymis, and commencement of the vas deferens. The lower part of this process passes out of the abdomen at the abdominal ring, and diminishing in substance and spreading, terminates in three processes, each of which has a distinct attachment. The central part and bulk of the gubernaculum is composed of a soft, transparent gelatinous substance, which, on examination by the microscope, is found to consist of nucleated cells, the primitive connective tissue; this central mass is surrounded by a layer of well-developed muscular fibres, which may be distinguished by the naked eye, and which can be very distinctly recognised in the microscope to be composed of striped elementary fibres. These muscular fibres, which may be traced the whole way from the ring to the testicle, are surrounded by a layer of the soft elements of the connective tissue, similar to that composing the central mass; and, in the same way as the testicle, the whole process, except at its posterior part, is invested with peritoneum. On care-

fully laying open the inguinal canal, and gently drawing up the gubernaculum, the muscular fibres may be traced to the three processes, which are attached as follows: the external and broadest is connected to Poupart's ligament in the inguinal canal; the middle forms a lengthened band which escapes at the external abdominal ring, and passes to the bottom of the scrotum, where it joins the dartos; the internal takes the direction inwards, and has a firm attachment to the os pubis and sheath of the rectus muscle. Besides these, a number of muscular fibres are reflected from the internal oblique on the front of the gubernaculum. It thus appears that the attachments of the muscle of the gubernaculum and those of the cremaster in the adult are exactly similar. I have succeeded in tracing out the former before the testicle has moved from its original position, at different stages of the process of transition, and immediately after its completion; and of the identity of the two muscles I entertain no doubt.

Between the fifth and sixth month of fœtal existence, sometimes later, the testicle begins to move from its situation near the kidney towards the ring, which it usually reaches about the seventh month. During the eighth month it generally traverses the inguinal canal, and by the end of the ninth arrives at the bottom of the scrotum, in which situation it is commonly found at birth.[1] The testicle, both during its passage to the ring and through the inguinal canal, carries along with it its original peritoneal coat, adhering by the reflexion of this membrane, during the whole of its course to the parts behind, in the same manner as whilst situated

[1] Dr. Ballard has communicated to me the case of a child born at seven months, with both testicles still in the abdomen. They afterwards emerged and gradually reached their right position in the scrotum about the time they would have done had the child remained *in utero*.

below the kidney. The testicle, therefore, does not pass directly and abruptly into a pouch prepared to receive it, but carries the peritoneum with it, continuing to be connected to the parts behind the reflexion of the membrane, between the folds of which the vessels and nerves join the gland. In the passage of the testicle from the abdomen to the bottom of the scrotum, the gubernaculum, including its peritoneal investment and muscular fibres, undergoes the same change as that which takes place in certain of the *rodentia* at the access of the season of sexual excitement; the muscle of the testicle is gradually everted, until, when the transition is completed, it forms a muscular envelope external to the process of peritoneum, which surrounds the gland and

Fig. 1.

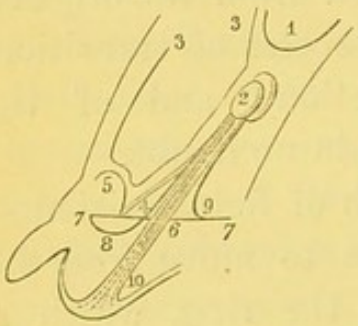


Diagram of the gubernaculum and testicle previous to its descent.

1, the kidney; 2, the testicle; 3, 3, the peritoneum; 4, vas deferens passing down into the pelvis by the side of the bladder; 5, the bladder; 6, the abdominal ring; 7, 7, Poupart's ligament; 8, pubic portion of the cremaster; 9, fibres of the cremaster arising from Poupart's ligament; 10, portion of the gubernaculum attached to the bottom of the scrotum.

front of the cord. As the testicle approaches the bottom of the scrotum, the gubernaculum diminishes in size, owing to a change in the disposition of its areolar elements; the muscular fibres, however, undergo little or no diminution, and are very distinct around the tunica vaginalis in the recently transposed testicle. The mass composing the central part of the gubernaculum, which is so soft, lax, and yielding, as in every way to facilitate these changes, becomes gradually diffused, and after the arrival of the testicle in the scrotum, contributes to form the loose connective tissue which afterwards exists so abundantly in this part; the middle

attachment of the gubernaculum, which may be traced to the dartos at the bottom of the scrotum, gradually wastes away and soon becomes indistinct, though slight traces of this process often remain to the latest period of life. Thus, after death, in dragging the testicle of an adult out of the scrotum by pulling the cord, the lower part of the gland, which is uncovered by serous membrane, is often found connected to the bottom of the scrotum by a band of firm and dense connective tissue, which requires division with the scalpel. This band is the remains of the middle attachment of the gubernaculum. In cases in which the testicle has been retained in the groin, I have traced a cord of dense tissue from the gland to the lower part of the scrotum. After the arrival of the testicle in the scrotum, the peritoneum with which it is closely invested, its original envelope, becomes the inner layer of the tunica vaginalis; whilst the pouch around, which is continuous with it, forms the outer layer, or vaginal sac. Immediately after the arrival of the testicle in the scrotum, this bag communicates with the abdomen, and in quadrupeds continues to do so during life; but in the human subject it soon begins to close, and when the fœtus is ushered into the world, the abdominal orifice is often shut, and the whole canal from the ring to the upper part of the gland is, in general, completely obliterated in the course of the first month after birth. The obliteration is effected by an intimate union of the surfaces of the serous membrane. It sometimes does not take place at all,[1] or is delayed or only partially completed. Congenital hernia, or hydrocele, is the result of a failure in this process; and other

[1] The communication constantly remains open in quadrupeds, the chimpanzee and gorilla being, I believe, the only brute animals in which the tunica vaginalis forms a shut sac.

forms of hydrocele are occasioned by imperfect obliteration of the canal.

Much difference of opinion exists as to the immediate cause of the transition of the testicle. Hunter, Meckel, and others, came to the conclusion that the muscular fibres of the cremaster are insufficient to bring the testicle further than the abdominal ring, and to complete the passage. They were not, however, acquainted with the attachment of this muscle to the pubis external to the ring, or it would be difficult to understand why Mr. Hunter, after arriving at the conviction that the cremaster passes to the testicle whilst in the abdomen, chiefly from analogy, was not induced by the same process of reasoning to conclude that a muscle, capable

Fig. 2.

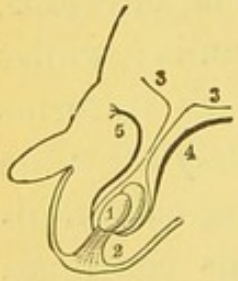


Diagram of the testicle immediately after its arrival in the scrotum, the cremaster being everted.

1, the testicle; 2, the shortened gubernaculum; 3, 3, the peritoneum; 4, portion of the cremaster arising from Poupart's ligament; 5, pubic portion of the muscle.

of changing the position of the testicle in animals would be adequate to accomplish the same office in the human fœtus. The necessity for some active agent to effect this change in the latter would appear to be greater even than in the lower animals, since, in the usual position of the fœtus in utero, the passage of the testicle is contrary to gravitation,[1] and unaided by the movements of respiration. Now, when we consider the attachments and connections of this muscle in the fœtus; the perfect development of its fibres, as ascer-

[1] For this reason I have departed from the usual custom of English anatomists, and have avoided describing the change in the position of the testicle, as *the descent*.

tained by microscopical examination; and the circumstance that there are apparently no other means, no other motive powers by which this change can be effected, or in any way promoted, I think there is sufficient reason for concluding that the cremaster executes the same office in the human embryo as that which it undoubtedly performs in certain brute animals at a particular season. The fibres proceeding from Poupart's ligament, and the obliquus internus, tend to guide the gland into the inguinal canal; those attached to the os pubis to draw it outside the abdominal ring; and the process extending to the bottom of the scrotum, to direct it to its final destination. As the process approaches completion, the muscular fibres which perform so important a part in it gradually become everted, and acquire the new functions of elevating, supporting, and compressing the gland.

Causes of detention of the testicle.—There are several causes which may prevent or arrest the passage of the testicle from the abdomen into the scrotum:—1. Paralysis, or defective development of the cremaster muscle. 2. Adhesions retaining the testicle within the abdomen. 3. A contracted state of the opening of the external abdominal ring.

1. When we reflect on the natural transition of the testicle, as above described, it is clear that there must be not only a perfect adaptation of parts, a due relation between the body displaced and the structures which it traverses, but also corresponding power in the agent by which it is accomplished. There are few muscles in the human body whose development in different individuals varies in a greater degree than that of the cremaster. And if such be the case after birth, it is not unreasonable to presume that similar differences exist in the fœtus

before the gland changes its position, and that a failure in the process may be the result of deficient power in the *musculus testis* to accomplish the passage. It seems very probable that this muscle is sometimes paralyzed, and that the faulty transition is owing to a want of a due supply of the nervous energy, which, we know, is often denied to other muscles during fœtal existence. Such is the cause of deformities in the feet and other parts, with which infants are often ushered into the world. In the examination of a testicle detained in the inguinal canal removed from a man aged twenty-six, Godard found no trace of the middle band of the gubernaculum.[1] A defect in this part of the muscle was the probable cause of detention in this case.

2. Peritonitis occasionally attacks the fœtus in utero,[2] and produces adhesions between the various abdominal viscera. In congenital hernia the testicle is frequently united to a portion of intestine or omentum, and the formation of these adhesions previous to the transition of the testicle is sometimes the cause of the displacement, the viscera being drawn, together with the gland, into the scrotum. Many facts seem to show that similar adhesions are, on the other hand, an occasional cause of the temporary and permanent retention of the testicle, the cremaster being insufficient to overcome this obstacle to its passage. In the body of an old man, M. J. Cloquet found the left side of the scrotum empty, and the testicle situated at the distance of an inch from the superior opening of the inguinal canal: the head of the epididymis was connected to the sigmoid flexure of the colon by a strong white fibrous band.[3] Wrisberg, on

[1] Lib. cit. p. 62.

[2] Vide Contributions to Intra-uterine Pathology, by Sir James Simpson, Edinb. Med. and Surg. Journal, Nos. cxxxvii. and cxl.

[3] Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 24.

examining an infant which had only the right testicle in the scrotum, and died a few days after birth, found the opposite gland close to the ring, and connected to the omentum by means of three slender filaments.[1] Dr. Simpson, in the dissection of an anencephalic fœtus, found marks of extensive peritonitis, and the right testicle imbedded in a quantity of coagulable lymph, which strongly attached it to the peritoneal surface of the iliac fossa.[2] Jobert once found, in the fœtus, the cœcum adherent to the testicle, which was on the point of passing the ring.[3] Mr. John Wood found a left testicle about one-third its proper size, but healthy in structure, lying in the iliac fossa in the body of a man between forty and fifty years of age. Passing from the globus major at its junction with the testis, to the mesenteric border of the sigmoid flexure of the colon above it, were three very distinct bands of adhesion. In many of the mesenteric glands were found chalky concretions like the *debris* of tubercle. Mr. Wood regards the history as "local inflammation from mesenteric disease in fœtal life, or early infancy—formation of adhesions, and arrest of the descent of the gland at the utmost stretch of the adhesion bands.[4] In the examination of a man, aged sixty, I found the right testicle just external to the abdominal ring; it was small in size, and closely adherent to a portion of omentum. A young man was under my care for many months, on account of an imperfect transition of the testicle on the left side. The gland moved backwards and forwards through the external abdominal ring. By pressure above, it could be forced down sufficiently to admit of being examined.

[1] Lib. cit. p. 229. [2] Edinb. Med. and Surg. Journal, No. cxc. p. 27.
[3] Traité des Maladies Chirurgicales du Canal Intestinal, t. ii. p. 332.
[4] Trans. of Path. Society, vol. viii. p. 265.

This testicle was much smaller than the right, which was in the scrotum, and I could distinctly make out a portion of intestine closely adherent, which accompanied the organ in all its movements.

3. The smallness of the opening in the external abdominal ring is sometimes a cause of the detention of the testicle, especially in those cases in which the organ is retained within the inguinal canal. That such may be the cause of the arrest is supported by the fact, that the testicle is oftener found in this situation than in the cavity of the abdomen. M. Delasiauve mentions a case, in which he states the organ was retained by the border of the outer column of the ring.[1]

In cases of retained testicle, the epididymis and commencing part of the vas deferens are sometimes found partially disengaged from the gland, elongated and extending through the ring into the upper part of the scrotum. I dissected the parts in a case of congenital inguinal hernia where this was the case. The lower part of the epididymis and convolutions of the vas deferens were so surrounded with fat and connective tissue as to form a rounded swelling covered with the tunica vaginalis, which closely resembled a testicle, for which, indeed, it was mistaken in the operation for hernia. The gland was situated just within the internal ring. Cloquet, Follin,[2] and Godard have recorded similar observations of displacement of the epididymis. The cremaster being attached to its tail, it is easy to understand how this part may be dragged away from the testicle, and, with the vas deferens, drawn into the scrotum, in cases where the proper transition of the body of the gland has been prevented by a narrow external ring, or by

[1] Revue Médicale, Mars, 1840, p. 363.

[2] Archives Générales de Médecine, t. xxvi. 4e série, p. 270.

adhesions. In examining the scrotum in these cases a sort of cord extending to the groin can be distinguished during life, and it is apt to puzzle the surgeon, who, finding no proper testicle in the scrotum, supposes that the substance which he feels is the remnant of an atrophied gland.

Hunter was inclined to suspect that the fault originates in the testicles themselves.[1] It is difficult to understand how this can be, for as the gland is passive in this process, it can offer no obstacle, except it be too large to pass the opening in the abdominal parietes; whereas it is admitted that the gland when retained is usually below the natural size. Nor does it appear that the interruption is owing to any want of proper length in the vas deferens, for in a case of imperfect transition in a boy, whose body I examined, I particularly noticed that this duct was so long as to be doubled on itself, and tortuous, a circumstance which has been remarked in other cases by Mr. Mayo, Rosenmerkel,[2] and others. It may be concluded, then, that the causes of a failure in the passage of the testicle are various; that this imperfection may result from want of power, or paralysis of the cremaster muscle; from adhesions retaining the gland within the abdomen; and from a contracted state of the opening of the external abdominal ring.

The disposition to an arrest of the testicle in its course to the site intended for it may be hereditary. Godard gives instances of a father and son who were the subjects of this anomaly. He also cites an interesting example noted by Gosselin—the case of a man with one testicle detained in the inguinal ring, whose father and son had the same infirmity.[3]

[1] Human Physiology, 3rd edit. p. 411.

[2] Ueber die Radicalcur des in der Weiche liegenden Testikels.

[3] Etudes sur les Monorchides et les Cryptorchides chez l'Homme, p. 16.

On the Condition of the retained Testicle.—Hunter states, that when one or both testicles remain through life in the belly, he believes that they are exceedingly imperfect, and probably incapable of performing their natural functions; and that this imperfection prevents the disposition for descent taking place. That they are more defective even than those which are late in passing to the scrotum, he infers from the circumstance, that in quadrupeds the testicle that has reached the scrotum is considerably larger than the one which remains in the abdomen. Hunter had seen only one case in the human subject where both testicles continued in the abdomen, but this he supposed proved an exception to the above observation, since he was led to conclude that they were perfectly formed, as the person had all the powers and passions of a man.[1] Professor Owen, in commenting upon these observations, states, "It seems remarkable that with this experience Mr. Hunter should have formed from inconclusive analogy, and promulgated, an opinion tending to occasion so much unhappiness as that which attributes exceeding imperfection and probable incapacity of performing their natural functions to testes which in the human subject are retained within the abdomen. That there is nothing in such a situation which necessarily tends to impair their efficiency is evident, from the number of animals in which they constantly form part of the abdominal viscera; and in those in which the testes naturally pass into the scrotum, their continuance in the abdomen, according to our author's own observation, is accompanied only with a difference of size or shape; now we may readily suppose that this may influence the quantity, but not necessarily the quality, of the secretion." In the two first editions of this work I ex-

[1] Works by Palmer, vol. iv. p. 18.

pressed my adhesion to these views of Professor Owen, but more recent investigations have led me entirely to change my opinion on this important point, and the facts which I shall adduce will be found to corroborate Hunter's opinion in a remarkable manner. When the testicle has not passed into the scrotum, the gland is nearly always small in size; generally it is healthy, but undeveloped; that is to say, it has not undergone the enlargement and change in structure which take place at puberty. In some instances, especially when seated in the inguinal canal, it is withered and atrophied, having suffered fibrous, and more rarely fatty degeneration, and exhibiting no trace of glandular structure. In the second edition of this book I have detailed observations made by myself, Cloquet, Broca, Follin, and Paletta, corresponding with this description, and I have since recorded several examinations which fully confirm its accuracy.[1]

Mr. Wilson mentions the case of a young man, twenty-five years of age, whose testicles never descended. He had some beard, and not an unmanly appearance; but although an imprudent, and in some things a dissipated person, he had never shown the least desire for women, or disposition for sexual intercourse.[2] Similar cases have occurred in the practice of other surgeons. On the other hand, there are many well authenticated instances of cryptorchics who, like Hunter's case, had a masculine development, sexual desires, and powers of copulation. Nevertheless, recent investigations show almost conclusively that a retained testicle only imperfectly executes its functions, and is incapable of forming healthy fertile semen.

Professor Goubaux, a distinguished French veterinary

[1] Vide Patholog. Trans. vols. ix. and xii.
[2] Lectures on the Urinary and Genital Organs, p. 408.

surgeon, was the first who noticed in horses, not only that the testicles detained in the abdomen were soft and small in size, but that the fluid in the corresponding vesiculæ seminales was destitute of spermatozoa. In 1851, M. Follin briefly alluded to three instances of detained testicle on one side in the human subject, in which he found the fluid in the vesicula seminalis of the same side destitute of spermatozoa, though they were present on the other side. In 1855 I described the examination of a man aged thirty-six, whose right testicle was in the abdomen, small and undeveloped. There were no spermatozoa in the efferent ducts, nor in the right vesicula seminalis, but the left contained them in abundance. In 1856 Messrs. Goubaux and Follin, in a joint memoir, "Sur la Cryptorchidie chez l'Homme et les Principaux Animaux Domestiques," read at the Société de Biologie, adduced several instances in man and animals in which testicles remaining in the abdomen were small, and did not secrete sperm. They furnished also a few examples of animals which, though possessing the desire and power to copulate, were quite sterile. Godard, in a memoir read at the Société de Biologie on the same evening as the above, mentioned the cases of three cryptorchic married men who had no children, and affirmed that such persons were always sterile. This earnest and indefatigable pathologist, in a more recent work, supported this opinion by additional facts. As considerable doubt existed of the soundness of this view, I took some pains in examining the question, and made known the results in a memoir published in April, 1864.[1] In this paper I collected nine cases in which the ejaculated semen of men with

[1] Observations on Sterility in Man, with Cases. Br. and For. Med.-Chir. Review.

retained testicles, or with a single detained testicle, (the other having been removed, or its excretory duct obstructed) was destitute of spermatozoa. Four of these cases occurred in my own practice, and as the subject is one of importance as respects the results and happiness of married life, the cases will be given in detail in a later chapter of this work (chap. xviii., sec. 11).

In confirmation of the results obtained in these cases, I may adduce some interesting observations made upon the lower animals. The following are related in Goubaux and Follin's "Memoir:"—A horse, twelve years of age, though presenting all the characters of an entire horse, bore the well-known marks of castration on the right side, but on the left side there was no trace of cicatrix, and no scrotal sac or testicle. Erections were manifested in the vicinity of mares. After covering one, the fluid emitted from the urethra was examined and found to be destitute of spermatozoa.—After the purchase of a horse six years old, a question arose between the buyer and vendor whether the animal could be used as a stallion. The veterinary surgeon could discover no testicles, although the skin of the region presented no marks of the animal having been castrated. In presence of a mare the horse manifested undoubted signs of the influence of the approach. He was allowed to cover her, but accomplished the act with more difficulty, and especially slowness, than usual with a vigorous stallion of the age. The examination of the fluid emitted on three occasions, at intervals of several days, afforded no trace of spermatozoa.[1] Godard relates[2] that a cryptorchic dog covered a bitch in heat four different times, in

[1] Professor Spooner, of the Veterinary College, informs me that he has examined several testes taken from the abdomen of horses after death, and in all of them the gland was small in size, and without spermatozoa.

[2] Etudes sur la Monorchidie et la Cryptorchidie, p. 147.

March, 1856. The fluid ejaculated on each occasion was found destitute of spermatozoa. In February, 1857, the same dog, who was addicted to coition, again covered the bitch, and the sperm emitted was also found to contain no zoosperms.

I have already alluded to a few instances in which the fluid found after death in the substance of a retained testicle, in the epididymis or vas deferens, or in the vesicula seminalis on the side corresponding to the malplaced gland, has been examined and found destitute of spermatozoa. Other examinations have been made with a similar result, and in the paper on "Sterility in Man," previously alluded to, I collected eight observations of the kind, three having been made by myself and four by Godard. Spermatozoa have not been discovered after death in the spermatic ways of a detained testicle in any one instance that I know of.

It has not been ascertained satisfactorily why a retained testicle does not perform its secreting function. One cause, no doubt, is imperfect development; for, as I have already remarked, the malplaced glands are small in size, and frequently have not undergone the change which takes place at the approach of puberty. But in several instances, mentioned by Godard, this must have occurred, for he states that the tubuli could be completely unravelled, which is not the case in an undeveloped gland.[1]

[1] With the view of ascertaining what influence simple position might have on the functions of the testicle, I commenced some experiments on animals. It is well known that in certain rodents the testicles remain in the abdomen until the season of heat, when they descend into the scrotum and secrete semen. My experiments on the adult guinea-pig did not answer, for the domestic animal was always in heat. I attempted to close the abdominal ring of the young animal with sutures, in order to prevent the testicle escaping at all from the abdomen, but the parts were so fragile and delicate that the sutures soon came out, and the object was not attained.

It appears that the testicle, when arrested in the inguinal canal, is more frequently found imperfect, withered, and atrophied than when confined within the abdomen. In the latter situation the organ is in a great degree protected from injury, and seldom gives rise to uneasiness or inconvenience. When, however, the passage of the testicle is interrupted in the inguinal canal, the case is very different. The organ is then liable to be compressed during any violent action of the abdominal muscles, and even in acute flexion of the thigh, as in walking up stairs, and on bending the body forwards whilst in the sitting posture. It is exposed to injury from blows which, being fixed, it is unable to elude, and to pressure from the frequent manipulation of the surgeon, and the ruder handling of bandage-makers, and often, through ignorance, from the application of a truss. It occasionally happens that a testicle, after retention in the abdomen, without any uneasiness having been experienced, passes into the inguinal canal, and sometimes appears at the external ring, playing backwards and forwards from one situation to another through the dilated opening. When this is the case, the gland is liable to compression from a sudden contraction or spasm of the abdominal muscles, which gives rise to violent pain and suffering, and a sickening sensation which lasts for some hours unless relieved by the hot bath, fomentations, and opiates.

In August, 1861, I saw, with Mr. Davies, of Gower-street, a healthy lad, eight years of age, strongly built, but looking anxious and out of spirits, who had suffered from several severe spasmodic attacks of pain in the lower part of the abdomen and groin on the left side. The left

I refer to these experiments, because they indicate a course of inquiry which might still be followed out with advantage.

testicle was lodged in the inguinal canal, but could be easily passed out through a dilated ring. The scrotum on that side was small, and contained only a membranous-like substance—an extension, probably, of the epididymis or vas deferens. There was no rupture. The attacks of pain were readily brought on by exertion, and they quite prevented his running and playing about like other boys. He was confined to the couch after the attacks. I attributed them to compression of the testicle at the outer ring. Mr. Bigg, by my direction, contrived a truss, with a plug attached to the lower extremity of the pad, to enter the ring and prevent the descent of the testicle. The pad was hollowed above to avoid pressure on the gland. After a few days the boy was brought to me again, quite relieved, and happy at being able to run about. In October following I saw him in consequence of an attack of pain after acute flexion of the thigh in trying on a boot. I recommended his avoiding all violent exertion, and to continue wearing the truss.—In 1863 I saw a robust lad, aged twelve, sent to me by Dr. Turnour, of Denbigh. The lad's right testicle was just outside the abdominal ring. The left had not emerged from the abdomen. Some weeks previously he had suffered from a sharp attack of inflammation in the right testicle, owing, I believe, to its having been compressed in the inguinal canal. I saw the patient, with Dr. Turnour, about three weeks afterwards, and found the right testicle much reduced in size, atrophy having followed the inflammatory attack.

Richter relates the following case :—"I remember a young man, twenty years of age, who had a small hernia, and no testicle on the left side of the scrotum. The testicle was contained in the abdomen, and sometimes presented at the ring, causing violent pain and

symptoms of strangulation, which rendered it necessary to push the gland back again. This object, however, could seldom be accomplished until more than twenty-four hours had elapsed, and emollient cataplasms had been employed. The symptoms immediately ceased when the return of the testicle was effected."[1] I shall presently mention cases in which occasional compression of a testicle in the groin produced so much suffering as to lead the surgeon to excise the gland in order to afford the patient relief.

We perceive, then, that when a testicle is retained in the groin, there are various circumstances which tend to interfere with its evolution at puberty, to impede its nutrition and to excite inflammation and disease in it, and dissections show that such results are not unfrequent. A testicle, therefore, situated in the abdomen is in a more satisfactory position, and is much less exposed to injury and disease than one which has been arrested in the groin. On this account, and as the passage is seldom perfectly accomplished when delayed beyond the age of one year, if the gland has not made its appearance at this period, the well-being of the patient will be best consulted by the employment of some mechanical means to prevent the escape of the organ from the abdomen. A strong reason for adopting this practice is afforded by the great liability to rupture which exists in all cases of the tardy transition of the organ, owing to the persistence of a sac ready prepared for the reception of a protrusion, and in many instances to adhesions between the testicle and intestine or omentum. A hernia may occur whilst the testicle is still in the abdomen, or after it has passed the ring, and the viscera may descend into the scrotum, the gland

[1] Quoted in Lawrence on Hernia, 5th edit. p. 571.

being detained in the groin. Cases of this kind are embarrassing, as it is impossible to fulfil the two opposite indications of preventing the protrusion of the viscera, and encouraging the descent of the testicle. Many years ago I had under my care a fine child, neither of whose testicles had made their appearance out of the abdomen. When I first saw him, he was about a year old, and had an inguinal rupture on both sides, which descended whenever he cried or struggled. In accordance with the usual practice, I objected to the application of any truss. The parents became anxious and impatient at the annoyance arising from the hernia, and consulted a high authority, who gave similar advice to that received from me. The rupture was consequently left to itself, and the boy restrained from exercise. He was petted, became fretful, and proved a constant cause of uneasiness to the parents. When I last examined him he was eight years of age, and fortunately the rupture on the right side had disappeared spontaneously, and the one on the left protruded very slightly, but there was no appearance of the testicles. Now, if it be granted that a testicle situated in the abdomen is in a better position than one placed in the groin; that it is productive of less inconvenience, and exposed to fewer causes tending to impair its structure; that its subsequent passage, if it ever takes place, is frequently, if not commonly, attended with rupture, it must, I imagine, likewise be admitted that the advice often given in these cases is unsound and injudicious. In patients beyond the age of two years, if the testicle has not emerged from the canal, and can be pressed back into the abdomen, I usually advise the application of a truss so as to prevent the descent of the testicle as well as the escape of intestine, which I am sure has

contributed much more to the health and comfort of the patient, than leaving him exposed to the inconveniences and dangers of an unrestrained rupture.

In certain cases where the testicle has passed out of the external ring, but without descending fully into the scrotum, complicated with hernia, a truss with a small pad carefully applied may serve to keep up the rupture, and at the same time prevent the testicle from slipping back into the inguinal canal. When this can be done effectually without risk of the pad pressing on the testicle, it is the practice which should be adopted. But if the testicle is constantly gliding in the way of the pad so as to be exposed to pressure, or if adhesion exists between a portion of intestine and the gland, this treatment is inapplicable, and a truss should be applied to keep the parts if possible within the abdominal cavity. —A middle-aged gentleman consulted me on account of a large scrotal rupture on the right side. A great part which consisted of bowel could be returned without difficulty, but a mass remained irreducible unless in company with the testicle, and this was clearly made out to be a large portion of omentum adherent to the gland. On forcing up all the parts, I found it impossible to apply a truss without making pressure on the testicle, and more than ordinary pressure was needed to prevent the protrusion of so great a mass. So much inconvenience and risk attended leaving the rupture unrestrained, that I was compelled to apply a truss without returning the omentum, which was necessarily exposed to pretty strong compression from the truss-pad. The pressure led to his suffering occasionally from a dragging pain referred chiefly to the left side, particularly when he was affected with flatulency or distended bowels. The pain was relieved by easing the truss and rest in

the recumbent posture. This gentleman had a varicocele on the left side, and wore a double moc-main lever truss, by which he was enabled readily to moderate the pressure.

It must not be inferred from the preceding observation that the arrival of the testicle in the scrotum is a matter of slight moment; for I have already shown that in cases of imperfect transition, the gland, whether arrested in the abdomen or groin, is defective in size and development, and is incapable of performing its proper functions. The mind too is very readily disturbed by any imperfection in the organs of generation, and the circumstance of the testicles not having passed into the scrotum is very liable to excite suspicion of impotency. A pupil of Sir Astley Cooper, who was the unfortunate subject of the infirmity, committed suicide under this painful impression. In early life, when the testicle has emerged from the abdomen, much may be done by gentle manipulation to promote its passage into the scrotum, and I have recommended traction with this view in favourable cases. But when there is no hope of this transition taking place, and when the patient is exposed to the inconveniences of compression or of rupture, it is best to take measures to prevent or remedy these serious and certain evils, and to recommend the application of a well-adjusted truss. In cases of unilateral detention the surgeon may confidently assure his patient that the imperfection offers no bar to marriage. In some instances the atrophy of a detained testicle is compensated for by hypertrophy of the organ which has passed into the scrotum.[1]

The detention of the testicle in the groin or abdomen must, then, be regarded under any circumstances as an

[1] See chapter xi. sec. 1.

unfortunate infirmity. One great disadvantage of this imperfection, which especially attaches to an arrest of the organ in the abdomen, arises from the relation preserved with the peritoneal cavity by which morbid actions originating in the testicle are liable to extend to the parts in the abdomen; and we cannot but view the passage of this gland into the scrotum, and the isolation of its serous investment, as a wise provision, obviating the serious risks to which man would otherwise be liable, owing to the frequency of the diseases of this organ. It will be shown in subsequent chapters that secondary orchitis, or inflammation, commencing in the epididymis, is peculiarly liable to extend to the tunica vaginalis, and that in all diseases of the organ this membrane is very commonly implicated. Now when the testicle is situated in the abdomen, or in the groin, and surrounded by a prolongation of peritoneum, there is no shut sac, no distinct tunica vaginalis, restricting the limits of inflammation when set up, but the disease is liable to affect the contiguous viscera and to extend throughout the abdominal cavity. Such appears to have happened in the following cases:—A lad, ten years of age, was brought to the London Hospital from a distance in the country, dangerously ill. His mother stated that on returning from school, four days before, he was kicked in the right groin by one of his schoolfellows. He suffered great pain at the time, and on the following day became very ill. Having continued to get worse, he was brought to the hospital. The boy was evidently dangerously ill from acute peritonitis. He was almost in a state of collapse; his countenance was anxious; his pulse quick, small, and feeble; his abdomen hot, tumid, and extremely tender; his bowels constipated, but they had been opened since the accident. There was a considerable

diffused swelling in the right groin, and the right side of the scrotum was empty. He died in twelve hours after his admission. On examination of the body, marks of extensive peritonitis were found throughout the whole of the abdominal cavity, the viscera being coated with lymph, and a turbid serum abundantly effused. In the right iliac fossa, just beneath the peritoneum, were seen two small abscesses of recent formation. An atrophied testicle was discovered close to the external ring, amongst a mass of connective tissue, infiltrated with pus and lymph. There were indistinct traces of a tunica vaginalis continuous with the peritoneum. I apprehend that, in this case, the blow occasioned inflammation in the testicle, and surrounding parts, which, extending to the peritoneum, caused the lad's death.—I was summoned one evening to the hospital to see a supposed case of strangulated hernia. On my arrival I found the patient, a stout labourer, aged thirty-three, and a married man, with a considerable swelling in the right groin, which was of an oval form, received a slight impulse on coughing, and was more solid and tender than is usually the case with a rupture. The house pupils had made unsuccessful attempts to reduce the swelling, which gave the man much pain. He stated that he was subject to a swelling in the groin, which occasionally came down in the daytime, and disappeared at night, but he had never worn a truss. It descended the evening before, and caused considerable pain; and although it went away during the night, the abdomen had continued painful during the day. Whilst straining himself at work in the evening, it again made its appearance; and as it occasioned considerable pain, he came to the hospital for relief. The abdomen was tender on pressure, and he complained of pain in it chiefly in the vicinity of the

umbilicus. He did not feel sick, and his bowels had been open twice during the day. The pulse was full and hard. There was no testicle on the right side of the scrotum, but the left was in its natural situation, and of proper size. I concluded, that the tumour consisted of a retained testicle which had been accidentally protruded at the external abdominal ring, and became inflamed from pressure, and that the inflammation had extended to the peritoneum, the latter membrane being, however, only slightly affected. I could not quite satisfy myself whether a portion of intestine had accompanied the testicle, though this appeared very probable. I ordered the man to be bled, fourteen leeches to be applied over the swelling, and a brisk cathartic to be given him. He continued in suffering during the early part of the night, but having dropped asleep, he found on awaking that the swelling had disappeared. The bowels were relieved in the course of the morning, but the groin and abdomen continued tender for two or three days. There was still a tendency to reprotrusion of the testicle and intestine when the man coughed. A truss, therefore, was applied as soon as the pressure of it could be borne, which was six days after his admission, when he was discharged.

I have noticed the pain and inflammation liable to arise from the compression to which a testicle is subject when seated in the groin, especially after the development of puberty. The suffering has proved so great in some instances that the patient has been glad to seek relief from an operation. Rosenmerkel relates the case of a man, aged twenty-six, one of whose testicles first made its appearance in the groin at the age of sixteen; it disappeared, and did not trouble him when at rest, but he suffered so much pain from it on taking exercise, that he was obliged to forego all active exertion. He was

admitted into the hospital at Munich on account of a chronic affection of the throat, and on his recovery Professor Koch proposed to him to undergo an operation for the relief of the testicle, to which he readily assented. The skin over the testicle having been pinched up into a transverse fold, an incision was made from the gland in the groin to the bottom of the scrotum. The parts beneath were next carefully divided upon a director, until a slight fluctuation was detected; a small opening was made in the tunica vaginalis, and about an ounce of serum discharged. The testicle was found of considerable size, but soft. On drawing the gland from its position in the inguinal canal, the cord was found convoluted and varicose. The testicle was then placed in a cavity in the scrotum prepared to receive it, and secured there by a suture attached to the septum, to prevent the gland being drawn up by the action of the cremaster muscle. The wound was afterwards closed with sutures. The testicle showed a disposition to return to its former position, and the cure proved tedious.[1]

Mr. Crompton, of Birmingham, has communicated to me the particulars of a case in which he was led, whilst assisting a friend in an operation for strangulated hernia, to attempt a similar removal of a detained testicle into the scrotum. It appears, that the hernial swelling descended only a short way into the scrotum, so that the incision was made high towards the inguinal canal. After having exposed the bowel, and returned it, he saw lying behind, the undescended testicle, about the size of a broad bean peeled, white, flattened, and surrounded by a white cord. Thinking that the testicle in this situation would be pressed on by a truss, he unwound the cord, and pushed the gland into the scrotum. On examination

[1] Lib. cit.

five years afterwards, Mr. Crompton found the testicle as low as the centre of the scrotum, and in size and feeling similar to the organ of a boy of perhaps eleven years of age. The patient said that occasionally the testicle got up to the edge of his truss, and then it caused him sufficient uneasiness to induce him to retire and raise the pad, and push the testicles down again.

It does not appear that in either of the above cases the operation quite succeeded. The obstacles, indeed, are great. In retention of the testicle, though the vas deferens is usually tortuous and capable of being unravelled and elongated, the vessels and nerves of the spermatic cord scarcely admit of a like sudden extension. The scrotum, too, is but imperfectly developed, so that there is really no tegumental pouch sufficient to receive the gland. In Mr. Crompton's case the patient, who had been married only a few months, imagined that the testicle had grown since its removal, but it was quite small five years afterwards, and I cannot but think that its excision at so opportune a moment as in the operation for hernia would have saved the patient some inconvenience and caused no real loss.

When a testicle retained in the inguinal canal or close to the abdominal ring is subject to attacks of pain and inflammation, which cannot be remedied by mechanical treatment, the best plan is to remove it. The operation has been performed in several instances. Mr. Hamilton, of Dublin, has related an interesting case, in which the distressing symptoms led him to excise the gland.[1]—Mr. W., aged forty-five, had a retained testicle in the right groin. About seven weeks since, whilst lifting a heavy weight, he felt something in the swelling crack, attended with acute pain. This was followed by active inflam-

[1] Dublin Quarterly Journal of Medical Science, May, 1852.

mation of the gland, which appeared to arise from the testicle having been subjected to severe compression under the tendon of the external oblique muscle. The inflammation subsided under antiphlogistic treatment, but a fortnight had scarcely elapsed when the testicle became again inflamed, and in the short interval of seven weeks he had altogether four attacks of orchitis from the organ being suddenly gripped. Under these distressing circumstances the removal of the testicle was proposed, and readily consented to by the patient. The gland was lodged in a sac which did not communicate with the peritoneum. Recovery took place in three weeks. The testicle was small in size, and its body was healthy in structure. The commencement of the vas deferens and vasa efferentia were blocked up with yellow deposit. It appears that Sir Philip Crampton, who was consulted in this case, suggested the operation of cutting down to the external abdominal ring, slitting it up, and that portion of the tendinous expansion of the external oblique muscle which forms the anterior wall of the inguinal canal, and which covered the testicle. This proceeding was objected to by Mr. Hamilton, on the ground that it might only prove palliative, for when the wound had healed and cicatrization taken place the hard cicatrix might be as bad as before. To this I may add the further objection, that weakening the walls of the abdomen in the groin would predispose to rupture.—In January, 1853, Mr. Solly afforded me the opportunity of seeing at St. Thomas's Hospital a case of detained testicle, for which he considered an operation necessary. The patient was a lad, aged nineteen, and looked pale and anxious. His left testicle was situated just outside the outer ring, and there was a rupture in the inguinal canal, but whether in a sac distinct from the testicle or

not, could not be clearly made out. He could not bear any kind of truss, either to retain the testicle outside the ring or within the abdomen, or to restrain the rupture; and he suffered so severely at times from compression of the gland in the inguinal canal that he was unable to earn a livelihood. The removal of the testicle was consequently proposed, and though the patient was informed that the operation could not be done without a certain amount of risk, he readily assented to its performance. The testicle was rather small, but quite healthy in structure: its sac communicated with the abdomen. Peritonitis ensued. This yielded to treatment, but the patient's recovery proved tedious.

In the spring of 1858, W. M., aged 31, came under my care at the London Hospital, in consequence of suffering pain in the right groin when lifting heavy weights. I found the seat of pain to be a small testicle in a closed sac, containing two or three drachms of fluid, situated just outside the abdominal ring. I advised the removal of the organ, but the patient having lost all pain during rest in bed for a few days, and the swelling having diminished, he declined the operation, which I did not press upon him. He again applied to me some months afterwards, on account of pain and increase of the hydrocele in the groin, but as it subsided under rest he still refused to submit to an operation. The frequent recurrence of pain after active exertion at length became so annoying that in October, 1859, he requested me to excise the testicle, which I did. The organ was small, and enclosed in a sac which extended up to the inner ring, but did not communicate with the peritoneum. He recovered quickly, and was completely relieved. The left testicle was in its proper position in the scrotum.

Stronmeyer, the distinguished surgeon in Germany,

sent me the particulars of a case of inguinal hernia, complicated with detained testicle, in a nobleman, aged 23. A truss could not be borne, and the patient could neither dance nor ride on horseback, a state which formed a great obstacle to his career. Stronmeyer, in 1841, proposed an operation, which was to consist either in the separation of the bands which kept the spermatic cord in its shortened state, or eventually in the removal of the testicle. The operation was objected to. Twenty years later he was called to this nobleman, in consequence of his being in great danger from an incarcerated hernia, which was relieved without operation. It appeared that he had been treated by Larrey and Cloquet for similar attacks, and, as Stronmeyer remarked, the patient would have been saved twenty years' pain and misery if the testicle had been removed in his youth.

The excision of the testicle was performed, in 1845, in a case of retained testicle with hernia, related by Gosselin.[1] It occurred at the Hôtel Dieu, in the practice of Blandin. The patient had suffered severely since the age of fourteen, and became so much discouraged by the repeated attacks that at twenty-eight he desired to have the testicle removed. Blandin would not consent to the operation, and tried a truss applied above the testicle, with the view of fixing it. During the following eighteen months the patient was frequently troubled and had an attack of strangulation, which was relieved by the taxis, and also of orchitis with acute inguinal hydrocele. Seeing no end to his sufferings, he insisted on the removal of the testicle, which was done, with complete relief. The vaginal sac was found distinct from the hernial sac.

These cases are related that, under similar circum-

[1] Fr. Tr. of my work on the Testis, p. 95.

stances, the surgeon should not hesitate to advise the removal of a retained gland which is incapable of performing its proper functions.

Diagnosis in Cases of imperfect Transition of the Testicle.—A testicle retained in the groin at the external abdominal ring, or immediately below it, is liable to be mistaken for a bubonocele. It often occurs that it can be pushed back, partially or completely, into the inguinal canal, but that it soon reappears when the pressure is removed. There is then a swelling in the groin, admitting, like a hernia, of replacement, which might at first lead to the suspicion of rupture. The size, form, and solidity of the tumour, however, which receives no impulse on coughing, the peculiar sensation produced by pressure, and the absence of the testicle from the scrotum, are sufficient to establish the true nature of the case, and to prevent it from being mistaken for either an intestinal or omental rupture. More difficulty is experienced in making the diagnosis, when an imperfect descent of the testicle is combined, as it often is, with a congenital rupture; and the case may be further complicated by the tunica vaginalis containing fluid, which can be pressed up into the abdomen, but which returns when the pressure is removed. But, even in these cases, the empty state of the scrotum, and the peculiar pain excited by pressure on the gland, are usually sufficient to prevent the surgeon from committing any serious error. When a testicle detained in the groin becomes inflamed, the sickness and pain in the abdomen consequent upon the orchitis tend very much to complicate the diagnosis, which is liable to be rendered still more perplexing by the effusion of blood or serum into the scrotum, concealing the absence of the testicle, so that no slight skill and judgment are required

to solve the difficulties of the case, as will appear from the following example:—Mr. Pott was sent for in a great hurry to perform the operation of bubonocele on a young man, who was suffering most acute pain in the groin and back. It appeared that, the day before, he struck his groin against a piece of timber, which gave him such exquisite pain that he fainted away, and his groin became immediately swollen to a very considerable degree. An apothecary bled him and poulticed the tumour, but he passed the night without sleep and in great agony. The next morning he stated that he had long had a rupture on that side, which had never perfectly returned. He was again bled, and some pains were taken to return the rupture. As the attempts produced great increase of pain, they were desisted from, and two glysters and a purge were given, but without effect. The pain was exquisite, the patient very sick, and the groin and scrotum were much swollen and very hard. The general appearance and figure of the tumour did not appear like that of a bubonocele. Instead of pointing obliquely from the ilium towards the pubes, it lay as it were across the groin; the scrotum was full and large, but much harder than Mr. Pott had ever found a piece of intestine. The discoloration was not at all like the effect of mortification, but had all the appearance of ecchymosis. The man had not had a fair stool for three days; he had been very sick, and had vomited; his belly was tight, hard, and painful, and his pulse much too quick; very little information was to be gained from examination of the tumour, for the pain was so exquisite that he could not bear the slightest touch. On inquiring further concerning the rupture, it was ascertained that he had worn a truss the first four years of his infancy, but that

it never kept the gut totally or perfectly up; and that, as he grew bigger and ran about, he was obliged to leave it off on account of the pain it gave him; that since, little or no alteration in the tumour had been observed, and that it had never given him any trouble or uneasiness, if he did not handle it, or kept the waistband of his breeches and his watch from pressing it. All this being far from satisfactory, Mr. Pott determined, before attempting any operation, to try the effects of a brisk cathartic, which produced a plentiful discharge, and relieved all apprehensions of stricture. Under fomentations and poultices, &c., the tumour subsided, and in about seven or eight days the scrotum was so unloaded as to permit an accurate examination, by which it was ascertained that it contained no testicle. Upon mentioning this circumstance to the patient, he said that he never had one on that side. This declaration was a solution of all difficulties, and of all the appearances. When all the effects of the blow were removed, there appeared in the groin a testicle of natural size and figure, which, by being much bruised, had caused all the mischief.[1] Delasiauve relates a case in which a testicle retained at the groin, and inflamed, was mistaken for a strangulated hernia, and actually operated on. When the nature of the case was ascertained, the gland was extirpated.[2] Dupuytren has also recorded an interesting case of hydro-sarcocele of the left testicle coupled with hernia, consequent upon a late descent of the gland. The case was mistaken for simple hernia, and the patient had worn a truss. The diagnosis was extremely difficult. The case was operated on; and after opening the tunica vaginalis, and letting out eight or ten ounces of fluid, he extirpated the enlarged and indurated testicle. The

[1] Lib. cit. p. 352, case 1.

[2] Revue Médicale, Mars, 1840.

patient did well.[1] It may seem unnecessary to direct the practitioner in all doubtful cases to make a careful examination of the scrotum. Yet it is surprising how apt the absence of the testicle is to be overlooked, the deficiency not being ascertained until all attempts to reduce the supposed bubonocele have failed, and the patient himself being often unaware of anything unusual in the state of the parts. Several cases in which this important point was overlooked have come to my knowledge.

A testicle retained in the groin, when inflamed, is liable to be mistaken for a bubo, the prominent oval swelling communicating a deceptive feeling of fluctuation and being attended with pain; the skin over it occasionally exhibiting even a slight red blush, and the tumour being seated in a region where bubo constantly occurs and suppurates. It is related that Ricord, of Paris, was once very nearly deceived by a case of the kind, and even called for a knife to open the supposed abscess, but a re-examination of the tumour having led to the discovery of the absence of the testicle on that side of the scrotum, he made further investigation, and detected the true nature of the case.[2] M. Rollet, of Lyons, has recorded two cases of gonorrhœal epididymitis simulating bubo in patients with a testicle retained in the abdominal ring. The symptoms were mild and yielded readily to treatment.[3] In addition to the history of the case, the absence of the testicle from the scrotum and the situation of the tumour above Poupart's ligament, would generally enable the surgeon to make a correct diagnosis without difficulty. M. Rollet notices also as a diagnostic mark the want of uniformity

[1] Leçons Orales, t. i.; also Dupuytren's Surgical Works, Trans. Sydenham Society, 1853-4, p. 347.

[2] Provincial Medical Journal, July, 1843.

[3] Gazette des Hôpitaux, Dec. 3, 1861.

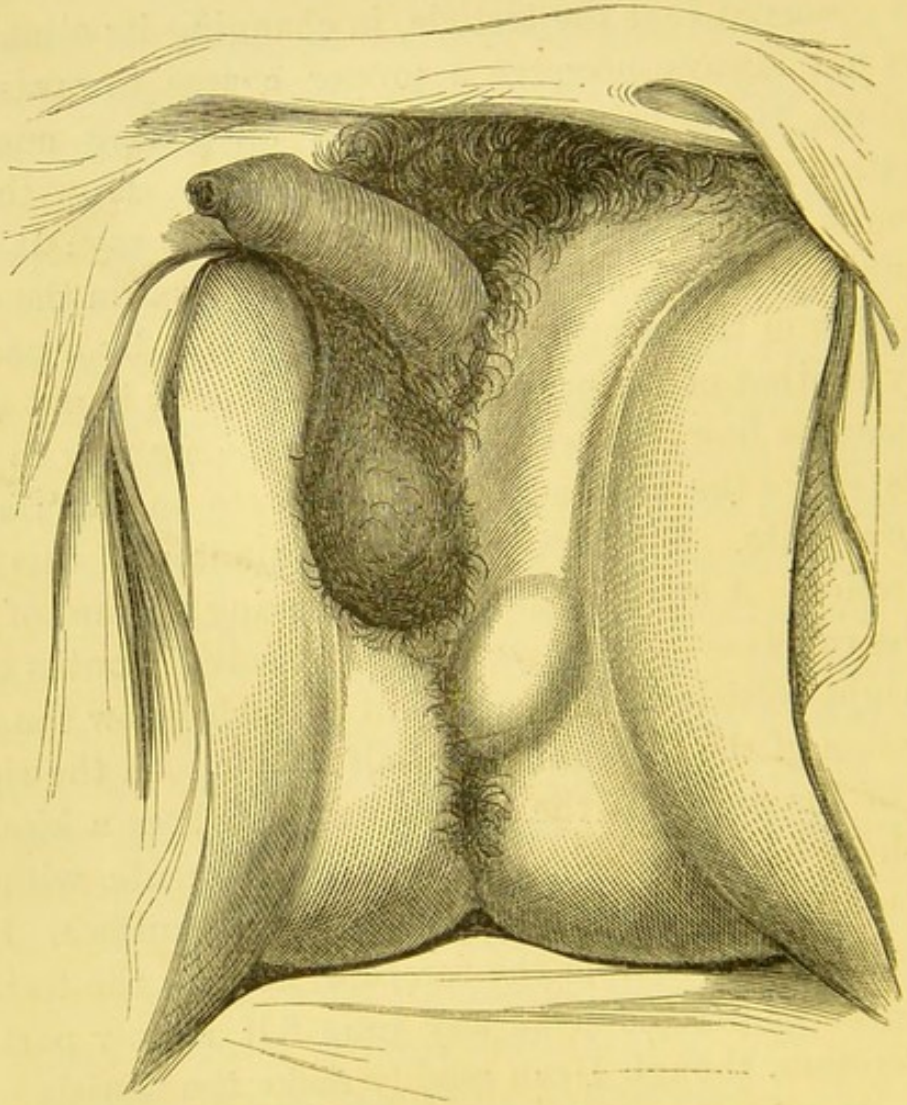
in the swelling, owing to the epididymis being the part affected. This irregularity in the tumour would be obscured, however, by effusion in a closed sac.

Passage of the Testicle into the Perineum.—Mr. Hunter first observed that the testicle, in changing its situation, does not always preserve a proper course towards the scrotum, there being instances of its taking another direction and passing into the perineum. How this is brought about, he remarks, it is difficult to say: it may possibly be occasioned by something unusual in the construction of the scrotum, or, more probably, by a peculiarity in that of the perineum itself. For it is not easy to imagine how the testicle could make its way to the parts above the perineum, if these were in a perfectly natural state. He met with two instances of this imperfection. A surgeon gave the following account of one of the cases:—"The boy is about twelve months old; his right testicle is situated about an inch below the termination of the scrotum, and half an inch on the right side of the centre of the rapha perinæi, where a kind of pouch is formed of the common integuments, without the least rugous or scrotal appearance on its surface. It is perfectly detached from the scrotum; nor can the testicle or spermatic process be at any time felt in any part of the scrotum, though I can readily make the testicle pass from its situation quite up into the groin; but immediately upon removing my hand, the testicle falls down into its pouch; and I can trace the spermatic cord from the body of the testicle up to the ring, running about a fourth of an inch on the right side of the scrotum. The scrotum on each side appears perfectly formed, and the left testicle is *in situ naturali!*"

Godard carefully described a case which came under his notice. In a man, aged fifty-six, the left testicle

remained in the groin until the age of twenty-five, when it gradually descended into the perineum, becoming situated in front and at the side of the anus. It was

FIG. 3.



(After Godard.)

moveable, and could be easily pressed up to the root of the penis, but it readily resumed its former position. Being thinly covered, the different parts, the body of the gland, the epididymis, and vas deferens could be easily distinguished beneath the skin. The spermatic cord could be traced along the cruro-scrotal fold into the inguinal canal, the vaginal sac being in front and admitting a hernial protrusion. The scrotum was wanting on

the left side. The appearance of the external parts is well seen in the woodcut, the swelling in the perineum indicating the testicle which had deviated from its proper course.

Three instances have occurred to me, all of them in children. One was a healthy Jew boy, four weeks old, who had a soft oval swelling on the left side of the perineum. The testicle was readily detected, and appeared to be surrounded with fluid. The spermatic cord could be traced into the groin, and the gland could be pushed up into this part. The scrotum on the left side was developed, but smaller than on the right. Mr. Hutchinson mentioned to me his having seen a boy, both of whose testicles had passed into the perineum. M. Vidal (de Cassis) observed it in two brothers: their father was exempt from it. The testicle abnormally placed was smaller than the other.[1] Mr. Ledwich met with this abnormity in dissecting a subject, aged thirty-five. The scrotum was deficient on the right side, and the right testicle was found lying in the perineum anterior and internal to the ascending ramus and fore-part of the right tuber ischii, an inch in front of the anus. The organ was extremely mobile, and could with facility be forced upwards and forwards into the scrotum, but readily relapsed into its former position. It was small and soft, but its ducts contained spermatozoa.[2] This dissection throws no light on the cause of the deviation of the gland from its usual course. It appears to be occasioned by an abnormal attachment of the middle portion of the gubernaculum. Dr. Humphry, of Cambridge, was consulted by a gentleman whose testicle was lodged in the cleft between the scrotum and the thigh, not having reached the perineum.[3]

[1] Traité de Pathologie externe, t. v. p. 432, 2ème edit.
[2] Dublin Quart. Journ. of Medical Science, Feb. 1855, p. 76.
[3] Holmes' System of Surgery, vol. iv. p. 545.

A testicle lodged in the perineum is very liable to be attended with inconvenience and risk of injury to the organ in the sitting posture, and riding on horseback. Fortunately the testicle is often very moveable, and readily slips out of the way into the groin. In Godard's case it easily passed up into the cruro-scrotal fold, so that the patient could walk and sit without trouble. In a case which occurred to Ricord, the patient was affected with gonorrhœa, and the gland becoming inflamed, produced a perineal tumour, which was exquisitely painful, fluctuating, and about the size of a pigeon's egg ; the skin adhered to it. It was at first taken for an abscess, and Ricord was about to open it, when examination of the scrotum led him to the discovery that one testicle was absent.[1] Zeis relates the case of a lad, aged fifteen, who came into hospital with stone in the bladder. He noticed that the scrotum contained only one testicle—the right. When the boy was placed in position for the lateral operation, he discovered on the left side of the perineum, near to the anus, a small prominence which was caused by a slightly-developed testicle lodged in this situation.[2] This led him to cut on the right side. These cases show the importance of a knowledge of the liability to this deviation.

Mr. Hunter advised that the organ should be supported in a situation near the groin, by the application of a bandage that might hinder its descent into the perineum, by which the parts might be in time so consolidated as to retain it by the side of the scrotum. This is the treatment which should be adopted in the adult whenever the deviation is attended with pain or inconvenience, and it can seldom be necessary to adopt more

[1] Provincial Medical Journal, 1843, p. 264.
[2] Langenbeck, Archiv für klinische Chirurgie, b. ii. p. 84.

active treatment. Mr. Partridge, in a case which came under his notice, attempted to transfer the testicle to its natural position by an operation, but it did not succeed, and he was obliged to excise the organ.[1] In cases of this malposition in the adult, the defective development of the scrotum, as seen in fig. 3, is an insuperable obstacle to the success of any operation for placing the testicle in its proper site. On this account I recommend the attempt to be made soon after birth, before the scrotal pouch has undergone the wasting which ensues from the absence of its proper contents. I performed the operation in the following case a month after birth:—A fine healthy child was brought to me at the London Hospital, in November, 1865, with the left testicle lodged in the front part of the perineum, near the scrotum, the right being in its usual place. The scrotum on the left side was developed, but contracted. The swelling in the perineum was oval, soft, and fluctuating, and the testicle could be distinctly felt. I made an incision at the upper part of the scrotum, on the left side, and introducing my little finger, opened up a sac in the scrotum. I then prolonged the incision in the direction of the perineum, and carefully dissected out the testicle without wounding the tunica vaginalis, which was large, and loosely distended with fluid. There was rather a firm adhesion at the back and lower part, formed, I conclude, by the gubernaculum, so that I could not detach the testicle by traction, but was obliged to cut the adhesion. I next transferred the testicle to the upper part of the scrotum, having found difficulty in carrying the organ down fully into the sac. The wound was then closed with wire sutures, and a

[1] Lancet, July 4, 1863.

pad was fixed over the perineal sac to promote adhesion and prevent the testicle slipping back into it. Inflammation ensued, and after two days the compress had to be removed. An abscess formed in the perineal sac, and burst. The parts had nearly healed, when the child was attacked with diarrhœa and bronchitis, and died a fortnight after the operation, owing very much to exposure in being brought to the hospital in the cold season.

The difficulty experienced in conveying the testicle fully into the scrotum, I suspect, arose from the cremaster retracting the organ after the separation of the adhesions which retained it, as the cord was quite long enough to admit of its removal to the intended site. In another operation I should endeavour to secure the testicle to the bottom of the scrotum with a suture.

Passage of the Testicle through the Crural Ring.—The following is an interesting case of this curious irregularity, related by a French surgeon, M. Guincourt:—A young man at the age of seven pressed his left testicle back into the scrotum. Ten years afterwards he was attacked with symptoms resembling and mistaken for strangulated hernia, a considerable tumour being discovered in the left groin. After unsuccessful attempts at reduction of the swelling by the taxis, an operation was performed, when the tumour was found to consist of the testicle only, which had escaped at the crural ring. The fallopian ligament was divided, after which the testicle returned gradually into the abdomen, and the patient recovered.[1] Vidal also relates the case of a man, one of whose testicles, instead of passing out of the abdomen at the inguinal canal, made its exit at the crural ring. The organ was mounted upon the abdomen

[1] Journal de Médecine, t. xvii., Janvier, 1809. This is the case mentioned by Scarpa.

like a crural hernia. A portion of intestine traversed the inguinal canal, forming a rupture on that side.[1] An instance of this anomaly was reported by Eckardt in 1798. Dr. Vetters, in dissecting the upper part of the thigh, found a healthy testicle protruding beneath the fallopian ligament.[2] This deviation was met with in the body of a healthy man in the dissecting-room of the London Hospital :—The right testicle was small, and not developed, and was lodged in the upper and inner part of the thigh, about three inches below Poupart's ligament. It was found behind the saphena vein, just in the opening of the fascia lata, the cord, which was long, encircling the vein. The right half of the scrotum was deficient.

The proper treatment in a deviation of this kind is, if possible, to press back the testicle into the abdomen, and to apply a truss to prevent it again escaping.

SECTION IV.

ALTERATIONS IN THE DISPOSITION OF THE TESTICLE IN THE SCROTUM.

1. *Inversion of the Testicle.*—It sometimes happens that the position of the testicle in the scrotum is so changed that the free surface presents posteriorly, and the epididymis is attached to the anterior part of the gland, instead of to the posterior. The first case that I met with was that of a man who had a swelling of the right testicle, which puzzled his medical attendant. On examination I found this to be the epididymis thickened from chronic inflammation. I was able clearly to trace the vas deferens proceeding to it along the front of the scrotum. The body of the testicle was unaffected, and its posterior edge was quite smooth and regular. The

[1] Pathol. ext. 2e edit. vol. v. p. 431.
[2] Loder's Journal für die Chirurg. ii. Bd. 1 Stff. s. 187.

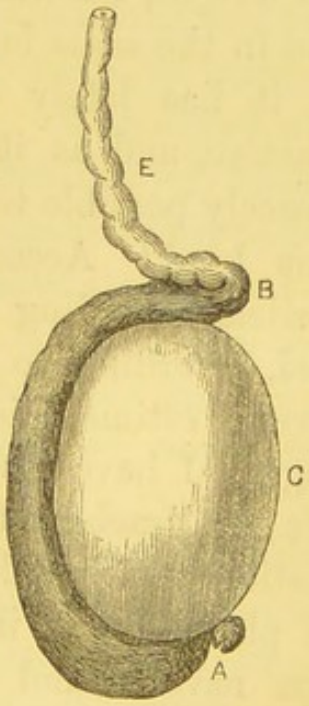
disposition of the left testicle was normal. On visiting Paris, in 1849, I was shown by M. Ricord a case of epididymitis on the left side, in which the gland was thus inverted. He informed me that he had often met with this arrangement. I have since had several patients under my care, one of whose testicles was thus inverted. Three were lads in the London Hospital affected with epididymitis. Another was a gentleman who consulted me for chronic orchitis confined to the body of the testicle. The epididymis being unaffected, the inversion was less perceptible than in the preceding cases. It was, however, very striking in a man under my care with large tubercular deposits limited to the epididymis of both testicles, the tumour on the left side being as usual behind the gland, but on the right, the side of the inversion, it projected in front of the organ. I have observed this malposition in a case of large varicocele, the enlarged veins forming a tumour in the fore-part of the scrotum instead of behind; and also in the dissection of a left congenital inguinal hernia which had been operated on with a fatal result. M. Maissonneuve, in a thesis published in Paris in 1835, first called attention to this irregularity, which he had met with many times upon the dead body and upon the living; and he mentions, what I have myself remarked in all the cases in which I have noticed the inversion, that it was confined to one side. In the dissection of the parts in two subjects with an inverted testicle, made by M. Royet, the attachments of the cremaster corresponded with the altered position of the gland.[1] No satisfactory explanation has yet been given of the cause of this anomaly, which is clearly congenital, and not the result of pathological changes after birth.

[1] Royat, De l'Inversion du Testicle, p. 46.

It is of considerable importance that surgeons should bear in mind the liability of the testicle to this irregular disposition, or they may make serious mistakes in their diagnosis and treatment of the diseases of the organ. In hydrocele occurring to a testicle so disposed, the testicle being seated in front of the sac would be particularly exposed to injury in tapping unless its position were previously detected; and in treating of hæmatocele I shall have occasion to notice instances in which the malposition has led to important consequences.

2. *Reversion of the Testicle.*—Godard has described and figured an abnormal disposition of the gland in the scrotum, which may be denominated *reversion*. It was observed in the dissection of a young man who had died after a severe injury, and whose right testicle was lodged in the iliac fossa. The left testicle was in the scrotum, but its position there was reversed, its upper extremity being directed downwards, so that the vas deferens sprang from the tail of the epididymis, above the testicle, and was shorter than usual.[1] Royet met with a similar disposition of the right testicle in dissecting a subject at Clamart, in Paris, the epididymis being as usual behind the gland.[2] The diagnosis of a reversed testicle during life would be very difficult, but not important, as this disposition of the organ does not affect the relations of the tunica vaginalis to the testicle and epididymis.

Fig. 4.



(After Royet.)

A. Head of the epididymis.
B. Tail of epididymis.
C. Front of testicle.
E. Vas deferens.

[1] Lib. cit. p. 55.

[2] Lib. cit. p. 44.

CHAPTER II.

LESIONS OF NUTRITION.

In investigating the alterations in the nutritive condition of the testicle, it is very desirable to fix, if possible, some standard by which they may be estimated. The size of the gland is neither uniform nor conveniently appreciated. Its weight, likewise, varies so much in different persons, and in the same individual at different periods, according as it has lately exercised its functions, or remained inactive, and as it is full of semen or empty, that it is scarcely possible to determine on any accurate standard of this kind.[1] According to Meckel, the weight of the testicle, including the epididymis, is only four drachms, and, according to Sir A. Cooper, about an ounce. The former estimate is certainly too low, and the latter too high. I have found the mean of these two estimates, viz., six drachms, to be the ordinary weight of the sound testicle of a healthy adult. In the most lingering cases of phthisis, and in other emaciating diseases, the organ was never found to weigh less than three drachms. I should consider, therefore, the testicle of an adult weighing upwards of an ounce as in a state of hypertrophy, and one weighing less than three drachms as in a state of atrophy.

[1] It is well known that the testicles on the two sides rarely agree in size, the volume and weight of the left testicle being most generally greater than those of the right. I weighed the testicles of six men, two of whom were killed by violence, and found the left gland heavier than the right in

SECTION I.

HYPERTROPHY OF THE TESTICLE.

The testicle cannot be said to be subject to an enlargement from simple hypertrophy constituting a morbid condition, as mere increase of the natural structure never occasions even local inconvenience. In deficiencies, however, of one testicle, the other is liable to an abnormal growth. Thus, in the case of absence of the left testicle, related at page 5, Mr. Page found the right of remarkable size. When prepared for maceration by cutting away the tunica vaginalis, this monster testicle was found by Mr. Page to weigh two ounces, two drachms, and two scruples. After it had been several years in spirit, I found its weight to be nine drachms. The organ was quite healthy in structure, and the epididymis was loaded with secretion.[1] In a second case, communicated to me by Mr. Page, of a man aged twenty-seven, who died of intestinal obstruction, the left testicle, situated just outside the external ring, was undeveloped and imperfect. The right was very large, and weighed one ounce and ninety-five grains.

A robust young man, aged twenty-six, a shipwright, consulted me on the propriety of marriage. It appeared that at the age of seventeen he had an attack of mumps, during which orchitis occurred in the left testicle. It subsided, leaving the organ reduced in size. I found the

five, but in neither instance was the difference greater than a drachm. M. Prunaire weighed the testicles, at different periods of life—from three months to seventy years—in twelve instances, and, with the exception of a man aged seventy, in which the weight of the two organs was equal, the left was heavier than the right in eleven, the differences varying from a grain and a half to a drachm (nine centigrammes to four grammes). Gaz. Médicale, 1863, p. 830.

[1] The testicle is preserved in the Museum of the College of Surgeons.

gland about a third its proper size, and soft, but otherwise well formed, and free from disease. The right testicle was remarkably large, plump, and firm, so as to constitute a state of hypertrophy. As he gave every indication of virility, I, of course, sanctioned his marriage.—In a middle-aged man who came under my notice with his left testicle either detained in the abdomen, or wanting, the right in the scrotum was of great size.—Mr. Wood has also related a case of retention of the left testicle in the iliac fossa, in which the organ was only one-third its proper size, whilst the right testicle was in the scrotum, and double its natural size.[1]

The duplicity of the testicles exemplifies the usual bounty of nature in all that concerns reproduction, one being sufficient for manhood. It is not surprising, therefore, that in cases of absence and imperfect development of one testicle, the other does not, as a rule, exceed the normal size.

SECTION II.

ATROPHY OF THE TESTICLE.

The testicles, like other organs formed for the exercise of temporary functions, do not arrive at a perfect state of development until a certain period of life, after which their activity ceases, and they become gradually and imperceptibly diminished. Thus we find that in early life they are small in proportion to the size of the body as compared with their condition at puberty, and that as old age advances, and the generative functions cease to be called into action, they undergo a diminution in size, their vessels grow less, the seminiferous tubes become

[1] Pathological Transactions, vol. viii. p. 265.

small and contracted, and partially obliterated, their place being supplied by fatty matter.[1] In the lower animals these changes are far more remarkable than in man, for as the functions of the testicle are exerted only at stated periods of the year, as the rutting or copulating season advances, these organs rapidly increase in bulk, and in its decline undergo a proportionate degree of wasting. In man it sometimes happens that the testicles do not acquire their proper size at the usual period, their development being from some cause or other arrested; and also, after the organs have arrived at their full and perfect growth, that occasionally one or both suffer a premature decay. Under the head, then, of Atrophy of the Testicle, I shall consider: 1. *Arrest of Development;* and 2. *Wasting.*

1. *Arrest of Development.*—If the congenital lesions to which the testicle is liable had not been previously treated of, the cases of absence of the organ already described might be correctly referred to the present head, as the deficiency in these cases was no doubt the result of an arrest in the early development of the organ. But the cases that I am now about to consider are those in which the subsequent evolution which the testicles undergo at puberty is delayed beyond the usual period, or never takes place at all. Mr. Wilson relates a curious instance of his having been consulted by a gentleman, twenty-six years of age, on the propriety of entering the marriage state, whose penis and testicles very little exceeded in size those of a boy of eight years of age. He had never felt the desire for sexual intercourse until he became acquainted with his intended wife; since that period he had experienced recent erections, attended with

[1] In the testicles of old men the tubules are commonly found loaded with a dark granular substance, the result of fatty degeneration.

nocturnal emissions. He married; became the father of a family; and these parts, which at six-and-twenty years of age were so much smaller than usual, at twenty-eight had increased nearly to the usual size of those of an adult man.[1] Mr. Wilson mentions this singular case, as it will admit of question whether the parts alluded to became properly formed as to size, and possessed of the power of secretion, in consequence of being, although so late in life, influenced by the passions excited by attachment to a particular female; or whether the enlargement and proper action of the parts beginning, occasioned such passion first to exist. He thinks the probability in favour of the former supposition, in which opinion I certainly concur. Lallemand mentions having seen a man about thirty years of age, extremely fat, and without a beard, or hair on the pubes, whose penis and testicle appeared to belong to a child of from seven to eight years: he had never experienced erections or venereal desires.[2]—A young man died in the London Hospital of disease of the heart. He was seventeen years and nine months old: the body measured five feet five inches in height, and was plump and well formed. There was no appearance of beard, or whiskers, or of hair on the pubes. The penis and testicles were very small, not larger than they are usually found in boys of three or four years of age. The testicles were about equal in size, and one of them weighed only two scruples and one grain. Both organs were normal in structure, appearing like the glands in early life, when the tubular structure is very indistinctly developed. No spermatozoa could be detected.—I examined the body of a man aged forty-six, who during life was of sound mind, but who died of

[1] Lectures on the Urinary and Genital Organs, p. 424.
[2] Des Pertes Séminales Involontaires, t. ii. p. 380.

paralysis in the Hackney union. He measured six feet one inch in height, but was of feminine appearance. His body was fat and rounded, his shoulders narrow, and his pelvis remarkably wide for a male. His face was smooth, without beard or whiskers. The hair was deficient generally over the body, a few only being scattered over the pubes. The external organs of generation, the penis and scrotum, were extremely small, about the size usually seen in a child four or five years of age. The testicles were in the scrotum, but were no larger than haricot beans. Each was enclosed in a vaginal sac. The left, the largest, measured half-an-inch in length. There were no adhesions, and no marks of disease. The glandular structure was healthy, but undeveloped, so that the tubuli could not be separated and drawn out. There were no spermatozoa. The museum of St. Thomas's Hospital contains the sexual organs in a similar state of imperfect growth, taken from a man about fifty years of age. A gentleman well developed, and in good health, between thirty and forty years of age, who has long been under my observation, has both testicles in the scrotum. The right is very small, like the testicle of a child, but properly formed. The left is plump, and unusually large. He has never suffered from orchitis, and his powers are satisfactory. These are all clearly instances of arrest in the development of the testicles.

As the testicles are chiefly excited to action by an operation of the mind, it is easy to understand that they may sometimes remain undeveloped owing to defective organization of the brain, an absence of sexual desires being invariably remarked in these cases. Cases of wasting of the testicles after injuries of the head, and the frequent absence of the venereal appetite in cretins and idiots, tend to strengthen this opinion. The follow-

ing are marked examples of defective development of the sexual organs, accompanied with imperfection of the brain.—An idiot, aged nineteen, subject to epileptic fits, died of typhus fever in the Hackney union. The youth was of short stature, and the form of the body was not indicative of either sex, but the contour was rounded as in the female. There was no appearance of hair about the face or pubes. The abdomen and other parts were covered with a thick layer of fat. The penis and scrotum were remarkably small, not larger than they are usually found in a child two or three years of age. Both testicles were in the scrotum, but they were of very diminutive size: the right weighed less than a drachm, and the left not more than twenty-three grains. The right gland had descended a very little way below the abdominal ring. The glandular structure and epididymis of both testicles were indistinct, and the vasa deferentia also extremely small. Nothing remarkable was observed in the structure of the brain. Mr. Hovell, the surgeon of the union, also showed me another inmate of the same workhouse, a lad aged nineteen, and of weak mind, whose penis and testicles did not exceed in size those of a boy seven or eight years of age, and who had only a few scattered hairs on the pubes.—Dr. Down sent me the testicles removed from a lad, aged nineteen, of weak intellect and diminutive stature, who had died in the Idiot Asylum at Earlswood of tuberculosis. His external organs of generation were not more developed than those of a boy three years of age, and he had no hair on the pubes and in the axillæ. The right testicle was found in the abdomen two inches from the internal ring. It weighed only twenty grains. The left testicle was in the scrotum, and, though much larger than the right, weighed only thirty-seven grains. There were no

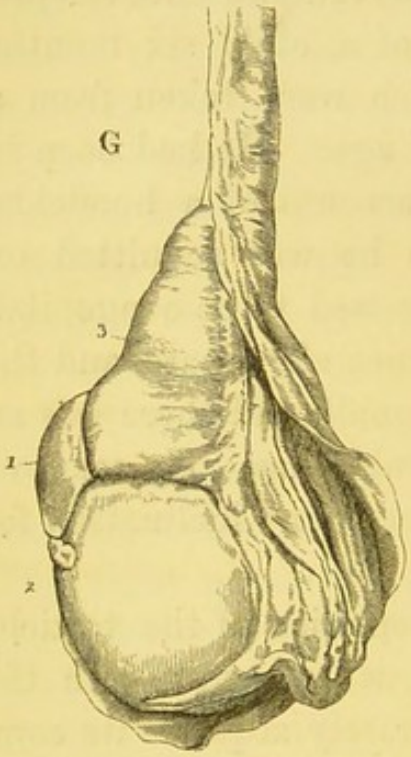
adhesions and no marks of disease about these organs. The glandular structure resembled the testicles of an infant, the tubuli being inseparable. In the Museum at the Military Hospital, Netley, are preserved two undeveloped testicles about the size of those of a child six months old, but healthy in structure, which were taken from a lunatic soldier fifty-eight years of age. He had been in confinement for many years on account of a homicide, after a trial for murder, of which he was acquitted on the plea of mental imbecility supposed to be congenital. His person was diminutive, his voice effeminate, and the beard wanting. His penis was small, and there was an appearance of mammæ of considerable size. He acknowledged that he had never experienced any inclination for sexual intercourse.

In treating of the imperfect transition of the testicle, I have remarked that this gland, when retained in the abdomen or inguinal canal, very rarely acquires its complete state of development, and is small in size. I have also noticed, in cases of congenital inguinal hernia, that the testicle, even in its natural situation, was not of its proper size at the period of puberty; so that when the infirmity existed on one side only, the testicle was not more than half or two-thirds the size of the other gland. The arrest of growth in this latter case may be in some degree attributable to the combined effects of the pressure of the protruded intestine on the vessels of the cord, and to the obstruction to the circulation caused by the application of trusses and bandages to the groin.

2. *Wasting.*—A testicle in an advanced state of wasting, not arising from disease of the gland, usually preserves its shape, but feels soft, having lost its plumpness, elasticity, and firmness. The tunica albuginea is thin. The texture of the gland is pale, and exhibits few

blood-vessels,[1] the tubuli and septa dividing the lobes are indistinct, and the former cannot be so readily drawn out into shreds as before. The epididymis does not usually waste so soon nor in the same degree as the body of the testicle. It sometimes, however, loses its characteristic appearance, and I have even found it reduced to a few fibrous threads. The fluid pressed out of the wasted testicle and epididymis is entirely destitute of spermatic granules and spermatozoa. In many instances adipose tissue is deposited behind the tunica vaginalis, and encroaches on the epididymis and posterior part of the testicle. Fatty matter is also found in the glandular substance. Fig. 5 represents the left testicle of its exact size, taken from a man aged forty-six, who died of dropsy consequent on disease of the kidneys. The gland was wasted to one-fifth its natural size. In addition to the presence of adipose tissue beneath the visceral portion of the tunica vaginalis, I recognised a

Fig. 5.



1. Epididymis. 2. Body of testicle. 3. Fatty deposit.

[1] Gosselin, in the French translation of this work (p. 81), has called attention to a lesion of the testicle, termed by him *testicular anæmia*. He has observed it in cases of tubercular and fibrous degeneration of the organ, and especially when the tunica vaginalis has been obliterated by adhesions. It is characterized by the pale anæmic appearances of the gland tissue and the absence of spermatozoa. Such a condition no doubt exists in different chronic diseases impairing the vitality or arresting the functions of the organ, and in most atrophied testicles. Anæmia, however, is a consequence of other changes, and cannot be recognised as a distinct disease, nor is it recognisable during life.

quantity of yellow matter irregularly disposed amongst the wasted tubuli. This matter on examination proved to be fat globules, and readily dissolved on the application of ether. Follin found a testicle detained in the inguinal canal of an old man normal in shape, but composed almost entirely of fat.[1] The structures composing the spermatic cord undergo a corresponding diminution; the cremaster muscle disappears, the nerves shrink, and the vessels are reduced in size and number. The vas deferens, though small, can generally be injected with mercury as far as the commencement of the epididymis, and sometimes the metal reaches the vasa efferentia.

A testicle, atrophied from disease, is not only of diminished size and weight, but is often altered in shape, being uneven and irregular, and sometimes of an elongated form. The surfaces of the tunica vaginalis are adherent, and its cavity is partly or entirely obliterated. There is no, or very little, trace of the proper glandular structure, the organ being converted into fibrous tissue of a firm texture, the tubuli themselves undergoing this transformation. The testicle loses also its peculiar sensibility to pressure, but is sometimes the seat of morbid sensibility. The epididymis undergoes similar changes, but usually to a less extent than the body of the gland.

All those causes which produce decay in other parts likewise occasion wasting of the testicle. Thus an im-

[1] Archives Génér. de Méd., 4e série, t. xxvi. p. 263. MM. Bastien and Le Gendre communicated to the Société de Biologie an interesting case of intra-uterine atrophy of the testicle on the left side, observed in a fœtus born at the full period. The vas deferens entered the inguinal canal and terminated in the scrotum in a rounded, smooth, greyish body no larger than a hempseed, which was found to consist of fragments of tubes and fatty matter enclosed in a fibrous membrane. The wasting very probably occurred after the transition of the organ from the abdomen. Gazette Médicale de Paris, année 1860, p. 213.

peded circulation, pressure, want of exercise, and loss of nervous influence, have been noticed as causes of atrophy of this gland. To these must be added certain causes which specially affect the testicle. The following case, related by Mr. Wardrop, is a good example of atrophy from defective nutrition :—A person, both of whose testicles were completely absorbed, nothing being felt in the scrotum but a loose vaginal coat, died of an aneurism of the aorta, formed at the origin of the spermatic arteries, both of which were obliterated.[1] A ligature on the spermatic artery is sufficient to cause a total decay of the testicle, which induced the celebrated Harvey[2] to propose its application for the removal of a certain form of sarcocele; a suggestion the credit of which has been wrongly given in recent years to C. J. Maunoir, of Geneva. In varicocele the interruption to the circulation consequent on the dilatation of the spermatic veins impairs the nutrition of the testicle, and causes more or less diminution in its size. In these cases the testicle on the side affected, the left, is almost invariably smaller than the right, whereas in a healthy state of the parts, the left is usually the larger of the two glands. The influence of pressure in causing partial atrophy of the testicle, is sometimes remarked in old cases of hydrocele and hæmatocele, in which the gland has been long subjected to compression from the retained fluid.

It has been said that the testicles waste in those persons who strictly adhere to their monastic vows, but I am not aware that there is sufficient authority for this remark. In persons who marry, after many years of

[1] Note to his edition of Baillie's Works, vol. ii. p. 315.

[2] Anatomical Exercitations concerning the Generation of Living Creatures. London, 1653, pp. 113, 114.

abstinence from sexual intercourse, the testicles undergo a certain degree of enlargement. These glands naturally remain somewhat small when not called upon to exercise their functions; but whilst they are in a condition for secretion, and can be further developed if excited, this state cannot properly be regarded as morbid atrophy. It is a great error to suppose that sexual connexion in early life is essential for their preservation. When the excretory duct of the testicle is obliterated or obstructed, the semen secreted under excitement having no outlet encumbers the gland for a time, but afterwards becomes absorbed, and it is said that the useless organ decays. This, however, I have shown in a preceding chapter to be by no means a common result.

As examples of atrophy of the testicles from impaired nervous influence, may be adduced cases of paraplegia, in which these organs have been known to waste. Portal mentions the case of a robust man, aged thirty-five, who was attacked with painter's colic, attended with great debility of the lower extremities. The testicles diminished considerably; and although he afterwards recovered from the paralysis of his limbs, these glands always remained wasted; and the man was incapable of the act of generation.[1] In the 20th volume of the "Medical and Physical Journal," there is an account of a case of recovery after fracture, with partial dislocation of the first and second lumbar vertebræ, followed by paraplegia, in which, three years afterwards, the testicles were found entirely obliterated. I examined the testicles of a man, aged thirty-one, the lower half of whose body had been completely paralysed after an injury of the middle dorsal vertebræ nearly two years before. They were sound in structure. One weighed upwards

[1] Cours d'Anatomie Médicale, t. v. p. 434.

of two drachms; the other a few grains less. No spermatozoa were found. It has been stated that the testicles sometimes waste from injuries, or from compression of the spine at the origin of the spermatic nerves. In a man who had received a blow on the lumbar region, the testicles gradually wasted away.[1]

The most common cause of atrophy of the testicle is the disturbance of its organization consequent upon inflammation. As the inflammatory process ceases, the enlarged gland not only becomes reduced to its original size, but it sometimes slowly but steadily diminishes, till at length very little vestige of it remains. Mr. Hunter has related three cases,[2] and Sir E. Home some others, in which the testicle decayed in this way. I have myself met with many instances of atrophy arising from this cause, and there are few surgeons of experience who have not witnessed cases of the kind. Wasting of the testicle has been observed to occur after an attack of orchitis in mumps, arising, as it is supposed, from the translation of inflammation from the parotid to the testicle. Two cases of cynanche parotidea in the adult, in which atrophy took place in the gland chiefly affected, are related by Dr. R. Hamilton.[3] At page 59 I have narrated a case of wasting from this cause, which has recently come under my notice, and I have also witnessed another case in which the patient attributed the loss of one gland to an attack of mumps in his infancy. Wasting is more liable to occur after inflammation of the body of the gland than after epididymitis. Indeed, I question whether wasting ever occurs from the latter, unless the inflammation extends to the substance of the testicle.

[1] Baillie's Works, by Wardrop, vol. ii. p. 315.
[2] Treatise on the Venereal Disease.
[3] Philos. Trans. Edinb. vol. ii. art. ix. p. 59.

It is stated that one or both testicles have been found to waste in persons who have indulged too much in sexual intercourse, or been addicted to onanism. Baron Larrey states that he met with several cases of atrophy from excessive venery, and abuse of strong drinks, amongst the soldiers of the Imperial Guard.[1] Sir B. Brodie has recorded two cases in which wasting was occasioned by over-excitement; in one from onanism, in the other from sexual intercourse.[2] I witnessed an instance of total atrophy of the left testicle, which was ascribed to excessive masturbation. In this case, and probably in some of the others just quoted, the wasting was preceded by an attack of inflammation, induced by the inordinate excitement. Gosselin has related the case of a young man, both of whose testicles were separately attacked with inflammation, induced by persistent masturbation, and afterwards wasted away. Erections and venereal desires ceased at the same time.[3] The atrophy, however, cannot always be referred to inflammatory action. There must be some further cause in operation to account for the change, as in the following instance in which both glands suffered:—H. C., aged twenty-two, a fair looking, but apparently a strong and healthy man, consulted me in consequence of wasting of his testicles and subsidence of all sexual feeling. He stated that both his testicles were formerly of full size. He had been addicted to excessive masturbation, and had abandoned the practice only a year previously. He had had connexion with women at different times. About four years back he strained himself in lifting a heavy weight; shortly afterwards, the right testicle swelled and became painful, and

[1] Mémoires de Chirurgie Militaires, vol. ii. p. 66.
[2] London Medical and Physical Journal, vol. lvi. p. 297.
[3] French translation of this work, p. 75.

since this attack the gland has gradually wasted, and, when I saw him, was no bigger than a pea. After straining himself again a year ago, the left testicle became swollen and inflamed, and afterwards began to waste. On examination I found it about the size of a pigeon's egg and very firm, but free from the irregularities and indurations commonly met with after severe orchitis. The vasa deferentia were of the proper size and consistency. The young man had the sleek, fat appearance of an eunuch, and had no beard or whiskers. He was very uncomfortable in mind respecting his state. The last time he attempted connexion was three months back, but no emission followed. We can easily understand that violent inflammation may disorganize a testicle and lead to its wasting, but in this case the orchitis was not of an active character, and left behind no changes indicative of its previous existence. The following case, communicated to me by my colleague, Mr. Adams, is of a somewhat similar character to the preceding. He was consulted by a gentleman in consequence of wasting of both testicles, which were reduced to the size of large beans. The only cause to which he could attribute the wasting, was over-excitement in dalliance with a lady with whom he was prevented having more intimate relations. His testicles had been painful, but there were no marks to indicate that the glands had been the seat of inflammation. The active secretion and overloaded state of the organs without the natural relief, may perhaps have injuriously affected their nutrition. Yet we know that in men with obliterated excretory ducts, but retaining sexual power, the testicle does not usually suffer from seminal engorgement.

It is a common belief, that wasting of the testicle is liable to be induced by the long-continued use of iodine.

I have not met with any instance of it, and there are few cases in which the evidence is such as to render it at all clear that the decay of the gland was really occasioned by this remedy. M. Cullerier has published the case of a young man who took from twenty-five to thirty drops of the tincture of iodine for a period of three months, for the cure of an obstinate gonorrhœa. This was followed by a state of impotency and partial wasting of the testicles, which lasted a twelvemonth, and the organs never regained their former size and vigour. M. Cullerier mentions another case of temporary loss of virile power occurring from the use of the iodide of iron.[1] I feel convinced, however, that if iodine ever produces wasting of the testicle, it does so so rarely, that the liability cannot be regarded as any objection to the free and long-continued use of this valuable remedy. In a recent discussion on iodism at the Academy of Medicine, Velpeau stated that during his long experience he had never observed a case of atrophy of the testicle from this cause.

Atrophy of the testicle has been remarked in elephantiasis of the Greeks, a disease in which tubercles are developed in various parts of the skin. Dr. Adams, in an account of the cases of that disease observed in Madeira, states that all those who were attacked with it before the age of puberty never acquired the distinguishing marks of that change in the constitution, and their testicles diminished in size, and that in those affected later in life the testicles became atrophied, and they lost the power of procreation.[2] Mr. Peacock also noticed a wasting of the testicles in several cases of elephantiasis in the Leper Hospital of Colombo, in

[1] Mémoires de la Société de Chirurgie de Paris, t. i.
[2] On Morbid Poisons, p. 265.

Ceylon.[1] A similar condition of these glands was remarked in a case of this disease, so rare in this country, narrated by Mr. Lawrence,[2] and also in another case at the London Hospital, which I recorded many years ago.[3] In a confirmed case, however, of this disease, in a boy, aged thirteen, who was under my care in the year 1849, there was no diminution in the size of these organs.

Wasting of the testicles is liable to occur after injuries of the head. Some years ago I saw a man who had met with an injury of this description, which had been followed by wasting of the testicles, and the development of tumours on each side of the chest resembling mammæ. He was about fifty-nine years of age, a married man, and the father of several children. He had belonged to the legion in the Queen of Spain's service. About two years and a half previously, in an attempt to jump over a trench, he fell backwards, and injured the posterior part of his head. Whilst on the ground he received a bayonet wound in the side, and a sabre cut on the forehead. He recovered from these injuries, and returned to England. Since the accident he had completely lost his virility. He had no desire for sexual connexion; his penis had dwindled in size; his right testicle had gradually wasted, and was no larger than a horse-bean, and the left gland was also a good deal diminished in bulk. The skull at the occiput seemed somewhat flattened. Baron Larrey records the case of a man who was wounded in the back of the neck by a musket ball, which grazed the inferior occipital protuberance. He recovered from the injury, but the testicles were reduced to a state of atrophy, and the penis shrunk and remained inactive. He also relates the

[1] Edinb. Medical and Surgical Journal, vol. liii. p. 139.
[2] Medico-Chirurgical Transactions, vol. vi. p. 214.
[3] Vide Medical Gazette, vol. vii. p. 447.

case of a man of strong constitution and vigorous passions who received a sabre wound which cut off all the convex projecting part of the occipital bone, and exposed the dura mater. The patient lost the senses of sight and hearing on the right side, and his testicles sensibly diminished, and in fifteen days were reduced, especially the left, to the size of a bean.[1] Lallemand had under his care a man thirty years of age, who, in the expedition to Algiers, had received a sabre wound at the nape of the neck. His testicles were wasted, and venereal desire as well as erections had entirely ceased.[2] We cannot doubt that in these cases the loss of sexual desire, and the wasting of the testicles, were the direct results of the injury to the brain, and they go far to prove the essential dependence of the functions of these glands upon the cerebral organ. The physiologist cannot fail to notice the rapidity with which the atrophy is stated in some of the cases to have succeeded the injury, and the extent to which it proceeded. The withering of the testicles was, indeed, so remarkable, that it can be attributed only to the sudden and complete extinction of the sexual instinct resident in the brain, and (if I may so express myself) to the immediate impression on the system of the future uselessness of these organs. In old age and in lingering diseases the decay of the testicles is extremely slow and gradual, and is never carried to the extent observed in cases of injury to the brain. In fact, men have survived the power or desire of performing the sexual act many years without the testicles being materially reduced in size. We have seen, too, that in the lower animals the testicles have been rendered useless by interrupting the vasa deferentia, without any such striking effect being

[1] Mémoires de Chirurgie Militaire, p. 262.
[2] Pertes Séminales Involontaires, t. ii. p. 41.

produced on the glands as occurred in these cases of cerebral injury.

Cases have come under my notice in practice, in which a careful inquiry has failed to enable me to ascertain satisfactorily the cause of the atrophy. Thus, a gentleman aged forty-seven, a married man of robust appearance, consulted me on account of wasting of both testicles, with failure in sexual power. The wasting had been going on gradually for eighteen months. It commenced during a voyage at sea when he was separated from his wife. I found the testicles soft, and reduced to one-fourth their natural size. They were extremely sensitive. He still enjoyed connexion, but at long intervals. On examination of the fluid removed from the urethra shortly after intercourse I could find no trace of spermatozoa. He had not previously indulged to excess. He was subject to attacks of gout, but I could detect no sugar or albumen in the urine, nor organic disease elsewhere.

An investigation of the causes of atrophy of the testicle is sufficient to show that in many of these cases the surgeon has little power by any method of treatment to promote the development or arrest the decay of this organ, these changes being the result of actions beyond his reach or control. In certain cases, as in atrophy from pressure, or from an impeded circulation, and in some instances of decay from injuries of the head, affections of the brain, and other causes, we may by judicious measures assist in retarding the wasting process. A knowledge of the circumstances which conduce to this change will indicate the means required to check its progress. The treatment suitable in these cases will be considered in the Chapter on Functional Disorders of the Testicle.

CHAPTER III.

INJURIES OF THE TESTICLE.

Although the testicles, owing to their exposed situation, are more liable to injury than any other glandular organ, they are preserved in a remarkable degree from the effects of external violence by their great mobility and capability of eluding pressure, and the nature and strength of their protecting tunics.

SECTION I.

CONTUSED, INCISED, AND PUNCTURED WOUNDS.

Contusions. — The testicle is in danger of being bruised in the exercise of riding on horseback, by the organ being struck against the pommel of the saddle, and many of the diseases of the organ are found to originate in this accident. It is sometimes forcibly compressed between the thighs, and is occasionally contused by a kick or blow. This injury usually occasions slight extravasation of blood within the sac of the tunica vaginalis, or between this membrane and the tunica albuginea. The effusion sometimes infiltrates the cord, giving rise to diffused hæmatocele of this part; and when the contusion has been particularly severe, the extravasation has been found to extend along the cord even to the kidney. A case of contusion of the testicle, in which the extravasation has reached as high as the

diaphragm, is related by Petit.[1] The tunica albuginea is so dense and strong, that it is rarely ruptured, and it protects in a great degree the glandular structure from the effects of this injury.

The consequences of a bruise of the testicle are soon felt, and are often severe; the immediate effects of the injury resembling a good deal the symptoms produced by a contusion of the viscera of the abdomen, owing to the connexion of its nerves with those of the organs in the abdominal cavity.[2] The patient instantly experiences acute pain, which extends up to the loins, and forces him to bend his body forwards for relief; and he is seized with a sickening sensation, often accompanied with syncope, vomiting, and cold perspirations. But these symptoms are transient; and in many instances, after recovery from the first effects of the injury, no further ill consequences are experienced; the effused blood is removed, and the testicle, after remaining tender for a few days, is gradually restored to its former healthy state. The only treatment required in these slight cases is rest, support to the organ with a handkerchief or suspensory bandage, and the application of a cooling lotion. In other instances, the contusion is followed by severe inflammation, which seriously injures, and sometimes completely destroys, the organ. Frequently the injury lays the foundation of chronic disease, which is

[1] Traité des Maladies Chirurgicales, t. ii. p. 479.

[2] An interesting case showing the sympathy of the vital organs with the testicles is recorded by Dr. Schlesier. A healthy man engaged in a fray in the dark was suddenly heard to shriek out: he fell in convulsions, and died in five minutes. On examination the only injury found was the rupture of both the spermatic arteries and veins at the internal rings, produced by the scrotum and testicles having been seized and pulled down by one of those with whom the man was fighting. Quoted by Paget in Brit. and For. Med. Rev., Jan. 1844, from Casper's Wochenschrift, Oct. 22, 1842.

slowly developed shortly after the accident. So complete are the disorganizing effects of a severe contusion on the gland, that squeezing the testicle was one of the modes adopted formerly in the Oriental courts for emasculating the attendants of the harem;[1] and I am informed that a similar plan of castrating bucks is sometimes resorted to by park-keepers in this country, and that, in the agricultural districts, calves and lambs are occasionally treated in the same way. Dupuytren states, too, that in Normandy horses are deprived of their testicles by compression.[2] This, however, is not a very sure way of emasculating, as some of the tubuli are liable to escape injury and the effects of the subsequent inflammation.

Punctured and incised wounds of the testicle are not in general followed by severe results. The organ has often been injured accidentally in operations with a trocar or lancet, and the wound has afterwards readily healed. Dupuytren relates that in tapping a hydrocele in which the testicle was in front, after piercing the gland, he injected the sac three times. The inflammation which supervened was moderate, and the patient did well. These injuries must be treated according to the particular circumstances of the cases, and if inflammation arise, it should be treated actively; but the fact that they commonly do well should be remembered by the surgeon, that he may not too hastily despair of saving the gland in incised wounds even of a severe character. In these wounds the tubuli seminiferi sometimes project through the opening in the tunica albuginea, appearing between the lips of the outer wound like a slough or brownish flocculi. The surgeon should bear this in

[1] A person rendered an eunuch in this way was termed θλαδιας.

[2] Leçons Orales, t. i.

mind, for if he attempted to remove the projecting tubuli instead of repressing them within the scrotum, he would inevitably draw out more of the tubes and destroy part of the gland. The protrusion of the tubuli, which occurs after a wound of the tunica albuginea, is, however, only small, and nothing like a hernial extrusion takes place without plastic exudation within the fibrous tunic.

SECTION II.

INJURIES TO THE VAS DEFERENS.

The vas deferens is a duct of great strength, and capable, therefore, of resisting considerable violence. In some experiments which I made on the dead subject, the duct isolated as far as the ring, sustained a weight of 15 lbs., and on increasing the weight it gave way near the testicle. Amongst the numerous cases of injury of all kinds which have come under my notice at the London Hospital, during a period of more than thirty years, I cannot call to mind a single case of laceration or rupture of the vas deferens. Such an injury, however, would be very liable to be overlooked, not only during life, but in examination after death. Mr. Hilton met with three cases in which he supposed the pelvic portion of this duct to have been torn completely across. They are recorded in an article on "Injuries of the Pelvis," by Mr. Birkett.[1] The indications of the injury are stated to be "a sudden and violent pain in the groin, arising as the result of severe exertion or of a blow; the flow of bright red blood from the urethra, although the urine which the bladder contains is free from blood; gradually increasing pain which extends over the lower part of the

[1] Holmes's System of Surgery, vol. ii., p. 502.

abdomen, accompanied with more or less pyrexia. The bleeding ceases; the pain subsides; but the testis on the affected side becomes at first swollen and tender, and finally diminishes, until, after the lapse of a few weeks, it becomes atrophied." Mr. Hilton considers that the duct was divided within the abdomen, between the internal abdominal ring and the point where it crosses the ureter, and that the blood flowed from the artery which accompanies it. The blood from this vessel traversed the tube, and so entered the prostatic portion of the urethra, anterior to the bladder, thus leaving the urine free from blood.

These cases are interesting, and well worthy of attention. It seems to me, however, that the mode of injury—in the first case, the forcible abduction of the leg; in the second, a sudden arrest in wheeling a barrow; and in the third, a fall on the knees without striking the groin, in running upstairs, is scarcely likely to produce a rupture deep within the pelvis of this strong duct.[1] In all three cases orchitis on the side injured ensued, and was followed in two which remained under observation by wasting of the testicle. It has already been shown that this is not the usual result of a division and obliteration of the vas deferens. The conjecture that the duct was ruptured in these cases requires confirmation by dissection.

SECTION III.

SELF-CASTRATION.

Persons ignorant of surgery have been known, like the pious Origen,[2] to perform double castration on them-

[1] In an experiment on the dead body the vas deferens gave way in the groin after several hard tugs at the testicle.

[2] It is clear from the saying of Christ (St. Matthew xix. 12) that self-castration was practised, from religious impulse, at a still earlier period than the time of the ancient Father Origen.

selves, and have evinced considerable determination and indifference to pain in accomplishing their purpose. It is natural to suppose that no one would attempt such an act, by which the perpetrator deprives himself of a faculty whose possession is universally so highly prized, and whose loss so degrades the condition of man, except during a fit of temporary insanity. I am strongly inclined to believe that self-castration is seldom undertaken without some strong motive intimately connected with the sexual functions, arising from a perverted use or guilty indulgence of them, and that some such cause may generally be ascertained by a little cautious inquiry. In some instances the attempt has been made by persons who have been unable to cure themselves of the odious vice of masturbation: such, I suspect, was the motive that led to the act in the two following cases which have come under my notice; in both, double castration was effectually completed.—A lad, aged sixteen, was brought to the London Hospital in June, 1832, exhausted and faint with bleeding going on from two wounds in the front of the scrotum; they were each about an inch in length, and situated at the sides of the raphé. Upon examination it was found that the scrotum did not contain the testicles. The boy subsequently gave the following account of his case. He stated that for about a week he had suffered from low spirits. Early in the morning he suddenly resolved to do himself some injury: his first determination was to cut his throat, but he afterwards resolved to perform the following act of mutilation. Having left his home in the Whitechapel-road for some fields in the neighbourhood, he first passed a piece of string tightly around the root of the scrotum; he then made an incision to the extent of an inch on one side with a common penknife, and,

having squeezed the testicle through it, divided the cord and removed the gland; he then proceeded to excise the other testicle in the same way. The loss of blood was considerable, and he endeavoured to restrain it by drawing the ligature tighter. He said he was not conscious of any pain in the operation; and though he could not assign any reason for selecting this mode of mutilation, he admitted that he had read in an encyclopædia an account of castration. The testicles were found in the field where the act was committed. The cord was divided close to the gland on one side, and at about an inch from it on the other. Ligatures were placed upon the spermatic arteries, and in three weeks the wounds had completely healed. No symptoms of insanity were evinced whilst the boy remained in the hospital; he enjoyed good health and spirits, and he talked and joked concerning his situation, without appearing at all to feel his loss.—A man, aged twenty-two, was brought to the London Hospital in January, 1836, having cut out both his testicles. He had removed a small piece of the integuments, and squeezed the testicles out through the opening, and excised them, having previously tied a piece of string tightly round the spermatic cords to restrain the hæmorrhage. These had retracted into the inguinal canals, and Mr. Adams, who was called to the case, was compelled to introduce his fingers at the wound and draw down the cords, in order to secure the vessels separately. The man admitted that he had been in the habit of constantly practising masturbation, and it was to rid himself of the perpetual desire to commit what he regarded as a great sin that he determined to remove the testicles. The wound healed without any unfavourable symptom.

I am indebted to Mr. Charles Hawkins for the follow-

ing particulars of a case which occurred at St. George's Hospital.—A man, about sixty years of age, much reduced in circumstances, and an inmate of a workhouse in the neighbourhood of London, where he was employed as a schoolmaster, was about to be dismissed for having had connexion with an idiot girl in the same house, when (as he said) to rid himself of the offending members which had been his ruin, he entirely removed with a razor both testicles and a considerable part of the scrotum. A medical man, who was called to him immediately after the ablation, secured the spermatic arteries, and then sent him to the hospital with his testicles in a paper parcel. Mr. Hawkins secured a small vessel which was still bleeding, and closed the wound in the scrotum with sutures. The part healed without a single bad symptom, and the patient left the hospital quite well in about five weeks, since which he had not been heard of.—A still more remarkable case of self-mutilation was brought to St. George's Hospital in 1863. A widower, aged forty-five, after some years of celibacy, was married a second time to a young woman. Finding himself unable to consummate the marriage tie, he became depressed, and attempted suicide by cutting off the whole of his genital organs—penis, scrotum, and testicles—with a common dinner-knife. The parts healed without a bad symptom.[1]

Mr. Liston relates that a boy in Edinburgh, wishing, as he said, to lead a "holy life," applied to be castrated. Mr. Liston recommended him to wait some time before he had the operation performed, observing that as he was still growing the testicles might be reproduced. After another interview, in which castration was again put off on the plea of his age, he called one evening at Mr.

[1] Lancet, vol. ii. 1863, p. 448.

Liston's house, having attempted the operation with a penknife. One of the testicles was completely exposed, and merely hanging by the cord; the boy said, "he did not like to cut the string." The wound was dressed, and the boy handed over to the priest to be admonished, but he did not apply again.[1]

Mr. Reid, surgeon, Markinch, states that he was called to a lad, a shoemaker, aged seventeen, who had attempted self-castration with a sharp-pointed knife. The right testicle was found hanging from a clean wound in the scrotum about $1\frac{3}{4}$ inch in length. The tunica vaginalis was cut to the extent of half-an-inch, and the posterior part of the testicle was slightly lacerated. The testicle was returned into the scrotum, and the wound dressed; the part was completely healed in about three weeks. He said that his reason for committing the deed was, that for some time past he had had such frequent and copious seminal emissions, that his master had quarrelled with him about soiling the sheets; so, to do away with this cause of disagreement, he had committed the rash act. The great bleeding had prevented him from completing the operation.[2]

Dupuytren mentions the case of an old man married to a young and trifling woman, of whose conduct he thought he had good reason to complain, who resolved to destroy himself, and completely extirpated both his testicles. The cure was prompt, but the monomaniac shortly afterwards drowned himself.[3]

To the curious cases of self-castration just related may be added a remarkable one, communicated to the Société Médico-Pratique de Paris, by Dr. Le Lonjon,

[1] Lancet, vol i. 1838-9, p. 38.
[2] Edinb. Medical and Surgical Journal, July, 1837, p. 95.
[3] Leçons Orales, t. ii.

of Tours.[1] In August, 1854, he was summoned to a man, aged thirty-two, in consequence of an alarming hæmorrhage from a wound in the scrotum, which had been completely arrested, however, before his arrival, by another surgeon, by the application of a concentrated solution of the perchloride of iron. It appeared that the patient had been addicted to masturbation at college, and at the age of twenty-four became troubled with persistent and painful erections, followed by ejaculations, which were attended with excessive pain in the genital organs, especially in the left testicle. He tried various remedies without success; and having in vain urged his physician to remove the testicle, presumed to be diseased, a proceeding which the sufferer believed could alone put an end to his troubles, he conceived and executed, unknown to his family, self-castration, having ascertained from medical works the mode of proceeding and the after-treatment. The wound healed in three months. After a period of remission, the erections, and sufferings which seemed inseparable from them, returned with increasing intensity. The remaining testicle became excessively painful, appeared to the patient the true seat of the evil, and he determined to excise it. After a night passed as usual without sleep, he got up, took a pair of scissors, made an incision in the scrotum, dissected, layer by layer, the envelopes of the testicle, and at length reached the organ and the cord, which he exposed and isolated. A ligature was placed round the cord, but unfortunately in dividing the latter, he also cut the ligature, and a violent hæmorrhage ensued. Preserving his *sang froid*, he placed his finger over the wounded artery, went into the nearest

[1] L'Union Médicale, t. ix. No 129.

water-closet, and threw away the testicle, returned, and summoned assistance, continued in spite of the compression to lose blood, but not his presence of mind and stoic courage. In about a month the wound had almost entirely healed, and the patient left Tours.

Cases of self-mutilation usually do well, and the state of mind under which the injury is inflicted does not operate prejudicially to the patient's recovery.

CHAPTER IV.

HYDROCELE.

The term *hydrocele* is applied to a swelling produced by a collection of fluid in connexion with the testicle, or spermatic cord.

The following table exhibits its different forms, varieties, and complications.

- Hydrocele
  - Of the Testicle
    - Vaginal
      - Common.
      - Inguinal.
      - Congenital.
    - Encysted
      - Of the Epididymis.
      - Of the Tunica Albuginea.
  - Of the Spermatic Cord
    - Diffused.
    - Encysted.
  - Complications of
    - Vaginal H. combined with Encysted H. of the Testicle.
    - Vaginal H. combined with Encysted H. of the Cord.
    - Vaginal H. combined with Diffused H. of the Cord.
    - Oscheo-Hydrocele
      - Vaginal H. combined with Inguinal Hernia.
      - Encysted H. of the Cord combined with Inguinal Hernia.
  - Of the Hernial Sac
    - True.
    - Spurious.

SECTION I.

COMMON VAGINAL HYDROCELE.

The sac of the tunica vaginalis, like other serous cavities, is liable to chronic dropsical effusion. But, before treating of this affection, I must make a few observations on inflammation of the tunica vaginalis, or, as it is sometimes termed, *acute hydrocele.*

The inflammatory changes of the tunica vaginalis resemble those of the other serous membranes. Investing, however, an organ not essential to life, this membrane, when acutely inflamed, very rarely comes under the notice of the pathologist. In a testicle which I examined shortly after an attack of acute inflammation, I found fibrinous exudation on both surfaces of the tunica vaginalis, presenting a honeycomb or lace-like appearance, similar to that often met with in the pericardium. On examining a testicle affected with acute consecutive orchitis supervening upon chronic, the opposed surfaces of the tunica vaginalis were connected throughout by loose fibrinous adhesions of a light reddish colour, and infiltrated with serum of a faint red hue; small quantities of the serum were isolated in different parts in imperfectly formed cysts; the tunica vaginalis was thickly covered with blood-vessels, and in two or three places minute branches could be traced penetrating the false membranes. In inflammation of the tunica vaginalis, the epididymis is generally more or less swollen. In the Museum of the College of Surgeons there is a beautifully injected preparation of hydrocele, showing the effects of inflammation after the application of the caustic. It is represented in the annexed woodcut, which exhibits the sac, with part of it cut away to show the

swollen state of the epididymis, and the aperture made by the caustic (1); the tunica vaginalis is coated with flocculi of lymph. The sac of an inguinal hernia is seen above the hydrocele. The sound state of the body of the testicle, though surrounded by an inflamed serous tunic, whilst the epididymis partakes in the disease, has been accounted for by Gendrin.[1] He says, when the subserous cellular tissue, which always participates in the inflammation of a serous membrane, penetrates into the interior of an organ, it becomes a ready means of communicating the inflammatory action; but when the contiguous organ, or subjacent part, is of a different structure from that of the cellular tissue, the extension of inflammation inwards is checked. Thus in the case of the inflamed tunica vaginalis, the cellular tissue readily transmitted the morbid action to the epididymis, but the tunica albuginea arrested its progress to the body of the testicle; and this explains the fact, that after inflammation of the tunica vaginalis excited by injection, the body of the gland is rarely found to suffer. On the other hand, the epididymis is seldom attacked with inflammation without the disease being quickly propagated to the tunica vaginalis.

Fig. 6.



The fibrin exuded in inflammation very often forms

[1] Journal Général de Médecine, &c., t. lviii. p. 25; quoted from Gendrin, Histoire Anatomique des Inflammations, t. i. p. 143.

adhesions between the opposed serous surfaces, and these, after a time, become firm and dense, and in old cases are liable to be converted into a close and firm fibrous tissue. The chief inconvenience of these adhesions arises from the testicle being more exposed to injury, in consequence of its not being able to glide away from pressure so readily as before. If inflammation of the tunica vaginalis be very violent, it may go on to the formation of pus. Suppuration, however, is a rare occurrence, unless artificially excited for the cure of hydrocele.

Inflammation of the tunica vaginalis is not only the most frequent disease of the testicle, but it is also one of the most common affections to which the body is liable. In some of the disorders of the gland, especially orchitis, this membrane usually becomes inflamed, and adhesions between its opposed surfaces are scarcely less common than those of the pleura. In examining the testicles of twenty-four adults, I found fibrinous adhesions of greater or less extent in one or both glands in nine instances. In the testicles of fifty-nine old men, Dr. Duplay found adhesions seventeen times; seven on the right side, six on the left, and in four instances on both sides.[1] The symptoms produced by active inflammation of the tunica vaginalis, and the treatment proper for its removal, are sufficiently comprehended in the observations on acute epididymitis, of which disease it is a very frequent complication.

Common vaginal hydrocele is essentially a chronic affection. The fluid effused is usually transparent, and of an amber, pale yellow, citron, or straw colour, and resembles the serum of the blood, but is occasionally thick and dark coloured, from the admixture of blood.

[1] Archives Générales de Médecine, Août, 1855.

According to Dr. Marcet's analysis,[1] 1000 grains of this fluid, of the specific gravity 1024·3, contained 80 grains of solid matter, of which 71·5 consisted of animal, and 8·5 of saline ingredients: hence it appears that this fluid only differs from the serum of the blood in possessing rather less animal matter. In an analysis of the fluid of hydrocele made by Dr. Bostock,[2] 100·00 parts, of the specific gravity 1024, were found to contain—

Water	91·25
Albumen	6·85
Uncoagulable matter	1·1
Salts	·8
	100·00

A quantity of flaky matter or flocculent albumen is sometimes found floating in the fluid; and it frequently contains, especially in old people, cholesterine in the form of a multitude of minute shining particles. The quantity of cholesterine contained in nineteen ounces of dark fluid full of these shining particles, which I removed from an old hydrocele, amounted to nine grains. In the examination of a testicle from a man of colour who died at an advanced age, I found the tunica vaginalis and its investing tissues very thick and firm, and the seat of cartilaginous and osseous deposits; it contained about three drachms of a thick brownish substance, which was almost entirely composed of cholesterine. This was, no doubt, a very old case of hydrocele, in which, the more fluid parts having been absorbed, the cholesterine was left behind within the indurated sac. I have also met with this substance in

[1] Medico-Chirurg. Trans. vol. ii. p. 372.

[2] Ibid. vol. iv. p. 72.

abundance in the fluid removed by tapping from two young men with a hydrocele, the sac of which was indurated and thickened from inflammation. In one of them injection had failed three times.

Fluid exhibiting the appearance of milk has in some rare instances been removed from the tunica vaginalis. M. Vidal (de Cassis) describes the case of a middle-aged man with tumours of the scrotum like hydrocele, except that they were not transparent. On tapping one he was astonished to find the fluid which escaped milky-white. The fluid from the other side presented a similar character. Vidal alludes, also, to another case recorded by Sichel.[1] Sir William Fergusson tapped the hydrocele of a German, aged forty-two, thrice in twelve months, and each time drew off fluid resembling milk. The fluid was exhibited at the Pathological Society, and was carefully examined by Dr. Harley and Mr. Mason,[2] who found that the milky whiteness was due simply to the presence of fatty matter, probably exuded by the capillaries of the tunica vaginalis. No spermatozoa were detected in this specimen, nor in the fluid removed by Vidal. Vidal applied to his case the ill-chosen term of "galactocele," but as the fluid does not really possess the true characters of milk, this term is likely to mislead.

The quantity of serum which accumulates varies considerably. In this country it seldom exceeds twenty ounces, though it has been known to amount to several pints. The largest quantity which I have met with is forty-eight ounces. Mr. Cline is said to have removed from Gibbon, the historian, as much as six quarts.[3] I

[1] Traité de Pathologie Externe, 5éme edit, t. v. p. 180.
[2] Pathol. Trans. vol. xvi. p. 184.
[3] Sir A. Cooper's Lectures, by Tyrrel, vol. ii. p. 92.

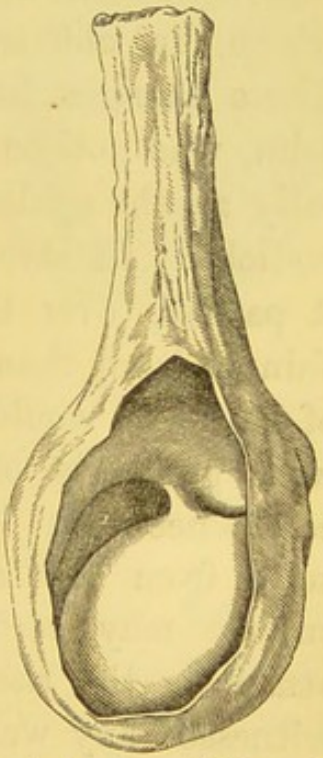
sometimes see an old gentleman, upwards of eighty years of age, who has a hydrocele probably as large, which has existed many years, and has never been tapped. He resolutely refuses to allow the removal of the fluid. From a table of 1000 cases of hydrocele which occurred at the native hospital of Calcutta, constructed by Dr. Dujat, it appears that the quantity of serum evacuated varied from less than ten to upwards of one hundred ounces. Of 370 cases of double hydrocele, the fluid was more abundant on the right side in 109, and on the left side in 128. Of the 630 cases of single hydrocele, in rather more than a third of the number the quantity of fluid was under ten ounces; in two-sevenths it was from ten to nineteen ounces; in nearly a third from twenty to forty-nine; and in eighteen cases the quantity of serum was from 50 to 120 ounces.[1]

In common hydrocele the testicle is found at the posterior part, and rather below the centre of the sac. Its situation, however, is subject to variations. Before the occurrence of hydrocele, the tunica vaginalis may have been inflamed and contracted adhesions, so that the testicle may be connected to the membrane in front; in which case, the serum accumulates on each side of or above and below the organ. The position of the testicle in front may also be owing to an original inversion of the organ, in which the free surface presenting backwards, the fluid collects in that direction and presses the testicle to the front of the sac. It is stated that adhesions occur, producing a sacculated arrangement, and forming what is termed a *multilocular hydrocele;* and that occasionally the cysts thus formed have no communication with each other. In two instances I have seen a membranous partition in the sac of a hydrocele,

[1] Gazette Médicale de Paris, 1838, p. 562.

separating it into two distinct cavities, formed by a layer of false membrane; but such a separation is extremely rare, and I believe that what is called the multilocular hydrocele is, in general, either a form of the encysted, or a complication of the vaginal and encysted. There is one kind of sac or pouch often met with in hydroceles, which is not commonly described. It is situated on the inner side of the testicle, but the opening into it is always found on the outer side, between the body of the gland and the middle of the epididymis. This sac, which varies very much in size, is formed by the distension of the cul-de-sac which I have described as existing naturally at this part. Two examples of this kind of pouch are contained in the Hunterian Museum. One of them is represented in the accompanying figure. In a case of congenital hernia, the sac of which contained a good deal of false membrane, I once found the opening between the body of the gland and the epididymis, leading to a cul-de-sac which extended as far as an inch and a quarter up the cord. In large hydroceles, the epididymis is usually flattened, elongated, and displaced; and instead of a pouch being formed, the central part of the epididymis is drawn to some distance from the body of the testicle.

Fig. 7.



1. Aperture of the pouch between the body of the testicle and middle of the epididymis.

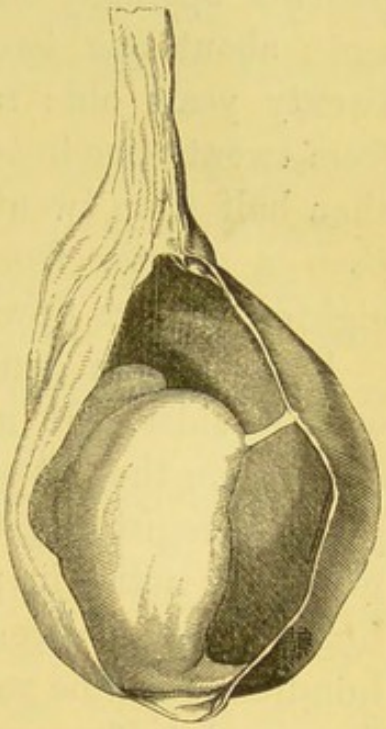
In old hydroceles the sac is often a good deal thickened, the tissues enveloping it being condensed and converted into layers of dense fascia, such as are commonly

observed investing old hernial sacs. The fibres, also, of the cremaster muscle become remarkably developed. This, however, is not constantly the case; for in some instances of hydrocele of large size I have found this muscle atrophied. The sac sometimes acquires the induration of cartilage, and after many years becomes partially ossified. The thickening and induration are chiefly due to the exudation of fibrin on the parietal portion of the tunica vaginalis, and its conversion into a false membrane of dense fibrous tissue or fibro-cartilage, which, in old cases, contains calcareous concretions. These changes have been minutely described by Gosselin, who notices that the false membrane stops generally at the epididymis, and is not continued over the testicle.[1] In several instances, however, I have traced it passing over the body of the gland, though in a thinner layer than the lining of the sac. The history of the cases would lead me to infer that these changes were generally of a chronic character, even from the commencement. The thickening, however, which results from the exudation of lymph in the serous surface may certainly arise from acute inflammation attacking the sac of a hydrocele. I have not myself witnessed any well-marked example of this kind, except after an injury to the tumour, when the effusion of blood into the sac merged the case into hæmatocele, but Gosselin has recorded an interesting case of spontaneous inflammation of the sac which occurred to a man aged sixty-three, in the Hôtel-Dieu, and which proved fatal.[2] In the Hunterian Museum there is a preparation (Fig. 8), showing a long narrow band of adhesion, passing from the anterior part of the testicle

[1] Archives Générales de Médecine, 4e série, t. xxvii.
[2] Fr. Tr. of this Work, p. 150.

across the dilated sac of the tunica vaginalis to the membrane in front, which is supposed to have resulted from a wound of the testicle in the operation of tapping. In all large hydroceles the spermatic vessels are separated and displaced. The glandular structure of the testicle is sound, and the organ capable of exercising its functions. The disease is strictly confined to the investing serous tunic. The testicle is, however, frequently somewhat altered in shape, being flattened by the pressure of the confined fluid; and in some instances it has been found partially atrophied.

Fig. 8.



Hydrocele is a very common disease in persons of all ranks in life, and in most climates, but more particularly in warm countries. Many writers have noticed its frequency both in the East and West Indies.

This disease occurs at all periods of life, but commences in early infancy and at middle age more frequently than at any other period. It is rather a common affection within a few weeks after birth. In sixty cases of hydrocele, M. Velpeau, of Paris, found,

Between the ages of	15 and 20	. .	3
,,	,, 20 — 30	. .	13
,,	,, 30 — 40	. .	11
,,	,, 40 — 50	. .	16
,,	,, 50 — 60	. .	10
,,	,, 60 — 70	. .	6
,,	,, 70 — 80	. .	1[1]

[1] La Presse Médicale, Mai, 1837.

In a table of 1000 cases of hydrocele treated at the Native Hospital of Calcutta, it appears that none of the patients operated on were less than eighteen years of age ; about one twenty-fourth were not more than twenty years old ; rather more than a sixteenth were from twenty-one to twenty-five years of age ; a little less than half from twenty-eight to thirty-five ; a little more than a quarter from thirty-six to forty-five ; and an eighteenth were upwards of forty-six years.[1]

Hydrocele is generally single, but sometimes occurs on both sides. It is commonly said to form more frequently on the left side than on the right. For a few years I registered the new cases of hydrocele coming under my notice in public and private practice. Of one hundred and fifteen cases of simple hydrocele, one hundred and nine were single, and six double. Of the former, sixty-five occurred on the right side, and forty-four on the left. This result, which gives a decided predominance to the right side, does not agree with the observations of Velpeau, Gerdy, and Dujat, and the more recent observations of Mr. Bryant,[2] who found

[1] Table of 1000 Cases of Hydrocele treated by Iodine Injections at the Native Hospital of Calcutta, from Jan. 1, 1836, to Jan. 5, 1838 ; constructed from the Registers by M. Dujat.—(Gazette Médicale de Paris, tom. xvi. 1838, p. 561.)

Ages.	Cases of Single Hydrocele.			Double.	Total.
	Right.	Left.	Total.		
From 18 to 20 years of age	14	11	25	16	41
21 to 25 „ „	51	58	109	64	173
26 to 35 „ „	147	147	294	179	473
36 to 45 „ „	72	94	167	90	257
46 to 59 „ „	17	6	23	20	43
60 to 70 „ „	4	8	12	1	13
	305	324	630	370	1000

[2] Of 117 cases, 41 occurred on the right side, 62 on the left, and 14 were double.—Guy's Hospital Reports, 3rd series, vol. xi. p. 75.

the disease to be more frequent on the left side. Hydrocele in young infants is usually single, and, in my experience, more common on the right side. I have seen, also, a few cases of double hydrocele at this early period.

Dropsy of the tunica vaginalis is usually regarded as purely a local affection, resulting from a disturbance of the nicely-adjusted balance between the functions of secretion and absorption. The same general causes which tend to produce effusion in the other serous membranes, we may conclude likewise operate in occasioning hydrocele. All circumstances which determine blood to the organ in excess, or impede its return to the heart, or which act in any way in disturbing the circulation through the gland, must be regarded as remote causes of the disease; and, considering the exposed and depending situation of the testicle, the liability of its vessels to obstruction, and the irregular nature of its functions, there can be no difficulty in accounting for the frequency of this affection.

Hydrocele has been observed in members of the same family. Mr. Crompton, of Birmingham, mentioned an instance of this to me, and examples have occurred in my own practice. There is also ground to conclude that the tendency to hydrocele, as to hernia, may be hereditary. In a few instances of hydrocele in adults, I was informed that the complaint had existed in early infancy, but had disappeared to return later in life.

Hydrocele is occasionally developed after a violent strain or great fatigue, or after a slight blow on the testicle, which was considered at the time to be too trivial to require attention. In many of these cases the effusion appears to originate in a low degree of inflammation of the tunica vaginalis. I have already stated

that marks of previous inflammation are occasionally observed in the sacs of hydroceles. On examining the body of a man, aged forty-nine, who died of apoplexy, I found about two ounces of serum in the vaginal sac of both testicles, and also several old adhesions, and some spots of induration and thickening of the testicular portion of the membrane. I have observed similar appearances in other cases of incipient hydrocele, as well as imperfect multilocular cavities and septa, and induration and enlargement of the epididymis, clearly evincing that the part had been the seat of inflammation. In some few instances I have met with hydrocele under circumstances which have led me to suspect that the disease was connected with, or sympathetic of, a chronic affection of the urethra, as stricture and morbid irritation in the canal. Hydrocele occasionally results from the irritation produced by loose accidental bodies in the tunica vaginalis, which are more frequently present than is generally supposed. In disturbed states of the circulation from disease of the heart, the tunica vaginalis is not so frequently the seat of dropsical effusion as the other serous membranes, with the exception of the arachnoid; but this is partly owing to the pressure exerted around the testicle by the accumulation of fluid in the scrotum, and the relief to the spermatic vessels afforded by the œdema. In cases, however, of general anasarca, I have very frequently found slight effusion into the vaginal sac combined with œdema of the scrotum.

When the fluid collected in the tunica vaginalis is attended with enlargement of the testicle, the swelling is termed a *hydro-sarcocele*. This affection is generally consequent on chronic orchitis, but it is occasioned by other morbid changes, malignant as well as innocent. In

these cases the disease of the testicle is the original complaint and source of the irritation that excites an undue secretion from the tunica vaginalis.

Symptoms.—Common vaginal hydrocele forms a swelling which is elastic, and of an oval or pyriform shape, which fluctuates, and has a smooth and even surface, and which, commencing at the lower part of the scrotum, increases very gradually, and without causing pain. At its back part the tumour feels firm and solid, and strong pressure there occasions the peculiar sensation experienced from compression of the testicle. The swelling is moveable, but remains constant under pressure and in all positions of the body; and, unless it be of large size, the spermatic cord can be felt above it. When examined by transmitted light, the tumour is found to be more or less transparent, except at the part where the testicle is situated, the opacity there indicating the exact position of the gland. When the hydrocele is of considerable size, the integuments are tense, and the veins ramifying beneath the skin appear prominent and enlarged. The penis is also partly or entirely buried in the swelling, the skin which usually invests it being drawn forward into the scrotum, giving to the orifice of the prepuce somewhat the form of the umbilicus. The hydrocele, even when large, is seldom attended with pain; though its bulk and weight produce a good deal of inconvenience, and, if not supported, the tumour produces a dragging effect on the spermatic cord, which causes uneasiness in the loins. Its progress varies in different individuals, the hydrocele in some instances being several months in attaining a size which in other cases it reaches in as many weeks. I once drew off twenty-four ounces, which the patient stated had formed in the short period of one month. But

the growth of a hydrocele is, in general, slow; and twelve and even eighteen months may elapse before the swelling approaches the abdominal ring. Sometimes, after arriving at a certain magnitude, it ceases to increase; whilst in other cases its growth, though slow, is uninterrupted. It rarely happens that a hydrocele attains any considerable magnitude, because so much inconvenience is occasioned by the tumour when of large size, that the patient obtains relief at an early period; otherwise it might increase until it reached as low down as the knees, as has really happened in long-neglected cases. Mursinna mentions a case[1] in which the tumour measured as much as twenty-seven inches in length and seventeen in width, which is, I believe, the largest hydrocele on record.

The symptoms of hydrocele are liable to several modifications. It sometimes happens, especially in children, that the tunica vaginalis remains after birth unobliterated for some distance along the cord; consequently, when fluid collects, the swelling assumes a pyramidal and elongated form, and the relative situation of the testicle is lower than in ordinary cases. Under these circumstances, there is often a well-marked contraction in the centre of the hydrocele, giving to the tumour the form of an hour-glass. The contraction is found just above the testicle, corresponding to the point where the obliteration of the prolongation of peritoneum usually takes place. A somewhat similar contraction is sometimes produced by bands of adhesion between the surfaces of the tunica vaginalis. In some instances the sac of a hydrocele has been found to extend into the inguinal canal as high up as the abdomen, a contraction existing at the part corresponding to the external ring. I have seen this in two well-marked cases. The upper portion of the sac has also

[1] Neue Medicinische-Chirurgische.

been dilated into a considerable pouch, forming a large abdominal tumour continuous with the scrotal. Mr. Lister has related[1] a remarkable example observed in dissection, in which the sac of a large and old hydrocele had extended through the inguinal canal, and formed a tumour beneath the peritoneum lining the iliac fossa and lower part of the anterior wall of the abdomen, where it had been seen and felt during the life of the patient, a native of Calcutta, aged thirty-five, who had died of diarrhœa. M. Rochard has also described an interesting case of this rare modification of vaginal hydrocele, and he[2] refers to another example observed in the practice of M. Huguier at the Beaujon Hospital. The scrotal tumour in the latter presented the size of a fœtal head at the full period. The quantity of fluid removed amounted to upwards of twenty-four ounces. In M. Rochard's case the double tumour was of much greater size. The two swellings were connected by a thick peduncle, corresponding to the left inguinal canal, and together measured nearly sixteen inches in length. The scrotal tumour descended to the lower third of the thigh, whilst the tumours on the abdomen mounted up to the umbilicus, and extended beyond the median line. M. Rochard punctured the hydrocele, and gave issue to nearly a gallon of a brownish-green fluid.[3] Two cases of vaginal hydrocele prolonged into the inguinal canal have lately been described by Dr. Humphry.[4]

In consequence of the sac and its investing tissues yielding unequally to the pressure of the fluid, the sur-

[1] Edinburgh Medical Journal, Sept. 1856.

[2] Union Médicale, Janvier 27, 1859, p. 170.

[3] This case was cured by iodine injections, and M. Huguier's by a wine injection.

[4] Holmes's System of Surgery, vol. iv. p. 551. They were cured by *incision*.

face of the tumour, instead of being smooth and even, may be more or less irregular and unequal. In inversion of the testicle the relation of parts is completely changed, and the organ, instead of being at the back of the sac, is seated directly in front. When the sac is loose and not fully distended the testicle may be readily felt wherever situated. This is often the case in children. Fluctuation is sometimes obscure, and in other instances is not distinguishable at all, owing to extreme tension or great thickness of the sac.

Mr. Pott remarks, "The transparency of the tumour is the most fallible and uncertain sign belonging to it: it is a circumstance which does not depend upon the quantity, colour, or consistence of the fluid constituting the disease, so much as on the uncertain thickness or thinness of the containing bag, and of the common membranes of the scrotum. If they are thin, the fluid limpid, and the accumulation made so quick as not to give the tunica vaginalis time to thicken much, the rays of light may sometimes be seen to pass through the tumour; but this is accidental, and by no means to be depended upon. Whoever would be acquainted with this disorder must learn to distinguish it by other, and those more certain, marks, or he will be apt to fall into very disgraceful as well as pernicious blunders."[1] The value of transparency, as a sign of hydrocele, is underrated in these remarks. In ordinary cases the surgeon should certainly be able to detect the disease without its assistance; and this is the more necessary, as its absence is no proof that the tumour is not a hydrocele. But it would be absurd to reject the aid of a symptom which, when present, constitutes one of the most certain signs of the disease, because of its inconstancy; and, in the present day, there

[1] Works, 4to, p. 394.

are few surgeons even of experience who do not avail themselves, in cases of doubt, of this ready and simple mode of examination. But, independently of the advantage to be derived from transparency as a means of diagnosis, we are enabled by this mode of examination to ascertain the exact position of the testicle, which is always important before undertaking any operation. In cases of encysted hydrocele, or inversion of the testicle, the unusual situation of the gland may thus be detected, and risk of injury to it be avoided. The mode of making the examination is to darken the room, and place a strong light in such a position that the tumour, when thrust forwards by the hand grasping it behind, may be interposed between the eye and the light, whilst the edge of the other hand is at the same time closely applied to the front of the hydrocele, in order to intercept the light from the side. The testicle is then recognised as an opaque object, and its situation exactly ascertained. In cases in which the walls of the sac are unusually thick, or when the fluid is dark in colour, I have derived assistance from using a common stethoscope. One end being placed against the tumour opposite the light, the surgeon, on looking through the bore of the instrument, can observe the transparency with great advantage. The growth of a hydrocele is occasionally attended with a good deal of local uneasiness, which has been ascribed to pressure on a nerve, or to the presence of accidental cartilages in the cyst. I have generally found, when pain exists, that the dropsical collection has either originated in, and been kept up by some disease of the testicle, or has formed quickly and produced great tension of the sac, the tunica vaginalis being too forcibly dilated to accommodate itself gradually to the effusion.

A hydrocele sometimes varies in size, being larger and more tense in the after part of the day than when

the patient first rises in the morning. This change has often been mentioned to me by patients, and I have lately quite satisfied myself on the point by getting a gentleman with hydrocele, who made an early morning visit, to call again late in the afternoon, when I noticed a marked increase in the size and tension of the tumour. The extent of surface afforded by the dilated tunica vaginalis is large, and the condition of the parts during day and night so very different, that such variations in size, consequent upon alterations in the functions of secretion and absorption, do not appear at all unlikely to occur.[1] I have been informed of a case in which the change was so remarkable, that the scrotum, which was full and tense when the patient retired to rest, became contracted and corrugated by the time he rose in the morning.

Diagnosis. — A hydrocele is usually distinguished without difficulty. The surgeon may conclude that a scrotal swelling is a hydrocele if the tumour be tense, transparent, and fluctuating; if it has a smooth and uniform surface; and if the testicle cannot be felt, and its position can only be ascertained by the greater solidity of the swelling, and the uneasiness experienced on pressure at one particular part, which is generally behind; and if the spermatic cord can be distinctly felt, of its natural size, and in a healthy state. The affections most likely to be confounded with hydrocele are scrotal hernia and malignant disease of the testicle. A hydrocele differs from a scrotal hernia in the following circumstances:—The swelling commences at the lower part of the scrotum; whereas in hernia it begins at the ring and gradually descends. The spermatic cord can be clearly felt above the tumour; but in hernia it can

[1] These changes were distinctly noticed by Gosselin in a young Spaniard with double hydrocele. Note to the French translation of this work, p. 110.

only be traced indistinctly along the back part of the swelling, and sometimes cannot be distinguished at all; the testicle cannot be felt; but in hernia, unless congenital, the organ can be readily perceived at the bottom of the swelling; and further, there is no impulse communicated on coughing, and the tumour is not subject to variations in size, as in rupture. The diagnosis is made with less facility when the hydrocele extends upwards along the cord to the external ring, or into the inguinal canal, as in the cases alluded to at page 102; for the cord cannot be felt, and the shape of the tumour nearly resembles that of a scrotal hernia, and there may even be an impulse transmitted to it on coughing; but attention to the other distinguishing marks which have been pointed out will generally be sufficient to enable the surgeon to make an accurate diagnosis. I have never experienced greater difficulty in the diagnosis of this affection, than in a case of large hydrocele extending into the canal, as high as the internal ring, and receiving consequently an impulse on coughing as distinct as is commonly felt in scrotal hernia. The difficulty was further increased by the thickened state of the sac and dark colour of the fluid so obscuring the transparency of the tumour, that a strong light could be only faintly perceived on careful examination through a tube in a darkened room. In this case I took the precaution of cutting down to the sac with a scalpel instead of puncturing it with a trocar. In one of the cases of prolonged hydrocele described by Dr. Humphry, the obscurity of the diagnosis led him also to cut down cautiously into the swelling.

To distinguish simple hydrocele from malignant disease of the testicle is not difficult, unless the parietes of the sac containing fluid be much thickened. But

when the cyst is so thick and dense as to render fluctuation obscure, and not to admit the passage of rays of light, a careful examination is necessary to enable the surgeon to form a correct opinion. Like hydrocele, the diseased testicle may present a tumour of an oval form, which has commenced at the lower part of the scrotum, and has formed gradually and without causing pain. It may also fluctuate indistinctly, and remain of uniform size under pressure, and in all positions; and the spermatic cord may be felt above it in its natural state. In lightly balancing, however, the tumour in the hand, the diseased testicle feels heavier than a hydrocele; and its external surface is seldom so even and uniform as, nor does it often assume the pyramidal form of, a hydrocele. On pressing the part occupied by the testicle, if the tumour be a hydrocele the usual pain is experienced; whereas if it be a malignant swelling of a large size, the disorganization is attended with loss of the natural sensibility of the gland. If the slightest transparency can be detected on inspecting the swelling through a tube in the manner explained (and I have met with very few cases of hydrocele in which transparency could not be perceived when the tumour was examined in this way), all doubt becomes removed. But in an obscure case the surgeon might introduce a grooved needle or fine trocar into the swelling, when, if the case be hydrocele, the escape of fluid would at once manifest the nature of the disease. I once met with an indolent tumour of small size in the scrotum of an old man, which was so irregular and uneven, felt so solid, and weighed so heavy, that it was impossible to determine exactly whether the swelling was occasioned by a morbid enlargement of the gland, a hæmatocele, or a hydrocele, with the sac unusually thickened and indurated. The

age of the patient was such as to put an operation out of the question. He subsequently died of disease of the chest; and, on examination, I found the tumour to be a hydrocele, the sac of which was lined by a thick and extremely dense false membrane, and contained a soft oleaginous substance, consisting chiefly of cholesterine. The nature of such a swelling could only have been clearly ascertained by a puncture. The difficulty of the diagnosis, in cases of cartilaginous thickening of the tunica vaginalis, has been attested by Dupuytren. In a case of enlargement and induration of the left testicle, attended with lancinating pains in the groin and loins, and much emaciation, symptoms expressive of scirrhous disease, and unaccompanied with any sign indicative of hydrocele, or scrofulous or venereal disease, this distinguished surgeon, to avoid all chance of error, made an exploratory puncture. The result showed the prudence of this precaution; for, instead of scirrhus, the case was found to be a hydrocele, with cartilaginous thickening of the tunica vaginalis.[1]

Treatment.—Though hydrocele is a disease free from danger, it causes serious inconvenience and discomfort. When of large size, its weight is such that it has a dragging effect on the spermatic cord, and produces considerable uneasiness. This may indeed be obviated in a great measure by supporting the tumour in a suspender; and, as a general rule, the patient should always be directed to wear one. There are, however, other sources of annoyance. The tumour is constantly exposed to slight blows, and impedes the activity of the patient's movements. In warm weather, troublesome excoriations are often caused by the friction of the hydrocele against the inner part of the thigh. The

[1] Leçons Orales, tome i. p. 49, edit. Brux.

penis being partly buried in the swelling, micturition and the genital functions are more or less interfered with; and as the tumour cannot be fully concealed by the dress, even motives of delicacy strongly incline the patient to desire its removal; so that persons labouring under this complaint generally apply sooner or later to the surgeon for relief.

A hydrocele may disappear without any treatment whatever. In infants this is a constant occurrence, but in adults is extremely rare. Mr. Pott has recorded two instances in the adult of confirmed hydrocele, which subsided without treatment. One is the case of a gentleman, forty-five years of age, in which the dropsical collection dispersed during six weeks' confinement for a severe fit of gout. The other is the case of a middle-aged man, who whilst intoxicated fell down and struck his scrotum against a piece of scaffolding, which caused considerable ecchymosis. This disappeared in about a fortnight, when it was observed that the hydrocele was much less in size than it was before the accident. In about three weeks more the whole of it had subsided, and it did not afterwards return.[1] The sac was most probably ruptured, and the cure effected by inflammation of the membrane excited by the injury. Sir B. Brodie also met with two examples of the spontaneous cure of hydrocele. In one of them the removal of the disease also appeared to have resulted from inflammation set up in the sac.[2] A hydrocele has even been known to disappear permanently after an attack of orchitis, consequent upon the extension of inflammation from the urethra. But these cases are exceptions to the general rule, and are not to be taken into account in determining upon the treatment to be adopted.

[1] Lib. cit. pp. 413, 414.

[2] Lond. Med. Gazette, vol. xiii. p. 90.

Infants affected with hydrocele are frequently brought to the surgeon within the first or second month after birth, the tumour naturally enough exciting uneasiness in the mind of the mother. In these cases, all that is necessary in the way of treatment is a stimulating application, and support to the scrotum with a bandage. A lotion, composed of an ounce of the hydrochlorate of ammonia, four ounces of distilled vinegar, and six ounces of water, or painting the scrotum with weak tincture of iodine, will generally cause the removal of the fluid. The application of collodion is equally effectual. If the hydrocele does not disperse under this treatment in the course of two or three weeks, the tumour may be pricked with a cataract needle in two or three places, which will allow the escape of the fluid into the connective tissue of the scrotum, from whence it will be rapidly absorbed. If the swelling return, before it attain its former size, puncture can be again resorted to. This is the only operation that I have ever found necessary in treating hydrocele in infants; and even acupuncture, which is a mild proceeding, and devoid of danger, is seldom required.

The cure of hydrocele has been attempted in the adult with external remedies. For this purpose highly stimulating lotions and liniments, frictions with iodine, tartar emetic, and mercurial ointments, and the repeated application of blisters to the scrotum, have been employed. Dupuytren once succeeded in removing a hydrocele by blisters; but Sir A. Cooper tried repeated blistering without producing a cure. I have applied blisters and the *linimentum hydrargyri* in several instances, and have also been unsuccessful.[1] In the following case I succeeded in

[1] Blistering the scrotum in persons advanced in life is not free from risk. M. Gerdy relates a case in which gangrene of the scrotum occurred after

temporarily removing a hydrocele by external treatment. A corpulent gentleman, fifty-one years of age, consulted me on account of a hydrocele of the right testicle, which he had observed for about six months. The fluid within the sac did not appear to amount to more than three ounces, and it produced no inconvenience. I painted the scrotum with a strong solution of iodine, and directed the use of a suspender. This application was made twice, and in three weeks all the fluid had become absorbed. In a few weeks afterwards the fluid again began to collect, and the hydrocele was subsequently cured by injection.

I have employed local treatment in other cases of older standing, but without success. External applications have, indeed, so seldom proved of any avail, that after the age of puberty chronic hydrocele is considered incurable by such remedies; and the time lost in the experiment and the pain and annoyance they produce are serious objections to any trial of them.

The distended tunica vaginalis is liable to be ruptured by accidental violence, the fluid escaping into the surrounding connective tissue, and producing œdema of the scrotum, instead of the defined tumour which previously existed. The œdema usually extends to the penis, and sometimes reaches the lower part of the abdomen, occasioning a diffused swelling, which might prove alarming to the inexperienced surgeon. The fluid, however, is not of an irritating quality, and is so rapidly absorbed that the accident is seldom attended with inconvenience. In these cases the hydrocele is removed for a time, and in many instances permanently; but in general the fluid collects again. A case is mentioned by M. Serres

the application of a blister for the removal of hydrocele in a man sixty years of age.—Archives Générales de Médecine, 3é sér. tom. i. p. 70.

of a Spaniard about forty years of age affected with hydrocele, who was in the habit, when the tumour got sufficiently large to be troublesome, of mounting a horse or taking some other violent exercise, until the swelling gave way. He stated that he had done this more than thirty times.[1]

Dr. Davey, of Colombo, relates the following remarkable case. A Cingalese presented himself with a hydrocele reaching below his knees. Dr. Davey introduced a trocar, and allowed about a washhandbasinful of serous fluid to escape, his intention being to remove the contents of the sac by instalments. The operation was repeated in a few days, and was followed by great swelling of the scrotum and severe inflammation. This was relieved by numerous punctures and by fomentations, and after absorption of the fluid from the scrotum the hydrocele was cured.[2]

When a patient with hydrocele applies to a surgeon it is usual to resort at once to operative treatment, which is of two kinds—*palliative* and *radical*.

Palliative Treatment of Hydrocele by Operation.—The palliative operation is exceedingly simple, of easy performance, and, if proper care be taken, free from danger. It consists in puncturing the tumour so as to allow of the escape of the fluid contained in the tunica vaginalis: the operation may be performed with a lancet or a trocar. The best place for making the puncture is a little below the centre of the anterior part of the tumour; but the surgeon should first ascertain the situation of the testicle; for when the position of the gland is altered by adhesions or other causes, it may be necessary to puncture the tumour at the side, or even behind. It is

[1] Lancette Française.
[2] British Medical Journal, July 11, 1847.

better, however, to avoid the posterior part if possible, as in this situation there is some risk of wounding the spermatic artery. Simple as the case may appear, the surgeon should omit none of the customary precautions, for more mishaps have occurred in the puncture of hydroceles than in any other operation in surgery.

The lancet was formerly used for this operation, but is not now employed; for the whole of the fluid cannot well be evacuated through the opening thus made, without much squeezing and handling of the parts; and there is also risk of the division of some small vessel, which by pouring blood into the tunica vaginalis may produce a hæmatocele. The operation is usually performed with a trocar, the canula of which is about two inches long and a line in diameter. In selecting an instrument the surgeon should see that the canula fits properly, and that its shoulder does not project too much; or else, after the point of the trocar has penetrated the cyst, the canula may hitch outside it, and instead of entering the cavity push the tunica vaginalis before it. In such a case, if the accident be not perceived in time, the testicle or the back part of the cyst is very liable to be wounded. The trocar before being used should be thrust through a piece of wash-leather held tense, and unless it penetrates readily the instrument is unfit for use. This advice may seem unimportant; but it should be recollected that, in addition to the risk of converting the case into a hæmatocele, any bungling in an operation of so simple a nature as the tapping of a hydrocele may induce the patient to suspect a general want of skill.

I generally prefer performing this operation with the patient standing before me; but if he be timid, or liable to faint, he may be seated in a chair, or placed in the

recumbent position. The surgeon, grasping the tumour behind with his left hand so as to put the integuments upon the stretch, and taking care not to wound any of the enlarged veins beneath the skin, should insert the trocar, previously well oiled, in an oblique direction upwards, with a brisk motion of the right hand; and as soon as the sac is perforated, which is ascertained by the immediate cessation of all resistance, the trocar should be withdrawn, whilst the canula is simultaneously thrust forwards by the action of the thumb and forefinger: gentle pressure is then to be maintained until all the fluid is removed. By manipulating in this way all risk of the tunica vaginalis slipping off the tube, or of the testicle and back of the sac being injured, is prevented. After the whole of the fluid has escaped the canula is to be withdrawn, and the edges of the wound slightly nipped together; after which the only application necessary is a piece of adhesive plaster to the wound. The part should be suspended and the patient should be directed not to walk about much for the next twenty-four hours, and to abstain from active exercise for a day or two; a precaution which is more especially necessary in individuals of an irritable or unhealthy constitution or in advanced life. If this advice be neglected, acute inflammation of the tunica vaginalis is liable to succeed the operation. Some years ago I tapped the hydrocele of a healthy man, fifty years of age, who, notwithstanding the caution I had given him, walked several miles the same afternoon; the consequence was severe inflammation of the sac, followed by sloughing of the scrotum. After much suffering he recovered, at the expiration of eight weeks, with the disease permanently cured. At a later period of life, if proper precautions be not taken, the palliative operation

can scarcely be viewed as free from danger. Sir A. Cooper mentions two cases of persons in advanced age, who having taken a long walk after the operation, had inflammation and sloughing of the scrotum, which terminated fatally.[1] Mr. Hamilton, of Dublin, also mentioned to me a case of gangrene of the scrotum ending fatally, which occurred, in a person of unhealthy constitution, from simple tapping.

The wound made by the trocar heals by the first intention. Friction of the scrotum against the dress sometimes causes slight inflammation, and even ulceration afterwards, so as to require the attention of the surgeon; but this is seldom the case, and when it occurs is easily remedied by the ordinary means. Occasionally there is slight extravasation in the connective tissue of the scrotum from a wound of some small vessel external to the sac, but very rarely to any extent so as to interfere with the healing of the wound.

The operation is always admissible whenever the amount of fluid is sufficient to admit of the introduction of the trocar without risk of injury to the testicle. It should be repeated as soon after the fluid has collected again as the tumour from its size or weight becomes troublesome. This varies greatly. I have had patients who for many years have been satisfied with the relief afforded by an annual operation; and in one case the fluid did not collect in a sufficient quantity to need removal for four years, when I drew off no more than sixteen ounces. In other instances patients have returned to have the fluid evacuated again at the expiration of two or three months, and even of a much shorter period. Indeed, I have known the hydrocele to regain its former size in the course of two or three days. Many

[1] Lib. cit. p. 181.

persons complain of uneasiness from only a small quantity of fluid, whilst others experience but little inconvenience until the hydrocele has attained a large size. In most cases the patient's feelings will be the best guide in indicating the necessity for a repetition of the operation.

Many persons affected with hydrocele, which after being tapped appears very slowly, and without causing uneasiness, are so satisfied with the temporary benefit afforded by this slight and almost painless operation, that they desire no further relief than is derivable from its repeated performance; and as hydrocele is not a disease which if suffered to remain is commonly followed by important consequences, such persons may be safely left to consult their own inclinations. Some patients are too timid to submit to any other kind of treatment, and others are unwilling to undergo for the permanent relief of so slight an inconvenience even the short confinement which might be required. Persons out of health, of an irritable constitution, or in advanced life, upon whom the radical operation cannot be performed without risk, must likewise be content with palliative treatment.

The tunica vaginalis may be emptied by a puncture made with a needle; when the fluid, instead of escaping externally, as in the former operation, gradually infiltrates the connective tissue surrounding the sac, whence it is afterwards removed by absorption. In this operation, which is termed *acupuncture*, anasarca of the scrotum is substituted for a common hydrocele. It was first suggested by Dr. Cumin, of Glasgow, who, at the conclusion of some observations on the treatment of ganglion by a similar procedure, published in 1825, remarks, that it has occurred to him that a cure of hydrocele might be accomplished by opening a commu-

nication, by means of the cataract needle, between the cavity of the tunica vaginalis and the cellular tissue of the scrotum.[1] He did not, however, submit this idea to the test of experiment. Several surgeons have subsequently claimed the merit of originating this operation as a palliative cure for hydrocele. Mr. Lewis, surgeon, of London, is entitled to the credit of having first recommended acupuncture to his professional brethren on the grounds of practical experience of its efficacy;[2] though no doubt can be entertained that the plan had been previously resorted to by other surgeons, who had regarded it as either too simple or too unimportant to deserve a formal notice, or who perhaps did not sufficiently appreciate its value.[3] Mr. Lewis punctured the tumour with a fine needle until a drop of fluid oozed out in withdrawing it, and in a few days the hydrocele entirely disappeared. The absence of danger, the slow re-accumulation of fluid, and the simplicity of the operation, are the advantages which he considers to be obtained by this mode over the operation of removing the fluid at once. In performing acupuncture I employ the common cataract needle, which I usually introduce in two or three different places, rotating the instrument between the finger and thumb to render the openings in the sac sufficiently patent. A little serum generally oozes out from the puncture in the skin in drops, or issues in a stream for a few seconds, and then ceases. In the course of a few hours the scrotal swelling becomes a good deal changed, and instead of a tense, smooth, and defined tumour, presents an œdematous tumefaction, with a soft, doughy, and inelastic feel. In large hydroceles

[1] Edinb. Medical and Surgical Journal, vol. xxiv. p. 97.

[2] Lancet, vol. ii. 1835-36, p. 206.

[3] Vide note from Mr. Keate on the Treatment of Hydrocele, Medical Gazette, vol. xix. p. 789.

the œdema extends to the integuments of the penis. The swelling thus produced takes from three days to a week gradually to disappear, the scrotum in favourable cases being left in its natural condition, without any excess of fluid either in its loose connective tissue or in the sac of the tunica vaginalis. The operation may be repeated again and again as the fluid returns, on each occasion before the tumour has acquired the same size as on the preceding one, by which means the sac may sometimes be gradually reduced to its natural size.

Though the advocates of this operation have not claimed for it the merit of constantly affording radical relief, it has been observed that the reaccumulation follows less quickly than after the fluid has been evacuated at once by the trocar, and in many instances does not take place at all. This accords to a certain extent with my own experience, for in several cases in which I have performed it, there was no return of the hydrocele for a period of many months.

Acupuncture cannot, however, be relied on for the permanent cure of hydrocele, but it must be regarded as a useful addition to our remedial means. It does not supersede the use of the trocar; for the latter is scarcely more painful or less simple, and in careful hands is equally safe and free from hazard, whilst the immediate and certain relief which the trocar affords will always give it an advantage. Acupuncture, too, is ill adapted for cases of thickened sac. In very timid persons, in those of impaired constitutions, and in children, and in some other forms of hydrocele not yet described, acupuncture may be resorted to with benefit, and even preferred to the trocar. I am informed by Mr. Luke, that in the case of a gentleman who was about to proceed to

a place in South America, where there would be no surgeon nearer his residence than 400 or 500 miles, he instructed his patient to perform this simple and harmless operation on himself.

Radical Treatment of Hydrocele by Operation.

The permanent and radical cure of hydrocele may be effected by any of the following operations :—incision of the sac ; excision or removal of the tunica vaginalis ; caustic applied to the integuments ; a tent introduced into the tunica vaginalis ; a seton passed through the sac ; and injection of the sac with a stimulating fluid ;—all which plans appear to have been known to ancient practitioners.[1]

Incision.—The treatment by incision is the most ancient of all these methods. In performing it the surgeon cuts gradually down to the cyst with a scalpel, and, making an opening into the upper part, introduces a director or the finger, and with a bistoury lays open the cyst as far as the bottom of the sac, so as completely to expose the testicle. Inflammation soon arises, and the tunica vaginalis becomes obliterated by adhesion ; or else suppuration ensues, and the part heals by granulation. After the incision was completed, it was often the custom to stuff the tunica vaginalis with lint, or to apply some other coarse and irritating substance. This

[1] Those interested in the history of the methods of cure for hydrocele may consult the writings of Sabatier (Médecine Opératoire), and the Treatise on Hydrocele by Sir James Earle. There are few diseases of the same importance which have been so much written on as this affection. Besides being largely treated of in most works on surgery, hydrocele and the particular modes of curing it have formed the subject of distinct treatises by the following British writers :—Douglas, Else, Pott, Howard, B. Bell, Keate, Earle, Holbrook, and Dease. Some of these works have run through several editions.

operation was consequently always succeeded by acute inflammation of the sac, the constitutional effects of which frequently proved exceedingly severe. Many of the older surgeons, as Wiseman, Cheselden, Heister, and Sharp, have noticed the painful and even dangerous consequences which sometimes resulted; and it is observed by Pott that this "method can never be said to be totally and absolutely void of some danger."[1] Mr. B. Bell, of Edinburgh, is the most recent authority in this country who has advocated this method of treating hydrocele, which he slightly improved upon by devising a less irritating mode of dressing.[2]

Mr. H. Curling, of Ramsgate, witnessed in Paris, in 1837, several cases of hydrocele cured by incision by Jobert; but the treatment proved very severe, and confined the patients to bed for a long time. I have myself seen three cases of this disease attended with considerable thickening of the sac, which, after injections had failed, were successfully treated by incision; and certainly the consequences were less severe than the representations of Sharp and Pott would lead us to expect; but in these cases the sac, being coated with lymph, was less disposed to inflammation than usual. Incision is rarely resorted to in the present day for the cure of vaginal hydrocele; and I quite concur in the general opinion, that the disease can be successfully treated by milder and safer means. When, however, in consequence of difficulty in the diagnosis, or of suspicion of hernia or disease of the testicle, an exploratory operation is required, or when a hydrocele is attended with great thickening of the sac, or is found to depend on the presence of loose cartilages, an incision may then be made with advantage.

[1] Lib. cit. p. 441.

[2] Treatise on Hydrocele.

Excision consists in cutting down upon the tunica vaginalis and excising the greater part of it with a pair of scissors, the spermatic vessels and testicle being left untouched. The wound, which is filled with lint and dressed, subsequently suppurates and heals by granulation. This operation is also one of considerable antiquity; but it long remained in disuse, until it was revived in England in the year 1755 by Mr. Douglas, who advised the removal of an oval portion of the scrotum, together with the cyst.[1] About the same period Bertrandi and several surgeons of eminence in France adopted the operation. The consequences of excision were not less severe or dangerous than those of incision; it was sometimes followed by gangrene of the scrotum, and generally by much constitutional irritation and tedious suppuration. This operation is rarely, if ever, performed in vaginal hydrocele, except in cases of great thickening and induration of the sac, in which it is the most suitable treatment. I have now performed it many times, in some cases with thickening as great as in chronic hæmatocele, and without any serious result.

Caustic.—In this method of treating hydrocele a caustic is applied to the scrotum, so as to destroy the integuments, and cause a slough extending to the tunica vaginalis. When the slough separates, the cavity of the tunica vaginalis becomes exposed, and the fluid within it escapes. This is followed by inflammation of the membrane, which afterwards contracts and closes by adhesion and granulation. The effects of the caustic are represented in Fig. 8 (p. 97). In the preparation there is a small aperture in the tunica vaginalis about a quarter of an inch in diameter, produced by a slough,

[1] Treatise on Hydrocele, p. 136.

and the inflamed membrane is coated with delicate flocculi of lymph. The caustic, although a mode of treatment introduced at a later date than incision and excision, was practised by surgeons at a very early period. It has been particularly described and advocated by Mr. Else; and Mr. Cline, one of the best practical surgeons of his day, also appears to have formed a very favourable opinion of this remedy, which he considered the mildest mode of all others.[1]

The caustic is in some respects a better method of treatment than those previously in vogue, the inflammation which it excites being less active and dangerous, but for many reasons it is an objectionable remedy. It occasions a needless destruction of parts, and is liable to produce a tedious and unhealthy sore; its action cannot be regulated with such exactness as to insure an opening through the tunica vaginalis, so that a fresh application of the caustic, or the introduction of a lancet or trocar, was often necessary to complete the process; its operation is slow, and the consequences are unnecessarily severe and painful. The treatment by caustic has therefore been long superseded in this country by milder means.

Tent.—This method consists in keeping a wound made in the tunica vaginalis by a small incision patent by introducing a tent of linen, lint, or sponge, or some more solid substance, as a canula, or piece of elastic gum catheter, so as to induce inflammation. In some instances, when the tent was not of an irritating nature and was soon removed, the inflammation excited terminated in the effusion of lymph and the adhesion of the

[1] Lectures on Surgery, from Notes by Dr. Wilkinson.—Medical Gazette, vol. xxiii. p. 279. It must be observed that Mr. Cline's favourable opinion of the caustic was expressed previous to the appearance of Sir J. Earle's work on the radical cure by injection.

sides of the membrane. In other cases the result was less favourable, the inflammation ending in suppuration, and the obliteration of the cyst by granulation. The introduction of a tent into the tunica vaginalis is a very certain and effective mode of curing hydrocele, and at one period it was very commonly resorted to by practitioners. One of the most recent authorities by whom it is recommended is the late Baron Larrey, the distinguished French military surgeon. His plan was, after drawing off the fluid by means of a trocar, to pass a piece of gum-elastic catheter through the canula into the interior of the tunica vaginalis, and to leave it there until sufficient inflammation to procure adhesion was excited. He speaks of this proceeding as being as mild as it is certain.[1] Such has not proved to be the case in other hands; and this, as well as the other forms of the tent, are in the present day rarely if ever resorted to for the cure of hydrocele.

Seton.—The invention of this mode of treatment is ascribed to the Arabians. It appears to have remained in disuse for many years before the time of Pott. This excellent surgeon having experienced the severe effects of the methods of treatment already described, was induced to make trial of the seton, which he employed in numerous instances with success. His aim in the operation was to produce a cohesion without destroying the tunic, or causing it to slough. His improved mode of performing the operation has been particularly described by Sir James Earle,[2] who states that in less than twenty-four hours after the introduction of a seton consisting of coarse sewing silk, by means of an eye-probe carried through the canula of the trocar along the whole

[1] Mémoires de Chirurgie Militaires, t. iii. p. 407.
[2] Treatise on the Hydrocele, p. 70.

length of the sac, the scrotum and testicle began to inflame, and put on the appearance of a hernia humoralis, which was treated in the same manner as is usual in that complaint. When the swelling was diminished, and the parts were regaining their natural state, which happened about the tenth or twelfth day, the seton was gradually removed, a few only of the threads being withdrawn at a time.

The late Mr. Green, of St. Thomas's Hospital, was an advocate of this plan.[1] His mode of performing the operation was nearly the same as that practised by Pott; but there was this important difference in the treatment: that the seton was retained a much shorter period, the average time being twenty-four hours, though it varied in different instances. In three of the eight cases treated on this plan which are reported, the re-introduction of the seton was necessary. In one case the connective tissue of the scrotum suppurated, and in another an abscess formed in the vaginal membrane: both required to be punctured. In two instances the seton was obliged to be removed in a few hours, on account of the excessive pain which it produced. In the only three cases in which the seton operated mildly as well as successfully, one was cured in twenty-seven days, another in twenty-nine, and a third in about a fortnight. Mr. Green's account of these cases will induce few to take a favourable view of this plan of treatment.

The seton is a better mode of treating simple hydrocele than the other plans which I have described; but though a remedy less severe than these, it is not free from the same objection, of being very liable to

[1] On the Treatment of Hydrocele by Setons, St. Thomas's Hospital Reports, No. I., p. 59.

produce more inflammation than is requisite for the cure of the complaint. It is, however, a very useful remedy in certain forms of the disease, and in vaginal hydrocele under certain circumstances. The plan I adopt is to pass an ordinary curved needle, armed with a single or double silk ligature, through the skin and sac in front, leaving the space of an inch or an inch and a half between the ends of the ligature, which may be tied loosely together to prevent the seton escaping. The two or four threads should be sufficient to fill up the apertures made by the needle, and thus prevent the admission of air and escape of blood. The fluid in the sac then drains away along the threads. Inflammation of the sac soon arises, and causes fibrinous exudation. This is known by the greater solidity of the tumour, and it is then necessary to remove the threads, usually from the second to the third or fourth day after the operation. The inflammation and swelling afterwards subside, and the hydrocele is permanently cured by adhesion. In this way of employing the seton, the sac is disturbed much less than in the ordinary method, and the inflammation excited is usually mild. I have resorted to it in many cases of encysted hydrocele of the cord and testicle, with a satisfactory result. In cases of simple hydrocele, after the failure of injections by others, I have also used the seton with success, and I have tried it, too, in cases where no other treatment has been adopted. The great objection to its use in vaginal hydrocele is the uncertainty of its operation. I have generally found it both a sure and gentle remedy, though occasionally I have been disappointed by its producing high inflammation, which it was impossible to control and which speedily ran on to suppuration.

Since the introduction of metallic sutures into surgical practice, wire has been used in setons for the cure of hydrocele. Dr. Young, of Edinburgh, tried metallic setons by request of Sir James Simpson in several cases, with success.[1] They have also been employed by other surgeons, but not generally with a happy result; for they often gave rise to active inflammation ending in suppuration.[2] Metallic setons are proved, indeed, to be open to all the objections which attach to setons of silk thread.

Injection is a plan of treatment alluded to by Celsus, who advised the use of a solution of nitre. Lambert, in his Œuvres Chirurgicales (1667), recommended the injection of sublimate dissolved in lime-water, and he has recorded several cases in which it was attended with success. The practice appears, however, to have been for some time entirely laid aside, until it was revived about the middle of the last century by Mr. G. Munro, of Scotland, who at first employed spirits of wine, but subsequently, in consequence of the pain which it excited, substituted wine.[3] This plan was soon afterwards adopted by several other surgeons in Edinburgh. Mr. S. Sharp, of London, about the same time, also made trial of an injection of spirits of wine in a case of hydrocele, which was cured after very severe inflammation and the formation of two abscesses. Douglas, Le Dran, and Pott, in their works, disapproved of injections, which towards the end of the last century fell again into disrepute, owing, it seems, to the too irritating nature of the fluids employed. Sir James Earle,[4]

[1] Med. Times and Gazette, Feb. 1859, p. 207.

[2] Such was the result of several cases in which wire setons were tried by Dr. Gillespie (Med. Times, Sept. 1859) and others, and of a case treated by one of my colleagues in the London Hospital.

[3] Munro on the Dropsy, 3rd edit. p. 222.

[4] The first edition of his Treatise on the Radical cure of Hydrocele by Injection appeared in 1791.

surgeon of St. Bartholomew's Hospital, is entitled to the credit of having introduced injections into general practice by showing the advantages of a milder mode of proceeding; and those who compare the effects of this operation, practised in the manner he recommended, with the severe results of all those methods of treating hydrocele previously resorted to, will readily acknowledge the high value of this improvement.

Different surgeons employed different kinds of stimulating fluids for injection. Sir James Earle gave the preference to dilute port wine. Solutions of alum, or of the sulphate of zinc, were also employed. Other fluids have been resorted to, as lime-water, cold and warm water, and dilute spirits of wine. Hot wine has been much used in France. All these injections have now been superseded by iodine.

Iodine injections were first employed in India by Sir Ranald Martin, the distinguished Physician to the Council of India.[1] He used the tincture in the proportion of ʒij—ʒvj of water; injected only a small quantity; and instead of afterwards withdrawing the fluid, allowed it to remain in the sac to be removed by absorption. In a report of cases of hydrocele thus treated at the Native Hospital of Calcutta,[2] it is stated that from the 9th of March, 1832, to 31st of December, 1839, 2393 cases were under treatment. Of these—

1265	were	Hindus.
1076	,,	Mahometans.
52	,,	Christians.
2393		

[1] Transactions of the Medical Society of Calcutta, vol. vii.
[2] Lancet, April 30, 1842.

And it appears that the failures were rather under one per cent.: a remarkably successful result. Since 1840 iodine injections have been generally adopted in Europe. I do not believe, as some have supposed, that iodine exerts any peculiar or specific influence on the serous sac. Like other injections it acts as a stimulant, stirring up mild inflammation, and like them also, it is liable occasionally to fail, though the retention of a portion of the injection in the sac more certainly insures a favourable result. The apparatus for iodine injections is simpler and more portable than what is required for other fluids, and the operation is free from the risk of infiltrating the scrotum. The only apparatus required, in addition to a medium-sized trocar, is a half-ounce glass syringe with a metallic nozzle which fits into a small stop-cock adapted to the canula. The metallic parts should be made of palladium, which is not acted on by iodine.[1] I employed at first injections of the strength recommended by Sir Ranald Martin (one drachm of the simple tincture of iodine to three of water), but I found this too weak, and I have used latterly a compound tincture of the following strength undiluted: iodine ℈ij, iodide of potassium ʒss, spirits of wine ℥j.—injecting from two to three drachms, and allowing this to remain in the sac for five minutes. The greater part of the fluid is then withdrawn, about half a drachm only being left behind in the sac. Some surgeons are content to inject a drachm of the tincture, and to leave it in the sac, which answers quite well. I have not found the tincture employed

[1] Palladium, being elastic, is a better material for a canula than silver. If made of silver the instruments should be immediately cleansed after use by dipping them in a solution of the hyposulphite of soda (℥j—℥j), which will prevent the iodine corroding the silver. This solution is also useful in removing iodine stains from the fingers.

in this way in adults at all too stimulating. In operating, however, on persons under puberty, I dilute it one-half.

I generally tap the hydrocele on the patient standing, and then allow him to lie down before injecting. The hydrocele is to be punctured at the same place and in the same manner as in the palliative operation, but the canula is to be pushed in up to the hilt; and after the serum is wholly evacuated, the tube of the syringe is to be applied to the canula, and the stimulating liquid injected gradually.[1] Directly the stimulating fluid becomes lodged in the vaginal sac, the patient experiences pain in the part, and in the cord, with uneasiness in the loins, and sometimes becomes sick and faint. In this condition, the recumbent is the best posture. The pain from the injection varies greatly in different cases. Some patients find it very severe, whilst others complain but little of it.[2] All suffering may be prevented by chloroform inhalation. An hour after the operation the patient is generally quite at ease. The amount of inflammation excited cannot be estimated by the degree of pain caused by the injection. There is great difference in persons in their tolerance of stimuli, inflammation being more readily excited in some than in others, but its amount and intensity by no means depend on the susceptibility of individuals to pain.

The success of the operation of injection depends in some degree on the after-treatment. If too much in-

[1] When the vaginal sac was fully distended, in the way injection was practised formerly, part of the fluid was liable to be forced into the connective tissue of the scrotum, where it sometimes caused diffuse inflammation and gangrene.

[2] A man sixty years of age, whose hydrocele I treated with the usual iodine injection, declared that he did not experience the least pain, but only a slight sensation of heat.

flammation be apprehended, means must be taken to moderate it ; on the other hand, as a certain degree of inflammatory action is essential to the cure, if no tenderness or swelling arise, the surgeon must endeavour to excite them. When symptoms of inflammation arise, which generally happen in the course of a few hours, I recommend the use of a suspender and rest in the recumbent position until they begin to subside. Should no symptoms of inflammatory action be evinced in the course of eight or twelve hours, the patient should be encouraged to move about ; and the testicle may be handled, so as to occasion slight friction between the surfaces of the tunica vaginalis. The stimulating fluids which were formerly used for injection sometimes excited so much inflammation that suppuration ensued. I have never known or heard of an instance of this after the employment of iodine. Indeed, my chief apprehension has generally been that enough inflammation had not been excited to ensure the cure of the hydrocele. Yet it is surprising how slight a disturbance will sometimes be sufficient for the cure, so that the surgeon is rarely disappointed in the result of the operation. Upon several occasions I have been apprehensive of failure, owing to the mild character of the inflammation of the sac, the patient not having been confined a single day, and yet there has been no return of the disease. In cases in which the tenderness and swelling have been so slight as to threaten a failure, I have, on the third or fourth day after the operation, introduced a small trocar and removed the fluid in the sac, and then repeated the injection, throwing in a drachm of the tincture of iodine which has been left there. This succeeded perfectly in two cases, in one of which there were only three drachms of fluid in the sac at the time of the second

operation. But if the quantity of fluid should be too small to admit of the safe introduction of a very small trocar, the surgeon may pinch up a portion of the scrotum and sac between his finger and thumb, and pass a seton consisting of two or four threads of silk through them by means of a slightly-curved needle, which will insure a cure. But iodine injection so seldom fails, that it is generally better to wait the result of the operation, even when its effects are mild, rather than resort to a measure which is not free from the risk of producing suppuration. The seton can be passed at a later period, if the injection prove a failure. In the following case unusual difficulty was experienced in exciting inflammation of the sac.—In 1852, a gentleman, aged forty, slightly dyspeptic, who had just arrived from the East Indies, where he had been resident many years, applied to me for the cure of a small hydrocele on the right side, which had been forming about six months. I tapped it on the 4th of June, and drew off about three ounces of serum, and found the testicle healthy. The fluid quickly returned, and on the 15th I removed two ounces, and injected two drachms of the compound tincture of iodine, kept the fluid in eight minutes, and left a small quantity in the sac. No inflammation ensued. The patient was allowed to walk about and take his ordinary diet with wine, and on the second day I well rubbed the surfaces of the sac together for several minutes, yet no inflammation arose. On the 18th I nipped up the scrotum and sac and passed a seton of double silk thread. The inflammation which followed was very mild, though the patient continued to walk about with the seton in. On the 23rd it was removed, and I was in hopes that the inflammation produced would prove sufficient for the cure of the hydrocele. All

evidence of inflammation quickly subsided, but not the swelling produced by the effusion. My patient being very anxious to return to India cured, with as little delay as possible, and being myself doubtful of the ultimate success of what had been done, I introduced, on the 1st July, a fine exploring trocar and drew off half an ounce of serum, and then passed a needle armed with a thick silk ligature moistened with the tincture of iodine, through the canula, which being withdrawn, the seton of two threads was left in the sac. This produced slight tenderness and a somewhat solid swelling, and on the 3rd the seton was withdrawn. The inflammation subsided slowly, and the patient left England on the 7th. I received a letter from him, from Syria, nearly a month afterwards, in which he stated that the induration and swelling had subsided, and that he was cured.

I have sometimes applied compression with strapping to the testicle to hasten absorption, in cases where the effusion was slow in disappearing after injection, and I am sure that this has had a good effect. Dr. Agnes, of the Royal Horse Guards, was the first to call attention to this after-treatment, which he had employed with benefit in two cases.[1] I have also quite lately applied strapping after injection as soon as the first effects have passed off (usually within an hour), so as to retain the opposing surfaces of the tunica vaginalis in contact, and I believe that this treatment will materially help to ensure a cure, but my experience in it is at present limited.

I seldom inject a hydrocele when the fluid amounts to more than ten or twelve ounces, because the extent of the serous surface in large hydroceles is liable to mar the success of the operation. In these cases it is better to draw off the fluid, and then wait until a smaller

[1] Lancet, May 20, 1865.

quantity is formed, when the operation may be undertaken with every hope of success. The surgeon should also be careful to ascertain that the dropsical effusion is not dependent on existing disease of the testicle. A man was admitted into the London Hospital with a double hydrocele on purpose to undergo the operation for the radical cure. He had been suffering for some time previously from disease of the larynx, which increased soon after his admission, and caused suffocation and death. On examination of the testicles, deposits of concrete pus were found in the substance of both the glands. In this case, had his state of health permitted of an operation, after removal of the fluid the morbid condition of the testicles would probably have been detected, and injection, which could only have done harm, would have been abandoned. The fluid around a diseased testicle by producing pressure sometime causes pain, and it may then be evacuated with benefit; but I need scarcely add that to attempt the permanent removal of a hydrocele whilst the original disease remains unsubdued, would be both fruitless and hurtful. The affection of the gland must be treated without reference to the effusion, and it will commonly be found, that as the former subsides the hydrocele likewise disappears. Thus, in several cases of hydrosarcocele consequent on orchitis, in which after drawing off the fluid the testicle has been found tender as well as enlarged, I have succeeded, by small doses of mercury and local treatment, in subduing the chronic inflammation of the gland and effecting the cure of the hydrocele. In some instances, however, in which inflammation of the testicle or epididymis is the primary disease, the hydrocele remains long after morbid action has ceased. The case must then be regarded in the same light, and

treated in the same way, as ordinary hydrocele. An enlarged and indurated testicle or epididymis does not, then, constitute an absolute objection to the operation for the radical cure of hydrocele; but the proceeding would not be advisable unless the original disease had been long in abeyance.

In favourable cases iodine injection is followed by only slight tenderness and swelling, and by scarcely any constitutional disturbance, and is devoid of danger. The chief risk in the old mode of injection arose from the stimulating fluid being injected into the connective tissue around the tunica vaginalis instead of into the sac, owing to the canula slipping out of the opening. This accident was sometimes succeeded by diffuse inflammation with suppuration and gangrene, and in persons advanced in life or of a debilitated constitution it has caused the loss of life. This accident might always be avoided by proper care and caution: even when it did occur, it was not invariably succeeded by serious consequences, and two cases have come to my knowledge in which dilute port wine was injected into the scrotum without any ill effects resulting. Another accident said to attend this operation is an attack of tetanus, a few cases of which have come to my knowledge. It is, however, so very rare an occurrence, many thousands having undergone injection without an attack, that the liability cannot be regarded as constituting the slightest objection to the operation.

In three or four days after injection the tenderness and swelling begin to subside, and in about three weeks the cure is usually accomplished, all the effused fluid having been removed. But sometimes this process takes place more slowly, the cure not being completed for two or three months. It was supposed at one time

that the cure by injection resulted from complete adhesion of the two surfaces of the tunica vaginalis; but more recent observations have shown that in many instances the adhesions are only partial, and that in some cases a cure is effected without any adhesion whatever, the inflammation producing such an alteration in the secretory action that the serum ceases to be poured out in excess. When the adhesion is complete the cure is permanent, and the patient free from all liability to a relapse; but if the hydrocele be removed without perfect obliteration of the cavity, the relief may be only temporary, and the same causes which originally gave rise to the hydrocele might, at a future period, occasion a return of it. Instances are known in which a hydrocele, after having been removed by injection, has re-appeared at the end of ten, and even twenty years. Some years ago I tapped a hydrocele which had been cured by injection by Sir A. Cooper twenty-five years before, and had returned only during the previous six months.

I have not had the opportunity of ascertaining anatomically the condition of the tunica vaginalis after the cure of hydrocele by iodine injection. Gosselin, however, has cited some important researches made by M. Hutin, and communicated to the Academy of Medicine of Paris. In sixteen patients who had been cured by iodine injection (two-thirds of water and one-third of tincture of iodine) eight were found after death to have complete obliteration of the vaginal sac. In four others there was partial obliteration, and in the remaining four there were no adhesions at all. Velpeau, Chaumet (of Bordeaux), and Boinet, have also noticed the absence of adhesions of the tunica vaginalis in the bodies of persons cured by iodine injection.*

[1] French Translation of this work, p. 163. M. Hutin also examined

I have injected hydroceles in adults of all ages up to seventy, but seldom later. It is desirable to avoid even slight operations on persons far advanced in life, and the injection of a hydrocele, by exciting a low form of inflammation, may lead to serious consequences. Very old people should be content with palliative treatment.

It was the opinion formerly that in double hydrocele injection should not be performed on both sides at the same time, as the effects of a double operation might prove very severe, and the injection on one side has been known to succeed in curing both, by the extension of the inflammatory action from one sac to the other, their external surfaces being nearly in contact. A man fifty years of age entered Dupuytren's clinical ward at the Hôtel-Dieu with double hydrocele. That on the right side was large, and of old standing; the other was small and recent. Dupuytren punctured and injected the first with wine, which caused the usual reaction, and the disease was cured on both sides. He had observed the same phenomenon several times.[1] I have not myself met with similar success from a single operation, and in late years I have injected both sacs at the same time with good success. In 1860 I attended, with Dr. Reginald Read, a gentleman about forty years of age, who had a double hydrocele, consequent on double syphilitic orchitis, which had been cured. I tapped both hydroceles, one immediately after the other, and drew off above eight ounces of fluid from each, and left the canulas in the sacs. I then injected the tincture of iodine, of the strength recommended at page 129, into both

fifteen subjects who had been operated on by different methods before the invention of iodine injections. Four of them had been treated with wine injection. In all these there was a complete obliteration of the tunica vaginalis.

[1] Lancette Française, Février, 1837.

sacs as quickly as possible. The shock and suffering were scarcely greater than is usual in a single operation. The inflammation which followed was mild, and both hydroceles were cured by the double operation.—In 1863 I performed a similar operation on a man aged twenty-nine, in the London Hospital. The hydroceles were large: one containing sixteen ounces of fluid, and the other seventeen. The suffering consequent on the injection was inconsiderable, and both hydroceles were quite cured in about eight weeks.—In 1864 I performed the double operation on a man aged forty-five. I drew off eight and a-half ounces of fluid from the right side, and eighteen ounces from the left. I then injected both sides with iodine of the strength above noted. He suffered very little, and nine days afterwards left the hospital. He presented himself after three months with both hydroceles cured. He stated that the one on the left side had been twice treated unsuccessfully with sulphate of zinc injection, and once with a seton, before he came under my care, so that the result of the strong iodine injection was most satisfactory.

A careful inquiry into the merits of the various modes of effecting the radical cure of hydrocele fully establishes the superiority of the treatment by iodine injection. The older surgeons committed a great error by endeavouring to excite too high a degree of inflammation; for, not perceiving that the disease could be arrested by altering the action of the vessels of the part, they sought to obtain the closure of the natural cavity, which, moreover, they endeavoured to effect by producing suppurative inflammation and granulation, instead of by the milder process of adhesion. The improvement in treatment consists in reducing the local disturbance to the lowest possible standard, the chief risk incurred arising

from the plans employed proving too mild to be efficacious and sure. Iodine injection has now been largely tried in this and other countries; and experience warrants us in asserting that, though it is not an infallible remedy, of all the plans hitherto practised it combines the greatest number of advantages. The pain attending it is slight; its effects are mild, and at the same time tolerably sure; it is quite free from danger; and it often succeeds without altering the natural condition of the parts. I know it is a question whether the cure by adhesion, though less perfect than that in which the disposition merely of the vessels is changed, is not upon the whole preferable. In the latter there is a possibility of a relapse at some future period; whilst the inconvenience produced by an impediment to the free movements of the testicle, in cases cured by adhesion, is regarded as too trivial to be any disadvantage. But now after a long and large experience, I can bear strong testimony to the great rarity of a return of the hydrocele after the cure by iodine injection; so that I have no hesitation in preferring to leave the patient exposed to the very distant chance of a relapse, than to subject him to severe treatment in order to secure adhesion and obliteration of the sac. Iodine injection, however, is not capable of effecting a cure in every case. The judicious surgeon, therefore, whilst resorting to it as his ordinary remedy, will be prepared in special cases to avail himself of other means, such as the seton, incision or excision of the sac.

The causes which lead to failure of injection are sometimes obscure. In some instances there appears to be an insusceptibility in the vaginal membrane to a change in its disposition to excessive secretion. Previous inflammation of the sac is, however, a principal cause of failure, and, as Gosselin particularly pointed out, a thickened

sac, too dense and inflexible to admit of collapse and contraction after evacuation of the fluid, is very unfavourable to adhesions between the opposed surfaces, whilst the lining false membrane modifies the vitality of the tunica vaginalis. In cases of slight thickening, a second injection of strong tincture of iodine a few days after the first, when effusion has returned, would tend materially to ensure success. I have done this in several cases. In old hydroceles, with a sac greatly thickened, excision of a large portion of the dense tissues is the best remedy. The cure is speedier and more satisfactory than when incision only is performed.

The complication of encysted hydrocele of the testicle with vaginal hydrocele is a rare but occasional cause of failure of injection of the latter. Two interesting cases illustrating this will be found at page 184.

SECTION II.

INGUINAL HYDROCELE.

A TESTICLE detained in the inguinal canal, or outside the external abdominal ring, and enclosed in a distinct tunica vaginalis, may be surrounded by serum, forming a tumour which may be properly termed *inguinal hydrocele*. The complaint has been rarely noticed, and is one very liable to escape detection during life.—A man, aged sixty, who was supposed to be affected with hernia, died in the physicians' ward of the London Hospital of pneumonia. On examination of the body, a large swelling was observed in the right groin, and the scrotum on that side was defective and contained no testicle. The swelling consisted of a large cyst, with thin walls, which projected from the inguinal canal, extending through the

external ring and mounting upwards on the aponeurosis of the external oblique muscle. A constriction in the sac corresponded to the external ring. On laying open the sac, the testicle was found lodged in the part situated in the inguinal canal. The gland was quite small, like the undeveloped testicle of a child. It was free from adhesions, and healthy in structure. The vaginal sac contained about six ounces of clear fluid. It was slightly sacculated, extended up to the internal ring, but had no communication with the peritoneum. The left testicle was small, but sound in structure, and situated in the scrotum.

At page 43 I have related the case of a labouring man who suffered severely from a retained testicle, and had also an inguinal hydrocele. It formed a large, tense, fluctuating tumour, of an oval shape, extending transversely from the external ring to the centre of the pubes. He stated that it was small in size after rest, but that it increased under exertion during the day. Dr. Richet admitted into the hospital of La Charité, in Paris, a man, nearly fifty years of age, who had both testicles in the inguinal canals. On the left side there was an acute hydrocele, consequent on the improper application of a hernial bandage. Dr. Richet punctured the tumour, and discharged some clear yellow fluid. The effusion did not return.[1] In the case of hernia with retained testicle related at page 44, there was an acute hydrocele, which was tapped by Blandin. When visiting the hospital of St. Eugenie, in Paris, in 1862, I was shown by Dr. Marjolin a boy, aged eight, who had an inguinal hydrocele on the right side. The scrotum was developed on both sides. On the left the testicle was present, but on the right there was only a filamentous

[1] Godard. Études sur la Monorchidie, p. 131.

substance in the scrotum, no doubt an elongated epididymis: The tumour in the right groin was about the size of a small hen's egg. It was tense, fluctuating, irreducible, and received no impulse on coughing, and it was distinctly transparent.

As the serous sac surrounding a testicle detained in the inguinal canal more generally communicates with the abdomen, inguinal hydrocele is very rare. A hydrocele in the groin, with an absence of the testicle from the scrotum on the corresponding side, might be mistaken for an irreducible hernia complicated with a detained testicle. The best diagnostic marks would be the fluctuating feel and transparency of the tumour; but, in consequence of the sheltered situation of the swelling, its translucency might be difficult of detection. This form of hydrocele must not be confounded with the cases of inguinal and abdominal swelling described at page 102, since in the latter there was a scrotal tumour, of which the inguinal was only a prolongation, the testicle being in its normal site.

A chronic hydrocele in the groin might be cured by iodine injection; but it will generally be better to get rid of the complaint, and of other troubles attending a detained testicle, by excising the atrophied and useless gland.

SECTION III.

CONGENITAL HYDROCELE.

In common and in inguinal hydrocele the original communication between the cavities of the peritoneum and of the tunica vaginalis is permanently obliterated; but it sometimes happens that fluid accumulates around the

testicle in cases in which the obliteration has not been completed, constituting the variety termed *congenital hydrocele*. The opening of communication between the two cavities is usually small in size, about sufficient to admit a crow's or goose's quill. In these cases it is difficult to determine whether the fluid is secreted in the abdomen or in the tunica vaginalis; since, if poured out by the peritoneum, it must naturally tend to accumulate in the more depending cavity. But as the fluid usually becomes absorbed after the communication between the abdomen and tunica vaginalis has been obliterated by pressure, it seems probable that the fluid is originally formed in the abdomen. There is rather a rare variety of congenital hydrocele, in which the testicle is retained in the abdomen or inguinal canal whilst the peritoneum, prolonged for a short distance into the scrotum, forms the cyst containing the fluid, which is covered only by the integuments and superficial fascia. A hydrocele presenting the same characters as the congenital sometimes follows a late transition of the testicle, unaccompanied with a hernial descent. This is also a case of rare occurrence; but I once met with an instance in a lad eighteen years of age.

Symptoms.—A congenital hydrocele usually appears soon after birth, forming a smooth, transparent, fluctuating swelling, which is prolonged into the inguinal canal, and receives an impulse when the child coughs or struggles. By gentle pressure the fluid may be gradually forced up into the abdominal cavity, and as the tumour disappears the testicle becomes perceptible in the scrotum. The same symptoms are produced by this complaint in the adult; it has also been noticed that the hydrocele is larger at night than when the patient first rises in the morning. M. J. Cloquet observed, in two cases of congenital hydrocele in adults, that the hand expe-

rienced a tremulous and peculiar rustling sensation in pressing the fluid into the abdomen.[1]

Diagnosis. — Congenital hydrocele is easily distinguished from ordinary hydrocele by the absence of a defined boundary to the tumour at its upper part; by the impulse received on coughing; and by pressure, causing the disappearance of the swelling, and rendering the testicle perceptible. A congenital hydrocele might be mistaken for a reducible intestinal hernia, which also disappears on pressure, and dilates and receives an impulse on coughing; but the nature of the disease is indicated by the fluctuation and transparency of the swelling, and by the absence of the gurgling sound accompanying the return of the intestine, and by the circumstance that if the fluid be returned into the abdomen whilst the patient is in the recumbent position, and pressure with the finger be lightly made at the ring, on his assuming the erect posture the fluid will imperceptibly escape into the sac, and cause a gradual return of the swelling, though nothing has been felt to pass the ring, and the surgeon is quite certain that the intestine cannot have descended.

I once met with a case of congenital hydrocele in a boy three years of age, the diagnosis of which was attended with unusual difficulty; so much so that the case had been mistaken by an experienced hospital surgeon. The swelling had been noticed only a few months, and it presented the characters of simple hydrocele. There was no impulse received on coughing, and the swelling was not immediately reduced by pressure and by placing the boy in the recumbent posture. The father stated, however, that the swelling was de-

[1] Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 95.

cidedly less in size in the morning than at night, and there appeared to be a slight thickening in the direction of the cord. Dr. Buchanan, formerly of Stepney, who sent the case to me, also mentioned that he had succeeded by long continued pressure in reducing the size of the swelling. I placed the boy in the recumbent posture, and kept up steady pressure on the tumour for some time. After fifteen minutes it was perceptibly smaller, in half an hour it was diminished one-half, and at the end of fifty minutes it was only a quarter its previous size; but I did not succeed in causing its entire disappearance, the father objecting to my continuing my efforts. I believe that the aperture of communication in this case was scarcely so large as a pin-hole. In no other way can I account for the very gradual subsidence of the tumour on pressure. The small size of the opening would also explain the want of impulse. The hydrocele was quite cured in a few weeks by pressure on the inguinal canal.

Treatment.—In the treatment of congenital hydrocele the primary object is to occasion an obliteration of the neck of the sac, so as to cut off the communication with the abdomen. For this purpose the patient must constantly wear a truss made to press firmly on the inguinal canal. After adhesion has taken place the fluid usually disappears: its removal may be encouraged by the application of a stimulating lotion, or may be effected by acupuncture. This plan is usually successful when adopted in early life; but if after many months' trial it is found to fail, the truss should still be worn, not only to prevent the passage of fluid from the abdomen into the sac, but also to impede a hernial descent, and to afford a further chance of obtaining obliteration of the opening. This form of hydrocele

sometimes requires injection for its cure, but the operation should not be performed until an effort has been made to close the communication between the sac and abdomen. In 1851 a young gentleman, aged nineteen, consulted me on account of a congenital hydrocele, for which I recommended wearing a truss. The opening of communication with the abdomen, which from the symptoms must have been very small, appeared to have closed after some months. The fluid in the tunica vaginalis, however, did not disappear, and as he was living at a distance in the country, he applied to another surgeon, who first tried iodine injection and afterwards the seton without success. He placed himself under my care in 1856. I injected the sac with strong tincture of iodine, leaving a portion behind. The operation produced chronic inflammation of the epididymis which subsided somewhat slowly, but the hydrocele became cured.

Experience shows that so little risk attends the injection of iodine into important serous sacs, that the surgeon need not be deterred by the patency of the communication with the abdomen from attempting the cure of a congenital hydrocele, after steady pressure has failed to obliterate the opening. The passage of the fluid into the peritoneal sac can be readily prevented during the operation by pressure at the ring, and no danger is likely to ensue from extension of inflammation afterwards.[1] Formerly, when more stimulating injections were employed, this practice was attended with

[1] The little risk attending iodine injection in congenital hydrocele is confirmed by the immunity from peritonitis observed in those cases where the hernial sac has been injected for the radical cure of an inguinal rupture. Gosselin, who notices this, has cited three cases in which he operated in this way for the radical cure of hernia without the slightest symptom of peritonitis.

great risk. Peritonitis has been excited and death has followed. A strong motive for persevering in the attempt to cure congenital hydrocele in early life is the risk of inflammation to which the testicle is afterwards liable, extending to the sac, and thence to the peritoneum in the abdominal cavity,—an inconvenience similar to that remarked in the case of imperfect transition of the testicle. Cloquet examined the body of a man, aged fifty, affected with congenital hernia, whose thoracic and abdominal viscera were perfectly sound; but the abdominal cavity contained six pints of yellow serum mixed with flocculent albumen, which appeared to have originated in disease of the testicle, and the extension of inflammation from the tunica vaginalis to the peritoneum.[1]

SECTION IV.

ENCYSTED HYDROCELE OF THE TESTICLE.

In this form of hydrocele, fluid is effused into an adventitious cyst or cysts distinct from the sac of the tunica vaginalis. They may be developed in two situations: 1. Beneath the visceral portion of the tunica vaginalis investing the epididymis; 2. Between the testicular portion of the tunica vaginalis and the tunica albuginea, which are thus separated from each other. The first is by far the most common situation, the latter being very rare.

Since the publication of the last edition of this work I have re-examined the cysts formed in connexion with the epididymis, and have been led to modify somewhat my views respecting them, which are now more in accordance

[1] Lib. cit. p. 144.

with the observations of Gosselin[1] and Luschka.[2] Two kinds of cysts are developed in this part, 1. The *subserous*, and, 2. The *parenchymatous;* or, according to Gosselin, the *small* and *large*.

The subserous are small spherical or oval thin-walled cysts not larger than a pea, and even smaller, which are frequently found immediately beneath the serous membrane covering the head of the epididymis, in which they produce a slight depression. In several instances I have found as many as five or six perfectly distinct cysts connected with this part. Sometimes one or two small cysts are so embedded in the substance of the epididymis, that they appear like pellucid spots on its surface. Though these minute cysts generally contain a limpid serum, I have found them filled with fluid of a milky hue, probably from the presence of fatty matter, and I have observed matter like pus tinged with blood, but have never detected spermatozoa in them, nor has Gosselin. The cysts are formed in the subserous connective tissue, and may be enucleated from it. They have no connexion with the efferent tubes, never attain a large size, and do not give rise to any symptoms requiring surgical treatment.

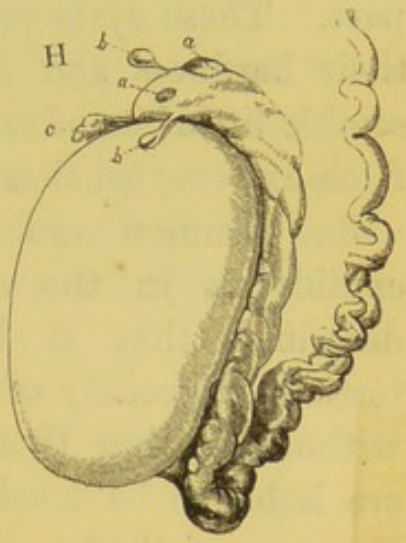
These small accidental cysts sometimes project the tunica vaginalis before them until they become so far separated from the part where they were originally formed, as to be attached only by a narrow peduncle formed by the contracted tunica vaginalis. Such is the mode of development of those small pedunculated cysts containing a limpid fluid often found hanging from the

[1] M. Gosselin has given an elaborate account of the cysts connected with the epididymis in two papers published in the 16th volume (4ème série) of the Archives Générales de Médecine.

[2] Virchow's Archiv, vol. vi. p. 310; also Wedl's Pathological Histology, p. 465 (Syd. Soc.).

head of the epididymis, commonly known as the hydatids of Morgagni. I have on many occasions observed them in the different stages of their production. (*Vide* Figure). Thus I have seen a pedunculated cyst

FIG. 9.



H. Cysts developed in the epididymis:—
a, *a*. Small cysts slightly elevating the tunica vaginalis.
b, *b*. Small pedunculated cysts.
c. Small process or fold of the serous membrane attached at the junction of the epididymis to the body of the testicle.

attached to one part, whilst close to it there was a cyst of a similar nature embedded in the substance of the epididymis. In other instances I have found the cyst very prominent, but still connected by a broad attachment of the tunica vaginalis reflected over it, the membrane not having as yet contracted to form a narrow neck. In all these cases the prolongation of the tunica vaginalis investing the cyst could always be demonstrated by a little careful dissection, and between this membrane and the cyst some minute red blood-vessels were generally seen ramifying. These pedunculated cysts never acquire a large size; I have seldom found them to exceed that of a currant. From the exposed situation of the testicle, they are liable to be ruptured, the vestiges of them consisting of fimbriated folds of membrane; but this is not a common occurrence. I have seen the delicate peduncle by which the cyst was attached as long as three-quarters of an inch. Similar

cysts are sometimes developed in the little appendage to the tunica vaginalis so often connected with the upper part of the testicle. Small cysts of a somewhat irregular form and remarkable firmness are occasionally found at the side of the epididymis, near its middle part. These cysts contain a limpid fluid, but owing to their hardness and semi-transparency they closely resemble little bits of enchondroma. The hardness results from extreme tension of the walls of the cyst.

So common are small cysts connected with the epididymis in the various states and stages I have described, that it is impossible to examine many testicles, especially of persons beyond the age of puberty, without finding them. According to Gosselin,[1] they are liable to be developed from the period of puberty to the age of thirty or thirty-five, but are rare at this period. After the age of forty they are very common, having being met with by him in at least two-thirds of the testicles examined. Dr. Banks, in an able memoir[2] on the Wolffian bodies of the fœtus, and their remains in the adult, has recently ascribed the origin of these small serous cysts to enlargements of Müller's duct, and he has shown that they occur just where traces of the duct are sometimes met with.[3]

The parenchymatous, or large cysts, are generally found rather below the head of the epididymis, close

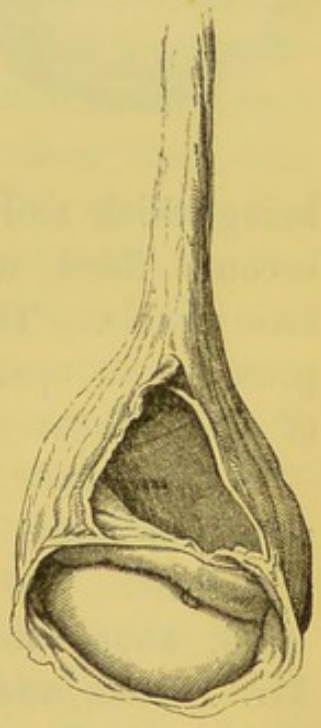
[1] In examining a healthy testicle I once found six or seven small cysts about the size of currants, studding the surface of the loose portion of the tunica vaginalis. Two of them were situated in a part of the membrane extending up the cord. They projected internally, and contained a limpid fluid. I have twice since seen a similar kind of cyst in the same portion of the tunica vaginalis. Similar adventitious cysts have also been observed on the internal surface of the sac of a simple hydrocele, and a preparation of the kind is contained in the Hunterian Museum.

[2] Prize Thesis, Edinburgh, 1864.

[3] Luschka had previously supposed that these cysts originate in a dilatation of the vesicles and cæcal tubes of the Wolffian body.

to the anterior extremity of its lower border. They are developed in the connective tissue beneath the investing membrane of the epididymis, and in close contact with the efferent tubes. They are lined with a delicate tesselated epithelium. They are generally solitary, and seldom exceed two or three in number, but are occasionally numerous. When one or more of these parenchymatous cysts increase so as to form a tumour in the scrotum they constitute the form of hydrocele called, from its original seat, *encysted hydrocele of the epididymis*. As a cyst enlarges the epididymis becomes flattened, and displaced to one side, whilst the testicle is found either in front or at the bottom. It is sometimes at the side, but rarely at the posterior part of the swelling. In the adjoining woodcut of a specimen in the London Hospital College, the cyst is above the testicle, which is so displaced by it that its anterior edge is directed downwards. When the hydrocele is composed of several cysts, they are seldom of large size, but form a cluster more or less complicated and irregular, according to their size and number.

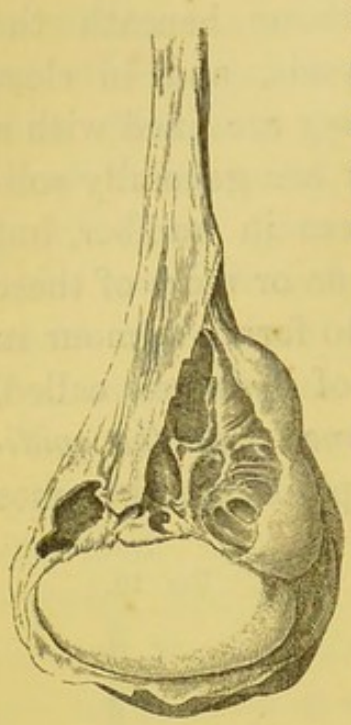
Fig. 10.



A curious sacculated arrangement produced by the development of numerous contiguous cysts may be seen in figure 11 (next page), taken from a specimen dissected by me, and preserved in the London Hospital College. Part of the walls of the cysts are cut away to exhibit their interiors.

The fluid contained in these cysts, when small in size, differs from that of vaginal hydrocele in being

Fig. 11.



perfectly limpid and colourless, and nearly free from albumen. It contains molecular granules in great abundance. The fluid seldom exceeds three or four ounces in quantity, though I have removed as much as thirty-two ounces from a single cyst. The cysts are liable to inflammation, which causes more or less alteration in the quality and appearance of the fluid contained in them. It may become very albuminous and assume the straw or amber colour of ordinary hydrocele; and the cyst may contain lymph, form adhesions, or be lined with a false membrane, the fluid being thick and turbid. The cysts are liable also to become filled with blood, constituting a variety of hæmatocele. The fluid instead of being limpid, often presents an opaline opacity arising from the presence of spermatozoa.

The presence of spermatozoa in the cyst is a circumstance of much interest in connexion with this form of hydrocele. The discovery was made in this country in 1843, about the same time, and independently, by Mr. Liston, and by Mr. Lloyd, of St. Bartholomew's Hospital.[1] Since this period I have met with them in a large number of cases of encysted hydrocele, indeed in the majority of instances in which I have searched for them. They were found in subjects of various ages, from thirty to seventy-five, and in cysts of all sizes, from

[1] *Vide* Medico-Chirurgical Trans. vol. xxvi. pp. 216 and 368. Velpeau states that the presence of spermatozoa in the fluid of a hydrocele was first noticed in a patient of his in the Hospital of La Charité in 1840 by M. Letellier, who mentioned the fact in his Thesis. *Vide* Dictionnaire de Médecine, 1844, t. xxix. p. 496.

that of a filbert to the largest which the hydrocele attains. The fluid in some instances contained these bodies in remarkable abundance; in others they existed sparingly. When very numerous, they give to the fluid an opaline opacity, or an appearance resembling cocoa-nut milk, which is so characteristic as to enable the surgeon to predicate their presence from the appearance of the fluid alone without minute examination. If the fluid be allowed to remain at rest in a glass vessel, the spermatozoa subside to the bottom, rendering the lower portion more opaque and milky-looking than the upper. The fluid also exhibits slight traces of albumen, when tested in the usual way, which is not the case with the ordinary pellucid colourless fluid of encysted hydrocele. The spermatozoa were sometimes as perfect in form and as lively as in fresh semen; at other times they were quiescent and imperfect, the tails, or other parts, being wanting. They were observed more frequently in the larger cysts than in the smaller. I once found them in fluids removed from two distinct cysts connected with the epididymis of a man about sixty years of age. I have detected them in the fluid from encysted hydroceles tapped for the first time, and also in the examination of small cysts connected with testicles removed after death. In a man, aged seventy-five, I removed from an encysted hydrocele, which had never been tapped before, as much as thirty-two ounces of fluid, which contained an abundance of spermatozoa. They were also detected in fluid taken from a man aged fifty-four, who stated that the tumour had existed for twenty years, and had never been operated on before. In a case of four years' duration, Mr. Stanley removed from a cyst on the right side twenty-five ounces of fluid containing spermatozoa, and from one on the left side forty-six ounces. The age is not stated.[1]

[1] Paget's Pathology, 2nd edit., p. 413.

Various opinions have been broached to account for the occurrence of spermatozoa in the fluid in this form of hydrocele. It has been supposed that these bodies were accidentally introduced, owing to a wound of an adjoining duct in the operation of tapping; but this is disproved by their having been observed in cysts when tapped for the first time, and in others which have never been opened until after death. Mr. Paget suggests, as the most probable explanation, "that certain cysts seated near the organ which naturally secretes the material for semen, may possess a power of secreting a similar fluid.[1] This explanation has never appeared to me satisfactory. The cysts in which spermatozoa are found are not formed in connexion with the secretory portion of the organ, but with the excretory, so that the analogy with the cysts in the thyroid and mammary glands which is made in support of this view, is not borne out. The perfect condition of the spermatozoa in some of these encysted hydroceles is also opposed to the theory of their being formed in the cysts, developed merely in connective tissue, and unconnected with the secreting tissue of the organ.[2] Mr. Liston suspected that the presence of spermatozoa might be explained by the circumstance that the cyst was formed by dilatation of a seminiferous tube. This is the view taken by Luschka, who states that in many cases the cyst communicates so openly with the seminiferous canal, that the cyst may be regarded as a vesicular dilatation of the duct.

I have made many minute examinations of the cysts

[1] Medico-Chirurgical Trans. vol. xxvii. p. 401, and Surgical Pathology, vol. ii. p. 53.

[2] It is deserving of notice that in the disease of the testicle which is more nearly analogous to the cystic disease of the breast, viz., the true cystic growths formed by a morbid dilatation of the ducts of the rete testis, spermatic filaments are never found in the fluid contents of the cysts.

in encysted hydrocele in order to make out the mode in which they form. Their close connexion with the excretory apparatus of the testicle led me, also, at first to suppose that they must have originated in a morbid dilatation of the tubes, but from repeated investigations I must conclude that they are independent formations—cysts developed in the connective tissue between the efferent ducts and their investing membrane. Gosselin also views the cyst as accidental, but supposes that it is probably consecutive to the rupture of an efferent duct—that this rupture allowed the escape of some drops of sperm in the connective tissue, and that the presence of this liquid at length led to the formation of an accidental cyst around it. In patients, I have noticed the gradual formation of the cysts to occur after an attack of epididymitis, and in several specimens adhesions have been observed between the surfaces of the tunica vaginalis.

The explanation of the occurrence of spermatozoa in encysted hydrocele, which I offered shortly after their discovery in these cases,[1] was, *that their presence was probably owing to the rupture of one of the tubes of the epididymis, and the escape of semen into the sac of the hydrocele.* The close proximity of the efferent tubes to the cyst, the slight texture of the ducts, the thin and delicate walls of the sac, and the liability of the part to contusion and injury when a swelling even of moderate size exists, seemed to favour this view. The circumstance that spermatozoa are rarely found in small cysts shows that they are not originally formed there, but are a subsequent addition to their contents.

In investigating the history of the cases of encysted hydrocele containing spermatozoa which came under

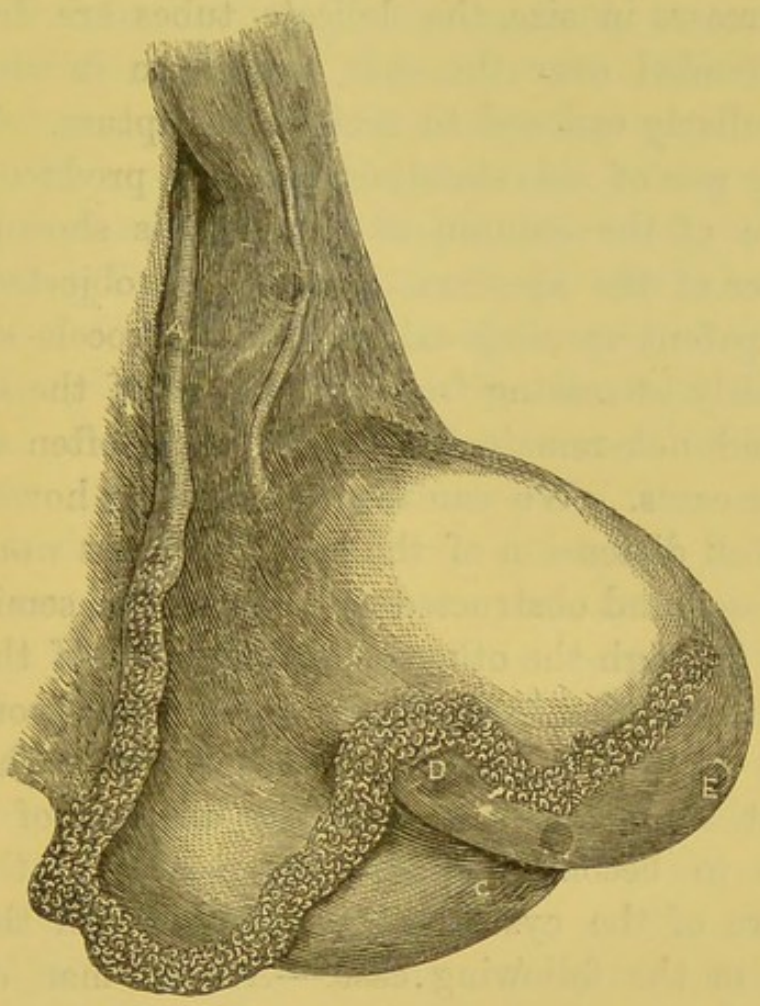
[1] First edition of this work, 1843, Appendix, p. 541, and Edinburgh Journal of Medical Science, Sept. 1849, p. 1023.

my notice, I found in a majority of instances that the swelling had gradually formed after an injury to the testicle; and in two cases it was clear that a small cystic swelling had long existed in a stationary state, but after a slight blow had enlarged. So that it was most probable that a duct had been ruptured by the contusion, and that the irritation consequent on the injury, and perhaps on the addition of the spermatozoa to the fluid contents of the cyst, had led to its further growth.[1] After several attempts to establish by anatomical examination the existence of a communication between the duct and the cyst of the hydrocele, which failed owing to the difficulty of injecting the tubes in the head of the epididymis, I succeeded, with the assistance of the late Mr. Quekett, in detecting a communication in two instances.—A man, aged fifty-three, died in the London Hospital in July, 1854. His testicles being enlarged were removed. On laying open the tunica vaginalis, I found a cyst containing about four drachms of milky fluid, containing spermatozoa, attached to the head of the epididymis in both testicles. At my request Mr. Quekett inserted a tube into the vas deferens, and injected the glands with mercury. The metal passed into the epididymis, and escaped freely into the cyst attached to it in both

[1] Mr. Bryant has published the following interesting case, which quite supports this view :—A man, aged sixty, had an encysted hydrocele of the left testicle of twenty years' growth. The increase had been very slow till the last month, when the tumour had doubled its normal size, this rapid growth having followed an injury produced by a fall. There was an irregular cystic tumour, evidently made up of several cysts, of which three of large size could readily be distinguished, two being very tense. Tapping was at once resorted to, and the largest cyst emptied, many ounces of a milky fluid being drawn off. The second tense cyst was then tapped through the same opening, with the same result, and the fluid collected in a distinct glass. The third cyst was also tapped, but in this the fluid was quite watery. The first two contained abundance of spermatozoa; the third did not contain any. Guy's Hospital Reports, 3rd series, vol. xi. p. 88.

organs. The ducts of the epididymis, loaded with mercury, were found ramifying over the walls of the cyst, having been drawn out and expanded by the growth of the hydrocele, as may be seen in the adjoining Figure taken from one of the specimens preserved

Fig. 12.



A, vas deferens; C, testicle; D, epididymis, with the ducts expanded over the cyst; E, cyst.

in the Hunterian Museum. On examination of the interior of the cysts, the open mouth of the duct from which the mercury had escaped was distinctly visible. There was an oval opening in the membrane of the cyst, the edges of which were even and rounded, and at a point in the centre of this opening globules were seen escaping from a minute aperture in one of the ducts.

The open mouth of the duct, into which a bristle has been passed, may be distinctly seen in the preparation.

The examination of these two testicles affords the true solution of the difficulty which had existed in satisfactorily accounting for the presence of spermatozoa in encysted hydroceles. It appears that as the hydrocele increases in size, the delicate tubes are drawn out and extended over the cyst, a position in which they are peculiarly exposed to accidental rupture. That the opening was of old standing, and not produced by the pressure of the column of mercury, is shown by the character of the aperture. It may be objected that if such a patent opening existed, the hydrocele should go on steadily increasing from the ingress of the spermatic fluid, and not remain stationary, as is often witnessed in these cases. We can readily conceive, however, that in the full distension of the cyst, the ducts would be so compressed and obstructed as to cause the seminal fluid to flow through the other efferent tubes. If the hydrocele were emptied by puncture, the channel would again become free, and fresh spermatozoa would then enter the cyst. In some instances the opening of the duct appears to become permanently closed, so that after puncture of the cyst there is no return of the hydrocele, as in the following case.—An old man consulted me on account of a large hydrocele which extended up to the abdominal ring, the testicle being situated at the bottom of the scrotum. It was on the right side, had been forming for eight years, and had never been tapped. I introduced a trocar, and drew off thirty-two ounces of a milky fluid, which contained myriads of spermatozoa. I saw him two months afterwards, and found a fulness on the right side of the scrotum from the collapsed sac, but there was no return of the hydrocele.

At the time that the openings of the efferent ducts were discovered by Mr. Quekett and myself in these cysts, I was not aware that Luschka had previously observed in several cases of encysted hydrocele, a distinct communication between the cyst and a seminiferous duct, the opening being large enough to admit a bristle, and to permit mercury to pass from the tubes into the cyst. Luschka often failed to discover any communication between the cysts and the tubules. It is very probable that an opening of communication once formed is liable afterwards to become obliterated. This would account for the absence of spermatozoa from a hydrocele when tapped a second time, although they were detected in the fluid in a first operation. Gosselin supposes that several of the efferent ducts may open successively into the cyst and afterwards close, which may help to explain in another way the varying presence of spermatozoa.

It may now be regarded as fully established by the independent but concurrent researches of Luschka and myself, that the presence of spermatozoa in the sac of an encysted hydrocele is owing to the existence of an opening of communication with one of the efferent tubes, but that the mode in which the cyst is originally developed, whether by progressive dilatation of the duct, as supposed by Luschka, or by the formation of an independent cyst into which an efferent duct has accidentally opened, as advocated by Gosselin and myself, may still be regarded as not finally determined. As the presence of spermatozoa is not an essential or constant character of this form of hydrocele, I must reject the term "spermatic," which has been wrongly applied to it by some authors.

The ducts of the epididymis, when extended over the

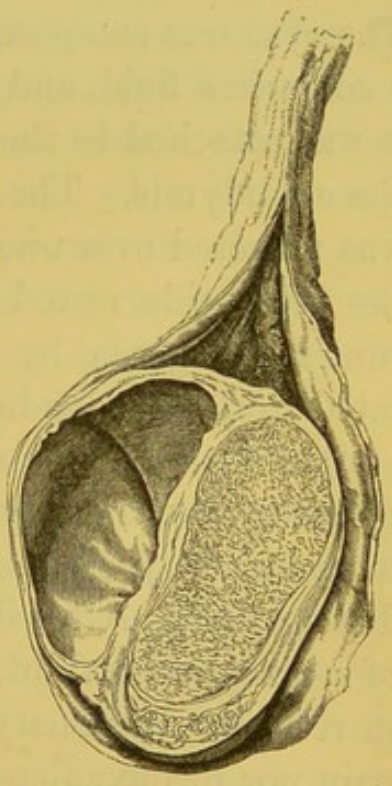
cyst, as represented in Fig. 12, must not only be liable to rupture from a slight contusion, but also to be punctured in the operation of tapping; and no doubt they are occasionally wounded in this way. This may, perhaps, explain what happened in the following case.—A man, aged fifty-one, had an encysted hydrocele, which was tapped by one of my colleagues, and about an ounce of limpid fluid was removed from two distinct cysts. He was again tapped by the same surgeon a month afterwards, and on neither occasion were any spermatozoa detected in the fluid removed. In a few weeks afterwards he applied to me in consequence of a return of the swelling, attended with a good deal of uneasiness. I performed acupuncture in three places, and in the drops of fluid which escaped spermatozoa were found.

Spermatozoa are stated to have been found in some two or three instances in fluid removed from the tunica vaginalis. It is not improbable that these cases may have been encysted hydroceles mistaken for simple. The diagnosis is sometimes very difficult, and in the case of the cyst examined by Mr. Paget, this error was made before death by a hospital surgeon. I have, however, found spermatozoa in the sac of the tunica vaginalis, and the following case will account for their presence.—A man, aged fifty-four, died in the London Hospital of disease of the kidneys, of one of the ureters, and of the bladder, which appeared to be consequent on a severe blow on the loins about six weeks before. The tunica vaginalis of one of the testicles contained two ounces and a half of slightly opaque fluid, in which a few spermatozoa were found. There were three small cysts containing fluid immediately connected with the epididymis, and also at one spot an irregular ragged membranous appearance, evidently caused by the rupture of

a cyst. It is most probable that the spermatozoa had escaped from this cyst, which may indeed have been burst at the time of the injury. Luschka has also noticed a ruptured cyst in the cavity of a vaginal hydrocele containing spermatozoa. I have examined the fluid from the tunica vaginalis in a large number of instances without finding these bodies, and I believe their occurrence in vaginal hydrocele to be extremely rare.

2. When a hydrocele forms between the tunica albuginea and the inner layer of the tunica vaginalis, the cyst is generally single and of small size. As it grows, it separates the two membranes, which are naturally closely adherent to each other. This is a very rare form of hydrocele. A specimen, which I discovered accidentally in dissection, is represented in the annexed woodcut. The cyst is thick and dense, and contains about two drachms of fluid. It is situated along the front of the testicle, which is depressed. One section of it is preserved in the Hunterian Museum, the other in the London Hospital College. The latter contains a somewhat similar specimen, which is described and figured by Mr. Hutchinson in the Pathological Transactions (Vol. VII.). It consists of a single thick-walled cyst, consisting of dense fibrous tissue, with a few spiculæ of bone, lined by an organized false membrane. The contents were a grayish-brown fluid and flakes of lymph. The cyst,

Fig. 13.



together with the testicle, was removed by operation from a man aged sixty-three.

In these cases the cyst appears to have had no connexion with the epididymis. But in the Museum of St. Thomas's Hospital there is a specimen of a small cyst developed in the epididymis, which, in its subsequent growth, had extended on the testicle, separating the tunica vaginalis from the tunica albuginea. I have examined also a similar preparation in the museum of St. George's Hospital. It is described by Sir B. Brodie. A man who died in the hospital was discovered after death to have had encysted hydrocele of one testicle. The cyst was composed of a thin membrane, containing a colourless fluid, and was of about the size of a walnut; it was attached to the anterior part of the testicle, below the epididymis. The inner layer of the tunica vaginalis was reflected over one side of the cyst, while the cyst on the other side rested on the fibrous membrane of the tunica albuginea, by which it was in consequence separated from the glandular structure of the testicle.[1]

Symptoms.—An encysted hydrocele of the testicle, or rather of the epididymis, commences imperceptibly, and increases very gradually, and in general without producing pain. After it has attained a certain size, as that of a grape or walnut, its growth is often arrested, and it remains stationary for many years, causing neither pain nor inconvenience. In this state the swelling is perceptible through the scrotum, the testicle appearing of an irregular form, or as if it were double. On careful examination the cyst may be detected projecting either at the upper part, on one side, or behind the testicle, forming a tense fluctuating tumour connected with the gland, and moving with it. In other cases the cyst

[1] London Med. and Phys. Journal, vol. lvi., p. 522.

continues to increase until it forms a tense elastic swelling, twice, thrice, or even four times the size of the testicle, but which seldom becomes so large as common hydrocele. In tumours of some size the situation of the testicle may be ascertained, as in vaginal hydrocele, on examination of the swelling by transmitted light; by the more solid feel of the cyst at one particular part, and the peculiar pain experienced there on pressure. When the hydrocele consists of two or more cysts the tumour in the scrotum has a lobular form, but the elastic fluctuating cysts can generally be distinguished from the solid gland. In a remarkably large many-cysted hydrocele on the left side which came under my notice, the tumour was of an irregular pyriform shape, the base being above, and the apex, where the testicle was situated, below. The hydrocele, when large, occasions inconvenience proportionate to its bulk. A swelling becomes apparent through the patient's dress; it is exposed to injury, and feels weighty and uncomfortable. I have observed in several cases that more pain was experienced than is usual in other forms of hydrocele, the uneasiness extending up to the loins, and not being relieved by support or the recumbent position. This may be partly due to the distension of the tunica vaginalis reflected over the epididymis, and the pressure therefore made on this part. The pain is generally relieved by puncturing the cysts. For some years a man, nearly sixty years of age, in bad health, was in the habit of coming to me about every six weeks to have acupuncture performed on an encysted hydrocele consisting of two cysts, which always became painful when it acquired a certain size and the cysts became tense. In the following case the suffering was unusually severe.—W. I., a healthy man, aged forty-five,

was admitted into the London Hospital in 1846, under the care of the late Mr. Andrews, in consequence of some painful swellings of the right testicle. Three cysts, about the size of walnuts, were found connected with the upper part of the gland. The patient stated that the testicle had been contused by a rope about seven years previously, and that the inflammation which followed obliged him to keep his bed for several days. The swellings formed afterwards, and he had been laid up four or five times by attacks of pain in the part extending up the cord to the loins. The cysts were tapped, and the fluid removed. The operation was followed by a little pain and inflammation in the part and a return of the swellings. Mr. Andrews then determined to incise the cysts, but the patient, when on the table, urged the removal of the gland rather than be exposed to any further suffering. Castration was accordingly performed, and he recovered favourably. The tunica vaginalis contained a small loose cartilage, and at one spot, probably where the trocar had penetrated, the two surfaces were adherent. The walls of the three cysts attached to the epididymis were so firm that when opened they did not collapse. There were also some smaller cysts connected with the part.

Diagnosis.—An encysted hydrocele of the testicle is distinguishable from vaginal hydrocele by the different position of the gland, which is generally found in front or at the bottom of the tumour; by the smaller size of the swelling; and by the limpid and colourless character of the fluid evacuated. As the position of the testicle is liable to variation in ordinary hydrocele, the nature of the case cannot always be determined with accuracy until the cyst has been punctured, and the character of the fluid ascertained. In a case of small encysted hydrocele,

combined with rather a large varicocele, which came under my notice, the diagnosis was extremely difficult, in consequence of the dilated veins concealing the cyst, rendering fluctuation indistinct, and obscuring the transparency of the tumour. The nature of the hydrocele was rendered clear by a puncture with a needle, and the escape of a few drops of milky fluid which contained spermatozoa. When also the hydrocele is multilocular, fluctuation and transparency are usually indistinct.

Treatment.—An encysted hydrocele of the testicle should not be interfered with if small, and unattended with pain or inconvenience. When painful or troublesome from its large size, the tumour may be removed temporarily by acupuncture, or by a trocar, applied either at the back or side of the hydrocele, in order to avoid risk of wounding the testicle, the exact situation of which should first be ascertained. When two or more cysts exist they must be punctured separately. In a large many-cysted hydrocele in a man eighty years old, I tapped one cyst and drew off eight ounces of fluid. I then tapped a second and let out twenty ounces, and without withdrawing the canula, inserted the trocar, and punctured a third cyst, and discharged four ounces more, making altogether thirty-two. There was still a small quantity remaining in a fourth cyst, which was not interfered with. Simple tapping sometimes gives permanent relief, as in the case of the large hydrocele mentioned at page 158, but more generally the fluid again collects, and it becomes necessary to resort to some method of obtaining a radical cure. For many years I was in the habit of employing the seton in the mode described at page 126. The inflammation excited by it was generally mild, and the operation successful. In one instance, however, I was annoyed by suppuration

occurring in the vaginal sac; and in another case of large encysted hydrocele, an abscess formed in the scrotum external to the tunica vaginalis, and caused a sinus, which was tedious in healing. It must be obvious that, as the seton traverses the vaginal sac, as well as the cyst of the hydrocele, there is a double risk of suppurative inflammation taking place. This circumstance, and the effects of the inflammation in the cases just mentioned, led me to try iodine injections, and the results proved so satisfactory that I have since almost invariably practised this method for the radical cure of the encysted form of hydrocele. In no instance have any ill effects attended the operation.

In dealing with hydroceles composed of two or more distinct cysts, the surgeon should bear in mind that the inflammation excited in one may extend to the others, and be sufficient for their obliteration. This does not always happen, but it is better to wait the result of an operation on one cyst before meddling with the others. This course was adopted in the following case, which came under my care before I treated encysted hydroceles by injection.—I. H., aged thirty-one, was admitted into hospital in 1846, on account of a large lobulated tumour of the left testicle, which was found to consist of three cysts of different sizes attached to the head of the epididymis. The largest cyst contained eight ounces of fluid. The two others were each about the size of a chestnut. One of these was also punctured, and spermatozoa were detected in the fluid removed from it. The spermatic cord passed in front of the tumour, and to the outer side of one of the smaller cysts. After the cysts which had been tapped had refilled, I passed a seton consisting of six silk threads through the whole length of the large cyst. The inflammation excited was

mild, but as the tumour felt solid on the third day after, the seton was removed. The induration and swelling subsided slowly. A month after this operation I passed a seton of four threads through the second sized cyst. The inflammation was so active on the following day that the seton was removed in the evening to prevent suppuration taking place. The tenderness and swelling gradually diminished, and in a short time it became evident that both the smaller cysts were obliterated, no doubt from the extension of inflammation from the cyst operated on to the adjoining one. The patient was under treatment altogether seven weeks.

In the case related at p. 163, the surgeon intended at first to incise the cysts. This operation, which involves the laying open also the tunica vaginalis, is not to be lightly undertaken, as it is liable to be followed by severe inflammation and constitutional disturbance. Mr. Laing, surgeon, of Aberdeen, some years ago published two cases of what he termed "cystic or hydatoid disease of the testis," but which were evidently cases of encysted hydrocele, in which he was led to cut down upon and puncture the cysts. The cases were remarkable from the great number of cysts which presented themselves. The effects of the operation were severe in both instances, and in one the inflammation extended to the scrotum, and produced sloughing.[1]

SECTION V.

DIFFUSED HYDROCELE OF THE SPERMATIC CORD.

Mr. Pott has given an admirable account of this affection, under the denomination of *hydrocele of the cells*

[1] Lond. Medical Gazette, vol. xxvii. p. 456.

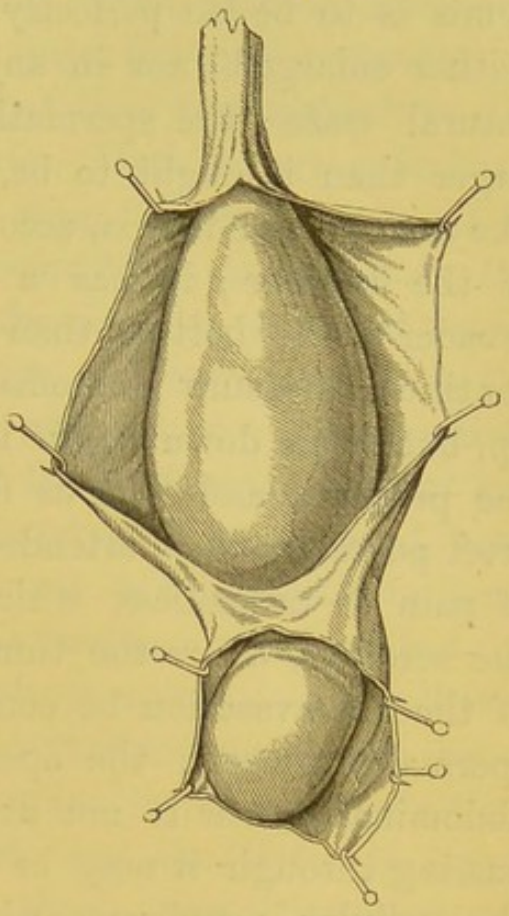
of the tunica communis.[1] It has likewise been particularly described by Scarpa.[2] The disease is of the nature of simple œdema, a watery fluid being diffused throughout the loose tissue connecting the vessels of the spermatic cord, and enclosed in a sheath of condensed tissue, which is invested by the musculo-aponeurotic structure of the cremaster muscle. On dissection the sheath is found distended, and, when the complaint has lasted for some time, more or less thickened. The connective tissue beneath is infiltrated with a limpid albuminous serum of a white or yellowish colour, which flows out in the course of the dissection. It is owing to the confinement of the fluid by the investing sheath that the swelling assumes an uniform surface and definite shape. The cells infiltrated with serum are converted into large vesicles, some of which are big enough to admit the end of the finger. These cells are larger and more delicate towards the base of the swelling, where they sometimes disappear altogether; so that there is only one considerable cavity, the fluid having a tendency to collect towards the lowest and most depending part, and to form a fluctuating tumour there. The base of the swelling corresponds to the point at which the spermatic vessels join the testicle, and at this part a dense septum cuts off all communication with the tunica vaginalis. In some instances the effusion extends along the cord into the abdomen, as in a remarkable case related by Mr. Pott. In the annexed figure of this affection, taken from Scarpa, the envelope of the cremaster is laid open,

[1] Vide his Treatise on Hydrocele.

[2] Memoria sull' Idrocele del Cordone Spermatico. Bertrandi, an Italian surgeon, in a memoir published by the French Academy of Surgery in 1778, has given an accurate description of this affection, which, however, he did not sufficiently distinguish from the encysted hydrocele of the cord. He dissected on the dead body a diffused hydrocele which contained twenty ounces of fluid.

exposing the pyramidal swelling enclosed in its sheath of condensed tissue. The testicle and tunica vaginalis are seen below it. In general anasarca the connective tissue of the spermatic cord, as well as of the scrotum, is frequently distended with serum; but œdema of the cord alone is certainly a very rare affection. Sir A. Cooper makes no allusion to it, and Mr. Pott, to whom we are indebted for so good and accurate a description of this species of hydrocele, probably met with a greater number of cases of it than have occurred in the practice of any surgeon since his day. Causes obstructing the return of blood from the testicle, as induration and enlargement of the glands in the course of the cord, would conduce to its production. I have observed a slight œdema of the cord in two or three instances after acute orchitis, but it always disappeared as the inflammation subsided. The affection is said to have been induced by the pressure of a truss applied for the cure of an inguinal hernia.

Fig. 14.



Symptoms.—Mr. Pott thus describes the appearance and symptoms of this affection: "In general, while it is of moderate size, the state of it is as follows: the scrotal bag is free from all appearance of disease; except that when the skin is not corrugated it seems

rather fuller, and hangs rather lower on that side than on the other, and if suspended lightly in the palm of the hand feels heavier : the testicle with its epididymis is to be felt perfectly distinct below this fulness, neither enlarged, nor in any manner altered from its natural state : the spermatic process is considerably larger than it ought to be, and feels like a varix, or like an omental hernia, according to the different size of the tumour ; it has a pyramidal kind of form, broader at the bottom than at the top : by gentle and continued pressure it seems gradually to recede or go up, but drops down again immediately upon removing the pressure, and that as freely in a supine as in an erect posture : it is attended with a very small degree of pain or uneasiness, which uneasiness is not felt in the scrotum, where the tumefaction is, but in the loins. If the extravasation be confined to what is called the spermatic process, the opening in the tendon of the abdominal muscle is not at all dilated, and the process passing through it may be very distinctly felt ; but if the cellular membrane which invests the spermatic vessels within the abdomen be affected, the tendinous aperture is enlarged, and the increased size of the distended membrane passing through it produces to the touch a sensation not very unlike that of an omental rupture." At its commencement the tumour is of a cylindrical form ; but at a later period, and as it increases in size, it becomes pyramidal, especially when the patient is in the erect posture. By altering his position to the recumbent the form of the tumour is slightly changed : it becomes more oblong, and nearly of equal dimensions from the ring to the testicle. However much the swelling may increase, it has been remarked that the penis never appears so much retracted as in common hydrocele of equal size.

Diagnosis.—An omental hernia, or an encysted hydrocele of the cord, might be mistaken for a diffused hydrocele of the spermatic cord. In regard to the former, Scarpa observes that "the diffused hydrocele of the cord, when it enters into the ring, resembles an omental hernia so closely that it is very difficult to distinguish the two complaints. Both have a cylindrical form, and extend into the ring. They are similar in consistence and degree of sensibility, as well as in the difficulty experienced in returning them. Pott represents that the omentum, when returned, remains in the abdomen until the patient assumes the erect position, or makes some effort; while the swelling in diffused hydrocele comes back immediately. I have found, however, that the omentum comes down quickly in some omental herniæ, and that the swelling, when pushed up, does not reappear immediately in some cases of diffused hydrocele. I have observed that the swelling is firmer and more irregular on the surface in the epiplocele than in the watery effusion; and that the latter is larger below than above, while these proportions are reversed in the rupture."[1] Mr. Lawrence remarks that "The distinction of the two cases must rest on the following points:—the impulse on coughing in the rupture; the complete removal of the swelling, and the sense of the omentum passing up into the abdomen; its visible and tangible escape from the cavity when the rupture is brought down again by coughing, and the free natural condition of the cord and ring when the swelling has been replaced. The fluctuation of the watery tumour at its lower part; the absence of impulse in coughing; its imperfect removal under pressure, so that the cord can never be felt in a natural state; and

[1] Sull' Ernie, Mem. 1, § xxxii.; quoted from Lawrence on Hernia, 5th edit. p. 251.

sometimes a visible enlargement of the inguinal canal and its neighbourhood when the fluid is pressed upwards."[1] An irreducible epiplocele would be even more liable to be mistaken for a diffused hydrocele, as some of these distinguishing marks would be absent. In cases of much difficulty and doubt, the surgeon must be guarded in pronouncing an opinion, and very cautious in performing any operation. Scarpa, indeed, frankly confesses the imperfection of our art with respect to the diagnosis in these cases.[2]

Diffused hydrocele is distinguished from encysted hydrocele of the cord by the pyramidal and somewhat diffused form of the swelling, which extends to the ring; by the alteration in shape producible by pressure; and by the absence of fluctuation in its upper part.

As the testicle is perceptible in diffused hydrocele of the cord, this disease cannot well be mistaken for simple hydrocele. Nor is diffused hydrocele likely to be confounded with varicocele, the characteristic symptoms of the latter being too evident to allow of the intelligent surgeon erring in his diagnosis of these affections.

Treatment.—In regard to the treatment of diffused hydrocele of the cord, Mr. Pott observes, "While it is small it is hardly an object of surgery, the pain or inconvenience which it produces being so little that few people would choose to submit to an operation to get rid of it, and it is very seldom radically curable without one; but when it is large, or affects the membrane within the cavity as well as without, it becomes an apparent deformity, is very inconvenient both from its size and weight; and the only method of cure which it admits is far from being void of hazard; as must appear to every one who will consider, or who is at all acquainted

[1] Lib. cit. p. 252. [2] Treatise on Hernia, tr. by Wishart, p. 99.

either with the nature of lymphatic extravasation or absorption, or with the frequent consequences of wounds inflicted on parts merely membranous."[1] This form of hydrocele admits of temporary if not permanent relief, with less risk than was supposed by Mr. Pott. For, as the cells communicate freely, it is not necessary to make a large incision for the removal of the fluid, one or two acupunctures in the depending part of the tumour being sufficient to enable the fluid to escape into the connective tissue of the scrotum, from which it will soon be removed by absorption. The danger of free incisions into the distended connective tissue arises from their being liable to excite diffused inflammation, which is apt to spread along the cord to the pelvis, and end in gangrene, especially in persons of impaired constitution. Both Scarpa and Pott have witnessed instances in which the operation of incision has proved fatal. The latter surgeon has related a remarkable case of diffused hydrocele, in a man aged thirty-five, of such prodigious size that it hung more than half-way down to the patient's knee, and formed a considerable tumour in the inguinal region. The diagnosis was extremely difficult. An incision was made into it, and eleven Winchester pints of water were drained off. The fluid collected again; and Mr. Pott divided the whole scrotum from the bottom upwards, from which operation the patient died.[2]

SECTION VI.

ENCYSTED HYDROCELE OF THE SPERMATIC CORD.

This term is applied to a tumour caused by the development of a cyst containing fluid in the loose

[1] Lib. cit. p. 371.

[2] Lib. cit. Case X. p. 377.

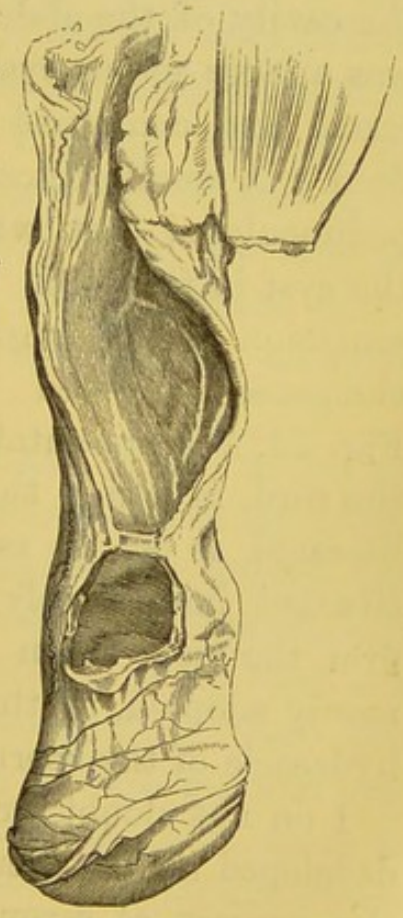
connective tissue of the spermatic cord. The cyst is formed of a thin transparent membrane, possessing the ordinary characters of a serous membrane, and contains generally a limpid pale or straw-coloured serum similar to the fluid of simple hydrocele.[1] It is of an oval form, and its size, though variable, seldom exceeds that of a hen's egg, and is usually smaller. It is loosely attached to the vessels of the cord which are situated at its back part, but become separated and displaced by it. The cyst is invested by the common integuments, superficial fascia, musculo-aponeurotic sheath of the cremaster muscle, and fascia transversalis. It may occur either immediately above the testicle, in the middle of the cord, or just below the abdominal ring, and even within the inguinal canal. Usually there is a single cyst, but occasionally several are developed, and a chain of them has been formed along the cord. The cyst and its contents are liable to changes consequent upon inflammation.

Encysted hydrocele of the cord generally originates in a partial or imperfect obliteration of the prolongation of peritoneum, formed at the period of the transition of the testicle. Thus, in consequence of the serous membrane remaining unclosed at one or more spots, an isolated sac or sacs are left in the course of the spermatic

[1] It is not unfrequently stated by surgeons that they have removed fluid containing spermatozoa from a hydrocele in the spermatic cord, and Mr. Paget assumes that they may occur in these cysts. I have never succeeded in detecting spermatozoa in any hydrocele of the cord examined after death, nor am I acquainted with any instance of the kind; but, knowing how often a large cyst springing from the epididymis and reaching up the cord is mistaken for encysted hydrocele there, I have no doubt that in the instances above alluded to the hydrocele was connected with the epididymis, and did not originate in the cord. This mistake in diagnosis was made in all probability by M. Peters, who communicated to Gosselin (French Translation of this work, p. 211) a case of supposed encysted hydrocele of the cord treated by seton, and followed by violent epididymitis and obstinate induration in the part.

cord. A cyst of this kind when distended with serum constitutes an encysted hydrocele. Such is obviously the mode of origin of this affection when occurring in infants, and no doubt in adults it generally originates in the same way. M. J. Cloquet has remarked that the remains of the peritoneal process accompanying the testicles in their descent, were met with in male subjects of all ages, and he mentions as a singular circumstance, that they were nearly as frequently found in the old as in the young subjects.[1] My own dissections agree with the observations of this accurate anatomist. In the London College Hospital there is a preparation showing the tunica vaginalis contained for about two inches up the cord, and, immediately above it, an encysted hydrocele, which was taken from an adult subject. In dissecting the body of a man, aged eighteen, I found an encysted hydrocele of the cord above the testicle in close contact with the tunica vaginalis. Immediately above this cyst, but quite distinct from it, there was a narrow and empty serous sac three inches in length, with a contracted neck, and communicating with the abdomen. They are figured in the accompanying engraving, with the hernial sac laid open, and part of the parietes of the encysted hydrocele cut away to expose their interiors. The position of the testicle is so changed that its

Fig. 15.



[1] Description of the parts concerned in Inguinal and Femoral Hernia, tr. by McWhinnie, p. 25.

anterior border is directed downwards.—In the examination of the body of a man who died of disease of the heart, I found on the right side a thickened and empty serous pouch, extending for about an inch and a half below the external abdominal ring. Directly below it was an independent cyst, capable of containing a walnut, similar in structure to the hernial sac, but lined by a thin false membrane. The tunica vaginalis, which was healthy in structure, extended up the cord as far as the cyst, from which it was separated by a thick and firm partition.—In opening the body of a sailor who died with ascites, I noticed at the internal ring a small, delicate, transparent, pedunculated cyst, not larger than a nut, projecting into the cavity of the abdomen. In the spermatic cord there was a large serous cyst, which extended into the inguinal canal, and contained a small quantity of transparent fluid. A small orifice at its upper part opened into the pedunculated cyst, which proved to be a process from the cyst in the cord. In Fig. 18 I have given a representation of an inguinal hernia, combined with an elongated encysted hydrocele of the cord; and in Fig. 22, a representation of an encysted hæmatocele of the cord, in which the tunica vaginalis remained unobliterated as far up as the cyst, whilst a hernial sac is situated immediately above it. These dissections confirm the view taken by Sir A. Cooper, and now commonly adopted, of the usual mode of origin of encysted hydrocele of the spermatic cord in the adult.

I do not doubt, however, that cysts are liable to be developed in the spermatic cord quite independently of the process of serous membrane. In the Museum of the London Hospital College there is a cyst in the cord not larger than a small nut, which probably originated in this way. In 1858, M. Giraldé, of Paris, communicated

to the Royal Society a paper,[1] in which he announced the discovery of a minute structure which he had observed in the spermatic cord of new-born infants, as well as in later life, and even in the bodies of old people. He termed this body *corps innominé*, and supposed it to be the remains of the Wolffian body. It consists of small vesicles and convoluted tubules, which latter are short and tortuous, and beset with varicose dilatations. He supposed that the cæcal tubes of this body may undergo dilatation, and he explained in this way the formation of encysted hydrocele in the cord. Following the directions of Giraldé, I have succeeded in finding this minute structure in two instances, and I believe that it may generally be detected in the bodies of infants. It is, indeed, highly probable that minute cysts are sometimes developed from the remains of the Wolffian body in the adult, but that, like the subserous cysts of the epididymis, they constantly remain small, and we have no evidence that they ever attain a size to attract notice during life, or to constitute a perceptible encysted hydrocele of the cord.

Symptoms.—An encysted hydrocele of the spermatic cord is seldom discovered until it has attained some considerable size, its formation being imperceptible, and unattended with pain or inconvenience. It produces a swelling in the spermatic cord, which is of an oval and defined form, and distinct from the testicle, which feels even and tense, and has an obscure fluctuation, and may be handled freely without pain, and which is more or less transparent and quite moveable upwards and downwards. The distance of the tumour from the abdominal

[1] See Proceedings of the Royal Society, May, 1858; also Dr. Banks' Thesis on the Wolffian Bodies of the Fœtus, and their Remains in the Adult. Edinb. 1864.

ring and testicle varies in different cases, and is liable also to temporary alterations from the irregular contractions of the cremaster muscle. The vessels forming the spermatic cord can generally be traced to the posterior part of the cyst. This affection is met with most commonly in infants, and I have seen it as early as a fortnight after birth; but it occurs at all periods of life. The swelling sometimes forms with such rapidity as to constitute an acute hydrocele, fluid being rapidly effused into an unclosed sac. I saw with Mr. Nunn, of Stratford-place, a tall young gentleman who had a small hydrocele in the cord, which first formed, in the course of a few hours, after active exertion, without causing pain. At page 180 I have narrated two other cases in which the symptoms were also acute.

Diagnosis.—An encysted hydrocele of the spermatic cord can scarcely be mistaken for a vaginal hydrocele, but sometimes cannot be distinguished without difficulty from an encysted hydrocele of the testicle. Indeed I know that cases which have been described as hydroceles of the cord, the fluid containing spermatozoa, have been in reality encysted hydroceles springing from the epididymis. When the cyst in the cord is situated high up, the distinction is clear; but when it is close to the gland and of large size, so that the testicle is more or less embedded in the tumour, this form of hydrocele is very readily mistaken for an encysted hydrocele of the testicle, nor is the diagnosis always possible. The chief distinctive mark is the circumstance that notwithstanding its apparent close connexion with the gland, the cyst may be detached by manipulation, and proved to be formed above and distinct from the testicle or epididymis; whereas when an encysted hydrocele of the epididymis is pushed

towards the ring, the testicle closely follows or moves with it.

An encysted hydrocele of the cord is liable to be mistaken for an inguinal hernia. It differs, however, in the uniform size and defined shape of the tumour, which does not extend upwards to the ring; in being transparent, very moveable, and receiving no impulse on coughing; and in the absence of the gurgling sensation, and other symptoms usually attendant on ruptures. When of small size, and situated near the abdominal ring, the tumour may admit of being pushed upwards into the inguinal canal: a circumstance which renders the diagnosis rather difficult. The facility, however, with which the vessels of the cord can generally be felt when the tumour has descended again, and the parts between the swelling and the ring are grasped between the finger and thumb, will enable the surgeon to ascertain the nature of the case. But if, as sometimes happens, the cyst be situated within the inguinal canal, or at the opening of the external abdominal ring, it is extremely difficult to distinguish the swelling from a hernia; for it disappears under pressure, is very apparent when the patient is in the erect position, and is removed or is less manifest when he is in the recumbent posture. The diagnosis will be facilitated by observing that although the tumour cannot be made to descend below the external ring, neither can it be thrust completely into the abdomen like a portion of intestine. The cyst being lodged in the inguinal canal, there must still be a tumour in the groin behind the tendon of the external oblique muscle, which, though somewhat obscure, will yet be perceptible to the eye and fingers of the adroit surgeon.

The following is a rare case of *acute* hydrocele of the

cord, in which difficulty was experienced in the diagnosis.—A youth, aged fifteen, was admitted into hospital on account of a supposed strangulated hernia. When three years of age he had been subject to rupture on the right side, and had worn a truss for two years, when it was discontinued as the hernia seemed cured. On the morning of his admission he was seized whilst at work with pain in the right groin, and on feeling the part discovered a small swelling. As the pain was increasing, he returned home, and shortly afterwards vomited. A surgeon who was sent for applied the taxis, and failing to reduce what he supposed from the history and examination to be a hernia, sent the lad to the hospital, when he was again examined, and placed in a warm bath, after which I was summoned to perform an operation. I found the lad with an anxious countenance and affected with nausea. Just below the abdominal ring there was an extremely tense and tender oval swelling the size of a pullet's egg. It had a contracted neck extending into the inguinal canal, received no impulse on coughing, and the testicle was below and distinct from it. On examination by transmitted light the swelling was found to be quite transparent. I at once came to the conclusion that the case was an acute hydrocele of the spermatic cord, and by the application of leeches and ice to the tumour, and the administration of calomel and opium, all the symptoms were relieved. He was discharged in a few days, at which time the fluid had nearly disappeared. Above the swelling there was a slight hernial descent, for which a truss was ordered.

A child between four and five years of age was brought to Mr. Syme labouring under what seemed to be an incarcerated, if not strangulated inguinal hernia. It appeared that a rupture bandage had been worn be-

tween two and three years, when a scrotal swelling suddenly enlarged with great distension of the abdomen, but without any symptoms of hernia. The muscles having been relaxed under chloroform, Mr. Syme was able to ascertain that the case was not hernia, but hydrocele. Lest this view should not be correct he made a small incision, which showed that the fluid was contained, not in the tunica vaginalis, but in the cord, and he evacuated a large quantity of serous effusion.[1]

Treatment.—In children, encysted hydrocele of the cord, like common vaginal hydrocele, often and indeed generally disappears spontaneously, so that surgical interference is seldom required for its removal. It is frequently, however, a source of uneasiness to parents, who are apt to apprehend the existence of a rupture. The surgeon may therefore safely assure them, not only that it is a complaint of slight importance, but that if it does not vanish of its own accord or by simple treatment, an operation comparatively trifling will effectually remove it whenever it attains such a size as to be productive of inconvenience. But it is best not to interfere with an encysted hydrocele of the cord, either in children or adults, so long as it is of small size and unattended with pain.

The compound tincture of iodine may be painted over the swelling every second or third day. Should it not disperse under this treatment in the course of two or three weeks, and continue to be a source of annoyance from its bulk, acupuncture may be performed. In early life this generally proves a permanent remedy. But if the swelling return, as may be expected in the adult, other measures must be resorted to.

The radical cure of encysted hydrocele of the sper-

[1] Syme's Clinical Observations, p. 113.

matic cord may be effected in various ways. Excision of a portion of the cyst, incision, the seton, the tent, and injection, have all been employed for the purpose. Incision and the seton are not free from risk, being liable to excite diffuse inflammation of the connective tissue of the part. Mr. Pott has related a case treated by incision which proved fatal on the seventh day, from inflammation extending to the connective tissue of the pelvis and loins. The subject of the operation was, however, in a bad state of health.[1] I was informed by the late Mr. Morton of a case in which such severe inflammation of the connective tissue succeeded the introduction of a seton, composed of a single thread of silk, through an encysted hydrocele in the spermatic cord of a boy, that suppuration took place in the iliac fossa, and for a time endangered the patient's life, though he finally recovered.

The injection of the tincture of iodine is quite applicable to this form of hydrocele, and is the treatment which I recommend as both safe and effectual.

SECTION VII.

COMPLICATIONS OF HYDROCELE.

The following are the principal complications of hydrocele:—

1. Vaginal hydrocele, combined with encysted hydrocele of the testicle.
2. Vaginal hydrocele, combined with encysted hydrocele of the spermatic cord.
3. Vaginal hydrocele, combined with diffused hydrocele of the spermatic cord.

[1] Lib. cit. Case XIV. p. 390.

4. Oscheo-hydrocele, including both vaginal hydrocele, and encysted hydrocele of the cord, combined separately with inguinal hernia.

1. *Vaginal hydrocele, combined with encysted hydrocele of the testicle*, is not an uncommon complication. In dissections I have often found the tunica vaginalis distended with three or four drachms, and even an ounce or two of serum, two or more small distinct cysts being at the same time connected with the upper part of the epididymis; and I have twice met with this complication on both sides in the same individual. The small adventitious cysts appear to be the original disease, the irritation produced by them being the cause of the effusion in the tunica vaginalis. The tumour formed by the combined cysts is in some cases smooth, and in others irregular, according to their relative size. When the quantity of fluid effused in the tunica vaginalis is only small, this complication may sometimes be distinguished; but when the amount is considerable the distension of the tunica vaginalis completely masks the cysts developed in the testicle or epididymis, rendering it impossible for the surgeon to detect the nature of the case until after the withdrawal of the fluid from the vaginal sac. The combined hydroceles sometimes attain so great a size as to require tapping; and some of the cases of operation on multilocular hydrocele mentioned by writers I believe to have been instances of this complication. It sometimes happens in a case of this kind, that when the trocar is introduced at the anterior part of the swelling, a quantity of pale straw-coloured serum is drawn off; but the tumour, though diminished, is not removed. If, however, the trocar be afterwards passed into the fluctuating swelling which still remains, exit is given to a limpid or opaque white fluid.—A man,

aged fifty-four, consulted me on account of a hydrocele. I removed four ounces of yellow serum from the sac of the tunica vaginalis, and then detected a cyst attached to the epididymis. This I tapped with a fine trocar, and drew off two drachms of opaque fluid, which contained spermatozoa. There was no return of either hydrocele at the end of two months. The only after-treatment adopted was suspension, and the outward application of the tincture of iodine. It is fair to infer that by the non-return of the encysted hydrocele, the irritation which produced the vaginal hydrocele was removed. The facility of diagnosis and cure in this instance may be contrasted with the difficulties encountered in the following case, for which I am indebted to Mr. Hamilton, of Dublin.—Mr. B., a fair young man, aged twenty, consulted Mr. Hamilton about a hydrocele of moderate size on the left side. It had existed for two years, and had been acupunctured and repeatedly tapped, and its radical cure had been attempted by iodine injection, and also by seton, but without any effect on the hydrocele. The testicle was declared to be diseased, and he had been salivated, but with no diminution of the swelling. Mr. H. drew off about half a pint of clear pale yellow fluid, and then observed that the testicle was enlarged, very irregular and nodulated, the lower part of the epididymis being prolonged considerably downwards. The patient being of a strumous constitution and family, two of his brothers having died of phthisis at the age of puberty, the case was regarded as one of scrofulous disease of the testicle, with extensive deposit in the epididymis. Castration was advised and performed, and the patient recovered favourably. When I visited Dublin the tumour was shown me by Mr. Hamilton. The tunica vaginalis was thickened, but

free from adhesions. The testicle was healthy, and displaced to one side by a moderate-sized multilocular hydrocele of the epididymis. There was also a small distinct cyst between the tunica vaginalis reflexa and tunica albuginea. The above case is one of remarkable interest and practical value. The strumous habit of the patient, the irregular tumour of the epididymis, and the resistance of the hydrocele to active treatment, indicated serious disease of the organ, and led to its being excised. In a similar case, the examination of the tumour by transmitted light in a dark room would probably enable the surgeon to detect the nature of the disease; yet not without difficulty, especially if, as in the case just narrated, the tunica vaginalis was thickened, and the encysted hydrocele multilocular.

The following case occurred to my colleague, Mr. Adams. As in the one just related, the failure of the radical treatment of the vaginal hydrocele appears to have been owing to the complication with encysted hydrocele.—A man, aged twenty-two, was admitted into the London Hospital in February, 1855, with a hydrocele, which had formed after a contusion of the right testicle. It had already been tapped five or six times. Mr. Adams injected the tunica vaginalis with tincture of iodine without success. Three months afterwards he laid open the thickened sac, and then perceived three transparent cysts about the size of hazel-nuts connected with the epididymis. These cysts were also incised. A good deal of inflammation and swelling of the parts followed the operation. This subsided, and the wound closed by granulation in three weeks.

2. *Vaginal hydrocele, combined with encysted hydrocele of the spermatic cord*, is somewhat rare. The swelling produced by the accumulation in the tunica vaginalis is

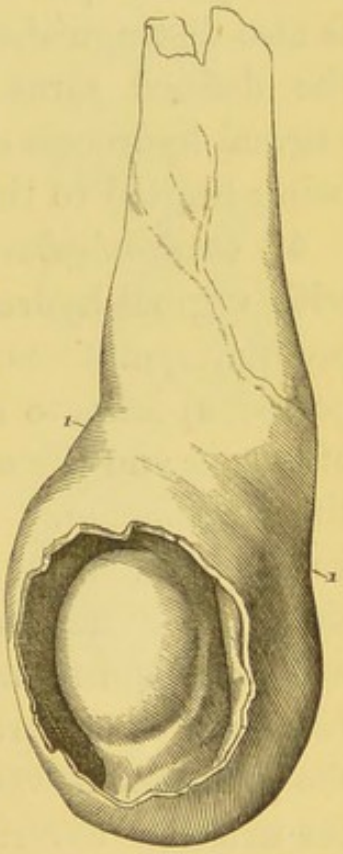
below and rather in front of the tumour in the spermatic cord, and a well-defined furrow in the scrotum generally marks the boundary between the two. In the London Hospital College there are two specimens of a collection of fluid in the tunica vaginalis associated with an encysted hydrocele of the spermatic cord. In one of them the tunica vaginalis has remained unobliterated for about two inches along the spermatic cord, and the encysted hydrocele is seen immediately above it. In the other preparation, it is apparent that both sacs have been the seat of inflammation, false membranes being contained within them, and the testicle being a good deal enlarged. A case of this complication, in an infant not many weeks old, is recorded in the Medical Gazette.[1]—A child, six years of age, came under my care at the hospital on account of a large hydrocele on the right side, which extended upwards nearly as high as the abdominal ring. Three acupunctures were made in the tumour, and in ten days the whole of the fluid had disappeared; but, observing a small swelling still remaining in the direction of the spermatic cord, I made a further examination, and detected an encysted hydrocele of the cord just above the testicle, which had previously been concealed by the fluid collected in the vaginal sac. The skin covering it was painted with tincture of iodine twice a week; but not disappearing so quickly as I wished, it was afterwards punctured with a needle. The acupuncture was repeated two or three times, and in a fortnight the encysted hydrocele of the cord was removed, and I believe did not return.—A man, aged sixty-six, was admitted into the London Hospital with a large tense swelling on the right side of the scrotum extending up to the outer ring. He was constipated, and the case

[1] Vol. xxix. p. 757.

had been mistaken for a rupture, and attempts made at reduction. The tumour had a marked contraction across its centre. It received no impulse on coughing, was transparent, and the man stated that it had been forming for four years. I inserted a trocar into the lower portion of the tumour, and removed about four ounces of straw-coloured serum, and could then feel the testicle. As the upper part of the swelling still remained distinct and tense, I passed the trocar into it and drew off about as much more fluid of a similar colour. Ten days afterwards the fluid was reappearing in the vaginal sac, but not in the spermatic cord.

The tumour caused by this complication differs from the one first described, vaginal hydrocele combined with encysted hydrocele of the testicle, in the greater distinctness of the tumours and their separation, usually by a well-defined transverse furrow, though this was not apparent in the case of the child.

Fig. 16.



Vaginal hydrocele combined with diffused hydrocele of the cord. (After Scarpa.) 1 — 1 Furrow marking the division between the tumours.

3. *Vaginal hydrocele, associated with diffused hydrocele of the cord,* is also a rare complication. The chief marks of the complaint are, the remarkable volume of the neck of the tumour, with a dilated state of the abdominal ring; the irregular form of the swelling; and the existence of a furrow passing obliquely on the anterior part of the scrotum, corresponding to the superior margin of the distended vaginal coat, and being higher or lower,

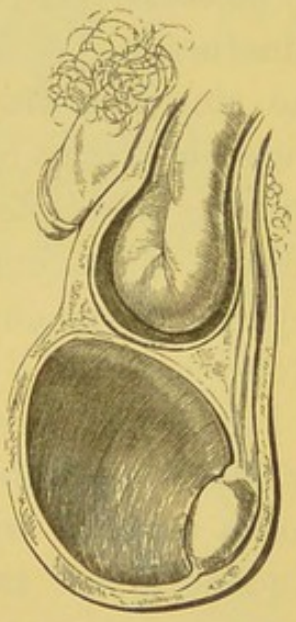
according to the amount of the fluid accumulated within it. Simple hydrocele of the hour-glass form exhibits a double tumour divided by a furrow; but the swelling is defined above, and has no neck, and fluctuation is communicable from one to the other. Any doubt in regard to diagnosis in a case of this kind may be cleared up by a puncture made into the anterior tumour, when, after the water collected in the tunica vaginalis has escaped, the swelling occasioned by the diffused hydrocele of the cord will still remain undiminished.

Encysted hydrocele, combined with simple hydrocele, is also distinguished from the present complication by the defined form of the tumour above; and from a vaginal hydrocele of the hour-glass form, by fluctuation being limited to the separate swellings.

4. *Oscheo-hydrocele.*—Scrotal hernia may be combined with vaginal hydrocele, each disease being marked by its peculiar symptoms. A voluminous hydrocele, if unsupported, appears to be highly favourable to the occurrence of hernia and the extension of the sac, by dragging down the peritoneum. M. J. Cloquet dissected the body of an old man, the subject of inguinal hernia on the right side. The sac was four inches in length; its orifice was large and rounded, and its cavity was separated into two parts by a fibrous projecting ring. Below the latter the peritoneum was thick, whitish, and very adherent to the external coverings; above, it was thin and transparent, as in the abdomen. The descent of the fibrous ring, and consequently the elongation of the sac, appeared to be owing to the weight of a voluminous hydrocele of the tunica vaginalis, which intimately adhered to the lower part of the hernial tumour. A fold of small intestine, two inches and a half long, and

unadherent, occupied the upper division of the sac. M. Cloquet has related the particulars of another case of inguinal hernia, complicated with a very large hydrocele, in which he observed, on raising the tumour and gently drawing up the peritoneum of the abdomen, that the hernial sac receded and diminished in extent. The sac contained omentum, which was reducible, and the hernia was situated behind the hydrocele.[1] The occurrence of these two diseases is not an uncommon complication; in most of the cases which I have met with the hydrocele was placed below, and free of the rupture, and in a few only in front of it. I have never found the hernial sac covering the forepart of a hydrocele. The ordinary relations of hydrocele and scrotal hernia may be seen in the accompanying woodcut. In Fig. 6 (page 90) the sac of an inguinal hernia is represented at some little distance, above a small hydrocele. Dupuytren states that when a hydrocele is placed in front of a hernia, a part of the omentum or intestine descends into a cyst, which projects into the hydrocele, and is formed of the hernial sac and serous fold of the tunic of the testicle. Out of six cases of this kind which came under his observation, in two instances he found symptoms of strangulation to depend on constriction at the part where the viscera were engaged in the serous pouch of the testicle.[2] This complication is of the nature of

Fig. 17.



[1] Recherches Pathologiques sur les Causes et l'Anatomie des Hernies Abdominales, p 22.

[2] Leçons Orales, Brussels edit., t. iv. p. 233.

the *hernia infantilis*, described by Mr. Hey, and called by Sir A. Cooper *encysted hernia of the tunica vaginalis.*

When the hydrocele is large and the hernia irreducible, the diagnosis of these cases is sometimes difficult, in consequence of the hernial tumour pressing on the upper part of the sac of the hydrocele, and conveying an impulse on coughing to the whole body of the fluid contained in the latter. The nature of the case may be ascertained on examination of the tumour by transmitted light.

The coexistence of hernia and hydrocele does not constitute an objection to the performance of the radical operation for the latter. The hernia should always, if possible, be reduced before the tunica vaginalis is punctured. A large pyramidal hydrocele reaching to the ring not only interferes with the application of a truss, but may render one unnecessary by closing the opening and effectually preventing the descent of the bowel. In a case of the kind, in which I removed by tapping thirty ounces of fluid, a large hernial protrusion occurred as the hydrocele subsided during the operation.

Scarpa has described a case of strangulated inguinal hernia, complicated with encysted hydrocele of the spermatic cord, in which it was necessary to operate.—A student, about twenty-nine years of age, was attacked with symptoms of incarcerated hernia. He had been subject to a rupture on the left side of the scrotum for more than fifteen years, but had not been able to fit a proper bandage. The hernia was tense and above the moderate size, and the bottom of the tumour was unusually raised, and as it were pushed upwards, by a body situated behind the hernia; which body was undoubtedly not the testicle, as the gland was felt in the bottom of the scrotum, and lower down than the hernia. The

symptoms being very urgent, the patient was operated on in Scarpa's presence. The hernial sac was found to contain a very small quantity of water, and a loop of small intestine slightly tinged of a brown colour, and about three or four inches in length. After division of the neck of the sac and the ring, and also after reduction of the intestine, there still remained externally a soft tumour, elastic, and evidently full of fluid. An incision was made into this tumour, and a considerable quantity of serous fluid discharged. At the bottom there appeared a vesicular gelatinous substance, which was cut away; and it was clearly perceived that the intestinal scrotal hernia was accompanied posteriorly with an encysted hydrocele of the spermatic cord. In the course of six weeks the patient was completely cured of both these diseases.[1] This is a somewhat rare complication, and I have met with but few instances of it. In all it occurred on the right side, and the patients were adults. In one, who died of peritoneal inflammation, with the hernia unreduced, I made a dissection of the parts. The hernial sac was greatly thickened, and coated with lymph, and contained a small fold of intestine surrounded by turbid serum. Directly below it there was a hydrocele of the cord of an

Fig. 18.



[1] Treatise on Hernia, tr. by Wishart, p. 231.

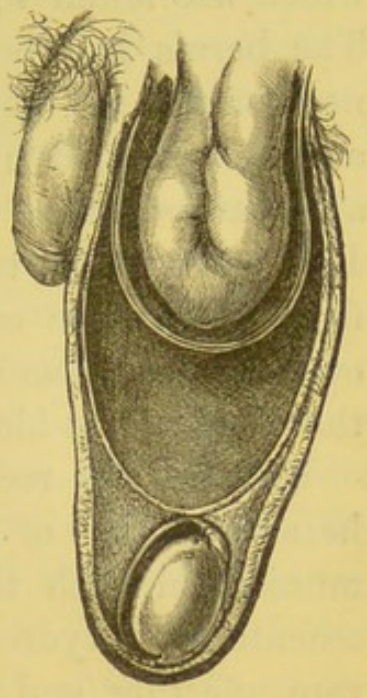
oblong shape, and more than two inches in length, the parietes of which differed from the hernial sac in being thin and transparent. The testicle hung lower than natural, and was so displaced that its antero-inferior edge presented directly downwards. (See Fig. 18.) In another case, the patient was a young man, twenty years of age, and the hydrocele and hernia were both recent and had formed about the same time.

In encysted hydrocele of the spermatic cord the parts are generally in a condition favourable to a hernial descent, the cyst being most commonly the result of an indisposition of the peritoneum in the course of the cord to unite, or become obliterated after the arrival of the testicle in the scrotum; and it often happens in these cases that the peritoneal process above the hydrocele remains patent, and in communication with the cavity of the abdomen. Thus, at page 175, I have narrated two cases of encysted hydrocele of the cord, in which, on dissection, I found an empty hernial sac above the cyst of the hydrocele. If the hydrocele extended high up, it would prevent the proper adjustment of a truss, and would therefore require to be cured before the application of any instrument. This was the case with a middle-aged man sent me for examination by the late Mr. Avery. The hydrocele was on the right side, and being only a short distance below the external ring interfered with the application of a truss, on which account I recommended it, though small in size and not otherwise inconvenient, being injected.

Rather a curious, and certainly a very uncommon disposition of parts, was recently met with by Mr. Walter Rivington, in the dissection room of the London Hospital Medical College. The specimen is

preserved in the Museum. The subject was a man, aged forty-five, who died of disease of the heart. There was an elongated swelling in the right groin and scrotum. It consisted of a hernial sac containing ileum, which projected or dipped into an encysted hydrocele of the spermatic cord, (see Fig. 19,) so that if an operation for hernia had become necessary, the surgeon would probably have been embarrassed by opening a cyst containing fluid before reaching the hernial sac. The case differs from the cases alluded to at page 189, and described by Dupuytren and Cooper, in the circumstance that the hernial sac projected into an encysted hydrocele of the cord instead of into a vaginal hydrocele.[1]

Fig. 19.



SECTION VIII.

HYDROCELE OF THE HERNIAL SAC.

A HERNIAL sac sometimes becomes the seat of dropsical effusion, the connexion with the abdomen being interrupted by adhesion at the neck, or by a portion of adherent intestine or omentum blocking up the orifice. Thus the continued application of a truss sometimes causes obliteration of the neck of the sac, and the radical cure of the hernia; but the lower part, remaining patent, is liable to become the seat of an effusion of serum. A

[1] The specimen is more fully described by Mr. W. Rivington in the Lond. Hosp. Reports, vol. ii. p. 371.

man was admitted into the Hospital of La Charité in Paris, under Boyer, with a tumour in the right groin, which was found to be hydrocele of an old hernial sac. The hernia had been cured by the obliteration of the neck of the sac, and the serous pouch had remained for a time wrinkled up in the course of the cord, but it afterwards became the seat of dropsical effusion.[1] Mr. Pott has narrated two interesting cases of a collection of fluid in the sac of a congenital hernia.[2] In one the opening of the sac was closed by adherent omentum; in the other it was blocked up by intestine.

Pelletan has recorded two cases of hydrocele of the hernial sac (one of them congenital), in which the communication with the abdomen was closed by adherent omentum.[3] Hydrocele of the hernial sac is certainly a rare affection, and I have witnessed only a few cases of it. In one which occurred some years ago at the London Hospital the hydrocele was double; the tumours were very large on each side, quite unconnected with the testicles, and resulted from the constant wearing of a double truss for a period of thirty-five years. Le Dran has recorded a remarkable case of triple hydrocele on the same side, a hydrocele of a hernial sac having been combined with a hydrocele of the cord and with a simple hydrocele, which together formed a tumour the size of a small melon. The hydrocele of the hernial sac was consequent upon the radical cure of a hernia, the obliteration of the neck of the sac having been caused by the pressure of a truss.[4]

Diagnosis.—In hydrocele of the hernial sac, the absence of a defined margin at the upper part of the

[1] La Lancette Française, Février, 1837.
[2] Lib. cit. p. 463, Cases XXXIV. and XXXV.
[3] Clinique Chirurgicale, tom. iii. pp. 22, 108.
[4] Observations on Surgery, tr., Case LXXV., p. 260.

tumour, together with the swelling at the abdominal ring, and the inability of feeling the spermatic cord, being also marks of scrotal hernia, tend to render the diagnosis of this rare form of hydrocele somewhat obscure. But the detection of fluid by the transparency and evident fluctuation of the tumour, and a careful attention to the history of the case, are sufficient to enable the practitioner to avoid any serious error. There is generally, also, an absence of any impulse on coughing; though sometimes, in consequence of the swelling extending up into the inguinal canal, an impulse is communicated to it from the abdomen, which increases the difficulty of the diagnosis. The extension of the swelling to the abdominal ring, and the testicle being distinct from the tumour at the bottom of the scrotum, are sufficient to distinguish hydrocele of the hernial sac from vaginal hydrocele. Some difficulty might be experienced in diagnosing a small hydrocele of the hernial sac from an encysted hydrocele of the cord high up. They are both distinct from the testicle, and their relative situation and even mode of formation are very similar; the only essential difference being that the process of peritoneum constituting the former had once contained either intestine or omentum. A hydrocele of the hernial sac occurs somewhat late in life, is usually of some considerable size, and its fluid contents are of an amber or dark colour; whilst an encysted hydrocele of the cord generally appears before puberty, is rather small in size, and contains fluid which is generally colourless and nearly free from albumen. Attention, therefore, to these circumstances, but more especially to the history of the case, would leave but little room for doubt.

The following case will illustrate the difficulties of the

diagnosis.—J. B., a shoemaker, aged fifty-eight, came under my care at the London Hospital, March 25, 1843, on account of a painful swelling in the left groin. There was a tense tumour, the size of a hen's egg, just below the external abdominal ring, and about two inches above the testicle, from which it was quite separate. It received no impulse on the patient coughing, fluctuated indistinctly, and was very tender when handled. The spermatic cord could be traced from the testicle to the back part of the swelling. The tumour was defined below, but extended by a broad neck into the inguinal canal. The patient was placed in a dark room, and the swelling examined by transmitted light, and found to be transparent, but its want of prominence and small size rendered this mode of examination very difficult. He stated that the swelling first came about two years ago, after a blow in the groin, which he received by running against a post. It came gradually in the course of a month after the accident, and has never since disappeared. He was seized three days before he came to the hospital with vomiting, and pain which extended from the tumour into the abdomen, and pain was still felt on pressure in the vicinity of the abdominal ring. He had experienced a similar attack about nine months previously. I concluded that this was a case of hydrocele of the hernial sac, a piece of intestine or omentum being adherent at the ring, and slightly inflamed. The pain just above the tumour, and the diffused character of its upper part, induced me to suppose that it was not an encysted hydrocele of the cord. Eight leeches were applied to the upper part of the swelling, and afterwards a cold lotion; a dose of castor oil was given, and the patient kept at rest in bed. 28th. The swelling was less in size and not so tender, and he was relieved of the pain

in the abdomen. Five more leeches were applied, and the lotion continued. April 3rd. The swelling was further diminished, and all tenderness removed. I ordered a blister over the part. From this time the tumour continued steadily to decrease, and on the 17th all the fluid had disappeared. On placing the hand on the groin a distinct impulse, arising from a slight protrusion, was felt when the patient coughed. A truss was applied. This restrained the protrusion, and the patient was discharged cured without the slightest swelling remaining in the course of the spermatic cord.

Treatment.—Cases of hydrocele of the hernial sac arising after the radical cure of a rupture, the neck of the sac being permanently obliterated by adhesion, should be treated on the same principles and in the same manner as vaginal hydrocele. In the treatment of cases where there is reason to believe that the opening of communication has become closed by the adhesion of a portion of omentum or intestine, more care is required, and the surgeon should be content with palliative means. Some years ago I saw a case of hydrocele of the hernial sac through which a seton had been passed for the radical cure, but with a fatal result. The neck of the sac was found after death closed by adherent omentum, which was highly inflamed, marks of peritonitis existing in its vicinity.

SECTION IX.

SPURIOUS HYDROCELE OF THE HERNIAL SAC.

Cases of a chronic collection of fluid in the sac of an old hernia, in which the communication with the abdomen has been permanently obliterated by adhesion at the neck,

either of the sides of the sac, or of a portion of omentum or intestine, must not be confounded with cases of scrotal hernia attended with a remarkable effusion of fluid. The latter affection may be denominated *spurious hydrocele of the hernial sac*, a term that would include all cases of hernial sac coupled with serous effusion, whether the communication with the peritoneal cavity be closed or open, and the fluid reducible into the abdomen. The second case, related by Mr. Pott, to which I have alluded, seems to have been an example of this kind. Symptoms of strangulation ensued in a man, aged twenty-two, who had been subject to rupture. Mr. Pott divided the integuments of a large scrotal swelling as in the operation for hernia, and on opening the sac let out about half a pint of clear limpid water, upon the discharge of which the whole tumour of the scrotum subsided, and it was supposed that he had mistaken a hydrocele for a hernia. But the tumour and hardness about the abdominal ring still remained unaltered, and on passing the finger upwards a small portion of intestine was found engaged in the abdominal ring, and bound extremely tight. The stricture was divided; but the gut could not be returned, until an adhesion which connected it to the lower border of the opening was discovered and also divided. The patient recovered.

Scarpa well remarks, "Whatever difficulty these complications may oppose to the exact diagnosis of reducible intestinal scrotal hernia, they do not occasion any with regard to the operation, whenever the hernia is affected with strangulation; as the symptoms accompanying the incarceration of the intestine show clearly the nature of the principal disease, and render the operation necessary, by means of which we have at the same time the advantage of laying bare what formed the complication of the

hernia, and of curing radically both diseases."[1] He has related an example of acute hydrocele of the hernial sac, complicated with intestinal scrotal hernia, which illustrates the difficulty of the diagnosis also in these cases.—A man, twenty-five years of age, stout and very fat, was affected with incarcerated scrotal hernia of enormous size. The hernia was of eight years' standing. The day before the incarceration, he was obliged to make a rapid journey on horseback, his truss broke on the way, and on alighting he found the scrotum of extraordinary size; he was likewise affected with nausea, acute pain in the groin, and inclination to vomit. The tumour was fully sixteen inches in circumference, and almost entirely concealed the penis; it was broad at the bottom, narrow at the upper part towards the ring, equal and smooth in almost its whole surface, and elastic. It resembled a large hydrocele, and might have been taken for one, if there had not been evident marks of incarcerated intestine. Scarpa remarks, "I could with difficulty persuade myself that this large tumour was formed for the most part by water collected in the vaginal coat of the testicle, or in the hernial sac, as the patient never had the smallest mark of serous effusion in the scrotum, as well as because, from the repeated assertion of the patient, the hernia in the course of eight years had never exceeded the size of a hen's egg, and there was no reason to suppose that so much water had descended from the cavity of the abdomen into the scrotum in a young man in other respects very healthy and strong. I rather suspected, considering the fatness of the patient, that by the exertion of the riding a great mass of omentum had descended, although there still remained some doubt how, in so short a time, the

[1] Treatise on Hernia, tr. by Wishart, p. 230.

hernial sac could have yielded to so great a distension, and because the tumour had rather the appearance and elasticity of a large hydrocele than of a large hernia composed of intestine and omentum." There was no doubt as to the impossibility of reducing the parts without an operation, as the symptoms of strangulation increased in violence every minute. On the first cut into the hernial sac, about three pounds of yellowish serum were discharged. It was a common scrotal hernia. At the upper part of the sac there was a loop of small intestine about two inches long, but no omentum. The stricture was divided, and the intestine returned. The patient recovered, the wound having healed in seven weeks. A somewhat similar case of large strangulated scrotal hernia, in which the bulk of the tumour was formed by serous effusion, is recorded by Mr. Shaw, of the Middlesex Hospital.[1] Nothing is more common than the presence of fluid in the sac of a strangulated hernia, though it rarely exists, as in these cases, in such abundance as to cause any difficulty in the diagnosis. I have met with three cases of strangulated scrotal hernia, in which several ounces of fluid were contained in the same sac with the protruded viscera, and in which the rupture being congenital no testicle could be distinguished; but the previous history, fulness at the abdominal ring, and well-marked symptoms of strangulation, were sufficient to indicate the true nature of the complaint. In one of these cases, which was operated on by Mr. Hamilton, the stricture was divided external to the sac; and the fluid which had concealed the intestine, adherent omentum, and testicle remained after the operation, but became absorbed as the patient recovered. Had Scarpa, in the case related above, examined the

[1] Lond. Med. and Phys. Journal, vol. lvi. p. 18.

tumour by transmitted light, he could scarcely have suspected that the bulk of the swelling consisted of omentum. In those cases of spurious hydrocele of the hernial sac in which the fluid and intestine or omentum are reducible, the complication may be made out by returning the contents of the sac into the abdomen, the patient being in the horizontal posture; when by pressing the finger gently on the abdominal ring, and allowing the patient to rise, the fluid will slip down into the scrotum, and produce a transparent tumour or hydrocele. On entirely remitting the pressure, the intestine or omentum will be felt descending into its former situation.

In the following case, which was shown me by Mr. Adams, the symptoms produced by spurious hydrocele of the sac of a congenital hernia closely resembled those of a congenital hydrocele.—A lad, aged twelve, applied as an out-patient at the London Hospital, on account of a swelling which occupied the left side of the scrotum. It was a transparent tumour, of an oval form, reaching upwards into the abdominal canal, which fluctuated, completely filled the scrotum, and received an impulse on coughing. The left testicle was imperceptible. On making gentle pressure the swelling disappeared *rather suddenly*, and then the testicle could be readily distinguished, and was found less than half the size of the gland on the right side. The sac which contained the fluid felt a good deal thickened. The boy stated that the swelling had existed since he was two years of age. This appeared to be a case of congenital hydrocele, of which, indeed, it presented all the usual symptoms, except that on pressure the swelling disappeared suddenly instead of gradually. The boy was accordingly directed to have a truss to press on the abdominal ring. After it had

been worn for three weeks, the fluid was found to have entirely disappeared from the sac, and none descended on the removal of the truss. When, however, the boy coughed, a small intestinal hernia came down. It then became clear that this had been a case of spurious hydrocele of the hernial sac; and thus was explained the only symptom unusual in congenital hydrocele, viz., the sudden disappearance of the tumour on pressure, the fluid passing into the abdomen together with the intestine, which it had completely masked from observation.

M. J. Cloquet has detailed the particulars of the dissection of the parts, in a case of congenital inguinal hernia on the right side, found in the body of a man, aged thirty, affected with ascites, who had worn a truss. The testicle, which had not descended lower than just outside the abdominal ring, had formed a valve, which admitted the passage of fluid into the sac, but prevented its return into the abdomen.[1] The testicle, in this case, seems to have acted much in the same way as the valvular fold of peritoneum which exists at the ring in many quadrupeds.

In operating for the removal of fluid in cases in which there is reason to suspect that intestine or omentum is also contained in the hernial sac, the surgeon should proceed in the most cautious manner. Monro, senior, relates the following case:[2]—"An old man had long laboured under a hernia, which had not been reduced for many years. The tumour became at last of a monstrous size, descending nearly to his knee, and having a proportional transverse diameter: he was con-

[1] Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 97.

[2] Medical Essays and Observations, vol. v. p. 314.

fined to lie on his back, had violent pain both in the tumour and his loins, and his flesh and strength wasted. In some places a plain fluctuation was perceived, without any of the unequal solid substances felt everywhere else. Neither the water nor solid substances could be pushed into the belly. The tumour being pressed, so as to make one of those parts where the fluctuation was most evident and the teguments were thinnest as tense and prominent as possible, a trocar, as small as a crow-quill, was thrust very slowly through the teguments and cyst. Whenever the bag was pierced the stilet was taken out, and the canula was pressed a little forward, through which six pounds of clear serous water ran out; then the convolutions of the intestines and the knotty parts of the omentum were plainly felt, but none of them would reduce." The patient was greatly relieved of his pain, and no further operation was thought proper. Unless the fluid should accumulate in so large a quantity as to cause serious inconvenience to the patient, as in this remarkable case, an operation for its removal would not be proper; for the surgeon is not warranted in opening a serous sac containing intestine on slight grounds. If it became necessary to get rid of the fluid, acupuncture would be the plan best suitable to such a case. If the intestine or omentum were reducible, the application of a truss would be the treatment required.

CHAPTER V.

HÆMATOCELE.

Hæmatocele denotes the swelling occasioned by effusion of blood in the sac of the tunica vaginalis, or in a cyst connected with the testicle. It is also applied to tumours produced by extravasation in the substance of the spermatic cord, or in the sac of an encysted hydrocele of this part. Some writers describe swellings of the scrotum from subcutaneous extravasation of blood under the head of hæmatocele, but I restrict the term to blood tumours connected with the testicle or spermatic cord, though in traumatic cases there is generally more or less sanguineous effusion in the connective tissue of the scrotum. The following table exhibits at one view the different forms of this affection :—

- Hæmatocele
  - Of the Testicle
    - Vaginal.
      - Simple.
      - Associated with Hydrocele.
    - Encysted.
  - Of the Spermatic Cord
    - Diffused.
    - Encysted.

SECTION I.

VAGINAL HÆMATOCELE OF THE TESTICLE.

This is by far the most common form of hæmatocele.

The extravasation of blood may take place in a healthy state of the parts, or it may succeed or be combined with hydrocele. The first variety of vaginal hæmatocele occurs from the accidental rupture of some blood-vessel. Thus it is liable to happen to a person on horseback, from the testicle being struck against the pommel of the saddle; or it may be occasioned by violent efforts made in straining, as in the attempt to raise a heavy weight. In these cases the testicle immediately enlarges, sometimes to more than double its natural size, from rapid distension of the tunica vaginalis with blood. Gosselin remarks that he has never witnessed a case of traumatic vaginal hæmatocele. Though I have not verified the fact by observation after death, I do not doubt the occurrence of such effusions, having seen several cases of traumatic swelling of the testicle, which I could explain only in this way. But I agree with Gosselin that the affection is rare.

The second variety of vaginal hæmatocele, in which the extravasation takes place in combination with hydrocele, is of more frequent occurrence than the first. It may also be produced by a blow, or by the wound of some vessel in the operation of tapping. The testicle, owing to its free mobility, does not often suffer from mechanical violence; but when hydrocele exists, the tumour, from its prominence and size, is exposed to injury. A blow occasions a slight rupture of the tunica vaginalis, and of some of the enlarged vessels ramifying outside it; and the blood which escapes passes into the sac and mixes with the fluid of the hydrocele, producing a sudden increase in the size of the tumour. The accident is most liable to occur in old people whose vessels are diseased and readily rupture under injury. The quantity of blood effused varies considerably. It may

be merely sufficient to impart a red tinge to the serum. In general, however, it is greater in amount, and coagula are formed, which remain undissolved in the fluid. A hæmatocele may be produced, in the operation of tapping a hydrocele, in two ways. 1. It may be occasioned by the accidental wound of some vessel ramifying over the tunica vaginalis, which, instead of bleeding externally, or into the connective tissue of the scrotum, pours its blood into the sac of the hydrocele. This accident may occur when the operation is performed with a trocar, but is more liable to happen when the lancet is used. 2. A hæmatocele may be caused by the trocar or lancet penetrating too far, and wounding the testicle or spermatic artery. A case in which a hæmatocele was occasioned by a wound of the artery is recorded by Scarpa.[1] Sir William Fergusson relates that a man, in the habit of performing acupuncture for himself with several needles, on one occasion left a needle in the sac, which was quickly followed by the formation of a hæmatocele. The tunica vaginalis was laid open, the needle extracted, and the patient cured.[2] In hæmatoceles consequent upon contusions, an opportunity of tracing the source of hæmorrhage is very rarely obtained. When the parts are in a healthy state, the bleeding probably proceeds from a rupture of some of the vessels ramifying between the tunica albuginea and the tunica vaginalis testis. In cases of hydrocele the parietal portion of the tunica vaginalis is ruptured, the blood being derived from the vessels of the scrotum. In the case of a man who had long had a hydrocele, and had received a severe blow upon it, which suddenly increased the swelling, bruised the

[1] Treatise on Hernia, tr. by Wishart, p. 76.
[2] Lond. and Edinb. Monthly Journal, July, 1843.

scrotum, and produced great pain from distension, Sir A. Cooper, on making an incision into it and discharging a large quantity of water and coagulated blood, found a rent in the tunica vaginalis, between one and two inches in length, covered with coagulum.[1]

The blood effused often acts as a foreign body, and excites active inflammation in the tunica vaginalis, lymph is exuded, and this mixing with blood and serum modifies the appearance of the contents of the cyst, rendering it turbid and of a lighter colour. The inflammation leads also to plastic effusions on the inner surface of the sac, and sometimes goes on to suppuration. It may extend from the tunica vaginalis to the surrounding connective tissue and fascia, which in recent cases are found infiltrated with serum and lymph. In a case of hæmatocele, occasioned by the wound of a vessel in tapping a hydrocele, in which I was consulted, the inflammation which ensued caused in the course of a fortnight great thickening of the tissues external to the sac, and the formation of an abscess in the scrotum on one side of the hæmatocele. The inflammation is not always, however, of this active character. A chronic form of inflammation is sometimes set up in the sac as well as in the surrounding fascia and connective tissue. In these cases the internal surface of the tunica vaginalis is lined with layers of plastic lymph slightly adherent, and admitting of separation like the layers of fibrin in an aneurismal sac. The interior of the cavity, instead of presenting its natural smooth and polished surface, is rough, granular, and irregular, and sometimes feels as tough as a piece of leather, having lost all the characters of a serous membrane. The sac and its investing tissues not only become extremely dense and firm, but

[1] Lib. cit. p. 212.

sometimes acquire as much as half an inch in thickness. In old hæmatoceles the blood becomes changed into a substance resembling coffee grounds, of a brownish-red, or chocolate colour, and more or less fluid. The coagula sometimes present a cellular or honeycomb appearance, the cells being filled with a reddish serum. Occasionally the blood is found converted into a solid fibrinous substance, of a yellow or fawn colour, arranged in firm layers, similar to the coagula lining the sac of an aneurism.

Gosselin in 1851[1] made known some interesting observations on the pathological changes in hæmatocele, in which he dissented from the commonly received views, that the accidental effusion of blood leads to inflammation and thickening of the sac. He contended that inflammation of the sac commonly precedes the effusion of blood, which is due to the rupture of vessels in the false membranes at a period when their walls are too feeble and too incompletely organized to resist friction and slight shocks. Consequently, he regarded the effusion of blood as the result instead of the cause of the changes in the sac observed in hæmatocele. In his translation of this work (1857), Gosselin adheres to these views, and in confirmation of them, and as showing the readiness with which blood is effused from recently-organized lymph, he adduces cases in which he had observed apoplectic clots between the layers of false membrane lining the sac. The pathological evidence supplied by so careful and correct an observer as Gosselin, leaves no doubt that hæmatocele is liable to succeed inflammatory changes in the vaginal sac, but the clinical history of the cases which have fallen under my notice do not enable me to support this notion of the common mode

[1] Archives Générales de Médecine, 4e série, t. 27.

in which hæmatocele is produced. I have observed so many cases of hydrocele without any unusual thickening of the sac, which have been accidentally converted into hæmatocele, that I must join issue with Gosselin as to the mode in which the disease usually occurs.

In hæmatocele the testicle preserves the same relation to the remainder of the tumour as in common hydrocele, being situated at the posterior part, and rather below the centre. Its position, however, is liable to similar alterations as occur in hydrocele, and they are dependent upon the same causes. I once witnessed an untoward event, which happened in the practice of a surgeon who was unaware of the testicle being out of its usual position. A young man with an inverted testicle became affected with hydrocele. The case was converted into a hæmatocele by the wound of a vessel in the operation of tapping. Inflammation ensued, and it became necessary to lay open the sac. The surgeon, in carrying the incision to the lower part of the tunica vaginalis, divided the vas deferens, and severed the sound testicle nearly in two with his bistoury, the thickening around the sac having prevented him from detecting the gland in its unusual situation in front of the sac. This unfortunate accident obliged the surgeon to perform castration instead of incision. In describing the difficulties of distinguishing the position of the testicle, I shall have occasion to mention another case of hæmatocele occurring to an inverted testicle in which a similar injury was inflicted in the operation of incision, and the testicle was removed in consequence.

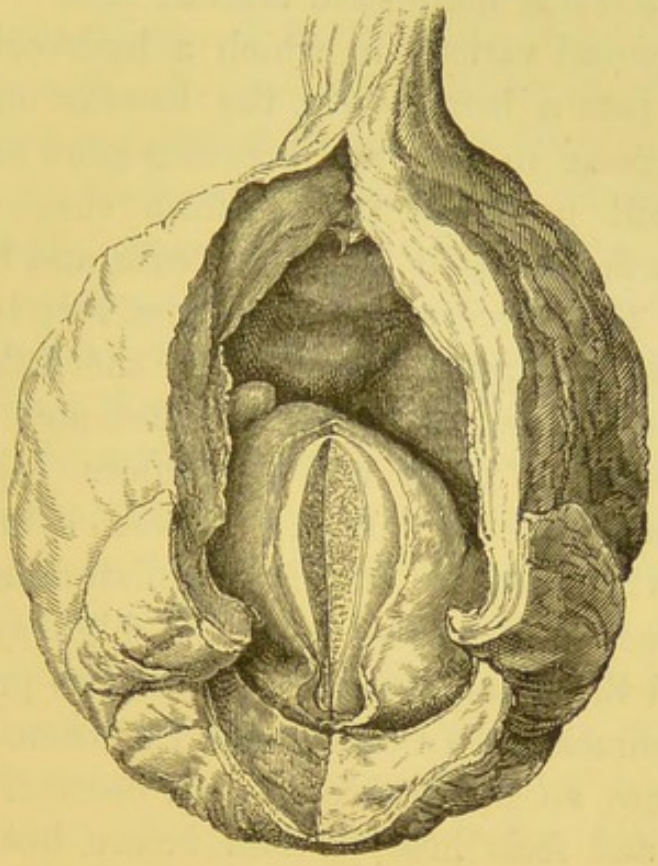
In chronic hæmatoceles it is said that the glandular structure of the testicle sometimes disappears as in old cases of hydrocele, atrophy being occasioned by the long-continued pressure arising from the extravasated

blood. On examining the body of an elderly negro who died of disease in the lungs, Sir B. Brodie observed on the right side of the scrotum a large tumour which was formed by the tunica vaginalis, distended with about twelve ounces of fluid having the appearance of coffee grounds, with numerous masses of solid substance, manifestly fragments of coagulum, floating in it. The tunica vaginalis itself was much thickened. The substance of the testicle, the tunica albuginea, and the tunica vaginalis immediately covering it were entirely destroyed, so that not a vestige of these parts could be discovered. The vas deferens adhered to the posterior part of the tumour, and was imperceptibly lost at the part where it usually joins the testicle. Sir B. Brodie likewise met with another case in which the appearances on dissection were precisely similar; but here also he unfortunately lost an opportunity of learning the history of the case during the patient's lifetime.[1] Judging from my own observations, complete wasting of the testicle is a rare occurrence. In the examination of a large hæmatocele which had existed for many years, and was removed by operation under the impression that it was a solid enlargement of the testicle, I found the tunica vaginalis nearly half an inch thick, and full of a soft friable substance of a chocolate colour; the testicle, which was situated at the posterior part of the cavity, was somewhat flattened, and partly embedded in the thickened cyst; but the glandular structure was perfectly healthy, and the bulk of the organ scarcely less than natural. The hæmatocele, with the sac and testicle laid open, is represented in Fig. 20. I have generally found the structure of the gland sound in hæmatocele, though its nutrition is often impaired

[1] Lond. Med. and Phys. Journal, vol. lviii. p. 299.

when the disease is of old standing. Gosselin has noticed that the gland is usually anæmic—that its substance is pale, and that it contains no spermatozoa.

Fig. 20.



Symptoms.—The first variety of vaginal hæmatocele appears suddenly after a strain or the receipt of some injury. The testicle quickly enlarges to more than double its natural size, and forms a tumour, which is of an oval shape, tender, tense, and fluctuates indistinctly. If the affection be occasioned by a blow, this enlargement is accompanied with extravasation in the connective tissue of the scrotum, which conceals the hæmatocele. In one case which came under my notice, the amount of blood effused into the scrotum was so great that the hæmatocele was not detected for a week, the enlargement consequent upon the effusion into the vaginal sac being obscured and concealed by the blood extravasated around

it. As the latter became absorbed, the former was rendered distinct and subsided much more slowly. Slight pain and tenderness continue for some days, and then subside, leaving the swelling but little altered, except that it feels rather more solid than at first.

In the second variety, in which a hydrocele becomes converted into a hæmatocele, the tumour undergoes a sudden increase in size, and becomes more or less painful. It still preserves its pyriform shape and even uniform surface; but it feels very tense, and heavier and more solid than before, and fluctuates very indistinctly. In the course of a few hours, or on the following day, inflammation arises, the part feels hot and tender, the scrotum becomes tense and sometimes injected, and further enlargement ensues. These symptoms are attended with more or less febrile disturbance. Occasionally there is excessive pain, and high symptomatic fever; and the inflammation, if allowed to proceed, goes on to suppuration. In other cases the tumour from the first assumes an indolent character, becomes more firm and solid, and feels heavier than before, but undergoes no alteration in size. It may remain stationary in this condition for several years, producing no inconvenience beyond that which arises from its bulk and weight, which are sometimes considerable.

Diagnosis.—A vaginal hæmatocele may be distinguished from a hydrocele by the absence of transparency, the obscure character of the fluctuation, the heavy feel of the tumour when balanced in the hand, and the sudden and accidental mode of its occurrence. In old cases, in which the tunica vaginalis and its envelopes have become much thickened and indurated, the tumour possesses so firm a character, feels so heavy and solid, that it is very liable to be mistaken for a

chronic enlargement of the testicle; and the diagnosis, at all times difficult, in some instances cannot be satisfactorily made out by the nicest manipulation of the most experienced hands. The records of surgery furnish many cases in which castration has been performed from a mistaken diagnosis: I have known three instances of the kind myself. In chronic swelling of the testicle, whether from malignant deposit or other disease, the gland loses for the most part its natural sensibility; but in hæmatocele pressure on the back part, where the testicle is usually situated, occasions the peculiar pain always experienced when the organ is compressed. When the least doubt exists, it should in all cases be removed by the introduction of a lancet or trocar immediately before any serious operation, such as castration or incision, is undertaken. Swelling of the scrotum from extravasation of blood in its loose connective tissue may arise somewhat suddenly after a blow; but the diffused nature of the tumour and its extension to both sides of the scrotum, the concealment more or less of both testicles, doughy feel, and red or dark colour of the skin, are characters too clearly expressive of the nature of the case to mislead the practitioner.

Treatment.—In the first variety of vaginal hæmatocele, if the quantity of blood effused into the sac be small, the treatment required is very simple. The patient is to be kept in the recumbent position, with the testicle supported, and a cold lotion or a bag of ice is to be applied to the part. If the tenderness be considerable, or symptoms of inflammation arise, a few leeches should be applied to the scrotum, or, if there be much contusion of the part, to the corresponding groin; but this is seldom necessary. By such means inflammation may be prevented, and in the course of time the

effused blood becomes absorbed. In general, this takes place very gradually and slowly, and several weeks may elapse before the blood is entirely removed. If the quantity of blood extravasated be large, so as to cause great tension of the tunica vaginalis and severe pain, and endanger the nutrition of the testicle, it would be necessary to lay open the sac by an incision, and to remove the blood. The part would afterwards heal by granulation. I have never had occasion to perform this operation in any case of injury, and I believe that it is very rarely called for.

When hæmatocele succeeds to, or is combined with hydrocele, the practice formerly was at once to make an incision into the tunica vaginalis, and discharge its contents. This is not generally necessary. The blood effused, especially when small in quantity, often produces but little irritation, and becoming mixed with the fluid of the hydrocele may be readily removed by tapping, and the operation can be repeated afterwards at intervals until the fluid is free from any red tinge. Even when inflammation arises the surgeon should not be too hasty in laying open the tunica vaginalis, for even then by emptying the sac with a trocar so as to relieve the tension, and afterwards by rest and antiphlogistic treatment, the inflammation may subside, and the operation may be avoided, as in the following case.—J.D., an ostler, aged forty-three, was admitted into the hospital on account of a large heavy scrotal swelling, which was highly inflamed, œdematous, and very tender. It appeared that he had been subject to hydrocele for some years, and that it had been tapped by a surgeon. When the swelling returned he punctured it himself with a penknife, and got rid of the water without any ill consequence. About a month before his admission he re-

peated the operation, but this time was not so fortunate, for the part soon became painful and enlarged. The swelling was afterwards increased by a kick from a horse. I kept him in bed, leeched the scrotum, and applied cold lotion for three days. Finding the swelling to be increasing, I inserted a large trocar, and drew off eight ounces of dark fluid blood with some small coagula, and ordered calomel and opium to be taken at night. The swelling returned quickly, but there was less pain and tenderness, and the œdema subsided. In four days I drew off five ounces more fluid blood. The part again enlarged for a few days, and then gradually subsided until all fluid had disappeared, and he was discharged, cured both of hydrocele and hæmatocele, seventeen days after his admission. In another case of hæmatocele from injury, in which the inflammation was less severe than in the preceding case, the hydrocele, which was of old standing, disappeared after the bloody fluid had been twice removed and the inflammation had subsided. When, however, the quantity of blood effused is large, and the inflammation very acute, with considerable local swelling and increasing thickening of the parts, absorption cannot be expected, and delay in operating will only lead to suppuration. The tunica vaginalis should be punctured with a scalpel at its upper part, a director or the finger introduced, and the whole extent of the sac then laid open by an incision with a bistoury carried quite to its lower part, in order to prevent any bagging of the discharge afterwards. This must be done with care, so as to avoid wounding the testicle. In a hæmatocele with a very thickened sac, the difficulty of detecting beforehand the precise situation of this organ is very great, the only available guide to its position being the peculiar

sensation caused by its compression. But when the testicle is small, wasted, or well protected by the dense and thickened tissues, and when the tumour is so sensitive or the patient so timid, that he complains wherever pressure is applied, it is almost impossible for the surgeon to ascertain exactly the site of the gland. It is not therefore surprising that in hæmatoceles requiring incision, when the testicle is out of its usual position it should be extremely liable to injury. I have already alluded (p. 209) to a case of inversion in which the organ had been wounded in the operation. The following instructive case exhibits difficulties which would have embarrassed any surgeon, even the most experienced and cautious.—A Portuguese Jew, aged twenty-six, recently arrived in England, applied to me on account of a disease of the right testicle. The organ was enlarged to more than thrice its natural size, was opaque, felt firm, weighed heavy, and afforded an indistinct sense of fluctuation. The man looked healthy, and stated that the enlargement had existed twelve years, but had increased a good deal lately. In the expectation of finding fluid, I thrust a fine exploring trocar into the upper part of the swelling, but nothing except a few drops of blood appeared. Mercury was then taken until the mouth became sore, without any effect on the tumour. Being strongly impressed that fluid existed, I next introduced the exploring trocar into the lower part of the swelling, but with the same result as before. The punctures did not give rise to an increase of tenderness. The patient was now admitted into the London Hospital, and a consultation held on the case. The senior surgeon being of opinion that the disease might be the result of chronic orchitis, the tumour was strapped, and iodide of potassium given in-

ternally for a fortnight, when a slight increase rather than improvement being manifested, the plan was discontinued. At a second consultation it was determined, as the tumour had not yielded to treatment, that it should be removed by operation. It was supposed that the disease might be cystic. A very careful examination was made, and firm pressure exercised at different parts, in order if possible to ascertain the site of the testicle, but the man being very timid and sensitive to pain, and unacquainted with the English language, no information in reference to this point could be obtained. He was placed under the influence of chloroform, and, as a measure of precaution, a full-sized hydrocele trocar was plunged into the upper and front part of the tumour where fluctuation seemed manifest. After the instrument had penetrated solid tissues of considerable thickness, resistance ceased, and on withdrawal of the trocar a small quantity of dark red grumous fluid loaded with cholesterine escaped. Suspecting now that I had to deal with a hæmatocele, a free incision was made in front of the tumour just below the puncture, when the appearance of tubuli convinced me that the disease was either cystic with the glandular structure spread over the surface, or a hæmatocele with the testicle occupying an abnormal position in front of the sac. The latter seemed most probable; and as it was considered that the gland had been seriously wounded both by puncture and incision, and that the sac was much diseased, castration was advised, and immediately performed. The case proved to be a chronic hæmatocele of an inverted testicle. The vas deferens passed down the front of the sac to the testicle, which was sound in structure, but flattened and spread out so as to occupy a great part of the front of the thick, dense, leather-like sac in which

it was embedded. The trocar had transfixed its upper part. The patient recovered favourably. Had it been possible to ascertain the nature of the case and situation of the testicle before the operation, the tumour might have been incised at its back part and the testicle thereby preserved.

If in a recent case the spermatic artery or a vessel of any size be found wounded, and bleeding, it can be easily secured. In the case related by Scarpa, previously alluded to, the wounded spermatic artery was seen, after the tunica vaginalis had been laid open, pumping out blood. A poultice or the water dressing is the only application necessary afterwards. The surgeon may leave a piece of lint between the edges of the wound to prevent union by the first intention; but it should not be carried to the bottom of the sac, or be placed in contact with the serous membrane. Severe symptoms and a good deal of constitutional irritation sometimes follow this operation: they are occasioned by acute inflammation of the exposed sac, which when large and dilated affords a considerable extent of surface. But in general the inflammation is relieved by the incision and consequent loss of blood, and under mild treatment the local irritation soon subsides. In old persons gangrene has arisen from the incision of a hæmatocele; and formerly, when it was the practice to stuff the bottom of the wound with lint or other extraneous substances for the purpose of insuring sufficient inflammation, the operation was not altogether free from risk, especially in large hæmatoceles, and in persons of an unhealthy constitution.

I have recorded in the Medico-Chirurgical Transactions[1] the case of a gentleman, aged seventy-nine, to

[1] Vol. xxxiii. p. 241.

whom I was summoned on account of an attack of retention of urine from enlargement of the prostate gland. He had also, on the left side, a chronic vaginal hæmatocele, which had attained so large a size as to interfere with the introduction of a catheter. The tumour reached half-way down the thighs, and the penis was so completely buried in it that I was unable to reach the glans at the navel-like orifice in the integuments to pass the catheter. I had no alternative, therefore, but to lay open the hæmatocele, from which three pints of dark grumous blood were discharged. The thickening of the sac prevented its collapsing after the incision. The patient died a week afterwards. This is the only case of hæmatocele terminating fatally which has come under my observation, but Gosselin mentions several examples in which inflammation of a thickened sac had led to a fatal result. He considers that the risk of incision is much diminished by afterwards taking away the false membrane, and he strongly advocates a process of decortication. Several interesting cases in which this has been done with success are related and referred to by him. When the false membrane is not too firmly consolidated the detachment and removal of the layers is the right treatment, but in a very large chronic hæmatocele with great consolidation and thickening of the sac, the best operation, especially in persons advanced in life, is the excision of the whole of the mass. The loss of the testicle in such a case is of little importance; and the scrotal integuments contract so much from the removal of large tumours, that the wound would not only be comparatively small in size and much less than if the hæmatocele were incised, but would also heal readily instead of being the seat of protracted suppuration. This course was adopted by Mr.

Bowman in the following case, which he kindly afforded me the opportunity of seeing in King's College Hospital, in January, 1853.—A labourer, aged fifty, two years before received a blow on his left testicle, which afterwards gradually enlarged until it reached the size of a goose's egg. This swelling was also struck accidentally, and from this time rapidly increased to a great size. The tumour was pyriform in shape, firm, tense, opaque, but not at all tender. It reached nearly halfway down the thighs. By firm pressure at a spot in the back part I was able to make out the position of the testicle. Mr. Bowman punctured the swelling with a trocar, and gave issue to about fifty ounces of dark red fluid, which partly coagulated, and contained abundance of red globules. The tumour in a week regained nearly its former size. Having evacuated about a pint of dark-brown fluid by puncture, Mr. Bowman excised the whole mass, and after tying numerous vessels, closed the wound with sutures. The patient recovered favourably in about a month. The tunica vaginalis was greatly thickened by extensive layers of fibrine deposited within the sac. The testicle was sound, but concealed and flattened by the fibrinous exudations.

SECTION II.

ENCYSTED HÆMATOCELE OF THE TESTICLE.

This form of hæmatocele occurs when a cyst developed from the epididymis becomes the seat of bloody effusion, instead of the fluid which it usually contains. It may arise from external violence, as in the following case.—My former colleague, Mr. Hamilton, requested me to examine a painful tumour connected with the testicle of a patient in the hospital. He was a

Jew, aged eighteen, who had received three months before an injury of the left testicle. He stated that the scrotum became much swollen, and that the tumour was observed afterwards. I found a swelling the size of a chestnut just above the testicle, quite moveable and loose in the scrotum, but attached to the upper part of the gland by a small neck. It was firm, but gave an indistinct feeling of fluctuation when examined. Handling caused pain. Mr. Hamilton punctured the cyst with a lancet, and discharged a quantity of dark coagula contained in a thick firm cyst, lined by a rough false membrane. The part healed favourably by granulation. The patient had no recollection of any tumour connected with the testicle before the injury; but knowing how frequently small cysts springing from the epididymis are present without being noticed, I have little doubt that one existed in this instance, and that the injury had caused effusion of blood into the cyst. This produced inflammation and thickening of the sac, and accounted for the tumour becoming painful and enlarged.

The following complicated case of twofold hæmatocele, an old and a recent one combined on the same side, affords a good example of encysted hæmatocele of the testicle.—In 1853, a man, aged forty-nine, who had had a swelling of the left testicle for thirteen years, came under my care at the London Hospital in consequence of the tumour becoming rapidly larger, and very painful. It reached half-way down the thigh, and was heavy, firm, and very tender. Finding an obscure feeling of fluctuation, I punctured the swelling with a trocar, and removed twenty-four ounces of a thick dark grumous fluid. Considerable thickening remained at the upper part, which was also extremely tender. The testicle was felt quite at the bottom of the thickened

sac. The tumour quickly increased nearly to its former size. Six days after the puncture I drew off ten ounces of a similar fluid, and then made a free incision along the front of the sac, dividing tissues of great thickness and density. The incision exposed a quantity of soft dark recent coagula at the upper part of the tumour, and opened below a very large cyst thickly coated with tough layers of lymph, the inner surface of which was rough, and of a reddish-brown colour. The walls did not collapse. Considering that castration was attended with less risk than leaving the parts to suppurate, especially as the man was not in sound health, and that he was not likely to feel the loss of a testicle, I excised the whole of the morbid parts. On dissection, the large sac proved to be an encysted hydrocele of the epididymis converted into an old hæmatocele, the recent coagula being lodged between the thick layers of adventitious membrane lining the cyst. The testicle was found distinct at the bottom of the sac, and not embedded in the thickened walls as in vaginal hæmatocele. The surfaces of the tunica vaginalis were adherent partly by old and partly by recent adhesions. The epididymis was drawn up, and lost in the walls of the large cyst. Recent depositions in a beaded form were observed in the testicle, and the ducts were loaded with a granular substance, the result of fatty degeneration. The patient's recovery proved tedious.

Sir A. Cooper has recorded a case of hæmatocele, the cyst of which, we may safely conclude from his description, was originally an encysted hydrocele of the testicle; but this eminent surgeon does not appear to have recognised its true character.[1]

In encysted hæmatocele as in vaginal the sac may

[1] Lib. cit. p. 210.

become thickened, and, in the course of years, undergo conversion into fibro-cartilage or bone. The late Mr. Grey showed me, in the museum of St. George's Hospital, a remarkable specimen of encysted hæmatocele, consisting of a complete bony cyst containing a soft reddish substance, altered blood. The specimen was discovered accidentally in the dissecting-room, and there was no history attached to it.

This form of hæmatocele is very little known, and when it occurs is liable to be mistaken for a vaginal hæmatocele or a hæmatocele of the spermatic cord. It may generally be distinguished from the former by the presence of the testicle distinct from the tumour, and below or in front of it, for even in cases where the sac is dense and much thickened, the gland is not sunk and buried in the tumour as in vaginal hæmatocele, but in a careful examination may be detected on the surface. The treatment applicable to encysted hæmatocele is the same as that required for vaginal.

In August, 1864, I incised a large chronic encysted hæmatocele with a thickened sac in a man, aged forty-three, a patient in the London Hospital. He went on well at first, until the wound was attacked with hospital gangrene which delayed the healing, but he ultimately got quite well.

SECTION III.

HÆMATOCELE OF THE SPERMATIC CORD.

Hæmatocele of the spermatic cord, termed also *funicular*, occurs in two forms, the diffused and encysted.

Diffused hæmatocele was first noticed by Mr. Pott. It is liable to be produced by the accidental rupture of a spermatic vein during violent and sudden exertion, as in

straining to lift a heavy weight, when blood immediately escapes into and infiltrates the loose connective tissue along the cord, where it accumulates, its further diffusion being prevented by the fascious envelope of this part. Mr. Pott has related three cases, all of which occurred in this way. Diffused hæmatocele of the cord may also be occasioned by contusion. Mr. Maunder relates a case in the Hôpital du Midi in Paris, in which the extravasation occurred in the left side during the act of copulation.[1] It may happen to persons in good health, and whose genital organs are free from disease, but is more likely to occur in a varicose state of the veins or fatty degeneration of the arteries. The complaint is rare.

The symptoms of this affection are very similar to those of diffused hydrocele of the cord; from which, however, it may be distinguished by its sudden appearance, and in cases where it results from contusion, by ecchymosis of the scrotum and groin. I have met with slight hæmatocele of the cord coupled with more or less effusion of blood in the scrotum in several instances. The swelling of the scrotum did not prevent my detecting a defined tumour of the cord, but in one case the hæmatocele was not recognised for several days, the effusion in the scrotum concealing the hard and defined swelling produced by the effusion in the spermatic cord. Mr. Pott relates the following case.—A labouring man, who had fallen down with a load on his back, was brought into St. Bartholomew's Hospital with a supposed rupture, a swelling having appeared in the groin and scrotum immediately after the accident. The tumour seemed to occupy the whole spermatic process, which was so enlarged by it that it was impossible to feel the passage of it from the abdomen through the muscle; but the

[1] Medical Times and Gazette, Oct. 1858, p. 413.

testicle below it was perfectly distinct. The appearance of a tumour, the suddenness of its formation, the distinct fluctuation of the testicle below, and the circumstance of the man's not having had a stool for two days past, inclined Mr. Freke to believe it to be hernia and to treat it accordingly. After fruitless attempts at reduction, he determined upon an operation. He divided the superficial parts and tendinous opening in the abdominal muscle, and made several trials to reduce what he supposed to be the gut without opening the sac, but ineffectually. He was at length obliged to lay open the containing membrane, when a large quantity of blood, partly fluid and partly grumous, burst forth, and the whole tumour subsided. The parts were washed, and search made for the bleeding vessel, but it could not be found. The wound was dressed, and the man got well.[1] In this case it does not appear that there were any urgent symptoms of hernia demanding an operation. The costive state of the bowels was an accidental circumstance, which might have been shortly removed by the exhibition of a purgative. An operation can very rarely be required in any case of diffused hæmatocele. If left alone, the blood will in the course of time be removed by absorption. All that appears to be required in the way of treatment is to check any tendency that may arise to inflammation. If the tumour, however, should continue to increase, hæmorrhage still going on and infiltrating the connective tissue, it may become necessary to make an incision, in order to secure the bleeding vessels. This appears to have been necessary in the following case detailed by Mr. Pott.—A young fellow straining at stool felt a sudden pain in his left groin; and, upon examination, found

[1] Lib. cit. Case XXX. p. 456.

a swelling extending from thence into the scrotum. He took it for a rupture, and immediately applied to an advertising operator, who, after unsuccessful attempts to reduce it, applied a truss. After some days, during which the pain and swelling increased, he was seen by Mr. Pott. The tumour was large, and had somewhat the feel of an omental hernia; the abdominal aperture seemed dilated; the testicle was tolerably distinct below; pain in the erect posture was considerable, but in a supine one very little; he had neither heat, quickness of pulse, hiccough, nor vomiting, and had been thrice at stool that day. Notwithstanding he was bled freely and kept in bed, the pain and tumour increased and fluctuation became palpable. Thinking that the fluid might possibly be collected in the sac of an omental hernia, Mr. Pott made a puncture with a lancet, and let out some ounces of clear blood. The hæmorrhage continuing for three or four days, an incision of some length was made up to the groin, and the cellular membrane of the spermatic process was found loaded with extravasated blood. The wound was dressed with lint pressed out from a styptic; but an alarming return of the hæmorrhage soon after induced Mr. Pott to perform castration.[1] Modern surgeons will not be inclined to admit that castration was "the only remedy in this case." Had diligent search been made for the vessel, it might have been found and secured.

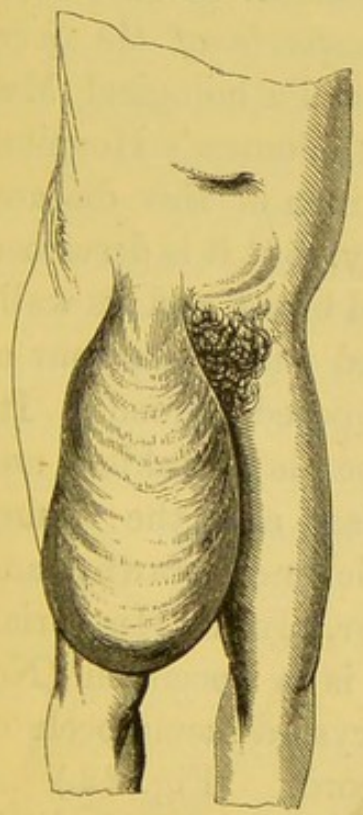
Mr. Bowman has recorded[2] a very remarkable case of hæmatocele of the spermatic cord, in which the tumour attained an extraordinary size, and ultimately proved fatal. The subject of it was a farmer nearly sixty years of age. About ten years before his death he was

[1] Lib. cit. Case XXXI. p. 458.

[2] Lib. cit.

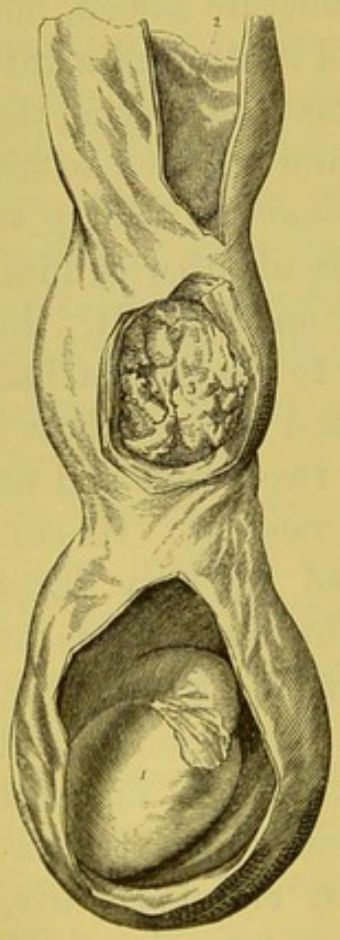
thrown from his horse, and received a blow on the right groin, which gave rise to a swelling confined to the inguinal canal, and resembling a hernia. It could not, however, be reduced, had no impulse from coughing, and was accompanied with ecchymosis. The pain and ecchymosis subsided, and he resumed his ordinary pursuits; but the swelling, which was as large as a hen's egg, oval, firm, and elastic, remained nearly stationary for seven years, when, during exertion in walking, it became suddenly larger and heavier, blood being also largely effused in the scrotum. After the disappearance of the ecchymosis, the tumour manifested a disposition to augment. A surgeon introduced a trocar, which was followed by a gush of blood. The puncture healed, but the tumour continued to increase until it attained a vast size. Mr. Bowman, on visiting the patient, found him confined to his bed from sheer inability to drag so great a substance about with him. As represented in Fig. 21, the tumour reached to the patella, had an oval shape, and was so heavy that it required two hands and no slight effort to raise it. Its surface was crossed by very large veins. The right testicle was at the lowest part of the tumour, resting on the knee joint, and formed no part of the diseased mass. The tumour was tympanitic at its most elevated parts, and seemed to contain air mixed with fluid. This sign, with a low irritative fever, rendered it probable that the contents had

Fig. 21.



become decomposed since the last puncture. It was therefore deemed desirable to lay open the part to give vent to the gas, and other putrid matters. Mr. Bowman made an opening three inches in extent, and discharged a large quantity of dark-brown putrid blood of the consistence of treacle, mixed with large masses of old coagulum, altogether nearly filling two large wash-hand basins. In the reduced condition of the patient, it was not considered safe to attempt the removal of the entire tumour. A counter-opening was made at the lower part without interfering with the testicle. The walls of the cavity being firm and solid, collapsed but little. He survived the operation only five days. No *post-mortem* examination was made, and it must remain doubtful whether the origin of the hæmatocele was arterial or venous.

Fig. 22.



Encysted Hæmatocele of the Spermatic Cord.—The Pathological Museum of St. Bartholomew's Hospital[1] contains a specimen of this disease. The cyst is empty, but it is described to have contained blood, and its walls are deeply stained with the colour of partially decomposed blood. Its lining membrane is wrinkled and coarsely granular, and the tissues around it are thickened, brawny, and adherent together. In the Hunterian Museum there is a specimen (No. 2460) of old encysted hæmatocele of the spermatic cord. (Fig. 22.) A good-sized cyst, lined by a membrane, polished and a little

[1] Series 22nd, No. 11 in printed Catalogue.

wrinkled, is filled with a soft tawny-looking granular matter (3), resembling the altered coagulum of blood observed in ordinary hæmatocele after long maceration in spirit. The tissues around the cyst are thickened and indurated, just like those around an old hæmatocele of the testicle. There is a hernial sac immediately above it (2), and a hydrocele below, with the sac open for some distance up the cord as far as the cyst of the hæmatocele. The latter does not communicate either with the tunica vaginalis or the hernial sac. In the Musée Dupuytren in Paris there is also a preparation of this affection which occurred in the practice of M. Blandin.

This form of hæmatocele is very uncommon, the small size of the cyst and its protected situation fully accounting for the rarity of the contents of an encysted hydrocele of the cord becoming mixed with or changed to blood. Its diagnosis is extremely difficult; indeed, the nature of the case could hardly be determined positively without a puncture. We should expect that an existing hydrocele of the cord would suddenly enlarge and become painful; that it would lose its transparency, fluctuate less distinctly, and feel more firm and solid than before. Two cases in which an encysted hæmatocele of the cord was met with during life, and its character determined by an opening made into the cyst, are recorded by M. Beraud.[1] One occurred to M. Velpeau, the other to Dr. Cabaret. The latter was complicated with vaginal hydrocele and enlargement of the testicle.

An encysted hæmatocele of the cord should be treated in the same way as a hæmatocele of the testicle. In slight cases sufficient relief may be afforded by rest and

[1] Archives Générales de Médecine, 4e série, t. xxv. p. 299.

antiphlogistic measures; if the tumour should become painful and inflamed, or show no disposition to disperse, the blood must be liberated by an incision, and the wound be encouraged to heal by granulations from the bottom of the cyst. This treatment was adopted with success in the two cases mentioned by M. Beraud.

CHAPTER VI.

ORCHITIS.

Inflammation of the testicle occurs in two forms, acute and chronic; and it may commence either in the body or secreting part of the organ, or in the epididymis. Inflammation beginning in the body of the testicle, commonly called *parenchymatous orchitis*, may be idiopathic, or may be excited by external violence; the disease is at first confined to the interior of the organ, the epididymis and tunica vaginalis being affected only secondarily, and sometimes entirely escaping. Orchitis is far more frequently a consecutive affection than a primary, the inflammation being transmitted from the urethra along the vas deferens. In this latter form of orchitis, now commonly called *epididymitis*, but familiarly known by the term *hernia humoralis*, the epididymis is the part attacked, and the tunica vaginalis generally participates in the disease.

SECTION I.

ACUTE ORCHITIS.

Few pathologists have examined a testicle in a state of acute inflammation, and I am unacquainted with any authentic account of the alterations in structure from inflammation originating in the body of the gland. Many years ago I twice had an opportunity of inspecting a testicle affected with acute secondary

orchitis; and the following description of the pathological appearances is drawn up from these examinations, and from the account of the dissection of two testicles affected with gonorrhœal inflammation recorded by M. Gaussail.[1] The tunica vaginalis is more or less distended with lymph, or albuminous matter infiltrated with reddish serum, which forms loose adhesions between the opposed surfaces of the membrane; these adhesions are so slight as easily to admit of being broken down with the finger. The membrane is injected with a multitude of minute red vessels, which ramify in various directions, and form a compact network. At a later period red vessels may be traced, proceeding from the free surface of the tunica vaginalis to the false membranes forming the adhesions. The volume of the testicle is very little, if at all increased, the great bulk of the tumour being occasioned by the swollen epididymis and effusion into the serous sac. When cut into, the gland appears somewhat darker than natural, from a congested state of its vessels. The epididymis, particularly the lower part, is enlarged to twice, and sometimes thrice, its natural size, and feels thick, firm, and indurated. This enlargement is produced by the exudation of a brownish deposit in the connective tissue between the convolutions of the duct. The coats of the vas deferens are thickened, and the vessels ramifying near them injected, sometimes along the whole extent of the duct. Exudation matter is found in the connective tissue around a tortuous part of the vas deferens and tail of the epididymis, which frequently forms the bulk of the swelling observed in these cases. Gosselin examined, with M. Marcé, the

[1] Mémoire sur l'Orchite Blennorrhagique, Archives Générales de Médecine, tom. xxvii. p. 210.

testicle of a man who died of cholera twenty-six days after the commencement of an attack of gonorrhœal epididymitis. The tail of the epididymis alone presented traces of inflammation. It was enlarged and formed a hard mass the size of a haricot bean. When cut, it exhibited a yellow appearance from the deposit of plastic matter in the cavity, and in the walls of the convoluted duct. This matter consisted of fat granules, granular globules of inflammation, and globules of pus. There was no deposit in the surrounding connective tissue. Gosselin remarks that the presence of exudation matter in the cavity and walls of the canal allows us to comprehend the occurrence of obliteration by the intratubular exudation passing into a fibrous state.[1]

In treating of the acute inflammatory changes in the tunica vaginalis (page 90), I remarked that the inflammatory action was very liable to extend to the substance of the epididymis, but not to the body of the testicle; and I noticed the pathological law enunciated by Gendrin by which this circumstance was accounted for. We find, too, that inflammation of the epididymis is much more readily propagated to the tunica vaginalis than inflammation originating in the glandular structure of the testicle. When inflammation commences in the body of the gland, the enlargement takes place slowly, and is seldom considerable until the disease has existed for some length of time, which is easily explained by the unyielding texture of the tunica albuginea, and the circumstance of the tunica vaginalis remaining unaffected. Suppuration occasionally takes place in this form of orchitis, whereas in epididymitis the formation of pus in the substance of the testicle is of very rare occurrence. I do not mean, however, to assert that

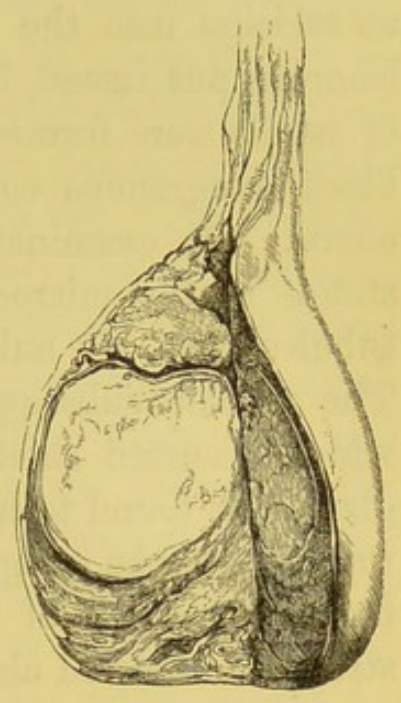
[1] Fr. Trans. of this work, p. 279.

the glandular structure of the organ never suffers in epididymitis, for I believe that it does so in some instances; but, according to my observations, it most commonly escapes, the inflammation not extending further than to the epididymis.

Inflammation of the testicle rarely terminates in suppuration. But when it occurs, owing to the thickness and density of the tunica albuginea, the matter is slow in making its way externally. It burrows in the gland, and disorganizes its delicate structure. The matter sometimes becomes encysted, forming a separate abscess. In these cases, after all inflammation has subsided, the more fluid particles becoming absorbed, the pus remains for a considerable time in the form of an indolent concrete mass, which has been mistaken, after death, for tubercular deposit. The pus, when found in this concrete state, appears at first sight very like crude tubercular deposit; but on further examination, it will be found to be contained in a distinct cyst, from which it may easily be separated; whereas in tubercular disease the morbid deposit is in immediate contact with the disorganized tubules. Concrete pus may likewise be mistaken for the firm yellow exudation matter effused in chronic inflammation. It differs from it, however, in being friable and easily broken up, and also in being enclosed in a cyst; whereas the yellow fibrinous substance is homogeneous and consistent, and almost inseparably connected with the tubuli around it. The distinctive characters just described will be easily recognised on comparing the accompanying representation (fig. 23) of concrete pus encysted in the testicle from a preparation in the collection of the late Sir A. Cooper, with Figs. 26 and 32. I examined two enlarged testicles taken from a man who died somewhat unexpectedly

from a disease of the larynx. Both glands had formerly been attacked with acute inflammation, and for some months before death they had been the seat of chronic pain. In the left testicle, which was the larger of the two, from two to three drachms of thick yellow inspissated pus were contained in a distinct cyst, which occupied the centre of the gland. There was no trace of tubuli seminiferi, but the remainder of the organ was composed of a fibrous tissue: the sac of the tunica vaginalis was obliterated by close adhesions. The tunica vaginalis of the right testicle contained half an ounce of yellowish serum; in the centre of the gland there was a small concrete abscess, but the tubular structure was apparent, and apparently very little diseased. Pus existing in this concrete or inspissated state may keep up pain and irritation for a long period, and render the testicle liable to repeated relapses of inflammation. Suppuration also occurs in the epididymis. In neglected cases of epididymitis an abscess often forms in the connective tissue around the termination of the epididymis and inflected portion of the vas deferens, and bursts at the most depending part of the scrotum.

Fig. 23.



I have not myself met with any instance in which acute parenchymatous orchitis had ended in gangrene. The late Mr. Harvey Ludlow has recorded, in his Prize Essay, a case of acute inflammation of the body of the left testicle occurring to a man in St. Bartholomew's

Hospital, who was in feeble health and had suffered much from stricture. In consequence of the severity and obstinate character of the pain, Mr. Stanley made an incision into the testicle. A very small quantity of ichorous pus issued, but a cavity was exposed, the walls of which were formed by the glandular substance in a black gangrenous condition, and exhaling an offensive odour. On examination of a portion of the black substance in the microscope, it was found to consist of tubules with air bubbles between and inside of them. The testicle subsequently protruded; and after death, which occurred chiefly from peritonitis, nearly half the gland was found to have perished. The epididymis was unaffected: the gangrenous inflammation had been confined to the body of the gland. Sloughing of the gland structure occurred also to an old man in the same hospital, and under the same surgeon, from acute orchitis, after the operation of lithotrity.[1]

After acute orchitis has subsided, the testicle is generally restored to its natural condition; in other cases, permanent changes of a serious nature are the consequence. I have observed in testicles that have been affected with parenchymatous inflammation some time before, that the septa appear to be more distinct, and to enter more largely into the composition of the gland than is natural; that the seminal tubes are less numerous and apparent; and that a great part of the organ is converted into a dense white fibrous tissue, without the presence of tubuli. In these cases the lymph exuded in the connective tissue between the tubes, instead of being absorbed, becomes changed into the dense tissue just described; the ducts also undergo fibrous degeneration and disappear. Complete atrophy is one of the

[1] Med. Times and Gazette, Dec. 1856.

most serious results of acute inflammation. In Chapter II. the disturbance in the organization of the testicle consequent upon inflammation was noticed as the most common cause of wasting, and several examples of it were adduced. Epididymitis, if neglected at its onset, seldom subsides without leaving behind distinct traces of its existence, which never disappear entirely during the remainder of the patient's life. The epididymis frequently remains enlarged, presenting an indurated irregular knotty swelling, seated usually at its lower part, which is occasioned by the presence of a dense hard deposit between the convolutions of the duct and around the inflected portion of the vas deferens. On making a section of the epididymis in this state, I have often observed not only a highly thickened condition of its duct, but also, in some instances, very considerable dilatation; so that the point of a fine probe might be introduced into the canal without difficulty, its area being increased four or five times. These remarkable dilatations are owing to seminal engorgement consequent on obliteration from inflammatory exudation of the excretory duct in the tail of the epididymis or inflected portion of the vas deferens. The occasional occurrence of such obstructions has been fully confirmed by the researches of Gosselin. In the examination of several testicles taken from bodies after death he found the duct of the epididymis dilated, the canal at the seat of induration in the globus minor being at the same time impermeable to the finest injections.[1] I have already noticed (page 233) the more recent observation of Gosselin, in which exudation matter was found in the cavity as well as in the walls of the canal of the epididymis. These changes, when producing complete and

[1] Archives Générales de Médecine, 4e série, t. xiv. et xv.

permanent obstruction, are important in relation to the reproductive functions, and will be more fully considered in Chapter XVIII., when treating of Sterility in Man. In old cases the tail of the epididymis acquires great density and consistency, and sometimes becomes the seat of earthy deposits. Changes in the epididymis are rarely found without the presence of old adhesions, obliterating partially or completely the sac of the tunica vaginalis. The coats of the vas deferens are also found for some extent thickened and indurated. The alterations noticed in the body of the testicle have been observed, in some instances, coexisting with those in the epididymis, but in by far the majority of cases the glandular structure is unimpaired. In only two cases in which the epididymis was thus diseased have I remarked a decidedly atrophied condition of the organ.

Acute parenchymatous orchitis may arise from various causes. It may be produced by contusion, as from a kick on the part or a blow against the pommel of a saddle, the patient being jerked forwards in riding; or by compression occasioned by crossing one thigh upon the other, or by other accidental injury. Great excitement of the sexual organs, without the opportunity of indulging the passions, may also lead to inflammation of the gland; in many instances the disease is developed without any evident cause.

The testicle is liable to inflammation during the subsidence of an attack of cynanche parotidea or mumps. The orchitis is usually slight, and seldom requires any other than mild treatment. M. Rilliet, in a careful account of an epidemic visitation of mumps, which prevailed at Geneva in the years 1848 and 1849,[1] noticed that the orchitis usually appeared on the sixth or eighth

[1] Gazette Médicale de Paris, t. 1. p. 42.

day, reaching its height in from four to six days. The body of the testicle rather than the epididymis was attacked. When the latter was affected, it was to a less extent than the testicle, and never exhibited the hardness observed in gonorrhœal orchitis. The cord was sometimes a little enlarged. The greatest number of persons attacked were between twenty-three and thirty-eight years of age; the youngest was fourteen, the eldest forty-five. It is supposed that orchitis in mumps arises from the translation of inflammation from the parotid to the testicle. But M. Rilliet observed no case of *metastasis*, properly so called, nor any example in which the orchitis suddenly disappeared and the parotitis returned. The orchitis was oftenest unilateral, while the parotitis was most frequently double. In twenty-three cases orchitis was observed on the right side in thirteen, on the left in six, and in four it was double. In two cases there was orchitis without parotitis. It is commonly believed that wasting of the testicle is a frequent result of this complaint. Sir A. Cooper met with no instance of the kind in his own practice. I have already referred to two cases of atrophy after mumps, which have fallen under my notice (*vide* page 70), and Dr. R. Hamilton has also narrated two similar cases. One was the case of a gentleman about forty years of age. On the morning of the fourth day of the attack the testicles began to swell. On the fifth day both glands were much tumefied, the right by far the most so. After all disease had ceased, the right testicle, which had been chiefly affected, continued gradually to waste away, till at length a mere empty bag, consisting of the coats only, remained. The second case was that of a young man, twenty-five years of age, who was attacked by this distemper. Upon the

tumid salivary glands subsiding suddenly, the testicles became affected. One of them was much more swelled than the other, and was found, when the swelling was reduced, to be diminished more than one half of its natural size, at which it remained two months afterwards.[1] M. Rilliet noticed in two of the cases observed in Geneva a marked diminution in the size of the testicle. In one the organ was reduced in size one-half, and the atrophy remained ten months after the attack.

In the first edition of this work (1843) I remarked[2] that inflammation of the testicle, when arising apparently from cold, sometimes assumes a rheumatic character; that is to say, the pain is periodic and increases towards evening. The inflammatory action arises and subsides rather suddenly, and occurs in persons liable to other rheumatic affections. Dr. Macleod, in his work on rheumatism published in 1842, observes, "I think I have several times seen rheumatism of the tunica albuginea testis. Persons subject to rheumatism have complained of acute pain in one testicle coming on suddenly, accompanied by increased heat, and by great tenderness to the touch, but without tumefaction; the symptoms shifting from one testis to the other, and at last disappearing as suddenly as they had come on, just in the manner we see rheumatism change from one joint to another." M. Bouisson has recently drawn particular attention to this form of orchitis.[3] He describes rheumatism as affecting the tunica albuginea, tunica vaginalis, and the cellulo-fibrous tissues in the vicinity. He gives the case of a man, aged twenty-eight, suffering from lumbar rheumatism. It subsided, but as

[1] Trans. of Royal Society of Edinburgh, vol. ii. art. ix. p. 59.
[2] Page 272.
[3] Tribut à la Chirurgie, t. ii. Montpellier, 1861.

it disappeared the right testis swelled and became painful with all the rapidity of a metastasis. Another man, aged fifty-one, was attacked with rheumatic swellings of the knees. This was subsiding when, after a chill, orchitis attacked first the right testicle and five days after the left. Similar phenomena had been observed in other cases confirming the rheumatic character of the affection of the testicle. Dr. Garrod has informed me that several cases of orchitis, undoubtedly rheumatic, have fallen under his notice.

Some years ago, Gosselin called attention to a variety of parenchymatous orchitis, which is developed in the course of small-pox, and which is due to the deposit in the substance of the testicle of a plastic matter similar to that which often infiltrates the lungs in this disease.[1] M. Beraud has since published an elaborate memoir on variolous orchitis, founded on numerous dissections and observations during life. He distinguishes two forms: a peripheral variolous orchitis and a parenchymatous; the first, in which the tunica vaginalis is the chief seat of inflammation, being by far the most frequent. He believes variolous orchitis to be more common than is suspected, its secondary importance causing it to be overlooked. It is sometimes unilateral, but more frequently bilateral. The disease seldom leads to permanent changes of a serious character.[2] On inquiry of Dr. Munk and Mr. Marson, who, as medical officers of the Smallpox Hospital in London have had large experience in the disease, I was informed that no case of variolous orchitis had been observed by them,[3] so that I

[1] French translation of this work, p. 278. See also Bulletin de la Société Anatomique, t. xxii. p. 107.

[2] Archives Générales de Méd.; v^e^ série, t. xiii. p. 274.

[3] Mr. Marson gave me a similar reply two years after I called his attention to Beraud's observations.

suspect its occurrence in the cases noticed by Beraud to be a rare, if not an accidental, complication.

I have remarked that inflammation of the testicle is far more frequently met with as a consecutive affection than as a primary. This gland is directly connected through the medium of the vas deferens with the urinary organs, the lining membrane of its numerous minute ducts being continuous with the mucous membrane of the urethra. Any irritation, therefore, affecting that part of the urethra where the vasa deferentia terminate, is liable to be propagated to the testicle, and to cause it to inflame. In cases of gonorrhœa, in which the inflammatory action has reached that part of the canal, or of stricture, in which the portion of the urethra behind the obstruction has become diseased; when the urethra has been irritated by foreign bodies, as calculi or instruments, or by an enlarged prostate gland, or disease of the vesiculæ seminales; in morbid states of the prostatic part of the canal, from the excitement of excessive onanism or sexual indulgence, and after its division and laceration in the operation of lithotomy, the irritation and inflammation are frequently transmitted to the testicle, and give rise to epididymitis. Of all the causes here mentioned gonorrhœa is by far the most common. Epididymitis is indeed so frequent a sequel of gonorrhœa, that it is generally treated of by writers in connexion with this affection, and few pathologists have drawn any distinction between this and the idiopathic and accidental form of the disease. Epididymitis differs, however, from the latter, in many important respects.

Epididymitis may arise at all periods of a gonorrhœal discharge, during its early and acute stage as well as towards its termination, though it more frequently com-

mences when the pain and discharge begin to subside. It is a common observation, that when inflammation of the testicle supervenes in gonorrhœa, the pain in making water and urethral discharge cease altogether, or undergo considerable diminution, but return as the orchitis subsides; which has led to the opinion that the orchitis is occasioned by a metastasis, or sudden translation of the inflammation from the urethra to the testicle. The doctrine of metastasis, to explain the phenomena of disease, has been too often adopted on insufficient grounds. It is extremely questionable whether anything of the kind ever takes place in gonorrhœal orchitis. Assuredly it does not in the majority of cases, in which the inflammatory action may be traced gradually creeping along the vas deferens to the epididymis. In these cases, nevertheless, the pain and discharge from the urethra diminish generally, though not constantly, during the early stage of the disease. Several of the French pathologists have taken considerable pains in investigating the connexion supposed to exist between the state of the discharge and the inflammatory action in the testicle. In sixty-seven of seventy-three cases observed by M. Gaussail, the discharge and other symptoms of gonorrhœa diminished more or less from the first appearance of the disease. In fifty-eight out of eighty-one patients noticed by M. Aubry, there was a considerable diminution of the discharge at the commencement of the attack.[1] M. D'Espine states that in six out of twenty-nine cases, the discharge underwent no modification on the accession of orchitis. In twenty-two cases the discharge was variously modified: it was either in-

[1] Recherches sur l'Epididymite Blennorrhagique, Archives Générales de Médecine, Mai, 1841.

creased, diminished, or suppressed; but more frequently these modifications occurred only before or after the orchitis, the amendment of which was not in general followed by a return of the discharge to the state in which it existed before the inflammation of the testicle. In only three cases did the running, after having been suppressed at the commencement of the affection, reappear and increase as the acute symptoms of orchitis subsided.[1] Mr. Hunter states, that he has known cases where the testicle has swelled, and yet the discharge become more violent; nay, that he has seen some instances where a swelling has come on after the discharge had ceased, yet the discharge has returned with violence, and remained as long as the swelling of the testicle.[2] The recurrence of the pain and discharge is not essential to the doctrine of metastasis; on the other hand, the marked amelioration of the gonorrhœal symptoms cannot be regarded as adequate proof of its occurrence. It is well known that when a part becomes actively inflamed, the symptoms of inflammation going on in another part, especially if it be in near proximity, usually diminish, though the two parts are not directly connected or continuous with each other. The effects of blisters and other counter-irritants in relieving inflammation of internal organs afford a familiar illustration of this remark; and I once had an opportunity of observing, in a case of orchitis occasioned by a blow, that the symptoms of a gonorrhœa, with which the patient was affected at the time of the injury, subsided, as is often witnessed in ordinary cases of secondary inflammation of the gland. It is clear that Mr. Hunter

[1] Mémoire Analytique sur l'Orchite Blennorrhagique, Mémoires de la Société Médicale d'Observation, tom. i. p. 494.

[2] Treatise on the Venereal Disease, 4to. p. 55.

entertained considerable doubt as to the influence of metastasis in these cases—a doctrine which was generally admitted in his day. Thus he remarks, "Although an action in the urethra is the remote cause, yet it is still impossible to say whether it be the cessation of that action that is the cause of the swelling of the testicle, or the swelling of the testicle the cause of the cessation." Inflammation frequently attacks the epididymis of persons labouring under gonorrhœa, apparently without any previous affection of the vas deferens. It is in such cases only that the disease can be attributed to a metastasis. But when we consider how readily inflammatory action may be propagated from one part to another along a continuous membranous surface, as from the mucous membrane of the bladder to the kidney; how rapidly this transmission may take place without the inflammation remaining fixed in any part of the continuous membrane a sufficient time to produce any evident signs of disease; how rarely it happens that the gonorrhœal symptoms entirely subside as the epididymitis becomes developed; and how seldom it occurs when the discharge is quickly arrested by specific remedies or injections;—we cannot readily admit that the affection of the epididymis commonly owes its origin to a translation of disease from the urethra, or assent to the doctrine of a metastasis in these cases.

In the sympathetic form of gonorrhœal orchitis just alluded to, in which the testicle is attacked, apparently without any previous affection of the vas deferens, the inflammation likewise commences generally in the epididymis. This form of epididymitis, though less common than the other, is by no means of unfrequent occurrence. Of one hundred and four cases of gonorrhœal orchitis noted by M. Aubry, in thirty-one the

disease was sympathetic; in the remaining seventy-three, the inflammation first attacked the vas deferens. It is the opinion of many surgeons, that epididymitis most frequently arises in cases in which the discharge has been somewhat suddenly arrested by cubebs or copaiba, or astringent injections. More mischief is perhaps ascribed to these remedies than they can justly be said to produce. I have prescribed copaiba and cubebs separately or conjointly in all stages of gonorrhœa, and have not found the patients to whom they were exhibited more liable to be attacked with epididymitis than others treated differently. With regard to injections, my own experience leads me to conclude that when employed of a proper strength they are very little liable to excite epididymitis. It is only when used improperly, when too strong and injected too freely, so as to aggravate or too suddenly suppress the urethral inflammation, that they tend to produce inflammation in the testicle. According to my observation, epididymitis most frequently arises in those cases in which the affection of the urethra is allowed to linger for want of a due exhibition of the remedies alluded to, particularly when the prostatic part of the canal is affected. Some pathologists have gone so far as to say that the chances of a swelled testicle are increased in direct ratio to the continuance of the disease in the urethra. Certainly most practitioners will allow that the occurrence of epididymitis during the early and acute stage of gonorrhœa is comparatively rare.

In chronic gonorrhœa, stricture, and morbid states of the prostatic part of the urethra, the patients are liable, especially at night, to distressing and painful erections, accompanied with abnormal sexual excitement and seminal emissions. In these cases the testicle often feels

heavy and uneasy, and tender on pressure; and in this irritable state is disposed to inflammatory action. Accordingly we find that slight circumstances, which would produce no ill effects at other times, then appear sufficient to excite orchitis. Slight blows or pressure, horse exercise, any excess in stimulating drinks, and neglect of the use of a suspender, are commonly sufficient to induce the disease. There can be no doubt that some persons are naturally more susceptible to attacks of orchitis than others. Thus there are many individuals who never contract a gonorrhœa without its being followed by inflammation of the testicle, notwithstanding every precaution taken to prevent the attack; whilst there are many others, who, though repeatedly affected with gonorrhœa, yet altogether escape an attack of epididymitis. We do not find, too, that those who suffer most severely from gonorrhœa are the most liable to epididymitis. The persons most susceptible of the disease are the scrofulous, and those of a weak habit, who, though they suffer less in the first instance, find great difficulty in getting rid of the discharge, and more frequently experience relapses; whilst the robust, and persons of a naturally good and strong constitution, who, when they contract gonorrhœa, experience its effects in an acute form, sooner get rid of the disease, and more commonly escape its after-consequences, orchitis and stricture.

Epididymitis is generally supposed to occur more frequently on the left side than on the right, but statistical inquiries show the fallacy of this opinion. Thus, in seventy-three cases of orchitis observed by M. Gaussail, in forty-five the disease was on the right side, and in twenty-four on the left; four were double. In twenty-nine cases of gonorrhœal orchitis, M. D'Espine found

twelve on the right side, eleven on the left, and six double. I have registered only a few of the cases which have occurred in my practice. Of thirty-six cases of epididymitis twenty-one occurred on the right side, and fourteen on the left; one only was double. My observations therefore agree with those of the above writers in indicating the right testicle to be the one most frequently attacked. Taking the three series of observations together, we have 138 cases of orchitis; of these the right testicle was the seat of disease in seventy-eight, the left in forty-nine, and both glands in eleven. In cases of epididymitis arising from chronic disease in the urethra, both organs are more commonly attacked than appears from these statistics.

Symptoms.—A testicle attacked with acute inflammation in a few hours becomes swollen, hard, and tender, and feels heavy and painful. It increases to twice or nearly thrice its natural size, but without alteration in its oval form. The enlargement is attended with a sense of weight, which is a good deal increased in the erect posture. The pain is of a constant dull aching description, and extends upwards to the loins, where it is often severe. It not unfrequently takes a reflex course, extending downwards to the hip, upper part of the thigh, and crista of the ilium, in the direction of the branches of the different lumbar nerves. As the disease advances, the swollen testicle becomes so tender that the patient can scarcely allow the part to be touched, and cannot bear even the contact of the thigh. The scrotum becomes injected, and is found red, hot, smooth, and slightly œdematous.

The constitutional symptoms vary a good deal, but are sometimes severe. The pulse is rapid and hard, the skin hot, and the tongue white and furred. The patient

suffers often from nausea and occasionally from vomiting. After the acute symptoms have existed for a period varying from forty-eight hours to a week or more, they begin to disappear, subsiding more gradually and slowly than they set in. But the duration of the disease is much influenced by the activity of the means adopted for its removal, as well as by the constitution of the patient. In many persons, more particularly in those of feeble constitution or advanced age, the inflammation soon assumes a subacute form. The swelling increases without producing much suffering, and afterwards subsides slowly; the disease being often obstinate and lingering, and subject to relapse.

Epididymitis is usually preceded by uneasiness in the course of the vas deferens; the patient occasionally experiences distress and irritation about the bladder, and is troubled with a frequent desire to pass water, which is shortly followed by a dull aching pain and slight fulness in the groin. On examination of the spermatic cord, it feels full, and sometimes œdematous, and the vas deferens is found to be tender and enlarged. The thickening is sometimes so great, that the duct feels nearly as large as the little finger. The epididymis soon afterwards becomes swollen and painful: the tumefaction commences at the lower part or tail, and increases very rapidly. It forms an irregular elongated or crescentic swelling at the back of the testicle, which is fuller and larger than the gland itself, and extremely tender, whilst the body of the organ in front may often be pressed without causing uneasiness. The epididymis may remain affected for many hours, and even a day or two or longer, before the inflammation extends further; and if checked in time it may never reach the tunica vaginalis, or body of the gland. The tunica vaginalis,

however, often becomes affected; and then so much tumefaction ensues that the inflamed mass forms an uniform tumour, in which the epididymis can scarcely be distinguished from the other parts; but fluctuation may generally be distinguished in the front part. In the sympathetic form of epididymitis, the swelling of the epididymis takes place without the symptoms indicative of a previous affection of the vas deferens. There is much variety in the intensity of the symptoms. In some cases there is merely a slight dull pain, with little enlargement, and scarcely any constitutional disturbance. Sometimes the swelling is from the first very considerable, the volume of the gland becoming three or four times larger than natural, the pain being acute and constant, and the symptomatic fever severe. In other cases the swelling, though considerable, is quite indolent, and its progress slow and of long duration. But, in general, the symptoms continue to increase in intensity for several days till about the seventh or eighth, when they begin to disappear, the febrile disturbance and pain entirely subsiding, and shortly afterwards the tumefaction. As the swelling diminishes, the epididymis becomes distinct, forming an indurated, knotty, and irregular swelling, at the back part of the testicle, which often lasts for many months, and in some instances never disappears entirely during the remainder of the patient's life. In fifteen cases observed by M. D'Espine which were cured, the mean duration of the disease was thirty-three days and a half. This closely accords with the observations of M. Gaussail, who found the mean duration of seventy-three cases to vary from thirty to thirty-five days; but in my experience it much exceeds the period usually occupied by acute epididymitis under suitable treatment. The cure of the disease is liable to

be interrupted and its duration prolonged by relapses, which are readily induced by any neglect or imprudence.

A testicle which has been attacked with inflammation is afterwards more liable to orchitis than before. The gland, too, sometimes remains more sensitive; feels uneasy under gentle pressure, or when the patient gets out of health; and sometimes becomes painful and swollen from slight causes. These uneasy sensations sometimes arise, I believe, from obstruction of the excretory duct.—A gentleman, aged twenty-five, consulted me respecting his right testicle. It appeared that in Melbourne four years before he had an attack of epididymitis, which occurred after a hard ride. The attack lasted a week, and left an induration in the tail of the epididymis. He again hurt himself in riding, three years afterwards, and had another attack of inflammation in the same part. On examination I found the body of the testicle quite sound, but there was a firm induration in the lower part of the epididymis. He stated that he had uneasiness in the organ after slight exercise, but he suffered chiefly after sexual intercourse, which was followed by pain in the course of the spermatic cord extending to the loin, and the part sometimes became swollen and tender. He always experienced more or less uneasiness after sexual excitement.—A married man, about thirty years of age, showed me a hard nodule in the lower part of the epididymis on the right side, and complained of its always becoming larger after coition, and of the testicle feeling uneasy for two days afterwards. It appeared that some years before he had suffered from two attacks of epididymitis, which had left an induration behind. The other testicle was unaffected, and his wife had borne children.

Acute orchitis occurs occasionally in young infants.

The symptoms are acute and the swelling considerable, but the inflammation soon subsides, and is generally confined to one testicle.—A Jew child, only five months old, was brought to me at the London Hospital on account of a swelling in the left groin and scrotum. The mother first observed it the day before on washing the child: he afterwards cried the greater part of the night. The tumour extended from the external ring to the bottom of the scrotum, was full six times the size of the right testicle, felt firm and hard, and received no impulse when the child cried or struggled. The scrotum was distended, and very red and hot. I ordered the application of a leech and cold lotion, and two drachms of castor oil to be given. In two days I found the swelling reduced about one-third, and much less tender; and the infant appeared free from suffering. I directed four grains of the hydrarg. cum cretâ to be given every night. Under this treatment the swelling and induration soon subsided, and in a week the gland was nearly reduced to the size of the right testicle, but the cord still remained thickened and hard. Three weeks after the attack first commenced, I found the parts perfectly natural.—In 1842, I was requested to see in consultation a little boy, two years of age, who, on recovering from an inflammatory attack of the chest and head, was seized with an affection of the testicle. It appeared that before his illness there was a small hydrocele on the right side. A few days previous to my visit the scrotum became red, tender, and œdematous. I found a swelling of the right testicle nearly the size of a hen's egg, which fluctuated in front, felt solid at the back part, and was hot and very tender. I considered this to be a case of acute inflammation of the tunica vaginalis and testicle. The child was weak,

irritable, and emaciated, and had recently taken mercury to some extent. I ordered a leech to the scrotum, the parts to be frequently fomented and well supported, and the child to be kept in the recumbent position. I saw him again at the end of a week. The tunica vaginalis had suppurated, and burst through the scrotum in front, and had discharged a quantity of thick matter. The swelling was much reduced in size; but the testicle as well as the cord was still enlarged and indurated. A small quantity of matter continued to be discharged. He was ordered quinine and a nourishing diet; and a month afterwards I was informed that the opening had closed, and that the boy was restored to health, slight induration only remaining at the back part of the gland. I have seen several cases of a similar kind. Dr. Fleming has published a case of benign fungus consequent on acute orchitis, which commenced in a child only fourteen days old.[1]

Diagnosis. — No difficulty is experienced in distinguishing a testicle swollen from inflammation from a strangulated inguinal hernia. In both, there may be a scrotal swelling, accompanied with pain and tenderness of the abdomen, vomiting, obstinate constipation, and a good deal of constitutional disturbance. The true nature of the case, when these symptoms exist, can always be ascertained very readily by the absence of tension in the abdomen; the limitation of the pain and tenderness to one side; inability to feel the testicle of its natural size below the swelling (supposing the hernia not to be congenital, and if so the history of the case would set all doubts at rest); and by the tumour when handled being found harder, more solid, and more painful than a hernial swelling, and, unless there is

[1] Dublin Medical Journal, vol. xxxviii. p. 334.

much swelling of the spermatic cord, being clearly defined at its upper part. When a testicle detained in the groin becomes inflamed, the diagnosis is much more difficult, a tense inguinal swelling being coupled with sickness, pain in the abdomen, and sometimes constipation. The empty state of the scrotum would always be sufficient to excite suspicion, and an active purge to set all doubts at rest. The active character of the symptoms renders acute orchitis unlikely to be mistaken for the more chronic diseases of the gland.

Epididymitis differs from inflammation of the body of the testicle in being preceded generally by swelling, and tenderness of the spermatic cord and in the course of the vas deferens; in the epididymis being invariably the part of the organ first affected; in the more rapid formation and greater size of the swelling; in the disease being of a more chronic character, and in the pain and constitutional suffering being less severe. It rarely leads to suppuration, disorganization, or atrophy of the gland, but often leaves the epididymis enlarged and indurated.

Treatment.—Acute orchitis must be treated with antiphlogistic remedies, the activity of the means being proportioned to the intensity of the inflammatory action and the constitution of the patient. In the gonorrhœal form of the affection, all means which may have been resorted to in order to arrest the discharge must be abandoned. In cases in which it can be managed without inconvenience, I usually direct the patient at the onset to maintain the recumbent position, either on a sofa or in bed; and in very acute cases I even elevate the pelvis by a pillow placed under the nates. The scrotum and its contents must also be well supported in a suspender. The parts may be effectually sustained in

a silk, or, better still, a cambric handkerchief, doubled so as to form a triangle, the middle of the base, to which a piece of double tape has been sewn, being applied to the perineum, and the extremities of the handkerchief carried forwards and attached in front to a band round the waist, whilst the ends of the tape being secured to the band behind prevent the handkerchief slipping forwards. Patients suppose that the recumbent position obviates the necessity for support; but this is a mistake, the effects of gravitation being further counteracted, and much relief afforded by raising the testicle from its position upon or between the thighs. In the majority of cases of gonorrhœal epididymitis patients do not find it convenient to lay up, and are content with the relief afforded by a suspender, which in mild cases proves sufficient. The patient's diet must be restricted, and the bowels gently purged. Acute orchitis, if treated quite early with nauseating doses of tartar emetic, usually subsides rapidly, so that this plan renders local depletion unnecessary; and as the depressing influence of the remedy is only temporary, the patient quickly regains his health and strength. I have seen very acute parenchymatous orchitis arrested and subdued in thirty hours by keeping up nausea with antimony. Tartar emetic may be prescribed in camphor mixture, with small doses of sulphate of magnesia and tincture of henbane. Pain and constitutional derangement may be relieved by one or two grains of calomel combined with eight or ten grains of Dover's powder, or with half a grain of morphia taken at bed-time. In both parenchymatous orchitis and epididymitis considerable benefit is derived from mercury, which may be continued in small doses until the mouth becomes slightly touched. I am confident that by this treatment the

duration of the disease is materially abridged, and, what is of no little importance, it is succeeded by much less induration and thickening of the epididymis, and less risk of a permanent obstruction of the excretory duct than when mercury has been deferred to a later period.

In the treatment of orchitis in private practice, it is generally desirable to avoid local blood-letting, but in cases of a severe or obstinate character depletion sometimes becomes necessary. From six to eight leeches, according to the circumstances of the case, are to be applied, and if no relief be experienced in from twelve to sixteen hours, they can be repeated. I usually direct the leeches to be applied in the course of the cord just above the inflamed testicle, the parts being previously shaved. The leech-bites are followed by less irritation in this situation than in the lower part of the scrotum. The flow of blood may be encouraged, after the removal of the leeches, by a warm hip-bath or a light poultice. In consequence of the mess produced by leeches and the itching and soreness of the leech-bites afterwards, some surgeons prefer the abstraction of blood from the veins of the scrotum. The patient should be directed to stand up and foment the scrotum for a few minutes with warm water. Three or four of the distended veins are then to be punctured with a lancet. After enough blood has been withdrawn, the patient must lie down and raise the scrotum, when the bleeding in general immediately ceases. If blood should still flow, it may be readily arrested by attaching to the wounded parts Dieffenbach's artery forceps. Local venesection usually answers well enough, though in some instances the blood has not flowed with readiness, and I have even failed in removing a sufficient quantity. The scrotum

is not always tense and distended, nor are the veins always apparent and prominent.

The local application most generally applicable to the inflamed testicle is a piece of lint, dipped in warm water or an infusion of poppy-heads, covered with oiled silk to keep it moist; or piline cloth may be used in the same way. This promotes the action of the skin, and is a grateful and soothing application. In cases of acute orchitis consequent on injuries, and of epididymitis, if I see the patient early, I generally recommend the local application of ice. The plan of proceeding is to keep the patient in bed with the testicle well supported by a handkerchief in the way already described, or, what is better, by a crutch-pad applied transversely beneath the testicles, the piece of bandage attached to each end of the pad being passed above the crest of the ilium and secured around the body. The ice is to be applied to the testicle by enclosing it in a small bladder or in an india-rubber bag with a somewhat narrow neck. This may be suspended from a cradle placed over the body, and the cold must be sedulously maintained by frequent renewal of the ice. The patient should be provided with two bladders or bags, one to take the place of the other as the ice melts. The effects of the application are remarkable. The scrotum becomes blanched, shrunk, and corrugated; the pain and heat are entirely removed, and in a few hours the enlargement of the gland is found much diminished. The advantages of this treatment consist in the early and complete relief of the pain, from the benumbing effects of the cold; in its decided antiphlogistic influence, arising both from the reduction in temperature and the even and steady compression of the testicle by the strong tonic contraction of the dartos; and in the saving of the patient's

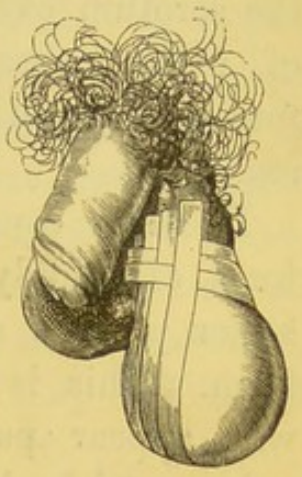
strength by the avoidance of all depletory measures, the only other treatment required during the acute stage being restriction in diet and a purge. The efficacy of this plan of treatment, however, much depends on its early application, and steady continuance for a period of from twenty-four to fifty-two hours or longer. After orchitis has existed a day or two, the application of ice does not generally appear to answer.

The cure of orchitis has been facilitated by the application of a mode of treatment which has been found of great service in relieving certain forms of inflammation in other parts of the body—viz., *compression*. The object of compression is to afford support to the weakened vessels; and in inflammation of the integuments, when properly applied for this purpose, and not so firmly as to produce pressure and arrest the circulation, it often proves a very valuable method of treatment. Dr. Fricke, of Hamburg, first suggested the practice of treating both acute and chronic orchitis by compression, applied to the testicle by means of adhesive plaster. In an early report of this practice, he states that out of fifty-one cases of acute orchitis eighteen were treated by the ordinary means and thirty-three by compression. In the latter cases the average duration of the disease was nine days, whilst in the former it was thirteen. In cases treated more recently, after improvements had been made in the mode of applying the compression, the result was still more favourable.[1] This practice has since been extensively adopted both in this country and on the Continent. Some care is required in making the application, which I perform as follows. The patient being placed in the recumbent position,

[1] Zeitschrift für die Gesammte Medicin, as quoted in the Gazette Médicale de Paris, année 1836, p. 182.

with the testicle raised, is to remain there three or four minutes, in order to allow the vessels of the gland to become as empty as possible. The parts are to be shaved; and some adhesive plaster on chamois leather must be cut into strips, about three-quarters of an inch in width, and eight or nine inches in length. The opposite testicle and side of the scrotum being drawn away from the diseased one, so as to render the integuments of the latter quite tense, the first strap is to be placed circularly round the cord, just above the testicle, as tightly as the patient can bear it. A strip of lint may be placed beneath the edge of the plaster to prevent its irritating the scrotum. The second strap is to be placed in an opposite direction, from behind forwards, at the side of the testicle, near the septum. The third strap is to be applied below the first, so as partly to overlap it; and the fourth in like manner, internal to the second; and so on in succession, until the straps meet, and the whole of the testicle is covered, and evenly compressed. A few additional straps may afterwards be applied where most needed to afford support, and keep the others in place; the parts are afterwards to be supported in a suspensory bandage. The strapping generally requires to be re-applied in the course of twenty-four hours. When the patient rises after its application, he feels relieved from the aching pain and sense of weight. The application of compression has been recommended at the onset of the inflammatory attack, but in acute orchitis it is better to commence with antimony, ice, or depletion, and to have recourse to strapping when the active symptoms are yielding.

Fig. 25.



At this period compression well applied often greatly facilitates the cure, promoting the rapid subsidence of swelling and the removal of plastic exudation, and of the thickening of the epididymis. This may be further promoted by small doses of mercury, or by the iodide of potassium. When there is much effusion in the vaginal sac, strapping the tumour does not seem to act with much effect. In these cases, and also when it is inconvenient to renew the strapping, which usually soon gets loose, counter-irritation may be kept up by painting the scrotum over the affected testicle with the tincture of iodine, repeating the application every third or fourth day until the gland is restored to its healthy state.

In some constitutions, after the more active symptoms of epididymitis have subsided, the inflammatory action persists, and continues in a subdued and chronic form. This is observed in persons of a weak frame, who appear pale, and as if they did not habitually enjoy good health. In these subjects, the inflammation even at the onset is often neither acute, nor accompanied with any marked constitutional disturbance. Neither depletion nor the application of ice makes much impression on the inflamed testicle, which continues swollen and tender, whilst the loss of blood renders the patient weak and irritable, and retards his recovery. In these cases of subacute epididymitis the diet should be nourishing. A few grains of blue pill should be taken night and morning, and some quinine during the day, or the muriated tincture of iron may be combined with small doses of the bichloride of mercury. The diseased testicle should be carefully strapped; but in those cases in which the enlargement of the epididymis is accompanied with effusion in the vaginal sac the

scrotum should be painted with tincture of iodine until the fluid is absorbed, when compression may be applied with advantage.

The induration which remains in the tail of the epididymis after active disease has subsided, generally disappears under the steady continuance of small doses of mercury or of iodide of potassium. Epididymitis, especially when double, should not be regarded as a trivial and unimportant affection, and the treatment of it should be prolonged until the effused matter is absorbed and all induration has disappeared; for if the disease be allowed to pass into and remain in a chronic state, permanent obstruction of the excretory duct is liable to ensue. It has been found that under careful treatment callosities obstructing the canal have disappeared at the end of many months, leaving the course of the semen free. Godard has related a case in which he had cured sterility from this cause that had lasted eighteen months.

The advice given by Bromfield and other surgeons of his day in cases of gonorrhœal orchitis, to introduce a bougie into the urethra, or to inoculate it afresh in order to bring back the discharge, was founded on the erroneous idea that the acute symptoms of orchitis are never dissipated till the return of the discharge from the urethra. These are absurdities which the common sense of modern surgeons has completely banished from practice. Copaiba, cubebs, and remedies of this class, as well as injections, must not, however, be employed so long as any active disease is going on in the testicle; and even after the symptoms of inflammation have disappeared, they must be used with caution and in moderation. Though I have rarely found them give rise to orchitis, I have known them, when injudiciously used,

produce a relapse after all inflammation had ceased. In 1811, Mr. Ramsden published some observations[1] to show that chronic enlargement and induration of the testicle, to which he applied the term *sclerocele*, were dependent on some affection of the urethra, and that they were to be cured by remedies directed to correct the diseased condition of the canal. His views never made much impression on the profession. He was wrong in regarding the disease in the urethra as the invariable cause of the affection of the testicle, instead of an occasional one; but he committed a greater error in practice by chiefly applying his remedies to the part supposed to be the original source of irritation, instead of to the actual seat of disease, and in considering the use of the bougie an essential part of the treatment of these cases. Mr. Ramsden's observations, however, were useful in directing attention to the frequency of the connexion between morbid states of the urethra and testicle, which exists more commonly than was supposed. In cases of stricture, it often happens after an attack of acute epididymitis that the epididymis continues for several weeks, and even months, tender and enlarged, and the cause of annoyance to the patient, owing to a low degree of inflammation still lurking in the part. In several of these cases, after the stricture has been cured by instruments, the affection of the testicle has subsided without any other treatment being necessary than simply supporting the organ. I believe, too, that in the majority of cases in which inflammation of the epididymis exhibits a tendency to return, or in which relapses occur, there is some disease or source of irritation in the urethra. In the treatment, therefore,

[1] Practical Observations on the Sclerocele and other Morbid Enlargements of the Testicle, &c.

of epididymitis of an indolent or obstinate character, it is often prudent to pass a bougie in order to ascertain the state of this passage.

When suppuration occurs, the scrotum must be fomented and covered with a poultice or the simple water dressing; and as soon as matter can be detected by fluctuation, a lancet is to be introduced and the pus discharged, in order to obviate the sinuses and fistulous passages liable to be occasioned by the confinement of matter within the tunics. In epididymitis the small isolated collections of serum often formed between the adhesions of the tunica vaginalis, which fluctuate distinctly and sometimes evince little disposition to disappear, are apt to be mistaken for deposits of pus. When any doubt exists, a grooved needle can be introduced to remove it. The opening made for the escape of matter should not be allowed to close too soon.

I have not considered it necessary to draw any distinction in the treatment of parenchymatous orchitis and epididymitis, the same general principles being applicable to both affections. But the pathological distinction which has been observed is of practical interest, and should not be lost sight of in the treatment of these cases. As inflammation originating in the body of the testicle is of a more destructive character, and more injurious to the organ than that commencing in the epididymis, and as the pain and constitutional derangement are greater in the former, as a general rule the treatment of orchitis should be more active than that of epididymitis, and this form of the disease more generally requires local depletion. The prognosis in epididymitis is more favourable than in parenchymatous orchitis; on the other hand, after inflammation has

ceased epididymitis is more exposed to relapses, and the swelling and induration accompanying it subside less readily and quickly than in parenchymatous orchitis.

In France two operations have been resorted to for the treatment of acute orchitis: 1. Puncture of the tunica vaginalis; 2. Incision (*débridement*) of the tunica albuginea. Gosselin has made some judicious observations on both these operations.[1]

Puncture of the Tunica Vaginalis.—The object of this operation is to give exit to the serum effused into the vaginal sac, and thus to get rid of the pain occasioned by its distension and by the pressure of the liquid on the testicle. The parts being grasped from behind and put on the stretch with the left hand, a lancet in the right is plunged rapidly into the front of the swelling. The serum soon escapes, and the wound is then left to itself. Of course the puncture should be made only when the presence of fluid is distinctly indicated. It must be made also at the back part when the testicle is inverted. Gosselin has often practised this operation with the following results:—1. The evacuation of the fluid caused the pain to cease even when it had resisted rest and narcotics. 2. It did not prevent the disease following its usual course, nor accelerate a cure. He therefore recommends the operation only in rare cases, in which the acute orchitis is very painful. Useless in other cases, it would have the inconvenience of leaving in the sac only the plastic matter, and thus of favouring the agglutination of the opposed surfaces and the formation of extensive adhesions. In a few cases of acute orchitis I have tapped the vaginal sac with a small trocar, and the escape of serum has been followed by some mitigation of pain. My limited experience of the

[1] French Translation of this Work, p. 315.

operation leads me to agree fully with Gosselin in his estimate of its value.

Incision of the Tunica Albuginea.—Vidal de Cassis strongly insisted on this operation as applicable to certain cases of parenchymatous orchitis in which the pains are violent, the general symptoms severe, and which appear likely to terminate quickly in suppuration with destruction, and even gangrene, of the seminiferous substance. By incising the tunica albuginea he proposed to relax the fibrous envelope and remove the obstacle to swelling, which he considered the principal cause of pain and of threatening gangrene. This author states that he has practised the operation four hundred times, without any inconvenience, and always with advantage, to the patient, and in nearly all the cases he obtained a prompt cessation of pain and arrested the tendency to suppuration.[1] This operation has always appeared to me to be founded on wrong views in pathology, and to be unsafe in practice, and as English surgeons are reported to have adopted it,[2] I must invite attention to the critical remarks of Gosselin, and add my voice in condemnation of the treatment. Gosselin shows with much point that the cases which Vidal de Cassis treated in this way were cases of gonorrhœal orchitis, in which the body of the testicle very seldom suffers—that the pains and symptoms described by him are common to cases of epididymitis, and that the relief experienced by the patients after operation has most probably resulted from the opening of the vaginal sac and discharge of serum, rather than from incision of the tunica albuginea. Gosselin goes further, and even doubts whether, in the cases cited, the tunica

[1] Traité des Maladies Vénériennes, 1ère édit. p. 76.
[2] *Vide* Medical Times and Gazette, Oct., 1864, p. 479.

albuginea was opened at all; and he remarks that it is not likely that it should have been so often incised without immediate hernia, or secondary escape of the seminal tubes. In cases of parenchymatous orchitis, with strangulation and threatening gangrene, we may without fear open the tunica albuginea. Gosselin states that he has never had occasion to practise this operation; nor have I, but I have already referred to two cases of gangrene (page 236) which occurred to Mr. Stanley, in which this surgeon made an incision into the testicle.

I have already noticed (Chapter I., Section III.) the liability of a testicle detained in the groin to be attacked with inflammation, and of the tumour to be mistaken for a strangulated hernia or a bubo. It is only necessary to add that a case of the kind should be treated with great care, to prevent the inflammatory action extending to the peritoneum, and giving rise to dangerous symptoms.

I have not had much experience in the treatment of the rheumatic form of orchitis. My colleague at the London Hospital, Dr. Davies, has recently shown the great efficacy of blisters in rapidly curing articular rheumatism; and it is worthy of notice that in two cases of rheumatic orchitis recorded by Bouisson, leeches were applied without benefit, but in both, the inflammation promptly subsided on the application of a blister.[1]

Orchitis occurring during an attack of mumps requires little more than simple treatment: rest, support to the testicle, and mild aperients; but as atrophy is liable to follow, the case should be watched, and the symptoms, if acute, should be checked by more active treatment.

[1] Lib. cit. p. 343.

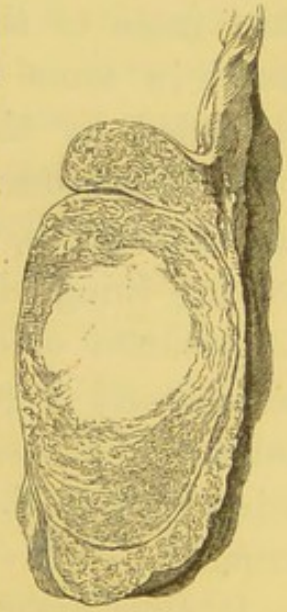
SECTION II.

CHRONIC ORCHITIS.

The testicle is liable to a form of inflammatory swelling of a distinct and chronic character, which occasionally succeeds acute orchitis, but far more commonly arises spontaneously. The disease is of importance, for if unchecked, it tends to disorganize and destroy the gland.

The chief anatomical character of this form of orchitis is the exudation of a peculiar yellow homogeneous substance in the body of the testicle. This substance, when first formed, is of somewhat soft consistence, but afterwards becomes firm and solid, and so closely adherent and intimately blended with the proper structure of the organ as not to admit of separation without much difficulty. In general, there is a single deposit of this substance in the centre of the glandular structure, as in the preparation from which the annexed woodcut was taken. In a case of chronic enlargement of both testicles, taken from a patient who died of *ramollissement* of the medulla spinalis, I found six or seven separate deposits of this yellow matter in the substance of the right testicle, and a single one only in the body of the left. The presence of several separate deposits, however, is by no means a common occurrence. The small masses as they enlarge coalesce, or the single one increases, until the whole testicle presents an uniform yellowish-white appearance.

Fig. 26.



I have never succeeded in injecting this deposit or tracing vessels into it. The vessels of the testicle generally are enlarged. When chronic orchitis is preceded by epididymitis, this part is found thickened and enlarged from adventitious deposit between the ducts. The epididymis, however, is most generally unaffected. There is often effusion of serum within the cavity of the tunica vaginalis, seldom amounting to more than two or three ounces, and sometimes also an exudation of lymph. The sac may even be partially or totally obliterated by adhesions.

On a minute examination of testicles affected with this disease, it appears that the deposit consists principally of a substance exuded in the connective tissue between the tubuli. This substance is a tenacious lymph with a fibrillated basis, in which corpuscles are either wanting or very sparingly present. The tubuli are also filled with a darkish yellow matter, of a friable character, containing abundance of corpuscles, and resembling scrofulous matter. In the vicinity of the chief mass of the deposit the walls of the tubes were found in some instances thickened, and their cavities distended by the matter within, but there were no local dilatations. Some of the tubes were found slit up lengthways, the matter within the tubes thus becoming mingled with the intra-tubular substance. In a specimen of old-standing disease many of the tubes were found degenerating and becoming fibrous, their tubular character ceasing, and their extremities being mingled with the fibrillated deposit in the body of the organ.

It thus appears that two distinct products are observed in this disease: one effused between the tubes and of a fibrinous character, the other intra-tubular,

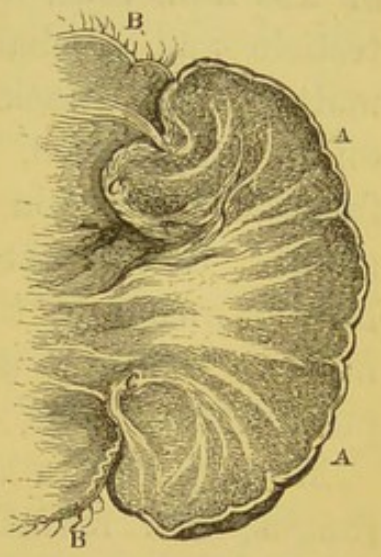
mainly corpuscular, and resembling scrofulous matter. Chronic orchitis, however, is of a very different nature from tubercle, and as the two diseases have been often confounded, and require very different treatment, it is most important to recognise the pathological distinction. The tubules are not observed to be irregularly dilated, as in tubercle (*vide* p. 313); but, what is more marked and more important, no softening process ensues in the morbid product; and instead of its being diffused, and occurring especially in the epididymis, like tubercle, it is formed in the body of the gland, and, however largely developed, occurs generally in a single or isolated mass. In tracing the progress of the disease we shall find that it rarely occurs in early life; that if allowed to proceed unchecked, it does not commonly, like tubercle, break up and disintegrate the tubules or give rise to abscess, but leads rather to their wasting from the outside pressure of the lymph and interference with nutrition, or to their fibrous degeneration. And here it becomes a question of no slight interest to determine, whether the two products, the intra-tubular and corpuscular, and the extra-tubular and fibrinous, are merely modifications of one and the same exudation; whether, in fact, the exudation which assumes a fibrinous character between the tubes becomes so changed in its passage through them as to lose its tendency to fibrillate, and acquires that of becoming corpuscular; or whether, as seems to me more probable, the two products are different, the one being purely lymphatic and prior in point of time, the other developed in the tubes as the result of a disturbance in their nutrition, being really of a scrofulous character, but differing from ordinary scrofulous matter in that it springs from purely local and not from constitutional conditions.

The yellow substance exuded in chronic orchitis is sometimes called the *yellow tubercle of the testicle*, but as the disease differs from scrofula in several essential points, and cannot be regarded as the local manifestation of tuberculosis, the term is an objectionable one and liable to lead to error. This yellow matter under appropriate treatment undergoes complete absorption, the testicle being left in a condition to perform its natural functions. It sometimes happens, however, that ulceration ensues in its tunics and integuments, and that a fungous-looking growth gradually protrudes through the opening which is thus formed. This fungous growth, properly termed *benign*, is sometimes called *granular swelling;* it has also received the name of *hernia testis*, being formed in a manner very analogous to that of a *hernia cerebri*, in which the substance of the brain is protruded through an ulcerated opening in the dura mater. It appears that the yellow deposit after some time excites ulceration in some part of the tunica albuginea. The tunica vaginalis, and afterwards the skin, become adherent at this spot, and likewise inflame and ulcerate. The resistance afforded by the dense unyielding tunica albuginea being thus removed, the adventitious deposit gradually presses out the tubular structure, which forms a projecting tumour consisting of the tubuli mixed up with this yellow substance, and also of ordinary granulations. The mass often projects so much that scarcely any part of the organ is contained within the integuments, the tunica albuginea being partially everted, and the scrotum, relieved from tension, being retracted all round the opening by the action of the dartos.

It can be clearly shown by dissection and microscopic examination that the projecting fungous mass when of

large size is composed of the tubules of the testicle and of lymph interspersed amongst them, together with ordinary granulations springing from those tubes which are near the surface. The smaller fungous growths consist simply of the gland tissue extruded from the everted tunica albuginea, protected or coated on the surface with prominent granulations of lymph. In Fig. 27, taken from a preparation in the London Hospital College, and representing a section of a benign fungus, nearly the whole of the glandular structure of the testicle is seen to be exterior to the scrotum, the mediastinum testis being above the level of the integuments. In minute examinations of these fungous growths I have rarely found any great amount of exuded matter. The ulceration of the coats of the testicle, and consequent protrusion, appear to have a beneficial influence as respects the nutritive condition of the glandular structure. The tubuli and blood-vessels are relieved from the injurious effects of compression, the circulation is re-established, and, in many instances, the exuded lymph undergoes absorption, and the morbid product disappears from the interior of the tubes. The tunica albuginea is commonly thickened around the margin of the opening, the edges of which are everted. The margin of the scrotal integument immediately around the fungus in old cases is generally indurated and thickened, and is sometimes also slightly undermined.

FIG. 27.



Section of a benign fungus:—A, A, the projecting fungus; B, B, scrotum; C, C, everted tunica albuginea.

It is only in recent years that benign fungus of the testicle has attracted particular attention. In 1808, Mr. Lawrence explained its true nature in a paper illustrated with several cases;[1] and his observations on its causes, symptoms, and progress have been confirmed by all succeeding writers on the diseases of the testicle. Though the benign fungus occurs most frequently as a chronic change in this form of orchitis, it is occasionally the result of acute inflammation supervening upon the chronic disease and terminating in suppuration in the substance of the gland. In a case of this kind, in addition to the glandular swelling, there are sinuses more or less numerous, which burrow in the interior of the testicle and discharge pus mingled with the yellow matter. An attack of orchitis originally acute, going on to suppuration, is also liable to be followed by a fungous protrusion of the secreting structure of the gland. In the latter case, the growth is not so exuberant, owing to the absence of the yellow exudation matter; but there are generally sinuses which furnish a purulent discharge, sometimes mixed with semen.

M. Jarjavay, in an excellent memoir on the benign fungus,[2] has recently described a superficial form in which the growth springs from the fibro-serous envelope of the gland. I at first supposed that this was simply the granulating surface which the tunica albuginea presents when uncovered by the parietal tunica vaginalis and the scrotum, without any disease of the testicle, the prominence being occasioned chiefly by retraction of the integuments: a condition which I have observed in hydrocele after the operation of incision. But I have since been indebted to Mr. Paget for showing me a

[1] Edinb. Medical and Surgical Journal, vol. iv. p. 257.
[2] Archives Générales de Médecine, 4ème série, t. xx.

testicle in which the fungus was of the superficial form described by M. Jarjavay. Mr. Paget furnished me with the following account of the case.—In a poor, dirty Irishman, aged thirty-one, the right testicle, without evident cause, slowly enlarged, with dull pain and weight, for about seven months, when it broke and discharged through the front of the scrotum. The testicle then projected through an opening from two and a half to two inches in diameter. The aperture was surrounded by indurated tissue with inflammatory redness, and the protruding surface was covered with a layer of granulations. The case was mistaken for strumous disease, with ulceration and protrusion, and the testicle was consequently excised. On examination, the testicle and epididymis were found to be healthy in structure. The surfaces of the tunica vaginalis were adherent. The tunica albuginea was distinct and quite natural up to the borders of the protrusion, and there it did not cease, as if perforated, but became thick, soft, succulent, and easily torn. In this state it existed in the whole extent of the protrusion, having on its outer surface the layer of granulations, and on its inner surface the outer part of the tubular structure of the testicle adherent to it, and confused with it by being also the seat of inflammatory exudation. There was nowhere any appearance of a perforation of the tunica albuginea. Mr. Paget remarks, that the disease seems to consist essentially in softening, thickening, and a *staphylomatous* condition of a part of the tunica albuginea, which protrudes through an ulcerated opening in the scrotum, and becomes covered with granulations. It is obvious that this protruding growth is pathologically distinct from ordinary benign fungus, inasmuch as the latter springs from and involves the interior and secreting structure of the testicle.

A testicle, after becoming somewhat enlarged from chronic inflammation, often continues indolent and stationary for years, giving rise to very little inconvenience. On examining the organ in this state, the yellow adventitious deposit is found to possess considerable firmness and consistency; the tunica albuginea is thickened, and in some places as dense and indurated as cartilage; and the surfaces of the tunica vaginalis are closely connected by old adhesions. The glandular structure is atrophied by the pressure of the yellow matter; and after some time both become converted into fibrous tissue or undergo a slow process of wasting, so that an enlarged and indurated gland is progressively reduced, until scarcely anything remains beyond a mere nodule of fibrous tissue of the size of a nut, at which the spermatic cord terminates. I found, on examination of the body of a man who some few years previously had suffered from chronic inflammation of the testicles, both glands much indurated, but about the natural size. In both, the tubular structure was very deficient, its place being supplied by a dense fibrous tissue. At the upper part of the right gland there was a yellowish deposit almost as dense as cartilage, and exhibiting very little trace of vascularity. A testicle in this indolent state, when examined in the hand, often feels as hard nearly as a stone; and formerly the term *scirrhus* was applied to such enlargements. In these indurated testicles, the epididymis often escapes the morbid alteration affecting the body of the gland; in other cases, however, the epididymis is also found nodose, irregular, and hard.

It will be perceived, from the preceding observations, that the tendency of this chronic disease is gradually to destroy the integrity of the testicle. If the inflamma-

ion be checked in an early stage, the gland is left unimpaired; if its course be not arrested until a later period, the secreting structure is partly disorganized and reduced in size; but if the disease be allowed to continue unchecked by treatment, the organ is totally destroyed, either by suppuration and ulceration, or by the slower process of wasting and fibrous degeneration. When both testicles are attacked, the sexual desires and powers in time decline, in proportion to the damage resulting from the disease.

Chronic orchitis is essentially a constitutional disease; that is to say, it occurs only in persons of low vital powers, or in persons whose health is impaired by some constitutional malady. Yet the immediate or exciting cause is often local. Thus, a chronic swelling sometimes takes place after a slight contusion, the first effects of which were so inconsiderable as to be very little regarded by the patient. Occasionally it arises a short time after the cessation of an attack of acute orchitis, more particularly when the patient has been guilty of some imprudence in drinking or sexual indulgence. Persons suffering from stricture and other affections of the urinary organs causing irritation in the urethra, are liable to it; and the inflammation, though usually idiopathic, may sometimes be traced creeping along the vas deferens to the epididymis, and thence to the testicle, as in consecutive orchitis. As Sir A. Cooper remarked, frequent exposure to wet, cold, or fatigue, and an excessive indulgence of the passions, predispose to its production. I have seen it in several persons who have passed some years in tropical climates, and in others who have been exposed to privations at sea. Chronic orchitis sometimes arises during an attack of gout, and in persons suffering from chronic rheumatism.

M. Bouisson, in the memoir already alluded to,[1] has endeavoured to establish rheumatic orchitis as a distinct variety of the disease. But in the cases of chronic orchitis in persons affected with rheumatism which have fallen under my notice, I have been unable to recognise any characters entitling it to be distinguished from the other forms of this disease. The following is a case of double chronic orchitis occurring after an attack of acute rheumatism.—A tall thin man, aged thirty-nine, a coal-porter, was admitted into hospital January 13th, 1857. He was a married man, and until recently had enjoyed good health. About a year before he suffered from acute rheumatism for two months, and as he was recovering his right testicle swelled and became painful. The pain subsided, and three months afterwards the left testicle was attacked in a similar manner. Four days before his admission he fell and hurt his back, when the right testicle became more painful and swelled considerably by the next morning, and as this continued he came to the hospital. On examination I found an uniform solid enlargement of both testicles, the right being more swollen and painful than the left, but the pain was not acute. He had no symptoms of syphilis, nor had he suffered from the disease in any shape for seven years. His virility was not impaired. Under mild mercurial treatment the enlargement quite subsided, and the man was discharged cured on March 2nd. Another case of double orchitis in a rheumatic subject will be found related at page 296.

The diathesis which most commonly predisposes to chronic orchitis is undoubtedly syphilis, and probably in nine cases out of ten which occur in hospital practice the origin of the enlargement of the testicle may

[1] Lib. cit. p. 358.

be traced to this disease. Indeed, some surgeons scarcely admit any other constitutional cause, and chronic orchitis is always regarded as one of the sequelæ of advanced syphilis. Such, indeed, is the opinion commonly entertained by the French surgeons.[1] I have seen so many cases of chronic orchitis without any symptom of syphilis being present and without any history of syphilis, that I cannot doubt but that the disease arises from other causes. Syphilitic orchitis will receive special consideration in another section.

I have noticed particularly the pathological distinction between chronic orchitis and tubercular disease of the testicle, and have laid stress on the importance of making a correct diagnosis between them. I have seen, however, several cases of chronic orchitis which have an undoubted strumous type, being characterized by great indolence and indisposition to undergo absorption under treatment, and a tendency to suppurate, the patient exhibiting the marks of a strumous constitution.

Symptoms.—The symptoms of this disease are uniformly of an indolent character. At the commencement the testicle feels somewhat tender; and after a short time the patient detects a slight enlargement and an irregular induration in some part of the organ. This induration often commences at the lower part of the epididymis; but not always, nor so frequently as is supposed by many pathologists. The body of the gland and the epididymis shortly become involved in one common swelling, which feels smooth, firm, inelastic, and of uniform consistence, and is of an oval form, with the sides somewhat flattened. The enlargement advances slowly, but goes on steadily increasing until the organ is at least twice its natural size. The

[1] See observations by Gosselin in his translation of this work, p. 351.

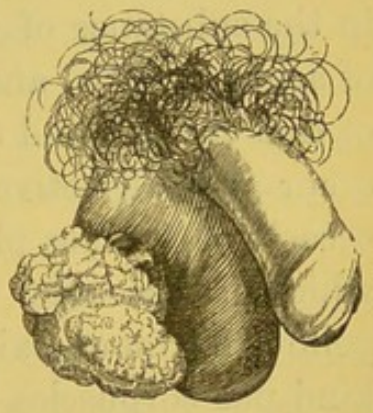
swelling is attended with slight pain of an obtuse character, and a sense of weight in the part and in the loins. The pain on pressure is also dull; and when the disease continues for seven or eight weeks or longer, the organ loses in a great degree its peculiar sensibility. The spermatic cord is not generally indurated; but it feels full, and its veins are rather swollen. There is often some effusion in the vaginal sac around the enlarged testicle, constituting the affection to which the term *hydrosarcocele* was formerly applied. The effusion is seldom considerable; indeed, I have rarely found it exceed two or three ounces. It is frequently collected at one spot, its diffusion throughout the sac being prevented by adhesions. Frequently both testicles become affected, inflammation having commenced in one gland, shortly after the enlargement of the other, or, having ceased in one, then appearing in the other. Sometimes fluid is effused only on one side; in other cases there is double hydrocele, coupled with morbid enlargement of both testicles.

So little inconvenience is usually experienced from this disease, that the testicle sometimes acquires a considerable size before the patient's attention is seriously attracted to it. He finds relief, perhaps, from a suspensory bandage, and continues his usual occupations, exercise, and mode of living, without paying any further attention to it, until fresh inflammation is excited by a slight blow, or excess in drinking, or venery; when, the symptoms becoming suddenly severe or increased, he is induced to seek for surgical assistance.

After the disease has existed for many weeks, or even months, the skin at some part of the scrotum, usually the front, grows thin and prominent, and becomes red

and inflamed. In a short time it breaks, and a fungous-looking substance, and sometimes a small quantity of pus, are discharged; and this is soon followed by a protrusion of the substance of the testicle, which gradually increases, until the part presents the characteristic appearance of the benign fungus. This consists of a protuberant mass, presenting an ash or yellowish-white appearance, varied by irregular patches of a pale red hue, and sometimes of black, from inspissated blood. As on other granulating surfaces, the eminences are more or less prominent, but in some instances are quite indistinct, the surface of the tumour being even and smooth. The projecting growth is surrounded and often closely girt by the skin of the scrotum, the ulcerated edges of which are thickened and everted. It furnishes a scanty thin sanious discharge, occasionally mixed with the seminal fluid. It is nearly insensible to friction, the action of caustics, and incisions with the knife. The spermatic cord may be distinctly traced to the base of this morbid protrusion of the gland, which often projects so much that scarcely any part of the organ can fairly be said to be contained within the scrotum. The disease in this stage is very indolent, and if not interfered with lasts many months without undergoing any perceptible change. As soon as the scrotum has thus given way all pain abates, and the scrotal swelling partly subsides. Though chronic orchitis not unfrequently affects both testicles, the benign fungus has been rarely observed in both organs at the same time. I have met with it in only two instances.

Fig. 28.



Mr. Lawrence, in his original memoir, describes two cases in which the organs were successively attacked with chronic enlargement followed by granular swelling. The disease appears to reach this stage less commonly in the present day than was the case formerly, owing, I presume, to the profession generally having become better informed in the diseases of the testicles, and to the success attending their improved treatment of them in the early stage. I come to this conclusion because cases of benign fungus are extremely rare in private practice, whilst not a year passes without my seeing some two or three in the hospital wards, chiefly in patients who have neglected the disease in the testicle in the early stage.

I have spoken at page 234 of the deposition of matter in the substance of the testicle and epididymis in cases of acute orchitis, and have mentioned the concrete form of this deposit, and chronic state of the symptoms which occur after all active disease has subsided. Suppuration occasionally takes place in the chronic form of orchitis which I am now describing, in connexion with the yellow fibrinous exudation matter, and in a case of the kind pus corpuscles were found within the tubuli. Both pus and plastic matter may be effused in the substance of the testicle; or lymph may be deposited in the testicle, whilst suppuration occurs in the epididymis only. The formation of pus in these cases is a serious aggravation of the disease, and much lessens our prospect of being able to save the testicle. When effused in the body of the gland it disorganizes the delicate structure; and when ulceration ensues and the matter escapes, sinuses are left which communicate with the interior of the organ, and evince but little disposition to close. These sinuses discharge a thin pus, mixed in

some cases with seminal fluid, forming consequently a *spermatic fistula*. A case of double spermatic fistula of the epididymis, with obstruction of the excretory duct, is related in Chapter XVIII., Section II.

In some instances chronic orchitis is characterized by a remarkable indolence throughout its whole course. In these cases there is not much enlargement; there is no pain, and scarcely any tenderness; but the induration is very great, and yields very little to remedies. Even when recognised early and submitted to treatment, the disease lasts many months before disappearing, and in other cases may continue for two or three years. This intractable form of chronic orchitis never gives rise to fungus, but it often terminates in atrophy or fibroid degeneration—a change to which attention has lately been directed as occurring in tertiary syphilis; but I have seen many cases of chronic orchitis exhibiting this peculiarly indolent character in which there was no history whatever of syphilis.

Diagnosis.—An enlargement of the testicle from chronic orchitis may be mistaken for encephaloid cancer of the organ, and for a hæmatocele. It differs from the former in the surface of the gland being more uniform and regular, in the tumour being of less size, and in the absence of any concomitant affection of the cord and lymphatic glands in the groin. In some cases the origin of the disease in the epididymis also serves to indicate the nature of the case. In the early stage, however, of encephaloid cancer, the characters of the tumour are so similar to those of chronic orchitis that the diagnosis is extremely difficult, and sometimes we have no other guide on which we can rely than the influence of remedies on the disease.—A

few years ago a gentleman residing in a midland town came to London to take the opinion of surgeons respecting a disease of his testicle, which had existed eighteen months. The organ was much enlarged, and very hard and heavy, and the vaginal sac contained a small quantity of fluid. His general health was somewhat impaired. He had taken mercury, iodide of potassium, and iodide of iron, and used mercurial and iodine applications locally, but without effect in reducing the tumour. This gentleman saw the late Sir B. Brodie, Mr. Lawrence, and myself separately. Neither of us ventured to pronounce a positive opinion of the nature of the disease, but we were inclined to regard it as incurable. As it appeared that the mouth had not been made sore, a further trial of mercury carried to salivation was recommended, and if the enlargement did not subside under this treatment, we all agreed in advising castration. The disease, which I presume was chronic orchitis, subsided under mercurial treatment, and the patient was cured in three months. The tumour produced by chronic orchitis is more solid, and not so elastic as a hæmatocele. It very rarely, too, attains so large a size as the latter, without causing ulceration of the tunica albuginea, and a fungous protrusion of its glandular structure. On inquiry into the history of the case, the disease will be found to have come on very gradually, and not to have occurred suddenly after a blow, or to have succeeded a hydrocele, as is the case with a hæmatocele. The diagnosis is usually very easy; indeed, I have not witnessed any case of chronic orchitis in which there was any difficulty in distinguishing the disease from a hæmatocele. A hydrosarcocele can only be distinguished from a hydrocele by an examination of the part, after the fluid has been

evacuated, unless the serous effusion be very small in quantity, or the sac should happen to be loose and not fully distended, in which case the enlarged and indurated testicle may be detected through the fluid.

A chronic inflammatory is very liable to be mistaken for a true tubercular enlargement of the testicle. The mode of distinguishing the two affections will be found described at page 320. The diagnosis is very important, because the remedy recommended for orchitis is likely to be injurious in tubercular disease.

The benign fungus of the testicle, until recent years, was commonly confounded with malignant fungoid disease of the gland. Such a mistake is not likely to be made in the present day by any well-informed surgeon. The granulating character of the protruding mass, its consistency, and the absence of bleeding, plainly indicate the nature of the swelling. The circumstance, too, that pressure on the tumour causes the ordinary pain of a compressed testicle, whilst in malignant disease force so applied produces no such sensation, will further assist the diagnosis in any instance of doubt.

Treatment.—Chronic orchitis, if seen early, is very amenable to treatment. The two chief remedies are mercury and iodide of potassium. In patients whose health has not suffered materially, mercury commonly proves very effectual. As soon as its influence on the system begins to be manifested, the pain and tenderness cease, the swelling diminishes, and the induration gradually disappears. Five grains of blue pill, with a quarter of a grain of opium, may be given twice daily; and the dose can afterwards be increased or diminished according to its effects; or mercurial inunction may be substituted for the pills. No object is gained by making the

mouth very sore; but it is desirable to touch the mouth slightly, and to keep the patient under the mild influence of the remedy until all swelling has subsided and the induration is nearly removed, which takes place slowly, and usually occupies four or five weeks. It must be borne in mind that we have to treat a low form of local inflammation in a constitution generally enfeebled and impaired. The patient should therefore be allowed a nutritious diet—meat twice a day, and in some instances malt liquor or wine. The sulphate of quinine and muriated tincture of iron may be given during the mercurial course with much advantage. I sometimes recommend the patient to keep, at first, constantly in the recumbent position, in bed, or on a sofa; but this is not absolutely necessary, and may often be dispensed with during the treatment. Compression by means of strapping, applied in the manner already explained, tends to promote the absorption of the adventitious deposit, and hasten the resolution of the swelling. The efficacy of mercury is so great that I have seldom employed compression without it, but I have several times combined the two, apparently with much benefit. In these cases I generally strap with the emplastrum ammoniaci cum hydrargyro. The reduction of the swelling and induration may also be promoted by applying to the scrotum the unguentum iodinii c., or the ceratum hydrargyri c., or by painting the scrotum every alternate day with the tincture of iodine. These local applications are particularly applicable to those cases in which the presence of fluid in the tunica vaginalis prevents the advantageous use of compression. It is often necessary to continue the local means and the exhibition of small doses of mercury for several weeks, before the effects of the disease are entirely removed. But it is

not necessary that the patient should be strictly confined all this time. He may pursue his usual occupations in-doors, and even take gentle exercise in the open air. One great advantage of compression is, that it dispenses with confinement to the recumbent position in most of the cases in which it is employed. In patients of strumous constitution or in very weak health it is safer to give the iodide of potassium. From five to ten grains of this remedy may be given in decoction of bark or of sarsaparilla, three times a day. Also, after mercury has been discontinued, the iodide of potassium may be given with much benefit in getting rid of the swelling and induration. The syrup of the iodide of iron is another suitable remedy under such circumstances. During the treatment, the patient must strictly abstain from the excitement of venery.

The successful result of treatment necessarily much depends upon the period at which the case comes under the surgeon's care. If the disease has not existed longer than five or six weeks, the restoration of the testicle is complete; but if its duration be greater, the structure of the gland often suffers, though the organ may still be saved from complete destruction. When inflammatory action has been allowed to go on for many months, the testicle generally becomes so disorganized that all we can hope for is, to arrest the progress of a disease which is a source of suffering, keeps up irritation, and tends to impair the general health; and in some instances the amount of exuded matter is so great as to be beyond the influence of absorption, and there is then no alternative but to remove the gland. This operation, however, is rarely required. I had occasion to perform it on a married gentleman, thirty-two years of age, of somewhat robust frame, but not in strong

health, who had great enlargement of the right testicle from chronic orchitis, with considerable effusion of serum into the vaginal sac. This gentleman was an officer in the army, and had served a good deal in warm climates, but had never suffered from syphilis. His left testicle had been removed by another surgeon for a similar disease seven years before. He had taken the iodide of potassium, and been kept under the influence of mercury without any effect on the diseased right testicle. He was the father of two children, and his sexual powers still existed, though in diminished force, and were evidently declining. The great size of the scrotal swelling, its painful condition, the frequent necessity for removal of the fluid by puncture, and the hindrance to the pursuit of an active profession caused by the disease, led him to submit readily to a second operation for castration, which I performed with a favourable result.—In the summer of 1859 both testicles, affected with this disease, were removed by Mr. Critchett, in the London Hospital, from a sailor, aged thirty-one, lately returned from the tropics. There was an interval of a month only between the two operations. The enlargement of the organs was very great and had resisted all treatment. I examined one of them, and found a large deposit of strumous lymph without any trace of glandular structure. The patient recovered favourably. Both these cases are examples of the strumous type of chronic orchitis. There was no history of constitutional syphilis in either of them.

As the inflammation of the testicle subsides, the fluid effused into the vaginal sac usually becomes absorbed; so that the hydrocele seldom requires any other treatment than that employed for the removal of the disease which produces it. Sometimes, however, these

means prove insufficient to get rid of the hydrocele, and an operation becomes necessary to make a complete cure. There should be no hurry in resorting to active measures for this purpose; for it often occurs, as the patient recovers from the effects of the disease and the treatment, and his health becomes fully re-established, that the fluid in the tunica vaginalis is slowly absorbed. When, therefore, after the removal of the disease of the testicle, the quantity of fluid is so considerable as to produce a tumour of inconvenient size, the surgeon should perform acupuncture, or introduce a trocar, and having drawn off the fluid wait the result. If it should collect again, he can then have recourse to iodine injection; which must be employed with more than usual caution, in order to avoid exciting fresh inflammation in the substance of the testicle. In a case which I injected lately, about six months after the cure of chronic orchitis, the operation caused a solid enlargement, from effusion in the vaginal sac, of great size; I was induced to give mercury, and afterwards tonics, under which treatment the swelling slowly but steadily subsided.

The following case will serve to illustrate many points in the history and treatment of this affection.—A captain of a ship, a man of swarthy complexion and muscular frame, aged twenty-seven, who had just returned from a voyage to the West Indies, was brought to me, October 1st, 1840, by a medical friend, for my opinion respecting the state of his testicles. It appeared that the right gland had begun to swell about a twelvemonth previously, and that six months afterwards the left had also increased in size, and they had since continued to enlarge. The inconvenience which he suffered was so slight that no attention had been

paid to his complaint, which did not appear to affect his health. He was engaged to undertake another voyage in a few days; but he thought proper to consult his usual medical attendant before joining his ship. On examination I found a hydrocele of moderate size on the right side, and could without difficulty detect the testicle behind by the solidity and firmness of the tumour at this part, which were greater than usual. There was a hydrocele also on the left side, which extended some way up the cord; but owing to the looseness of the sac, and the presence of only a small quantity of fluid, I could easily feel the left testicle, which was evidently enlarged and indurated. The slight inconvenience which the patient experienced appeared to arise from the size and weight of the tumours. I drew off about six ounces of serum from the hydrocele on the right side with a trocar, and then found this testicle larger even than the left, and also very hard. In both, the induration was in the body of the gland. The patient stated that he had not been subject to any complaint of the urinary organs during the last two years, and he ascribed the origin of the disease of the testicles to excessive venereal indulgence. The importance of abandoning his intention of shortly going to sea was strongly urged, and reluctantly consented to. The following treatment was adopted:—Rest in the recumbent position; three five-grain blue pills in the day; and the application of the linimentum hydrargyri to the scrotum.—October 17th. Although the pills had been increased to four daily, the mouth was scarcely at all affected by the mercury. The testicles were less tender, and a little diminished in size. The hydrocele on the right side returned a few days after the operation. He was now ordered to rub

in a drachm of strong mercurial ointment on the inside of the thighs night and morning, and to take two blue pills daily. On the 22nd the mouth was rather sore, and the fluid was entirely absorbed from the left side; and the testicle was softer, and partly reduced in size. The right testicle and hydrocele were also diminished. The treatment was continued.—Nov. 3rd. The mouth was very sore: the blue pills had been omitted since the 27th ult. Both testicles were much diminished in size; but they felt irregular, and were still heavier and harder than natural. A small quantity of fluid was yet remaining in the tunica vaginalis on the right side. I ordered decoct. sarzæ cum potass. iodid. gr. v. ter. die; pil. hydrarg. gr. ij. o. n.; and the scrotum to be painted every alternate day with tinct. iodinii c. This treatment was continued for about two weeks. The patient was allowed good diet and to take exercise; and as his health became re-established all effusion disappeared, and both testicles were restored to their natural size, a little induration only remaining at the end of ten weeks after I first saw him.

In the benign fungus of the testicle the treatment formerly resorted to was castration. A knowledge of the morbid changes producing this affection naturally led to better modes of practice, and now nearly all cases of this affection are found to be remediable without recourse to excision of the gland. The merit of this improvement in surgery is justly due to Mr. Lawrence, who observes that in many instances, if the complaint were left entirely to itself, the swelling would subside, the fungus shrink, and a complete cure ensue, without any professional assistance. But this can seldom be the case, for the anatomical condition of the parts producing the fungus tends powerfully to prevent a natural

restoration. The chief obstacle to the healing of the wound being the impediment offered by the protuberant fungous mass, it was naturally supposed that the first object in treatment was to reduce this projecting growth to the level of the surrounding skin. For this purpose pressure and various escharotics were applied to the surface of the swelling. These applications, though effectual in reducing the granulations and setting up a healing process in the surrounding skin, especially when pressure and the caustic were combined, often proved tedious, and in some instances failed in obtaining a cure. Mr. Lawrence was, in consequence, led to recommend the removal of the fungus with the knife, as the shortest and most effectual mode of treatment. Sir A. Cooper also practised an operation by which, he states, "the part is excised, leaving the epididymis and testicle uninjured." But the mode of proceeding described by this distinguished surgeon would certainly not save the secreting part of the organ from extirpation. Excision of the fungus cannot indeed be regarded as a satisfactory operation. It has been seen that the projecting growth partly consists of tubuli seminiferi, and in some instances includes nearly the whole of the glandular part of the testicle, so that its removal becomes an operation which in effect is but little short of castration. It may, indeed, be doubted whether the secreting structure protruded in this affection can be so far restored as to be enabled to perform its proper functions; but it does not appear that in most of these cases the gland tissue, though more or less injured, is wholly destroyed, or beyond recovery. That the tubuli are capable of secreting whilst projecting from the scrotum has in a few instances been proved by the appearance of spermatozoa in the discharge; and I see

no reason why they should not be able to continue their functions after the testicle has resumed its right place and the sore has closed. In several cases in which I have had an opportunity of examining the organ several weeks after cure of a large fungus without excision, there was no indication of atrophy; no reason to question that the greater part, if not the whole of the tubular structure, had been preserved in a condition fit for the office of secretion. That such may be the case is shown by the following example.—A man, aged twenty-eight, was admitted into the Royal Infirmary of Edinburgh with fungus of the left testicle. The protruded part was about the size of a large walnut, and appeared to include the greater part of, if not the entire, gland. The fungus was consequent upon disease of four months' standing. The right testicle had been diseased at a former period, and no trace of it remained. The scrotum was incised on each side of the fungus, and the organ replaced, as suggested by Mr. Syme, and partial union took place by the first intention. In about six weeks the patient left the hospital with the wound quite healed. At this time Dr. Duncan ascertained that the man's sexual feelings were unimpaired, and, at a later period, had reason to believe that the powers had been tested.[1] The object of the surgeon should be to endeavour to place the diseased organ as nearly as possible in its former site and condition, and the greater his success the more perfect will be the character of his practice. Upon this principle the extirpation of any part of the gland is objectionable, especially as the healing of the wound can be obtained by other treatment as readily as by excision of the fungus. The same objection as that made to excision applies to the practice of tying a

[1] Northern Journal of Medicine, June, 1845.

ligature tightly round the base of the projecting tumour, in order to produce strangulation and the death of the part; a plan of treating these cases which is not only more tedious, but more painful than excision. I have stated that when the fungus protrudes, in consequence of the glandular tissue being relieved from pressure, the original disease becomes less active, and often subsides, and that the pain likewise ceases. It would be wrong, however, to conclude that the exuded lymph, though ceasing to act injuriously by pressure, always becomes absorbed, and that the structure of the testicle at once recovers its healthy state. The constitutional depravity leading to the disease often remains, and the size of the projecting fungus—a size often much greater than would result from granulations on the surface of the extruded tubuli—indicates the presence of adventitious deposit in the substance of the organ. This would seem to have been lost sight of in the treatment until Sir B. Brodie recommended, in addition to the application of escharotics, recourse to the usual remedies for chronic orchitis.[1] This practice, combined with an effectual mode of repression by compresses and strapping, was advocated by me in 1843,[2] on the ground of practical experience of its efficacy.

In 1845, Mr. Syme, of Edinburgh, who seems to have been under the erroneous impression that the treatment generally adopted was to excise or cauterize the fungus, communicated to the profession[3] what he considered to be an improved mode of practice, by which the testicle was preserved entire, and the period of cure shortened. He described the principle of this

[1] Medical Gazette, vol. xiii. p. 222.

[2] *Vide* first edition of this work, p. 318, in which the treatment by ligature and excision was strongly condemned.

[3] London and Edinburgh Monthly Journal, Jan. 1845.

mode as consisting in the application of compression, simply by enclosing the fungus within its proper covering of the scrotum, which he effected by an operation. He cut round the fungus, and extended the incision upwards as well as downwards, so as to give it an elliptical form. The integuments were then separated on each side, and brought over the growth, where they were retained by stitches. The scrotum was supported by plasters and a bandage. Mr. Syme states that the surface of the fungus being coated by granulations unites with the surface of the integuments as soon as it becomes encrusted with effused lymph; and in order to facilitate the healing process he recommended the removal of the hard ring of skin through which the fungus protrudes. Two cases are described: in one the part healed in four weeks, and in the other in three weeks. Though this operation is in many instances uncalled for, the case readily admitting of cure without it, the conception was a good one, and in certain cases this plan undoubtedly promotes and hastens the healing process. But the operation is unfit for those cases in which much enlargement of the exposed gland still exists from adventitious deposit in its substance; at any rate until partial reduction of the growth has been first obtained by constitutional treatment and rest. In several of the cases operated on in London, respecting which I have obtained information, the flaps did not readily unite over the fungus, but receded considerably after division of the sutures, allowing a certain amount of protrusion, so that the wound afterwards healed slowly by advancing cicatrization, as in the treatment by pressure and escharotic applications.

Having given a brief account of the various modes

of treating the benign fungus of the testicle which have been adopted since its true nature was explained by Mr. Lawrence, in order to place in a clear light the successive improvements in practice, I proceed to describe the treatment which I believe to be best suited to the affection in the circumstances under which we meet with it. In cases of a recent character the patient should be directed to keep in bed; and if there is any tenderness or pain in the testicle, to take four or five grains of blue pill night and morning, until all symptoms of morbid action are removed. A piece of lint of sufficient size to cover the sore, having been dipped in a solution of the nitrate of silver in the proportion of ten grains to the ounce, is to be placed on the part. One or two compresses of lint are to be applied over this, and tolerably firm compression is then to be made by several strips of adhesive plaster, and the whole is to be secured by a bandage. This is to be repeated daily; and as the protrusion recedes the scrotum is to be drawn over it, and the edges of the wound are to be gradually approximated by narrow strips of plaster. Under this treatment cicatrization takes place, and the testicle steadily resumes its place in the scrotum, remaining firmly adherent to the new skin. In cases where there is no enlargement and no occasion for the exhibition of mercury; or after its discontinuance, if the general health be impaired, the sulphate of quinine, iodide of potassium, or steel medicines, may be combined with the local remedies. Other escharotics are also effectual in keeping down the granulations and promoting a healing action, such as a solution of the sulphate of copper, and the ointments of the nitric-oxide of mercury, or of the red iodide of mercury. When the fungus ceases to project, the black wash makes a good application.

In those cases in which the fungus projects considerably, its neck being girt by the scrotum, and in old-standing cases, in which the integuments around the fungus are thickened and indisposed to cicatrize, a modification of the operation practised by Mr. Syme will much assist the cure and shorten its duration. This consists in making two or three radiating incisions half an inch or more long in the skin encircling the fungus, and dissecting back a triangular flap of skin on each side. It is as well also to cut away a strip from the margin of the other parts of the ring, as by refreshing the edges healing more readily ensues. The fungus being repressed by pressure, the sore closes by gradual cicatrization.

I have described the occurrence of suppuration in the testicle followed by the formation of troublesome sinuses. Their cure may be promoted by keeping the testicle steadily compressed by means of strapping, the orifices being left free and being occasionally touched with an escharotic. In several cases I have injected some rather strong tincture of iodine, which has produced slight irritation, followed by a closure of the sinuses. In some instances these fistulous passages prove so tedious and intractable that it becomes desirable to resort to the operation of castration. I once witnessed the removal of a testicle from an elderly man on this account. On examination, the epididymis was found encased in the serous membrane, much indurated and thickened; the tunica vaginalis contained a quantity of serum. There were three distinct deposits of inspissated pus in different parts of the epididymis, and at its lower part a suppurating cavity, lined by a rough-looking membrane : the cavity opened externally by a fistulous passage leading to the bottom of the scrotum. The body of the testicle was quite sound. The patient had

suffered from the disease for eight months, and it had resisted the ordinary treatment. I excised the testicle in the following case with the view of getting the patient speedily well, the organ being useless.—M. C., aged twenty-nine, a married man, of pale complexion, was admitted into the London Hospital on account of disease of both testicles. He stated that he had suffered from an attack of acute rheumatism seven years before, and had since been subject to slight rheumatic affections. He had never had syphilis. About fifteen months ago the right testicle slowly enlarged without causing him uneasiness, but after two months became hot and painful, and an abscess formed, which burst. The discharge gradually diminished and became thin. He then married, and after two months another abscess occurred and burst at the existing opening. The discharge continued, but was scanty and thin. The left testicle also began to enlarge and harden, a year ago. It had never pained him, and had since somewhat diminished. I found the right testicle very little enlarged, but hard and nodulated, and not at all tender. There was an opening in front, and a probe passed deep into sinuses in two directions. The left testicle was very hard and irregular but not enlarged. Concluding that the testicles had both undergone fibroid degeneration, and that the sinuses in the right would not readily heal, I excised the organ, and the wound healed in a fortnight. Under doses of iodide of potassium the left testicle became somewhat softer. The organ removed was found composed of fibrous tissue without any trace of tubuli, the tunica vaginalis being obliterated by adhesions. The sinuses penetrated deeply into the interior.

In cases of pus effused in the testicle without finding any vent, there is often an indolent intractable enlarge-

ment of the gland, which continues stationary, does not yield to remedies, and is attended with very little or no pain; but still causes so much annoyance to the patient and so disturbs his mind, that he becomes desirous of parting with the organ in order to regain his health and resume his customary occupations.—In March, 1841, I was requested to visit the master of a ship, a man aged forty-three, in consequence of a chronic enlargement of the right testicle, which had been gradually forming for many months. The mouth had been made sore by mercury, and various stimulating applications to the part had been used, without any effect on the disease. He did not suffer much, and was desirous of returning to his ship; but Mr. Arthur, his medical attendant, considered it unsafe for him to go to sea again with such a disease unrelieved. As the swelling had not subsided under the remedies which had been judiciously tried and persevered with, I recommended the removal of the gland, to which the patient readily consented, rather than submit to any long confinement. I accordingly performed the operation, from which the patient recovered, so as to be able to join his ship in a month. The testicle was enlarged to more than thrice its natural size. The surfaces of the tunica vaginalis were closely adherent. On making a section of the tumour no trace of the natural texture of the gland was apparent, its place being supplied by irregular masses of lymph and soft purulent deposits, separated by thick septa of fibrous tissue.

In some instances, when pus is pent up in the testicle, the organ continues enlarged and tender and the seat of a dull chronic pain, the matter proving a continual source of irritation. These symptoms may be relieved by rest, local depletion, and mercury; but the benefit is in general only temporary, the patient continuing

to suffer more or less, and frequently experiencing relapses. For this state of the organ there is seldom any other remedy than castration. The following case is related by Sir A. Cooper.—"A surgeon in the cavalry had an inflammation and chronic enlargement of the testicle, which had been repeatedly relieved by the recumbent position, local depletion, and the use of mercury; yet when he returned to the exertions necessary to the due performance of his military duties, the symptoms were renewed. Tired by these repeated disappointments, and unable to pursue his profession satisfactorily, he requested me to remove the part, to which I consented, and found, upon dissection of the testicle, a chronic abscess in the centre, which kept up irritation of the part, and repeatedly reproduced the inflammation."[1]—In 1859, I excised the testicle of a married man, aged 37, who had suffered for seven months from a painful chronic enlargement and great induration of the left testicle, chiefly at its upper and back part. He had also a hard firm swelling the size of a filbert in the spermatic close to the outer ring. He stated that he had never had syphilis, and that his family were not phthisical. Both the testicle and the tumour in the groin were the seats of a constant distressing pain. He had taken iodine and mercury before coming under my care, without getting relief. I gave him mercury, so as to produce slight ptyalism, and at the same time steel medicine, with a good diet and wine. This had no effect in removing the pain, and at length, at the urgent request of the patient, I excised the testicle and the spermatic cord, including the tumour in the groin. The

[1] Lib. cit. p. 44. Gosselin refers to two similar cases of abscess within the tunica albuginea in which castration was performed, one by Nelaton, the other by Professor Denonvilliers. Fr. translation, p. 351.

latter was found to be a small abscess, with dense thick wall, connected with the vas deferens. The disease of the testicle was also an abscess in the caput epididymis, the whole of this part being disorganized. The walls of the abscess were very dense and thick. The glandular substance of the testicle was sound. The man afterwards improved in health, and got stout before he left the hospital.

A testicle which has undergone fibrous degeneration after chronic orchitis has sometimes been excised unnecessarily, chiefly from apprehension of the disease becoming more serious in character. Thus, Mr. Travers mentions a case in which the organ was removed, owing to the person affected being impatient for its extirpation, from apprehension of the disease being scirrhous or malignant.[1] Sir B. Brodie states that he extirpated a testicle that had undergone this fibrous conversion; between six and twelve months after the operation the other testicle became hard and enlarged, and apparently affected in a similar way. As an experiment he gave the patient iodine internally, and rubbed the iodine ointment on the testicle also. The hardness became in some degree diminished, and the progress of the disease stopped; and the patient left the hospital with the greater part of the remaining testicle in a sound state. This was no doubt a case of fibrous induration from chronic orchitis.

SECTION III.

SYPHILITIC ORCHITIS.

A CHRONIC enlargement of the testicle, commonly termed *syphilitic sarcocele*, is well known to be one of the con-

[1] Med.-Chir. Trans. vol. xvii. p. 327.

stitutional effects of the venereal poison. It is the most common form of chronic orchitis, but its frequency and origin in so important a disease as syphilis induce me to give it separate consideration.

Syphilitic disease of the testicle, unnoticed by Hunter, attracted but little attention before the appearance of the cases published by Sir A. Cooper in 1830. It was fully recognised but briefly described by Ricord in 1838,[1] and was treated of by the author of this work in 1843.[2] Mr. Hamilton, of Dublin, also drew particular attention to it in a memoir published in 1849.

This affection of the testicle occurs in secondary syphilis usually in a late stage of the disease, and in tertiary syphilis maintains the same indolent character throughout its entire course, as in chronic orchitis from other causes. The enlargement takes place very slowly, often insidiously and without pain, but sometimes with a dull uneasiness and sense of weight. The disease commences in the body of the gland and generally gives rise, sooner or later, to effusion in the vaginal sac. It sometimes goes on to suppuration and the production of a hernial fungus. Within the last ten years I have seen some ten or twelve examples of syphilitic benign fungus in hospital practice. The epididymis is seldom affected, except in bad cases of syphilitic cachexia, or in patients of a tubercular diathesis. Mr. Hamilton particularly noticed the occurrence of the disease in the epidydimis, in tertiary syphilis, in cases of a tubercular character.[3]

[1] Traité Pratique des Maladies Vénériennes.

[2] First edition.

[3] Dr. Dron, of Lyons, in a Memoir, "De l'Epididyme Syphilitique" (Archives Générales de Médecine, 6éme série, t. ii.), has related no less than sixteen cases of syphilitic epididymitis which he had seen in hospital in less than six months. In fourteen there was no affection of the body of the gland. Nothing like this has been observed in my experience.

Syphilitic orchitis is generally accompanied with marked symptoms of venereal disease, such as a scaly or pustular eruption, tubercles in the skin, ulcers in the throat, and periosteal enlargements. It is liable to occur, however, after the constitutional symptoms have nearly or completely disappeared, and it is only by inquiry into the history of the case that its origin can be traced to a syphilitic taint. The disease is sometimes limited to one testicle. Such was the case in six of the eight cases related by Sir A. Cooper. In tertiary syphilis I have commonly found both testicles affected.

Like other syphilitic symptoms, the chronic enlargement of the testicle is apt to recur after subsiding under treatment insufficiently prolonged. Mr. Ludlow has described, in his Prize Essay, the case of a man in St. Bartholomew's Hospital, on account of syphilitic orchitis, whose testicle had enlarged five times within three years. It invariably resumed its natural state under the use of mercury or iodine. Sir A. Cooper mentions—"A man applied to me in November, 1807, with a testicle diseased, and hard as a marble. Four years before he had a venereal complaint, and in a few weeks afterwards the testicle became enlarged; but under the use of mercury it was reduced in a month. In four months after, the swelling in the testicle returned, and in two months it again disappeared by the same treatment. Two years ago it swelled again, and was again relieved; and in the last spring it became again swollen, and now, in the month of November, it is of large size."

The morbid changes in recent syphilitic orchitis correspond with those observed in ordinary chronic orchitis; but in advanced syphilis yellow deposits, described by Mr. Hamilton as tubercular, also occur

both in the body of the gland and in the globus major of the epididymis. In describing the changes which take place in chronic orchitis, I noticed the presence of two morbid products, one fibrinous and extra-tubular, and the other tubercular and intra-tubular; and I suggested that the latter was probably the result of a local disturbance in nutrition, not the local manifestation of a constitutional disorder. In tertiary syphilis the enlargement of the testicles takes place in persons whose constitutions are enfeebled and seriously impaired by long-existing general disease, the blood being depraved and the nutritive functions badly performed. And as in this condition tubercles are frequently developed in the lungs, it seems a reasonable conclusion that in the worst forms of venereal testicle, the tubercular product prevails locally to a greater extent than in simple chronic orchitis, or than in the orchitis of secondary syphilis.

Syphilitic orchitis disorganizes and destroys the testicle in the same way as ordinary chronic orchitis. After the exuded matter has disappeared under treatment, the organ sometimes suffers complete fibroid degeneration. Mr. Hamilton has related the case of a man, aged thirty-six, both of whose testicles had been attacked with the disease, and had undergone this change, with complete loss of his virile powers. In advanced syphilis a deposition of albuminous matter may take place in the testicle without any obvious enlargement or evident symptom, and may afterwards terminate in fibroid degeneration, the disease exhibiting the characters described at page 281.

Treatment.—The disease of the testicle occurring in secondary syphilis should be treated on the same principles as ordinary chronic orchitis. The striking efficacy

of mercury in the latter affection has been already pointed out. In syphilitic orchitis mercury is generally required not only for the removal of the disease in the testicle, but also for the cure of the other syphilitic symptoms. It is necessary, too, to continue the mercury for six or eight weeks,—to keep up its influence on the system for a longer period than in simple chronic orchitis, owing to the tendency to relapse, if the disease be imperfectly cured. The best mode of giving mercury is by the vapour bath or by inunction, and these remedies should be used until a slight effect is produced on the mouth, and should be continued until the enlargement and induration of the gland have nearly disappeared. Tonics, such as bark and steel, with wine or malt liquor, may be given during the mercurial course to sustain the general health. In persons who do not bear mercurial treatment well, the iodide of potassium may often be substituted with much benefit.

The treatment of the orchitis of tertiary syphilis must depend very much on the patient's general condition, on the duration of the syphilitic disease, and the extent to which the constitution has been impaired by the poison. In many instances, unfortunately, the orchitis is the least important of the local affections from which the patient suffers. Mercury can seldom be given, and the remedy upon which we must chiefly rely is the iodide of potassium, in doses of from five to ten grains three times a day. I have sometimes combined with it the iodide of mercury with great advantage in reducing the swelling. In all cases great attention must be paid to the general health—in diet, clothing, and temperature; and in cachectic cases quinine, steel, or cod liver oil may be more suitable even than the iodide of potassium.

The character of the disease and the principles of treatment will be best gathered from the following cases.

Double syphilitic orchitis.—R. H., aged twenty-five, a valet to a nobleman, stated that in September, 1858, he had a chancre, which healed readily under the application of black wash. A month afterwards the glands in both groins inflamed and suppurated. In April, 1859, he was admitted into St. George's Hospital, suffering from an eruption over the head and face, and pains over the whole body. Nodes appeared on the left tibia, and small ulcers formed on the shoulders and arms. He was treated chiefly with mercurial vapour baths. He was discharged in September, and obtained admittance into the Margate Sea-Bathing Infirmary. At this time he was in a cachectic condition, and suffering severely from ulcers on various parts of the body. His left testicle soon became enlarged, and afterwards the right. He was treated by Dr. Conry with bark and nitric acid, and plenty of port wine; and, after his health became improved, he took, off and on, the iodide of potassium in decoctions of sarsaparilla, and small doses of bichloride of mercury, with benefit to his general health, but without much effect on the testicles, which went on enlarging. Dr. Conry sent him up to me, at the London Hospital, May 9th, 1861. His general health seemed pretty good. Cicatrices were apparent on his head, shoulders, and elbows. Each testicle was about the size of a very large lemon, very hard, and slightly nodulated, especially the right. Moderate pressure caused very little pain, but he had a constant sensation of weight and dragging. I kept him in bed, put him on full diet, and directed the testicles to be strapped with emplastrum ammoniaci c. hydrargyro on leather, and

ordered dec. sarzæ c. hydrarg. biniodid. gr. $\frac{1}{16}$, et pot. iodid. gr. iii., ter die. The medicine produced some griping and purging, and had to be discontinued for a day or two several times, but was resumed with the addition of a few drops of laudanum. The iodide of potassium also disagreed repeatedly, as it had done at Margate, producing a rash on the forehead and irritation in the mouth and throat, so that I could give i only in reduced doses of two grains, and afterwards one grain. With slight modifications, and occasionally substituting quinine, and nitro-muriatic acid for the above remedies, this treatment was continued for several months, strapping being sedulously applied to the testicles, which slowly diminished in size. In July, nodes on the right tibia caused him some uneasiness, and troubled him at times for more than three months, but they were always relieved by painting with tincture of iodine and by small doses of the iodide of potassium. The patient remained in hospital until Nov. 23rd, when he was discharged cured of all his syphilitic symptoms, his testicles being reduced nearly to their natural size. He called to see me nearly a twelvemonth afterwards, when I ascertained that he had remained well, his testicles being indurated but not materially enlarged.

Syphilitic Orchitis and Benign Fungus of the Testicle.—J. S., aged twenty-nine, a stoker, came under my care in the London Hospital in December, 1851, on account of a large benign fungus of the left testicle. He had contracted syphilis about a year before, and there was a large dark-brown patch covered with a thin scab on the fore part of the left thigh, and a similar blotch in front of the left leg. He first noticed a swelling of the testicle about two months previously, the gland slowly increasing until it attained a considerable size before the inte-

guments gave way, which occurred about a month after the commencement of the swelling. On examination I found the testicle greatly enlarged; a fungus, measuring no less than two inches and a half in length, and nearly two inches in width, projected in front of the scrotum. This fungus had an even rounded surface and was of a dusky red colour. It overlapped the thickened margin of the scrotum, especially at the lower part, where the skin slightly girted the neck of the swelling. He had been a strong muscular man, but was looking pale and out of health, and had lately lost flesh considerably. —Dec. 11th. I divided the integument girting the lower part of the fungus by an incision an inch and a half long; dissected back a triangular flap of skin on each side, and excised some of the margin of the thickened integument. The solid nitrate of silver was afterwards applied freely to the surface of the fungus; and a thick dossil of lint being placed on the part, the integuments were drawn forwards with strips of plaster. I ordered him to bed, and to take pil. hydrarg. gr. v., c. op. gr. ss. n. et m., and the application of the lunar caustic and the dressings to be repeated daily. In about ten days the mouth became sore, and the fungus was found considerably reduced in size, but the integument around evinced very little disposition to heal. The influence of mercury was kept up until the 29th, when it was discontinued, and dec. sarzæ c. pot. iodid. gr. v. ter die prescribed. Six ounces of wine were added to his full diet. The black wash was applied to the fungus, which was covered with a compress and strapped as before. On Jan. 10th, 1852, the patient's health was much improved, the syphilitic blotches had nearly disappeared, and the fungus was found by measurement reduced to a third of its original size, and cicatrization

was advancing at its base. The same treatment was continued, but he was allowed to leave his bed. From this time he mended steadily. He entirely regained his health, and became stout, but the healing process advanced so slowly that the sore had not entirely closed before March 18th. When he was examined five weeks later, the testicle appeared of ample size and perfectly restored. At the end of two months the patient was still in good health.

SECTION IV.

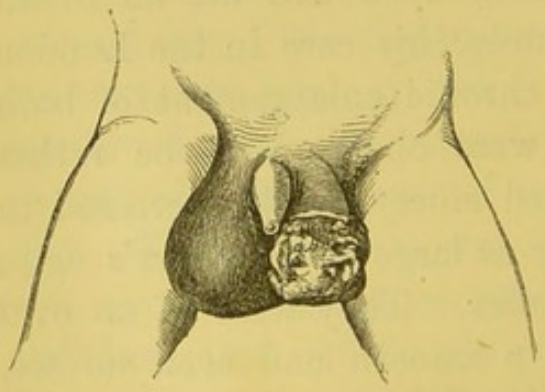
INFANTILE CHRONIC ORCHITIS.

The testicle is liable to chronic enlargement at an early period of life. Thus, Sir A. Cooper remarked, that the organ, even in very young children, sometimes becomes enlarged and very hard, but without pain or any inconvenience; and the disease is accidentally discovered by the parent or servant. In this state of indolent increase it remains for many weeks, months, or years; and then, under improvement of the general health, the enlargement subsides, and the gland resumes its natural state.[1] Some years ago, Mr. Hamilton showed me an infant ten months old, who was under his care in the London Hospital on account of a chronic enlargement of both testicles. These glands were observed to be rather large at birth, but they had since greatly increased in size. The right was nearly as large as a plover's egg; the left was somewhat smaller. They were of an oval shape, and quite hard, had a smooth and even surface, and did not appear at all tender when handled. The infant was in pretty good health. The case had been

[1] Lib. cit. p. 97.

under observation three weeks, during which time the organs had remained stationary. I have since seen several similar cases. The increase in size is somewhat remarkable. In a boy two years of age the testicle affected was four times as large as the other. I had not met with any case in which the disease had given rise to benign fungus at this early period of life until the summer of 1854, when, being in Dublin, I was shown by Dr. Fleming, surgeon of the Richmond Hospital, a well-marked case of granular swelling in a child about two years of age, and also the drawing of the scrotum of another child with a similar affection. In a communication with which I have since been favoured, Dr. Fleming informs me that he has met with several cases of chronic orchitis, both single and double, in different stages, in children applying for relief at the Netterville Institution. The drawing above alluded to was taken from a child, aged twenty months, born of healthy parents, who was seized with chronic orchitis first in the left testicle, and afterwards in the right. This occurred about six weeks or two months before application was made for relief. At this time, the local signs of the double disease were as graphically marked as in the best selected case of the adult, and the enlarged left testicle bulged forwards through an ulcerated opening in the scrotum and presented the peculiar appearances of the granular swelling. (Fig. 29.) The right side of the scrotum was faintly tinged with red, œdematous, and at one part

Fig. 29.



adherent to the testicle. During the stay of this child in hospital the curative process proceeded favourably under the usual treatment, but the child was removed before the cure was completed. Dr. Fleming mentioned to me two other cases of benign fungus consequent on chronic orchitis, in children about three years of age, one testicle only being affected. Gosselin exhibited at the Société de Chirurgie, in Paris, an infant, ten months old, with a benign fungus of the testicle.[1] I believe that chronic orchitis rarely ends in fungus, except in badly nourished and neglected children.

This affection of the testicle of infants is certainly rare. Its most common cause I believe to be congenital syphilis, though Dr. Fleming states that in none of the cases which had fallen under his notice had he been able to trace the disease to any syphilitic taint; and he considers it to depend generally on some affection of the bladder or urethra. I have certainly seen cases of chronic orchitis, both single and double, without any clear history of syphilis in the parents, and without any concomitant syphilitic affection in the infant; but I have not been able to connect the enlargement with any urinary disease.[2] Gosselin's case of benign fungus was undoubtedly syphilitic, characteristic mucous papules having been observed at the anus. Dr. Wilks lately brought before the notice of the Pathological Society a child, aged five months, suffering from the ordinary symptoms of congenital syphilis, and in whom both testicles were much enlarged.[3]

The treatment which I have found invariably success-

[1] Union Médicale, Nov. 4, 1858.

[2] Rollet, a writer on Syphilis, mentions the case of an infant with benign fungus consequent on chronic orchitis which had no syphilitic origin. Recherches sur la Syphilis, p. 483.

[3] Pathological Transactions, vol. xvi. p. 189.

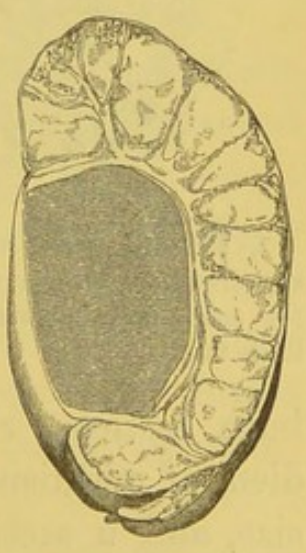
ful is mercurial, which is best applied by inunction. It must be continued until all swelling disappears, attention being paid to the general health. Small doses of iodide of potassium or of iodide of iron might be given, if the mercury disagrees. The treatment of benign fungus should be conducted in the infant on the same principles as in the adult.

CHAPTER VII.

TUBERCULAR DISEASE OF THE TESTICLE.

This disease generally attacks primarily the epididymis, occurring in the form of yellow crude tubercle. In the body of the testicle it usually appears at first as small pearly or greyish bodies of the shape and size of millet seeds, which are ranged in lines like strung beads, being, however, less abundant and less regular at the front of the testicle than towards the rete testis, where they are closely set, and sometimes confluent. These little bodies coalesce, increase, and become changed into a yellow friable cheesy substance, which at a later period softens, and is often broken up into a curdy purulent fluid.

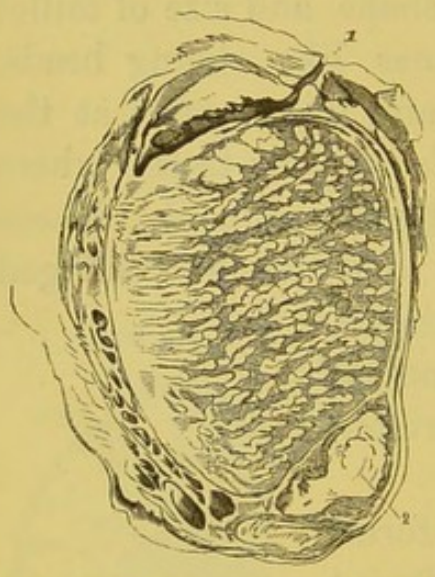
Fig. 30.



Crude tubercle commonly forms several distinct deposits in different parts of the testicle at the expense of the glandular structure, which disappears as the disease advances. The epididymis is not only more frequently attacked than the body of the testicle, but when both parts are affected the disease is always more advanced in the former than in the latter. In a specimen taken from a man who died of phthisis (Fig. 30) I found the whole of the epididymis occupied by crude tubercular

matter with scarcely a trace of ducts, whilst the body of the gland, though small, was free from morbid deposit. In several instances I have observed small bead-like bodies in the substance of the gland, which was but little enlarged, whilst the epididymis was swollen to double or treble its proper size, and filled with a yellow caseous deposit. Tubercle is liable to form in all parts of the epididymis, but it occurs first in the head, and is generally most advanced in this part; whereas in orchitis the tail is the part primarily and most frequently affected. In Fig. 31 isolated tubercles are seen in the body of the testicle, appearing more numerous towards the rete testis, where they are seen coalescing and forming a number of closely-set yellow lines or processes. Suppuration has taken place in the head of the epididymis, and a mass of caseous deposit occupies its lower part.

Fig. 31.

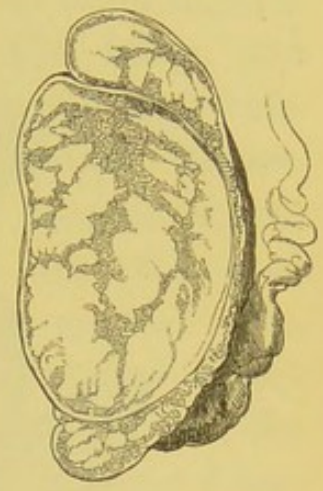


1, Fistulus sinus, leading to a suppurating cavity in the head of the epididymis; 2, Caseous deposit in its tail.

In testicles which have been affected for some time the greater part of the gland is invaded by the morbid deposit. This was the case in both testicles removed from a middle-aged man who died of phthisis. They were injected with coloured size, and a section of one of them reduced in size is represented in Fig. 32. These and some others in which the disease was similarly advanced, made beautiful preparations, the yellow tubercular matter contrasting in a marked degree with the vermilion hue

of the intervening remnants of glandular structure highly injected. In a later stage of this disease the characteristic deposit becomes softened down and converted into a yellow pultaceous substance; inflammation is set up, new products are evolved, and pus is formed. The abscess extends to the scrotum; and after it has burst and the matter has escaped, cavities and sinuses are left which resemble tubercular cavities in the lungs. In cases where the disease has been largely developed, the whole gland is tunnelled by fistulous passages.

Fig. 32.

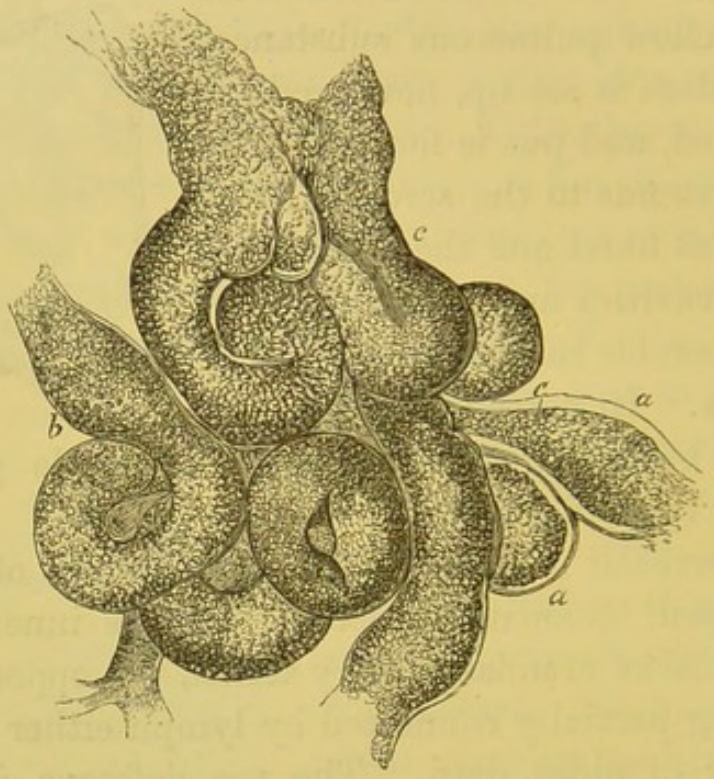


In tubercular testicles the tunica vaginalis often contains a small quantity of serum, and its inner surface exhibits marks of inflammatory action, the opposing surfaces being partially connected by lymph either recently exuded or of older date. The vas deferens in many instances also is blocked up with scrofulous matter.

A minute examination of the tubercular testicle clearly proves that the disease is originally developed within the tubules of the testicle or duct of the epididymis. The following account of the histology of these deposits is the result of careful investigation, in which I have to acknowledge the valuable aid of Dr. Andrew Clark. The small isolated yellowish-grey bodies found in the testicle in the early stage of the disease are composed of coils of diseased seminal tubes with altered contents, a little fibroid tissue, the branches of disintegrating blood-vessels. The tubules most distant from these bodies are usually healthy, but as they approach the tumours they are irregularly distended at intervals, and their fibrous coat is observed to be thickened, opened

up, studded with fat granules, and splitting. Their contents consist mainly of large cells, some of which

Fig. 33.



A coil of seminal tubes affected with tubercle (about 80 d.).—*a*, *a*, Thickened walls of the tubes; *b*, *b*, Dilated tubes; *c*, *c*, Constricted tubes.

exhibit vesicular nuclei, and are disintegrating; of smaller shrivelled cells, of irregularly-shaped nuclear particles, and of a small quantity of granulo-molecular matter. The distension of the tubules in some places is sudden and globular, so that the distended portion with its contents represents a small tumour. From the circumference, the tubules may be traced into the larger tumours, which are composed of their coils. The walls of the tubes and their contents become gradually changed as they reach the centre. The blood-vessels surrounding them may be observed disintegrating, and the nucleated fibroid walls broken up.

The matter which occupies the diseased tubes and

forms the tumours in the body of the testicle, as also that deposited in the epididymis, corresponds to the scrofulous or tubercular matter observed in other organs. This matter originally forms within the tubes, and accumulates there until the tubes burst and their contents are extravasated into the surrounding tissues. Its production is preceded by a state of congestion, but does not appear to be followed by the exudation and growth of organized lymph. "This matter," Dr. Andrew Clark observes, "arises by a process of abnormal nutrition in the cellular contents of the tubes, the different aspects of its structural elements being determined by the different phases of retrogressive metamorphoses through which it passes. In the early stage this matter consists mainly of large cells and the products of disintegration. Some of these cells become filled with fat granules, and after a time become broken up; others develope nuclei, which are afterwards extruded and persist; a third class simply shrivel and disintegrate. During these latter stages much moleculo-granular matter and free fat accumulate; and this, with the free nuclei and shrivelled cells, constitutes the leading structural feature of the deposit. With further disintegration more molecular matter and fat are developed, and at last earthy salts." Coincident with the changes occurring in the contents of the tubes, their walls and the small blood-vessels become variously changed, split up, and disintegrated, so that their elements after a time become mixed with the original deposit chiefly in the form of nuclear fibres and nucleated fibroid tissue. When the deposit has proceeded to such an extent as to rupture the tubes and cause extravasation, the local circulation becomes embarrassed and frequently, though not always, an ex-

udation occurs from the blood-vessels which infiltrates the deposit and adjacent parts. Such an exudation usually retards the progress of the deposit, and especially its disintegration.

Fig. 34.

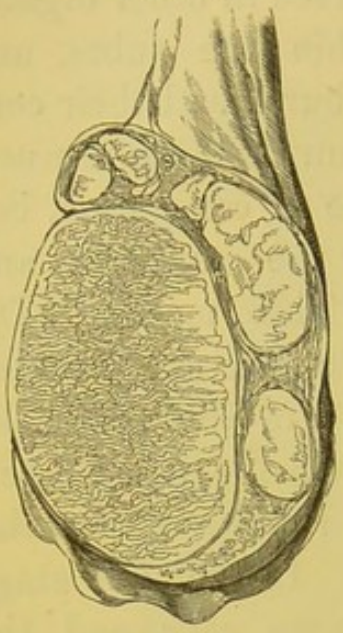
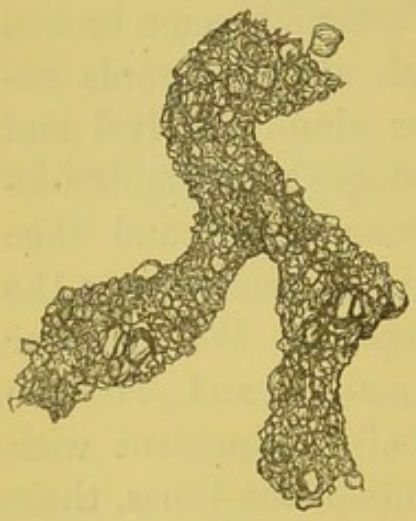


Fig. 35.



Amorphous and crystalline earthy matter in the interior of a seminal tube. (About 70 d.)

Earthy matter, exactly similar to the dry putty-looking chalky matter observed in the lungs and bronchial glands of persons who have been affected with tubercular disease, is sometimes found in the testicle, most commonly in the epididymis. There is every reason to suppose that in these cases the gland had at some former period been the seat of tubercular deposit. A good specimen of this calcareous matter in the epididymis, from the collection of the late Sir A. Cooper, is represented in Fig. 34. The epididymis is enlarged, and contains three separate deposits of this matter, whilst the body of the testicle is perfectly sound. The earthy matter, resulting from the transformation of tubercle, has also been distinctly recognised in the tubuli of the testicle, which appear irregularly contracted, as in Fig. 35.

Tubercle, though sometimes formed in the testicle in the earlier periods of life, does not usually occur till after the development of the organ at puberty. We

have very little information respecting the relative frequency of this deposit in the testicles, as compared with other organs. In the tables of Louis, Lombard, and Papavoine, no mention is made of the testicle. Rokitanski places these organs low in the order of frequency. I have seen a large number of cases of tubercular testicle, and believe the disease to occur primarily in the genito-urinary organs more frequently than is generally supposed. In many instances only one gland is attacked; but not unfrequently both are affected simultaneously, or one shortly after the other.

The occurrence of this disease in the testicle must be viewed as one of the manifestations of the peculiar morbid state of constitution commonly known by the term *scrofula* or *tuberculosis*. It appears, however, that a weak condition of the organ, or an impaired organization consequent upon previous disease, especially in the urinary organs, tends greatly to favour the development of tubercle in this part. Thus, in two cases of phthisis in which I met with it, the patients were both affected with obstinate strictures, and had suffered from epididymitis in early life.

Symptoms.—The disease commences insidiously, and is indolent in its progress. The patient's attention is usually first attracted by a slight uneasiness in some part of the gland, generally the epididymis, which on examination is found to be somewhat enlarged, prominent, and hardened. Sometimes the whole organ feels slightly enlarged and indurated, though it more frequently forms a tumour with an unequal and irregular surface. The state of the testicle, however, is often masked by small local effusions of fluid in the tunica vaginalis, the surfaces of this membrane being partially adherent. Very little pain is experienced in the part,

and there is but slight tenderness on pressure. After the disease has lasted for some time, many months or even a year and more, making little progress, and often remaining stationary, one of the prominences begins to increase, so as to be observed externally, and to feel painful and tender; the skin over it becomes adherent, changes to a livid hue, ulcerates and bursts, giving vent to a soft caseous matter mixed with pus. This is followed by the formation of a fistulous sinus, which discharges a scanty thin serous pus, mixed with particles of tubercular matter, and occasionally with semen. Similar changes may take place in other parts of the testicle, occasioning two or more sinuses leading to the interior of the gland. These sinuses sometimes communicate, and they may continue open and discharging for a great length of time. After the deposit has all come away, if the original disease be arrested, and no more tubercular matter formed, reparative changes take place; the discharge ceases; the fistulæ close up, leaving the organ more or less diminished in size or entirely wasted, according to the extent to which it had been disorganized by the tubercular deposit. A small pit or depression with adhesion of the cicatrix to the testicle remains to indicate the spot where the fistula opened. The bursting of the abscess and escape of the tubercular matter is rarely followed by any hernial protrusion of the testicle, the seminal tubes being largely destroyed at this stage of the disease.

Strumous disease of the testicle is not often seen in the suppurative stage in children, or before the age of puberty.—A little boy, aged five years, with fair complexion, bright eyes, and florid cheeks, was brought to me at the hospital in March, 1842, on account of an affection of the left testicle. This gland was three or

four times the size of the right; of an oval form, with an uneven surface, so as to feel nodular; extremely indurated, indeed almost as hard as cartilage; and was nearly insensible to pressure. I ordered small doses of the hydrarg. cum cretâ and the camphorated mercurial ointment to the part. As the swelling remained but little changed at the end of three weeks, I prescribed the decoction of bark, with iodide of potassium, and some iodine ointment to be applied to the testicle. In May the skin became adherent to the lower part of the gland; an abscess formed, and about the middle of June burst, and discharged some caseous matter and thin pus, and left a fistulous opening. The health began to fail, which induced me to substitute some steel medicine for the iodide of potassium. The mother became phthisical and too ill to bring the boy, and I saw nothing more of him till the father brought him to see me in the following November, when I found the fistula closed, the testicle a good deal reduced in size, but still hard and nodular, and adherent to the lower part of the scrotum. The boy's health was much improved. Another small abscess subsequently formed and burst as before, since which I lost sight of the patient. Mr. Bryant met with this disease in a boy even younger. He relates that he excised the testicle of a child, aged two and a half years, for tubercular disease of six months' standing. It had progressed very slowly, and had attained a large size before suppuration occurred. The child died subsequently of general tuberculosis. Both testicle and epididymis were nearly filled with scrofulous deposit.[1]

The testicle may be the only organ affected with tubercle, but the disease is more commonly associated with scrofulous affections of other parts, especially of

[1] Guy's Hospital Reports, third series, vol. xi. p. 123.

the vesiculæ seminales and prostate. Gosselin states that in cases of tubercular disease of the testicle he has often detected, by digital examination in the rectum, an affection of these organs. The patient is sometimes phthisical, or is subject to strumous swellings of the lymphatic glands, and manifests the ordinary characteristics of a scrofulous constitution; so that in many cases, certainly in the majority of those which have come under my notice, the affection of the testicle was of secondary importance to disease existing in other organs, and to the morbid state of the system generally. The constitution, also, is very slightly affected by, or sympathizes very little with, the morbid changes going on in the testicle.

Diagnosis.—Tubercular disease of the testicle may be mistaken for chronic inflammatory, and malignant enlargements of the gland. Writers often confound the former of these affections with the tubercular, being misled by the indolent nature of the swelling and the yellow appearance of the morbid deposit in chronic orchitis. The strumous differs, however, from the chronic inflammatory swelling in being more indolent; in making even slower progress, and being attended with still less pain and inconvenience; in the irregular surface and smaller size of the swelling; and, when the epidydimis is attacked, in the globus major being the part principally affected, instead of the lower part, which is usually first enlarged in chronic inflammation. The diagnosis, however, may be extremely difficult, as in both cases the changes in the gland or in the epidydimis are liable to be masked by inflammatory effusion in the tunica vaginalis. It is of much importance to make a right distinction, for the remedies proper for orchitis, if given in tubercular disease, may do consider-

able harm. In one case of error which came under my notice phthisis was rapidly developed at the conclusion of a course of mercury. The disease may be distinguished from malignant enlargements of the organ by the smaller size, uneven surface, and more indurated nature of the swelling, and by its very chronic progress. In all cases the judgment of the surgeon will be materially assisted by his noting the general characters of the constitution, and whether there is any concomitant affection of other parts.

Treatment.—From what has been remarked in reference to this disease, it will naturally be inferred that the remedies of most consequence are those calculated to correct the morbid state of constitution which predisposes to local scrofulous deposit. The patient should reside in a pure air in the country, and, if possible, by the sea-side, for many months. He should take gentle exercise. The diet should be nutritious, consisting of a due proportion of animal food; and stimulating viands and drinks must be prohibited. Malt liquors, as light pale ale, or a glass or two of wine, may, however, be taken in many cases with advantage. Medicines which tend to improve the appetite and give tone to the digestive organs are required. The sulphate of quinine, the preparations of steel, and cod liver oil are appropriate medicines. The iodide of iron, long continued, is well suited to these cases, and assists in correcting the tendency to tubercular formation.

When inflammatory symptoms exist they must be combated by the application of one or two leeches, fomentations, and rest in the recumbent position. Antiphlogistic measures are not often necessary. In all cases the gland must be supported, and tenderness may often be removed by the external application of tincture

of iodine. When suppuration ensues, the part is to be poulticed, and after the abscess has burst, the orifices of the sinuses must be kept open, to allow the free escape of the softened tubercular matter. After this has been all got rid of, the sinuses often evince an indisposition to heal, and the patient is annoyed with a discharge from the part and a succession of small abscesses when the aperture closes. Some surgeons consider this an advantage, in diverting tubercular disease from other parts. If the patient is in tolerably good health, I have no hesitation in attempting to procure the permanent healing of the part by injections of tincture of iodine, so as to cause plastic effusion and the obliteration of the fistulous passages.

In certain cases, in which the testicle is quite disorganized and tunnelled by sinuses which cannot be made to close, but remain obstinate and troublesome, castration may be necessary. This operation, however, is seldom required, and it should not be performed when signs exist of advanced disease in the lungs.

CHAPTER VIII.

CARCINOMA OF THE TESTICLE.

Carcinoma occurs in the testicle under the three forms of Scirrhus, Encephaloid, and Melanosis.

SECTION I.

SCIRRHUS OF THE TESTICLE.

Carcinoma seldom affects the testicle in the dense form which it commonly assumes in the breast. Sir A. Cooper describes a scirrhous affection, in which the testicle is invaded by a large white mass in lobes or tubercles. The spermatic cord is attacked with a similar disease, and the glands of the abdomen become converted into a white solid texture, unlike that of the fungoid disease. The organ affected feels tubercular, irregular, and excessively hard, and is the seat of severe pain, which extends to the loins. The morbid mass never becomes soft, nor so large as the encephaloid cancer, nor does it produce a fungoid or bleeding surface. Ulceration, indeed, rarely occurs, but the patient becomes cachectic; his countenance appears sallow, and he sinks under impaired digestion, pain and tumour in the abdomen, with œdema of the lower extremity on the side affected, and sometimes ascites.

This form of cancer is characterized chiefly by its slow progress and great hardness during the whole

continuance of the disease, and also by its irregular and tuberculated feel. It occurs less frequently in different parts of the body at the same time than encephaloid cancer, and is slower in proceeding to a fatal termination.

This carcinomatous affection of the testicle is rare, and only a few cases have come under my notice. The following examples will serve to illustrate some of the chief features of the disease.—In July, 1844, a corpulent gentleman, aged fifty-eight, consulted me on account of a disease of the left testicle. He stated that he first perceived a hardness in the gland about five years before. He paid no attention to it for two years, when the part became enlarged and inflamed, and an abscess formed in the scrotum, and after it burst he got relief. The opening closed, but the increased enlargement only partially subsided. I found the left testicle converted into an irregularly-shaped body the size of a large orange, and extremely indurated. The scrotum was puckered, and adherent to its front part. Firm pressure caused very slight uneasiness. The spermatic cord was also very much enlarged, and formed a thick rounded body extending far into the inguinal canal. The right testicle was sound, but there was a swelling the size of a hen's egg in the right groin. He suffered occasional pains, chiefly in the left testicle and right groin; but they did not disturb his rest. He had no uneasiness in the loins. This gentleman appeared in tolerable health. His appetite was good, and he was able to walk several miles. The disease slowly increased without producing any severe suffering, and he died in December, 1845. On examination of the body, the disease was found to consist of hard cancer, which had extended into the abdomen and in-

volved the bladder. The abdominal viscera were unaffected. There was no attenuation, the abdomen being thickly covered with adipose tissue.—J. M., aged fifty-two, a carpenter, came under my care at the London Hospital in 1849, on account of scirrhous disease of the right testicle. He stated that the organ had been squeezed about seven years ago, which caused swelling. It became hard and enlarged four years afterwards. The organ was about three times its natural size, and almost of stony hardness, especially at its back part. There was also an indurated tumour half the size of the diseased gland, in the spermatic cord, extending to the abdominal ring. No swellings could be detected in the lumbar region, nor did he complain of uneasiness there. He suffered severe pain in the testicle, especially at night. He remained under observation several months, during which period the disease made scarcely any progress.

These two cases are well-marked examples of hard cancer of the testicle. The first is remarkable for the small amount of pain attending the development of the disease, and the slight degree in which the constitution suffered from it. In both instances the progress of the cancer was extremely chronic. There is no other remedy for this disease but castration, which must not be delayed so as to endanger a production of the disease in the spermatic cord, or the growth of a tumour in the abdomen.

SECTION II.

ENCEPHALOID CANCER OF THE TESTICLE.

Encephaloid or medullary cancer is by far the most frequent disease of a malignant character to which the

testicle is liable. It usually commences in the production of one, two, or more small masses amongst the tubuli, which become gradually destroyed as the morbid deposit increases. The matter is very rarely infiltrated. The testicle at this early period is extremely full, firm, and hard, owing, not to the solid nature of the deposit, but to the excessive distension of the unyielding tunica albuginea. The glandular structure soon entirely disappears, the whole organ being occupied by the new growth, intermixed with and sustained by the septa and fibrous processes from the mediastinum and tunica albuginea. The morbid mass sometimes accumulates in large lobes invested with fibrous tissue. More rarely the disease is first developed in the rete testis. In this case the glandular structure is found at an early period surrounding a solitary deposit in the centre of the tumour, but at a later stage, and even when the tumour has attained a considerable size, the tubuli may be seen expanded in a thin layer around a mass of encephaloid matter. This characteristic appearance is remarked only in those cases in which the cancer originates from the rete testis. The tubuli so situated on the surface have been found distended with the cancerous element.[1] As the disease advances, the tunica vaginalis becomes distended with serum, not, however, in any considerable quantity. The effusion is caused by inflammation excited by the presence of the encephaloid deposit. It sometimes produces adhesion and partial or complete obliteration of the cavity of the tunica vaginalis. The tough tunica albuginea gradually yields, and allows the mass to accumulate within it to a great size. The

[1] This was seen in a testicle excised by me from a gentleman aged forty-six. The specimen is described by Mr. Little. Path. Trans., vol. xv. p. 154.

morbid growth at length penetrates the fibrous tunic, and a portion protrudes, forming a mass projecting from the body of the tumour. This sometimes occurs in more places than one. The epididymis remains for some time unaffected; but as the disease increases, this part likewise becomes implicated and destroyed. In one instance I found the tubes in the head of the epididymis (the only part of the gland not destroyed) filled with white carcinomatous matter. The scrotum in time becomes fully distended by the diseased mass, which presents the well-known appearances of encephaloid cancer.[1] Small cysts containing serum or a bloody fluid and nucleated cells, are sometimes mixed with the disease.

In diseased testicles of some considerable size, grey or yellow deposits, not unlike in appearance crude tubercular matter, are occasionally interspersed amongst the carcinomatous matter. Similar deposits are observed in encephaloid cancer of the kidney, ovarium, and other parts, but not so often as in the testicle. They consist of considerable portions of cancer structure which has undergone fatty degeneration, the cells being withered and imperfect. I have seen nearly the whole of the cancerous matter in the testicle in this state. Masses of enchondroma are sometimes found conjoined with encephaloid growths. The cartilage is probably first developed within the tubes, as in cystic disease of the testicle, although the destruction of the ducts generally renders it difficult to trace the origin of the enchondromatous masses. In a specimen which I examined, the cartilaginous mass was composed of a number of small

[1] I have described only the peculiarities which encephaloid cancer presents in the testicle. For an account of the general and minute characters of the disease, I must refer the reader to the works of Paget, Lebert, and Rokitanski.

but distinct portions of enchondroma closely clustered, which in a section resembled very much the little masses commonly seen in cystic disease of the testicle. When the tunica albuginea and scrotum give way, the morbid growth projects as a bleeding fungus. The mass then becomes less firm, and its consistence varies very much in different parts, the morbid matter being in some a mere pulp, or resembling a creamy fluid. It is interspersed with round or irregular patches of dark-looking coagula, and when incised often presents in different places dark minute spots of various sizes, produced by coagulation of blood in the vascular net-work, usually mixed up with the morbid deposit. On macerating the tumours, or on pouring a stream of water on them for some time, a granular substance, the cancerous matter, is washed away, leaving behind a filamentous shreddy tissue or meshes of a delicate cellular texture, which may often be found connected to a denser fibrous substance, the remains of the tunica albuginea. The spermatic cord is often invaded by a similar substance; and in an advanced stage of the complaint, large bodies of the same kind, originating in disease of the lumbar glands, are found on the sides of the vertebræ, reaching as high up as the diaphragm. The abdominal aorta and ascending vena cava become surrounded by them, and are often displaced or compressed. I have known the circulation through the vena cava completely obstructed by the pressure. This vessel has also been found filled with, and obliterated by, encephaloid matter. The kidneys are sometimes encroached upon by the disease. The spine too may be implicated, the bones of the lumbar vertebræ being more or less destroyed by the morbid growth, which, indeed, spares no parts or textures in its progress. The glands in the

groin of the side corresponding to the diseased testicle escape contamination more frequently than those in the loins; still they often become affected. It has been said that they do not enlarge until the disease has reached the scrotum. Such, however, is not always the case; for I have seen them affected before any appearance of disease in this part. Mr. Abernethy describes a case in which the glands in both groins became so enlarged that the skin over them ulcerated, without the scrotum being involved.[1] As the lumbar glands enlarge, the peritoneum covering them and the various viscera is pushed forwards, and there is often serous effusion in the cavity of the abdomen. In some instances the mesenteric glands are diseased, and carcinomatous tubercles are found dispersed through the liver. Masses of a similar kind are sometimes found also in the lungs, the thoracic cavities being occupied by serous effusion. The carcinomatous matter is often deposited in such abundance as to form a tumour of very considerable size; indeed, there is no other disease of the testicle which occasions solid enlargements of so great a magnitude as encephaloid cancer. M. P. Boyer removed a testicle converted into an encephaloid tumour which weighed more than nine pounds.[2] The vessels of the cord undergo great enlargement in this disease; in one case which I examined the spermatic artery was found as large as the radial artery at the wrist.

Encephaloid cancer of the testicle occurs at all ages; for though it is met with most commonly at the middle period of life, no age can be said to be exempt from it.[3] It may attack the testicle long before its full develop-

[1] Observations on Tumours, p. 52.

[2] Revue Médicale, Nov. 1839.

[3] Mr. H. Ludlow (Prize Essay) collected 34 cases of encephaloid cancer

ment and the period for the exercise of its functions. Thus, Sir W. Blizard extirpated the carcinomatous testicle of a child two years and a half old. The late Mr. H. Earle published an account of a case in which the disease attacked the testicle of an infant very little more than a year old. The part was removed, but in a few months he died of the same disease in the brain and other parts.[1] Mr. Langstaff preserved the testicle of a child, which began to enlarge when he was ten months old. It increased rapidly, and in two months acquired the magnitude and figure of a hen's egg. Castration was performed, but the patient lived only six months afterwards. The lumbar glands, lungs, and dura mater were found affected with the same disease. The Museum of the College of Surgeons contains the section of a medullary testicle removed from a child only seven months old (No. 2401). The disease, as I have already remarked, more commonly occurs in the middle period of life, or between the ages of twenty and forty; but I have met with it at a much more advanced age. A patient died in the London Hospital of carcinoma of the testicle at the age of sixty; and I once had under my care a man, aged sixty-four, whose left testicle formed a tumour the size of a large orange, which had been coming about six months. The glands in the groin were enlarged, and the left leg was œdematous. The disease afterwards made rapid progress. The testicle

of the testicle, and having added to them 17 tabulated by Lebert, found the ages to be as follows:—

	Cases.
Before the age of 5	5
From the age of 15 to 20	1
„ 20 „ 30	11
„ 30 „ 40	22
„ 40 „ 50	6
„ 50 „ 70	6
	51

[1] Medico-Chirurgical Transactions, vol. iii. p. 59.

and swellings in the groin increased to a great size; the scrotum ulcerated, and a bleeding and sloughing fungus protruded. The man died about two months after I first saw him.

In this last case the right testicle, though completely enveloped in the morbid deposit, was found after death quite sound. It is, indeed, extremely rare for both testicles to become affected with cancer, either simultaneously, or in succession. Mr. Wilson removed both testicles extensively affected with this disease; no recurrence took place for two years afterwards.[1] Gosselin relates that Professor Denonvilliers excised, at the pressing desire of the patient, the testicle of a man who had two voluminous sarcoceles. The tumour, after removal, was recognised as cancerous by the naked eye and by the microscope. Some time after, death took place from the progress of the cancerous cachexia, and at the autopsy, cancer was found in the other testicle and in the belly. Demarquay had a still more remarkable case of two encephaloid testicles, which were removed from the same subject, a man between thirty and forty years of age, at an interval of three years.[2]

There are few organs in which the origin of soft cancer can be so frequently and distinctly referred to some injury of the part as the testicle. In these instances, we must assume that the constitution was predisposed to the disease, but that the local injury stirred up the morbid action and determined the seat of its manifestation.

Symptoms.—The disease commences in an enlargement, with considerable induration of the body of the testicle, which preserves its oval form and even surface. The enlargement is attended with slight tenderness, a

[1] Lectures on Urinary and Genital Organs, p. 132.
[2] Gaz. Hôp., 1854, p. 474.

dull pain, and occasionally with a little effusion into the tunica vaginalis. The growth of the morbid deposit varies, and is very unequal. It is sometimes very slow, the disease making but little progress in several months; at other times it increases rapidly. In cases of rapid growth the pain is sometimes acute, owing probably to extreme tension of the fibrous tissue. The growth is liable to be accelerated by a slight blow or exercise. As the gland enlarges it becomes uneven, loses, too, its indurated character, and softens, but more so in one part than in another, and acquires an elastic feel. As the disease advances the pain increases, but still amounts to little more than a dull sense of weight extending up to the loins, and is sometimes quite absent. The spermatic cord becomes thick and full, owing to enlargement of the various blood-vessels. The scrotum is at first unaltered; but as it becomes distended by the increasing size of the tumour, its veins are obstructed and appear swollen and varicose. By this period the glands in the lumbar region usually become diseased and enlarged, and the lower extremity of the side affected swells from œdema.[1] The surgeon may in a short time, especially in a thin subject, distinguish the swellings on the sides of the spine by making pressure over the abdomen. The pains in the loins and abdomen soon become constant, and the patient's sufferings are altogether much increased. The general health, which was at first but little affected, now exhibits a material alteration. The patient loses flesh and strength, his countenance assumes a peculiar sallow hue, his tongue is furred, and his appetite and digestion are more or less impaired.

[1] In a case related at p. 344, the swelling of the lower extremity occurred after castration on the side of the sound testicle. The lumbar glands on both sides were found diseased after death.

As the enlargement goes on the scrotum becomes adherent to the tumour in one or more places; then ulcerates, and allows the protrusion of the morbid mass, which projects as an open bleeding fungus, discharging a thin fluid mixed with blood, and having a disagreeable faint odour. The disease then makes very rapid progress; the fungus spreads; sloughs form on its surface; coagula separate; bleeding repeatedly occurs; and the patient at length sinks, dying from the drain on the system, or from the interference of the morbid deposit with the functions of the important internal organs. Mr. Paget estimates the average duration of life of persons with medullary cancer of the testicle at about twenty-three months.

The diseased testicle usually attains a large size without the appearance of a bleeding fungus, as the scrotum admits of great distension before ulceration ensues. In the Musée Dupuytren in Paris, there is a wax model of a scrotal tumour produced by a cancerous growth of the testicle, of enormous size without any breach of surface. Mr. Wardrop remarks, indeed, that in no case has he ever been able to learn that the integuments have given way, and a fungus grown from the diseased testicle; and Sir B. Brodie likewise states that it has not fallen in his way to observe a tumour in this advanced stage.[1] At page 330, I have briefly related the particulars of a case that came under my notice, in which the disease extended so as to produce a bleeding fungus; but as the testicle is usually removed before the disease reaches this point, it is rarely that an opportunity is afforded to the surgeon of witnessing it. Besides, as the scrotum admits of very considerable distension without ulceration being induced, the patient's

[1] London Medical Gazette, vol. xiii. p. 408.

life may be destroyed by a similar affection of the internal organs before the skin gives way. In the case of the old man who died in the London Hospital to which I have referred, life was destroyed by internal disease before even the tunica albuginea had given way. The disease in the lumbar glands generally causes but slight pain and inconvenience, yet in some instances the suffering is severe from pressure produced by the morbid mass on the lumbar nerves. Sir B. Brodie mentions the case of a gentleman whose testicle was removed for this disease. He afterwards became completely paralysed, and on examination of the body a large tumour in the loins was found to have affected the vertebræ, and to have pressed on the medulla spinalis. Cruveilhier has also recorded the case of a man, aged twenty-seven, whose testicle was extirpated on account of malignant cystic sarcoma. The disease did not return in the part, but made its appearance in the body of the sixth and seventh cervical vertebræ and the posterior extremities of the two first ribs, and caused death by pressing on the medulla spinalis, and producing paralysis of the parts below.[1]

There are many cases on record of carcinoma affecting testicles retained in the groin. Some of these are noticed in the chapter on castration. Mr. Pott met with a case in which the disease proceeded to ulceration. There was a large sore with high callous edges in the right groin of a man fifty-five years old. After death the lumbar glands, liver, and right kidney were found affected with the same disease.[2] I have lately seen with Mr. Hodgson, of Brighton, a man, aged thirty-three, with a very large tumour on the right side of the abdo-

[1] Anatomie Pathologique du Corps Humain, liv. v. p. 1.
[2] Works, 4to, Edin. p. 357

men, caused by carcinomatous disease of the right testicle, which had been detained in the inguinal canal. The tumour extended from the anterior superior spinous process to the pubes and median line, and upwards on the abdomen nearly to the umbilicus. It had been growing more than two years. His general health had not suffered materially, and he had married only nine months before, long after the swelling had commenced. The tumour was closely adherent to the abdominal muscles, and too far advanced to admit of any operation. Dr. Johnson has given an account of a remarkable case of encephaloid cancer affecting a testicle which had been retained within the cavity of the abdomen. The patient was a young man, aged twenty-seven. The testicle attacked was the right, and the tumour increased rapidly, and at his death had attained an immense size, so as to weigh nearly twenty pounds. It measured fourteen inches in length and twelve in breadth. During its growth the patient experienced severe pain, even at an early period.[1]

Diagnosis.—Encephaloid cancer of the testicle may be confounded with hydrocele, with hæmatocele, with the cystic disease, and in its early stage with chronic orchitis. It differs from hydrocele in being of an oval shape; in its sides being somewhat flattened; in the circumstance that the enlargement takes place uniformly, and not from the bottom, as in hydrocele; in the uneven surface of the swelling; in the absence of transparency; and in the greater weight of the tumour when balanced in the hand. Encephaloid cancer, when handled, gives an indistinct feeling of fluctuation, which has often proved very deceptive, and puzzled the most experienced surgeons. By a careful examination, however, the difference may

[1] Medico-Chirurgical Trans. vol. xxiv. p. 15.

generally be detected, as the consistence and obscure sense of fluctuation vary in different parts, the tumour being softer in one place than in another. A hæmatocele, especially if the sac be much thickened, is more difficult to be distinguished from this disease than a hydrocele, the tumour being heavier and wanting transparency, and fluctuation being very obscure or imperceptible ; circumstances in which I have stated that the encephaloid disease differs also from hydrocele. The other distinguishing marks mentioned, together with a patient inquiry into the history of the case, will generally enable the surgeon to distinguish these two affections. In a case of difficulty, all doubt might be set at rest by a puncture with a trocar or lancet. If the swelling should happen to prove carcinomatous, there would be a flow of blood, and perhaps an escape of a small quantity of brain-like matter. But, in general, the bleeding soon ceases. Sometimes the great vascularity of the tumour causes a free discharge of blood, but then it flows of a bright colour, and is not attended with a corresponding decrease in the size of the swelling, as in hæmatocele. Encephaloid cancer may very readily be mistaken for the cystic disease, before at least the former arrives at that stage when no prudent surgeon would contemplate an operation. The tumour caused by the malignant disease makes more rapid and more variable progress, and its surface is less even, and its consistency less uniform than cystic sarcoma; but in other respects the characters of the swelling in these two diseases are so similar, that no certain directions can be given for distinguishing them. The necessity for making the distinction is perhaps less, since in both cases no other treatment is of service but an operation; after which

an examination of the diseased organ will afford the surgeon the opportunity of pronouncing an opinion as to the security obtained from future disease. Very great difficulty is experienced, in distinguishing encephaloid disease, in its early stage, from the enlargement produced by chronic inflammation of the body of the testicle; and as the success of an operation in malignant disease depends very much upon the period at which it is performed, it is of no slight importance that the nature of the affection should be detected as early as possible. As there are no external marks that can be relied on for distinguishing the two diseases, the only course that can be adopted is to exhibit mercury so as to make the gums slightly sore; when, if the induration and enlargement should happen to depend on chronic orchitis, the gland will gradually begin to soften and diminish, and if the remedy be persevered in a little longer will be restored to its natural state. If, on the contrary, no change ensue, or if the testicle continue rather to increase in bulk, it may be pretty certainly concluded that the alteration in structure is of a malignant character, or that it results from a disease for which there is no remedy but the knife, and we should therefore be justified in recommending an operation. I have already related (page 282) a case of difficult diagnosis in which this course was pursued with advantage.

The following example will serve to illustrate some of the difficulties of the diagnosis in these cases, and to point out the kind of careful investigation necessary to enable the surgeon to form a correct opinion respecting the nature of the disease.—A healthy-looking man, aged thirty-four, married, and by trade a carpenter, applied for relief on account of a chronic enlargement of

his left testicle. About nine or ten months previously he first perceived an increase in the size and weight of the organ, which occurred without any apparent cause or the receipt of any injury to the part. He continued at his occupation, taking little heed of the swelling, until at length becoming alarmed by its increasing to seven or eight times the size of the other testicle, and experiencing considerable inconvenience from its bulk and weight, he was induced to seek surgical assistance. There was a large tumour occupying the left side of the scrotum. It was of an oval form; its surface was pretty even, except at the upper and front part, which had a slight, smooth, and round projection. The skin covering the swelling was sound, and not adherent; but the subcutaneous veins were a good deal dilated. The consistence of the swelling generally was about that of a hæmatocele; but then it was unequal, being firmer in front than at other parts. On seeking for fluctuation, the obscure sensation produced was more like the resilience of a soft elastic solid than the displacement of a fluid. The small projection above, however, communicated a more evident feeling of fluid. The weight of the tumour was greater than that of a hydrocele, but might be about that of a hæmatocele or a soft solid growth. The swelling was not transparent, and had little sensibility, firm pressure causing merely a dull pain. The testicle completely escaped detection: it could be distinguished neither by its form or consistence nor by the character of the pain usually experienced from compression. The spermatic cord was full and large, but otherwise natural, and it passed to the posterior part of the tumour. The lumbar and iliac glands appeared to be free from disease. The important internal organs performed their functions properly, and there was

no indication of a morbid state of constitution. Such, then, were the characters of the tumour, and the symptoms by which it was to be ascertained whether the disease was a hydrocele with thickening of the investing tunics, a hæmatocele, cystic sarcoma, or encephaloid cancer. Against the supposition of a hydrocele there was the oval shape, uneven surface, greater weight and irregular consistence of the tumour, the absence of transparency, and the impossibility of detecting the testicle by firm pressure at the part where the gland is usually found in cases of effusion into the tunica vaginalis. Opposed to the idea of a hæmatocle there was not only the irregular surface, varying consistence, and impossibility of detecting the testicle by pressure; but also the mode of growth, the tumour in hæmatocele being of sudden or rapid formation, more often occurring from some injury, and when formed afterwards remaining little altered for a considerable period: whereas in this case the swelling arose spontaneously, took nine or ten months to acquire its large size, and still continued to increase. It was concluded, then, that the tumour must be either cystic sarcoma or encephaloid cancer, its mode of formation, shape, size, weight, and general consistence, and the state of the cord, being such as might correspond to either of these two diseases. The irregularity in the surface and consistence of the swelling, and the large development of the subcutaneous vessels, induced me to incline to the opinion that the growth was of a carcinomatous character; and such proved to be its nature when the tumour was removed after an exploring puncture. There was no trace of the glandular structure of the testicle remaining; but the epididymis was sound, and situated at the upper part of the tumour, surrounded by the tunica

vaginalis, which contained about six drachms of serum, and formed the indistinctly fluctuating projection observed at this part.

But great as are the difficulties of the diagnosis with the testicle in the scrotum, they are so much increased when the diseased organ is retained in the groin, that it is almost impossible to pronounce a positive opinion of the nature of the tumour without an exploratory puncture or incision. A surgeon of sound judgment, Mr. Arnott, in describing a case of the kind,[1] states, that he was unable to determine its precise nature, whether hydrocele or hæmatocele with a thickened tunica vaginalis, cystic sarcoma, or malignant disease; and he quotes a case communicated to him by Mr. Hodgson, in which equal difficulty was experienced in deciding on the nature of a large tumour in the groin. The patient was seen by Sir B. Brodie, Mr. Key, Mr. Stanley, and others, all of whom coincided with Mr. Hodgson in the opinion that the case was most probably an undescended and diseased testicle; but they could not determine its nature. I have already alluded (page 47) to a case recorded by Dupuytren of tumour in the groin formed by a collection of fluid around a retained testicle, carcinomatous and much enlarged. The diagnosis was rendered extremely puzzling by the varying state of the swelling. There was an opening into the abdomen which allowed the occasional descent of a hernia, whilst the enlarged epididymis formed a valve at the entrance of the ring, which prevented the surgeon returning the fluid into the abdominal cavity. In Dr. Johnson's case of cancerous testicle within the abdomen, referred to at page 335, the diagnosis of the tumour was necessarily a question of great difficulty, but the seat as

[1] Medico-Chir. Trans. vol. xxx. p. 10.

well as the nature of the disease was suspected some time before the patient's death.

Treatment.—In a disease of so fatal a tendency as encephaloid cancer, the only alternative left when it attacks the testicle is an early amputation of the organ. Unfortunately this resource is exceedingly liable to fail, for the disease generally manifests itself afterwards in the lymphatic glands connected with the testicle, in the wound, or in some internal organ. Indeed, so unsuccessful has the operation proved, that the propriety of having recourse to it in any case has been called in question. Sir A. Cooper, whose experience was very great, has recorded five cases, in all of which the disease returned after the operation. He has not mentioned one in which the patient survived for any lengthened period.

But although every practical surgeon acknowledges that the removal of a testicle affected with soft cancer cannot be undertaken, in any case, with much hope of the patient remaining long free from a recurrence of the disease, still there are several reasons why it is greatly to his interest that the part should be excised. In the first place, there is a chance, small indeed, but still a chance, of the disease being limited to the testicle, and being got rid of by the operation.—In 1845, I excised the right testicle of a gentleman, aged forty-four. It had been enlarging for two years, and the disease was attributed to an injury. Sir B. Brodie was consulted, and recommended the operation; but owing to the duration and size of the tumour gave little hope of a favourable result. On dissection and microscopic examination of the organ after removal, it was found to exhibit the characters of carcinoma. This patient survived the operation upwards of fifteen years, and died at last of general paralysis and pneumonia.—In 1851, I

removed the left testicle of a farm-labourer, twenty-seven years old, in the London Hospital. The organ had been rapidly enlarging for about four months. It was a well-marked specimen of soft cancer, and presented some yellow patches of degenerated carcinomatous matter. This man was five years after the operation at work in excellent health.—In 1846, Mr. Meade, surgeon of the Bradford Infirmary, removed the testicle of a gentleman, forty years of age, on account of a chronic enlargement which had existed about nine months. The diseased gland appeared to Mr. Meade, and to Mr. Teale who assisted at the operation, to present well-marked characters of encephaloid disease; and the morbid matter, on minute examination, exhibited nucleated cells elongated and fusiform in shape.[1] In a note which I received in January, 1854, nine years and three months after the operation, Mr. Meade states that "the patient continues free from any return of the disease, and in a good state of health."—In October, 1841, Mr. Cæsar Hawkins excised the testicle of a gentleman, aged forty-five, which had been diseased for two years. There was no hesitation in considering it a specimen of medullary disease. The tumour was injected, and is preserved in the Museum of St. George's Hospital, where I examined it with the late Mr. Grey. We found no reason to question the view originally taken of the nature of the disease. It consisted of a mass of encephaloid matter, with large patches of yellow degenerated carcinomatous matter. In 1853 this patient was living, and in good health.

[1] This case is recorded in the London Medical Gazette, vol. xliv. p. 702, 1849. I have had an opportunity of examining the testicle. Though preserved in spirit, it was too decomposed to enable me to form a fair opinion of the nature of the disease. The appearances, however, were such as to sustain the view that it was soft cancer.

In these four cases, the true nature of the disease was satisfactorily determined, by examination of the part after its removal. In the second case, the period which had elapsed since the operation (nearly five years) is limited; but the early age of the patient, and the rapidity with which the disease was advancing, would lead us to anticipate its early recurrence, if it were not eradicated from the system. It would thus appear that an encephaloid tumour of the testicle has, in some few instances, been removed whilst yet a local affection, and that the constitution has escaped the infection. Dr. Baring, of Hanover, who has written an elaborate treatise on this disease of the testicle, gives the history of four cases, in which the operation of castration was performed by Rust, of Berlin; by Langenbeck, of Göttingen; and by Hagedorn, of Stade. In two of these cases a period of five years, in another of three years, and in the fourth of two years, had elapsed since the removal of the testicle; and the patients were still in the enjoyment of perfect health, and had not experienced the slightest return of the complaint.[1]

But there are strong reasons, in addition to the chance of eradicating the disease, for recommending castration. The uncertainty of the diagnosis in many instances renders the operation highly desirable. It is often impossible to determine exactly whether an enlargement of the testicle is carcinomatous or cystic, and in the more common form of the latter disease, the innocent, excision ensures a permanent cure. I shall have occasion to show in a future chapter that castration is an operation attended with very small risk to life. I have never lost a patient from it, and recovery is generally speedy,

[1] Ueber den Markschwamm der Hoden, Göttingen; also British and Foreign Medical Review, vol. i. p. 477.

so that objection can seldom arise on the score of danger from the knife. And if, as most commonly happens, the disease should return, the operation, when performed sufficiently early, undoubtedly tends to prolong life, and perhaps to save the patient the horrors and sufferings of external cancer; for death from internal disease is less distressing and painful than from an open fungoid sore. But castration should never be undertaken when the lumbar glands are enlarged, because the recurrence of disease will be speedy, and the operation will not have the effect of prolonging life. A careful examination, therefore, should be made beforehand; and if by pressure on the abdomen at the sides of the lumbar spine any solid swellings can be detected, or if either of the lower extremities be found œdematous, no operation should be recommended. When, however, castration is performed before the manifestation of internal disease, it rarely fails to prove beneficial. Its advantages, in promoting the comfort and welfare of the patient, are well shown in the following case.—In October, 1849, I saw, with Mr. Iliff, of Kennington, an eminent barrister, aged fifty-one, who had a solid enlargement of the right testicle of a questionable character. He had previously consulted Mr. Lawrence, who had recommended his taking mercury, in which advice I fully concurred. Our patient took it until his mouth became sore without any diminution in the size of the tumour. We then recommended castration, and this advice was strengthened by the opinion of Sir B. Brodie. The operation was performed by Mr. Lawrence, in December, 1849, and the recovery was rapid. The disease proved to be encephaloid cancer. Our patient continued well until December, 1851, when pains occurred in the back, and his left lower extremity shortly afterwards became œdematous.

He died in May, 1852, of disease of the lumbar glands on both sides of the spine. This gentleman remained in good health for two years after the operation, during which period he was largely engaged in the arduous duties of his profession. He continued, indeed, to go circuit until a few weeks previous to his decease. Had no operation been performed, it cannot be doubted that he would not have enjoyed health for two years, and continued the practice of his profession for two and a half to the great advantage of his family, but would have been disabled and destroyed at a much earlier period.[1]

A return of disease after operation is seldom delayed so late even as in the preceding case.[2] The following remarkable case is regarded by Mr. Paget[3] as an instance of its tardy recurrence.—J. R., aged thirty-nine, had his right testicle removed by Sir A. Cooper on account of medullary disease. The left had never descended. He enjoyed good health afterwards for nearly twelve years, when he fell off, and after an illness of nine months, attended with sickness and constipation, sank. On examination of the body, a white fungous mass,

[1] Mr. Bryant excised a testicle affected with medullary cancer from a child two years of age. The disease had existed six months. No recurrence took place for nearly two years, a long period in so young a subject. Guy's Hosp. Rep., lib. cit. p. 134.

[2] Mr. H. Ludlow composed the following Table, consisting of 8 cases of his own and 15 of Lebert's, in order to show the period at which the disease recurs after operation.

	Cases.
From 3 months to 6 months . . .	7
„ 6 „ 12 „ . . .	2
„ 12 „ 18 „ . . .	4
„ 18 „ 2 years . . .	5
„ 2 years 3 „ . . .	4
„ 4 „ 10 „ . . .	1
	23

[3] Lectures on Pathology, vol. ii. p. 408.

about the size of a large Seville orange, situated in front of the bladder and connected by a narrowish pedicle to the glands on the left side of the spine, was found to constrict the descending colon. The left testicle was not discovered. The glands on the right side were healthy. Mr. Paget, to whom I am indebted for the above particulars, states, in a note to me, that "he has no doubt that the diseased structures were cancerous." The occurrence of the disease in connexion with the lumbar glands on the opposite side to that from which the testicle was removed, together with the late period of the formation of the internal tumour, leads me to the opinion that the pelvic growth was a new development of cancer, and not the result of contamination from the former disease, of which the germs had long remained dormant. It seems highly probable, also, that the internal carcinomatous tumour was a disease of the retained testicle, which, it appears, was not discoverable at the examination.

The recurrence of disease is sometimes rapid.—Feb. 9, 1859, I excised from a married man, aged twenty-eight, a testicle affected with medullary cancer which had been slowly increasing for five years. He was a spare man, and there was nothing to indicate internal disease. The wound healed, but towards the end of April following a large swelling formed at the extremity of the spermatic cord; hemiplegia and hæmoptysis shortly ensued, a large tumour appeared in the region of the liver, the swelling in the scrotum broke and became fungous, and the patient died May 26th.—Mr. Cock, of Guy's Hospital, removed the cancerous right testicle of a man, aged twenty-eight, apparently in good health, no disease being detected in the chest and abdomen on a careful examination. There was only a slightly enlarged gland

above the clavicle. The man died in six weeks after the operation, when malignant deposits were found in the lumbar glands and right lung.[1]

SECTION III.

Melanosis has been observed in the testicle in only a few instances.

Cruveilhier relates the case of a man who died at the age of forty-six of melanosis affecting the hand, lungs, heart, stomach, and other parts.[2] The right testicle contained a little of the same matter, and the left a deposit the size of a nut. Some years ago Mr. Stanley removed from a man, aged thirty-eight, a patient in St. Bartholomew's Hospital, a testicle affected with medullary and melanotic cancer. The disease soon re-appeared, and destroyed the patient. The Norwich Hospital Museum is said to contain a specimen of this rare disease.

SECTION IV.

CARCINOMA OF THE TUNICA VAGINALIS.

Carcinoma has, in some few instances, been found to originate from the tunica vaginalis, the glandular part of the testicle remaining unaffected. An important peculiarity in these cases is the circumstance that the effusion of fluid into the vaginal sac, to which the disease gives rise, renders it extremely difficult to ascertain its real character at the early period at which an operation would be desirable. The following case is

[1] Medical Times and Gazette, Sept. 10, 1859, p. 257.
[2] Anatomie Pathologique, liv. xxx. pl. 3 and 4.

recorded by Sir Everard Home.[1]—In December, 1781, a gentleman felt an uneasy sensation in the scrotum. On examining it he perceived the left testicle swelled, with a small degree of hardness to the touch. He immediately applied to a surgeon, who told him that the disease was a hydrocele, and advised him to let it alone till it became large, when an operation would cure him. From that time to March, 1782, the swelling gradually increased, the pain became acute, and the hardness increased. About this period two other medical gentlemen saw him: they were of opinion that the disease was complicated, and by no means a simple hydrocele; therefore desired him to do nothing for a fortnight or three weeks, and then they would see him again. In the mean time he applied to a surgeon noted for curing this complaint, who made two or three punctures for the palliative cure of hydrocele, assuring the patient that the disease was of that nature. On finding a failure of the good effects which had been promised, he again applied to his former surgeon, with the inflammation, pain, and swelling much increased. At this time Mr. Hunter was called in, and it was thought advisable to open into the tumour, to ascertain the real nature of the disease, and then to proceed accordingly. This was done; and, on examining the substance of the tumour, it appeared to be composed of a thick coat, within which was a grumous and gelatinous substance. From this appearance of the tumour it was thought advisable to remove the whole, which was immediately done. Some of the skin, which was diseased and adherent to the fore part of the tumour, was also removed. The tumour was found to consist of a thickened tunica vaginalis, filled with a firm coagulum of blood, which, in some

[1] Observations on Cancer, p. 125.

parts, had lost its red particles, the whole appearing like a mottled swelling; and the testicle entire in the posterior part, only appearing to be squeezed into a smaller size than natural, from the pressure of this substance in the tunica vaginalis. The parts healed up readily, but some months after a swelling of the abdomen was observed. This increased, and he became weak, hectic, and died. On examination of the body, large masses were found extending up the left side along the back, as high as the diaphragm. The epiploon appeared to have a large mass in it, connecting the colon, stomach, and other viscera together. The liver was studded full of small tumours of the same structure; and the spermatic cord out of the belly had become thickened in the same way.[1]

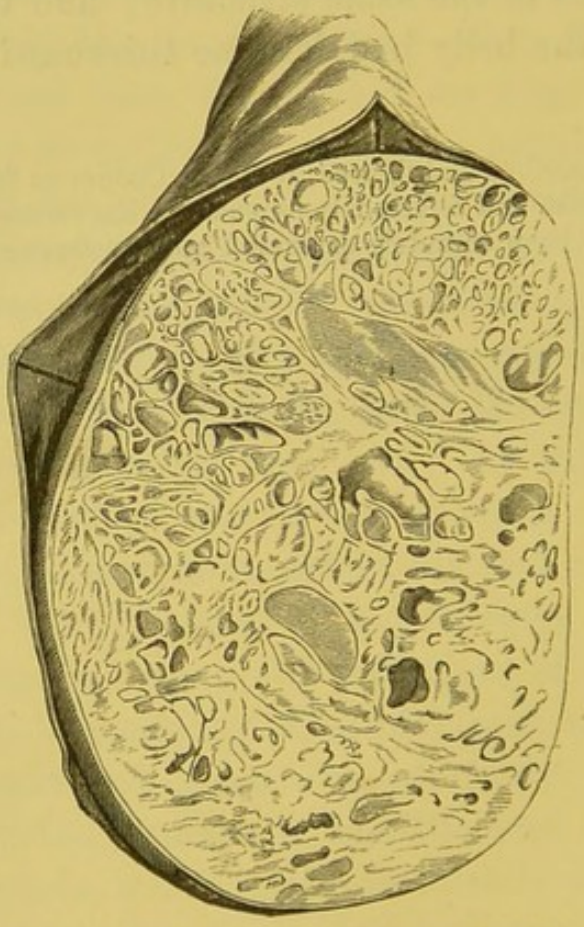
[1] A tumour described and figured by Sir A. Cooper as fungoid disease of the tunica vaginalis, and referred to as such in the former editions of this work, has lately been minutely examined, and ascertained to be a fibro-cellular growth.

CHAPTER IX.

CYSTIC DISEASE OF THE TESTICLE.

In this rare affection, commonly called *Cystic Sarcoma*, a tumour formed of compound or proliferous cysts is developed in the testicle.

Fig. 36.



Section of a cystic tumour of the testicle, showing a multitude of cysts of various shapes and sizes, with solid matter interposed between them. (From a specimen in the Museum of the College of Surgeons, No. 2389.)

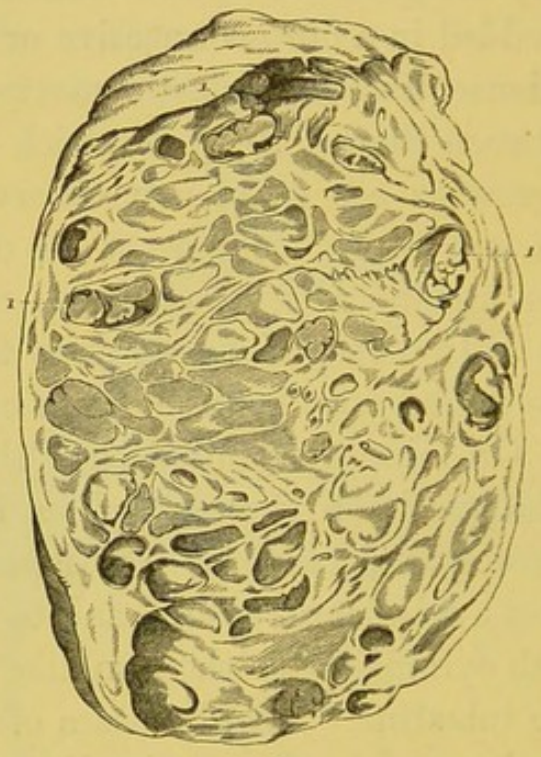
The morbid mass is developed within the tunica

albuginea, which is generally a good deal thinned. The cysts of which it is composed vary very much both in number and size, and in the nature of their contents. They may be only a few in number, or they may exist in a countless multitude. They vary in size from that of a millet-seed to the dimensions of a pigeon's egg, and are composed of a smooth membrane closely adherent, and containing a transparent light-coloured fluid, or a fluid which is thick, viscid, and albuminous, or tinged with blood, and they are sometimes filled with coagula. The cysts are embedded in a fibro-connective or fibrous tissue more or less dense, fibrinous plastic matter being often interposed between them. In cysts which have attained a large size, growths are frequently observed springing from the walls, and occupying more or less of the cavities. Some of these assume a polypus form; others have a lobular shape. In external appearance they resemble very much the intra-cystic bodies seen in cystic tumours of the breast. On minute examination of the intra-cystic growths in the specimen represented in Fig. 37, made by the late Professor Quekett at my request, they were found to possess a cellular structure, and to be covered on the surface with cylindrical epithelium, like that covering the villi of the intestine. Small masses of enchondroma are often mixed up with the cystic disease. They are usually of an elongated form, and appear like pearly-looking bodies in sections of the tumours. The tubular structure may generally be found in the form of a thin layer spread over the cystic growth, or massed on its upper surface, and seated just beneath the thinned tunica albuginea. The gland tissue can be peeled readily from the surface towards the back part where it is attached. The cystic growth is generally separated from the glandular structure by a capsule of dense connective

tissue. In tumours of considerable size, the tubular structure sometimes entirely disappears. The epididymis is at first unaffected, but becomes wasted and lost as the growth increases.

Considerable doubt has long existed in respect to the nature and mode of origin of this disease of the testicle. Sir A. Cooper, who described it under the name of "hydatid disease," evidently supposed that the cysts

Fig. 37.



Section of a cystic testicle in which the cysts are of larger size than in the preceding figure. (From a specimen in the Museum of the College of Surgeons, No. 2390.) It was removed by operation from a man thirty-three years of age. There was no return of the disease. 1, 1, 1, Lobular intra-cystic growths. In both figures the tumour is reduced in size about one-half.

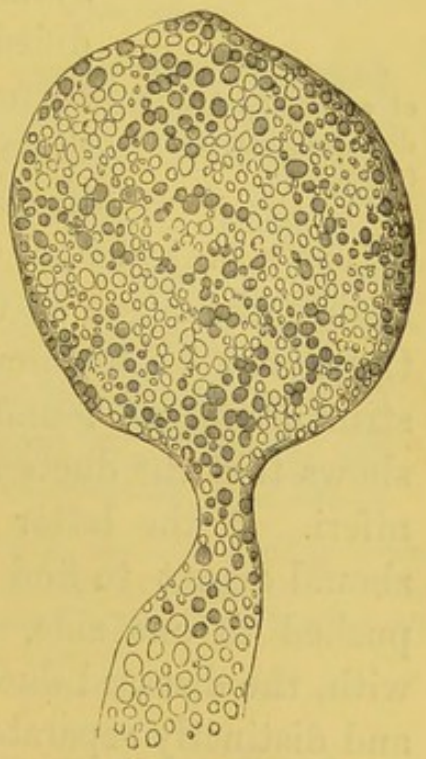
might be formed of enlarged and obstructed tubuli seminiferi; for he remarks, "Although at first sight they appear to be cysts, yet when traced they are not distinct bags, but send out solid processes by which they are connected with other bags."[1] In this opinion I was

[1] Lib. cit. p. 83.

disposed to concur, the disease appearing to me to be analogous to the cystic tumours of the breast which originate in a morbid dilatation of the lactiferous tubes. But having subsequently observed in several specimens of cystic testicle healthy tubuli seminiferi forming a layer spread over the morbid mass, generally at its upper part, I was at a loss to reconcile the tubular origin of the disease with this condition of the organ, until the difficulty was solved by careful inquiries which I made in a case favourable for investigation, owing to the early stage of the cystic development.

In December, 1852, a man, aged thirty-seven, consulted me on account of an enlargement of the testicle, which was first observed about seven months previously. Having no doubt that the disease was either carcinomatous or cystic, I recommended its removal, and performed the operation. The patient recovered favourably, and has since remained quite well. On making a section of the tumour, I found the tubular structure spread over a part of its surface just beneath the thinned tunica albuginea. The morbid mass was a marked specimen of cystic disease. Some of the larger cysts measured half an inch in diameter, but the majority were much smaller, and many were no larger than millet seeds. A great many of the cysts contained a transparent limpid fluid, others a bloody fluid, a few coagulated

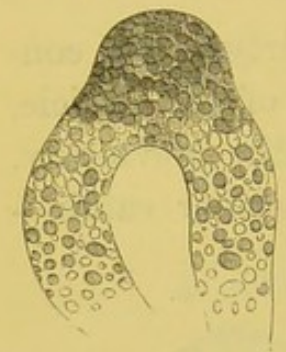
FIG. 38.



Seminal tube terminating in a dilated pouch (130 d.)

blood, and several a solid whitish opaque matter. The cysts were embedded in fibrous tissue, which was particularly dense towards the centre of the growth. On examination of thin slices of the tumour in the microscope, the origin of the cysts in a dilatation of tubes was clearly made out. Thus, in some specimens, a tube could be traced to a termination in a dilated pouch (Fig. 38). In others a cyst appeared to arise from a lateral dilatation of a columnar tube, or at the extremity of a loop (Fig. 39); whilst in others the dilatation appeared to be uniform. These dilated tubes and cysts were lined by a tesselated epithelium, and many of them contained a dark granular matter. The opaque whitish substance found in several of the larger cysts consisted chiefly of a mass of modified tesselated epithelial scales, and corresponded to what is called cholesteatoma. No spermatozoa were detected in any of the cysts or morbid tubes.[1]

Fig. 39.



Lateral dilatation of a tube filled with dark granular matter (250 d.)

The minute examination of this specimen fully establishes the origin of the cysts in a morbid condition of the ducts. The circumstance of the healthy tubular structure being found external to the morbid growth, shows that the ducts affected are not the tubuli seminiferi. If the latter were the seat of the disease, we should expect to find the tubes which remained sound pushed to one side, or at any rate near, or mixed up with, the diseased ducts, and not spread over the surface and distinctly separated from the morbid growth. Nor

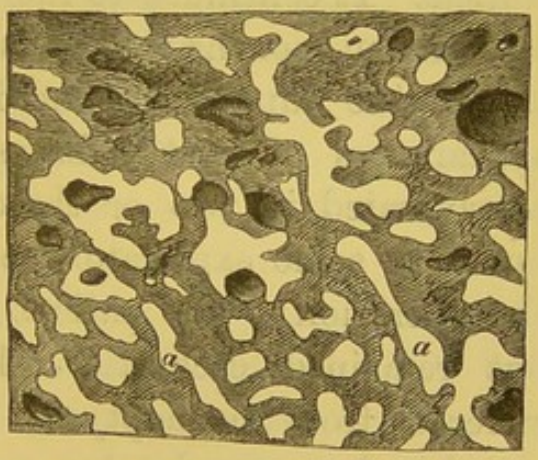
[1] A fuller account of these investigations, illustrated by plates, will be found in a paper communicated to the Medico-Chirurgical Transactions (vol. xxxvi. p. 449). These observations have since been confirmed by examination of another specimen of the disease.

can the diseased ducts be those of the epididymis, for I have invariably found this part unaffected or wasted and lost in the morbid mass. If the disease sprang from the tubes of the epididymis, the tubular structure of the gland, unless destroyed by pressure, would certainly be found in a mass enclosed in its own tunics, distinct from the morbid growth, and not extended over its surface.

It being clear, then, that neither the tubuli seminiferi nor the ducts of the epididymis are the tubes which undergo the changes constituting the cystic disease, its seat may be considered as conclusively traced to the ducts of the *rete testis*.[1] Why they alone are subject to the morbid change, I admit my inability to explain.

I have remarked that small masses of enchondroma are frequently mixed up with the cystic growth. It is clear from recent observations that the enchondroma is originally formed within the tubes and their cystic dilatations. I have examined with the late Professor Quekett several specimens of cystic testicle in which the intra-tubular development of the cartilage was quite manifest. The cartilage occurs in elongated portions, which are easily detached from the cysts enclosing them. Enchondroma may be developed

Fig. 40.



Portion of the section of a testicle in the Museum of the College of Surgeons, with numerous masses of enchondroma between the cysts, of the exact size.
a, *a*, enchondroma.

[1] This view has since been confirmed by Virchow. (Archiv für Pathol. Anat. vol. viii. p. 404.)

so abundantly as to encroach upon and obliterate the cysts, and to form the chief bulk of the tumour. This appears to have been the case in a testicle excised by Mr. Hey, of Leeds,[1] and in a large one removed by Mr. Hancock. The development of the cartilage within dilated tubes in this specimen is described and figured by Mr. Hogg in the Transactions of the Pathological Society.[2]

The minute examination of these cystic tumours shows the non-malignant character of the disease, which, moreover, is fully confirmed by the accounts of those cases in which the history has been preserved, patients having lived many years after the excision of the organ, and died of a different disease. Yet cases occasionally occur which strongly tend to shake our confidence in this conclusion. Some years ago a medical friend, aged thirty-two, was attacked with disease of the testicle. It continued to increase in size, and at the end of eighteen months was excised. On a cursory examination of the tumour I found it to exhibit the ordinary appearances of cystic disease, blood being, however, extravasated in two or three places, which was attributed to some exploratory punctures made previous to the operation. The patient never regained his health, but remained cachectic. In about six months he suffered from hæmoptysis, which was followed by attacks of severe lumbar pain, and subsequently the liver enlarged to a great size. He died eighteen months after the operation. On examination of the body, masses of medullary cancer were found in the lumbar glands, lungs, and liver.

In a visit which I paid several years ago to the Museum of St. George's Hospital, Mr. Cæsar Hawkins

[1] Med. Times, Feb. 20, 1858.

[2] Vol. iv. p. 180.

showed me two specimens of well-marked cystic testicle which had been removed by operation, the patients having died within two years afterwards of internal tumours, and he expressed to me his opinion that this disease was a malignant affection. I have recently made a careful examination of these preparations. The soft matter from the cysts of both tumours, when placed under the microscope, was found to consist of a mass of nucleated cancer-cells. Some of them contained numerous dark granules; and where the diseased mass was the softest, the granules were more abundant than the cells, the cell walls in these instances having been most probably destroyed. In some of the masses portions of ducts filled with cells might be observed. No epithelial scales could be detected in either of the specimens. In one of them there were some small portions of enchondroma.[1]

It seems clear from these facts that cystic disease occurs in the testicle in two forms, a malignant and non-malignant, the former being by far the more rare; but recent investigations unfortunately show that we cannot always depend on microscopic investigations in determining the true character of the tumour.

In describing a malignant form of the disease I do not comprise cases of encephaloid cancer in which two or three cysts may be found mixed up with the cancerous matter, but tumours the great bulk of which is composed of cysts of various sizes. Indeed, in a specimen of this form of the cystic disease which I have recently examined, the appearances so closely resembled those of the non-malignant form of this affection, that it

[1] Cruveilhier has described and figured a diseased testicle, which appears to have been a well-marked specimen of malignant cystic disease with enchondroma. This case has already been referred to at page 334.

was impossible to distinguish the difference without the aid of the microscope. It seems probable, however, that although in the early stage of the malignant form the cystic structure prevails, at a later period the cysts become destroyed by the rapid growth of carcinomatous tissue. This had probably occurred in a specimen in the Hunterian Collection (No. 2416). It is a section of a large tumour of the testicle, the upper part of which is composed of a multitude of small cysts, whilst the remainder exhibits the usual appearances of medullary cancer. The patient died of internal cancer a few weeks after the removal of the diseased organ.

In the preceding account of a cystic testicle I have noticed the occurrence, in a few well-developed cysts, of a solid whitish matter, exhibiting the characters of cholesteatoma. I have observed isolated formations of the same kind in other cystic testicles, both malignant and non-malignant. In a diseased testicle removed by Mr. Henry Thompson, and sent to me for examination, I found a combination of cholesteatoma, enchondroma, and encephaloma, with cysts within the dilated and thinned tunica albuginea. The cholesteatomatous matter existed in great abundance, forming with numerous small deposits of enchondroma a portion of the tumour, the upper, distinct from the larger mass below, which consisted principally of encephaloid growths and cysts. The two portions were separated by loose seminal tubes. The tubes between the cysts were in some parts unaltered, and in others dilated and filled with changed cells.[1] The patient, a

[1] For fuller particulars of the minute examination of this tumour, *vide* Transactions of Pathological Society, vol. vi. p. 241.

man aged twenty-five, died about five months after the operation of medullary cancer of the lumbar glands, lungs, and other internal parts. In this case, also, it seems probable, that the cystic structure was more perfect in the early period of the disease than at the time of the operation.

The tumour produced by the cystic disease sometimes attains a great size. The specimen represented in Fig. 36 measures five inches in its long diameter and three inches in its transverse. I have seen one which was excised by Mr. Hancock that weighed six pounds four ounces. Dr. Hughes, of Dublin, removed one still larger. It measured twenty-two inches in circumference, seven inches in its longest diameter, five and three-quarters in its shortest, and weighed five pounds. The tumour caused ulceration of the integuments, and projected from the scrotum like a benignant fungus.[1] So far as I know this is the largest cystic testicle on record.

Symptoms.—The swelling to which the cystic disease gives rise takes place imperceptibly, very slowly, and without producing pain. After existing for several months, it occasions a chronic indolent tumour of an oval shape and elastic feel, which is scarcely at all tender or painful. The surface of the tumour is generally smooth and even, but is occasionally irregular. There is sometimes fluctuation consequent on the presence of a thin layer of fluid in the vaginal sac surrounding the cystic growth. When the tumour attains a large size it is inconvenient from its bulk, and unless well supported, it occasions a dragging sensation and uneasiness in the loins. The disease usually commences at the middle period of life. In a table of thirty cases

[1] Dublin Medical Press, Dec. 24, 1862.

collected by Dr. Conche, in twenty-six of which the age was noted, twenty-four occurred between the ages of twenty and forty.[1] Mr. Athol Johnson has described an interesting case of cystic disease of the testicle which he removed from a child aged two years and nine months, the enlargement having been first noticed when he was only three months old.[2] The origin of cystic disease is often ascribed to some accidental injury of the part.

Diagnosis.—Cystic disease of the testicle may be mistaken for hydrocele, hæmatocele, and encephaloid cancer. The diagnosis from vaginal hydrocele is extremely easy. The tumour is of an oval shape, not pyriform, as in hydrocele; it feels heavier, and fluctuates less distinctly; and there is an absence of the pain experienced in compressing the part usually occupied by the testicle in hydrocele. The swelling also is not transparent. Notwithstanding these distinctive marks, Sir A. Cooper considered that the surgeon was very liable to err, and he admitted that he had been two or three times mistaken, and had put a lancet into the part expecting to find water issue, and a few drops of blood only have followed. The distinction from hæmatocele is much less marked, as the latter has a somewhat solid feel, weighs heavy in the hand, is not transparent, and fluctuates less distinctly than a hydrocele. The absence of pain on compressing the back of the tumour will be the best guide to distinguish the cystic disease from a hæmatocele. As I have remarked in the previous chapter, the characters of the cystic disease are in general so similar to those of encephaloid cancer, that I can give no satisfactory directions for distinguishing them. The surgeon

[1] Mém. de la Société des Sciences Médicales de Lyon, t. iv. p. 175.
[2] Pathological Trans. vol. vii. p. 241.

must be guided in his opinion by inquiries into the history of the case, and by noticing the condition of the cord and of the lumbar glands, and the state of the patient's health, which are unaffected in the cystic disease, but are liable to suffer in malignant enlargements of the gland. The tumour produced by the latter affection is also less even and regular, and makes more rapid progress than that occasioned by the cystic disease.

In cases of difficult diagnosis the doubt may, in general, be safely removed by introducing a trocar into the front of the tumour. A hydrocele or a hæmatocele will be at once made evident by the free escape of serum or blood, and a great reduction in the size of the swelling. If the case be cystic disease, only a small quantity of serum tinged with blood will flow; and if it be a soft cancer, blood of a bright colour will probably escape somewhat copiously without producing any diminution in the size of the tumour. In some instances, the existence of the latter disease may be rendered yet more certain by the detection of cancer-cells in the soft matter or fluid found in the canula after its withdrawal. In performing this exploring operation the surgeon should use a common-sized hydrocele trocar. The bore of the exploring trocar, and the groove of the exploring needle, the instruments commonly used, are not of sufficient size to allow of the ready escape of the grumous blood of an old hæmatocele, or of the matter of soft cancer. The wound of the trocar is quite unimportant. In cases in which an operation is likely to be required, it will often be convenient to defer this exploratory examination until arrangements have been made for further proceedings, if necessary.

Treatment.—No kind of treatment, either local or general, is of any service in this disease, the morbid changes being quite beyond the influence of remedies. The only means that can be adopted is the removal of the tumour, which should be performed as soon as the surgeon is satisfied that the disease will not yield to treatment, and if the cysts contain tesselated epithelium, and if no cancer-cells be found, there is a great probability that the patient will experience no relapse.

CHAPTER X.

FIBROUS TUMOURS OF THE TESTICLE.

In treating of atrophy of the testicle, and of the effects of orchitis, I have stated that the gland sometimes undergoes a fibrous transformation, being converted into a fibrous tissue consisting in part of the processes springing from the tunica albuginea, and in part of a metamorphosis of the coats of the tubuli, and of the fibrinous matter exuded between them in inflammation. In some instances the structure into which the organ is converted is a loose fibrous tissue. On examining the left testicle, removed after death from just outside the external ring, of a man aged forty-two, I found it only half the proper size. There was no trace of tubuli, their place being supplied by a white but rather loose fibrous tissue. More frequently the texture is close, dense, and firm, somewhat resembling the fibrous tumour of the uterus. Occasionally two or three small cells, containing a serous fluid, occur in the fibrous structure, and in old cases the tissue undergoes calcareous degeneration. In all these instances the testicle is more or less diminished in bulk, generally in a marked degree, and is sometimes reduced to a few filamentous shreds.

Filamentous connective or fibrous tissue is sometimes abundantly developed in other morbid conditions of the testicle. I have described at page 297 a case of con-

siderable chronic enlargement of the testicle, in which the organ was composed of masses of fibrinous matter and deposits of pus separated by thick and dense septa of fibrous tissue. In cystic sarcoma, also, this tissue is sometimes largely developed, so much so that Mr. Paget, before the tubular origin of the cysts was made out, was inclined to regard the cystic disease as essentially a fibrous tumour in the testicle.[1] It appears that the quantity of the fibrous element varies according to the duration of the cystic growth, being small in those tumours removed at an early period, and predominating in those of old standing. Thus the fibrous matter was largely present in a cystic tumour of ten years' standing removed by Mr. Paget from a man fifty-eight years of age.[2]

But this chapter is intended to comprise cases in which there is more than a transformation of the natural tissue, or the debris of the original structure—cases in which there is a new formation of fibrous tissue to a considerable extent without any other important change. For it appears that in the testicle, as in several other organs, the healthy structure may be supplanted by an entirely fresh formation of this structure, attended with an increase in the bulk of the organ. This pathological change is extremely rare. In Cruveilhier's Anatomie Pathologique[3] there is an excellent representation of the disease. The testicle was removed from a patient at the Hôpital Beaujon, by M. Marjolin. It was twice the natural size, and very heavy. It offered a good deal of resistance to the knife, and creaked when cut; and it was entirely composed of a

[1] Lectures on Surgical Pathology, vol. ii. p. 137.
[2] Med. Times, Aug. 1852, p. 139.
[3] Liv. v. p. 1, fig. 3.

number of greyish-white fibres intersecting each other and arranged in lobules, similar to the fibrous tumour of the uterus. Mr. Paget describes a specimen of considerable size which was removed by Mr. John Lawrence, with the testicle, within the tunica albuginea of which it was entirely enclosed. The patient was a healthy-looking man, thirty-seven years old, and the tumour had in seven years grown to a measurement of nearly six inches by four.[1]

A fibroid disease of a more important character may affect the testicle. Thus, M. Lebert has recorded a case of a man, aged seventeen, with a fibro-plastic tumour of six months' standing, which sprang from the epididymis of the left testicle, and which was removed, together with the organ, by Velpeau. The swelling was prolonged along the cord into the abdomen. Three weeks after the operation the abdominal tumour increased considerably, and the patient died about a year after the commencement of the disease. It was observed at the autopsy that, in addition to a large abdominal tumour occupying the left side of the abdomen, there was a swelling the size of the fist in the left groin, and immense tumours in the diaphragm, costal and pulmonary pleura, and on the intestines.

Another well-marked case of this disease, now commonly known as recurrent fibro-plastic, and affecting the testicle, is recorded by M. Horand.[2] The case is additionally interesting as the patient was a cryptorchic. A man, thirty-nine years of age, married, but without children, was admitted into the Hôtel Dieu, at Lyons, for a tumour in the right groin, which had been enlarging for seven or eight years, and had increased

[1] Lib. cit. vol. ii. p. 118.

[2] Mém. de la Société des Sciences Médicales de Lyon, t. iv. p. 118.

rapidly the last four months. The tumour was considered to be an enlargement of the testicle in the inguinal canal, but it was impossible to determine the nature of the disease. It was excised, and proved to be a fibro-plastic growth affecting both the testicle and epididymis. The patient died four days afterwards, and on examination of the body a chain of enlarged glands, consisting of the same disease as the testicle, was found compressing the aorta and vena cava.

CHAPTER XI.

CARTILAGINOUS TUMOURS OF THE TESTICLE.

In treating two important diseases to which the testicle is subject, soft cancer and the cystic, I have had occasion to notice the disposition which often exists in these affections to the development of enchondroma. In the former the cartilage, though sometimes mixed up with the soft cancer, is more commonly found as a distinct mass in its substance, and separated from it by a capsule.[1] In the cystic disease, the cartilage occurs in numerous small isolated masses, which are disseminated throughout the tumour. They are developed within dilated tubes of the rete testis, and the little masses are easily shelled out from the cysts enclosing them. The formation of cartilage in both these instances is subordinate to the other changes, and commonly limited in degree.[2] But enchondroma has been observed in some rare cases so largely developed in the testicle, as to constitute a separate or the principal lesion, and to produce a considerable tumour of the organ. Such was the character of an immense tumour of the testicle excised

[1] Baring (Ueber den Markschwamm der Hoden, Pl. 11) has figured an encephaloid testicle exhibiting an isolated mass of cartilage in the substance of the tumour enclosed in a capsule. Mr. Paget also mentions three similar specimens. (Lectures on Pathology, vol. ii. p. 209.)

[2] M. Paul Dauvé mentions in a memoir to which I shall again refer, that enchondroma has been seen in the tubercular testicle in two instances. I have examined a large number of specimens of tubercular testicle without meeting with any cartilaginous deposit.

by M. Demarquay.[1] It weighed about two pounds and a half, and was composed almost entirely of enchondroma. In a case referred to at page 359, in which a tumour of the testicle weighed four pounds and six ounces, the disease was primarily and essentially cystic; but cartilage was developed in such great abundance as to encroach upon and obliterate the cysts, and to form the chief mass of the tumour. Mr. Paget has recently recorded a remarkable case of cartilaginous growth in the testicle, which presents many points of great interest to the pathologist.[2]—A man, aged thirty-seven, was admitted into St. Bartholomew's Hospital on account of a large swelling of the right testicle and spermatic cord. The diseased parts were excised, and the patient recovered favourably, but he returned to the hospital in about three weeks, much enfeebled and labouring under dyspnœa. This continued to increase until his death, which took place suddenly ten days afterwards. The oval mass occupying the place of the testicle was composed of tortuous cylindriform and knotted pieces of cartilage, which were from half a line to two lines in diameter, and were closely packed and embedded in a tough connective tissue. Over parts of the outer surface of the mass a layer of seminal tubes was thinly spread out between it and the tunica albuginea. Surmounting this mass, and separated by a layer of connective tissue, there was a conical mass formed of similar but smaller pieces of cartilage. These were found to be contained in tortuous but communicating canals. Above this second mass a series of smaller cartilaginous swellings extended along the whole course

[1] Bulletin de la Société de Chirurgie de Paris, 2e série, t. ii. p. 676.

[2] Medico-Chirurgical Transactions, vol. xxxviii. p. 247. This interesting case is minutely described by the author with his usual care and clearness, and is well illustrated by figures.

of the spermatic cord. It was evident that the disease consisted chiefly in morbid growths within canals; and dissection (the details of which are minutely given by Mr. Paget) satisfactorily showed that these canals were lymphatics. From the scar of the operation-wound two dilated lymphatics, filled with growths like those in the spermatic cord, passed upwards to a swelling of the size of a hen's egg (probably a diseased lymphatic gland), which on section presented cavities filled with pellucid fluid, and partitioned by fibrous and cartilaginous textures. This swelling adhered closely to the vena cava inferior, and a cartilaginous swelling projected from it into the cavity of the vein. The only other diseased parts were the lungs. Both these organs were enlarged by formations in them of masses of cartilage, in such abundance that the two lungs together weighed eleven pounds and a half. The cartilage appears to have been developed in the rete testis, and its primary seat is supposed by Mr. Paget to have been the lymphatics of the testicle. He considers the case to present the most probable instance he has yet known of "a local disease becoming constitutional," and justly remarks, "The local origin and maintenance of those tumours in the testicle, that contain cartilage without cancer, are well established by the many cases in which no recurrence of the disease has followed their removal, as well as by the cases in which, cancerous growths being combined with the cartilaginous, the recurrent disease has contained cancerous structures alone. In this instance, however, we must assume that the cartilaginous local growths, extending into the blood, infected it. The quantity of cartilage found in the lungs gives a striking illustration of the enormous power of multiplication and increase of such structures, when in free contact with

the blood. It may be estimated that, from the germs (if we may so call the material in whatever form) derived from the small growth that projected into the vena cava inferior, nine pounds of cartilage were developed in less than three months."

M. Paul Dauvé, in an able and elaborate memoir[1] on enchondroma of the testicle, has related an interesting case of recurrent cartilaginous disease of this organ. A man, aged twenty-six, had his right testicle removed on account of a large enchondromatous testicle, which weighed about eleven ounces (310 grammes). A fungous growth appeared at the divided extremity of the spermatic cord a week after castration. Tumours formed in the abdomen and left groin, the patient's health failed, and he died three months and a few days after the operation. In addition to a large enchondromatous growth in the spermatic cord, and enormous development of the lymphatic vessels of the part, a similar tumour of the lumbar glands had opened into the duodenum. In this instance also the disease appears to have spread from the testicle, and to have become rapidly developed in the system by the conveyance of the cartilaginous elements along the lymphatics of the spermatic cord to the lumbar glands.

The diagnosis of enchondroma of the testicle cannot be made with precision in any case before the growth has increased to a considerable size. M. Paul Dauvé mentions that hard and elastic eminences, when present, furnish a sure diagnostic mark, as they are not found in any other affection of the testicle; but these marks may be wanting, as in Verneuil's case alluded to below, and are liable to be masked by effusion into the tunica vaginalis. The assemblage of the following symptoms

[1] Mém. de la Société de Chirurgie de Paris, t. 16ème, p. 291.

will generally indicate the nature of the tumour, viz.—its long duration, slowness of progress, slight sensibility to pressure, great size and weight, hardness, density, and oval form, and the healthy state of the cord. Most of these symptoms, it is true, characterize cystic disease, from which enchondroma differs chiefly in the greater volume, hardness, and density of the tumour. By these signs M. Verneuil was able to pronounce the diagnosis of an enchondromatous testicle which weighed upwards of fourteen ounces (400 grammes), though he had not before seen a case of the disease.[1]

There is no other treatment for enchondroma but castration, and, bearing in mind the liability of the diseases constituting many of the tumours of the testicle to spread and contaminate the system, and especially the unhappy termination of Mr. Paget's and M. Paul Dauvé's cases of enchondroma, we must regard it as a good practical rule to recommend an operation without unnecessary delay in all cases of large sarcocele which cannot be cured by other means.

[1] Case related in Dauvé's Memoir, p. 329.

CHAPTER XII.

CALCAREOUS DEPOSITS IN THE TESTICLE.

Earthy matter is met with in the testicle under two forms: 1, laminated, and often mixed up with fibrous tissue; and, 2, as an irregular amorphous mass. In the first form, it is usually deposited between the tunica vaginalis testis and the tunica albuginea, in little fibro-calcareous patches, similar to those occurring on the pleura.[1] I have frequently found one or two irregularly-shaped projecting bodies of stony hardness, scarcely larger than a pin's head, attached to the tunica vaginalis, covering the upper part of the testicle. Laminated calcareous matter occurs also in old cases of hydrocele, being formed in false membrane lining the outer portion of the tunica vaginalis, where it is sometimes so abundant as to form a complete bone-like cyst. Two well-marked specimens of the kind have been shown me by Mr. Spence, of Edinburgh; and Gosselin also refers to a similar case in which the false membrane on the tunica vaginalis was so extensively invaded by calcareous

[1] 100 parts of earthy matter from the tunica vaginalis, divested of membrane and dried, were found by Mr. Barry to consist of—

Phosphate of lime	45
Carbonate of lime, with a trace of magnesia	17
Animal matter	38
	100

—Cooper on the Testis, p. 245.

deposit as to resemble the shell of a cocoa-nut. It has been said that the epididymis alone may be encased in calcareous matter, the testicle being free; but this I have never seen. Earthy matter occurs, however, in the substance of the epididymis, especially in the tail, from calcareous degeneration of the plastic matter exuded in inflammation.

The body of the human testicle is more rarely the seat of earthy deposits. The matter exuded there in inflammation, especially in chronic, may, as in the epididymis, undergo calcareous degeneration. When atrophied and reduced to a mere fibrous tissue, the gland, after a time, becomes the seat of earthy deposits. Small masses of bony matter occur in enchondromatous testicles. The Museum of St. Thomas's Hospital contains a good specimen of mixed cystic and enchondromatous disease of the testicle with calcareous deposit in the substance of the cartilage. Nothing is known of its history. In the Hunterian Museum there is a preparation (No. 2429A) of two large portions of bone-like substance, of light and delicate filamentous texture, composed of granules of earthy matter imbedded in animal tissue, which were enclosed within a tumour connected with the testicle. The large tumour was removed by operation from a man aged seventy-two. The late Mr. Quekett has described in the Catalogue of the Histological Series of the Hunterian Museum (Vol. I. Pl. VII.) sections of a cartilaginous tumour of the testicle, each of which exhibits in its centre a small mass of bone. Although the bony matter is of some considerable thickness, it exhibits no trace of bone-cells. Mr. Quekett informed me that he had examined several specimens of bony deposit in this organ, but had never observed any in which bone-cells or lacunæ were present,

the bone being in every case of that kind termed false or abnormal.[1]

These changes possess, in general, more pathological interest than practical importance. Calcareous deposit in the testicle, however, though existing for a long time in an indolent state, may, at a later period, set up suppurative inflammation, and cause tedious and troublesome sinuses. Three such cases have come under my notice.—A gentleman, aged seventy, consulted me on account of a tedious fistula of the left testicle. About ten months previously the organ became swollen, hard, and painful, which was followed by the formation of a chronic abscess. This was opened after some time, and it had continued to discharge ever since. Various attempts had been made to get the sinus to heal, but without success. On examination, I found the testicle reduced in size, and the orifice of a sinus leading into it, situated in the front of the scrotum. On introducing a probe, the sides of the sinus felt firm and indurated, and the instrument came in contact with a substance of bone-like hardness. The discharge was very scanty. I confirmed the opinion which had been given of the obstinate and intractable nature of the case, but did not

[1] Calcification of the tubular structure of the testicle has been met with in several animals. A very beautiful specimen from the ram, belonging to a farmer in Wiltshire, has been described and figured by Mr. Joseph S. Gamgee. Another specimen, also from the ram, and formerly belonging to the late Mr. Langstaff, is in the possession of Dr. Crisp. In the collection of drawings by Dr. Carswell at University College, there is the figure of the testicle of a goat in a similar condition. In the two first-named cases the tubuli are converted into calcareous matter, but are of the natural size. The Museum of the College of Surgeons contains the testicle of a bull, in which this change is in an incipient stage, some of the tubuli being perfectly soft and of uniform diameter; whilst others are wholly or partially converted into calcified tubes, precisely the same as in the ram. This calcareous change does not appear to have been observed in the epididymis or vas deferens in these animals. I am not acquainted with any instance of calcification of the tubuli in the human testicle.

see the patient again.—A soldier, about seventy years of age, whose left testicle was apparently converted into bone, and felt extremely firm and indurated, was an out-patient at the London Hospital under Mr. Adams for many weeks, on account of the organ becoming painful and inflamed. After some time it suppurated; and the pus, on being discharged, had the usual offensive smell of an abscess connected with dead bone. The earthy matter came away by degrees in small pieces, which amounted to nearly one hundred, and the patient ultimately recovered with an atrophied testicle.—A man, aged sixty-two, came under my care at the London Hospital on account of a painful swelling and fistulous sinus of the left testicle. He had been affected with acute orchitis twenty years previously, since which the organ had remained enlarged. Two similar attacks had since followed an injury of the part. The last occurred a few weeks before his admission, and ended in an abscess, which had burst, leaving an open sinus. Another abscess formed, which I punctured, and on passing a probe to the bottom of the sac, it struck against a hard substance like bone. Some weeks afterwards I seized this body with the forceps, and endeavoured to detach it, but it was too firmly attached to come away. The part was not very sensitive, for the man himself endeavoured to remove the hard substance with the sharp end of a common nail, but without success. The fistula continued to discharge thin pus for several weeks, and at length the man discontinued his attendance.

In the second form, the earthy matter is deposited in an irregular mass resembling mortar, and containing very little animal matter, being very similar to the earthy substance found in the lungs and bronchial

glands. It is generally met with in the head of the epididymis, and sometimes in the lower part, and but very seldom in the body of the testicle. As I have already stated, this earthy matter results from the degeneration of tubercular matter deposited in the testicle in early life. (See observations at page 316, and the accompanying figures.)

Gosselin has noticed the occurrence of calcareous deposits, mixed in some instances with tubercular matter, in the areolar tissue at the bottom of the scrotum, external to the vas deferens and epididymis, though connected with and proceeding from one of these structures. He considers that the tumour originates in tubercular affection, but the deposit, instead of remaining encysted in the parenchyma of the organ, makes its way into the external areolar tissue, where it may undergo further development and calcareous change. He refers to three cases of this kind, and calls attention to the difficulty of ascertaining the true character of the case. When sinuses exist the tumour can be removed without the testicle.[1]

[1] Fr. Translation of this work, p. 432.

CHAPTER XIII.

LOOSE BODIES IN THE TUNICA VAGINALIS.

Loose bodies are occasionally found in the cavity of the tunica vaginalis. They are small in size, and of an oval flattened shape, and the surface is smooth and polished. Their texture is in most instances elastic and homogeneous, or arranged in concentric laminæ, and consists of a fibro-cartilage, or, as Lebert states, of a tissue resembling the elastic coat of the arteries. Ossific deposits are often found in them—indeed, the loose body is sometimes entirely composed of bony matter. On examining a thin lamina of one in the microscope, I found well-defined bone corpuscles. Richter, of Göttingen, met with three round bodies in the tunica vaginalis, which were quite hard, and of the size of a very large hazel-nut; but they rarely attain so large a size as this.[1] They seldom exceed three in number; and they occur generally in combination with hydrocele, the loose bodies being the original disease, since in their movements in the cavity of the tunica vaginalis they promote a greater secretion of fluid from the serous membrane, in the same way as a loose cartilage in a joint excites an increased synovial secretion from the membrane by which it is lined. In some cases the surface of the tunica vaginalis is found thickened and uneven.

[1] Medical and Chirurgical Observations, tr.

The manner in which these loose bodies originate does not differ essentially from the mode of development of loose cartilages in the interior of joints. Deposition takes place beneath the tunica vaginalis testis, which is gradually protruded until the fibro-cartilaginous or ossific body forms a pendulous tumour, which, being attached merely by a slender stalk, is accidentally separated in the motions of the testicle, and is thus left loose in the cavity of the tunica vaginalis. These bodies have been observed in the various stages of their development. The Museum at Netley Hospital contains a testicle with a small fibro-cartilaginous body hanging by a peduncle from the head of the epididymis; and also four other small bodies which were found loose in the vaginal sac. In a loose substance of the size of a small grape of firm consistence, and possessing a bony nucleus, found in a case of hydrocele, Morgagni noticed a short and slender neck by which it had been adherent.[1] But, in general, there is no trace of the original attachment left on either the loose body or the tunica vaginalis. I have seldom observed these bodies except in connexion with hydrocele. If present without the effusion of fluid, they admit of being moved around the testicle, and may in this way be readily detected. If inconvenient, the loose body might be pinched up and taken out by a small incision in the scrotum and tunica vaginalis. Chassaignac exhibited to the Surgical Society of Paris a loose body about three-quarters of an inch in length and half an each in breadth, which he had excised from the vaginal sac during life. It is described and figured by Lebert.[2]

[1] Cooke's Morgagni, vol. ii. p. 429.

[2] Traité d'Anatomie Pathologique, p. 175.

CHAPTER XIV.

DERMOID CYSTS IN THE TESTICLE AND SCROTUM.

Cysts containing skin, hair, bone, teeth, and other structures foreign to the part, have, in some rare instances, been found in the scrotum in connexion with the testicle. No case of the kind has fallen under my notice. Dr. Duncan, of Edinburgh, removed a congenital tumour of the testicle from a boy eight years of age. Dr. Goodsir examined the tumour and found skin, hairs, and portions of cartilage in it.[1] Mr. Erichsen has briefly alluded to a case which occurred at University College Hospital in 1852. A testicle, about the size of an ostrich's egg, was removed by operation, from a man thirty years of age, by Mr. Marshall. The patient had been affected with the tumour from early infancy. It was found after removal to be composed of a large cyst, filled with an oily fluid, like melted butter, which solidified on cooling. The cyst contained some fœtal debris, but of what nature is not described.[2] Dr. Verneuil, of Paris, collected and carefully analysed all the recorded cases which he had been able to meet with.[3] The cases are nine in number, and to these he has added one of great interest, observed by himself and M. Paul Guersant. The de-

[1] Northern Journal of Medicine, June, 1845.

[2] Science and Art of Surgery, first edit. p. 931.

[3] Archives Générales de Médecine, 5e série, t. 5 et 6, 1855. I must refer the reader to Verneuil's able and elaborate Memoir for further information on the subject of these cysts.

scription of some of them is extremely concise or very imperfect. The two best observed examples are—the author's, in which, amongst other elements foreign to the part, such as skin and cartilage, he recognised the grey matter of the brain,—and Velpeau's well-known case of a man, twenty-seven years of age, from whose scrotum he excised a congenital tumour, which was found to be occasioned by the presence of nearly all the anatomical elements of a fœtus.[1] Of the ten cases, the side was noted in six, and in all of these was the right —a preference which has been also remarked in tumours of the ovary containing fœtal remains. It was supposed by Velpeau and Ollivier, that in all these cases the inclusion[2] is originally abdominal; that is to say, that the organic debris are first situated in the abdomen along with the testicle, and accompany the organ in its progression out of that cavity. Dr. Verneuil dissents from this opinion, and shows that, although in some instances the tumour is originally foreign to the scrotum, and is formed in intimate connexion with the testicle before its transition, in other cases, the tumour is first developed in the subcutaneous tissues of the scrotum, independently of the testicle, though it commonly becomes connected to the gland in the process of growth. He believes, indeed, that the inclusion is commonly *extra-glandular*. But in whatever situation the tumour is developed the testicle generally suffers, becoming atrophied, or more or less altered by inflammation. The tumour remains indolent for a variable period, growing

[1] Gazette Médicale de Paris, Fév. 15, 1840.

[2] The reader will understand that the word "inclusion" signifies a form of double monstrosity, in which the small and imperfect germs of an individual are grafted on, or constitute a parasitic growth in, the body of another of larger size, and for the most part well formed. (*Vide* Geoffroy Saint-Hilaire, Hist. des Anomalies de l'Organization.)

with the body, but afterwards enlarging until it attains in some instances an immense size. At length inflammation is set up, an abscess forms, and ends in fistulous openings, from which the fœtal debris are discharged. This may occur in infancy or be delayed till a later age, even, as in one of the cases, till the adult period.

The theory of "fœtal inclusion" of Saint-Hilaire has not received the assent of later pathologists. Lebert, Paget, and others being of opinion that the cysts, thus highly organized and productive, are the result of great formative power in the fœtal or earliest extra-uterine periods of life.

In infancy, the tumour, when solid and of large size, can scarcely be mistaken for any other disease of the part, and at all periods, the congenital nature of the affection would serve to indicate its true nature. It would distinguish it from soft cancer and tubercular disease, the lesions most likely to occur to the testicle in early life. The excision of the tumour, including the testicle, is generally necessary. Velpeau managed in his case, by a very minute and laborious dissection, to save the organ; but the gland is, in most instances, so intimately connected with the tumour and injured in structure, that the attempt to separate them can rarely succeed, or be desirable. In one instance, in an infant, the surgeon contented himself with incising the tumour and extracting the fœtal fragments.

CHAPTER XV.

ENTOZOA IN THE TESTICLE AND SCROTUM.

The Entozoa very rarely indeed infest the testicle; in the examination of a large number of testicles I have not met with a single example. Sir A. Cooper mentions an instance of an independent cyst, probably an *acephalocyst*, which was found accidentally on dissection in a sac connected with the epididymis. Dr. Baillie notices having seen a testicle with a small firm cyst adhering to it, which contained a *filaria medinensis* or Guinea worm.[1] In the Hunterian Museum at Glasgow there is a preparation (No. 66 S) of a cyst attached to the lower part of the vas deferens containing this worm, which is very likely the specimen alluded to by Dr. Baillie. The man had probably visited some warm country in which the Guinea worm is found, and the animal having been developed in the lower part of the scrotum had caused the formation around it of an accidental cyst, which had contracted an adhesion to the vas deferens. In the Museum of the College of Surgeons in Edinburgh there is a tumour (No. 2554) taken from the scrotum of a Lascar, containing a Guinea worm which had died and become converted into a substance resembling adipocere.

[1] Morbid Anatomy, p. 237.

CHAPTER XVI.

SPERMATOCELE.

This term implies a tumour formed by a collection of the seminal fluid; but it has occasionally been applied by writers to an encysted hydrocele containing spermatozoa, and also to swellings produced by varicocele and other affections of these parts. It is possible that the semen might collect in and dilate one or more of the seminiferous ducts in the body of the testicle, in consequence of some obstruction, and thereby constitute a swelling of a similar character to the lacteal tumour of the breast; but amongst the many hundred testicles I have examined, I have not met with a single instance of the kind. I have sometimes noticed, however, in testicles, otherwise healthy, small collections of thick caseous matter of a yellow colour (apparently inspissated sperm) blocking up and distending some of the efferent tubes of the epididymis, and the round dilatations frequently connected with them. Similar collections have been noticed also by Gosselin in cases of obliteration of the excretory duct. The rarity of any considerable accumulation, causing a tumour obvious during life, to which the term *spermatocele* might be applied, may be readily explained by the readiness with which the spermatic fluid becomes absorbed into the system. In the following instance the dilatations consequent on the retained sperm were

more remarkable than usual.—A man, aged forty-four, died in the London Hospital of phthisis. One testicle was quite sound. The body of the other was soft, pale, and somewhat enlarged. The epididymis was remarkably enlarged, and formed a saccular tumour. The saccules evidently contained fluid, and had a pearly lustre. The lower part of the vas deferens also exhibited frequent saccular dilatations, the coats of the duct at these points being thin and translucent. Near the upper dilatation, and about an inch and a half from the tail of the epididymis, the vas deferens was obliterated by a firm deposit partly fibrous and partly earthy. The mucous membrane of the duct below this was rough, and studded with earthy particles which grated against the knife. The fluid in the head of the epididymis was opalescent, in the tail white and thick, and in the vas deferens thin and gritty. There was no fluid in the duct above the point of obliteration. The fluid from the epididymis contained cells filled with spermatic filaments and free filaments in great abundance, and also a few altered cells, and others filled with fat granules. The fluid from the vas deferens contained altered epithelial cells, some with fat granules, others with earthy granules; and also the debris of spermatozoa. The fluid contained, too, free earthy granules, and some peculiar delicate spear-shaped crystals. The obliteration was no doubt of old-standing, and the result of inflammation, but I could obtain no history of the case.

I have stated, that a swelling consequent upon an obstruction in the vas deferens has rarely been noticed during life. I am indebted to Mr. Crompton, of Birmingham, for the particulars of the following interesting case.—A gentleman's servant came under his care

for what appeared to be a neuralgia of the right testicle, and he was for some time treated for such complaint without effect. He was frequently quite free from pain, and otherwise healthy. He was a married man, but was unable to have connexion with his wife from the excessive pain he suffered before and at the time. It was so severe as to render him wet with perspiration, and nearly make him faint. He was able, however, to do his work as butler during the day. On examining him, Mr. Crompton found, distinct from the testicle and about the point where the vas deferens commences, a small tumour, which was the seat of the severe pain. He could sensibly feel this tumour enlarging, until it became as large as a horsebean, the pain increasing every moment. This was noticed on several occasions. If he suddenly examined the part, no tumour was to be found; but upon handling the scrotum the swelling commenced, and increased until the pain became excessive. When no tumour was to be felt the man was easy. It was ascertained that, at the age of eighteen, he had an attack of gonorrhœa, and orchitis on the right side; and a firm nodule still existed in the globus minor of the epididymis. Mr. Crompton supposes this case to have been one of stricture at the commencement of the vas deferens, in which opinion I am disposed to concur, though the gradual formation of the tumour during an examination of the part is not very easy of explanation. He gave the bichloride of mercury and applied belladonna to the part, but the patient got no relief, and his wife eloped with another man.

CHAPTER XVII.

NERVOUS AFFECTIONS OF THE TESTICLE.

We may distinguish two kinds of nervous affections of the testicle. One, the more common of the two, consists in an exaltation of the natural sensibility of the part; and it is to this complaint that the term "irritable testis" used by writers more properly applies. The other is a true neuralgic affection of the spermatic nerves.

SECTION I.

IRRITABLE TESTICLE.

A patient suffering from an irritable testicle cannot bear the least pressure on the gland, in many cases not even the contact of his dress; he shrinks when the part is handled in the most gentle manner; and the motions of the testicle often occasion so much uneasiness that he is prevented from taking exercise, and is compelled to remain constantly at rest in the recumbent position. The morbid sensibility is not always confined to the testicle, but sometimes extends up the cord to the loins, so that the passage of fæces through the colon and its distension by flatus are liable to cause uneasiness. The pain is in some degree increased when the patient is in the erect position and the testicle

without support. It is frequently referred to one particular spot on the gland, which possesses more exquisite sensibility than the surrounding parts. This is often the head of the epididymis, or a small hard body growing from it. In some instances both testicles are affected, one perhaps more than the other; in other cases the morbid sensibility is confined to one side, generally the left. There is no perceptible alteration in the parts, except occasionally a degree of fulness, more particularly in the spermatic cord; slight varicose dilatation of the veins, and a relaxed state of the scrotum. The complaint is usually tedious, and lasts many months. The persons subject to it are those of a weak and irritable habit, who are dyspeptic or hypochondriacal, and unequal to much bodily exertion. In severe cases of this affection all enjoyment of life and its pleasures disappears; the sufferers concentrate their thoughts upon their maladies; they fancy they shall never get cured; and whilst some become uneasy as to the effect of the complaint in impairing the integrity of the gland, and rendering them impotent, others as urgently desire castration as the sole means of relief from their distress.

Morbid sensibility of the testicles is in general intimately connected with the state of the genital functions, and is frequently dependent on abuses of them. In several instances I have known it to be consequent on onanism, and on involuntary seminal emissions; and I have found it disappear when the seminal discharges ceased. It may arise from morbid irritation at the prostatic part of the urethra. In one of the most obstinate cases I have had to treat, the complaint was evidently dependent on irritation of this part of the urethra, consequent on an abscess in the prostate, which

formed during an attack of gonorrhœa, and burst into the canal. It sometimes occurs after cessation from free indulgence in sexual intercourse; and it occasionally affects persons exposed to sexual excitement, but who have not been able to indulge their passions. In such cases the glands are very much in the same condition as the tender and swollen mammæ at the commencement of lactation or of weaning. In several persons of chaste habits thus affected, the morbid sensibility disappeared on marriage. The testicles, like the mammæ, often also become affected with morbid sensibility about the period of puberty. It sometimes succeeds an attack of epididymitis, owing probably to a temporary closure of the excretory duct from inflammatory exudation, causing an engorgement of the seminal tubes, especially after excitement. In cases in which an attack of orchitis has ended in atrophy, the epididymis or remnants of the gland occasionally remain exquisitely sensitive. Though troublesome, this complaint generally disappears, either spontaneously or under treatment, after a longer or shorter duration.

Treatment.—In the treatment of morbid sensibility of the testicle the first object is to endeavour, if possible, to get rid of the cause of the affection. In many cases, however, this cannot be ascertained, or is only suspected. Attention must be paid to the state of the general health and of the digestive organs. Steel medicines and quinine may often be given with benefit. In many cases much service is derived from change of air and scene, so as to amuse the mind, and prevent the sufferer from brooding over his complaints. It often happens that when the mind is occupied and the patient obliged to exert himself, he is free from suffering. As in many other nervous affections, the complaint becomes worse and aggravated

by too much attention being paid to it. Advantage is often derived from cold bathing, and sponging the scrotum with iced water. I have sometimes succeeded in procuring relief with the douche bath, by causing a stream of cold fresh-drawn spring water to be directed on the scrotum so as to produce a powerful effect. The application should be made at least once daily. Enclosing the scrotum in a belladonna plaster, and supporting the parts, also sometimes afford relief. The testicle may at the same time be protected from the effects of friction and contact of the dress, when the patient moves about, by lining a full-sized suspender with a layer of soft wadding or wool. But the surgeon's success in the treatment of these cases mainly depends on his being able to ascertain the true cause of the complaint.—A young man, aged twenty-two, a sack-maker, applied to me for relief on account of distressing pains in the testicles. He stated that he was a single man, and had suffered from these pains for about two months. He was of a weak frame of body, thin and pale; and had a languid, melancholy countenance, and was subject to headache. His voice was feeble, and he trembled as he entered the room. The penis and testicles were small in size; the latter were extremely tender when handled, so that he could scarcely suffer me to touch them. I directed them to be supported and kept cool, and as much as possible protected from friction, and ordered the shower bath and steel medicines. Suspecting, from his general appearance and the character of his countenance, that he was addicted to onanism, I twice questioned him upon the subject, but without eliciting that he was habituated to this vice. But after he had attended for some time, and the above remedies, as well as arsenic, quinine, &c., had been tried without any decided im-

provement, I made further inquiries, and ascertained that he had been for years subject to involuntary seminal emissions, which occurred without erections both in the daytime and at night, and often on evacuating the bowels. I introduced into the urethra a full-sized bougie, and found that it produced great pain on reaching the prostatic part of the canal. I then applied the nitrate of silver to this part. The application was transient, but the patient instantly fainted from the sharp pain which it produced. The effects of the lunar caustic subsided in about a week. No emissions occurred afterwards. The pains in the loins and morbid sensibility of the testicles soon completely subsided; he lost his headache, and in a few weeks became much improved in health, when he was discharged cured. In other cases in which the morbid sensibility was connected with seminal emissions, or dependent on irritation at the prostatic portion of the urethra, I have applied the solid nitrate of silver to the part with a beneficial result. In the chapter on Varicocele I have related a case of extreme morbid sensibility of the left testicle, arising from dilatation of the veins of the spermatic cord, which was cured by the application of a truss to the outer abdominal ring.

Castration should never be performed for this affection; for the complaint generally ceases sooner or later, and can almost always be relieved by judicious treatment. Romberg relates,[1] that he had a patient under his care who was attacked with this disease at the time he was engaged to be married. In spite of all the serious objections of a distinguished surgeon whom he had called into consultation, in spite of his own earnest representation, the patient insisted upon having castra-

[1] Lehob der Nervenkrankheiten, S. 142.

tion performed; and the operation was accordingly done, that no greater mischief might ensue. Eight days afterwards the old pain had taken up its seat in the other testicle; but this its owner preferred keeping, the marriage being at hand, and he very soon recovered completely. The testicle which had been removed, with the exception of a few dilated vessels, did not differ in the slightest degree from the normal state.

SECTION II.

NEURALGIA OF THE TESTICLE.

In the nervous affection just described there is merely morbid sensibility; pain seldom being experienced whilst the patient remains at rest, and the gland and spermatic cord are supported, and entirely free from pressure or rough contact with the dress. The nerves of the testicle are liable, however, to a more painful affection, possessing the characters of tic douloureux or true neuralgia, in which the pain is sudden, severe, and remittent, and occurs in paroxysms of variable duration, generally at irregular, but occasionally at regular intervals. The pain is sometimes of an acute, darting, or lancinating description, at other times of a dragging or pricking nature; and is commonly attended with forcible retraction of the testicle to the groin by spasmodic action of the cremaster muscle, and occasionally with nausea and vomiting. Dr. Graves mentions a case in which the patient, when attacked with a paroxysm, would throw himself on the floor and roll about in the greatest agony, covered with a cold perspiration.[1] During the intervals of the paroxysms the testicle may sometimes

[1] Dublin Journal of Medical Science, vol. xiv. p. 371.

be freely handled without causing pain; but frequently the neuralgia is combined with morbid sensibility, and a paroxysm is readily induced by the slightest pressure. In two cases, in which the neuralgic symptoms were slight, and appeared to depend on some affection of the kidney, the patient complained of a remitting pain or soreness at the crest of the ilium, near the anterior superior spinous process, though there was no tenderness on pressure.

In most cases of neuralgic testicle there is no disease or alteration in the gland; but when the pains have been long continued and intense the testicle occasionally becomes swollen and tender, and affected even with a slight degree of inflammation.

In this painful affection the digestive organs are often out of order, and the health becomes deranged from the acute suffering and disturbance of the patient's rest. The neuralgia is almost always confined to the spermatic nerves of one side, whilst in morbid sensibility both sides are as frequently implicated.

Neuralgia of the testicle occurs at all ages, and arises from various causes. We have examples of it in the uneasiness in the organ and spasm of the cremaster muscle occurring in diseases of the kidney, and in the severe neuralgic pains usually experienced during the passage of a calculus along the ureter to the bladder. In treating of varicocele, I have stated that a dilated state of the spermatic veins is occasionally accompanied with neuralgic pains in the testicle; and as the latter occur subsequently to the appearance of the former, and subside on its removal, and often when the patient is in the recumbent position, we may conclude that the morbid condition of the veins gives rise to the neuralgia. But the cause is seldom so obvious as in these instances.

The testicle has been accurately examined, and the nerves of the cord have been carefully dissected out, but very rarely has any thing which could account for this distressing complaint been discovered.[1] Its primary seat has been referred to the spinal cord; in some instances it has appeared to depend on derangement of the digestive organs,[2] and in others it was evidently connected with a disposition to gout. In several cases, also, slight neuralgia has succeeded an attack of orchitis, continuing to distress the patient after all inflammation has subsided. In these cases it may be dependent on an obstruction in the excretory duct, as in the cases related at page 251; but in the majority of instances it is very difficult, and even impossible, to make out the cause of the neuralgic pains.

Treatment.—In cases of neuralgic testicle dependent on renal disease, the passage of a calculus along the ureter, or varicocele, the treatment must chiefly be directed to the relief of the complaints to which the nervous affection owes it origin. When the disease is connected with derangement of the digestive organs, or a tendency to gout, measures must be taken for their correction. In all cases, particular attention should be paid to the condition of the urine. Cases of neuralgic testicle, in which neither the cause nor seat of disease can be discovered, must necessarily be treated empirically. Those of an intermittent character are sometimes benefited by quinine in large doses, as five grains three times a day, or by the liquor arsenicalis. In Dr. Graves' acute case of neuralgia previously alluded to, the complaint yielded to large doses of the sesquioxyde of iron

[1] A perfectly healthy testicle, extirpated by Sir W. Blizard on account of this disease, is preserved in the Museum of the College of Surgeons.

[2] *Vide* an interesting case related by Sir B. Brodie, London Medical Gazette, vol. xiii. p. 620.

freshly prepared, and frequent inunction of the testicle and cord with belladonna ointment. The oil of turpentine sometimes proves very efficacious in these cases, when not dependent on renal disease. Other remedies of reputed efficacy in neuralgia have been tried in this affection, but have all disappointed expectations much oftener than they have cured. The various preparations of opium, hyoscyamus, and conium, often afford temporary relief; and they greatly contribute to mitigate the patient's sufferings, though incapable of removing the disease. The scrotum may be blistered, and the surface dressed with an ointment containing the acetate or muriate of morphia, in the proportion of five grains to the ounce. An ointment containing one grain of aconitina to a drachm of lard, smeared over the scrotum in the direction of the cord twice a day, will sometimes arrest the pains for many hours. The tincture of aconite, applied to the scrotum with a piece of sponge, produces a numbing sensation, and is efficacious in relieving both the morbid sensibility of the testicle and neuralgic pains. A piece of lint soaked in chloroform, applied to the part and covered with oiled silk, will have the same effect: or a liniment composed of equal parts of chloroform and olive oil may be rubbed in the course of the spermatic cord. But none of these palliative remedies are so efficacious as hypodermic injections of morphia, which may be easily introduced in the course of the spermatic cord.

In some cases of uneasy sensations of the testicles in vigorous persons leading chaste lives, I have prescribed, with advantage, the bromide of potassium in order to arrest secretion. A remarkably tall fine man, nearly sixty years of age, but looking full ten years younger, who had been some years a widower and led a chaste life, consulted me on account of uneasy sensations in the

course of the spermatic cords, and reaching up to the loins, consequent chiefly on erotic desires, which he was unable to suppress. The sensations were very annoying to him. His testicles were large, firm, and plump, but in no degree tender. I prescribed five grains of the bromide of potassium to be taken in camphor mixture three times a day, and a third of a grain of the extract of Indian hemp at bed time. He derived great relief from these remedies, and in a fortnight had nearly lost all uneasiness.

In cases in which remedies of every kind and in all shapes have been repeatedly tried, and have as frequently failed in affording more than temporary relief, the patient's life is sometimes rendered so truly miserable that he becomes anxious to undergo some operation, and even that of castration, to get rid of a disease of so obstinate and harassing a character. Operations, however, for the cure of neuralgia are in general very precarious and unsatisfactory, and as our experience increases, the less encouragement we find to repeat them. When the disease has a constitutional origin, or its true seat is at a distance from the part where its painful effects are manifested, and beyond the reach of the knife, it would be unreasonable to expect any beneficial result from the division of the nerves, or the removal of the part to which the pains are referred; and we find that in several of the cases in which the operation has been resorted to no benefit has resulted from it.

Dr. Macculloch mentions a case of neuralgic testicle, in which, after a long period of suffering, the gland was extirpated in the usual manner, but the disease returned in the cord.[1] Mr. Russell has given a brief account of

[1] Essay on the Marsh Fever and Neuralgia, p. 77.

three cases of this affection which occurred in Edinburgh. In one, in the person of a medical practitioner, castration was performed on account of the intolerable suffering, and with perfect relief. The patient recovered his health, strength, and spirits, which had been impaired by the severity and continuance of his complaints. A practitioner, encouraged by the success of this operation, adopted a similar practice in a like case, which, however, was not followed by an equally favourable result; as the patient experienced in the first instance but imperfect relief, while the complaint gradually returned, increasing in severity, till at last it attained its original violence. The next case that occurred was treated upon other principles. The practitioner advised the patient to submit to his sufferings with patience, in the hope that time would at last accomplish a cure. The patient followed this advice, and was relieved from his misery in the course of eighteen months.[1] Sir A. Cooper resorted to castration in three cases of neuralgic testicle, in all of which the result proved satisfactory, the patients having recovered, and afterwards continued free from any return of the distressing complaint.[2] If the details of these three interesting cases are carefully examined, the success of the operation can, I think, be accounted for. In all of them, it is clear that the neuralgia had a local origin. In the second case, it was dependent on varicocele, and consequently admitted of perfect relief by castration, the cause of the disease being removed together with the testicle, though the morbid condition of the veins might have been remedied by milder treatment. In the two other cases, it appears that the neuralgia was originally induced by an

[1] Observations on Diseases of the Testicle, p. 186 et seq.
[2] Lib. cit. p. 69 et seq.

attack of orchitis; and though it afterwards proved irremediable by antiphlogistic means, and persisted after all inflammation had subsided, the nerves affected were evidently those immediately connected with the testicle, which, having been removed, the painful symptoms all ceased. In cases, then, in which the neuralgia has a local origin, is confined to one side, and is clearly dependent on some change in the state of the nerves of the testicle or cord, castration might be performed when the symptoms are sufficiently severe, and the patient is willing to undergo it, with a fair prospect of permanent relief.[1] But in cases in which it is impossible to determine exactly the seat or the cause of the disease, the surgeon incurs no slight risk of failure; and if he ventures to undertake the removal of so important an organ as the testicle at the earnest entreaty of the sufferer, it would be his duty, as well as his policy, fully to apprize his patient of the uncertainty of the result.

[1] Mr. Harvey Ludlow relates in his Jacksonian Prize Essay, the case of a man, aged twenty, a patient in St. Bartholomew's Hospital, who had suffered for six years from neuralgia of the left testicle, which originated in an injury of the part followed by inflammation. After the trial of various remedies without success, Mr. Stanley, with the concurrence of his colleagues, removed the organ. On examination, the surfaces of the tunica vaginalis were found partially adherent, the membrane being thickened; and the epididymis was changed into a firm white fibrous substance. There had been no return of pain three months after the operation.

CHAPTER XVIII.

FUNCTIONAL DISORDERS OF THE TESTICLE.

Defective as is our knowledge of the sympathetic and functional disorders of the glands, there are few with whose derangements we are less acquainted than the testicles. The functions of these organs are so involved in the actions of other parts, are influenced by such peculiar causes, and are so dependent on and modified by particular events and circumstances, that the investigation of their disorders is necessarily complex and difficult. During life, the product of these glands is never afforded in a pure and unmixed state, so that it is almost impossible, either by chemistry or the microscope, to appreciate properly the qualities of the secretion, and to note the changes dependent on disease. And as repugnance is felt to such inquiries it is not surprising that the functional disturbances of the testicle have been but imperfectly investigated, and rarely treated of by the pathologist and legitimate practitioner.

The functions of the testicles, like those of other secreting organs, may become suspended and incapable of excitement; or they may be exerted to excess, improperly excited, and so abused, as to fail prematurely, or produce injurious effects on the constitution; or excretion may be interrupted.

These disorders may be conveniently considered under the three heads—*Impotency*, *Sterility*, and *Spermatorrhœa*.

By the first is understood absence of sexual desire, or defective power of copulation, which necessarily involves also the second. But I shall have to show that a want of aptitude to impregnate may co-exist with the capacity for sexual intercourse; or, in other words, that man is subject to *sterility* independently of *impotency*.

SECTION I.

IMPOTENCY.[1]

The testicles not being parts essential to life are subject to different laws from those which regulate the actions of the vital organs. Their functions may be suspended, or they may remain in abeyance for an indefinite period without injury to the glands or any material effect on the constitution. In persons of recluse and studious habits these organs often continue dormant for years. Like the mammæ in the unmarried female, though inactive, they remain sound and competent for secretion when duly excited and called upon to exercise their functions. The opinion, that in manhood the testicles waste from long-continued chastity, I believe to be as erroneous as its tendency is obviously injurious and immoral, in furnishing an excuse for illicit intercourse to those who cannot otherwise indulge the sexual appetite. The case is somewhat different, however, late in life. Thus widowers, after remaining chaste for some time, on marrying have been doomed to disappointment. Inaction has hastened the natural decline.[2]

[1] In treating this subject I cannot restrict my observations to imperfections in the functions of the testicles, but must include other conditions which prevent the efficient performance of the reproductive act.

[2] A remarkable case of self-mutilation performed under these painful circumstances is related at page 84.

The impulse for commerce with the other sex exists in different degrees of force in different men, those of a sanguine temperament being most prone to indulge, and best able to do so without hurt. In the adult the moderate exercise of this function is favourable to health, and to the maintenance of the powers both of the mind and body. A certain degree of vigour, however, is necessary to bear the nervous excitement attending it; hence in advanced years, and in weak and susceptible individuals, the frame is unable to sustain frequent coition with impunity. The old man often pays dearly for a matrimonial connexion with a young woman by an attack of paralysis, or else an exhausted frame, premature debility, and death. Rules have been given for regulating the sexual functions and restricting the performance of them within due bounds. They are, however, of little value, for, as I have already mentioned, the powers vary greatly in different persons, and also at different periods of life; and what is moderation in one man or at one period of life, is excess in another man or at another time of life. Whenever the sexual act is followed by a prolonged sense of debility and lassitude, an uncomfortable feeling in the head, and disinclination for either physical or mental exertion, the limits consistent with health have been exceeded.[1] The hurtful effects of frequent sexual intercourse result less from the drain upon the system by the discharge of the seminal secretion than from the nervous excitement attending the act. In cases, also, of

[1] Professor Humphry mentions the case of an apparently healthy man who, about the early age of forty-five, suffered so much depression, with staggering and partial loss of vision, after each connexion with his wife, that, being unable to restrain himself, he urgently demanded and submitted to castration. He lived many years afterwards in the enjoyment of perfect health, and in the conviction that the mutilation had been the means of preserving his visual organs, if not of saving him from general paralysis.—Holmes' System of Surgery, vol. iv. p. 609.

excessive masturbation, the amount of fluid evacuated bears no proportion to the exhaustion of the bodily powers, and the prostration of the mental faculties consequent on the practice. Not only is the enjoyment heightened, but the effects of coition on the constitution are far less depressing when the necessary energy is supplied by the stimulus of a warm attachment, than when the appetite is irregularly indulged in fornication. The nervous system is invigorated by the passion, and acquires a power which enables it to bear the excitement of repeated coition; whilst the debauchee often suffers as severely in his health as he always does in his morals from the unrestrained gratification of his animal propensities.

After middle age, as life advances, the testicles diminish in size and become soft and flaccid, the secretion of semen becomes languid, and the desire and power to indulge in coition gradually subside. The period of life at which these changes become marked varies, as I have already stated, in different men, but most persons are conscious of some decline in sexual vigour after the age of forty. There are some remarkable instances on record of men who have been capable of the reproductive act in very advanced life. Cato the Censor is said to have had a son at eighty years of age. Ladislas, King of Poland, at the age of ninety, married his second wife, and had two sons. Buffon relates that Cramer, the imperial physician, had seen at Temeswar two brothers, one aged 110, the other 112, both of whom became fathers at these advanced ages.[1] Many

[1] Old Parr, who lived to the great age of 152, was dissected by the celebrated Harvey; and it is stated, "Genitalibus erat integris, neque retracto pene neque extenuato, neque scroto distento ramice aquoso ut in decrepitis solet, testiculis etiam integris et magnis."—Bettus, De Ortu et Natura Sanguinis, p. 320.

other cases of a like kind might be quoted. But knowing the frailty of the sex, we must hesitate to place entire reliance on these recorded instances of senile virility, though it is undoubted that men of unusual vigour of constitution and temperate habits have retained their sexual powers in a degree to a very great age. I have several times detected spermatozoa in the testicles of men upwards of seventy years of age; and once in the testicles of a tailor, who died at the age of eighty-seven. Duplay states that he discovered them in the testicles of nine octogenarians.[1] It must be remarked, however, that although the scantily secreted sperm may retain its fecundating properties, old men may still fail in the other conditions essential to the due performance of the sexual functions.

The testicles are under the influence of the brain, which animates and controls the desire for sexual enjoyment. An emotion of the mind, as sudden disgust or anger, arrests the secretion of these glands, and quenches sexual ardour as quickly and as effectually as a strong mental impression stops the secretion of gastric juice and takes away the appetite for food. An attack of apoplexy often permanently extinguishes all desire as well as capacity for coition. In Chapter II. I have mentioned cases in which the procreative function has been annihilated and complete wasting of the testicles has resulted from injuries of the head, as well as cases of idiots whose genital organs were imperfectly formed, and who had experienced no inclination for sexual pleasures. I will now adduce some additional facts in relation to the influence of the brain on the functions of the testicles.—Hildanus mentions the case of a man accused of

[1] Recherches sur le Sperme des Vieillards. Archiv. Générales de Médecine, Série iv. t. xxx. p. 385.

impotency by his wife, who sued for a divorce. Nothing external was defective; but the man stated that eight years previously he had received a blow on his head by a stick. From that period "confitebatur penem erigi non posse."[1]—Mr. B., aged forty-one, a passenger on the railway between Boston and Providence, apprehending an accident, thrust his head out of window at the moment that the train came in collision with another running in an opposite direction with fearful violence. Most of the passengers were thrown out and seriously injured. Mr. B.'s head and neck struck against the edge of the window-frame with great force, and he himself was thrown to the ground, where he remained for some time in a state of insensibility. He regained, however, his senses, and was conveyed home in a carriage. The surgeon, on visiting him, found him suffering great pain in the occipital region and upper part of the neck; but there was no indication of fracture of the skull or spine. On the second day after the accident he complained of a numbness in his right arm, and experienced difficulty in passing his urine. In the course of two weeks he was able to leave his bed and walk in the street; but his vision was defective. Between the fourth and fifth week after his injury he made the discovery that he had lost the desire and physical power for sexual intercourse, and that no amorous sentiment, or the approach of a female, could excite it. Under appropriate treatment the bladder gradually recovered its power, and his vision became perfect; but the numbness of the right arm continued, and the generative functions remained impaired. His mental powers, particularly his memory of events, were also for

[1] Opera Observationum et Curationum Medico-Chirurgicarum, p. 574.

a time seriously affected.[1] Dr. Smyth, in some excellent observations on the subject of impotency, states that he has seen complete impotence (absence of erection) of three months' duration, accompanied by general emaciation and impairment of health, excessive irritability of both mind and body, and considerable shrinking of the penis and testicles, occur in a strong young man of twenty-five from injury of the back part of the head. This gentleman being engaged in a quarrel, received a blow on the face which stunned him; and having fallen backwards, first struck the ground with the tuberosity of the occipital bone, and sustained in consequence a concussion of the brain, manifested by insensibility and total unconsciousness for eight or ten hours. Being a diligent student of medicine, he continued his professional pursuits the following day, and without interruption for six weeks, during which time he took no further notice of the occurrence. The general emaciation and failure of the sexual function were first perceived in little more than a week after the injury.[2] Dr. Gall mentions that at Vienna he was consulted by two officers who had become impotent in consequence of blows from fire-arms which had grazed the napes of their necks.[3]

When impotency depends on an injury of the head the prospect of relief is in general far from promising. The event itself is one of the last to be detected, and is rarely perceived till all treatment of the injury has ceased, and the patient is in progress of recovery. In some instances it is first announced by the visible wasting of the testicles. When otherwise, however, the

[1] Case related by Dr. Fisher. American Journal of the Medical Sciences, Feb. 1839, p. 357.

[2] The Lancet, August 28, 1841, p. 784.

[3] On the Functions of the Cerebellum, tr. by Combe, p. 46.

surgeon must not despair of the patient regaining his sexual powers as the other effects of the injury disappear. Thus one of the officers mentioned by Gall recovered by degrees the generative faculty, married, and became the father of several children. Purgation, followed by a slight alterative course of blue pill, effected a complete and speedy cure in Dr. Smyth's patient, after change of air and other hygienic measures had been tried in vain: as the gums became tender the patient began to recover flesh, and to experience a return of the procreative power. In the case of the patient injured on the railroad, the function was only partially restored. The treatment required in these cases is such as would be adapted to remove the other symptoms of cerebral mischief. If aphrodisiac medicines are used, they must be given with great caution. Electro-magnetism, applied from the occiput along the spine, might prove of service.

The reader will recollect the singular case of arrest of the development of the testicle related at page 61, in which the organs acquired their normal size and assumed their functions at an unusually late period of life, as the dormant passions were aroused by a particular attachment. No doubt some men, especially those who constantly exert their mental powers in some engrossing pursuit, are less susceptible to the influence of the female sex than usual; and in such persons, until a suitable impression is made and the instinct is excited, the sexual organs may remain long inactive, and in abeyance. There are well-recorded instances of men, and of persons too of great intellectual attainments, who, though to all appearance robust and perfectly formed, have not only passed a life of absolute chastity, but have never even evinced the slightest disposition for

sexual enjoyment. In the figurative language of Sir A. Cooper, "To such persons a Venus might display her charms, and on such her son might exhaust his quiver in vain. No genial spring is here, no blooming summer or fruitful autumn; but all is winter—a dreary, desolate, and barren winter—in which the springs of life are frozen up and the animal propensities destroyed." It is difficult to account for such cold indifference; but we may suppose that, in some instances, that particular part of the brain which is the seat of the procreative function has been but little or imperfectly developed. The several facts stated in this work fully justify the inference that the functions of the testicles may remain unexercised, and that impotence may ensue from a cerebral defect, or from the absence of the usual stimulus derived from the sensorium; and though more often occurring in idiots, I perceive no reason why such a fault should not exist in a brain otherwise in a high state of perfection. This constitutional and congenital form of impotency is sometimes, but not always, accompanied with arrest in the development of the sexual organs, and an effeminate appearance and frame of body.

Impotency of a temporary nature may be the effect of violent emotions of the mind, as mental affliction, anxiety, and rage; indeed, any impulse sufficiently intense to absorb the attention to the exclusion of the sexual passion will extinguish desire and arrest the secretion of the testicles. Thus sudden and exciting news, either good or bad, has been known to allay the sexual passion. When, however, the emotion subsides, and the mind becomes tranquillized, the generative instinct is again aroused. Disgust, also, is sometimes a cause of sexual incapacity. Thus men, at other times competent to the act, have remained impotent in the

company of certain women, owing to a particular aversion to the uninviting person, or to the coldness and indifference of their companion. For such cases of relative impotency the remedy is obvious.

The most common cause of a failure in the exercise of the reproductive powers is want of self-confidence—excessive apprehension of inability to perform well the duty of the sex. When persons are so timid and diffident as to entertain these groundless fears, it may be long before success attends their efforts, every failure adding to the evil by diminishing the reliance upon their powers. Mr. Hunter has treated this kind of impotency depending on the mind with his usual sagacity, and has related the following case.—He was consulted by a gentleman who had lost his powers in this way. The patient was subject to erections, accompanied with desire; but from doubt, or fear, or the want of success, was unable to copulate with a particular female. Mr. Hunter told him that he might be cured if he could perfectly rely on his own power of self-denial. He was then recommended to go to bed to this woman; but first to promise himself that he would not have any connexion with her for six nights, let his inclinations and powers be what they would, which he engaged to do. This resolution produced such a total alteration in the state of his mind, that the power soon took place; for instead of going to bed with the fear of inability, he went with fears that he should be possessed with too much desire, too much power, so as to become uneasy to him, which really happened; for he would have been happy to have shortened the time: and when he had once broken the spell, the mind and powers went on together, his mind never returning to its former state.[1] Modes of varying this advice in

[1] Treatise on the Venereal Disease, 4to, p. 203.

the case of persons recently married, who may be affected with this form of impotency, will readily occur to the practitioner. Thus, some mild tonic may be prescribed, and the patient be directed to abstain from intercourse while under treatment, and the surgeon may rest satisfied that not many days will pass over before nature asserts her empire. These cases must, on no account, be lightly treated. The situation of the patient is often one of great distress of mind, and much relief may be afforded by the surgeon calmly reasoning with him on the subject of his complaint. He may be told that his case is not uncommon; the true cause of failure may be pointed out; and he may be confidently assured of the groundless character of his fears, and of the influence of his doubts and apprehensions in preventing him from fulfilling his desires. Kind and confidential advice of this nature, by encouraging the patient, will do more in effecting a cure than any sort of medical treatment or stimulating medicines. A single success at once banishes all his fears, and gives security for the future. Unmarried patients, who have been led to adopt irregularly the natural cure, have sometimes come to me on account of a new complaint, a morbid apprehension, equally groundless, of having contracted syphilis, the remedy for one mental affection having proved the exciting cause of another.

It has been confidently asserted that excessive indulgence in tobacco-smoking weakens or destroys the sexual powers. I know of no facts to warrant the belief that tobacco exerts a special sedative effect on the genital organs, or that such injurious influence results from the habitual practice of smoking it in moderation. The Germans, whom we should regard as excessive smokers, evince no failure in the reproductive functions;

and although the importation of tobacco into this country has largely increased in recent years, the Registrar-General's Reports exhibit no corresponding decrease in the population. The intemperate use of tobacco, however, especially by chewing, is very liable to impair the digestive organs, and lower the nervous force, and I have no doubt whatever that its depressing influence is likewise manifested in a diminution of the sexual powers. In several cases of impotency with dyspepsia, in persons between thirty and forty years of age, which have fallen under my notice, I have found on inquiry that they were either inveterate smokers or habitual chewers of tobacco, and no treatment proved effectual without great restriction in these customs. Opium, whether chewed or smoked, is still more hurtful than tobacco. There is ample evidence of impotence being a common effect of indulgence in this pernicious drug.

Abuse of the sexual functions is a frequent cause of impotency, and of impotency very difficult to treat and remove; for moral as much as medical treatment is required, the mind being frequently more at fault than the body, and the surgeon finding it as necessary to urge the duty and importance of self-control as to prescribe for the patient's health. Such advice is particularly called for in persons whose inclinations are stronger than their powers of fulfilment. By indulging the mind in erotic thoughts, desires are created which lead to sexual excesses, imperfect performance, and ultimately to failure. Many men, usually persons in affluence or without occupation, allow their minds to be so constantly occupied with these functions, that they render themselves truly miserable—become hypochondriacal, morose, and reserved, and unfitted for the social duties of life. They seem to consider that they are born for

no other purpose than to gratify an animal passion, and it sometimes becomes the surgeon's duty to expose the folly and evils of such infatuation. Persons who indulge to excess sometimes become suddenly impotent, and a considerable period of rest may elapse before the organs are capable of resuming their functions. Such occurrences are not unfrequent shortly after marriage. Addiction to sexual pleasure in early life often entails a permanent loss of power in middle age, at a period when most men still retain it in full vigour. This is often experienced in the despotic countries of the East. M. Volney,[1] in his Travels through Asia Minor, mentions that the people of rank in that country, who can afford the expense of a harem, often complain of impotency at the early age of thirty. Mr. Russell, of Edinburgh, in some excellent observations on this subject, remarks "that matters are not so bad in this country, though it is a well-known fact that young men of fashion, who indulge their amorous propensities at an early age, lose the power of procreating sooner than the more continent."[2] Too great indulgence of the sexual appetite is productive, however, of other effects besides premature impotency: as every practical surgeon is aware, it tends to derange the digestive functions, and to weaken the physical and mental powers. Sexual excesses are likewise a fertile source of the diseases of the testicle: persons affected with chronic inflammation and other disorders of the gland frequently, and I believe with justice, refer their complaints to an unrestricted indulgence of their passions. In men advanced in age, irritability of the bladder and chronic catarrh are not uncommon results of such excesses; and I presume that

[1] Voyage en Syrie et en Egypte, tom. ii. p. 444.
[2] Observations on the Testicles, p. 35.

the frequent desire to micturate under these circumstances gave rise to the ancient proverb, *Raro mingitur castus*. Sexual indulgence late in life seems also to promote the enlargement of the prostate gland; and I know of several instances of old men being attacked with retention of urine from congestion of this organ occurring after coition. I suspect, too, that these excesses, if long continued, are very apt to lay the foundation of disease in the kidneys. A gentleman, who when young had been much addicted to the society of women, invariably suffered subsequently from pains in the loins, and alkaline urine, after intercourse with the sex. There can be little doubt, too, that the erotic longings which sometimes continue to distress the aged long after the period at which in the course of nature they should have ceased, depend as much on physical infirmity as mental depravity, a diseased state of the prostate inciting and producing the morbid desires. By regarding these propensities as symptoms of disease, and treating them accordingly, they would often subside, and the subjects of them would cease to indulge in vicious courses.

One of the most common results of inordinate excitement of the genital organs is an excessive involuntary discharge of the spermatic fluid, or *spermatorrhœa*, a subject which will be considered in Section III. of this chapter.

Diseases and injuries of the spinal cord, producing paraplegia, have no direct effect on the testicles, but destroy the power to copulate. In the chapter on Atrophy I have given instances of wasting of the testicles succeeding an injury to the spine. In general, desire remains, the seat of the instinct being unaffected; and I suspect that in the cases alluded to,

in which wasting took place, the injury affected other parts besides the spinal cord. The following is a case of temporary impotency consequent on concussion of the spine.—A stout healthy married man, aged forty-five, whilst intoxicated, fell down stairs, alighting heavily on the upper part of his back. Two days after the accident he was brought to the London Hospital. He had lost the power of moving his limbs, especially the lower, and he was unable to void urine. Under treatment, he partially recovered the paralysis in about a month. At this time he confessed to having lost all sexual desires. He shortly regained the power over his bladder, and under repeated blisters to the spine, and subsequently electro-magnetism, he recovered the use of his lower extremities, so as to be able to walk four or five miles. Four months after the accident he had quite regained sexual feeling and power. M. Brachet has recorded the following curious case.—A soldier, after several years' service, experienced, in 1814 and 1815, rheumatic pains, particularly in the lumbar region. In 1816 he had a fall from his horse. By degrees, the lower extremities and inferior part of the abdomen became completely paralysed. For eight years the paralysis remained stationary. Whilst in this state he had two children. The spermatic fluid was secreted, erection took place, and ejaculation followed; but "sans secousse et sans sensation voluptueuse."[1] We must suppose that in this case, although the sensibility of the penis was destroyed, the connexion between the brain and testicles was still maintained by the sympathetic system, which communicated the necessary influence; and that their functions were, accordingly, as little disturbed by the

[1] Recherches Experimentales sur le Système Nerveux, 2nd edit. p. 280.

affection of the medulla spinalis as are those of the important organs of the abdomen in the same disease.[1] But notwithstanding the success of this old soldier, there are few in a state of paraplegia who would not find themselves physically incapacitated. The nux vomica is adapted not only to relieve the paralytic symptoms, but also to restore the sexual powers. The warm baths of Gastein, in Austria, have long enjoyed a great reputation for restoring patients with partial paralysis of the lower extremities, accompanied by more or less complete loss of sexual power. The chemical composition of the water would not account for any remarkable properties in the baths, and as they are situated more than 3000 feet above the sea, it is most probable that their invigorating influence arises from the bracing climate improving the general health.

Varicocele tends gradually to impair the nutrition and diminish the secreting powers of the testicle.[2] Hence the importance of not neglecting this complaint,

[1] M. Brachet performed the following experiments.—Having made sure that a cat a year old had covered several times a female cat with which he was shut up during the day, M. B. divided his spinal marrow between the third and fourth lumbar vertebræ. All behind was paralysed, the rectum and bladder equally so. He kept the animal three days; when, on examining the genital organs, he found them healthy, and the vesiculæ seminales full of semen. This experiment was repeated three times with the same result. The next is given in the words of the experimenter: "Sur un chat de dix mois, je fis la section de la moëlle spinale dans la région lombaire. Comme la paralysie du train derrière mettait cet animal dans l'impossibilité d'exécuter les manœuvres du coït, j'y fis suppléer par une sorte de masturbation. Il fallut plus de tems, mais elle finit par déterminer une éjaculation. Vingt-quatre heures après, je fis répéter la même manœuvre; et une nouvelle éjaculation eut lieu; je la fis encore répéter le lendemain avec le même résultat." (Lib. cit. pp. 289-291). These experiments, though interesting, as showing that the functions of the testicles may be carried on in paraplegia without sensation or any influence derived from the brain through the spinal cord, do not, as Brachet supposed, prove that the secretion of sperm is altogether independent of the influence of the spinal system.

[2] M. Gosselin observed in a case of varicocele on the left side, in which the

though it may produce no painful symptoms. My colleague at the London Hospital, Mr. Hutchinson, is of opinion that the dilatation of the veins is rather the result than the cause of the wasting. He alludes to a series of four cases, remarkably similar in their details, that had come under his care during two years, in which gentlemen in good health, without known cause, all of them married, had experienced the distressing symptom of failure of generative function. In all there was double varicocele and atrophic glands. He had reason to believe that in all four, the patients, both before and after marriage, had been accustomed to very free indulgence. In three out of the four, the patients presented—in respect to muscular strength and build, facial hair, floridness, &c.—the very types of virility and vigour. Mr. Hutchinson concludes that the generative function, being arrested by central disease, the glands which minister to that function waste. The nutritional innervation of the testes and of their vessels is disturbed. The arteries shrink, and the veins dilate.[1] We can easily understand that in atrophy of the testicle, the spermatic veins, from causes which conduce to varicocele, may not shrink and contract in proportion to the wasting of the arteries as is commonly observed in other parts, and I suspect that in Mr. Hutchinson's cases the veins, retaining their normal dimensions, seemed large and varicose in the atrophied state of the testicles, which probably arose from a central cause. The almost constant occurrence of partial wasting of the testicle in varicocele leaves no doubt in my mind that this morbid condi-

testicle was one-third smaller than the other, that after an attack of gonorrhœal orchitis in the right testicle, no spermatozoa could be detected in the semen. Archives Générales, 5ème série, t. ii. p. 268.

[1] London Hospital Reports, vol. i. p. 77.

tion of the spermatic veins impairs both the nutrition and function of the gland, and this is confirmed by the fact that after the obliteration of the dilated veins by operation the testicle has, in some instances, recovered its size and tone. I may add, that varicocele, when limited to one side, need not disturb the mind of the patient. The influence of detention of the testicles in the abdomen and in the groin external to the cavity, on their nutritive condition and functions, has been already considered in a previous chapter.

Diseases which destroy the substance or produce wasting of the testicle necessarily prevent its secreting. The functions, however, of this gland are not very readily impaired by disease; and so long as a small part remains entire, the organ may be fitted to perform its office sufficiently for the end destined by nature. When the testicle is to a great extent disorganized by the exudation of lymph, and forms an open fungoid sore, secretion may still go on under excitement, as is evinced by the presence of spermatozoa in the discharge. This fact shows the importance of the surgeon striving to save the testicle when mutilated either by accident or disease. In double hydrocele the functions of the testicles continue unaffected. After severe or repeated attacks of acute orchitis the glandular structure of the testicle almost invariably manifests a diminution in bulk, and more or less impairment of its secreting powers. In inflammatory affections of the epididymis, although the plastic matter effused amongst the convolutions of the duct is liable to obstruct the tube, the effect is rarely more than temporary, owing partly to the readiness with which such exudations are absorbed,

but chiefly to the absence of a strong fibrous envelope, and the yielding nature of the serous membrane by which it is invested; for, as I have already stated, after inflammation of the body of the testicle, wasting and disorganization of its glandular tissue are not uncommon. Chronic orchitis, as I have previously remarked (page 275), also proves more or less destructive to the organ. It is extremely difficult to obtain satisfactory evidence of the effects of disease on the functions of the testicle in cases in which there is no absolute diminution of its bulk, not only for the reasons stated at the commencement of this chapter, but also in consequence of the rarity of both glands being seriously affected, and the greater rarity of their both suffering in precisely the same degree. At page 285 I have related the case of a gentleman, thirty-two years of age, both of whose testicles had been excised on account of chronic strumous orchitis, the right having been removed seven years after the excision of the left. At the time of the second operation the capacity for intercourse still existed, though in diminished force, coition having occurred only a week before. On examination of the diseased right testicle I could find but little trace of tubular structure, the enlarged organ consisting of a mass of lymph, with scrofulous pus in the centre In the case related at page 296, of double fibrous degeneration after chronic orchitis, in which the right testicle was excised, and the left was much reduced in size and extremely indurated, the patient, a young married man, stated, two months after treatment had ceased, that he retained satisfactory power of coition, but a very scanty emission of fluid followed. Vidal has related the

following cases.—In a robust man, aged twenty-nine, affected with syphilis, the left testicle swelled to a great size, and was removed by operation. Two years afterwards the right testicle became very large and hard, and the seat of sharp lancinating pains. Viewing the disease as syphilitic, M. Vidal prescribed the iodide of potassium, under which treatment the enlargement subsided, and the testicle recovered its normal state in three months. The man was afterwards much addicted to sexual pleasures, and contracted gonorrhœas.[1]—A carman had one testicle, the right, undeveloped, and detained outside the inguinal canal. The left was attacked with syphilitic disease, which subsided under treatment without impairment of sexual power.[2] M. Vidal, whilst admitting the injurious effects which generally result from syphilitic inflammation of the testicle, adduces these cases to show that the organ is not invariably damaged either in structure or function by the disease, a conclusion which my own experience enables me fully to confirm. He has also related a case in which, after an attack of double orchitis in a man aged fifty, one testicle became atrophied and the other hypertrophied. True hypertrophy of the testicle is so rarely observed under any circumstances, even in early life, that we may fairly hesitate to admit the enlargement to have been due to an excess of nutrition. It was most probably occasioned by unabsorbed inflammatory exudation. The injurious effects of chronic orchitis ending in a fungous growth, and perhaps of the treatment by excision, are shown in the following case described by Mr. Lawrence.[3]

[1] Traité de Pathologie Externe, t. v. p. 461.
[2] Mémoires de la Société de Chirurgie de Paris, t. iii.
[3] Edinb. Med. and Surg. Journal, vol. iv. p. 262.

—In a man, aged twenty-three, the right testicle became hard and painful, and in four months the skin burst, and a growth projected which the surgeon gradually cut away, and the parts cicatrized. The cord could be traced to a small lump connected to the cicatrix. A month later, the left testicle became affected in a similar way, and a fungus arose, which was destroyed by lunar caustic, and a cicatrix ensued. Mr. Lawrence adds that the man had lost all venereal appetite since the left testicle began to swell.

Certain affections, as carcinoma, generally extend until the glandular structure is wholly destroyed. But, as I have just remarked, it is very seldom that both testicles are disorganized; and the remaining one, if sound and well developed, is fully sufficient for the purpose of reproduction. In a case of detained right testicle affected with carcinoma, related at page 334, the patient, a young man, his left testicle being sound and in the scrotum, married fifteen months after the commencement of the disease. The same holds good when one testicle has been removed by operation; but in the adult, when both are extirpated or destroyed, the patient becomes sterile, and generally, but not necessarily, impotent. The question has been raised, and was at one time much discussed in Germany, whether a person castrated after arriving at the age of puberty may not retain the power of procreating for a certain period afterwards. The following case bearing on the point is recorded by Sir A. Cooper.—A man had one of his testicles removed in 1799. In June, 1801, the other testicle was removed by Sir A. Cooper in Guy's Hospital on account of a chronic abscess. He had been married prior to the loss of one testicle. Four days after the second operation it was found that he had had during

the night an emission, which appeared upon his linen. After he had recovered and quitted the hospital, Sir A. Cooper repeatedly visited him for many years. For nearly the first twelve months he stated that he had emissions *in coitu*, or that he had the sensations of emission. That then he had erections and coitus at distant intervals, but without the sensations of emission. After two years he had erections very rarely and very imperfectly, and they generally immediately ceased under an attempt at coitus. Ten years after the operation he said he had during the past year been once connected. In 1829 he visited Sir A. Cooper, because he was a severe sufferer from piles. He then stated that for years he had seldom any erection, and then that it was imperfect; that he had no emissions from the first year of the operation; that he had for many years only a few times attempted coitus, but unsuccessfully; that he had once or twice dreams of desire, and a sensation of emission, but without the slightest appearance of it. The penis was shrivelled and wasted. He shaved once a week, and sometimes twice. His voice, naturally rather feeble, remained as at the time of the operation.—Mr. Wilson performed the operation of double castration on a married man for carcinomatous disease of the testicles. The wounds cicatrized in little more than a month, and he survived the operation two years. He assured Mr. Wilson that after the removal of the testicles he had occasional erections, not unaccompanied with desire, and which, when as a married man he indulged, were attended with the usual paroxysm and emission of some fluid.[1]—The gentleman, the subject of double castration, whose case is described at page 285, visited me four and a half years after the last operation. He was stout and puffy looking. His

[1] Lectures on the Urinary and Genital Organs, p. 133.

moustache and whiskers were thin. He stated that up to that time he had continued steady intercourse with his wife about once a fortnight, but without emission.

In determining the question alluded to, we must not confound the power to copulate with that of impregnation. It has been seen that the loss of the testicles so affects the brain as completely to extinguish the sexual instinct; but this is an effect which is not immediate, but takes place, in many instances, very gradually, as is clearly shown by the preceding cases: hence we must admit that the castrated individual may experience desire, have erections, accomplish the coitus, and even emit fluid for many months, and even years, after recovery from the operation. But the fluid which is essential to the propagation of the species is the secretion of the testicles, none of which can of course be elaborated after the removal of both glands. The question then resolves itself into this—how long may the seminal fluid already formed remain in the excretory ducts and vesiculæ seminales in a condition to impregnate the female? Much, of course, must depend on the state of the testicle or testicles at the period of the operation. If the gland last removed were thoroughly disorganized, taking into account the period previous to the operation since which the organ could have been in a condition to secrete, and the time occupied in the healing of the wound, which, together, cannot be estimated at less than eight or nine weeks, we may decide that in such a case the castrated patient would be unable to impregnate; since in the numerous examinations which I have made of the fluid taken from the vesiculæ seminales and vasa deferentia of hospital patients who have died of various chronic diseases, I have never found spermatozoa in them at a later period than seven weeks after their admission, or

after they had possessed the opportunity of having sexual intercourse. In a case, however, in which the testicles were sound and capable of secretion at the time of castration, it must be concluded that a sufficiency of the spermatic filaments may remain in the excretory ducts and vesiculæ for two or three weeks after recovery from the operation in the usual period, so as to allow of the possibility of impregnation being effected, improbable as such an occurrence must undoubtedly be regarded.

Some error has prevailed respecting the effects of chronic constitutional diseases in impairing the functions of the testicles. Thus, consumptive individuals are supposed to be more than ordinarily addicted to sexual pleasure; and it has been stated that they have retained the power and propensity to gratify it up to the very day of death. Louis made careful inquiries in reference to this point, and found in every instance that the tendency to sexual intercourse declined with the increase of general weakness and other symptoms, almost exactly as is the case with individuals labouring under any other affection. The accuracy of this statement is confirmed by my own observations and inquiries. I examined the testicles of four persons who had died of pulmonary consumption, and found that they were all below the average weight and size of those of healthy adults. In the testicles taken from the bodies of twelve phthisical patients examined in the London Hospital, no spermatozoa could be detected in the fluid obtained from the substance of the gland and epididymis. In several of these cases, the contents of the vesiculæ seminales were likewise examined, and found destitute of spermatozoa.[1]

[1] Dr. Davy examined microscopically the fluid taken from the divided substance of the testicle of twelve persons who died of phthisis, but in no instance discovered spermatozoa; but he found them in several instances

Rayer has also remarked that the vesiculæ of phthisical patients afford few or none of these bodies.[1] The testicles of persons who die of chronic lingering diseases are almost invariably soft and inelastic. Their glandular structure seems to contain but few blood-vessels, is pale, apparently shrunk and dry, and the little fluid that can be squeezed from it is destitute of spermatic cells.

A fit of dyspepsia is an occasional cause of temporary loss of virile power. A gentleman, after a separation of many weeks from his wife, on his return was much alarmed by finding himself incapacitated. On inquiry, it appeared that he had dined imprudently, and had suffered from indigestion and heartburn during the night. Virility is more permanently affected by organic disease of the abdominal viscera ; but there are few complaints which have greater influence in impairing the generative functions than those in the kidneys. Diuretics, as the nitrate of potash, carbonate of soda, &c., are well known to act as anaphrodisiacs. In irritative dyspepsia, with deposits in the urine of the earthy phosphates or oxalate of lime, there is generally more or less inability. Impotency in these cases is only one of the manifestations of defective assimilation and depressed vital force: though it is often the symptom which chiefly attracts the attention of patients. They are observed to lose flesh, and to have a quick irritable pulse. They are weak and readily fatigued, feel unfit for either bodily or mental exertion, sleep badly, and are subject to excessive depression of spirits, and sometimes complain of a deep-seated dull aching sensation in the loins. Though in both these forms of urinary

either in the vesiculæ seminales or vasa deferentia. Edinb. Medical and Surgical Journal, July, 1838, p. 1.

[1] Archives Générales de Médecine, Août, 1842, p. 487.

disorder the generative force is generally deficient, the defect is greater and more marked in dyspepsia, attended with deposits of the oxalate of lime, than of the phosphates, and the power is often altogether lost. The late Dr. Golding Bird, who first drew the attention of the profession to the oxalate of lime as a common deposit in the urine, ascribed the impotency attending it to the exhaustion produced by the excessive secretion of urea so common in this affection.[1] Dr. Begbie has described the symptoms of the irritative form of dyspepsia, in which the oxalate of lime abounds in the urine, with great accuracy; and in his valuable paper has related several well-observed cases of this affection. He noticed in the more confirmed forms a complete prostration of the virile powers.[2] In some of the cases which have fallen under my notice, the patient has been affected slightly with spermatorrhœa, to which the sexual weakness was attributed, the chief cause having been quite overlooked. On making a microscopic examination of the cloudy urine I have sometimes excited surprise by the announcement that, instead of spermatozoa, it contained abundance of octohedral crystals—an indication of impaired digestion, not of seminal waste. It has been stated, that the presence of these crystals is a pretty sure indication of the existence of spermatorrhœa. They are found, it is true, very generally in the urine of persons labouring under this complaint, but I quite agree with Dr. G. Bird that oxalate of lime constantly occurs where no suspicion of an escape of semen can be entertained. In all instances of dyspepsia with impotency, the surgeon should make a careful examination of the patient's urine, and by doing so he will often be

[1] Bird on Urinary Deposits, 3rd edit. p. 231.
[2] Edinb. Monthly Journal, Aug. 1849.

able to detect a cause for the weakness quite within the reach of remedies. The treatment of such cases by careful regulation of the diet, and the administration of the mineral acids and other remedies calculated to check the formation of the urinary deposits, and to improve the general health, is indeed very successful in restoring sexual vigour. The phosphatic deposits occurring in dyspepsia are in general more readily corrected by treatment than those of the oxalate of lime. Patients suffering from the latter often require careful and prolonged treatment before the mal-assimilation which leads to it is corrected. In cases in which the generative functions have been previously weakened, and the general health deranged by excessive indulgence in coition, masturbation, or long-continued involuntary emissions, the results are not always satisfactory. Dr. Golding Bird mentions the case of a gentleman who committed the gross folly of testing his powers previous to marriage, by sleeping with two women. The result was an epileptic fit; and from that moment he has been paying a heavy penalty for his indiscretion in the persistence of the symptoms of oxaluria in an aggravated form.[1]

In diabetes and albuminuria the reproductive organs are weak and often quite inactive.—A married gentleman, aged forty-eight, consulted me on account of loss of sexual power. I found on inquiry that he voided urine in large quantity. It was pale, feebly acid, and slightly albuminous, its specific gravity being 1·012. Under treatment adapted to correct the disordered actions of the kidneys, he entirely regained his virile powers. Several cases of impotency in men between twenty and thirty years of age, whose urine has remained feebly albuminous long after an attack of scarlet fever, have come under

[1] Lib. cit. p. 234.

my notice.—A gentleman, aged twenty-eight, a tall fine man, but not in vigorous health, consulted me in 1862 on account of loss of sexual power. On inquiry I found that his urine was albuminous, sometimes faintly, at other times highly so. This state of urine had existed eleven years, having originated in an attack of scarlet fever. Remedies had very little influence upon it.—I was consulted by a clergyman, aged twenty-seven, who had been attacked with scarlet fever two years before, after which his urine remained slightly albuminous for some months. He afterwards married, but his erections were feeble, and he was unable to effect more than a partial connexion. He had taken the muriated tincture of iron with tincture of cantharides, and had gained some strength after a good many doses, but he lost ground directly the medicine was discontinued. I prescribed a pill of the extract of nux vomica at night, and gradually increased its strength, under which treatment he rapidly acquired satisfactory power, which had not declined when I saw him some time afterwards.

Impotency sometimes occurs in middle life without any obvious cause. In such persons I have noticed a constitutional change, similar to that which takes place in eunuchs. They have been observed to grow sleek and corpulent, to have a scanty beard, and to be indisposed to active muscular exertion. In general, they evince no unhappiness at their altered condition. This state is far from hopeful, but the following case affords encouragement.—In 1853, I saw, with Mr. Arthur, of Shadwell, a publican, aged forty-one, of a full florid complexion, married, and the father of a family. He complained of defective sexual power, and stated he had been strong in this respect, and had experienced no

failure until about twelve months previously, during which period he had grown remarkably stout. He experienced scarcely any inclination for sexual intercourse, and had lost almost entirely the ability to indulge in it. He had been slightly affected with gout a few weeks before, but he was quite free from it and in good health at the time of his consulting me. His chief annoyance arose from his wife suspecting him of infidelities in consequence of his neglect of marital duties. His testicles were of proper size, but somewhat soft and flaccid. I formed rather an unfavourable prognosis in this case, but recommended his taking the ergot of rye with quinine, plenty of exercise, and paying careful attention to his health. He took the medicine for a fortnight, and then left town for change of air. After his return, in about three months, he called on Mr. Arthur, who found that he had lost weight considerably, was more capable of taking exercise, and that he had no occasion to complain of inability.

In atonic impotency the external organs afford indications of the want of power. Not only are the testicles soft and flaccid from the absence of blood in the vessels and sperm in the tubes, but the penis is small and shrivelled, and the surface of the glands relaxed. The scrotum is also loose. These parts are pale, often feel cold, and their sensibility to contact is diminished. The patient, too, complains of the dull lifeless condition of his penis, owing to the languid state of the circulation there.

In the preceding observations, whilst explaining the various causes impairing the functions of the testicles, I have, for the most part, indicated the nature of the treatment required for their restoration. Certain medicines, reputed to possess the property of stimulating and

invigorating the sexual organs, have been classed as *aphrodisiacs;* and some of them are said to be used, especially in the East, by the sensualist, to excite the organs when exhausted by satiety and excess. Several of these remedies act on and stimulate the urinary apparatus, and thereby give a temporary power to the function of erection; but they produce little or no effect on the special sexual organs. They act much in the same way as hæmorrhoids, affections of the prostate, and calculi in the kidney or bladder, the irritation of which often determines blood to the penis, and causes morbid erections without any voluptuous sensations or desires. Such appears to be the nature of the influence produced by cantharides, the most common of this class of medicines, and the chief ingredient of quack remedies for impotency. There are, however, a few cases of defective sexual power in which the use of cantharides would be proper. In an atonic state of the organs, in which the erections are feeble, unstable, and insufficient, a small dose of the tincture of cantharides may be given every three or four hours for a short period before the occasion arises for the exercise of the sexual functions. Bayle states that Leroy and Bouttatz experimented on themselves with phosphorus, and found that it produced strong excitement of the genital organs. The same was observed in animals to whom Leroy gave this remedy.[1] Phosphorus seems to act much in the same way as cantharides, irritating and stimulating the urinary organs, and determining the blood to these parts, and no doubt its effects would be equally injurious in many cases of impotency. Nux vomica is also in repute as a remedy in these cases, and I have given it in many instances with undoubted advantage. M. Trousseau found nux

[1] Bibliothèque de Thérapeutique, tom. ii. p. 124.

vomica successful in impotence, but he noticed in some cases, that its effects, like those of other stimulating remedies, were manifested only whilst the patients were taking the medicine. A young man, twenty-five years of age, of an athletic constitution, who had been married for eighteen months without having any other than almost fraternal communications with his wife, acquired his virility under the use of nux vomica, though he again lost it soon after leaving off its employment.[1] M. Duclos, of Tours, speaks highly of the efficacy of the alcoholic extract of nux vomica. He divides 75 grains into 100 pills, of which he gives one every night, gradually increasing the number every five days until three or four are taken night and morning.[2] A combination of phosphoric acid and strychnia is an effectual remedy in suitable cases, and one which I have often prescribed with advantage. In addition to these remedies, stimulating liniments may be rubbed into the loins and nates.

The condition to which these aphrodisiac remedies are applicable, is chiefly that in which the intromittent organ is but feebly excited, and does not maintain the physical state necessary for penetration, or the period of congress. Such torpidity may exist in persons in whom desires are at times strongly felt, and the functions of the testicles properly performed. In these cases, also in timid persons, and in others whose organs are inexcitable from long disuse, stimulating treatment may conduce to success, and ensure confidence for the future. But these remedies exert no animating influence in that apathy of the sexual faculty alluded to at page 405. They also have rarely more than a temporary effect; and in per-

[1] Pereira's Materia Medica, 2nd edit. vol. ii. p. 1305.
[2] Bull. de Thérap. t. xxxvi.

sons advanced in life, when the parts, having fulfilled their office, are experiencing the natural decline, they operate injuriously, and, I believe, tend to produce congestion of the prostate, and local disease. In those cases, also, in which the sexual organs are weakened or prematurely exhausted by excess, they are likewise hurtful as well as fruitless. After such abuses, a period of repose is required, and by the avoidance of all sources of excitement, and by a diet and remedies adapted to invigorate the body, we may hope for a gradual restoration of the procreative functions.

There is a remedy for impotency which I sometimes recommend—viz., electro-magnetism. Interrupted currents (Faradic) may be passed in two directions, from the perineum to the glans penis in cases of defective erectile power, and from the groin along the spermatic cords to the testicles, in cases where these organs are soft and flaccid, and when secretion is languid. This treatment has generally been conducted for me by Dr. Althaus. As might be expected, the results are often disappointing, but sufficient success has resulted from the remedy to induce me to give it a trial in cases where other means have failed. In some cases of impotency in which the desires are strong but the erections feeble, the sensibility of the glans penis is so lowered that the friction of coition is incapable of maintaining prolonged distension of the organ, and erection subsides shortly after penetration and before completion of the act. In such cases a few applications of the electric current render the glans penis more sensitive, and in this way cause a more persistent distension of the organ under the natural excitement. Electro-magnetism succeeds more frequently in impotency of this character than when, in addition to defective erec-

tion, the desires are feeble and the testicles soft and inelastic ; and yet the repetition of the remedy has succeeded in some instances of this less hopeful kind in rousing a dormant power, causing secretion to be resumed and erections to return.

Before leaving this subject, I must notice certain physical causes for impotency, the consideration of which, though not strictly within the scope of this work, will tend to the completeness of this Section.

The rigidity and efficiency of the intromittent organ may be impeded by exudation of plastic lymph in the cells of the corpus spongiosum or corpora cavernosa. An interruption in the former is the more important, as it not only causes imperfect erection, the penis being bent towards the perineum, but also prevents the distension of the glans and the irritation of the sensitive nerves which ends in seminal ejaculation. In the following case impotency arose from this cause.—A robust man, aged thirty-three, enjoying good health, consulted me on account of incompetency. It appeared that about two years previously he had suffered from an attack of gonorrhœa, which had caused suppuration in the corpus spongiosum a little below the glans penis. The abscess had been opened freely by a surgeon, and the part afterwards healed, but ever since his erections had been imperfect, and his penis curved as in chordee, so that he had considerable difficulty in effecting penetration, and no emission followed. His desires were strong, and he was anxious to marry. On examination I found the sexual organs well developed. Beneath a cicatrix just below the glans there was considerable induration of the spongy part of the penis. It appeared on inquiry that the glans penis was not properly distended under excitement, whilst the corpora cavernosa

being filled as usual, the part became curved. Stimulating mercurial ointment was directed to be rubbed in over the induration. At the end of three weeks the hardness was diminished, and the patient stated that the organ was more equally distended. I did not see him again, but conclude that the induration disappeared and the part became restored under a continuance of the treatment.

A permanent obstruction in the corpus spongiosum is extremely rare. The extension of inflammation from the urethra to this part which gives rise to chordee always subsides without leaving any impediment to the passage of the blood. I have seen the corpus spongiosum freely cut into in operations for impenetrable stricture, and in conjunction with the urethra completely divided, both by the surgeon and accidentally, and yet the part has been afterwards perfectly restored so as to undergo the usual distension in erection of the penis.

Though less intimately connected with the urethra, and less liable to temporary obstruction from inflammation, the corpora cavernosa are much more subject to consolidation and permanent obstruction than the corpus spongiosum. The induration is usually situated in the dorsum of the penis near its root. When examined it generally feels like an oval mass of cartilage, but is sometimes less defined and somewhat superficial. Both corpora cavernosa are generally affected, so that the penis when excited is curved towards the abdomen. But the induration may be limited to one, in which case the curvature is lateral as well as towards the pubes, the organ assuming somewhat of a spiral twist. Ricord has noticed this affection as one of the sequences of gonorrhœa. I have never met with an instance in

which it arose from this cause. In all the cases which have occurred to me the patients had reached or passed middle age. Mr. H. J. Johnson, the only English writer I know off, who has noticed this condition of the penis, has recorded four cases, in all of which the subjects of it had attained the middle period of life.[1] The induration appears to result from chronic inflammation. It may occur from contusion or some strain of the fibrous tissue of the part in coition, but also forms without any obvious exciting cause. The persons most subject to it are those who have led intemperate lives, and I suspect it is sometimes connected with a gouty habit.—A married man, aged forty-nine, in the employ of the Customs, was brought to me by Mr. Tomkins, of Hackney, for my opinion respecting an inconvenient induration at the root of his penis. On examination I found a hard lump of an oval shape in the substance of the corpora cavernosa about half an inch from the pubis. It had not been observed longer than three weeks, and it occurred without any obvious cause. The man stated that his penis, when erect, curved awkwardly towards his abdomen. In early life he had lived freely, and he had been subject to rheumatism in his ankle and hand. I recommended his taking a blue pill at bed time, and the tincture of iodine to be painted over the part, but with what result I have not been able to ascertain.

In the two following cases the affection came under my notice incidentally:—During an attendance on a gentleman, aged forty-five, who had a troublesome sloughing sore on the foot, my attention was called to the state of his penis. I found a remarkable defined induration of almost cartilaginous hardness across the dorsum near the root, which the patient stated had

[1] Lancet, vol. ii. 1851, p. 481.

formed gradually without any obvious cause. Since he had observed it, his virile powers had declined, and his penis when distended, which occurred only feebly, was bent backwards. The part was directed to be painted with the tincture of iodine. A few months after the healing of the sore leg, the patient, who was a wine merchant and a free liver, died of internal disease.—In 1851 I saw, in consultation with Mr. Lane, a gentleman about sixty years of age who had a hydrocele after an inflammation of the testicle which originated in disease of the prostate gland. He also complained of a hardness at the back and root of the penis, and of the organ being bent during erection. This state of the penis had existed for six years. In this last case the complaint was of too old duration to yield readily to treatment, and the patient was not much concerned about it. The remedies most applicable consist chiefly of mercury and iodine applied locally, and also taken internally in small doses for a lengthened period. During the treatment the patient should live temperately, and strictly avoid sexual excitement.[1]

SECTION II.

STERILITY.

STERILITY is a condition which has usually been restricted in its application to the female, or in the male, has been confounded with impotency; and until recently our knowledge of the impaired functions of the male repro-

[1] M. Petrequin relates that a patient of M. Regnoli, of Pisa, had an ossification of the corpora cavernosa which supervened on a contusion of the pelvis, and caused an incurvation of the penis when erect. The ossified portion, which did not include the entire thickness of the corpora cavernosa, was excised. No bad symptom occurred, and the power of erection remained.—Br. and For. Med. Rev., July, 1845.

ductive organs has not warranted any distinction being drawn between an incapacity for sexual intercourse and an inability to procreate. Recent researches, however, have shown that a want of aptitude to impregnate may co-exist with the capacity for sexual intercourse; or in other words, that man is subject to *sterility*, independently of *impotency*.

Sterility in man may arise from the following causes: 1. Malposition of the testicles. 2. Obstruction in the excretory ducts of the testicle. 3. Impediments to the escape of the seminal fluid. 4. Aspermatismus, or non-ejaculation.

Sterility from Malposition of the Testicles.—In a previous Chapter (page 27), I have stated that a testicle which does not pass into the scrotum is nearly always small in size and often undeveloped, not having undergone the enlargement and change in structure which take place at puberty; and I have also adduced some remarkable evidence, both from man and the lower animals, to prove that a testicle thus detained fails to secrete a fertilizing fluid, and that a male with this defect on both sides, though often potent and efficient for sexual intercourse, is incapable of impregnating the female.

The following striking cases have come under my notice in practice:—

In 1859 a gentleman, aged thirty-eight, consulted me under the following circumstances:—His testicles had never properly descended into the scrotum, and though not deficient in copulative powers, he had been married eleven years without his wife becoming pregnant. He was desirous of knowing whether this was owing to any fault in himself. In external development this gentleman had all the attributes of the male sex. On exa-

mination, I found his penis normal, and his testicles small in size, the right being less than the left. Both were lodged in the groin, just outside the outer ring. The right could be easily pressed up into the inguinal canal, through rather a large external ring. Pressure on the left caused it to recede into the upper part of the thigh, just below Poupart's ligament, where the integuments were loose. When the left testicle became thus displaced, which occurred occasionally, the patient felt uneasiness, referred to the navel. The scrotum was small and imperfectly developed; the left testicle could be depressed into it by a little force. He stated that he performed the sexual functions about twice weekly, and when younger had done so more frequently. The fluid emitted in intercourse was carefully examined by myself and Dr. Andrew Clark separately, on three occasions, at intervals of about a week. It was found to be destitute of spermatozoa. With the view of forcing the left testicle into the scrotum, and retaining it there, I recommended his wearing the moc-main lever truss, but this treatment was not persevered in.

In 1852 I was requested to see an inmate of a charitable asylum, a youth, aged eleven, whose testicles had not passed into the scrotum. The right was lodged just outside the external ring; the left was not discernible at all. He had no scrotum. In 1861, at the age of twenty-one, he again came under my notice. He was rather short in stature, but had a masculine development. He wore a moustache, and had abundance of hair on the pubes. His penis was rather large. He held a clerk's situation in the city, and had been married twelve months. He stated that he had frequent intercourse with his wife, followed by ejaculations. She had not become pregnant. Some fluid obtained from the

urethra immediately after sexual intercourse was sent me on two occasions, the second being after an interval of eighteen months. It was carefully examined by myself and others, and found to be destitute of spermatozoa.

In April, 1861, I saw, with Mr. Duchesne, of Woodford, a gentleman, aged forty-six, a married man, who had serious disease of the left testicle, which had commenced about a month previously. The gland, being quite disorganized, was removed by me on the 22nd. The wound healed favourably. During my attendance I noticed that the right testicle had not emerged from the abdomen. After his recovery, and quite two months after the operation, he had intercourse with his wife. The fluid emitted was examined, but no spermatozoa could be discovered in it.

In March, 1863, I was consulted on the propriety of marriage under the following circumstances :—A gentleman, thirty-nine years of age, stated that about fourteen years ago he was in the habit of frequent sexual intercourse, when one night after connexion the left testicle was attacked with violent inflammation, which was followed by a gradual wasting of the gland. The right testicle was small, and had not fairly passed into the scrotum. The sexual appetite was keen, and coition was effected with ease, the emission being fairly copious. My patient was healthy and moderately robust. The left testicle was reduced to the size of a pea; the right was properly formed and tolerably firm, but quite small, like an undeveloped testicle before puberty. Some fluid emitted in sexual intercourse was sent me on two occasions. In both instances it was thin and destitute of spermatozoa. I consequently gave an opinion adverse to his marrying, on the ground that he was unfit to procreate—that his wife would be barren.

The facts which have been adduced, as opposed to the conclusion that cryptorchics are sterile, are chiefly instances in which they are reputed to have procreated children. Mr. Poland relates that a man, aged twenty-nine, once in the Dragoons, was admitted into Guy's Hospital on account of an omental hernia. His testicles had not descended, and there was no scrotum. The penis was well developed, and he had all the other signs of virility. He married when he was twenty, had two children by his first wife, and had been married two years to a second wife.[1] Mr. Cock has mentioned to me the case of a man whose testicles had not descended, and in whom the virile functions were perfect. He had married twice, and had children by each wife. He was a man of dissipated habits, and had served in a public-house. Mr. Durham has communicated to me the particulars of the case of a man with double oblique inguinal hernia, and with both testicles lodged in the inguinal canals. He was a well-grown, healthy labourer, aged thirty-two, and was operated on by Mr. Durham, in Guy's Hospital, in consequence of strangulation of the hernia on the left side. The patient recovered favourably. The left testicle was exposed and handled during the operation. It was smaller than usual. He had a masculine development,[2] was married, and his wife had borne him two children. He stated that since puberty he had experienced strong sexual desires, and had always been competent. No opportunity was afforded for the examination of his seminal fluid, and the man scouted the idea of his testicles being inefficient.

[1] Guy's Hospital Reports, Second Series, vol. i. p. 162.

[2] I visited the man in Guy's Hospital, and can bear testimony to his manly appearance.

I feel no little hesitation in calling in question the claims to paternity in instances of this kind, but it is remarkable that as yet no case has been found in which a retained testicle has been fully proved to be capable of secreting a fertilizing fluid. The observations previously referred to seem sufficient to show that, as a rule, they do not; and although I see no valid reason why there should not be exceptions—and Mr. Durham's case may possibly be one—still, the evidence is wanting to establish the exception in either of the instances of reputed paternity which I have mentioned. Dr. Debrou (d'Orleans) relates the case of Lebert, a man aged forty-two, who died in the Hôtel Dieu, at Orleans, of strangulated inguinal hernia on the right side, after four days' illness. After death both of his testicles were found in the inguinal canals, the scrotum being wanting. The body in other respects was that of a robust, well-formed man. He had been married, and was said to have liked intercourse with his wife, who had borne him a son, then eight years of age. His testicles, which were normal in structure, were carefully examined by Gosselin, and by Godard separately. They were unable to discover spermatozoa in either of them.[1] Dr. Debrou adduces this case as an argument to show, that the spermatozoa are not necessary to the fertility of the semen; but as their presence is admitted by the best physiologists to be essential, and as they are constantly found in the testicles of robust men, it is fairly open to question whether the impregnation of the wife was not due to another source than the legitimate one.

Dr. Alfred Taylor, in his valuable work on the Principles and Practice of Medical Jurisprudence (1865), in reviewing the facts which are adduced in my memoir in

[1] Gazette Hebdomadaire de Médecine et de Chirurgie, t. viii. 1861, p. 3.

the British and Foreign Medical Journal (April, 1864), on the subject of sterility from retention of the testicles, remarks (page 867), "it is incontestably established that cryptorchides are not necessarily sterile." Dr. Taylor assumes as indisputable that in the instances of reputed paternity which I have just mentioned, the children were the offspring of the putative father, thus claiming for evidence obtained from persons leading a low dissolute life, and from other cases also doubtful, the value of ascertained facts and the weight of exact knowledge. He argues that in these cases the spermatozoa were not proved to be absent, which is true enough, since no opportunity was afforded for looking for them. On the other hand, they have been found absent in every case of retained testicle, without exception, in which search has been made for them.[1]

2. *Sterility from Obstructions in the Excretory Ducts of the Testicle.*—In a previous Chapter (page 237), I have noticed the occurrence of exudation matter in the cavity as well as in the walls of the excretory ducts of the testicle in attacks of epididymitis, and I have stated that these changes sometimes produce complete and permanent obstruction of the canal. In 1853, Gosselin made known some curious researches in relation to this subject.[2] He carefully examined the semen in twenty individuals who had been attacked with double epididymitis after gonor-

[1] Dr. Taylor has recently called my attention to a case related by Casper (Gerichtliche Medicin, Theil 2, Fall 87, p. 187), of a boy, only fourteen and a half years of age, whose testicles were small and retained close to the rings. He was accused of unnatural crime upon a boy eight years of age. Sixteen days after the act spermatozoa were detected by Casper in stains upon the cryptorchic's shirt. This case cannot be regarded as *conclusively* proving that fluid containing spermatozoa was emitted by the boy. The possibility of the discharge coming from another source will readily occur to the minds of many.

[2] Archives Générales de Médecine, 5e série, t. ii.

rhœa. In fifteen of these cases, which were comparatively recent, a callosity existed in the tail of the epididymis at the time that they seemed to be cured. In all, the genital functions appeared fully restored and the sperm normal. The semen was repeatedly examined at intervals of several weeks, but no spermatozoa were detected. Gosselin lost sight of all but two cases, and in these the return of spermatozoa in the semen occurred after some months, and coincidently with the complete disappearance of the induration in the epididymis on one side. In the remaining five of the twenty cases the double epididymitis had occurred several years previously. One man, aged forty-five, had been attacked twenty years before, but the left callosity no longer existed, and spermatozoa were found in the semen. In another man the disease dated back five years, and had left a considerable induration at the lower part of each epididymis. The general health was good: no spermatozoa could be detected. In the three other cases the disease had occurred ten, six, and four years before. There was hardness on both sides. The testicles were otherwise unaltered. The indications of virility were quite satisfactory, and the semen presented its usual appearance. The individuals had all been married several years, but had no children. The sperm was carefully examined, and found destitute of spermatozoa. One of them had had children by a former wife before the attack of double epididymitis. Since the publication of the preceding observations, Gosselin met with two cases of men who, after suffering from bilateral epididymitis during their youth, had retained an induration on each side. They had been married several years and had no children. In both the virile powers were not, apparently, weak, but the sperm was entirely wanting in spermatozoa.[1]

[1] French translation of this work, p. 288.

The following cases show the importance of these inquiries:—

A stout, well-built man, aged forty-two, a widower, desired to obtain my opinion on the propriety of marriage. In early life he had indulged freely in sexual intercourse, and at the age of twenty-eight contracted a gonorrhœa, which was followed by double orchitis. This did not cause any loss of power, and at the age of thirty he married a young healthy woman. His wife had no children, and died ten years after the marriage. He then formed an illegitimate connexion with a young woman who had previously borne a child, but his acquaintance with her did not lead to her becoming pregnant. He stated that his sexual powers had declined slightly within the last two years, but he was quite efficient. He had repeatedly experienced uneasiness in the testicles the day after sexual intercourse. The question submitted to me was his ability to procreate children, as he contemplated a second marriage in the event of a decision in the affirmative. I found the right testicle of fair size, the left somewhat small, and both rather flaccid. In the lower part of the epididymis of each testicle there was a firm induration a little tender on pressure. Some discharge emitted in sexual intercourse was brought to me for examination. It was whitish, turbid, and glutinous. There was no trace of spermatozoa or spermatic granules. I gave my opinion that, in the event of marriage, his wife would be barren.

In 1860, a strongly-built man, aged forty-four, who had just arrived from a distant colony, consulted me in the following difficulty:—Twelve years ago he married a healthy young woman, who bore him a child, now eleven years of age. Two years after marriage he got a chill after a long fatiguing ride in wet boots. He was seized with pain in the loins and bladder, had

turbid urine and an urethral discharge, and was afterwards attacked with double orchitis. He became weak and emaciated, and was laid up five or six weeks. On recovery from this illness he found his sexual powers diminished, but he stated that they were still strong, and he was capable of indulging two or three times a week. His wife, however, had not conceived again. She was dissatisfied, desiring to increase her family, and believed he was at fault. It was arranged between them that he should seek advice in the mother country, and in the event of his returning without the ability to beget children, that they should separate. His testicles were rather small and flaccid. At the lower part of the epididymis of each gland there was a distinct induration, and the swellings were morbidly sensitive. The fluid emitted during erotic dreams was examined on two occasions. It was thin, and entirely wanting in spermatozoa. After experiencing sexual desires he had uneasiness in the testicles. I gave the opinion that he was incapable of procreation; but I also ventured to intimate that, however great might be the desire for children, sterility acquired after marriage was not a sufficient ground to justify a separation, especially as he was able to gratify his wife, though not to make her a mother. He gave me to understand, nevertheless, that the arrangement would be carried out.

A medical gentleman of my acquaintance, aged forty-five, moderately robust, contracted syphilis twenty-five years ago, and the next year had an attack of acute orchitis on the left side. This was followed by complete atrophy of the testicle, the organ being reduced to about the size of a French bean. He suffered at the same time from epididymitis on the right side. Slight secondary symptoms occurred during nearly ten years,

but since then there has been no trace of the disease. He married thirteen years ago. His right testicle is of fair size, but there is decided enlargement and induration of the epididymis. He has never been deficient in virile power, and the emissions have been abundant. His wife has never become pregnant. Between three and four years ago, he had occasion to examine the urine of a patient containing spermatozoa, and for the sake of comparison placed some of his own semen in the microscope. He was surprised to find it entirely destitute of spermatozoa. Since then he has frequently searched for them in the fluid emitted in sexual intercourse, but had never succeeded in finding any.

A gentleman, aged thirty-eight, who had resided much in warm climates, consulted me on account of failing powers. He had been twice married and had eight children, the last being two years of age. About nine years ago he had an attack of epididymitis on the right side. This ended in an abscess, which was lanced, leaving a sinus which has never healed, and he is subject to a slight discharge from it. Inflammation attacked the epididymis on the left side two years and a half ago, and was followed by an abscess, which burst spontaneously and terminated in a sinus. There are still swellings in the part on both sides. He says that his emissions in intercourse are scanty, and that his powers are gradually getting weaker. The fluid emitted in connexion was examined on two occasions and found to be destitute of spermatozoa. The discharge from the sinuses was also examined and was found to contain a few spermatozoa as well as pus globules. He had, indeed, in addition to obstruction of both ducts, a double spermatic fistula.

In 1858, a gentleman, thirty-eight years of age, con-

sulted me under the following circumstances. He stated that in India ten years before, after excitement from drink and excessive indulgence in sexual intercourse, he was attacked with violent inflammation of the prostate or parts around. He was obliged to embark for England, and was unable to obtain advice on board the ship. An abscess formed and burst in three situations—into the rectum, into the urethra, and in the perinæum. After his return to England, an elastic catheter was retained in his bladder for the cure of the urinary sinuses. This caused inflammation of both testicles. He discontinued the instrument and went to the sea-side, where, after many months, the sinuses closed, but he has since been subject to a mucous discharge in his urine. His health was good, and he was robust and active. Seven years ago he married, but his wife had never become pregnant. His desires were strong and his powers sufficient. In intercourse no distinct emission took place. He had the sensation of ejaculation with uneasiness at the neck of the bladder, but no discharge followed. His urine had been repeatedly examined after coition, but no spermatozoa had been discovered in it. He had no stricture nor enlargement of the prostate. There was a distinct induration in the lower part of the right epididymis. The testicles were, in other respects, sound and of fair size. The absence of emission led me to conclude that the inflammation and abscess had caused an obstruction in the ejaculatory canals. I recommended a prolonged course of the iodide of potassium, and the application of tincture of iodine to the perinæum, without any sanguine hope of absorption of the supposed source of obstruction after so long an existence. No change ensued. In March, 1863, this gentleman, for the first time, called my attention to a

small tumour, about the size of a large pea, in the vas deferens, about an inch and a half above the left testicle, which, it was supposed, might obstruct the passage of semen. Being very anxious to acquire the power to impregnate, he requested me to remove the tumour. Though not anticipating a satisfactory result, I consented to perform this slight operation.—April 4th. Sensibility having been annihilated by a freezing mixture, and the vas deferens fixed by a clamp, I cut upon the duct, and, avoiding the veins around, opened it just below the tumour, and introducing a fine probe, found the canal completely obstructed by the swelling. It consisted of a cyst containing a soft whitish substance like sebaceous matter. This was removed, and an opening made into the duct both above and below. The small wound in the scrotum was closed with a single suture. Matters went on very well for three days, when gout attacked one foot, and was shortly followed by orchitis on the left side, with considerable swelling and thickening of the spermatic cord. Under purgative treatment with colchicum the gout subsided, but the orchitis proved indolent. The patient's general health was a good deal disordered. Suppuration occurred in the spermatic cord, and the part did not heal for three weeks. There has been no restoration of the passage for the semen.

Godard has recorded an interesting case[1] of a strong, vigorous man who had the left testicle in the groin, and the right one, of full size, in the scrotum. When young he was much addicted to women, and became the father of a child. At the age of twenty-one the testicle in the scrotum was attacked with gonorrhœal orchitis, which became chronic, and left a deposit in the tail of the

[1] Etudes sur la monorchidie et cryptorchidie, p. 61.

epididymis. This was followed after five years by stricture in the urethra, and a second attack of orchitis in the right testicle. At the age of thirty-three he married, but his wife never became pregnant. She died at the end of five years, and at the age of thirty-nine he married again, but had no children. The ejaculated sperm was examined by Godard and others, but no spermatozoa could be detected in it. This is a case of sterility arising from a double cause—from malposition of one testicle, and obstruction in the excretory duct of the other.

The cases here detailed, and I have records of others, show the great importance of what I have already insisted on (page 261), viz., steadily prolonging the treatment of epididymitis until the enlargement and induration of the part have disappeared.

The passage of the semen from a sound testicle may be prevented by congenital absence of the vas deferens. This is an extremely rare cause of sterility, but in treating of the congenital imperfections of this duct (Chapter I., Section 11), I have adduced some instances of this nature.

The excretory duct of the testicle is liable also to be interrupted by tubercular deposits in the epididymis. It is well ascertained that this part is much more frequently the seat of tubercle than the body of the gland, and is often extensively diseased whilst the substance of the testicle remains sound. Sterility from this cause, in persons with double tubercular disease of the epididymis, is not very uncommon.—A young man, aged twenty-eight, moderately robust, was under my care on account of large tubercular deposits in the epididymis of both testicles. Although the disease had existed seven years, and had softened down and sup-

purated, there was not the slightest indication of morbid change in the substance of the glands, which were of moderate size. His general health was good, and he had no symptom of tubercular disease elsewhere. He had fair sexual powers, but the emitted fluid was small in quantity and contained no spermatozoa. This cause of sterility did not escape the searching inquiries of Godard. In a letter writen to me in November, 1860, he remarks, "J'ai toujours constaté que les individus avec double affection tuberculeuse du testicule entraient en erection, pouvaient avoir des rapports sexuels, mais ejaculaient au plus une a deux gouttes de semence absolutement privée de spermatozoïds."

The capacity for sexual intercourse may exist, though in diminished force, in extensive chronic disease of both testicles when the secreting structure is almost entirely destroyed, such as in old-standing strumous orchitis. This will not appear remarkable when it is recollected that coition may be performed for some time even after double castration.

3. *Sterility from Impediments to the Escape of the Seminal Fluid.*—It is well known that a close stricture in the urethra so completely interrupts the passage of the seminal fluid, that in ejaculation it regurgitates into the bladder, where it mixes with the urine. In erection of the penis the urethra becomes narrowed, so that a stricture which offers but a slight obstacle to the flow of urine may under congestion be sufficient to impede the emission of semen. I have grounds for concluding that sterility from chronic stricture in the urethra exists to a greater extent than is commonly supposed, being in some instances little suspected by the patient himself. The semen not having been ejected, dribbles afterwards from the urethra as erection subsides, and

so misleads the patient. As this is a condition which is, in most cases, remediable by the cure of the stricture, it is unnecessary to say more than to call particular attention to it as not an uncommon source of infertility. In a case described at page 444, I have mentioned that the absence of emissions in copulation led me to conclude that inflammation and abscesses near the prostate gland had occasioned obliteration of the ejaculatory canals, so that there was apparently a double cause for sterility, the excretory ducts also being obstructed. But sterility originating in a closure of the ejaculatory canals is a subject which needs further investigation. They must be liable to injury in lithotomy, and sterility might be the result of a bilateral operation.

Accoucheur physicians have informed me that, in seeking for the cause of sterility in their married patients, they have observed an absence of spermatozoa in the fluid removed from the vagina after sexual intercourse, and they have ascertained that the true cause of barrenness has in many instances rested with the husband. It is supposed that in men exhausted by early excesses the testicles do not secrete, the emitted fluid consisting of the secretions of the vesiculæ and prostate. No doubt this is sometimes the case, for in several weak patients I have detected an absence of spermatozoa. In advancing atrophy of the testicles, before the capacity for intercourse is wholly lost, the glands cease to supply the essential element.

A gentleman, aged forty-seven, a married man of robust appearance, consulted me on account of wasting of both testicles, with failure in sexual power. The wasting had been going on gradually for eighteen months. It commenced during a voyage at sea when he was separated from his wife. I found the testicles

soft, and reduced to one-fourth their natural size. They were extremely sensitive. He still enjoyed connexion, but at long intervals. On examination of the fluid removed from the urethra shortly after intercourse, I could find no trace of spermatozoa.

But when the desire and capacity for intercourse are strong, I believe that spermatozoa are never absent from the ejaculated fluid, except from causes which I have described. When the testicles cease to secrete them, there is defective power of copulation, and the absence of spermatozoa is an indication of incompetency for marital duties.

4. *Sterility from non-ejaculation.*—Sterility sometimes arises from a cause which has been expressed by the term *aspermatismus.* Thus, it is essential to the complete performance of the sexual act that the local excitement should culminate in the reflex action of expelling the collected semen. Unless this takes place, coition is unsatisfactory and fruitless.

A gentleman, aged twenty-eight, moderately robust and in good health, came from India to get married, and consulted me on the propriety of doing so. He stated that in his youth he had been subject to incontinency of urine. He had never practised self-abuse, and had strictly abstained from sexual intercourse, until quite recently, when he failed. He had occasional, but not frequent, emissions. His sexual desires were feeble, and he had great want of self-confidence. I passed a No. 10 sound, when the bladder was so irritable that the urine was discharged involuntarily around it. After a few introductions of the sound, and taking some valerianate of quinine, the irritability of the bladder subsided. He then took the muriated tincture of iron, with tincture of cantharides, and formed relations which

enabled him to test his powers. He soon succeeded in penetrating, and in maintaining coition, but, though often prolonged, it never ended in emission. He had seminal discharges at other times, and the fluid contained spermatozoa. Concluding that the nerves of the glans penis were wanting in excitability sufficient to produce reflex action, I requested Dr. Althaus to apply electro-magnetism to the part. This was done repeatedly for a fortnight without any satisfactory result. I then applied the acetum cantharidis to the glans and raised a vesication, which left the part in a very sensitive state. This quite succeeded, and the patient afterwards married, and seldom failed in completing sexual congress.

Schulz[1] briefly mentions some similar cases :—Lord R., aged twenty-eight, strong and well-built, states that sexual desire is easily excited, and that erection follows normally, but that he has ejaculation only after an hour and a half or two hours' coitus, followed by inexpressible fatigue, which confines him in bed a whole day. He had found no means of hastening the ejaculation.—Count M., a strong man, aged twenty-seven, says that he never had emission during coitus at any time of his life, although his erections are normal, but he often has emissions with erection during sleep. Schulz met with another case in a Polish Jew. The prepuce of the gentleman whose case I have narrated was congenitally defective. Hence it becomes a curious question whether circumcision, by exposing the surface of the glans penis and rendering it less sensitive, has any effect in delaying or preventing the completion of the sexual act. Induction electricity was used also in Schulz's cases without any effect.

Two important and delicate questions arise out of

[1] Ueber impotenz und deren heilung mittelst Electricität. Wiener Medicinische Wochenschrift, No. 9, 1861, p. 131.

these inquiries:—1. Whether a man who has the inclination and power to copulate, but who is nevertheless sterile, is justified in contracting marriage—should such a person be condemned to celibacy? 2. Whether this condition is a sufficient ground for divorce?

1. That a man who is unable to fulfil the command "to be fruitful and multiply" is right in disappointing the hopes, and perilling the happiness and perhaps health of a woman cannot, I think, be maintained by any casuist, and in some of the foregoing cases I have felt it my duty to give advice in accordance with this opinion.

It cannot be doubted that in women ready for conception frequent sexual excitement without impregnation is very likely to prove injurious to health. Dr. West mentions the occurrence of chronic ovarian irritation and chronic congestion of the womb leading to hypertrophy of the uterine substance and profuse bleeding from its lining membrane in cases where marriage is sterile.[1] It has been supposed that more important diseases of the female sexual organs, of a chronic character, have owed their origin to irregular and unfruitful excitement. In one of the cases which I have narrated, the sterile patient, a medical gentleman, informed me that after six months of married life his wife suffered from some of those obscure symptoms of irritable cervix uteri called chronic inflammation, and he believes that his wife's troubles were caused by non-impregnation. The wife of another patient, a fine healthy woman before marriage, has since been constantly under the care of

[1] Diseases of Women, Part I., p. 55. Dr. Priestley remarks:—"It is highly probable that sexual excitement which is not followed by the occurrence of pregnancy leads in many cases to permanent congestion of the ovaries, and this may readily be lighted up into more active disease."—(Clinical Lecture on Menorrhagia, Medical Times, vol. i., 1863, p. 445.)

accoucheur physicians, and the wife of a third has also suffered from disease of the uterus.

2. The second question is one upon which a surgeon is scarcely called upon to pronounce an opinion. But I may venture to remark, that as sterility in women is not considered an adequate cause for divorce, so the man ought not to pay such a penalty for unsuspected unfruitfulness.

SECTION III.

SPERMATORRHŒA.

It often happens that the passions are excited without an opportunity being afforded for their gratification. The active secretion which takes place under these circumstances is sometimes attended with uneasy sensations in the testicles. In this state the loaded ducts and seminal receptacles are relieved by ejaculations of the spermatic fluid during sleep. Nocturnal emissions occurring under these circumstances, and most continent persons in the vigour of manhood are subject to them, are followed by a sense of local relief and mental ease, and they thus appear to be a salutary provision to obviate the inconveniences which might arise from unsatisfied desires. The emissions may, however, be more frequent than is consistent with health, and too readily excited, so much so, indeed, as to affect virility, and to give rise to constitutional symptoms of a serious character. These excessive spermatic discharges constitute the complaint termed *spermatorrhœa*. This affection had attracted but little attention from the profession until the publication of Professor Lallemand's well-known work on the disease. His description of its

causes and symptoms is impaired by much bad taste and exaggeration, but he has the merit of having recognised the true character of the complaint, and of having pointed out its injurious effects.

Spermatorrhœa comes on very gradually. It commences by a precipitate emission of semen either in coition or during lascivious dreams. There exists a state of morbid irritability of the organs. The emissions consequently are premature, and without force, and the erections slight and incomplete, and soon subside. As the affection increases, the emissions become more frequent and more readily excited, and are induced merely by erotic ideas or the least contact or titillation, and take place without erection and without pleasure. In this weak and susceptible condition of the organs, involuntary pollutions are liable to occur both day and night, constituting a state of passive *spermatorrhœa*, which often lasts for many months, gradually undermining the health. The patient becomes thin, and feeble; has impaired vision, and a sickly languid look; suffers from palpitations, pains in the head and back; loses all energy; becomes shy, hypochondriacal, and apathetic, and unfitted for active bodily or mental occupation. He often experiences uneasy sensations in the testicles, which are soft, and hang low. The scrotum is pendulous and lax, and the spermatic veins are sometimes large and varicose. His symptoms are aggravated after each emission, which is usually followed by a painful sense of fatigue, and malaise, that last many hours.

Spermatorrhœa may be induced in various ways. In persons of strong passions, who make no efforts to subdue them, but indulge in lewd thoughts or in erotic conversation and reading, the testicles are stimulated to active secretion, and if no relief be afforded by commerce

with the other sex, emissions are liable to become frequent, and the habit being established, the parts get weakened and irritable, so that the discharges occur under slight provocation. The complaint may also be brought on by excessive indulgence in sexual intercourse. But its most common cause is long-continued and frequent self-abuse, those who give way to this vicious habit being little aware of the evils it engenders. The practice occasionally acquires a complete mastery over the reason and will. In some cases not even the strongest self-control can repress the disposition to abuse; and persons fully aware of the evil results, and actually dreading the consequences, are unable to restrain their fatal desires. In these cases there is a peculiar morbid condition of the nervous system. Indeed, the debilitating and enervating effects of this affection are far greater than would be occasioned merely by a drain of the amount of the fluid emitted, which is to be ascribed to the nervous exhaustion especially attending the reproductive function. The patient's mind is constantly absorbed with his sufferings: he gives an exaggerated account of his symptoms, finds great difficulty in abstracting his attention from them and occupying himself with other matters, and eagerly peruses anything relating to his complaint; a circumstance well known to the empirical authors who are constantly advertising their works on the subject. The condition of these persons is melancholy enough. Aware of the abhorrence with which their practices are regarded, they hesitate to consult the regular practitioner, and fly for relief to ignorant but artful quacks, by whom their pecuniary resources are drained, for which they only meet in return with bitter disappointment. Such is the heavy penalty often paid by man for gross indulgence

in sensuality—a degraded nature and a ruined constitution embittering the best days of his existence, and sometimes leading even to insanity and suicide.[1]

One of the sad results of habitual self-abuse and excessive spermatorrhœa is a morbid condition of the brain, giving rise to epileptic symptoms. In many cases, it will be found that the cerebral affection had existed previously, but had become confirmed and aggravated under the excitement and nervous exhaustion consequent on the practice. In others the epileptic paroxysms appear to be caused solely by excessive masturbation.

The matter emitted in spermatorrhœa is thin, and more liquid than healthy semen; but that it is really spermatic is proved by the spermatozoa which it is found to contain. Lallemand, who carefully examined the fluid voided in all stages of the complaint, found the zoosperms less abundant, and less developed and lively, in proportion to the severity of the disease, until at length in very advanced cases they almost entirely disappeared. The discharge is largely diluted with the secretions of the vesiculæ seminales and prostate; and in bad cases of the complaint the fluid emitted consists almost entirely of the latter, mixed with purulent matter, and sometimes a little blood. Occasionally the spermatic fluid, and even the prostatic secretion, pass into the bladder and mix with the urine, with which they are voided. Directions have been given for distinguishing the semen under these circumstances, but they are not to be depended on; and the only sure mode of ascertaining the existence of semen in the urine is a

[1] Dr. Ritchie, in a pamphlet entitled "An Enquiry into a frequent Cause of Insanity in Young Men," states that of 511 private male patients admitted into the Bethnal House Asylum, insanity arose from masturbation in 64, being a percentage of 12.52, or 1 in 7.98. A sad instance of suicide from this cause came under my notice a few years ago.

microscopic examination of the fluid, in order to detect the spermatozoa. In cases of this disorder there is often an escape of spermatic fluid with the last drops of urine in micturition. A similar discharge also occurs in defecation, being occasioned by the pressure on the vesiculæ. In some cases this only attends a costive evacuation, but in others is of constant occurrence.

Although this complaint is usually considered and treated as a functional derangement, there are few cases in which the parts remain long in a perfectly sound state. It will be found that the patient experiences a frequent desire to void his urine; that the evacuation is sometimes attended with slight scalding; that he occasionally feels pain and heat in the prostatic part of the urethra; and that if a bougie or catheter be introduced as far as this portion of the canal in the most gentle manner, it causes a sharp pain, and sometimes strong spasmodic contractions, the instrument being at the same time grasped in the canal. The prostatic and membranous parts of the urethra are indeed in a state of morbid irritation; and I believe that the increased secretion of the testicles, the hasty ejaculations, and inordinate desire for sexual indulgence or self-abuse very greatly depend on this morbid condition of the mucous membrane. Nor is it surprising, considering how much this part of the urethra is concerned in the function of generation, that a permanent state of disease should be produced by the frequent excitement of sexual excesses. Involuntary spermatic discharges are sometimes induced by gonorrhœa affecting the prostatic part of the urethra. Their origin has also been ascribed to certain affections of the prepuce and of the rectum and skin; but these are quite secondary causes, and are incapable of producing involuntary emissions without a more direct

source of excitement, or a state of morbid irritability at the orifices of the ejaculatory ducts.

I know of no instance in which an opportunity has been afforded of making an anatomical examination of the parts affected in the early stage of the complaint. Lallemand examined them in two very severe and complicated cases of the disease, in which the patients laboured under symptoms of cerebral congestion before death. I also carefully dissected them in an aggravated case, in which the patient was comatose for several hours previous to dissolution. In all three the morbid appearances were of the same character. The mucous membrane at the prostatic part of the urethra was swollen and injected. The prostate was nearly destroyed, and converted into a multilocular abscess, or a number of alveolæ or cells, communicating with each other; and the diseased mucous membrane covering it was riddled with holes, formed by a considerable enlargement of the original orifices of the gland, through which pus or altered secretion freely escaped on pressing the prostate. As Lallemand aptly remarks, the membrane at this part covers the multilocular cavity of the prostate, much in the same way as the cribriform plate of the ethmoid bone covers the nasal fossa in the dried skull. One or both vesiculæ seminales were infiltrated with pus, and their walls thickened by inflammation. The orifices of the ejaculatory canals were enlarged and abraded. When the prostate is affected, slight pain is occasioned by pressing on it through the rectum, and there is usually a discharge from the urethra when the patient is at stool.

The morbid condition of the mucous membrane of the prostatic part of the urethra, though not the original cause of spermatorrhœa, when established, tends mate-

rially to excite both the excessive seminal discharge and the secretions of the prostate, and to produce that morbid craving for indulgence and abuse which persons who have brought themselves to this state find so difficult to repress and resist. It is well known that any irritation at the orifice of an excretory duct usually acts as a stimulus to the secretions of the gland. Thus, hurtful matter in the duodenum produces a flow of bile; and a foreign body on the conjunctiva, as an inverted eyelash, a discharge of tears. So it is with the testicle when irritation exists at the orifices of their excretory ducts. The disorder at this part, moreover, appears to react on the brain, and to become in part the cause of the patient's mind being constantly occupied with subjects of sexual excitement, and of his indifference and apathy in respect to other matters. So that the local disease induced by abuse powerfully aids in perpetuating the mischief, and consequently becomes the object to which, in many instances, our treatment should be first directed. Certainly, in severe and confirmed cases, until the morbid condition of the mucous membrane of the urethra is corrected, we can scarcely hope to relieve the seminal emissions, or to recruit the patient's health and strength; and when it is removed, there is far less difficulty in inducing him to abandon his injurious habits, and in improving his general condition by other treatment. In some persons there appears to be a predisposition to this complaint, which is indicated by feeble sexual powers, irritability of the bladder, and incontinency of urine in early life.

It is necessary to remark, that in persons whose constitutions are suffering from frequent seminal emissions, it is not always easy to ascertain the real cause of impaired health. Either from not suspecting it, or un-

willingness to confess, patients are apt to refer their complaints to anything but the true cause. They complain of indigestion, palpitations, pains in the head, and other anomalous symptoms, but neglect to mention the emissions; so that some tact and cautious inquiry are often necessary in order to discover the nature and source of the malady with which they are afflicted. There is something, however, in the appearance and bearing of many of these persons—their shy and furtive glance, pallid and pasty complexion, want of frankness and incoherent account of their symptoms—which generally enables the practitioner to form a shrewd guess as to the true cause of the mischief.

In a great proportion of the cases which come under notice in practice, the complaint is extremely slight, or more mental than real. The ability to perform well the duties of the sex is a matter of such concern to most men, that it is not surprising that timid or weak persons, misled by artful advertisements and empirical works, should sometimes be troubled with unfounded fears, and fancy that they are incompetent and labouring under spermatorrhœa when no such disorder exists. The minds of these persons are usually more or less unhinged by dyspepsia, and the discharges natural in health are regarded as morbid.[1] They are reminded, in the writings alluded to, of having once practised the foolish habits common in schools, and too little restrained by teachers, but which have been long abandoned and have left no

[1] The occurrence of spermatozoa in the urine is sometimes referred to as undoubted evidence of the existence of spermatorrhœa; but it should be explained to patients that the presence of these bodies in the urine is not incompatible with sound health, and that they may be detected in it a day or two after a natural spermatic discharge. The cloud or deposit formed by lithate of ammonia has also often been taken advantage of by quacks to excite the fears of anxious patients.

permanent ill effects. I have met, indeed, with men, even of great intelligence, who have been so impressed with the conviction of being seriously affected with spermatorrhœa, and who have been so unhappy in consequence, without any real cause, that their condition has amounted almost to monomania. Care is required in dealing with these cases. Medical men are too apt to treat the complaints of such patients lightly, making no efforts to allay their anxiety—a course which often leads them to apply for aid in illegitimate quarters, and to become the victims of unprincipled men. The surgeon should endeavour to obtain the patient's confidence, and whilst paying due attention to his general health, should strive to convince him of the groundless nature of his fears, and of the unimportant nature of his local complaint.

Solitary abuse is sometimes practised in infancy; and cases have come to my knowledge in which it occurred at the early age of between three and four years. The sexual organs were not prematurely developed, but in one of them the child had passed a small calculus. The vice has been ascribed to the irritation produced by worms in the rectum; but I believe it is more often induced by the foolish habits of children and their associates. Though little fluid is emitted, the practice is very injurious to the constitution by its effects on the nervous system, and prevents the development of the sexual powers. As in the adult, it produces a morbid sensibility and condition of the urethra, which is to be treated on the same principles.

Treatment.—The treatment proper in spermatorrhœa varies greatly in different cases, depending much upon the patient's mental condition, physical powers, and general state of health, as well as upon the cause,

degree, and duration of the complaint. In slight and recent cases connected with dyspepsia, attention to diet and remedies which correct the unhealthy actions of the alimentary canal, and medicines taken at bedtime to relieve or prevent acidity during the night, coupled with cold bathing and active exercise, will be sufficient to stop the frequent discharges. When the complaint occurs to persons of depressed vital powers, and is accompanied with deposits of the phosphates or oxalates in the urine, diet of a tonic character, quinine or steel with the mineral acids and tincture of henbane, relief from mental toil, change of air and scene, exercise without fatigue in a pure dry air, and in some cases an opiate at bedtime, are the remedies calculated to give relief. Indeed, in the class of cases alluded to, the spermatic discharges are only symptoms of general derangement to which the patient has ascribed undue importance; and as the health improves under treatment, the discharges become less frequent and less a source of anxiety.

When the complaint is slight or chiefly mental, and unattended with weakness or impairment of the general health, the most effectual remedy is moderate but regular sexual intercourse. It tends to correct the irritable condition of the organs giving rise to precipitate ejaculation, and removes the disposition to self-abuse. There are some obvious difficulties in the way, and persons who have never ventured on connexion, or have failed in the attempt, have to overcome the apprehension of incapacity. In robust persons who remain continent, but do not exercise sufficient restraint on their thoughts, athletic exercises, active occupations of various kinds, indeed any engrossing pursuit, will materially assist the cure. One patient, a gentleman of great intelligence but without occupation, assured me that his recovery

was greatly promoted by his engaging in the study of chemistry, to which he applied himself with great zeal. In some cases, certain sedatives, such as the extract of cannabis indica, and of henbane, may be taken at bedtime with advantage. They quiet the mind, promote repose, and allay irritability in the sexual organs.

In cases of spermatorrhœa, slight but of some duration, and induced by abuse, the local irritation and morbid state of the prostatic part of the urethra may generally be corrected by the occasional introduction of a plated steel sound. I usually employ one of the size of No. 10, pass it very gently about once a week, and retain it in the canal for five minutes. Its influence may be aided by copaiba or turpentine in capsules, and by cubeb powder. In persons of feeble or impaired constitution I order cubeb powder with the compound infusion of roses and dilute sulphuric acid, and often combine the sulphate of quinine. Some patients are subject to frequent seminal emissions only when troubled with indigestion and heartburn at night. In these cases the discharges may be rendered less frequent by a dose of bicarbonate of potash and sal volatile, or of magnesia, at bedtime. Under this treatment, variously prolonged and modified according to circumstances, the increased irritability of the reflex system, and the morbid condition of the prostatic part of the urethra, become corrected, the health improves, the discharges become less frequent, and cease to occur without erection or to be a source of weakness. At this period, moderate sexual intercourse contributes to the patient's permanent recovery, and prevents a return to bad habits, though in the earlier stages of treatment it is improper.

In bad and confirmed cases of this disease the local

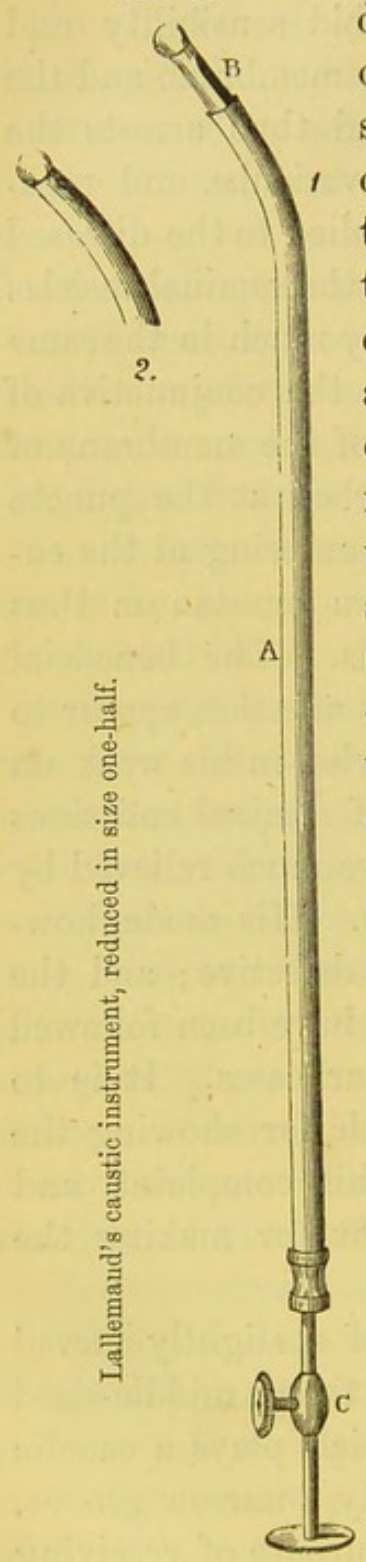
application of the nitrate of silver is the most effectual means of restoring the prostatic part of the urethra to a sound state. It allays the morbid sensibility and corrects the altered condition of the membrane and the orifices of the ejaculatory canals, and thus arrests the excessive secretions of the testicles, vesiculæ, and prostate. The nitrate of silver, when applied to the diseased part of the urethra, appears to act on the seminal vesicles and follicles of the prostate gland, very much in the same way as a stimulating application to the conjunctiva of the eye relieves a morbid condition of the membrane of the nasal sac or duct by being absorbed at the puncta lachrymalia. The dissolved caustic entering at the enlarged orifices at the sides of the veru montanum thus reaches the interior of these glands. The beneficial effects of the nitrate of silver in this affection appear to have been known to Sir E. Home, who, in his work on Strictures,[1] has recorded two cases of seminal emissions consequent upon onanism, which were much relieved by the application of the armed bougie. His mode, however, of using this remedy was very defective; and the plan of treatment does not seem to have been followed by other surgeons in these particular cases. It is to Lallemand that we are indebted both for showing the value of the caustic treatment of this complaint, and for devising an improved instrument for making the application.

Lallemand's instrument consists of a slightly-curved platina canule or tube, rather smaller than a middle-sized catheter (Fig. 41, 1, A), through which plays a caustic holder, having at its further extremity a narrow groove, eleven lines in length (B), for the purpose of receiving the caustic. After filling the groove with the nitrate of

[1] Vol. ii. p. 427.

silver by fusing it over a spirit-lamp, the caustic becomes so securely fixed that there is no danger of its escaping. At the other end there is a sliding screw or stop (c), by which means the application of the caustic may be limited to any extent less than the length of the groove which contains it. In employing this instrument I proceed as follows:—Having regulated the caustic holder so as to admit of nearly the whole of the groove being uncovered, and having closed the instrument so as to conceal the caustic (Fig. 41, 2), I introduce it well oiled as far as the prostatic part of the urethra, its arrival there being easily ascertained by the pain experienced by the patient, and by my being able, after the instrument is depressed and has passed the triangular ligament, to carry it freely onwards. I then thrust forwards the caustic holder, and after passing it once or twice backwards and forwards instantly close the apparatus, and then withdraw it. The dissolved caustic readily reaches all the parts to which the application is required. Other forms of instrument for applying the nitrate of silver have been suggested and recommended, but I have found none more convenient or better adapted to the purpose than Lallemand's. It is important that

Fig. 41.



Lallemand's caustic instrument, reduced in size one-half.

the knob at the extremity of the caustic holder should be of sufficient size to project beyond the canule, or else the mucous membrane is very liable to be caught at this point in the closing of the instrument, and a portion of the membrane to be stripped off in its removal from the canal. When used in the transient manner I have just described, the caustic occasions a sharp smarting sensation, which subsides, however, in about ten minutes. On making water afterwards the patient experiences scalding, and usually passes a little blood with the last drops of urine, and sometimes has a slight purulent discharge, which continues for twenty-four or thirty-six hours, and then gradually ceases. If much pain or even retention of urine should result from the application, it may be relieved by a warm hip-bath, and opiate suppositories or injections. I have never found the caustic produce so much hæmorrhage and such severe symptoms as are described by Lallemand occasionally to arise from it, which I attribute to the more gentle manner in which the application is made. The only instance in which retention of urine has occurred, in my practice, was in the case of a gentleman who neglected my injunction to remain at rest after the operation, and he was instantly relieved on taking a warm bath. The patient should remain quiet at home for twenty-four hours, and take no walking exercise, or malt liquor or wine, until after the slight bleeding has quite ceased. I usually order, for a night or two after the operation, some opium or henbane to procure rest and allay irritation, and order the patient to take freely of demulcent drinks.

In general, the emissions gradually cease to be too frequent, and to occur without erections, after one or two applications of the caustic: I have rarely had occasion to repeat it a third time. Indeed, if the remedy

does not succeed in giving tone to the parts, and in checking the discharges after one or two applications, they are not likely to be removed by more frequent renewal. The cauterization should not be repeated sooner than a month or six weeks. It is impossible to judge fairly of its effects in a shorter period, and I most commonly wait three months. In all cases, I pass, after a few weeks, a No. 10 sound, in order to satisfy myself that the canal has not been injured by the treatment. In the many cases in which I have used the caustic, I have very seldom observed any subsequent ill effects which could be ascribed to the remedy. In some two or three cases slight stricture has resulted; but it has yielded readily to dilatation, and has not become permanent.

Since the publication of Lallemand's work, the caustic has been extensively resorted to in spermatorrhœa, but much difference of opinion exists in respect to its value. It is regarded by some surgeons, who have never tried it, as a remedy worse than useless, and others who have employed it, expecting perhaps too much, have been disappointed. This discrepancy is not surprising when we consider that the caustic treatment has not only been unduly extolled, but has been used in unfit cases, as well as too freely and too frequently. In the cases in which I have resorted to this treatment, it has rarely failed to afford more or less relief. The caustic must not, however, be expected to operate like a charm. The irritation which it produces sometimes even increases the emissions for a time, and it is only as the parts recover from its first effects that any benefit is manifested. Nor does the caustic supersede other treatment. It must be viewed as only one of the means necessary

in certain cases for the cure of the complaint. Sedatives, tonics, and moral treatment are required to assist its action, or confirm the good effects obtained from it. But it must be admitted that the caustic is an uncertain remedy, and those who reckon too confidently on its favourable influence will sometimes meet with disappointment. In many cases it acts with marked benefit; whilst in others but little, if any, advantage is derived from it. It need scarcely be added, that no method of treatment is likely to be successful or permanent, without great resolution on the part of the patient in avoiding indulgence in vicious thoughts, and in the most rigid and persevering abstinence from self-gratification. All subjects capable of exciting erotic ideas should therefore be strictly avoided; and it must be recollected that a relapse is readily induced by the least imprudence or excess. Persons suffering from spermatorrhœa are often recommended to marry. In severe cases of the complaint this advice is not only unsound, but actually injurious; and if followed, which I believe rarely happens, would be a cause of much misery. Persons thus affected are by no means in a condition to enter the marriage state; they are in fact impotent; and nothing is more calculated to aggravate their complaints and impede recovery, than the excitement of the sex and fruitless attempts at sexual indulgence. The indications afforded in these cases are, to arrest the debilitating discharges; to obtain a period of rest during which the parts may recover their tone, the health may be reinstated, the constitution invigorated, and the appetite recalled by abstinence. When this is effected, but not till then, marriage is desirable, as it takes away the temptation to solitary vice, and is favourable to regularity and

moderation in the performance of the reproductive functions, and thus obviates the tendency to a relapse. As the local affection subsides, we must have recourse to remedies to improve the general health. Thus steel medicines, quinine, cold sponging and bathing, a nutritious but not stimulating diet, due regulation of the bowels, change of scene and exercise in an open pure air, and cheerful occupation, prove very beneficial in these cases.

Solutions of the nitrate of silver and stimulating ointments have also been applied to the prostatic part of the urethra by means of instruments constructed for the purpose. I have tried them in a few cases, but have found them less effectual than the solid caustic.

There are certain remedies which are reputed to have a special influence in checking spermatorrhœa. M. Duclos reports strongly in favour of the extract of nux vomica, combined with frictions on the loins and inner and upper part of the thighs with a stimulating liniment. The ergot of rye has also been recommended in these cases, in doses of five grains night and morning. The bromide of potassium has been largely used of late years, and in many cases has proved of undoubted service. It seems to act in restraining the secretion of the testicles. It may be given in doses of ten or fifteen grains three times a day. Mechanical contrivances to prevent patients sleeping on the back will sometimes help to arrest the night discharges. The removal of an elongated prepuce has been attended with a good effect. In lads addicted to masturbation this operation is very effectual. It at once breaks the habit, which, in many instances, is not afterwards renewed.[1] The application

[1] Jews, who undergo circumcision as a religious rite, though subject to

of the *acetum cantharidis* to the glans penis, so as to render the part sore for two or three weeks, will also cure the bad habit.

Persons troubled with seminal emissions which no effort of the will can prevent their provoking, or which persist in spite of medical treatment, have, in some instances, been solicitous for the removal of the testicles, to get rid of the disgusting complaint; and individuals have even been known to perform the operation of castration on themselves.[1] Some years ago I received from a patient thus affected two letters urgently requesting me to remove his right testicle, his left having been extirpated by a surgeon some time previously. This man refused to submit to any other treatment for his complaints, being impressed with the idea that this operation was the only remedy that could relieve him. He was a patient of the late Mr. Avery, who, as well as myself, was teased with repeated solicitations to castrate him; and he at length succeeded in inducing a surgeon to perform the operation. Castration is not justifiable in any case of mere involuntary seminal emissions; nor is any surgeon warranted in complying with the unreasonable wishes of a monomaniac. Unless important organic changes have taken place in the genito-urinary organs, the affection is certainly remediable by judicious treatment steadily pursued; whilst the operation of castration, even if effectual in relieving the symptoms, would leave the patient in a state of mutilation which might afterwards prove a source of the most bitter regret. I have been informed by a professional friend

spermatorrhœa from excessive sexual indulgence, rarely suffer from the effects of self-abuse.

[1] Several cases of self-castration are related in Chap. III. Sect. II.

of a case in which double castration was performed, at the urgent request of the patient, on account of most distressing self-pollutions, that had a very lamentable result. The patient, a gentleman in the upper ranks of life, committed suicide; and the surgeon who had been rash enough to emasculate him was threatened by the patient's friends with an action at law for performing so unwarrantable an operation.

CHAPTER XIX.

CASTRATION.

Castration, or excision of the testicle, is an operation of great antiquity, and was formerly one of the most common in surgery. Even at the present day it is frequently performed by the barbarous people of the East to deprive their slaves of manhood; but this cruel practice is now rarely resorted to in Europe, except for the removal of disease, being uncommon even in Italy, where it was once frequently performed on account of its effects on the vocal organs.

The diseases which may lead to the necessity for castration are the different forms of carcinoma, incurable struma, abscesses and tedious sinuses consequent on inflammation, cystic disease, enchondromatous and fibroplastic growths. The circumstances under which the operation is admissible in these various diseases have already been considered.

Castration is an operation simple, easy of performance, and nearly free from danger; but painful, owing to the large number of nerves and great sensibility of the parts incised. Patients generally prefer, therefore, being rendered insensible by chloroform. The hair must be first cleanly shaved off from the pubes and scrotum. The only instruments required are a straight bistoury or large scalpel, a pair of forceps, tenaculum, and suture needles armed with silver or iron wire. The patient is to recline upon a table of convenient height, and

the operator is to place himself on the right side; or he may seat himself between the patient's legs. An incision is to be made from about half an inch below the external ring, along the front of the tumour to the bottom of the scrotum. The envelopes of the cord and testicle, the layers of thickened fasciæ, and the cremaster muscle are then to be freely divided, nearly as high up as the abdominal ring. If this part of the operation be interrupted by bleeding from any of the branches of the external pudic artery, it will be well to secure them with ligatures. In detaching the diseased gland from the scrotum, the surgeon may employ traction, so as to lacerate the connective tissue. In chronic cases of disease, this tissue is often too condensed and thickened to admit of being thus torn; and in nearly all instances the dense adhesion between the lower part of the testicle and the scrotum requires division with the knife. When the tumour is of large size, care is necessary to avoid wounding the urethra and corpus cavernosum, and also the opposite gland, which should be drawn aside by an assistant. As soon as the spermatic cord is detached from the surrounding parts, and fully exposed, it is to be grasped between the finger and thumb of an assistant to prevent its retraction within the inguinal canal after being divided, and it is then to be cut across by a single stroke of the knife. Some surgeons are accustomed to secure the cord by passing a tenaculum or needle and ligature through it; a plan which need only be adopted when it is necessary to divide the cord very high up, as, in general, the fingers of an assistant are sufficient for the purpose, and give less pain and produce less disturbance of the parts than the other method. The arteries of the cord can now be secured. The spermatic artery is soon found, and is to be tied sepa-

rately. The artery of the vas deferens must next be sought for near the duct, and also tied. This vessel is so small that it is not always apparent; but the surgeon should endeavour to secure it, as it is sometimes the source of a troublesome hæmorrhage after the conclusion of the operation. The vessels of the scrotum are next to be tied: if the tumour be large, or the disease of long standing, they are likely to be numerous. The ligatures attached to the cord being carried to the upper angle of the wound, the divided edges are to be brought together by three or four metallic sutures or more, according to the length of the incision. Strips of plaster are not sufficient, as the natural contractility of the scrotum tends to separate and evert the edges of the wound. Its closure is to be completed by a compress of lint retained by plaster and a T bandage. The wound usually heals in from fourteen to twenty days.

There are some few circumstances of importance to be attended to in this apparently simple operation, and certain modifications are sometimes required. The operator should be careful to carry the first incision to the lowest part of the scrotum, as, by this means, he not only facilitates the detachment of the tumour, but afterwards prevents the bagging of matter in the scrotum. If the gland be much enlarged, or if the skin be adherent to it and diseased, it will be advisable to remove a portion of the scrotum. Instead, therefore, of a single straight cut, two lunated incisions should be made, so as to include an oval piece of the integuments. By this means, if the skin be adherent, a tedious dissection is avoided; or, if the tumour be large, the inconvenience of a bag of useless integument may be obviated: the hæmorrhage, also, will be less; and the vessels requiring ligatures will not be so numerous. In the excision of

such tumours the drawing up of the cord after its division is liable to become a source of embarrassment and delay. The retraction is usually ascribed to the action of the cremaster; but as the greater part of this muscle, together with the organ upon which its action is exerted, is cut off at the division of the cord, the retraction must be chiefly due to the elasticity of this part, so that, after the cord has been relieved of the weight of the enlarged testicle by which it was dragged down, it recovers its former position. The surgeon should take care to divide the muscular and fascious envelope of the cord before cutting it across; as, if this be neglected, some difficulty is likely to be experienced in tying the vessels after its division. In cases in which the cord has retracted within the abdominal ring, the surgeon has been obliged to divide the tendon of the external oblique muscle, in order to get at the bleeding vessels. In a case which came under the observation of Sir A. Cooper, the bleeding from the vessels of the retracted cord was so profuse, that the operator was convinced he had wounded the iliac artery, and unfortunately proceeded to place a ligature on that vessel. The patient died the day after the separation of the ligature. The iliac artery, though not wounded, had been tied securely enough; but the vessels of the cord, the source of the hæmorrhage, had been neglected. Mr. Benjamin Bell mentions two instances of patients having lost their lives from hæmorrhage, in consequence of retraction of the cord before the vessels were properly secured.[1] This ought never to happen; for the bleeding arteries may always be reached by laying open the inguinal canal. But this proceeding increases the dangers of the operation, in consequence of the proximity of the peritoneum.

[1] Treatise on the Hydrocele, &c. p. 265.

Sir William Fergusson mentions a case in which the operator had to pursue the vessels into the canal: inflammation within the abdomen ensued, and carried the patient off within three days.[1] When the vessels of the cord are not properly secured, and afterwards bleed, the connective tissue becomes so infiltrated with blood that the surgeon not only experiences great difficulty in finding the bleeding vessel, but the disturbance occasioned by the effusion is liable to induce inflammation and suppuration; and abscesses from this cause have been known to extend to the iliac fossa. The following case occurred to Mr. Spence, of Edinburgh. In excising a malignant tumour of the spermatic cord and testicle, he found the disease extending so high up that he had to lay open the inguinal canal before dividing the cord. The operation was followed by secondary hæmorrhage from vessels deep in the canal. Peritonitis ensued, and the patient died. On examination, it was found that effused blood had separated the connexions of the parietal peritoneum with the fascia transversalis, and formed a coagulum in the iliac fossa which had induced ulceration and perforation of the peritoneum.[2] It was formerly the practice to arrest the bleeding from the arteries of the cord by tightly tying all the parts composing it in a single ligature. This rude proceeding, by compressing the spermatic nerves, occasioned severe suffering, and sometimes was the cause of tetanus. It was consequently pretty generally abandoned, though I find it is still practised and recommended in cases of malignant disease, on the ground that it enables the surgeon to divide the cord higher up than he otherwise could. A case, however, in which the disease had extended so far

[1] Practical Surgery, third edition, p. 762.
[2] Lancet, July 26, 1856.

up as to need a high division of the cord would scarcely be fit for an operation. An additional objection to the inclusion of the whole cord in a ligature is the size of the mass, which must slough, produce suppuration, and prevent the early closure of the wound.

Unless care be taken, the operation of castration is liable to be succeeded by secondary hæmorrhage. In morbid enlargements of the testicle the scrotal vessels as well as the spermatic undergo considerable increase in size, and pour out blood freely when divided. Mr. Sharp castrated a man whose testicle weighed above three pounds, where some of the vessels were so exceedingly varicose and dilated as nearly to equal the size of the humeral artery.[1] I have myself found the spermatic artery of a testicle, which was removed in consequence of its being affected with malignant disease, as large certainly as the radial artery at the wrist. From exposure to the cold atmosphere and the corrugation of the skin, or in consequence of the patient becoming faint, the bleeding from the vessels of the scrotum stops in the course of the operation; but as soon as the patient becomes warm in bed, and the scrotum relaxes and the circulation is restored, the vessels again begin to pour out blood. On this account some surgeons prefer waiting an hour or two after the patient has been put to bed before closing the wound, in order to ensure him from so unpleasant and painful an occurrence as the disturbance of the dressings and re-opening the wound to arrest a secondary hæmorrhage; and this precaution may be adopted whenever vessels particularly large and numerous appear to cease bleeding from the effects of syncope or cold. Gentle pressure on the scrotum by a dossil of lint applied over the wound, and retained by

[1] Treatise on the Operations of Surgery, p. 52.

strips of plaster or a bandage, is usually, however, sufficient to prevent a return of hæmorrhage. There is certainly less bleeding from the vessels of the scrotum when the connective tissue has been lacerated, than after it has been divided with the knife. In two cases, in which I operated in this way, although the testicle was of considerable size, not a single scrotal vessel required ligature, and there was no after-hæmorrhage.

There is a very rapid and easy mode of performing castration which answers very well when the diseased testicle requiring removal is quite small in size, so as to be free from risk of retraction of the cord. The surgeon, grasping the gland in his left hand, and dragging it forwards so as to put the integuments on the stretch, may excise it together with the skin, with one stroke of the catlin. The vessels are then to be secured, and the wound closed with sutures.

The disease of the testicle requiring castration may be complicated with scrotal hernia. In such a case the parts must be returned, if possible, into the cavity of the abdomen, and protrusion prevented during the operation by the fingers of an assistant; and the surgeon should carefully endeavour to dissect away the cord without wounding the hernial sac.

In one case of extirpation of the testicle, Sir E. Home relates, "After the operation was completed, and the wound dressed, the patient being seized with a fit of coughing, to the astonishment and dismay of the surgeon, the dressings were forced off by a protrusion of several convolutions of small intestines: from this it was proved that the patient had had a hernia; but the diseased enlargement of the testicle had acted as a truss, and prevented the rupture from coming down."[1] If the

[1] Observations on Cancer, p. 236.

diseased gland be of great size, the practitioner will do well to satisfy himself respecting the existence of hernia before commencing this operation, as it is liable to be overlooked. On removing a diseased testicle of considerable size, in two instances, I accidentally opened, in dividing the spermatic cord, a hernial sac containing a small piece of omentum, of the existence of which I was not aware. A compress was applied at the groin, and in neither case did any ill effect result: both patients recovered favourably. Dr. Wedemeyer, of Hanover, removed the left testicle of a patient who had also, on the same side, a reducible scrotal rupture of considerable magnitude. The rupture, which was reduced at the time of the operation, did not subsequently protrude. Considerable inflammation supervened after the operation; and it is presumed that the descent of the intestine was prevented by adhesions formed during its process in the track through which the rupture had originally passed.[1] Jules Cloquet has recorded a case of castration in which secondary hæmorrhage from the cord gave rise to a large effusion of blood into the cavity of the peritoneum. The patient died, and at the autopsy it was found that the blood had entered the abdomen through a hernial sac divided at the same time as the spermatic cord.[2] In one of the cases in which I opened a hernial sac the vessels of the cord were divided high up, were very large and bled freely, so that I was very careful in the application of ligatures, and of pressure to prevent the passage of any blood into the abdomen.

Several instances in which a testicle retained in the inguinal canal has become so diseased as to lead to the

[1] Journal für Chirurgie, Band ix. Stück 1; as quoted in London Med. and Phys. Journal, vol. lvi. p. 482.

[2] Thèse, Paris, 1819.

necessity of castration are on record. Mr. Pott mentions a case of diseased testicle in the groin successfully removed by operation at St. George's Hospital.[1] In 1823, Manzoni, of Florence, extirpated a cancerous testicle retained within the abdominal ring. A similar operation was shortly afterwards performed at Pisa for the removal of an enormously-enlarged cancerous testicle, and the canal was laid open even into the abdomen. The patient recovered from the operation; the disease, however, returned in the glands of the mesentery, and he died two years afterwards from the relapse.[2] Professor Naegele extirpated an enlarged and diseased testicle from the left groin of a man twenty years of age. The peritoneum was wounded, and a portion of epiploon protruded. The man survived the operation; but the disease, which is said to have been carcinomatous, returned a month afterwards at the cicatrix of the wound.[3]

The excision of a testicle detained in the groin and affected with encephaloid cancer has been performed by Mr. Arnott, at the Middlesex Hospital,[4] by Mr. Robert Storks, of Gower-street,[5] and by Mr. Spry, of Truro.[6] In all three instances, the enlarged gland was removed without opening a communication with the abdomen. In Mr. Arnott's case,the patient proceeded favourably up to the twelfth day, when he was attacked with erysipelas of the face and head, of which he died in three days. On examination, a small deposit of encephaloid substance was found on the right spermatic cord just within

[1] Lib. cit., 4to edit. p. 356, Case III.

[2] Fragments d'un Voyage Médical en Italie, par T. J. E. Petrequin; Bulletin Médical Belge, Juin, 1837.

[3] Quoted from a German Journal in Archiv. Gén. de Médecine, t. xiii. p. 423, 1837.

[4] Medico-Chirurgical Transactions, vol. xxx. p. 9.

[5] London Medical Gazette, vol. xxxix. p. 101.

[6] Lancet, June 20, 1857.

the inner ring, and a large mass in the root of the mesentery, which, owing to his being fat, had not been detected during life. In Mr. Storks's case the patient survived the operation fourteen months, when he died of the same disease developed to a great extent in the abdomen. Mr. Spry's patient also recovered from the operation.

The excision of a diseased testicle from the groin, even when the tumour is of large size, is not a difficult proceeding. But in consequence of the obscurity of the diagnosis, which is much increased by the situation of the gland, the operation, in the first instance, must be simply exploratory. The incision should be made in the same direction as in operating for inguinal hernia, but a little higher up. The tendon forming the anterior boundary of the canal might be divided upon a director introduced at the ring, so as to expose the diseased gland. The surgeon, having opened the tunica vaginalis, would then proceed according to circumstances. The danger is certainly greater than after the excision of a testicle from the scrotum, owing to the liability of wounding the peritoneum, opening a vaginal sac communicating with the abdomen, or interfering with a testicle adherent to intestine or omentum. A diseased testicle, therefore, in this position is unfavourably situated for an operation, especially if the subject of malignant affection, since it would be impossible to determine beforehand with any degree of accuracy to what extent the disease had reached. In Mr. Arnott's patient there was evidently carcinomatous disease in the abdomen at the time of the operation, and in Horand's case of fibro-plastic tumour, referred to at page 365, the lumbar glands were affected when the growth was excised from the groin.

I have remarked that castration is not, under ordinary circumstances, a dangerous proceeding. I have performed and witnessed a large number of operations; but the only one which ended fatally was the case of a man, aged twenty-one, with strumous disease of the testicle, which was removed in the London Hospital by one of my colleagues. The patient died of erysipelas and sloughing of the scrotum eighteen days after the operation.

In the first edition of this work I gave to C. J. Maunoir, of Geneva, the credit of having first proposed an operation for the cure of sarcocele, without recourse to the excision of the testicle. The operation consists in cutting down upon and tying the spermatic artery, and thus interrupting the supply of blood to the diseased organ. In making this statement, I was not aware that our immortal countryman, Harvey, had not only suggested this operation, but had successfully performed it.[1] Maunoir has detailed two cases in which he adopted the practice with the effect of producing wasting of the enlarged gland.[2] I know of no forms of morbid enlargement to which the operation is properly applicable. In intractable diseases of the gland with an open sore, castration would be preferable; as cutting off the supply of blood would not assist in healing the wounds, and in cystic and malignant affections such an operation would be quite out of the question.

[1] *Vide* Anatomical Exercitations concerning the Generation of Living Creatures, English edition, 1653, p. 113.

[2] Nouvelle Méthode de traiter le Sarcocele sans avoir recours à l'extirpation du testicule.

DISEASES OF THE SPERMATIC CORD.

CHAPTER I.

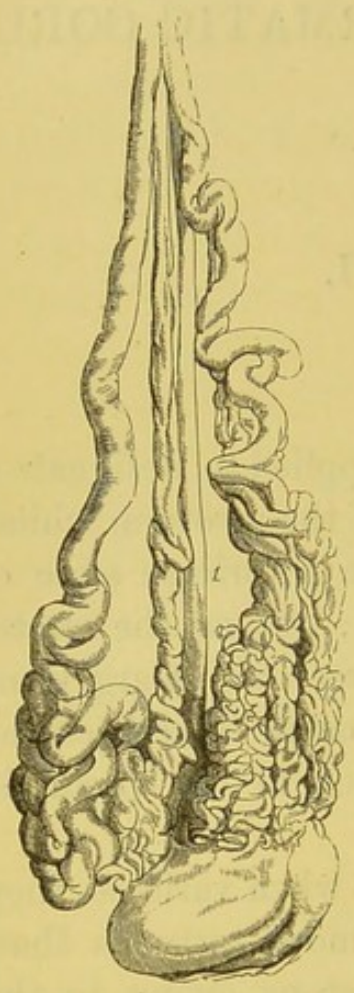
VARICOCELE.

The term *varicocele* is sometimes applied to designate a varicose enlargement of the veins of the scrotum, whilst the term *circocele* is used to denote a varicose state of the veins of the cord and testicle; but as the scrotal veins are not subject to a degree of enlargement amounting to disease, it is more usual to restrict the term *varicocele* to a morbid dilatation of the spermatic veins.

On dissecting the spermatic veins when varicose, they are found dilated, elongated, and more tortuous than natural, and apparently more numerous, owing to the enlargement of the smaller vessels. In an advanced stage of the disease their coats are thickened; so that when divided the vessels remain patent, and thus present the appearance of arteries. The enlarged veins hang down below the testicle, and reach upwards into the inguinal canal; and when very voluminous conceal the gland, encroach on the septum, and extend to the other side of the scrotum. In a specimen which I carefully dissected, the vessels were arranged in three

clusters (see Fig. 42). One formed of the larger vessels proceeded from the inferior extremity of the testicle; the second, in which the vessels were less in size, but more numerous and tortuous, arose from the upper extremity of the organ; whilst the third and smallest cluster surrounded and accompanied the vas deferens (1). The dilatation is not confined to the veins exterior to the testicle: even those in the gland itself are varicose, and enlarged veins may often be distinctly seen ramifying between the tunica vaginalis and tunica albuginea. The veins occasionally contain phlebolites, which are lodged in round dilatations of the vessels.

Fig. 42.



The veins of the left testicle are more subject to varicocele than those of the right. In upwards of 120 operations performed by Breschet, in only one instance was the varicocele on the right side.[1] Pott met with this disease on both sides of the body in only one case. The disease, however, is far from being so rare on the right side as is generally supposed, and often exists on both at the same time, although the varicose state of the right spermatic veins is nearly always much less than that of the left. Of 5639 recruits rejected for varicocele in Great Britain and Ireland during sixteen years and nine months ending December 31st, 1859, 344 had the dis-

[1] Landouzy, Du Varicocèle, p. 24.

ease on the right side, 4881 on the left, and 414 on both sides.[1] Landouzy, who has written a work on this affection containing much accurate information, states, that in eight cases out of seventeen he found the veins of the right testicle more dilated than natural, though they were much less in size than those of the left. This writer endeavoured to ascertain whether any relation subsists between varicocele and varices in other parts. In fifteen individuals affected with varicocele whom he examined, only one had varicose veins of the lower extremities; and in twenty persons with varicose veins of the leg, not one had a varicocele, and no connexion could be traced between varicocele and hæmorrhoids. This does not agree with my observations, for in cases of varicocele I have frequently found the superficial veins of the thigh and leg weak, large, and dilated. Dr. Sistach states that in thirty-eight conscripts rejected for varicocele in France varices co-existed in five instances.[2]

Of the causes of varicocele, some operate on both sides, others only on one. The most influential of the former is the hydrostatic pressure consequent upon the depending position of these veins, which have to support the weight of a column of blood extending from the testicle to the second dorsal vertebra. To this may be added want of support to the veins from surrounding tissues, and obstruction to the current of blood at the ring, or in the inguinal canal during violent action of

[1] Statistics of Recruiting, compiled from the Returns in the Army Medical Department. I have been indebted to the late Dr. Smith, and to the present Director-General, Sir James Gibson, for the opportunity of examining these returns. The sides affected are not now included in the returns. According to Sistach, the French returns do not bear out so great a frequency of varicocele on the right side as appears in the English returns.

[2] Etudes statistiques sur les varices et le varicocèle, par M. le Docteur Sistach. Gaz. Méd. de Paris, 1863, p. 810.

the abdominal muscles. The absence of valves is said by many pathologists (Dupuytren, Vidal, Landouzy) to conduce to this complaint, but this is certainly an error, for the larger spermatic veins are always furnished with valves, though the dilatation which takes place in varicocele prevents them performing their office.[1]

There are several anatomical circumstances which, taken together, are sufficient to explain the frequency of varicocele on the left side. On the right side the spermatic vein joins the vena cava, nearly parallel to the axis of that vessel, so that the blood enters in the course of the circulation ; but on the left side the spermatic vein terminates in the emulgent vein at a right angle, and in a direction perpendicular to the venous current from the kidney, which is less favourable to the return of blood from the testicle, since the two currents pursue a different direction. The left testicle hangs lower than the right ; consequently the veins must be longer, and the pressure produced by the column of blood greater on the left side than on the other. The accumulation of the fæces in the sigmoid flexure of the colon previous to an evacuation tends to produce pressure on the spermatic vein, and impede the return of blood from the left testicle, especially in persons whose bowels are habitually constipated. Some persons subject to vari-

[1] M. Prunaire examined the spermatic veins in twelve dead bodies. He states that the right spermatic vein generally has a pair of valves at its opening into the vena cava. The left spermatic vein had a pair of valves at its opening into the renal vein in eight of the twelve instances. In the other four they were wanting, but were found three centimetres lower. Another pair was found at the internal ring. Several existed between this point and the testicle on both sides, so that in the course of the vein there were from six to eight pairs of valves. (Thèse, Strasbourg, 1851, quoted by Sistach). Mr. Walter Rivington, who has recently examined these veins for me, met with results similar to Prunaire's. He also noticed that when no valves existed either at the orifice or a little below the orifice of the left spermatic vein, valves were present in the renal vein within half an inch from the opening.

cocele suffer from it only when the bowels are in this condition. But even the natural daily accumulation may be sufficient to produce obstruction. To this cause we must chiefly attribute the circumstance, that a varicose dilatation of the veins of the ovary in the female is nearly always confined to the left side.

The occasional causes of varicocele not depending on organization include all those circumstances which tend either to determine the blood in an inordinate degree to the testicles, or to impede its return to the heart, and which operate chiefly by weakening the coats of the vessels. In the first class are abuse of venery, masturbation, and attacks of acute orchitis.—A man, aged twenty-one, applied to me with a well-marked varicocele, which had become developed five months after an attack of orchitis, and this has been the cause ascribed in other cases. The second class comprises certain kinds of exercise greatly prolonged, as riding and rowing; and sudden and violent efforts, as in straining. A gentleman consulted me on account of a varicocele, which he attributed to prolonged waltzing. One patient first noticed the complaint after hard cricketing; and another after an attack of hooping cough. That a strain powerfully conduces to the production of a dilatation of the spermatic vessels, may certainly be concluded from the circumstance that the stress to which they are subjected during violent exertion is sometimes so great as to occasion rupture of their coats and extravasation of blood, as was pointed out in treating of hæmatocele of the spermatic cord. Want of the proper support afforded to the testicles and spermatic vessels by the contractility of the scrotum likewise predisposes to this disease. It is partly on this account that varicocele is more common in warm than in cold climates, and in persons of a weakened and relaxed habit than in those of a robust

and vigorous constitution, and is more troublesome in warm than in cold weather.

In the slight degree and chronic state in which we most frequently meet with this affection, no injurious effect is produced on the testicle; but when highly or rapidly developed, the dilatation of the veins interferes so much with the nutrition of the gland as to occasion wasting. A softening and partial atrophy of the gland, coexisting with varicocele, has come under my notice in numerous instances; indeed, in nearly all cases in which there was a decided dilatation of the spermatic veins on one side only, the testicle of that side was the smaller of the two. In a man, aged fifty-six, with a varicocele on the left side, the testicle was so reduced that it scarcely exceeded the usual size of the organ in an infant. Some years ago a tall sailor was under my care on account of a varicose ulcer on the left leg, who had a large varicocele on the left side, and a testicle so wasted, that it could scarcely be felt through the tunica vaginalis, which was loosely distended with fluid. We have evidence too that the secreting powers of the gland are impaired, and sometimes even destroyed, by this disease. I have already alluded to a case related by Gosselin (note, page 413), in which it appeared that the testicle on the side affected with varicocele did not secrete spermatozoa.

In forty-five cases in which Landouzy noted the age at which varicocele was first observed, ten having been taken from authors, and thirty-five having come under his own observation, the age was as follows:—

From	9 years	to	15	13
	15 ,,		25	29
	25 ,,		35	3
				45

The results agree very nearly with my own experience. I noted the ages of the last fifty patients who came under my notice; they were as follows:—

From 10 years	to	15	. . . .	2
15 „		25	. . . .	26
25 „		35	. . . .	14
35 „		45	. . . .	5
45 „		65	. . . .	3
				50

Many of these patients had been subject to the complaint for months or years before consulting me, which may account perhaps for the ages being greater than in the cases noted by Landouzy.

These tables show that the period of puberty is the time at which varicocele most commonly occurs. I have met with it before that period in a few cases.—A lad, aged eleven, was brought to me with a marked varicocele on the left side. About three months previously he had injured himself in jumping on the back of a boy at school. He was kept on a couch for some weeks, and when he commenced moving about the swelling of the spermatic veins was noticed.—A medical friend consulted me respecting his son, aged twelve, who had a well-marked varicocele, which was discovered quite accidentally, no inconvenience having resulted from it.—A boy, aged thirteen, had a varicocele on the left side, which was first observed after a fall, about a week before I saw him. In all these cases the periodic growth of the testicles had not taken place, and the left gland was smaller than the right.

Varicocele is a common affection, more common, indeed, than is generally supposed. Its prevalence is

best shown by the large number of recruits annually rejected for this disease. Of 166,317 recruits medically inspected in the districts of Great Britain and Ireland during the ten years ending 31st March, 1853, 55,474 were rejected. Of the latter, 3911 or 70·5 per 1000, were rejected for varicocele, a greater number, indeed, than the rejections for hernia.[1] Of 2,165,470 recruits examined in France in ten years from 1850 to 1860, 20,553, or 10·05 per 1000, were exempted for varicocele; but as the rejections were fewer than usual during the wars in the Crimea and in Italy, Dr. Sistach, in his able paper, estimates the average rejections at the age of twenty, at 11·97 per 1000, which is considerably below the rejections in the United Kingdom.[2]

There are certain occupations which favour the development of varicocele. I have seen many policemen with this affection. The habit of sauntering, and standing about for many hours daily, tends to produce the disease in those naturally predisposed to it. Several of my patients have been publicans, who are occupied on their feet a great part of the day. The complaint, too, is not uncommon in the men of cavalry regiments. Tall men, also, are more subject to it than short persons.

I have alluded to the thickened condition of the spermatic veins sometimes observed in confirmed cases of varicocele. The thickening is due to chronic inflammation of the outer coat of the vessels. The dilated veins are also liable to diffusive inflammation or phlebitis. This dangerous affection may occur after operations for the obliteration of the plexus, but is undoubtedly rare, and no case of the kind has fallen under my obser-

[1] The rejections for hernia were 1804, or 32·5 per 1000.

[2] Gaz. Méd. p. 760. It may be observed, however, that the standard of height in the French army is much below that in the English.

vation. Dr. Escallier has recorded two interesting cases of suppurative inflammation of a large plexus of dilated spermatic veins. They occurred in Paris, to persons who were natives of a warm climate, one of them a black from Guadaloupe, the other a merchant from the Brazils. Both cases terminated fatally in a few days, the symptoms simulating those of strangulation.[1]

Symptoms.—A varicose distension of the spermatic veins, in general, takes place so gradually, and produces so little inconvenience, that it is often not detected until the affection has made some progress. When somewhat advanced, it occasions a sensation of weight in the testicle, and a feeling of uneasiness in the course of the spermatic cord, which often extends to the loins, and is aggravated by exercise, as riding or walking. The patient is then apt to carry his hand to the scrotum to relieve the sensation of weight, or to give the part a more favourable and convenient position in his clothes. On examination, the scrotum is found to be long, pendulous, and lax; and in persons of a thin and delicate skin has a slight livid appearance, the colour of the blood in the veins being indistinctly visible through the integuments. An irregular swelling, of a somewhat pyramidal form, is observed in the course of the cord. This swelling when handled has a soft, doughy, inelastic feel, and communicates to the fingers a sensation which has been compared to that of a bundle of ropes or earthworms. The dilated veins may be traced upwards into the inguinal canal in advanced cases; and when very pendulous they sometimes form a double cone, the testicle being nearly in the centre, and the varicose veins above and below it. In bad and long standing cases, the veins of the scrotum are also affected, ap-

[1] Mémoires de la Société de Chirurgie de Paris, t. ii. p. 66.

pearing large and tortuous. The swelling is diminished by cold and the recumbent position; and on the other hand is increased by warmth, the erect position, and by straining and coughing. The disease, indeed, is sometimes first discovered by the patient whilst taking a bath, or during an attack of catarrh. The distension of the vessels is also greater towards evening than in the morning. Landouzy has noticed a curious fact in connexion with this disease—viz., the marked relief experienced by patients during and immediately after coition, followed by a severe exacerbation of the symptoms the next day.[1] This is owing to the support afforded to the vessels of the part by the tone and contraction of the scrotum, and the increased vigour of the circulation during the venereal orgasm; but as this is only temporary, when relaxation and lassitude ensue the symptoms of varicocele return with greater severity than before. I can confirm the latter observation; patients having several times complained to me of their symptoms being aggravated for several days after sexual connexion.

Varicocele, when slight, often remains stationary for a considerable time, neither increasing nor producing inconvenience. This is more particularly the case with varicocele in old people, and also on the right side; so that patients who have discovered the disease on the left side, remain for years in ignorance of any thing wrong on the right, which they believe to be sound, though it contains the rudiments of the same affection that exists on the left. Varicocele on the right side is less voluminous, occasions less uneasiness, and leads to consequences less grave than the same affection on the left.

If a patient affected with slight varicocele avoids

[1] Lib. cit. p. 76.

fatigue and the exciting causes of the disease, and wears a suspensory bandage, its progress is usually arrested; but if permitted to increase, it is liable to become a source of much annoyance. Slight exertion, warmth, and excitement of any kind increase the local uneasiness; so that the patient is prevented from taking exercise, and is disabled from earning his livelihood by labour. The pain and distress occasioned by this disease vary, however, a good deal, and are not exactly proportionate to the size of the varicocele. In varicoceles of large size, the pain is sometimes very slight; whilst in others, small in volume, it is occasionally very severe. Some persons experience uneasiness from a varicocele only when out of health, or labouring under indigestion. Persons afflicted with it at any early age, on the whole, suffer more than those who become affected later in life. The former sometimes labour under a degree of mental distress very much out of proportion to the actual disease. These hypochondriacal symptoms are often connected with spermatorrhœa and dyspepsia, but they sometimes arise from an apprehension, by no means unfounded, of the disease impairing the nutrition of an organ which exercises a marked influence on the characters of the sex. The pain sometimes partakes of a neuralgic character, and is so excessive and intolerable, that patients have gladly submitted to the operation of castration for their relief, which has been performed at the urgent request of the sufferer by Gooch,[1] Brodie,[2] Key,[3] and others.

Though varicocele usually occurs as a chronic affec-

[1] Practical Treatise on Wounds and other Chirurgical Subjects, vol. i. p. 244.

[2] London Medical and Physical Journal, vol. lvi. p. 299.

[3] Sir A. Cooper's Observations on the Testis, p. 224. *Vide* Case by Mr. Thompson, of Staleybridge, Lancet, vol. ii. 1839-40, p. 137.

tion, it sometimes forms suddenly and advances rapidly, appearing shortly after a severe injury or strain, which had probably occasioned a dilatation of the coats of the veins from which they were unable to recover. There may have been a previous tendency to the complaint; but patients often ascribe its origin to some sudden effort, since which they had experienced the annoying symptoms of the disease. In these acute cases, which nearly always occur in early life, the suffering is much greater than in the more chronic cases. Varicocele has also been known to occur as an acute affection shortly after an attack of orchitis. Mr. Pott has recorded three remarkable cases, in which varicocele made its appearance, not only suddenly and with acute pain, but was attended with very rapid wasting of the testicles.[1] There seems reason to doubt, however, whether these were simply cases of varicocele.[2]

Diagnosis.—The symptoms of varicocele slightly resemble those of a scrotal hernia. Like hernia, the swelling in varicocele increases when the patient is in the erect position; subsides spontaneously, or on pressure, when he is in the recumbent; and soon reappears when he again assumes the erect posture. When the dilated condition of the veins extends into the inguinal canal the ring is enlarged, and the swelling increases, and receives a slight impulse in coughing. A varicocele, however, cannot well be mistaken for an intestinal hernia; but the student may sometimes be unable to distinguish the feel of the tortuous and dilated vessels from that of an omental protrusion. The best mode of making the diagnosis is as follows. The patient having

[1] Lib. cit. p. 469, Cases XXXVI. XXXVII. and XXXVIII.

[2] In the first edition of this work, I gave an abstract of these cases, and appended some observations in which I stated my reasons for questioning the propriety of considering them to be examples simply of varicocele.

placed himself in the recumbent position, the testicle of the side affected is to be raised until the swelling disappears. The surgeon must then press gently with the fingers on the external abdominal ring, and direct the patient to rise. If the case be a varicocele, the swelling soon re-appears; but if it be a hernia, the descent of the omentum is prevented by the pressure. As the swelling is reproduced, it commences, if a varicocele, from below; if an omental hernia, from above. In making this examination, care must be taken that the pressure be not too great, or the veins will remain empty. A varicocele might possibly be mistaken for a congenital hydrocele, which likewise swells in the erect position, and disappears in the recumbent: the transparency of the tumour in hydrocele is sufficient to set all doubt at rest. Though I have given the above directions, I must observe, that I have never met with a case of varicocele in which there was any difficulty in detecting the nature of the case, or in distinguishing the disease from other affections of the part.

Treatment.—Varicocele in the mild form that is commonly met with, produces no suffering or even inconvenience. The treatment required is to keep the scrotum and testicles well supported, in order to diminish the length of the spermatic veins and the weight of the column of blood circulating in them. For this purpose, the patient should wear a well-fitting suspensory bandage, and as it is desirable for the parts to be kept cool, the suspender should be made of open silk net. Those commonly sold are often badly constructed and do not fit well, so that it is necessary for the surgeon to see that they answer the purpose intended. The patient should accustom himself either to souse the parts freely with cold spring water night and morning, or to take a

cold hip-bath daily. His lower garments ought to be as light as comfort will admit of, and not tight about the abdomen.[1] Fatiguing exercise, warm baths, excess in venery—every thing, in fact, which tends to determine the blood to the testicles and scrotum must be avoided. The bowels should be properly regulated, and any disposition to costiveness obviated by gentle aperients, or, what is better, by enemata of tepid water thrown well up into the colon every morning, in order to remove the fæculent collections from this part of the intestine. By these means, if we cannot correct the dilated condition of the veins, we may generally prevent its increasing, and contribute to the comfort and health of the patient.

For the purpose of supporting the testicle in cases of varicocele, Mr. Wormald, some years ago, recommended the following plan.[2] The lower part of the scrotum, whilst the patient is in the recumbent position and the veins comparatively empty, is to be drawn through a ring about an inch in diameter, made of soft silver wire of a suitable thickness, padded, and covered with wash-leather. The sides of the instrument are then to be pressed towards each other with sufficient force to prevent the scrotum escaping. Patients often find relief from this simple contrivance, and some prefer it to wearing a suspender. I have not found this, however, to be generally the case. The ring is equally annoying to the patient's feelings, and cannot always be steadily fixed so as to answer the purpose intended. Mr. Coulson has informed me of a case, in which the patient compressed the ring so tightly as to cause a slough of the integuments, which, having separated, was followed

[1] Merrett's perforated gusset fitted to the fork of the trowsers may be worn with advantage in varicocele.

[2] Medical Gazette, vol. xxii. p. 194.

fortunately by such contraction of the part as to raise the testicle, and afford relief from the uneasy symptoms of the complaint.

In order to afford a permanent and more complete support to the testicle, and to render a suspensory bandage unnecessary, Sir A. Cooper practised a very simple operation; viz., the removal of a portion of the relaxed scrotum, leaving the remaining part to form adhesions and to constitute a natural suspensory bandage. He recommended this operation only in the more severe cases of varicocele. In slighter cases he employed the suspensory bandage. In the paper[1] in which this treatment is described, five cases are related. In all of them, the painful symptoms of varicocele are stated to have been fully relieved by the operation. In other cases, the results of the operation have been either unsuccessful or far less satisfactory. Some years ago I examined a man, part of whose scrotum had been excised by Sir A. Cooper, for the relief of a varicocele, but so little benefit was derived from the operation that he afterwards submitted to castration. A medical friend informed me that in one of Sir Astley's published cases of success, the disease subsequently returned as bad as ever. In 1849 I was consulted by a man, aged twenty-five, on account of a varicocele, a portion of whose scrotum had been excised at York three years previously with only temporary relief. He still suffered a good deal of aching pain, especially towards evening, and required further aid. The late Mr. Bransby Cooper published an account of a case in which he performed the operation apparently at first with a successful result; but two years afterwards, it was found that the varicocele had returned, and the patient was obliged to wear a suspender.[2]

[1] Guy's Hospital Reports, vol. iii.

[2] Lectures on Surgery, Lond. Med. Gazette, vol. xliii. p. 356.

It is not surprising, when we consider the severity of excision of the scrotum, and the uncertainty of its success in the more painful cases of varicocele for which alone it was recommended, that few surgeons have been led to adopt this operation, indeed, it may now be regarded as exploded from practice.

Treatment of Varicocele by Pressure.—A surgeon suffering from a varix in the leg, having heard the late Sir Charles Bell state, in his lectures at the College of Surgeons, in illustration of the fact of the dilatation of a varicose vein being caused solely by the pressure of the column of blood, that if the distended vein be compressed with the finger the swollen condition of the vessel beneath shortly disappears, was led to apply the principle thus indicated to the treatment of his own case, which was attended with a satisfactory result. This gentleman mentioned the circumstance to the late Mr. Key, who was accordingly induced to adopt the same principle in the treatment of a case of varicocele.

In a patient affected with this disease, if the spermatic cord be pretty firmly compressed between the fingers whilst the patient is in the recumbent position and the vessels are empty, it will be found, on his assuming the erect posture, that the vessels, instead of swelling as before, still remain empty and contracted. Even, too, when the patient is standing, and the veins are full, if firm pressure be made on the cord, the vessels below, being thus relieved of the superincumbent weight of the blood, will often gradually diminish and become partially emptied of their contents. It was natural, therefore, to conclude, that if the pressure could be steadily continued for a sufficient length of time, it would enable the vessels to recover from the morbid state of dilatation in which they were previously re-

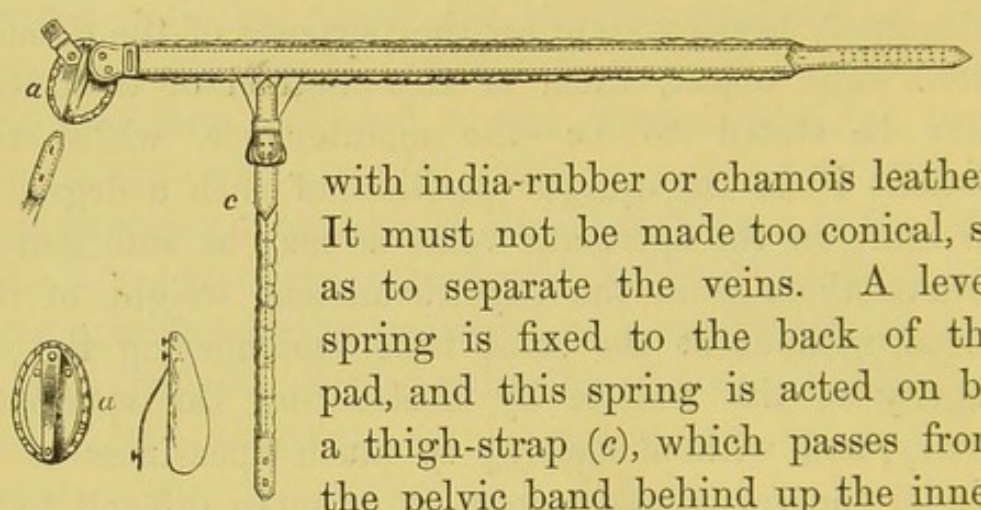
tained by the hydrostatic pressure of the blood. In the case of the varix in the leg, it is clear that the local pressure could have had no effect on the artery by which the vein was supplied, and we may reasonably conclude that the blood in the veins below the point of compression found its way back to the heart by collateral and healthy channels. When the spermatic vessels are compressed in the manner just described, the pressure does not appear to be sufficient to obstruct the spermatic artery; whilst the blood in the vessels below the part compressed, no doubt, returns by the smaller vessels, a sufficiency of which always exists in these cases in an adequately healthy state for the purposes of the circulation. The object, then, of this method of treatment may be stated to be—the maintenance, whilst the patient is in the upright position, of such a degree of pressure on the spermatic veins as may be sufficient to relieve them from the superincumbent weight of the blood, without at the same time endangering the integrity of the testicle by obstructing the spermatic artery, and without causing so much uneasiness as to render the remedy as painful as, or more difficult to be borne than, the disease. This pressure must be continued a sufficient time to enable the coats of the vessels to return to their natural dimensions, and to acquire strength to carry on the circulation. When this is effected the patient is cured. It is obvious, therefore, that the main difficulty of this treatment consists in the application of continuous local pressure. The only part where this can well be made on the spermatic veins is at the external abdominal ring;[1] but

[1] That pressure at the groin is capable of giving relief in varicocele has sometimes been found out by the patients themselves. Several have mentioned to me, that they had been in the habit, whilst walking about, of

unless the pressure be skilfully applied, patients are unwilling to submit to it. Indeed, several cases have come under my notice, in which disappointment has ensued, entirely from the imperfect application of this plan of treatment. The instrument which I have found to be best calculated to meet the exigencies of the treatment by pressure, is the moc-main lever truss.

This truss (Fig. 43) consists of a pelvic band, to one extremity of which a pad (*a*) is attached. This pad is stuffed with moc-main, a species of cotton, and covered

Fig. 43.



with india-rubber or chamois leather. It must not be made too conical, so as to separate the veins. A lever spring is fixed to the back of the pad, and this spring is acted on by a thigh-strap (*c*), which passes from the pelvic band behind up the inner part of the thigh, and is attached to a button at the extremity of the spring. The degree of pressure is regulated by the tightness of this strap. If the thigh-strap be made of strong elastic webbing for about three inches behind, it will yield to the movements of the body, and add much to the comfort of the patient. In double varicocele, pads must be attached to both extremities of the pelvic band, and two thigh-straps are required. Being made without any circular spring, this instrument is not so liable to be displaced

pressing on this part with the fingers, having found out that considerable ease could be obtained in this way.

as the ordinary trusses. The patient can readily regulate the pressure of the pad, increase or diminish it as may be necessary; whilst the pad itself, being stuffed with a light and elastic material, allows of the requisite pressure being made without causing discomfort. Several instances have come under my notice, in which persons affected with varicocele, after wearing other instruments without the least relief, have derived great comfort and benefit from the lever truss.

The truss should be applied whilst the patient is recumbent, so as to make rather firm pressure at the external ring. It sometimes happens that the truss, though worn with comfort after being adjusted in the morning, begins to produce uneasiness towards the after part of the day. When this is the case, the pressure should be diminished by loosening the thigh-strap. In general, the truss need be worn only during the day, though in some instances I have thought it advisable to recommend its use during the night also. Thus, in one case, the patient suffered uneasiness in lying on the side affected, and was able to pass a better night on wearing the truss. When the scrotum is unusually pendulous, or when the veins are very long and form a plexus of any size, I advise the addition of the silk net suspender, which may be readily adapted to the truss.

This method of treatment will be best explained by the relation of a few cases in which it was applied. The following are cases in which firm, steady, and continued pressure on the spermatic veins at the external abdominal ring succeeded in curing the disease.

Case I. *Varicocele Cured by Pressure in Nineteen Months.*—J. H., a tall spare man, aged twenty-two, a cabinet-maker, applied to me at the London Hospital in May, 1843, on account of a varicocele on the left

side. There was a considerable bunch of dilated veins above and behind the left testicle, which was about one-third less in size than the right. He had noticed the complaint between two and three years, and it was increasing in size; for the last two years he had worn a suspender, but latterly it had not afforded him the relief he at first experienced from it. He suffered a dull aching pain in the course of the spermatic cord, and this became worse towards evening, and after standing or much exertion. The lever truss was applied on the 8th.—May 11th. The patient complained of uneasiness from the pressure of the truss, but stated that it was not greater than he could easily manage to bear. He was relieved from the aching pain, and there was a decided diminution in the size of the dilated veins, though he had discontinued the use of a suspender; but this he was directed to resume. The truss was ordered to be worn day and night.—June 7th. He had worn the truss constantly, and suffered very little from it. There was scarcely any appearance of dilated veins, and no uneasiness in the course of the cord.—Dec. 20th. On a careful examination of the parts in the after part of the day, the truss being on, no enlargement of the veins could be distinguished. He had become accustomed to the truss, which he wore without inconvenience, taking it off at night.—Dec. 19th, 1844. On examination of the parts after removal of the truss, there was no appearance of varicocele, and the left testicle had acquired the same size as the right. I considered the complaint cured, and allowed the patient to discontinue wearing the truss, but cautioned him to avoid those circumstances which would tend to reproduce the disease.

Case II. *Slight Varicocele Cured by Pressure in Seven Months.*—A young man, aged twenty-four, a medical

assistant, in rather impaired health, applied to me in July, 1843, on account of a varicocele on the left side. It came after an injury, accompanied with strain, which occurred to him in the February preceding. The spermatic veins were not enlarged to any great extent, but they were distinctly varicose, and he experienced considerable uneasiness in the cord, especially after standing for some hours in his business. He had worn a suspender, which gave him only partial relief. The left testicle was rather smaller than the right. His countenance had an anxious expression, and he was uneasy in his mind about his case. His bowels were costive. I prescribed an aperient pill and some tonic medicine, and directed the truss to be applied; and, as usual, recommended him to avoid fatigue and straining efforts. I saw nothing more of this patient till nearly a month after his first visit, when he called and said that he was much relieved, and to a greater extent than he could have expected in so short a period. On examining him with the truss on, I found the spermatic veins less dilated than when I first saw him. He said the truss fretted his skin at first, but this had been remedied by interposing some wash-leather between the pad and skin. He was able to continue in his business, standing or moving about nearly all day. His countenance had lost the anxious expression, and his general health was improved. This patient visited me again February 3, 1844. He had been in the country, and had returned in improved health. He felt quite well, but still wore the truss. I could detect no enlargement of the spermatic veins, and considered the varicocele cured, though, as a precaution, I recommended him to continue wearing the truss for a few months longer.

Case III. *Double Varicocele Cured by Pressure in Ten Months.*—A gentleman, aged twenty-four, of spare form, pale countenance, and subject to indigestion since infancy, consulted me in May, 1844, on account of a double varicocele. There was evident enlargement of the spermatic veins on the left side, and a very slight dilatation of these veins on the right. He had been troubled with the complaint about a year. He had worn a suspender for many months, but the swelling and inconvenience were increasing. I noticed a dilated condition of the superficial veins throughout the body, the veins of the penis, thighs, and legs being especially large and prominent. He was of a costive habit. On the 22nd instant, I directed a double truss to be applied. I also recommended the legs to be bandaged with stocking-web rollers, a cold bath to be taken daily, the bowels to be kept open by an injection of cold water in the morning, and I also prescribed the citrate of quinine and iron.—July 23rd. He had steadily worn the truss since I last saw him, during which period he had been travelling on the Continent. His health and digestion were improved. The spermatic veins on the left side were diminished, and all uneasiness was removed. No enlargement of the veins was observed on the right side. —March 6th, 1845. There was no appearance of varicocele, nor uneasiness on either side. I considered the complaint cured, but recommended the patient to continue the use of the truss for six months longer.

Case IV. *Varicocele Cured by Pressure in Fifteen Months.*—A gentleman, aged twenty-seven, consulted the late Mr. Key for a rapidly increasing varicocele, and was recommended to have recourse to pressure on the spermatic veins by means of a truss. He wore it for two months, and clearly derived benefit, when he

quitted this country for Canada. He left off the truss after wearing it for fifteen months. On his return to England, at the expiration of three years, he was seen by Dr. Daldy, who had previously attended him, and Dr. Daldy found the varicocele quite cured.

To these examples of cure by pressure I could add several other cases, if necessary, to establish the value and utility of this plan of treatment. In those related, the dilatation of the veins had taken place at a comparatively early period of life, was not excessive, nor in two of them of long duration, but was productive of more or less inconvenience and uneasiness, which could be only partially or scarcely at all remedied by the suspender. They were precisely the cases, in which it was to be expected, that pressure, by relieving the veins of the superincumbent weight of the blood, would enable their coats to recover their proper size and tone.

The same method of treatment has been applied to several other cases of severe varicocele, in which a complete restoration of the veins was scarcely to be expected, but in which the lever truss speedily and fully relieved the painful symptoms of the complaint, and enabled the patient to follow active occupations without inconvenience, as in the following instance.

Case V. *Large painful Varicocele on the right side entirely relieved by Pressure.*—A middle-aged professional gentleman had been subject to varicocele on the right side for twenty years. A large plexus of dilated veins surrounded the body of the testicle and extended up to the inguinal canal. It caused considerable uneasiness, a disagreeable sense of dragging and weight from the loins, and sickness after much exertion. The right testicle was not smaller than the left, but felt somewhat softer. The complaint was attended with considerable

depression of spirits. No benefit was obtained from the use of the suspender. I saw this patient with Dr. Thomson, of Dalkeith, in 1848, and recommended the application of the lever truss. The instrument gave instant relief, and no tumour appeared in the scrotum on his rising from the recumbent posture. It did not, however, prevent the veins becoming swollen when violent exercise was taken on horseback; and as considerable discomfort arose when the bandage was tightened so as to increase the pressure, Dr. Thomson was led to suggest an alteration in the construction of the instrument, which fully answered the purpose intended. Violent exercise was taken without the occurrence of any distension of the veins, and the patient was entirely relieved from the distressing symptoms of the disease. A less amount of pressure was after a time found sufficient. In a note which I received from the patient in 1854, he states, that for four months he has been able to dispense with the use of the truss, finding a suspender amply sufficient to prevent any dilatation of the veins or uneasiness, and that he was more equal to physical exertion than he had been for years. I saw this gentleman in the summer of 1855. He was leading a most active life without inconvenience, and was wearing only the suspender.

I have met with very few cases in which a greater amount of pressure from the lever truss than could be borne without discomfort, was required in order to relieve the distended veins. In this last case, the varicocele was of long duration and of remarkable size, and the patient led a very active life, so that unusual force was necessary. The instrument contrived by Dr. Thomson was a combination of the ordinary spring and lever truss. It had, therefore, both a circular and lever

spring with a pad so attached as to admit of slight elongation. In some cases of large varicocele, an instrument of this kind might be more efficient, and be worn with greater comfort than the simple lever truss; for when much pressure is exerted with the latter, the tightness of the thigh-strap cannot be borne without uneasiness. Dr. Thomson has used his truss also in cases of varicocele coupled with reducible inguinal hernia with advantage.[1] Varicocele and inguinal hernia is, however, by no means a common complication, and the circumstance, that in no case of hernia in which a truss has been worn, have I observed any marked dilatation of the spermatic veins, is worthy of note in reference to the beneficial influence of pressure in varicocele.

I have already remarked, that persons afflicted with varicocele often labour under a degree of mental distress very much out of proportion to the actual disease. By appropriate general treatment and encouraging advice, combined with local means, these hypochondriacal symptoms may generally be removed. In other instances, the uneasiness in the testicle and spermatic cord, and even in the loins, is so great as to produce much real suffering, and to prevent the person affected from making any kind of exertion. In the following case, which was an instance of the kind, the patient was prepared to submit to an operation, had I recommended one, but the benefit derived from the truss was sufficient to render an operation unnecessary. In this case, the distension of the veins was so slight, that the relief obtained was, I believe, mainly due to the pressure made on the spermatic nerves.

[1] *Vide* Dr. Thomson on Varicocele treated by Compression, Monthly Journal of Medical Science, Nov. 1848.

Case VI. *Distressing Varicocele Relieved by Pressure.* —In March, 1845, I saw, in consultation with Mr. Pye Smith, a gentleman, aged twenty-five, who was affected with a distressing varicocele on the left side. He was single, and of delicate appearance, but his general health was represented to be pretty good. He had been troubled with the complaint for about four years; but, notwithstanding the use of a suspender, the uneasiness had continued to increase, and at length had become so severe, that he was unable to attend to business, or even to walk a short distance without lying down afterwards. On his entering my room, he begged to be allowed to place himself on the couch, in order to procure relief, and he afterwards remained in the recumbent position for half an hour before leaving the house. On examination I found the dilatation of the spermatic veins on the left side by no means considerable. The testicle was of proper size, but the seat of a good deal of morbid sensibility. On making tolerably firm pressure on the spermatic veins at the external abdominal ring with the fingers, and continuing it whilst the patient walked backwards and forwards in the room, no uneasiness whatever was experienced, whereas the pain returned in a few minutes after the pressure was remitted. The application of the lever truss was consequently recommended. This gentleman called on me again at the end of two months, and stated that he had derived great relief from constantly wearing the truss, and was able to take exercise and to attend to business, though he still suffered from the complaint at times, especially after fatigue. Mr. Smith has recently informed me that our patient continues free from uneasiness. He wore the truss for about three years, and then discontinued it, and now uses only a suspender.

In general, too little attention is paid to constitutional treatment in varicocele, which is commonly regarded as exclusively a local disease. In many of the cases in which support or pressure affords relief, the subjects of the disease are persons between eighteen and thirty years of age, of weak frame and constitution, whose venous system and circulation are feeble, as is evinced by the large size of the superficial veins, particularly in the lower extremities, paleness of the countenance, and cold hands and feet. Not unfrequently they are affected also with spermatorrhœa. In these cases, the operation of local remedies may be aided materially by general treatment, such as quinine and steel medicines, cod-liver oil, a nutritious diet, sea-bathing, and similar measures calculated to improve the tone of the system, as well as to check the frequent involuntary emissions.

Though pressure often gives complete relief in varicocele, and is a plan well adapted for the treatment of slight cases, especially of those in which the symptoms are of a neuralgic character, yet I meet with many persons who after wearing a truss for a time have been disappointed with it, or who have been unwilling to submit to this slow treatment, and have desired a quicker, more radical, and certain cure. Besides, cases in which the spermatic veins are largely dilated are not curable by pressure even long protracted. I have been led, therefore, to reconsider the question of more active surgical treatment, and later experience, as well as improvements in the mode of operating, have caused me to take a more favourable view of proceedings for obliterating the spermatic veins than I have expressed in former writings.

The radical cure of varicocele by operation has been attempted in many different ways. 1. By division of

the veins; 2. By excision; 3. By compression (Breschet's method); 4. By ligature; and 5. By Acupressure. Subcutaneous ligature and subcutaneous acupressure are the only operations which can be recommended as mild, and free from risk.

Subcutaneous Ligature.—Celsus recommended cutting down upon the spermatic veins, and the application of a ligature around them; an operation which has been frequently performed since his day by many of the older surgeons. This operation is adequate to the cure of the disease, but is not free from danger, owing to its liability to induce phlebitis. Sir Everard Home cut down upon and tied the spermatic veins for the cure of varicocele in a patient in St. George's Hospital. In this case, according to Sir B. Brodie, venous inflammation took place, attended with so much constitutional disturbance that the patient nearly died.[1] M. Ricord improved upon the preceding method by applying the ligature to the spermatic veins *subcutaneously*. His operation is performed in the following manner:—The vas deferens being separated from the mass of veins, and the latter being pinched up with a fold of the scrotum, a needle set in a handle with the eye near the point, armed with a double-looped thread, is to be passed beneath them. When the needle has traversed from one side to the other, the loop is to be drawn out, the needle retracted, and the veins let go, the skin alone being now held up. A second needle, similarly armed, is then to be passed through, over the veins, entering at the same hole by which the first needle was thrust out, and emerging at the same hole by which it entered. The second loop is next to be drawn out, and the needle withdrawn. The bundle of veins is thus included

[1] Lond. Med. Gaz. vol. xiii. p. 379.

between two double threads, of which one passes over, and the other beneath it. The ends of the thread on each side are then to be passed into the loop of the other, and now by drawing these ends in opposite directions the vessels are tied beneath the skin. By this mode of applying the ligatures, the vessels may either be suddenly constricted, or be tied gradually, by means of an ingenious instrument—a *serre-nœud*. In this way traction can be steadily kept up and so regulated as not to cause uneasiness. The vessels are divided, and the ligatures come away in from the tenth to the twentieth day. In 1849 I visited the Venereal Hospital in Paris with M. Ricord, who informed me that he had met with no bad results from this mode of tying the veins; and I saw a case under treatment in which the effects were quite mild. Mr. Tufnell, of Dublin, has made a slight improvement in this operation by using iron wire instead of threads, the former being less liable to excite suppuration. He also passes a piece of wire through the loops before they are tightened, to serve as retractors when the surgeon wishes to remove the ligatures from off the veins.[1]

Subcutaneous Acupressure.—To avoid the serious risks consequent upon the application of a ligature in the old way, many surgeons have had recourse to a plan for the obliteration of the dilated veins, which was first tried by M. Davat on the veins of animals.[2] This plan consists in passing a straight pin or needle through the scrotum, and underneath the varicose vessels, between the latter and the vas deferens, and then twisting a strong silk ligature around the projecting extremities of the pin in the form of the figure 8, with sufficient tight-

[1] Dublin Journal of Med. Science, vol. xxxii. p. 331.

[2] *Vide* Archives Générales de Médecine, 11e sér. t. xi. p. 1, 1833.

ness to compress and flatten the vessels, and arrest the circulation through them. Inflammation is by this means excited in the coats of the vessels; and the sides of the inner one being retained in contact, the vessels become obliterated by adhesion. The pin after remaining in a few days is removed, and the sores produced by it soon heal up. Velpeau and Jobert in Paris have practised this simple operation with success, and it has also been performed in this country by Liston, Fergusson, and other surgeons, with favourable results.

It has been found that compression of the veins with a single pin, or even with two or three,[1] is not always sufficient to procure the obliteration of the enlarged spermatic veins. To secure more completely this object, and also to prevent the risk of phlebitis, Mr. Henry Lee suggested a decided improvement on Davat's operation.[2] This consists in passing two pins beneath the veins at an interval of from half an inch to an inch, instead of one; and the subcutaneous division of the vessels between the pins on the third day after compression. As a slight modification of this method is the operation which I have practised now in many cases with good results, I shall particularly describe it.

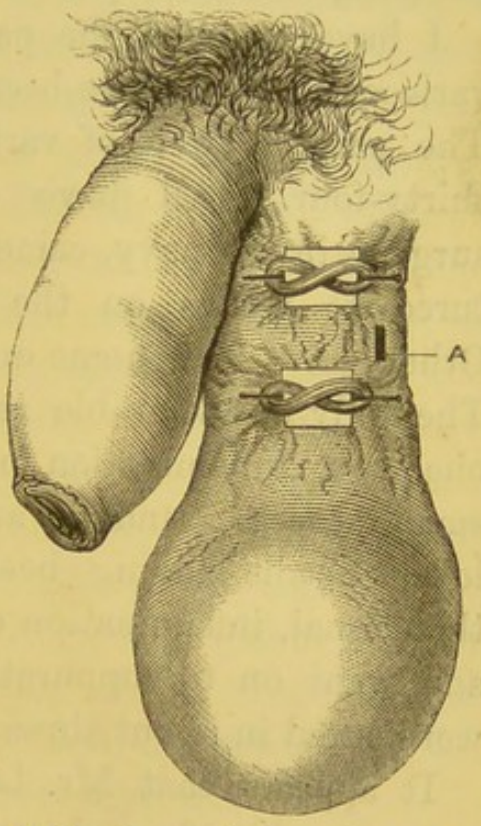
Chloroform may be given, if desired, but as the pain of the operation is very slight, and as I prefer passing the pins whilst the patient is in the erect posture, I do not recommend anæsthesia. Whilst the patient stands on a chair or footstool close to a couch, I feel with the left hand for the vas deferens, which is easily distinguished by its cord-like feel, and separating it from the large veins in front I pass a straight pin between

[1] Sir William Fergusson uses three pins. *Vide* Practical Surgery.

[2] On the Radical Cure of Varicocele by Subcutaneous Incision. By H. Lee. 1860.

the duct and the vessels, about two inches above the testicle, and at about three-quarters of an inch below this point another pin is passed in the same way. The patient is then directed to lie down. A stout silk ligature is applied round the ends of each pin, as in Davat's operation, a piece of card of proper size being first applied to the front of the scrotum between the ends of each pin, to guard the skin from being ulcerated by the pressure of the ligature. Having nipped off the sharp edge of each pin, I complete the operation with a narrow-bladed tenotomy knife, by freely dividing the veins subcutaneously midway between the pins. (Fig. 44, A.) A drop or two of blood only escapes, and a piece of lint to the small opening is the only dressing required. The patient is afterwards kept in bed, and on the sixth day I divide the ligatures and withdraw the pins. A hard lump, varying in size in different cases, is felt in the spermatic cord at the part operated on. The patient is kept recumbent until the apertures have closed and tenderness has subsided. Usually in two or three days after the removal of the pins he is able to get up and go about, wearing a suspender. The swelling and induration in the cord do not quite disappear for two or three weeks.

Fig. 44.



A, Opening made in section of the veins.

This method of proceeding differs from Mr. Henry Lee's, chiefly in the circumstance that I perform only one operation, dividing the veins immediately after compressing them, whereas Mr. Lee makes a second operation of it on the third day after, when the parts are in a more tender state.[1] Mr. Lee removes the pins on the fourth day; but I prefer allowing them to remain in till the sixth day, to secure more completely the obliteration of the veins. The subcutaneous division of the veins is a very important part of this operation in ensuring its success.

I have recorded the particulars of nineteen cases of varicocele which have been operated on in this manner. The patients were of various ages—from seventeen to thirty-four. All have done well. One patient, a surgeon in the navy, came up from Plymouth, and ventured to return on the eighth day after operation. Others have gone home on the tenth and eleventh days. The only unfavourable results which occurred, were, in one case, inflammation of the scrotum, followed by a small abscess; and in another, a very short man, the lower needle having been passed nearer the testicle than usual, inflammation of the tunica vaginalis ensued, and went on to suppuration; but both these patients were cured in about three weeks.

It appears that Mr. Lee, in some of his cases, had some trouble from hæmorrhage into the connective tissue of the part after the subcutaneous section. This has not occurred in any case in which I have operated, nor do I see how bleeding can take place if the surgeon is careful to keep the incision within the limits of the

[1] Mr. Lee mentions that, at the suggestion of Mr. Bowman, he at one time divided the veins in the first operation with good results, but it does not appear that he continued this practice.

parts submitted to acupressure, which must necessarily arrest any flow beyond the blood stagnant in the vessels between the parts compressed.

It is on record that Delpech, a surgeon of distinction in France, was assassinated by a man whom he had cured of double varicocele a year before by tying the dilated veins. The patient's testicles were found after death wasted and soft. A liability to orchitic atrophy from an operation on the veins would of course be serious, but there is really no ground for anxiety on this score. I have seen several of my patients months and years after operation, and in no instance have I ascertained that any wasting of the testicle had taken place. Indeed, in two instances, the organ had undergone a manifest increase in size. Ricord, Lee, and other surgeons in the habit of operating on the spermatic veins, all agree that there is no fear of causing atrophy of the testicle. The spermatic artery appears to escape compression by being drawn away along with the vas deferens. I have been very careful, however, not to include too much, and in one of the nineteen cases above alluded to I performed, after six months, a second operation upon some dilated veins which were not compressed in the first. If atrophy of the testicles really resulted from Delpech's operation, he must have been too free in the application of his ligatures.

M. Vidal practised a mode of obliterating the veins by passing a silver or steel pin behind the vessels, between them and the vas deferens, and then carrying a needle, armed with a fine silver wire, in front of them, through the same apertures by which the pin passed. Compression was made by twisting the ends of the wire round either end of the pin, and was gradually increased by the surgeon turning the pin from day to day. The

veins were in this way rolled up as well as compressed, until they became destroyed or cut through. The bridge of skin and the superficial veins in front were also divided, or incised on the fifteenth day.[1] This plan of obliterating the veins has been frequently resorted to by Mr. Erichsen, and it is no doubt quite effectual. Mr. Wood, of King's College Hospital, employs an ingenious method of compressing the veins by means of a pin and metallic wire, which is a modification of Vidal's operation, though a great improvement on it, inasmuch as the acupressure is wholly subcutaneous.[2] A youth, aged fourteen, with a fully-developed varicocele on the left side, was lately brought to me by his father for my sanction to an operation, which I gave. It was performed by Mr. Wood. The ligature took a fortnight in ulcerating through the included parts. I saw the lad some weeks after the operation, when the cure was quite satisfactory.

The great objection to all operations for the obliteration of the dilated spermatic veins has been the risk of phlebitis or pyæmia. This supposed source of danger long deterred me from resorting to active proceedings to get rid of a complaint not usually considered serious. Later experience has satisfied me that in healthy subjects, and with due care, the risk of pyæmia from a subcutaneous operation is extremely slight. After inquiry of the chief surgeons who have practised this operation in London, I have succeeded in finding only two cases in which the result proved serious. One occurred about seven years ago, and attracted some notice at the time. A gentleman, who had been operated

[1] Vidal, Traité de Pathologie, t. v. p. 223.

[2] Mr. Wood has favoured me with an unpublished account of his operation, but it is omitted here as the description would not be intelligible without figures.

on by a well-known hospital surgeon, died somewhat suddenly a few days afterwards. The patient's friend, Dr. Brinton, has informed me that the fatal result did not take place from pyæmia, but from erysipelas, which might occur after any operation.—A gentleman, aged twenty-seven, was brought to me about a year ago for my opinion on the propriety of an operation for the cure of a varicocele with which he was troubled. As he seemed in good health, as his left testicle was wasting, and as he was very anxious to get quit of his complaint in consequence, I sanctioned the operation being done. The subcutaneous ligature (Ricord's plan) was applied by a hospital surgeon. Eight days after the ligatures were removed, the patient got up for two or three hours without leave, and moved about, and in the evening he was seized with rigors, which were followed by the usual symptoms of pyæmia. Abscesses involving one knee, the shoulder, and other joints occurred, and after a very protracted illness, he recovered with ankylosis of the right knee and left shoulder, and imperfect use of the left elbow. A case of this kind, in which a young and healthy man, after submitting to ligature of the spermatic veins, narrowly escapes death only to become more or less crippled for life, may well induce the surgeon to hesitate in recommending active treatment for varicocele, and it is right that the patient should know that this measure is not wholly free from danger; but with our present experience of the smallness of the risk, I am of opinion that the surgeon is quite justified in undertaking an operation for the radical cure of severe varicocele; at the same time he cannot be too careful in the after-treatment, or too cautious in securing his patient from all contagious and miasmatic influences.

I give the preference to Lee's operation, as it is simple, attended with very little pain, and speedy in its effects. Ricord's and Wood's operations are, without doubt, equally effective and safe, but they occupy longer time, from ten days to a fortnight being required for the ligature to ulcerate through the included parts.

CHAPTER II.

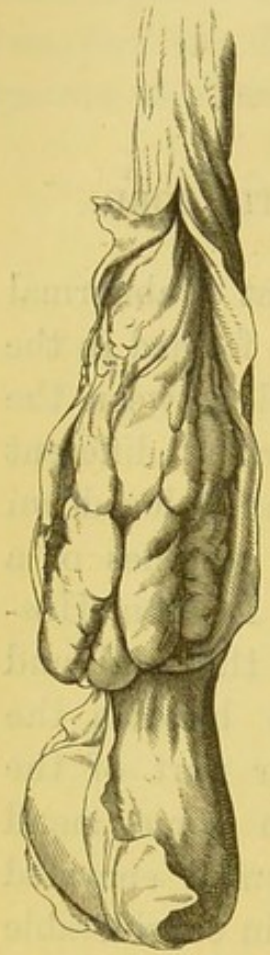
ADIPOSE TUMOURS OF THE SPERMATIC CORD.

The spermatic cord is sometimes the seat of abnormal depositions of fat. The adipose matter is formed in the loose connective tissue, and is interposed between the structures composing the cord. It occurs at different parts, as high up as the inguinal canal, and as low down as the epididymis. In examining the testicles of a young man who died of pleurisy in the London Hospital, I found a quantity of fat along the cord and around the epididymis, and some also beneath the tunica vaginalis reflexa on the posterior part of the testicle. In another case I met with some small isolated masses of fat, coupled with a small encysted hydrocele of the cord. When developed in considerable abundance, this deposit sometimes forms in front of the spermatic vessels a loose and moveable tumour, having the soft doughy feel and lobular character of ordinary adipose swellings. In general, these accumulations of fat occasion no inconvenience, and consequently do not require any surgical treatment. They have, however, been mistaken for omental hernia. Pelletan, by whom they have been noticed, speaks of them under the denomination of "*hernie graisseuse.*"[1] I once dissected a lobulated fatty tumour, surrounded by the thickened sheath of the spermatic cord, on the

[1] Clinique Chirurgicale, t. iii. p. 33.

body of a man upwards of eighty years of age, which was very similar in appearance to a portion of omentum contained in a hernial sac. It is represented in the annexed woodcut. Cloquet has also given an account of the dissection of a fatty tumour, found in the left spermatic cord of an old man, which resembled an irreducible epiplocele.[1] Mr. Macilwain mentions an instance in which it was thought proper to cut down upon a tumour of this kind in the spermatic cord to ascertain its nature, in consequence of the patient labouring under the symptoms of strangulated hernia. The surgeon, finding the fatty tumour to be so intimately connected with the cord as not to admit of extirpation without injury to it, removed tumour, testicle and all[2]—a proceeding which, in such a case, could scarcely have been justifiable. These swellings have the soft inelastic feel, elongated form, and indolent character of an irreducible omental hernia. In a case, therefore, where obstinate constipation and other symptoms of strangulated hernia exist, if after a careful examination of the tumour, and an attentive consideration of the history of the case, any question remain respecting its nature, it would be quite right to remove all doubt by cutting down upon the part. A mass of fat in the cord may form, however, a defined and distinct swelling. Such a tumour is preserved in the

Fig. 45.



[1] Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 26.
[2] Surgical Observations, p. 291, note.

Museum of the College of Surgeons (No. 2461). It is embedded about an inch above the testicle, in the tissues of the spermatic cord, and loosely connected with them. Its shape is oval; it measures four inches in length, and consists of numerous lobes of soft fat, closely held together by thin partitions of fibro-connective tissue.

The difficulties of the diagnosis, even of a small defined fatty tumour in the spermatic cord, are well illustrated in the following case.—A gentleman, aged forty-seven, consulted a surgeon of experience, in London, for a swelling in the left side of the scrotum, which was pronounced to be oblique omental hernia, and trusses of various kinds and strength were used to keep it up, but with no other effect than of causing considerable pain from pressure. After a month of this treatment the patient consulted a hospital surgeon who had written on varicocele. He, after a careful examination, declared that there was no rupture at all, and ordered the truss to be left off. Not satisfied with this view of the case the patient called on another hospital surgeon who had written on hernia. This gentleman was most painstaking in his examination, and decided positively that the case was omental rupture, and recommended the truss to be resumed. Both these surgeons were again called on, and after repeating the examination adhered to their opinions. Puzzled and distressed by such conflicting opinions the patient was induced to consult me. I found a small oval swelling midway between the testicle and abdominal ring. It was inelastic, moveable, and not sensitive. It had no impulse on coughing, and diminished very slightly indeed in the recumbent position, not more so than might be explained by the emptying of the veins of the part.

The swelling had been observed ten years, during which time it had remained stationary. The absence of any prolongation of the swelling into the inguinal canal, in addition to the other characters of the swelling, led me to conclude, with confidence, that it was a fatty growth in the spermatic cord—neither hernia nor varicocele.

An interesting case of large fatty tumour in the scrotum originating in the spermatic cord, was seen by several eminent surgeons a few years ago, the greatest difficulty having been experienced in distinguishing the nature of the swelling. The case is also remarkable on account of the frequent recurrence of the fatty growth after removal.—J. M., aged forty-three, a gentleman of a spare habit, became conscious, in the autumn of 1842, of an enlargement in the left side of the scrotum. The late Mr. Hale Thompson, who first saw him, supposed the swelling to be hernial, but subsequently changed his opinion and considered the disease to be confined to the spermatic cord. The tumour continuing to enlarge, the patient was seen by Mr. Lawrence, who viewed the swelling as hernial, and having made attempts at reduction without effect, pronounced the case to be irreducible omental hernia. Mr. Thompson not being satisfied with this conclusion, took the patient to Sir B. Brodie, who, after a careful examination, decided against the swelling being a hernia, without expressing an opinion of the nature of the case, which he considered was very obscure. Mr. M. afterwards left England, and spent eight months in Italy. Whilst in Florence he consulted Mr. Harding, formerly assistant-surgeon to the Westminster Hospital, who declined giving an opinion of the case. On the gentleman's return from the Continent, in August, 1843, the tumour was found to be very little

enlarged. In the course of the succeeding six months, however, it went on increasing. At this period Mr. Edwards, surgeon, of Chelsea, accompanied Mr. M. to my house.[1] I found on the left side of the scrotum a tumour about the size of a large orange, of rounded form, feeling soft and inelastic, and indistinctly defined above, where it was connected with a thickened spermatic cord. The testicle was distinct from the tumour, and situated at its lower part towards the inner side. The tumour remained constant under pressure and in all positions, and was quite opaque. The patient stated that when he rose in the morning the tumour began to swell and to feel heavy and uneasy, and that it became tense and painful before an evacuation, but afterwards resumed its former state. Although unable to explain at the time the connexion which appeared to exist between the bowels and the tumour, I had no hesitation, after a careful examination, in declaring that it was not hernial, but probably an adventitious formation in the scrotum; and I recommended the continuance of the iodine treatment, and also sanctioned the use of a truss, which had been applied by Mr. Edwards's direction to the groin, and which gave relief from the uneasy sensation in the bowels without increasing the size of the swelling. During the following twelvemonth the tumour went on enlarging until it acquired the average size of a melon. It preserved its pyriform shape, had a doughy feel, and the testicle was situated in front. Mr. M. was then examined by Sir B. Brodie, Mr. Travers, and Mr.

[1] The early history of this case is taken from Mr. Edwards's report, published in the Provincial Medical and Surgical Journal, June 25, 1845. The case has also been briefly described by Sir B. Brodie in his Lectures on Pathology and Surgery, p. 271; and by Mr. Lawrence in a Clinical Lecture in the Medical Gazette, vol. xxxvi. p. 177.

Lawrence, who, in consultation, decided against the tumour being connected with the testicle, or being hernial, and though unable to determine its nature recommended its removal, which had become urgently necessary from its great bulk and rapid growth. The operation was performed by Mr. Lawrence, assisted by Mr. Travers, in April, 1845. After an exploratory incision which revealed the structure of the morbid growth, an attempt was made to save the testicle, but the different parts of the cord were so mixed up with the tumour that after some loss of time the entire contents of the left scrotal sac were excised. The tumour was found to measure eight inches in length by six in width, and to be composed of adipose tissue partially lobulated, which had its origin in the spermatic cord high up, but as it increased in size had made its way downwards into the scrotum, a direction in which there was the least resistance. The patient recovered favourably. A tumour about the size of a large chestnut subsequently formed in the left groin, and was excised by me in 1849. It was a small lobulated fatty tumour developed from the spermatic cord within the inguinal canal, and I then supposed it to be a portion of the original tumour, which having been left in the first operation had since grown in size. The patient afterwards consulted me on account of another growth in the upper part of the same side of the scrotum. It had been forming for about six months, and was slowly increasing. On Nov. 29, 1855, this gentleman submitted to the knife a third time, and I excised, upwards of ten years after the first operation, two small adipose tumours, one the size of a large chestnut, the other about half its size. The larger tumour

extended from the contracted scrotum to the inner part of the thigh. It was situated a good deal lower down than the fatty growth removed in the second operation. About a year after the third operation, a small swelling was again observed in the left side of the scrotum. It slowly but gradually increased, and in June, 1861, was the size of a small pear. The patient's state of health at this time was so indifferent that I could not recommend an operation. In May, 1863, the swelling had increased so much, and caused such great inconvenience, that I was requested to remove it. The tumour was excised from the scrotum, lower part of the abdomen, and inner part of the left thigh. It consisted of lobulated adipose tissue, weighed upwards of a pound, and measured seven and a half inches in length, and four and a half in breadth; indeed, it was nearly as large as the original tumour. The patient recovered favourably, and up to the present time (March 1866) has had no return.

The sympathy which existed between the bowels and the tumour in this puzzling case, may be explained by reference to what I have observed in varicocele. Any cause obstructing the return of blood by the enlarged spermatic veins would tend to produce tension and uneasiness in the tumour. Such an obstruction occurred, from hydrostatic pressure, when the patient assumed an upright posture, and also from an accumulation of fæces in the sigmoid flexure previous to an evacuation, the tension and uneasiness being always relieved after an action of the bowels. That this is the right explanation of the symptoms which added so much to the obscurity of the diagnosis, is confirmed by the decided relief which was derived from a truss making pressure

at the abdominal ring, so as to relieve the swollen veins of the pressure of the column of blood. The persistent tendency to a recurrence of fatty growths in the cord and scrotum, and its limitation to the left side, are very remarkable. We are familiar with recurrent growths of other kinds, but I know of no similar case of a return of fatty tumours. The patient is a very lean person, and is subject to pains in the loins and lithic-acid deposits.

CHAPTER III.

CARCINOMA OF THE SPERMATIC CORD.

In the Hunterian Museum there are two examples (Nos. 2462, 2463) of encephaloid disease of the spermatic cord, the testicle being unaffected. One of them occurred to Mr. Hunter, who gives a history of the case, showing that the disease originated in the cord. The patient died from cancer in the abdomen, implicating the lumbar glands and omentum.

Mr. Spence, of Edinburgh, removed, by operation, a large medullary tumour, which weighed nearly six pounds. It commenced about two years before at the external inguinal ring, and gradually increased; its progress latterly having been rapid, and attended with pain and impairment of the general health. Owing to a portion of the tumour extending up into the inguinal canal, it was necessary to slit open the tendon of the oblique, and clear the cord high up. This was done cautiously, and the tumour was then readily and fully removed. Suppuration and sloughing supervened, and afterwards peritonitis, and the patient sank. The section of the tumour exhibited the characteristic appearances of medullary cancer; the matter being arranged in masses separated by septa forming cysts. The testicle was free from disease, and lying at the bottom of

the tumour in the tunica vaginalis, which was distended with fluid.[1]

Serous and sanguineous effusions into the areolar tissue of the cord, and cysts containing serum or blood developed in this part, have already been treated of under the respective heads of Hydrocele and Hæmatocele of the Spermatic Cord, and in Chapter III. I have noticed ruptures of the vas deferens.

[1] Edin. Med. Journal, Feb. 1856, p. 750.

CHAPTER IV.

RETRACTION OF THE TESTICLE.

Retraction of the testicle is an occasional symptom in affections of the urinary organs, and arises from spasm of the cremaster muscle. It occurs in diseases of the kidney and in the passage of a calculus down the ureter, and may be explained by the connexion which exists between the spermatic plexus of nerves and the renal. It takes place only on one side, and the spasm comes on suddenly; so that the testicle is forcibly drawn up and retained, whilst the spasm lasts, at the external abdominal ring, the patient suffering more or less pain. This affection is to be treated with the warm bath, fomentations of hops or poppy-heads, opiates, extract of belladonna, &c., attention being at the same time paid to the source of irritation. I have been consulted, however, in a good many cases of retracted testicle persistent in character and arising from other causes.

Retraction of the testicle, though liable to occur in adults as well as in children, is most commonly seen in young subjects, and on both sides. The glands are seldom retracted higher than just outside the abdominal rings, but in early life, before being developed, they are sometimes drawn into the inguinal canals, and even into the abdomen. Godard cites a case in which both testicles were retracted into the abdomen in an infant a

year old, during an attack of measles, and caused symptoms of colic, but descended after being concealed for fifteen or sixteen hours.[1] He also describes a case in which the left testicle was withdrawn within the inguinal canal, and afterwards remained fixed in this abnormal position. The retraction took place without apparent cause at the age of ten years, and was attended with inflammatory symptoms, which subsided under treatment. At the age of twenty-three, the patient, when seen and examined by Godard, had the testicle still lodged in the inguinal canal, the left side of his scrotum being deficient.[2] The following case of retraction within the abdomen recently came under my notice at the London Hospital.—A boy, aged nine, not very robust, was brought to me in consequence of a slight swelling in the left groin. I found the scrotum moderately developed, but empty, and was unable to discover the testicles even in the groins. A slight hernial swelling appeared at the left abdominal ring on coughing. The mother, who seemed an intelligent woman, assured me she was certain that both testicles were in their normal position up to the age of seven, when they disappeared, owing, she supposed, either to a fright or to a violent cough. Her son had been subject to attacks of pain in the lower part of the abdomen. I ordered a truss to restrain the rupture on the left side.

In cases of retraction of some duration, without a history on which reliance can be placed, it is very difficult to distinguish the acquired from the congenital defect, as in both the scrotum would be atrophied. In the case last related the existence of a moderate-sized scrotum led me to credit the mother's report that the testicles had passed into the scrotum and had after-

[1] Etudes sur la Monorchidie et la Cryptorchidie, p. 121. [2] Ibid. p. 33.

wards been withdrawn.—In the spring of 1853 I was consulted in the following case of retraction of the testicles in a child five years and a half old. He was brought to me from the north of England, in consequence of the medical attendant suspecting the existence of an imperfect transition of the glands, and of the anxiety of the parents, who imagined that a serious imperfection had been overlooked after birth. The boy was of feeble frame and constitution. The scrotum was moderately developed, but flaccid and empty. The testicles were lodged in the groins close to the abdominal rings, and the integuments below were slightly wrinkled. The nurse observed this state of the parts on coming to her situation a year before, but omitted to mention it, and the parents were not aware until recently of anything being wrong. By gentle manipulation I could press the glands down into the scrotum, but they were displaced immediately the traction was remitted. From this occurrence, and the developed condition of the scrotum, and from the circumstance of the former medical attendants and nurses not having noticed any imperfection, I came to the conclusion that the abnormal position of the testicles was the result of tonic spasm of the cremaster occurring some time after birth, but at a period which could not be ascertained. I recommended cold bathing and tonics, and directed the nurse to use gentle manipulation daily in order to press the glands down. The little boy was brought to me after four months' residence at the sea-side, much improved in health. The testicles descended occasionally into the scrotum, though not constantly. On suddenly exposing the parts I found them *in situ*, but they were instantly drawn up into the groins, which the nurse stated was their usual position. The manipulation was

directed to be continued. I saw the boy again in the summer of 1854, on his return from the sea-side. He was in improved health, and the testicles were in their natural situation, and, according to the nurse's report, remained so pretty constantly. I have met with two similar cases, in which the affection was also mistaken for an imperfect transition of the glands. But the presence of a properly-formed scrotum, and the facility with which the testicles were pressed into it, rendered the diagnosis easy.

A testicle retracted into the inguinal canal, like a detained testicle, is liable to inflammation from pressure in that situation or from injury which it cannot elude. Thus, a boy, seven years of age, was brought to me in consequence of pain in the lower part of the abdomen resulting from injury of a testicle retracted into the inguinal canal.—A Jew boy, aged twelve, was admitted into the London Hospital in December, 1860, on account of a swelling in the right groin, which was extremely tender to the touch and caused a sickening sensation, the skin over it being red. There was also a good deal of constitutional disturbance. The right testicle being absent from the scrotum, left no doubt as to the nature of the swelling. Under leeching and fomentations the pain subsided, and the testicle returned to its proper site. It appeared that both testicles were subject to retraction into the inguinal canals, the external openings being unusually large. His parents stated that he had suffered from repeated attacks of pain and sickness, with swelling in the groin. I ordered a double truss, making pressure on the rings with the view of diminishing their size and preventing the retraction of the testicles. This fully succeeded in retaining the glands in the scrotum.

I have rarely been able to make out satisfactorily the cause of retraction in children. They have usually been brought to me some time after the occurrence. It very likely arises from urinary irritation. In the following case, spasm of the cremaster muscle, of a mild character, appeared to be the result of an injury.—A Jew boy, aged eleven, applied to me at the hospital, on account of an uneasy state of the testicles. They were retracted to the external abdominal rings, producing a deep wrinkle across the pubes. The scrotum was flaccid and empty. It appeared that a short time before he had received a kick on the pubes, since which the testicles had become drawn up. Pressure on the pubes gave pain, and when made at the part where the cremaster is attached the testicle immediately descended, but was again elevated as soon as the pressure was remitted. Conceiving that the spasm was chiefly owing to slight inflammation at the seat of injury, which had affected the internal attachment of the cremaster, I ordered leeches to the part, fomentations, and mild aperients. No relief followed this treatment. The cold douche was then applied, with the effect of causing the muscle immediately to relax. The spasm returned soon afterwards, but not to the same extent as before. The douche was repeated with the same effect, and the boy ceased to attend. He came to me again, some months afterwards, with a discharge from the urethra, and a return of the spasm in the cremaster, which subsided as the disease in the urethra became relieved.

The retraction of the testicles in early life, if persistent, is of moment not only in consequence of the liability of the glands when in the groin to pressure and injury, but on account also of the probable effects of the malposition on the functions of these organs in

after-life. In former chapters I have adduced many facts to show that double congenital retention of the testicles is a cause of sterility, owing to the malplaced glands not secreting spermatozoa. Whether a similar condition occurs after the testicles have been long withdrawn from the scrotum, I have had no means of ascertaining. At all events the surgeon must see the importance of taking measures to replace the retracted testicles, and to secure their retention in the scrotum. If the patient be seen early he may generally succeed by gentle manipulation and pressure in bringing the testicles back into the scrotum, and a truss making mild pressure at the outer abdominal rings, worn for two or three months, will effectually prevent the testicles being drawn up again.

A few cases in which retraction of the testicles has taken place in the adult, independently of renal disease, have fallen under my notice in practice.—A young man, aged twenty-nine, married only a fortnight, consulted me for the relief of a troublesome retraction of the right testicle. It occurred chiefly in bed, when the gland was drawn up, tilted forwards, and became hard and painful. It was quite healthy, but had been inflamed after gonorrhœa three years before. He did not admit any undue indulgence in coition. In the following case this affection in the adult was probably also due to a slight injury:—A gentleman from Liverpool, aged forty-two, a strong man, but a nervous subject, consulted me on account of suffering annoyance from occasional retraction of his left testicle towards the groin, so that in flexion of the thigh the organ was exposed to compression. He first experienced inconvenience from this about three weeks previously. He was unable to account for it, unless it was owing to a blow from a

cricket-ball on the part six months before, though no inflammation followed the injury. There was nothing wrong in his urethra. He had been ordered to use fomentations, but gained no benefit from them. Finding that gentle pressure with the fingers on the ring kept the testicle in its proper place, I recommended his wearing a moc-main lever truss, with a small pad to make gentle pressure on the external abdominal ring. —A hale man, aged seventy-two, a retired captain R.N., consulted me in November, 1864, by recommendation of Dr. Jackson, of Southsea. The patient stated that he became affected with a hydrocele on the left side, about thirty years ago, that it had been repeatedly tapped, and about nine years back was cured by injection of port wine. Ever since he had been subject to retraction of the left testicle, especially in the winter, when the gland became drawn up into the groin and caused considerable pain, extending to the left loin. As another winter was approaching, and the retraction beginning, he was anxious to adopt some measure to prevent his suffering. I found the left testicle with thickening as usual after the cure of hydrocele. The organ was rather high in the scrotum, quite above the level of the right. It was not tender, and he was then free from suffering. I recommended his wearing the moc-main truss.

There can be no doubt that in the adult retraction of the testicle is liable to be produced by irritation at the prostatic part of the urethra.

DISEASES OF THE SCROTUM.

CHAPTER I.

INJURIES OF THE SCROTUM.

The scrotum is exposed to contusion and laceration from external violence. Contused wounds of the scrotum are chiefly remarkable on account of the large quantity of blood liable to be effused beneath the skin. The connective tissue is exceedingly loose, so that a slight blow produces rupture of vessels and abundant ecchymosis. The swelling which arises is considerable: the testicles become surrounded with so much blood that they cannot be felt, and the skin in a few days assumes a deep purple hue. These cases generally do well; but some weeks elapse before the blood is all absorbed, and the swelling and discoloration are completely removed. All that is usually necessary in the way of treatment, provided the testicles have escaped injury, is rest, support to the swollen scrotum with a bandage or pillow, and the application of a cold evaporating lotion, or, what is more effectual, of ice. Ice, enclosed in a bladder or india-rubber bag, may be suspended from a cradle, and kept in constant contact with the scrotum. In several hospital cases I have been surprised at the rapid disappearance of the extravasated blood under this treatment.

The application of ice must be made with caution in persons advanced in life, but I have never observed sloughing from it. When the contusion is severe and the extravasation considerable, inflammation sometimes arises, and even terminates in suppuration or mortification; but this is a rare result of such injuries. It is most liable to occur in persons of impaired constitution. In a case of the kind, after gangrene or suppuration has taken place, the scrotum should be relieved by free incisions. They must not, however, be resorted to for the relief merely of extravasation of blood.

Lacerations of the scrotum, though formidable in appearance, usually terminate favourably. There is not much hæmorrhage; but, owing to the contractile nature of the integuments, the scrotum presents a large gaping wound, and the testicles protrude. The injured parts must be cleansed, the coagula removed, the testicles repressed, and the edges of the wound brought together and retained by sutures and adhesive plaster. Water dressing should be applied, and the oiled silk will guard the wound from urine. The patient must keep at rest in bed. The wound heals in general very readily.—I was sent for to see a man who, in a state of intoxication, had sustained an injury of the privates by sitting down upon the broken arm of a chair. I found a large triangular lacerated wound on the left side of the scrotum, the edges of which were so far separated that the part appeared as if a great portion of the integuments had been removed, the whole of the left testicle and part of the spermatic cord being completely exposed and projecting. The edges of the wound were, without difficulty, immediately closed with sutures: they united by the first intention, and in a week the part had completely united, and the patient was cured.

Gosselin remarks, that if the surgeon is not called to a case of wounded scrotum early, the reduction of the hernial projection of the testicle may become very difficult, in consequence of the organ swelling, and of adhesions becoming established between it and the wounded surface. He refers to two cases of wounds of the scrotum with a cutting instrument, one not seen till after forty-eight hours, and the other not till after eight days, in both of which it became necessary to enlarge the wound in order to reduce the protruded testicle.[1] I have not myself met with a case in which delay in treatment has led to this difficulty. A remarkable case of *traumatic hernia of the testicle* recently occurred to M. Richet. A man was admitted into the hospital of La Pitié in Paris with the left testicle projecting completely through a recent lacerated wound in the scrotum, which constricted the spermatic cord, and prevented retraction until the patient was placed under chloroform and the wound dilated. Some similar instances are also referred to in Richet's clinical remarks on this case.[2]

The scrotum is not very often injured by burns or scalds, the part being protected by a woollen dress.—A deaf and dumb man, at work at a soap-boiler's, fell into a vat containing caustic potass of the strength of 10 per cent. He was admitted into the London Hospital shortly after the accident. The skin was denuded of cuticle, and superficial sloughs were produced on the face and hands; but his chief sufferings arose from the action of the caustic on the prepuce and scrotum, which were entirely excoriated, and a good deal of the skin destroyed. The sloughs separated, and the sores healed in about three weeks, the scrotum being slightly contracted.

[1] French translation of this work, p. 571.
[2] L'Union Médicale, Fév. 15, 1866.

CHAPTER II.

PRURIGO SCROTI.

The scrotum is sometimes the seat of an intolerable itching, which produces much distress, tormenting the patient by day and disturbing his rest at night, and thus whilst it lasts rendering his life truly miserable. This complaint is commonly accompanied with the formation of a number of round flattened papulæ of a slight red colour, which are readily recognised on the dull and darker surface of the scrotum. The skin becomes excoriated by the patient scratching himself; which, though productive of temporary relief, aggravates his sufferings afterwards. There is often a disagreeable discharge from the sebaceous follicles; and after the complaint has existed for some time the skin becomes browner than in its natural state, and somewhat thickened. The irritation comes on in paroxysms; it is increased by exercise, especially in warm weather, and by the heat of the bed at night; and it is liable to extend towards the anus and down the inside of the thighs.

This affection attacks adults; but occurs generally to persons in advanced life, and is supposed to be induced by inattention to cleanliness. It is a very obstinate complaint, sometimes resisting every kind of treatment for months, and even years, though liable to complete remissions and frequent relapses at variable intervals.

Treatment.—Very little relief is afforded in this affec-

tion by internal remedies. Attention should be paid to the state of the bowels and of the secretions; and if the general health should suffer from want of rest, morphia may be taken at bedtime. The patient should be enjoined to refrain from scratching the parts; his dress should be light and loose; and he ought strictly to avoid hot condiments and a stimulating diet. The parts should be washed daily with soap and water, and a warm bath might be taken two or three times a week. A lotion of the bichloride of mercury, in the proportion of two grains to the ounce of water, will generally allay the irritation. I often prescribe one of borax ʒij, hydrochlorate of morphia gr. xx, glycerine ʒiiij, and rose water ʒix. Another effectual lotion is one composed of a drachm of the sulphuret of potash dissolved in eight ounces of lime-water. I have found, too, the *unguentum hydrargyri nitratis mitius*, smeared over the scrotum at night, one of the most efficacious applications for diminishing the itching. Sulphur ointment and sulphureous vapour baths sometimes succeed in affording relief. Chloroform ointment often answers in allaying the irritation, and the vapour has also been used with good effect. Local cinnabar fumigations, applied by means of an apparatus adapted for the purpose, have been strongly recommended by M. Biett in this troublesome and distressing complaint.[1]

[1] Cazenave et Schedel, Abrégé pratique des Maladies de la Peau, édit. 3ème, p. 315.

CHAPTER III.

VARICOSE VEINS OF THE SCROTUM.

Some authors have noticed, amongst the diseases incidental to the scrotum, a varicose condition of its veins. The veins, however, of this part are never weakened and dilated to a degree sufficient to require the attention of the surgeon. The remarkable contractility of the dartos contributes to their support, and to diminish the tendency to dilatation. Varix of the spermatic veins commences much more commonly in young men than in old; whereas, in consequence of the lax state of the scrotum in advanced life, the scrotal veins more frequently become varicose at that period. In old men they sometimes present a curious appearance, the scrotum being studded with a number of minute red or black spots, about the size of a pin's head, and sometimes larger, evidently dilatations of the small veins, as they disappear for a time under gentle pressure of the finger. I have occasionally observed them when the scrotum has been distended by a hydrocele, and also in varicocele. In severe cases of the latter affection, the veins of the scrotum frequently partake in the dilatation of the vessels of the spermatic cord.

CHAPTER IV.

PNEUMATOCELE OF THE SCROTUM

Signifies a distended state of this part from the presence of air in its loose connective tissue, which is treated of by old writers on surgery as an affection of no uncommon occurrence. Emphysema of the scrotum, however, is only seen in the present day when produced by artificial inflation; a trick of feigning disease sometimes practised by soldiers and others. The scrotum has been inflated to the size of a child's head; a degree of distension which is borne without any injurious consequences. The nature of the tumour can be readily detected by the crepitation of the part under the finger.

CHAPTER V.

ŒDEMA OF THE SCROTUM.

The connective tissue of the scrotum being loose, abundant, and free from fat, and the skin plentiful and very extensible, this part undergoes a more remarkable degree of distension from œdema than any other part of the body; and, owing to the pendant position of the scrotum, œdema of this part is often met with, occurring generally as a symptom of organic disease, in conjunction with serous infiltration of the extremities or body at large. Œdema of the scrotum, termed by some writers *anasarcous hydrocele*, occasionally occurs, however, as a distinct affection, or independently of œdema in other parts.

Symptoms.—The œdema commences at the most depending part of the scrotum, to which it is confined when the infiltration is slight. When the whole scrotum is involved, the part presents a uniform, indistinctly-defined tumour, with a soft and doughy feel, and pits on pressure; but, owing to the large size of the spaces, the fluid traverses the connective tissue so freely that the parts retain the impression of the finger for but a few moments. As the tumefaction increases, the tegumental rugæ are obliterated, and the surface of the skin becomes smooth and somewhat tense, and has a pale, glistening, semi-transparent appearance. The testicles are so surrounded with the infiltrated serum that they

cannot be distinguished. When the œdema is considerable, the integuments of the penis generally participate in the distension: the prepuce becomes twisted and distorted, and so enlarged as to conceal the glans penis. The tumefaction often extends also to the groins and lower part of the abdomen.

Œdema of the scrotum is occasioned by the various causes obstructing the circulation and producing dropsical effusion in other parts; and, owing to the depending position of the scrotum, it is usually one of the parts first distended in general dropsy. It is observed occasionally as a local affection in old men, and in persons debilitated by disease, especially where the scrotum is particularly pendent. It is sometimes seen in children shortly after birth, and is produced by disease of the inguinal glands, and by tumours obstructing the course of the veins and lymphatics. In hydrocele, œdema is produced by acupuncture, and is liable to occur from an accidental rupture of the sac.

Diagnosis.—The symptoms presented by œdema of the scrotum are of so marked a character, that this affection is not readily confounded with any other disease, and, when the dropsy is general, it is scarcely possible that any error can be committed. Local œdema may, however, be mistaken for a hydrocele. In œdema the tumefaction is soft and diffuse, pits on pressure, occupies both sides of the scrotum, and conceals both testicles: in hydrocele it is resisting, defined, and fluctuating, and confined to one side; except in double hydrocele, in which case there is no similitude to œdema, as there are always two well-defined and distinct tumours on the two sides of the scrotum. Pott once operated on an œdematous swelling of one side of the scrotum, having mistaken the case for a hydrocele.—A man, aged

forty-five, showed him a swelling on the left side of the scrotum, which was large, full, tight, and had all the symptoms of a hydrocele—viz., fluctuation, freedom of the upper part of the process, and concealment of the testicle. Thinking himself clear in the true nature of the disease, he without scruple pierced it with a small trocar in the lower and anterior part, and let out about two ounces of limpid water, but could not draw off any more. He withdrew the canula, and examined the swelling again, which was but little diminished, though altered in appearance. He could then plainly distinguish the testicle, and became convinced that the disease was (what he had never seen before) an anasarca of the scrotum on one side only, having a certain quantity of water in one cyst or bag, and the rest diffused through the cells in the usual manner: the latter made all the tumefaction, which remained after tapping; and the former had concealed the testicle.[1] If this case had been narrated by a surgeon of less judgment and experience than Mr. Pott, we should be inclined to suspect that the tumour had originally been a hydrocele, and that, when tapped, the fluid had partially escaped into and infiltrated the connective tissue around the sac. The limitation of the œdematous swelling to one side of the scrotum was a very unusual occurrence; for although the connective tissue is usually somewhat condensed in the course of the septum, there is always a ready and free communication between the two sides. In this case the septum must have been particularly close and dense, and the cause of the dropsical effusion have operated only on one side.

Treatment.—Œdema of the scrotum being in general only a symptom of disease elsewhere, and not of itself

[1] Chirurgical Works, 4to, p. 336.

of any serious moment, seldom requires any separate or local treatment. When the tumefaction is very great, and the skin so tense that there is risk of its bursting or mortifying, the part must then be relieved by acupuncture. The spaces so freely communicate with each other, that one or two punctures with a darning or cataract needle are sufficient to relieve the most bulky swellings. It was usual formerly to relieve the distended scrotum by incisions. But this is a dangerous practice; for incisions are very likely to excite diffuse inflammation, which, in the weak state of the part and of the patient's powers, is speedily followed by mortification. Pott has recorded three cases in which extensive mortification followed incisions of the scrotum for this complaint, one of which proved fatal.[1].

[1] Lib. cit., case vi., p. 365.

CHAPTER VI.

DIFFUSE INFLAMMATION OF THE SCROTUM.

Diffuse inflammation of the scrotum, though not particularly noticed by writers on surgery,[1] often occurs as a distinct affection; and, owing to modifications in the texture of the integuments, the character of the disease differs in some respects from that of diffuse inflammation in other parts. This affection is not unfrequently seen in hospital practice. It occurs under two forms. In one, it is mild and unattended with danger, and terminates favourably under simple treatment. In the other form, the complaint is severe and dangerous, and prompt and decisive measures are requisite to avert serious consequences. The first form occurs generally to persons at the adult period of life. The skin of the scrotum becomes affected with slight erythema; assumes a faint rosy hue; soon becomes shining, tense, and œdematous; and quickly loses its rugous character. The light inflammatory blush extends in a short time to the perineum and integuments of the penis, which also become tumid and œdematous; and in some instances it spreads even to the groins, lower part of the abdomen, and inside of the thighs. Its appearance is accompanied with symptoms of slight fever. This affection usually occurs to persons exhausted by fatigue and want of rest and nutriment.—A lad, twenty years

[1] Some cases of this affection were published by Mr. Liston, under the denomination of "Acute Anasarca of the Scrotum," Med. Chir. Trans., vol. xxii.

of age, previously in tolerable health, who had walked up to London from a long distance in the country for work, and had fared badly on the road, applied to me on account of this affection, with which he was seized the day after his arrival in the metropolis.—A labouring man, who had been exposed to the inclemency of the weather, and had undergone a good deal of fatigue on board a barge in the river, was attacked in the same manner. I have seen it, in weakly persons, arise from slighter circumstances, and sometimes without any obvious cause. It is occasionally produced, especially in old people, by the irritation of the urine dribbling over the parts, and the lodgment of discharges and acrimonious fluids amongst the rugæ of the scrotum.

The second form of diffuse inflammation of the scrotum commences like the former; but the disease runs rapidly into mortification. The slight rosy hue of the scrotum soon becomes changed to a violet or livid colour, and ash-coloured or tawny spots appear at an early period on the most depending parts. These quickly extend, and, unless checked by decisive treatment, the whole scrotum soon becomes involved; so that if the patient survive, and the sloughs separate, the testicles are entirely denuded of their integuments. The sloughing is attended with symptoms of low fever, under which the patient often sinks. This form of the affection attacks persons of a cachectic habit and broken-down constitution, or men enfeebled by age. It is produced by the same causes as the milder form; but it is also liable to occur after a slight injury, and is often excited by disease of the urinary organs, as stricture, or an abscess in the perineum, independently of urinary extravasation.

It is a remarkable circumstance, that inflammation of the scrotum rarely terminates in the effusion of lymph

or pus. It seems that the pressure consequent upon the abundant effusion of serum is sufficient to arrest the circulation, and occasion mortification before other changes ensue. When suppuration takes place it is generally in the diffused form, though the matter has a tendency to collect at the most depending part of the scrotum. I have rarely met with a well-formed abscess in this part unconnected with suppuration in the perineum or with disease of the urethra.

Diagnosis.—Diffuse inflammation of the scrotum may be confounded with œdema; but differs from it in the more active character of the disease, in the inflammatory redness of the skin, and the general febrile disturbance which accompanies it. An urinary abscess deeply seated in the perineum is often attended with inflammatory œdema of the scrotum. The pain occasioned by firm pressure in the perineum, the swelling observed in that region, and the existence of urinary symptoms, would prevent the case from being mistaken for one simply of diffuse inflammation.

Treatment.—In the milder form of this affection gentle purgatives, rest in the recumbent position for a few days, with the application of an evaporating lotion to the scrotum, which should be well elevated on a pillow placed between the thighs, are generally all that is required to subdue the inflammatory action, and cause the swelling to subside. When there is much tension, warm fomentations are preferable to cold applications. If gangrene be apprehended, punctures with a lancet should be made in the scrotum at its most depending part, to allow the serum to escape, and thereby remove the tension. Nothing succeeds so speedily and effectually in averting the sloughing process as early incisions. They must not be merely skin-deep, but the distended connective tissue beneath should also be divided. They

need not, however, be very extensive, as one or two small openings well placed will be sufficient for the relief of the tension. It is of great moment to avoid the loss of blood: consequently, if bleeding ensue from any of the divided vessels, it should be restrained by pressure. The parts are to be treated after they have been incised with fomentations, water dressings, or light poultices. In this dangerous form of the disease the powers require to be supported by ammonia, chloric ether, wine and brandy, and a nourishing diet. The diffuse inflammation which occurs in connexion with stricture or perineal abscess usually subsides as soon as the obstruction is overcome, the matter discharged, and the exciting cause removed.

In persons of feeble constitution, a chronic thickening and œdematous state of the integuments are liable to remain after the inflammatory symptoms have subsided. This must be treated with steel medicines, quinine, a generous diet, and support in a suspender.—I attended a tall gentleman of a lymphatic temperament with an attack of this complaint in the mild form, but several weeks elapsed after the inflammation had subsided before the integuments of the penis and scrotum recovered their healthy state and proper size.—In 1859 I was consulted by a surgeon of middle age, who had been engaged in active practice, on account of a chronic œdematous condition of the penis and scrotum, which first appeared two months previously. These organs, as well as the lower part of the abdomen, had lately been the seat of slight erysipelas, which had left them increased in size and of a dusky-red appearance, but the patient stated that the inflammation which first preceded the œdema was so mild that it caused scarcely any change in the colour of the skin.

CHAPTER VII.

MORTIFICATION OF THE SCROTUM.

Mortification of the scrotum is commonly the result either of the worst form of diffuse inflammation just described, or of urinary extravasation, and it sometimes occurs at the close of exhausting fevers. It would be out of place to treat here of the subject of urinary effusion. It will be sufficient to remark that the effect of the irritating fluid diffused throughout, and distending the connective tissue of the scrotum, is soon to excite inflammation and produce the death of all the parts with which it comes in contact, unless such a result be speedily averted by deep and pretty free incisions, so as completely to relieve the distension and allow the urine to drain off from every part of the scrotum.

The scrotum is so situated, protected by and receiving the warmth of the thighs, and at no great distance from the centre of the circulation, and at the same time is so well supplied with blood-vessels, that it is a part by no means exposed to mortification from deprivation of animal heat. Amongst the numerous cases of frost-bites which have come under my notice, I have only witnessed one in which the scrotum had suffered from this cause. The spots were very small, and after the separation of the superficial sloughs the sores soon

healed. Sir A. Cooper has recorded the case of a soldier, who, in the retreat with the Duke of York's army in the Netherlands, was exposed to excessively severe cold. His scrotum became frost-bitten, and sloughed away.

Treatment.—Sloughing of the scrotum, from whatever cause it may proceed, is seldom free from danger, being attended with a failure of the powers of life and low febrile symptoms, which require to be counteracted by stimulants. The local treatment, after free incisions have been made, consists in the application of fomentations and light charcoal poultices, or of lotions either of Condy's fluid or chloride of lime applied warm. In many cases, the extension of gangrene can be arrested and the powers rallied by judicious treatment; and then the process of separation and detachment of the dead parts soon commences, and proceeds with activity. Large sloughs come away, leaving behind an extensive, open, and formidable-looking sore, with the testicles and spermatic cords completely denuded. Fortunately, there is no part of the body in which the reparative efforts of nature are more remarkably displayed after extensive mortification than in the scrotum. In cases in which the whole scrotum and even part of the integuments of the penis have sloughed away, granulations have rapidly sprung up from the exterior of the tunica vaginalis and investments of the cords; cicatrization has advanced from the surrounding skin; and partly by liberal demands upon the integuments of the pubes, groins, and perineum, and partly by the production of new skin, the exposed testicles and spermatic cords have become invested with a new covering adequate for their protection. The new scrotum is not exactly like its predecessor; it is thin, tense, and without colour, and

closely invests the testicles; and sometimes, when there is much contraction of the cicatrix, these organs are forced upwards into the groins. In these cases the surgeon can do but little to aid and promote the efforts of nature. He has only to apply mild and simple dressings, and to avoid unnecessary meddling.

CHAPTER VIII.

ELEPHANTIASIS OF THE SCROTUM.

Elephantiasis is a disease of the scrotum occasioning a remarkable tumour; it is rarely seen in Europe, but is of very common occurrence in many other parts of the globe. It consists in a morbid thickening or hypertrophy of the tissues of which the scrotum is composed. The epidermis becomes thickened, rough as in ichthyosis, and intersected with fissures or chaps. The chorion is immensely consolidated, and often nearly an inch in thickness, very dense, and tough. The chief bulk, however, of the tumour is formed by the conversion of the loose connective tissue of the scrotum into a large mass of fibro-connective tissue, infiltrated with a thick, jelly-like albuminous fluid. The areolæ of this tissue vary a good deal in size; some of them have been found large enough to admit the extremity of the little finger. These cells, when condensed by inflammation, form hardened masses in the substance of the tumour, which has a lardaceous appearance when cut, or resembles cartilage; and they sometimes undergo calcareous degeneration. In some cases lobes of fat tissue intermingle with the fibrous tissue. The testicles are buried in the morbid mass towards its posterior part, but they are usually sound in structure. Occasionally there is a quantity of serum in the tunica vaginalis. In the tumour figured at page 561, and also in a case operated on in Calcutta,

there was a hydrocele on both sides embedded in the diseased parts. In the latter instance the larger hydrocele contained between five and six pints of fluid.[1] The spermatic cords are elongated several inches, owing to the testicles being dragged downwards during the growth of the tumour, but they are not otherwise diseased. In a remarkable case operated on in Guy's Hospital, the cremaster muscles were nearly as thick as the finger.[2] The morbid growth is lowly organized. Its arteries are chiefly derived from the external pudic and perineal vessels; but these, owing to the magnitude of the tumour, become of great size. The veins are numerous, large, varicose, and very tortuous.

Elephantiasis chiefly affects the inhabitants of the warmer regions of the earth. It appears to be endemic in many parts of Asia and Africa, and is a very common disease in the East Indies, Syria, and Arabia, and also in Egypt. A moist, relaxing, as well as a hot climate, seems favourable to the development of this disease. Thus, according to Dr. Esdaile,[3] it is in a great measure confined to Bengal and the sea-board of India, being rarely met with in Upper India; and in Egypt it is also principally confined to the Delta of the Nile, and is seldom seen above Cairo. Elephantiasis was formerly considered peculiar to Barbadoes; but it now prevails in the other West India Islands, and likewise on the continent of America. Negroes are very subject to it. It is not, however, confined to the natives of warm climates, though they more frequently suffer from its attacks than European residents. But few cases of this disease have occurred in Europe. Sir W. Blizard presented to the College of Surgeons a good specimen of a

[1] Calcutta Quarterly Journal, No. 3.
[2] Medical Gazette, vol. viii. p. 95.
[3] Ibid. vol. xlvi. p. 449.

scrotum and prepuce affected with this disease in its early stage, which appears to have been removed after death. M. Charles Delacroix, formerly Minister for Foreign Affairs in France, suffered from this affection of the scrotum for fourteen years. The tumour, which weighed thirty-two pounds, was removed by operation, and he afterwards recovered.[1] Mr. Liston excised, in Edinburgh, a large tumour of this kind, which weighed upwards of forty-five pounds, from a young man, aged twenty-two. It had commenced when he was only ten years of age, and had gone on increasing gradually from that time.[2] Delpech operated on a patient, aged thirty-five, a native of Perpignan in the South of France, whose scrotum was converted into a large mass weighing sixty French pounds.[3] Mr. Wiblin has recently removed from a man, aged forty, a native of Southampton, a tumour which was estimated to weigh, during life, about fifty pounds.

Elephantiasis of the scrotum is a morbid affection of the integuments, analogous to the enlargement of the extremities commonly known by the name of *Barbadoes leg;* with which, indeed, in those countries where the disease is prevalent, it is liable to be combined. Elephantiasis of the scrotum, however, grows to a greater size and makes more rapid progress than the same disease in the leg, owing to the very loose texture and depending state of the parts. The labia pudendi of females, especially in warm climates, are subject to a similar change, though not to the same extent nor so frequently as the scrotum. I removed a large tumour of the kind, involving the right labium and part of the

[1] Delonnes, Opération de Sarcocèle.

[2] Edinb. Medical and Surgical Journal, vol. xix. p. 566. This tumour is deposited in the museum of the College of Surgeons in London.

[3] Chirurg. Clinique de Montpellier, t. ii. p. 5.

left, from an English woman twenty-five years of age. It owed its origin to a hurt at the age of eleven, but the tumour had grown rapidly during a recent pregnancy.

Elephantiasis of the scrotum appears to originate in a low form of inflammation of the integuments, probably of the nature of the mild diffuse inflammation, which in warm climates persists or recurs, and leads to organic changes in structure. A few cases of the disease in a comparatively early stage, and occurring in persons who have resided in the West Indies, have come under my notice in practice.—In 1847, I saw, with Mr. Haynes Walton, a gentleman, aged twenty-eight, a native of Barbadoes, recently married, and enjoying tolerable health, who had been in this country about four months. The whole scrotum was considerably enlarged, forming a doughy, inelastic swelling, slightly indented or fissured in two or three places. The skin was liable to an erythematous redness, attended with an itchy sensation. Its sensibility was very little impaired. The testicles were at the upper part of the scrotum, and healthy, with the exception of slight enlargement and induration of the left, the result of an operation for the radical cure of a hydrocele performed some years previously. A portion of skin at the root of the penis was a little red and puffy, evidently affected slightly with the disease. There was a diffused swelling in the left groin, and the upper femoral glands were enlarged. The right groin was unaffected. The patient first observed an enlargement of the scrotum about two years and a half previously, and he thought that it had increased rather than diminished since he had been in England. This was a genuine case of elephantiasis in the early stage of the disease.—In 1860, a short, stout gentleman, aged forty-seven, who had resided in Barbadoes twenty years, was

brought to me by Mr. Duckworth Nelson on account of elephantiasis. The prepuce was hypertrophied, forming an awkward swelling, and preventing retraction. The scrotum consisted of a rugous doughy mass of integument, the enlargement being greater on the left side. The left testicle was slightly swollen, firm, and tender. The glands in the left groin were somewhat enlarged. The patient said that the swelling of the scrotum and testicle commenced about ten years previously, after an injury in bathing. The prepuce had been affected only a year. Both prepuce and scrotum were increasing in size. These were genuine cases of elephantiasis in the early stage of the disease.—The case of a patient, a lad from Barbadoes, who was treated with considerable success, and of a gentleman from Surinam, with great enlargement of the scrotum, which I excised, will be found related at pages 564 and 566.

Symptoms.—Authors describe elephantiasis as commencing with rigors, followed by fever, pain, and heat in the part affected, and swelling and tenderness of the neighbouring lymphatic glands, the scrotum remaining swollen after these symptoms subside. Similar attacks of fever and inflammation occur more or less frequently, and at various intervals, the tumefaction being increased after each attack. Dr. Titley states,[1] that on each accession of fever there takes place an effusion of lymph into the cellular membrane, and that the part affected remains swollen for a longer period after each attack. After several returns, the quantity of lymph effused being greater than can be absorbed, the limb or part becomes permanently enlarged. The skin, as the disease advances, becomes rough and rugged. Patients will live for many years, carrying about with them an enormous leg or scrotum, and will enjoy excellent health, except

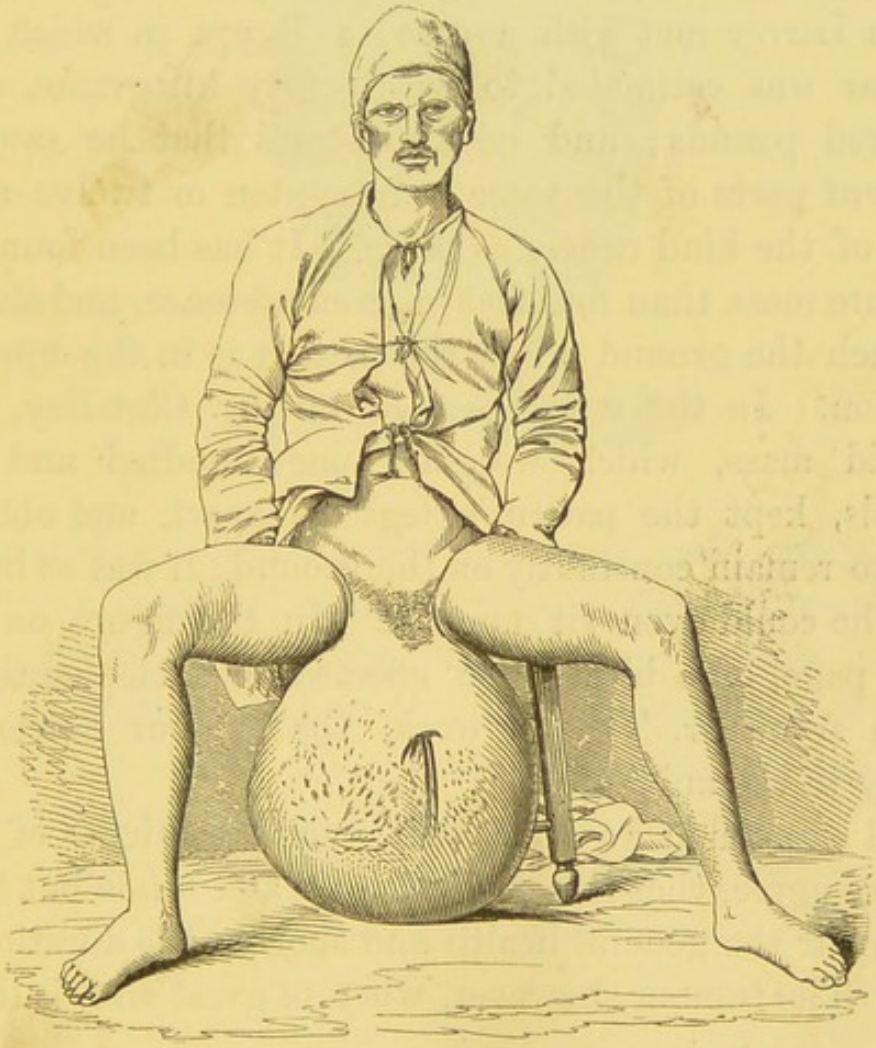
[1] Dr. Titley on Diseases of the Genitals of the Male.

during the occasional attacks of fever. When the scrotum is the part affected, after a certain time the tumour increases, independently of the febrile attacks. The prepuce is sometimes elongated and twisted, and hypertrophied in an extraordinary degree, forming a remarkable projection in front of the scrotum. The prepuce and scrotum may enlarge together in an equal ratio; but if the scrotum only be affected, then the penis becomes drawn in, so as ultimately to disappear, and become completely embedded in the tumour; the elongated prepuce opening by a navel-like aperture on some part of the anterior surface (see Fig. 46), or even at the very end of the tumour.

When the disease is fully established, the enlargement increases gradually and constantly for many years, until at length the swelling reaches an enormous magnitude. As this takes place, the skin is borrowed from the lower part of the abdomen, so that the hair on the pubes becomes thinly scattered on the front and upper part of the tumour, which at the same time encroaches on the perineum behind. The tumour, which is of an oval or pyramidal form, the apex being superior, thus becomes attached to the body by a thick peduncle, which extends from the pubes, occupies the whole of the perineum, and terminates posteriorly at the verge of the anus. The surface of the swelling is sometimes equal and smooth; more generally it is rough, rugous, and tuberculated, and covered in various parts with brownish scales. It is often ulcerated in different places, the sores being covered with scabs, or discharging a sanious matter. The tumour feels firm and solid; and sometimes, when handled, communicates an indistinct sense of fluctuation. In some instances it pits on pressure, but the density and thickness of the skin usually prevent the part from receiving

the impression of the finger. Its growth is unattended with pain; the part is by no means tender, and bears rough handling, and even being pricked and scratched, without the patient suffering uneasiness, owing to the skin having lost its natural sensibility. The chief inconvenience which it produces arises from its great bulk and weight; occasioning deformity, impeding and in many instances entirely putting a stop to the patient's movements, and interfering with micturition and the performance of the genital functions. The accompanying

Fig. 46.



woodcut is taken from a photograph of a man who was in the Military Hospital at Alexandria, under the care of

Mr. Farquhar. The tumour reached half way down the legs, and almost entirely prevented the patient from walking. It measured at its greatest diameter three feet eight inches. It was excised, and weighed seventy pounds after the fluid of the hydroceles had drained from it.[1]

Elephantiasis is sometimes complicated with scrotal hernia; and often, as has already been observed, with hydrocele. There is scarcely any limit to the size which the tumour may attain. It has been known to acquire such a magnitude as to weigh more than two hundred pounds,[2] exceeding the weight of the rest of the body. Baron Larrey met with a case in Egypt in which the tumour was estimated to weigh fifty kilograms, or a hundred pounds; and he also states that he saw, in different parts of the same country, ten or twelve more cases of the kind nearly as large. It has been found to measure more than four feet in circumference, and almost to reach the ground when the patient is in the upright position. In the case operated on by Clot-Bey, the morbid mass, which weighed one hundred and ten pounds, kept the patient's legs far apart, and obliged him to remain constantly on the ground; it was so bulky that he could even sit upon it. In the figure on the next page, of a black man affected with elephantiasis, taken from Dr. Titley's work, the tumour descended nearly to the ankles.

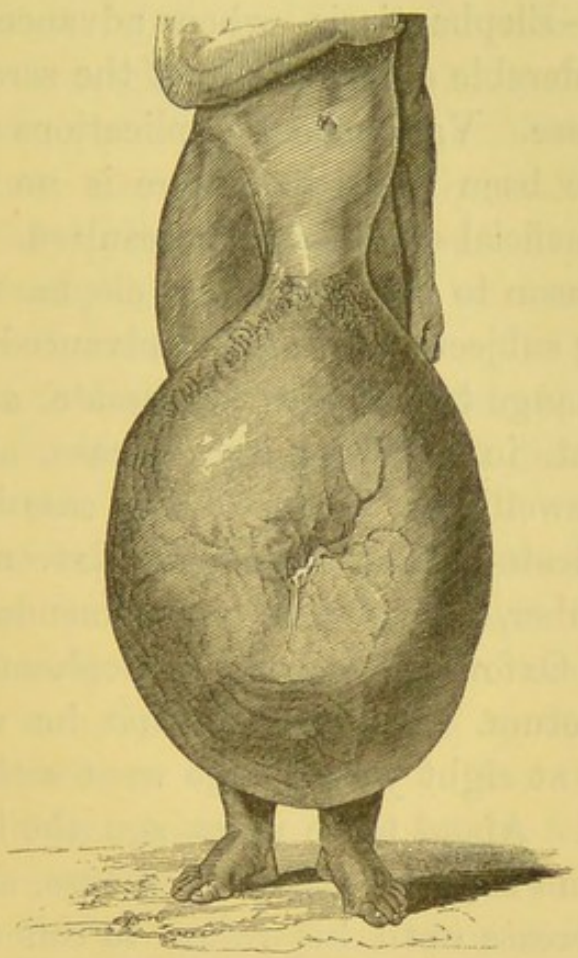
All surgeons who have had much experience of this disease agree, that it is entirely local, and tends but little to impair the general health and shorten the duration of life. The tumour, however, when of great size, is liable

[1] The case is described in the London Medical Gazette, vol. xlv. p. 192.

[2] Case cited from "Ephémérides d'Allemagne" by Larrey, Mémoires de Chirurgie Militaire, t. ii. p. 115.

to mortify. Dr. Hendy, of Barbadoes, has related the case of a black man who had a scrotal swelling which

Fig. 47.



measured six feet in circumference, and twenty-four inches in length. A mortification of the part terminated the miserable existence of this poor creature.[1] Dr. Hendy states, that five other cases had come within his knowledge where the scrotum, being much enlarged, had sloughed, leaving the testicles denuded.

Diagnosis.—The symptoms of this disease are so remarkable, that it can scarcely be confounded with any other affection. Œdematous thickening of the scrotum, consequent upon chronic diffuse inflammation, is the only disease which bears any resemblance to it. The rough

[1] A Vindication of the Facts and Opinions contained in a Treatise on the Glandular Disease of Barbadoes, p. 117.

and indurated state of the skin, the firm and solid nature of the tumour, and its large size, are characters quite sufficient to mark the true nature of elephantiasis.

Treatment.—Elephantiasis, when advanced so as to produce considerable enlargement of the scrotum, is an incurable disease. Various local applications and internal remedies have been tried, but there is no satisfactory account of beneficial effects having resulted.

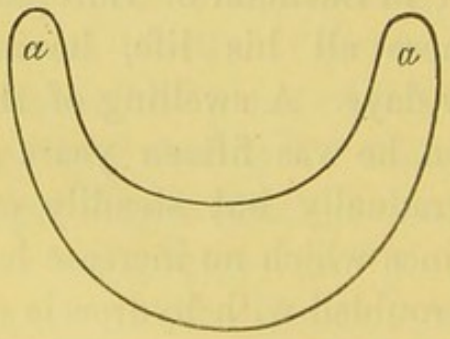
There is reason to believe that in elephantiasis occurring in young subjects, and not far advanced, much may be done by change to a temperate climate, and by suitable treatment, in arresting the disease, and even in reducing the swelling. The following case is encouraging:—A delicate-looking lad, aged sixteen, consulted me in November, 1860, at the recommendation of Mr. Symonds, of Oxford, on account of elephantiasis of the penis and scrotum. It appeared that he was born in England, but at eight years of age went with his parents to Barbadoes. About three years ago the integuments of the penis and scrotum began to enlarge, and had continued to increase until his return to this country two months before. Mr. Symonds had prescribed steel medicines and iodine, and under this treatment the swelling of the integuments and of the inguinal glands had subsided a good deal, and he had improved in his general health. On examination I found the integuments of the penis of a dusky red colour, and remarkably large and abundant. The prepuce was so voluminous and rugous that retraction was impossible. The scrotum also was large, baggy, and rugous, and inconvenient from its great size. The glands in both groins were enlarged, especially in the right. I recommended the continuance of the constitutional treatment. I saw the lad again in December, 1861, after a period of thirteen months. He was look-

ing much stronger, and feeling quite well The integuments of the penis and scrotum had lost the dusky red colour, were softer, and reduced in size. The prepuce, though large and full, could be retracted without difficulty. The enlargement of the glands on the left side had nearly disappeared; on the right side they were not much reduced. As he was about to return to the West Indies in the spring, I advised the excision of the prepuce and of an oval piece from the scrotum. This was done by Mr. Symonds, and the wounds healed slowly. He returned to England from Barbadoes, on his way to Queensland, in May, 1865, and I am informed he was then quite well.

When the enlargement of the scrotum has reached such a magnitude as seriously to interfere with the patient's comfort or to render his life miserable, there is no other remedy but its removal by the knife. The earlier the operation is performed after the tumour has attained an inconvenient size the better, for there is but little risk in excising parts consisting only of the hypertrophied tissues of the scrotum when moderate in size. I recently operated in the following case:—In April, 1864, Dr. Campbell, of Canonbury, brought to me a gentleman, aged twenty-two, on account of elephantiasis of the scrotum. He was born in Surinam of European parents, and had resided there all his life, having arrived in England only a few days. A swelling of the scrotum was first noticed when he was fifteen years of age, and afterwards it had gradually but steadily enlarged up to two years ago, since which no increase had been noticed. He had been troubled with hydrocele on the right side. This was tapped three years ago, and twenty-four ounces of fluid were drawn off. After a second tapping the sac was injected with hot wine, which

was followed by a good deal of inflammation, and the cure of the hydrocele. He enjoyed good health. On examination I found a considerable hypertrophy of the scrotum. The integuments were thickened, rugous, and baggy, forming a loose mass requiring constant support. On both sides the integuments were thick and lumpy towards the groin. The penis was nearly buried in the swelling. The testicles could be easily felt. The right, which had been operated on for hydrocele, was larger than natural, and less moveable than the left. The scrotum was softer and less swollen after rest in bed than after the patient had been some time in the erect posture. The lower extremities were also enlarged and œdematous, but diminished very much in the recumbent position. He stated that the great size of the scrotum so seriously interfered with his enjoyment of life, that he was desirous of undergoing an operation for its removal, and he had come to England for that purpose. Being of opinion that the excision of the greater part of the mass would not be attended with any special risk, I recommended the operation. Sir William Fergusson was also consulted, and sanctioned its being done. May 30th. I performed the operation, assisted by Mr. Hutchinson and Mr. Rivington. Chloroform having been administered, a large portion of the scrotum of the shape depicted in the figure (48) was rapidly excised. The upper flaps (*a a*) extending to the groins, and including the lumpy masses over the spermatic cords, were removed by raising the parts, and transfixing beneath with a

Fig. 48.



long straight bistoury, and the wounds on each side were then connected by transverse incisions. Just sufficient scrotum was left to be brought together and cover the testicles. The right was enlarged, and there was fluid in the tunica vaginalis of the left. I was careful not to open the sac, in order to avoid inflammation in it. But little blood was lost, and about a dozen vessels, some of considerable size, were tied. The patient bore the operation well, and went on favourably until June 2nd, when he had a sharp attack of rigors. As he had suffered from ague in Surinam the attack was attributed to this cause, and he was ordered five grain doses of sulphate of quinine with ten minims of chloric ether at short intervals. There was no return of the aguish symptoms and the medicine was soon discontinued. The wound healed steadily by granulation with water dressings, and afterwards nitrate of silver lotion. The lowest part of the scrotum was the last to close, but all was quite healed by July 10th. He kept his bed about three weeks, and was then allowed to sit up. In five weeks he was able to take carriage exercise, and soon afterwards to walk about. The scrotum was still kept supported, but there was every prospect of his being able to discontinue wearing any suspender. The hydrocele on the left side had diminished so much that it could not be distinguished. Some months afterwards he returned to Surinam.

There are few operations in surgery more formidable than the removal of elephantiasis of the scrotum when it has attained a very great size. I have already noticed cases in which large tumours of the scrotum have been successfully removed in Europe by Delonnes, Liston, and Delpech. Tumours even of a much greater size have been excised abroad, and the patients have afterwards

recovered. Dr. Titley successfully removed from a young man, a negro, a tumour weighing seventy pounds, which is represented in the engraving at page 563. Dr. Esdaile removed from a Hindoo, aged twenty-seven, in Calcutta, a mass which weighed one hundred and three pounds, and was as heavy as the man's whole body. He recovered from the operation. Clot-Bey excised one weighing one hundred and ten pounds.[1] There is nothing in the situation, structure, or relations of the tumour offering any objection to its removal. Its situation is external to the important cavities; integuments are the parts affected; and the only organs in any way involved are the testicles and penis. But owing to the great extent of the parts divided, and the size of the vessels supplying a morbid mass of the magnitude which many of these tumours acquire, the operation becomes very dangerous; and patients have died from hæmorrhage during or immediately after its performance. In Mr. Liston's operation the flow of blood was compared by those present to the discharge of water from a shower-bath, it was so instantaneous and abundant. Before half the vessels could be tied the patient sunk off the table, without pulse, and with relaxed muscles. He was only saved by being freely plied with strong whisky. Mr. Key removed from Hoo Loo, a native of China, aged thirty-two, who came over to this country on purpose to undergo the operation, a tumour of the scrotum which weighed fifty-six pounds eight ounces. The operation was performed in Guy's Hospital, and was very protracted, having lasted an hour and forty minutes. The patient died a few minutes after its termination from loss of blood.[2] A tumour

[1] Histoire d'une Tumeur Elephantiaque du Scrotum.
[2] Medical Gazette, vol. viii. p. 93.

weighing fifty-six pounds was excised by Dr. Goodeve, of Calcutta; but the patient, a man forty-five years of age, lost between thirty and forty ounces of blood, and gradually sank, and died in about six hours after the operation. Dr. Titley has also recorded a remarkable case in which a mass weighing one hundred and sixty-five pounds, and measuring two feet five inches in length and five feet ten inches in circumference, was removed from a slave at St. Christopher by Mr. Wilks, a surgeon. The operation occupied nearly eight hours; a copious venous hæmorrhage followed each stroke of the knife, and the man died, apparently from exhaustion, towards its conclusion.

Before undertaking the removal of a large tumour produced by this disease, it is necessary to determine whether the penis and testicles can be preserved. In the operation expedition is of the greatest moment; and the patient's safety might be compromised by a tedious dissection in order to preserve those parts. Surgeons have commenced with the intention of leaving them; but, in consequence of the alarming loss of blood, the attempt has been abandoned in the course of the operation. This was the case in Mr. Liston's operation, and likewise in Mr. Key's; the patient's powers, in the latter, having become so depressed, that Sir A. Cooper, who was present, proposed that no further attempts should be made to save the penis and testicles, which were accordingly excised. Clot-Bey and Dr. Titley succeeded in saving the penis, but they were obliged to remove the testicles. Dr. Esdaile, who has had considerable experience at Calcutta, having performed no less than one hundred and sixty-one operations, states, that he never attempts to preserve the testicles when the tumour is above fifty pounds (unless the man is strong

and robust); but the penis, with one exception, has been always saved, however large the mass. Delpech succeeded, after a tedious and difficult dissection, in saving these parts in his operation, and the patient recovered. The tumour weighed sixty pounds. The elongation of the spermatic cords, and the difficulty of finding healthy integuments to cover the testicles, are further reasons for not making the attempt to preserve them when the elephantiasis is of great magnitude.

Before the operation is commenced it is important to keep the tumour elevated above the level of the body for thirty minutes or longer, and to make pressure on the mass with the hands in order to empty it as much as possible of venous blood. In late years the risk of bleeding has been much diminished by the application either of a strong ligature round the base of the tumour, or of a powerful clamp. Dr. Fayrer, of Calcutta, has described and figured[1] a running cord with a brass ring, and also a steel clamp, which he uses in these operations. The passage of strong, thick, double ligatures through the upper part of the mass by means of straight needles of sufficient length, so as to constrict the base of the tumour temporarily in segments by tying the ends of the ligatures together, would be perhaps the most effectual way of checking hæmorrhage, especially from the larger veins. After the bleeding vessels had been tied separately these temporary ligatures could be removed. Great care must be taken to reduce any hernial protrusion before the clamp or ligatures are applied, a matter of some difficulty to determine in a large elephantiasis. In the case operated on by Mr. Wiblin, at Southampton, death was occasioned by the clamp

[1] Med. Times and Gazette, vol. i. 1863, p. 516.

compressing the protruded bowel, and causing gangrene.

Chloroform should always be given to prevent pain and diminish the shock of the operation. When no attempt is made to save the testicles the operation is of a simple nature. The penis is to be first dissected out from the front of the tumour, and then its peduncle is to be divided near its attachment to the body by rapid strokes made with an amputating knife, including in one sweep the spermatic cords, which latter should be immediately seized with the fingers by assistants to prevent their retracting. If any part of the integuments be sufficiently sound to form a flap to cover the large open wound, the surgeon must take advantage of it, and modify the operation accordingly. When the intention is to preserve the genital organs, three flaps of appropriate size must be formed: one in front to cover the penis, and two others, one on each side, to be brought together in order to invest the testicles in the manner practised by Delpech. In cases complicated with hernia the sac is usually adherent to the diseased tissues around, and requires to be detached with caution, which tends to delay and increase the difficulties of the operation.[1] Active assistants must be ready with their fingers to close the mouths of the bleeding vessels. Firm pressure on the cut surface by means of a large sponge, expertly applied so as to follow the surgeon's knife, will be found a good way of arresting the bleeding until the surgeon is ready to secure the vessels. The small bulldog forceps will be useful in closing the large veins. All bleeding points should be tied to prevent the risk of secondary bleeding.

[1] In one case, Dr. Ballingall cut off the end of a hernial sac, and a gush of turbid fluid flowed out, but no peritonitis ensued.

Considering the formidable character of these operations the success attending them is very great, and the immense wound heals readily. In the large number of one hundred and sixty-one operations performed by Dr. Esdaile, the mortality was only five per cent. Dr. Ballingall operated in twenty-one cases in Bombay, and had only two deaths. In one case of recovery the tumour weighed 106½ pounds.[1] Dr. Fayrer was less successful, having lost four patients out of fourteen. Three died from pyæmia and one from exhaustion, three or four hours after the removal of a tumour weighing sixty-six pounds.[2]

[1] Trans. Med. and Phys. Soc., Bombay, 1862.
[2] Edinb. Med. Journal, 1861-2, p. 722.

CHAPTER IX.

ADIPOSE TUMOURS OF THE SCROTUM.

Formations of fat in the scrotum have been known from the time of Galen by the term "Steatocele." Morgagni states that he has sometimes seen fat accumulated in the scrotum to a considerable extent.[1] I am indebted to Mr. Kiernan for a section of an immense scrotal tumour entirely composed of large lobules of adipose tissue. Unfortunately he was unable to supply me with any history of the case. There can be no doubt that in several of these tumours of the scrotum, the fat was originally deposited in the spermatic cord, and, in some instances, descended from its upper part in the groin. I have described at page 522 a case of large fatty tumour, in which this was the case. Indeed, a fatty tumour which has grown from the first in the connective tissue of the scrotum is an exceedingly rare lesion. The late Mr. Henry Gray showed me an adipose tumour which was undoubtedly developed in the connective tissue of both sides of the scrotum. The patient from whom it was taken died of phthisis and disease of the right knee, but as the tumour was not detected until after death, no history of it could be obtained. Mr. Gray, in describing this tumour, states,[2] "Although the body generally was very much emaciated and pale, the

[1] Cook's Morgagni, vol. ii. p. 435.

[2] Transactions of Pathological Society of London, vol. vi. p. 230.

subcutaneous areolar tissue over the whole of the front of the abdomen contained a considerable amount of fat. The same tissue, at the lower part of the abdomen, where it becomes continuous with the superficial cellular tissue and dartos of the scrotum, instead of changing its character, also contained a very large amount of fat. This was continued down into the scrotum on both sides, in the form of elongated round or oval-shaped lobules of very large size, towards the lower and most depending part of the scrotum; but becoming smaller, more flattened, and compact as the tumour pressed forwards or backwards towards the abdominal or perineal regions respectively. The masses of fat were placed immediately behind the skin of the scrotum, and in front of the spermatic cords and testes of both sides, forming two distinctly separate masses of an elongated oval-shaped form, with an uneven lobulated surface; the combined mass weighing half a pound."

Mr. Jabez Hogg and Mr. H. Thompson[1] have also described a similar growth of adipose matter in the subcutaneous connective tissue of the penis, as well as of the upper part of the scrotum. The tissues of the latter were considerably hypertrophied. These parts were removed from the body of a man aged sixty-five.

The diagnosis of adipose tumours occurring in the scrotum, whether originally formed there, or in the spermatic cord, is extremely obscure. I have already described the great difficulties experienced in making out the nature of a large fatty tumour which had sprung originally from the upper part of the cord. In Mr. Gray's case no clear decision as to what was the nature of the growth could be arrived at previous to the dissection of the part; and in Mr. Hogg's case, although the

[1] Transactions of Pathological Society of London, vol. vi. p. 232.

patient had suffered for nearly four years, it seems that the character of the swelling was never ascertained during life.

When a fatty tumour of the scrotum attains an inconvenient size, or is steadily growing, it should be excised, and the sooner this is done the less will be the risk. Mr. Lane lately removed a large tumour of the kind from a man, aged fifty-two, in St. Mary's Hospital. The left testicle was embedded in the tumour, and removed with it. The patient died on the fourteenth day from diffuse inflammation, with pelvic abscess and slight secondary bleeding.[1]

[1] Lancet, vol. ii., 1865, p. 724.

CHAPTER X.

FIBROUS TUMOURS OF THE SCROTUM.

Tumours of a fibrous nature occur in the connective tissue of the scrotum. They form round or oval masses, arranged, when of large size, in lobes, and they are enclosed in a capsule of fibro-connective tissue. The smaller growths are composed of a close-set fibrous tissue, which is sometimes dense and compact like the fibrous tumour in the uterus. The larger tumours consist also of dense fibrous tissue mixed with a large amount of a loose pliant fibro-connective tissue infiltrated with more or less serous fluid. The elongated filaments characteristic of fibre tissue are readily recognised in the microscope. Fat cells are sometimes interspersed with the delicate filaments; and in the more dense tumours, masses of cartilage and calcareous matter have been found imbedded.

Fibrous tumours are of slow formation, but show a constant tendency to increase. They occur about the middle period of life, but the larger growths have been observed chiefly in persons advanced in age. Tumours of a similar character are developed in other parts where loose connective tissue abounds. Some years ago I excised one from the labium of a female, aged forty-five.

Fibrous tumours of the scrotum sometimes attain an immense size. One, a section of which is preserved in

the Museum of the College of Surgeons, weighed twenty-three pounds, and measured twenty-three and a half inches in circumference. It was taken after death from a man aged seventy-five. Mr. Paget has described two cases which came under his notice in St. Bartholomew's Hospital. In a man, aged seventy-four, the tumour was found after death to weigh twenty-four pounds. In another man, seventy years old, the tumour was of great size, and caused sloughing and hæmorrhage, from which the patient sank.[1] M. Lesauvages has noticed the case of a man, aged seventy, who had a scrotal fibrous tumour which weighed forty-four pounds, and was of so great a size that as the patient sat with it resting on his thighs it reached beyond his knees and up to the sternum.[2]

Diagnosis.—A small fibrous growth, especially if attached to the tunica vaginalis, might be mistaken for an encysted hydrocele of the testicle, but the distinction is easily made by attention to the firmness of the swelling and the absence of transparency. A fibrous tumour of great size might be regarded at first sight as an elephantiasis, but the nature of the case would be easily recognised by the circumstance of the skin being sound and moveable over the growth.

Treatment.—The only mode of dealing with these tumours is to excise them, and, if thoroughly removed, there is but little liability to a recurrence of the disease. I excised a tumour of the kind from the scrotum of a gentleman aged fifty-one. It had formed very slowly, having been first observed about twenty-four years ago. In 1835, the patient consulted Mr. Aston Key. At that time the tumour was very small, and

[1] Lectures on Surgical Pathology, vol. ii. p. 112.
[2] Archives Générales de Médecine, 4e série, t. ix. p. 212.

Mr. Key called the swelling a varicocele, and regarded it as of no consequence. The tumour was very prominent in front of the left spermatic cord, just above the testicle, which was somewhat depressed. The surface of the tumour was very irregular and uneven, and it had the firmness and density of cartilage. It was connected with the spermatic cord, but was quite distinct from the testicle. It was the seat of very little tenderness or pain. The tumour, with a portion of the skin closely investing it in front, was excised on the 9th of January, 1859. Its back part was attached to the sheath of the spermatic cord, but none of the structures of this part were exposed in the operation. Care was taken to excise every lobule and portion of the growth. The patient recovered favourably from the operation.

The tumour was about the size of a small orange, but of an oval shape. It was composed of a large number of small lobules of various sizes, each lobule having a distinct capsule. The lobules were somewhat loosely connected by fibro-cellular tissue. Examined microscopically, the tumour was found to consist of white fibrous and fibroid tissue, blood-vessels of recent formation, and elongated nuclei interspersed with much moleculo-granular matter, and infiltrated with albumen and fat. There was also a stroma, resembling the matrix in which cartilage is formed. In 1865, six years after the operation, there had been no return of the disease.

The excision of a fibrous tumour of the scrotum should be performed at an early period. When first developed, the tumour is but loosely attached in the scrotum, but it soon gets connected to the coverings of the testicle, and on attaining a large size cannot be removed separately from the gland. Sir William Fergusson informed

me of one, about the size of a walnut, which he excised from a man, aged seventy-three, in King's College Hospital. It lay in close contact with the tunica vaginalis on one side, and care was required in order to avoid opening that membrane. Mr. Hilton removed a fibrous tumour, nearly the size of two fists, from the scrotum of a man aged thirty. It adhered so firmly to the tunica vaginalis that a portion of the membrane had to be excised with it.[1] Mr. Heath lately excised, from a man aged fifty-six, a large fibrous tumour, which was closely attached to the back of the epididymis and the tunica vaginalis, so that the testicle had also to be removed.[2]

When a fibrous tumour attains a great size, its removal becomes a formidable operation. Dr. Mott, of the United States, excised an enormous fibrous mass from the scrotum of a man about seventy-three years of age. The scrotum was twelve to fifteen times its ordinary bulk, and was filled with tumours of a stony hardness, from the size of nutmegs to that of a large pea. The tumours had all a very white appearance; and the integuments over two or three of the largest, having been ulcerated for upwards of a year, poured forth a fetid discharge. A white substance, resembling mortar, was discharged from these openings. The disease was upwards of twenty years' duration, and had been gradually increasing, the tumours multiplying as the scrotum augmented in size. The whole of the disease was removed, and the patient recovered from the operation, and at the end of three years afterwards he was enjoying excellent health.[3]

[1] Med. Times and Gazette, vol. vii. p. 679.
[2] Pathol. Trans. vol. xvi. p. 183.
[3] Philadelphia Journal, as quoted in the London Medical and Physical Journal, vol. lviii. p. 516.

Mr. O'Ferrall removed a large tumour of a similar kind from the scrotum of a man forty-four years of age, in St. Vincent's Hospital, Dublin. Repeated bleeding from an ulcer on the surface was exhausting his strength. He recovered from the operation, but died some months afterwards of phthisis. From the account given of the tumour, it seems probable that it was originally developed in the spermatic cord.[1]

[1] Dublin Quarterly Journal, vol. i. p. 521, and Paget's Lectures, vol. ii. p. 113.

CHAPTER XI.

CARTILAGINOUS AND BONY TUMOURS OF THE SCROTUM.

Tumours consisting of cartilage or bone are extremely rare in the scrotum. Dr. Kerr has described the case of a Chinaman, aged twenty-eight, who was admitted into the Ophthalmic Hospital, Canton, in consequence of a hard, dense, slowly-growing scrotal tumour, the size of an infant's head. It was excised, together with the left testicle, which was situated below it. It weighed five pounds, and consisted of numerous cartilaginous lobes of various sizes, in which large quantities of bone were deposited. Numerous hard spiculæ were scattered throughout the tumour, but there was a portion, consisting of a compact plate and radiating spiculæ, attached to a firmer base. Microscopic examination proved it to be genuine bone. From the position of the testicle, it is probable that the tumour grew first in the spermatic cord.[1]

[1] North American Medico-Chirurgical Review, January, 1858.

CHAPTER XII.

CYSTIC TUMOURS OF THE SCROTUM.

Tumours composed chiefly of cysts are liable to occur in the scrotum, but are very rare. They are of the nature of the proliferous cysts described by pathologists. Growths of a similar character have been observed in the labium, cheek, and other parts involving the integuments. These tumours are not malignant, and if wholly excised, are not liable to reappear. I am indebted to Mr. Crompton, of Birmingham, for kindly furnishing me with the particulars of an interesting case of this disease:—T. A., when about eight years of age, was observed to have two or three small cysts in the scrotum. They were of the size of a horse-bean, and situated beneath the integuments. In the course of a few months they increased considerably in size, and fresh cysts appeared. There were, perhaps, as many as twenty or thirty—some of the size of a pea, others as large as a kidney bean. They caused no pain or inconvenience. Mr. Francis Elkington, who had charge of the patient, having used friction with iodine and mercurial ointments without effect, punctured the cysts several times with a grooved needle, and afterwards applied pressure with adhesive plaster, but without any advantage. The fluid evacuated was invariably transparent and serous. After the disease had existed four or five years, Mr. Elkington took the lad to London to see Sir A. Cooper, who recommended

graduated pressure, which was applied for two years, but without benefit. The patient was afterwards lost sight of until he came under the care of Mr. Crompton in the General Hospital, Birmingham, in 1849. He was then about twenty-two years of age. The testicles felt healthy. Below them, in the substance, as it were, of the scrotum, a number of elastic globular bodies could be felt, and behind, a hardened and inflamed portion of the integument, which was tender on pressure, and the chief source of his annoyance. The disease appeared to involve the septum, and to spread from thence towards the crura of the penis. The condition of the scrotum is represented in Fig. 49. Mr. Crompton excised the whole of the diseased mass. The wound healed by granulation, and the man afterwards went to India as a soldier. The part removed resembled the cystic sarcoma of the breast. The cysts were of various sizes, and contained transparent fluid. The annexed wood-cut is taken from a drawing of the tumour sent me by Mr. Crompton.

Fig. 49.

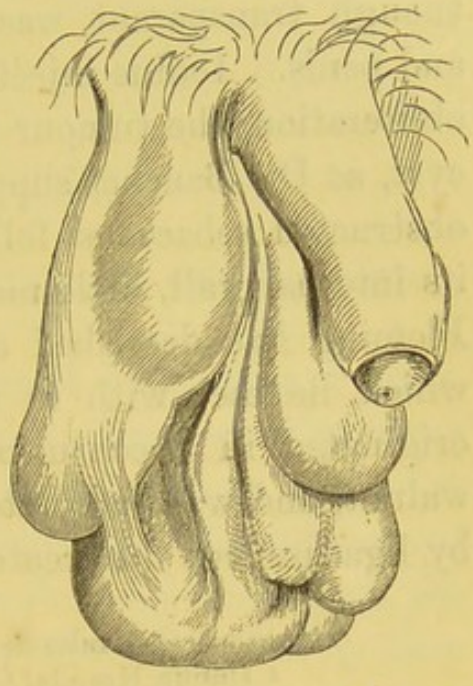


Fig. 50.



Dr. Bauchet has minutely recorded a case of cystic tumour, which had formed slowly in the scrotum of a

man aged thirty. It acquired the size of a small hen's egg, and on puncture was found to be filled with a yellow viscid fluid. The diagnosis was easy, for the tumour, though transparent, was quite distinct from the testicle and penis. Iodine injections having failed to produce its obliteration, the tumour was excised with success. The cyst, as Dr. Bauchet supposes, no doubt originated in an obstructed sebaceous follicle, for he found, attached to its internal wall, little masses of sebaceous matter.[1] Dr. Fleming has described a case of small cystic tumour which he met with in a boy nine years of age. It originated in a contusion, and acquired the size of a walnut, and was sacculated or lobulated. It was cured by ligature, but the treatment caused serious symptoms.[2]

[1] Archives Générales de Médecine, Janvier, 1858, p. 71.
[2] Dublin Hospital Gazette, vol. iv. 1857, p. 228.

CHAPTER XIII.

CONGENITAL VASCULAR TUMOURS OF THE SCROTUM.

M. A. Verneuil has given a minute description of a congenital venous tumour developed in the connective tissue of the scrotum.[1] Such tumours, indolent in character, are occasionally met with in the adult in different parts of the surface of the body. I have removed them from the arm and from the thigh ; but they have very rarely been observed in the scrotum. In 1851, M. Robert, surgeon to the Beaujon Hospital, excised a tumour of an erectile character from the scrotum of a young man twenty years of age.[2] It had been observed for twelve years, and I agree with M. Verneuil that it was probably congenital. The case described by M. Verneuil occurred in the practice of Ricord in the Hôpital du Midi, in 1855, in a man twenty-nine years of age. The tumour occupied the right side of the scrotum, and was clearly congenital. At the age of eleven, and again at nineteen, it became painful and inflamed. The patient married at the age of twenty-eight, and a recurrence of the inflammation afterwards induced him to seek the removal of the growth. It was of an oval shape, and large in size, extending up to the abdominal ring, and it surrounded the right testicle and spermatic cord. In the operation the

[1] Gazette Hebdom. de Médecine et de Chirurgie, 16 Sept. 1859, p. 58.
[2] Bulletin de la Société Anatomique, 26e année, p. 194.

tumour was carefully dissected from these parts by Ricord. The wound healed favourably. The tumour was of an erectile venous character, but had undergone changes consequent on inflammation. It contained plastic matter, as well as a number of small cysts filled with serous and sero-sanguineous fluid.

Mr. Holmes has recently described[1] a tumour of this kind in a lad aged ten, admitted into St. George's Hospital in May, 1862, under the late Mr. Johnson. The tumour was congenital, and had long been stationary, but had commenced to increase. The mass, consisting of a congeries of greatly enlarged veins, was encircled with three ligatures which cut their way out. This diminished the bulk of the swelling. The lad was readmitted in January, 1863, under the care of Mr. Holmes, who, in consequence of some increase in the size of the tumour, applied another ligature round its base. In July, 1864, no further enlargement had taken place.

The liability of the scrotum to such vascular tumours must be borne in mind by surgeons. After changes consequent on inflammation there might be great difficulty in distinguishing such a growth from a fatty, soft fibrous, or a cystic tumour in the scrotum. The history of the case, in revealing its congenital character, would greatly aid the surgeon in arriving at a correct diagnosis.

When a vascular tumour in the scrotum is inconveniently large, causes bleeding, or is liable to become painful and inflamed, its removal must be effected by ligature or excision. Mr. Holmes mentions that Mr. Prescott Hewitt was called upon to treat a tumour of this nature in the scrotum, in which the arteries were immensely enlarged, some of them being the size of the

[1] Path. Trans. vol. xv. p. 95.

radial, and from which alarming hæmorrhage had taken place. The growth was arrested, and the disease entirely cured by subcutaneous ligatures. In the adult, congenital vascular tumours may often be safely excised. I have treated several in this way in other situations, though not in the scrotum; but the cases of Robert and Ricord show that excision is applicable to tumours of the kind in this part. If any large pulsating vessels be felt, or if brisk arterial hæmorrhage has taken place, then the ligature will be safer; but *venous* growths could be more effectually removed by the knife, and with less risk of recurrence.

CHAPTER XIV.

CARCINOMA OF THE SCROTUM.

Cancer very rarely attacks the scrotum except in the comparatively mild form of the epithelial. Mr. Harvey Ludlow describes in his Prize Essay the case of a shoemaker, aged fifty-three, who was under Mr. Stanley's care in St. Bartholomew's Hospital on account of a large open cancerous ulcer on the scrotum. The growth, together with the right testicle and some diseased inguinal glands, were removed. The patient died of phlebitis a fortnight after the operation. Mr. Paget examined the cancer substance under the microscope and found no epithelial cells, but bodies similar to those exhibited by scirrhus of the mamma.

SECTION I.

MELANOTIC CANCER OF THE SCROTUM.

When we consider the proneness of black cancer to affect primarily the skin, and the deep colour of the scrotum, it is somewhat remarkable that this part is most rarely the seat of melanosis. The only case of it with which I am acquainted is the following one, which occurred in my own practice.—Mr. G., a cabinet-maker, aged thirty-two, and enjoying tolerable health, consulted me in November, 1842, on account of a fungous growth

on the scrotum. The tumour was about the size of a small walnut, and of a dark colour, had an irregular granular surface, and was attached to the left side of the scrotum by a narrow peduncle or neck. About an inch on one side of this tumour I observed a small dark spot, apparently produced by some black deposit beneath the epidermis, raising it a little above the surrounding surface. The patient stated that the fungous growth was first noticed about three months before, when it resembled the little speck just described, which had only been observed a fortnight. It had increased rapidly of late, but gave no pain. The shirt was discoloured by a slight discharge and bloody marks. There was no enlargement of the glands in the groins. I excised the tumour and small speck near it. On making a section of the morbid growth, the fungus appeared to spring from the cutis. Its base was hard, and evidently of a scirrhous character; but the projecting part was soft, and easily broken down. Small irregular spots of melanic pigment were observed on the cut surface, as well as on the exterior of the tumour, and the little speck seemed to consist of a similar matter deposited immediately beneath the epidermis. The wound healed favourably. In May, 1843, I saw Mr. G. in consequence of a return of the disease. I observed three black specks on the scrotum in the vicinity of the cicatrix, and the glands in the left groin were slightly enlarged and indurated. In March, 1844, the disease was found to have made considerable progress. There was a firm indurated mass about the size of an almond in the scrotum implicating the cicatrix, and an enlargement of the inguinal glands forming a tumour the size of an orange, and a smaller swelling the size of a hen's egg just below it. He suffered a good deal of pain, and his

general health was slightly impaired. After this, I saw no more of my patient for more than four years, when, in October, 1848, I was requested to visit him, and found him in bed in great pain from the tumour in the groin, which had grown to the size of a very large cocoa-nut. The hard mass in the scrotum had increased very little. It appeared that he had continued at his occupation until about three months back, when, after his making some unusual exertion, the tumour became more painful, rapidly enlarged, and in a few weeks doubled its previous size. Up to this period he had enjoyed tolerable health, and had latterly gained flesh; but since the attack of pain and change in the tumour he had become thinner and weaker, and been confined to his bed. On the 7th of the December following he died of repeated hæmorrhage from an ulcer in the rectum. The induration in the scrotum was found to consist of carcinomatous matter slightly tinged with black pigment. The inguinal tumour was a mass of encephaloid cancer. The lumbar glands were slightly enlarged and quite black. The organs of the chest and abdomen were all sound.

It must be noticed, as contrary to the usual course of melanotic cancer, that the disease having reappeared at its original seat, and also in the groin, so early as six months after the operation, subsequently advanced so slowly that after lasting six years the only internal parts affected with it were the lumbar glands, and those only in a very slight degree.

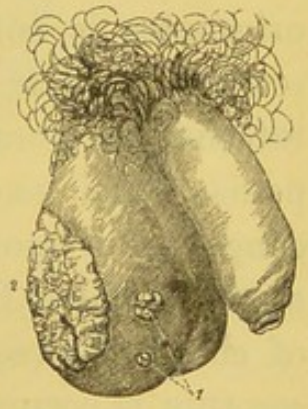
SECTION II.

EPITHELIAL CANCER OF THE SCROTUM.

EPITHELIAL cancer of the scrotum, or as it is commonly called, *chimney-sweeper's cancer*, is a disease of the skin,

which attacks the scrotum of persons who have been exposed to the contact of soot. It is generally developed in the form of a small pimple, or warty excrescence, termed *soot-wart*, which often remains on the scrotum for months, or even years, without undergoing any change. Usually there is only a single wart at the lower part of the scrotum; sometimes there are two or three of different sizes; and occasionally they are so numerous, and so abundantly and largely developed, as to form a considerable cauliflower excrescence. After a time the wart becomes soft, excoriated, and red, and exudes a thin irritating discharge; which, becoming dry, forms an incrustation over the excrescence. After the scab has been picked or rubbed off by friction against the dress, ulceration ensues, destroys the wart, and produces a painful chronic sore, characterized by an indurated base, with elevated and sometimes nodular or overhanging edges, and an irregularly excavated surface discharging a thin sanious fluid of an offensive odour. The ulcer, if suffered to proceed, increases widely, invading the whole scrotum to the perineum, and laying bare the crura penis. At the same time it penetrates deeply to the tunica vaginalis, which becomes firmly connected to the morbid scrotum and adherent to the testicle. This organ is said also to be liable to become involved in the disease, and to form the seat of a deep excavated sore, but no case in which the cancer has reached the testicle has fallen under my notice. The glands in the groin often enlarge at an early period from

Fig. 51.



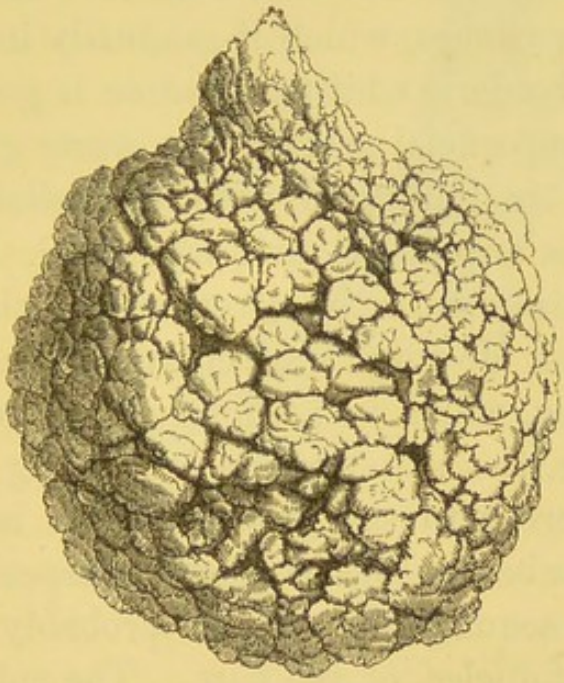
1. Small soot-warts.
2. Cancerous ulcer succeeding the wart.—From a preparation in the London Hospital Museum.

irritation; but at length become indurated and diseased. After a time they soften, suppurate, and form large and deep ulcers in the groin, similar in character to the sore on the scrotum. The ulcer spreads towards its circumference widely and superficially, whilst in the centre it burrows deeply, until in many instances it reaches the great vessels of the thigh, destroys their coats, and causes death by hæmorrhage. In other cases the inguinal glands remain unaffected; but ulceration continues to proceed slowly in the direction of the cord, and a frightful sore is produced, its progress being attended with severe darting pains. The patient's sufferings are protracted for many months, and sometimes for years; he becomes gradually cachectic; loses appetite and flesh; his countenance assumes a peculiar leaden or waxy hue and anxious expression; and he ultimately sinks, worn out by his sufferings and the effects of the disease on his constitution.

The small excrescence in which cancer scroti usually originates is soft, vascular, and sensitive, and in many respects similar to the soft warts which occur on the internal membrane of the prepuce, and on the glans penis. The soot-wart appears, in fact, to consist of a congeries of morbidly enlarged papillæ. The Museum of the London Hospital contains a remarkable specimen of chimney-sweeper's cancer, in which nearly the whole scrotum is occupied by a cauliflower excrescence, which exhibits these papillæ in a very advanced state of development. It was removed by Mr. Headington from an old man about sixty-four years of age, who afterwards left the hospital cured. Both testicles were exposed in the operation. The morbid growth is composed of a number of projecting processes densely grouped together, of variable size, but many very large, with

their summits lobulated, expanded, and elevated on narrow peduncles more or less flattened. They are represented in Fig. 52. The warty processes closely resemble the elevated growths abundantly developed about the cancerous ulcer, produced by soot on the back of a hand and wrist, preserved in the Museum of St. Bartholomew's Hospital.[1] The soot-wart is sometimes covered with a dense and thick concretion, formed by successive layers of incrustation, the superficial still remaining attached, so as to form a projecting elongated conical process, which is not unlike the spur of the cock. A specimen of cancer scroti, with a horn-like growth three-quarters of an inch in length, which I removed from a chimney-sweep, is preserved in the Museum of the College of Surgeons (No. 2469). The process when very long is occasionally twisted like the horn of a ram. Some curious excrescences of this kind are represented

Fig. 52.



[1] The case is related at page 595. The hand is figured in Paget's Pathology, vol. ii. p. 417.

in the clever etchings of Mr. Wadd.[1] The adjoining figure (53), taken from one of them, exhibits the process of its exact size.

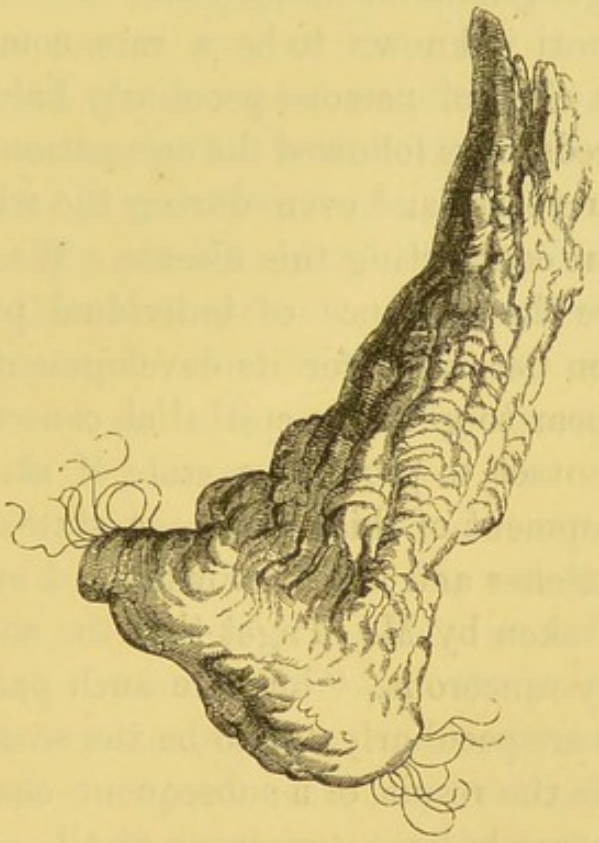
The appearances presented by this disease closely resemble those of carcinoma of the lower lip, and its minute structure corresponds with epithelial cancer, of which it forms a well-marked example. The base of the ulcer is composed of a greyish substance, which is firmer and harder than the adjoining cutis, and consists of epithelial cancer-cells. The border of this, the true cancerous substance, is not well defined. It mingles with the adjoining tissues, which it gradually invades, spreading at the borders, whilst ulceration is going on in the central and superficial parts. The warty growth, as well as the sore, is infiltrated with epithelial cancer-cells. The disease is originally quite superficial. Mr. N. Ward, however, excised from the scrotum of a chimney-sweep, in the London Hospital, a subcutaneous tumour, the size of a hazel-nut, which was wholly composed of epithelial cancer tissue, the skin covering it being quite sound, though adherent to the growth. This is the only instance of a subcutaneous chimney-sweeper's cancer with which I am acquainted. It was probably developed in one of the follicles of the part. The enlarged and indurated lymphatic glands are composed of an opaque yellowish-white substance, mixed up, when softening occurs, with a soft curd-like matter or greyish pus, and broken up whitish particles enclosed in a cyst, the capsule of the gland. The cancerous elements are the same in the inguinal glands as in the scrotum.

Carcinoma scroti is, with few exceptions, confined to chimney-sweepers; and the irritating action of the soot on the skin of the scrotum is no doubt its exciting

[1] Cases of Diseased Prepuce and Scrotum, Pl. x. xi. xii.

cause. A similar disease occasionally occurs in other parts of the skin, on the prepuce, and on different parts of the face, but the scrotum being seldom cleansed, and well adapted to harbour soot, seems more exposed to the disease. Sir James Earle has related the case of a man who had a large sore resembling chimney-sweeper's cancer, which reached from the bend of the wrist to the

Fig. 53.



knuckles, occupying almost the whole of the back of the left hand. The man was a gardener, and for several springs had been in the habit of strewing soot on the ground round the young plants to preserve them from slugs. He carried the soot in an old garden-pot which hung on his left hand, while he strewed the soot with his right.

Other irritating substances may excite this disease. Dr. Paris states that the smelters are occasionally

affected with a cancerous disease in the scrotum similar to that which affects chimney-sweepers.[1] Dr. Warren, of the United States, remarks that he has met with a few instances of cancer scroti in persons who were not chimney-sweepers.[2] I have been informed by Sir William Fergusson that he excised an epithelial cancer from the scrotum of a man in King's College Hospital, who had never been exposed to contact with soot, but had worked much amongst guano for many years.

Cancer scroti is known to be a rare complaint, even amongst the class of persons peculiarly liable to it, and many hundreds have followed the occupation of chimney-sweeping for years, and even during the whole of their lives, without contracting this disease. We must, therefore, conceive the existence of individual predisposition as a condition necessary for its development. The soot does not appear to generate epithelial cancer, but by its continued contact to produce a state of skin favourable to the development of this disease—a state characterized by scabby patches and warty growths. I entirely agree in the view taken by Mr. Paget that the soot-warts are not primarily cancerous, "but are such parts as in certain persons are peculiarly apt to be the seat of cancer."[3] The cancer is the result of a subsequent change. Some soot-warts never become cancerous at all. Others, after remaining in a stationary state for months or years, get hard and sore, and become converted into a cancerous ulcer, and we may assume that at the period when this change takes place the epithelial cancer-cells were formed or invaded the part.

The disposition to cancer scroti appears in some instances to be hereditary. Mr. Earle extirpated the

[1] Pharmacologia, vol. ii. p. 89.
[2] Surgical Observations on Tumours, p. 328. [3] Lib. cit. vol. ii. p. 468.

testicle and diseased integuments from a sweep, aged thirty-five, a patient in St. Bartholomew's Hospital, whose grandfather, father, and one brother had all perished from the effects of the disease.[1] A father and son were once in St. George's Hospital at the same time on account of it.[2] Mr. Cusack mentions that he removed a soot-wart from the hand of a female who carried on the business of chimney-sweeping, and that he had previously excised an excrescence of the same nature from the ear of her son.[3]

Cancer scroti occurs more commonly at the middle period than at any other time of life. In the majority of cases which I have met with, the disease occurred between the ages of thirty and forty. Those exposed, however, to the action of soot may become affected at a much earlier period. Mr. Wadd has figured a diseased prepuce and soot-wart on the scrotum from a boy aged fifteen; and Sir J. Earle witnessed a case of the disease as early as at eight years of age. It appears that the seeds of this malady are sown in early life, but in general do not germinate until they have remained for some time dormant in the system. What is the permanent effect on the scrotum produced by soot, which thus renders it in certain individuals so peculiarly susceptible of a cancerous action at some distant period, we cannot explain; but that the soot, though the exciting cause of the disease, may in some instances be a remote one, is shown by several striking facts. It is known that persons who have been sweeps when young, but have abandoned the occupation, have afterwards been attacked with chimney-sweeper's cancer, although they have long been removed

[1] Med.-Chir. Trans. vol. xii. p. 305.

[2] Mr. Hawkins' Lectures on Tumours, London Medical Gazette, vol. xxi. p. 842.

[3] Dublin Journal of Medical Science, vol. xxi. p. 137.

from all contact with soot.—A sailor, between forty and fifty years of age, was admitted into the London Hospital, with an ulcerated sore on the scrotum, presenting all the characters of genuine chimney-sweeper's cancer. The inguinal glands were indurated and enlarged, and subsequently ulcerated. He had been brought up as a sweep; but for the last twenty-two years, during which period he had served at sea, he had not been employed amongst soot in any way whatever. The disease first appeared in the scrotum about three years before. In this instance, therefore, the influence of soot, if this were really the exciting cause of the disease, must have been exerted nineteen years before its appearance, during which long period the part was entirely exempt from the action of this substance. It has sometimes happened, after the morbid parts had been completely extirpated, and the wound healed, the patient having avoided further contact with soot, that the disease has reappeared, as it were afresh, a second and even a third time; not, however, in the cicatrix of the wound, but on a different part of the scrotum. These, and similar facts, lead to the conclusion that though abandonment of his occupation may render the adult chimney-sweeper less liable to cancer, it by no means forms a satisfactory security against its occurrence.

Cancer scroti chiefly extends its ravages by affecting the contiguous tissues, and has little disposition to contaminate the lymphatic glands or distant parts. An instance is on record of an old chimney-sweeper, who had been subject to this disease forty years, and had undergone three operations for its removal, yet even then the glands in the groin were unaffected.[1]—A man, aged

[1] Mr. Hawkins' Lectures on Tumours, London Medical Gazette, vol. ii. p. 842.

fifty-one, who had been a chimney-sweeper ever since the age of seven years, was a patient of mine on account of this disease. He had been repeatedly attacked with it during a period of twenty-two years, and had submitted to no less than five operations for its removal. The glands in one groin became affected only a few months previously. Ulceration took place, and the patient ultimately died from its irritative effects on the constitution, in a state of extreme emaciation. On a careful examination of the body, no trace of internal disease could be detected. The cancer was strictly limited to the scrotum and groin on one side. Mr. Bransby Cooper has likewise recorded a case of chimney-sweeper's cancer which ended fatally; and on examination none of the glands or viscera of the interior of the body were affected.[1]—In a man who died from ulcerated carcinoma of the scrotum and groin in the Worcester Infirmary, the disease was limited to those parts, no secondary deposits having been found in any other region.[2] These cases show that the disease not only remains limited for a long period to the glands immediately connected with its primary seat, but, in some instances, destroys life without extending beyond them, or implicating more distant parts.

Chimney-sweeper's cancer is a disease almost peculiar to this country. Dr. Warren, a surgeon of great experience in the United States, remarks that he has never seen it in chimney-sweepers in his country. Richerand[3] and other French writers inform us that it does not occur in France. Pit-coal, from which soot is produced, is

[1] London Medical Gazette, vol. xliii. p. 532. I examined the body of a man who died of diffuse inflammation arising from a large cancerous sore and abscess in the groin, consequent on epithelial cancer of the penis, for which the organ had been amputated two years previously. The lumbar glands and internal organs were all healthy.

[2] Brit. Med. Journal, Oct. 1857, p. 861.

[3] Nosographie Chirurgicale, t. iv. p. 300.

only sparingly employed as fuel abroad; whilst in this country it is in almost universal use by all classes, and until recently our chimneys were cleansed by climbing-boys, who were consequently exposed from an early period of life to continued contact with soot. But these circumstances seem scarcely sufficient to account for the prevalence of epithelial cancer of the scrotum in England in comparison with other countries, without admitting the existence of a greater predisposition to the disease in the constitution of natives of this country. Mr. Russell states that it is rare at the Royal Infirmary in Edinburgh, and that he has seen but few cases of it.[1] Mr. Syme makes a similar statement. In late years the complaint has become less frequent in the large hospitals of London, no doubt owing to the general use of machinery in the cleansing of chimneys.

Diagnosis.—I scarcely know of any disease for which chimney-sweeper's cancer in a state of ulceration could well be mistaken, the malignant character of the sore having been in all cases that I have witnessed very clearly marked. The warty excrescence which precedes the ulcerative stage bears some resemblance to the syphilitic warts, or to the growths termed mucous tubercles, which sometimes form on the scrotum; but the history of the case, and more especially the occupation of the patient, would always excite suspicion, and in most instances be sufficient to indicate the true nature of the disease.

Treatment.—Scrotal cancer is a disease quite beyond the control of topical and internal remedies. Time has been lost in attempts to eradicate it by arsenical and various other applications, but nothing hitherto tried has proved of any avail in arresting its destructive pro-

[1] Observations on the Testicle, p. 98.

gress. There is, indeed, no effectual remedy but the knife; and fortunately this is a resource attended with a greater share of success than generally awaits operations on cancerous disease in other parts. When the scrotum is alone affected, the proceeding is very simple. The morbid parts are to be removed by two elliptical incisions, care being taken to cut wide of all disease; for if any part of the morbid tissue be left behind, the complaint will certainly reappear. The inguinal glands are so seldom contaminated at an early period of soot-cancer, that, as a practical rule, simple enlargement of them, which often arises from irritation, does not constitute an obstacle to the excision of the diseased scrotum.

After chimney-sweeper's cancer has to all appearance been effectually extirpated, and the wound has healed and remained so for some length of time, the disease has often been known to reappear; and, what is remarkable, it does not always return in, or in connexion with, the cicatrix of the wound, as ordinarily occurs after operations for cancer in other situations, but is sometimes developed in a different part of the scrotum. Now, I believe, that in these cases the reappearance of the disease is not the result of previous contamination, or of imperfect removal of the morbid tissues, but that the cancer is generated altogether anew. We observe the same thing in epithelial cancer of the lip. I excised a growth of the kind from the left side of the lower lip of a man aged sixty-six, in the London Hospital. Five years afterwards he was readmitted with cancer on the right side of the lip. This was also excised. I saw him a year later and found that there had been no return of the disease in the lip, and that the cicatrices were free from hardness, and were separated by sound structure.

There was an open cancer, however, of the submaxillary gland on the right side. The effect of the operation would seem to be the eradication of all existing disease, but unfortunately not to destroy the disposition to its development in the parts that remain; which may subsequently, therefore, become a fresh seat of cancerous action, especially if, as often happens, they continue exposed to its exciting cause—the soot. The surgeon should not, then, be guided in the treatment of these cases by the same principles which regulate his conduct in treating other forms of cancer, in which a repetition of the operation is seldom admissible, and rarely successful. On the contrary, if cancer appear, after excision, in a fresh part of the scrotum, it must be met as if it were a local and a new disease, not the return of an old one; and a second operation may be undertaken on the same grounds, and nearly with the same hope of success, as in the first instance. I know, indeed, of several interesting examples in which life had evidently been greatly prolonged by repeated operations. At page 599 I have related the case of a sweep, who, in the course of twenty-two years, had submitted to no less than five operations. Mr. Paget mentions a case of one in St. Bartholomew's Hospital with a small scrotal cancer, from whom a growth of the same kind was excised thirty years previously.[1] In another case in the same hospital the diseased scrotum had been removed three times during a period of nineteen years.[2] Some years ago I saw a sweep, aged sixty-six, whose finger had just been removed by Mr. Paget on account of well-marked cancer, and who had a cancer-wart on the opposite hand. A scrotal cancer was removed from this man thirty-five

[1] Lib. cit. vol. ii. p. 475.
[2] Medical Times and Gazette, vol. v. p. 415.

years before. The scar was quite sound, and there was no swelling of the inguinal glands. I know, too, of an instance in which, after the performance of a second operation, the patient lived for years, and ultimately died of another disease.

When the inguinal glands are hard and painful, and obviously carcinomatous, it has commonly been considered that no operation is advisable. But that such should be the rule of practice is clearly questionable. I have already shown (page 598) that soot-cancer does not readily extend beyond the inguinal glands, or those nearest to the primary seat of disease. Under these circumstances, it is right to conclude, that the glands in the groin, when affected, may be excised with a fair hope of prolonging life, and with some prospect even of eradicating the disease. The operation has been performed in several instances. Mr. Liston, after excision of the diseased part of the scrotum, carefully dissected out several indurated glands in the groin, which were the seat of lancinating pains.[1] In the case alluded to above, in which a cancer of the scrotum had been excised three times during nineteen years, Mr. Stanley afterwards removed some glands infiltrated with epithelial deposit from both groins. The wounds, though large, healed favourably. Mr. Paget has recorded an interesting example of primary epithelial cancer in the lymphatic glands of a sweep, forty-eight years old. He had no appearance of cancer or wart of any kind on the scrotum or penis. The disease existed on both sides, and in the right groin ulceration had commenced. Mr. Paget removed all the glands that seemed diseased, and the wounds healed soundly. The operator informed me, that two years after the operation his patient was

[1] Lancet, 1840-1, p. 793.

quite well, and apparently free from all cancerous disease.

When the inguinal glands are extensively ulcerated, or the cancerous disease has spread too far to admit of being effectually extirpated, there is nothing to be done but to endeavour to mitigate the patient's sufferings by opiates and anodyne applications, and to correct the irritating fetid discharge. Anodynes may be given internally, and a lotion of Condy's fluid, or of chloride of lime applied to the sore; or it may be covered with a charcoal poultice.

SECTION III.

ENCEPHALOID CANCER OF THE SCROTUM.

Mr. Craven admitted into the Hull Infirmary a man, aged forty-five, who had a great swelling of the scrotum which had existed two months, and was rapidly increasing in size. The tumour was removed, including both testicles. It was found on examination to consist of a large growth of medullary cancer, surrounding both the testicles. These organs were healthy. The patient recovered; but some months after his return home he died of internal disease, probably of a malignant character.[1]

This is a rare example of malignant disease. Medullary tumours are liable to be developed in the connective tissue in various parts of the body, but I know of no other case in which this disease has originated in the scrotum independently of the testicle.

[1] Medical Times and Gazette, Sept. 17, 1859, p. 207.

APPENDIX.

WHILST this work was passing through the press, a specimen of diseased testicle of great interest came under my notice, much too late for me to give an account of it in its proper place.

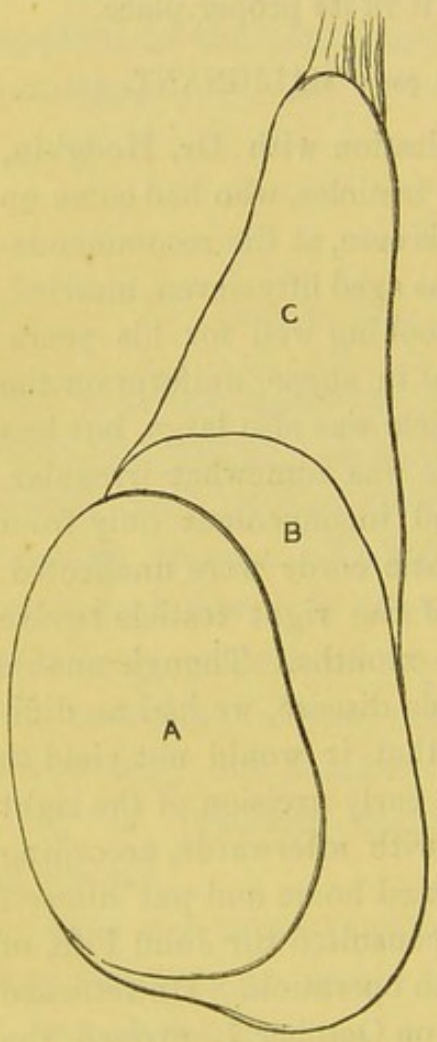
LARGE DOUBLE SARCOCELE *quasi* MALIGNANT.

August 23, 1865, I saw, in consultation with Dr. Hodgkin, a person with an enlargement of both testicles, who had come up from Nottingham for an opinion on his case, at the recommendation of Mr. Joseph Thompson. He was aged fifty-seven, married, had enjoyed good health, and was looking well for his years. The right testicle was very large, oval in shape, uniform on the surface, and very firm. The left testicle was also large, but less in size than the right, and its surface was somewhat irregular. They were not tender or painful, and inconvenient only from their size and weight. The spermatic cords were unaffected. He first noticed the enlargement of the right testicle twelve months before, and of the left, nine months. Though unable to determine the nature of the double disease, we had no difficulty in coming to the conclusion that it would not yield to treatment, and we recommended the early excision of the right testicle, leaving the left to be dealt with afterwards, according to circumstances. The patient returned home and put himself under the care of a quack, and then consulted Sir John Fife, of Newcastle, who also recommended an operation. He returned to the care of Mr. Thompson, who, on October 7, excised the right testicle, together with an enlargement of the cord extending as high up as the outer ring. The patient recovered favourably. He delayed submitting to a second operation till February 19, 1866, when the left testicle had greatly increased in size, and a considerable swelling had formed in the spermatic cord, so that Mr. Thompson had to slit up the inguinal canal

as far as the internal abdominal ring, in order to remove this part completely. He has since informed me that his patient recovered favourably, and was apparently in good health on March 11, 1866.

The mass formed by the disease of the left testicle was sent up to town, and reached me the day after its removal, quite fresh. It weighed more than a pound. Its surface was irregular, with rounded nodulations. The surfaces of the tunica vaginalis were adherent. A section of the tumour showed the body of the testicle (A), and of the epididymis (B), quite distinct, but greatly enlarged by morbid growth. (See Fig. 53.) The tunica albuginea was dilated and thickened. A mass similar in appearance to the disease in the testicle was found invading the spermatic cord to the distance of three inches (C). The upper extremity was rounded as if all the disease had been removed. The three separate masses of morbid growth presented a semi-opaque appearance, variegated in the testicle by some whitish spots. There was no trace of healthy natural structure either in the testicle or in the epididymis. Mr. Thompson has informed me that the morbid change in the right testicle resembled that in the left, though it was not so far advanced, as the former was excised at an earlier period of disease.

Fig. 54.



Outline of a section of the diseased testis, reduced in size one-half.

The tumour[1] was shown at a meeting of the Pathological Society on the day I received it, and was referred for minute examination

[1] One-half of the tumour is preserved in the Museum of the College of Surgeons.

to Mr. Sibley and Mr. Hulke. I have been favoured with the permission of the Council to publish the following report on the specimen, and to use the drawings of the microscopical appearances.

"*Report on Mr. Curling's Specimen of Tumour of the Testicle.*

"When examined with the naked eye the section of the tumour presented a tolerably uniform surface, more or less translucent, with a number of opaque white specks, like portions of twisted thread, distributed uniformly throughout the surface of the section.

"When a thin section was examined beneath the microscope, these thread-like streaks were seen to be seminal tubes, the new or diseased tissue being altogether situated between the tubes, and separated them from each other. The tubes themselves were all in a state of degeneration; the epithelial cells being filled with granules, and in some places the tubes being almost wholly made up of granular matter.

FIG. 55.



Seminal tube filled with granular matter, surrounded by nucleated cells.

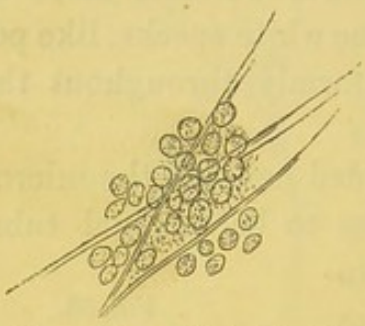
"The tissue between the tubes was made up chiefly of nuclei with a few cells, and a few fusiform fibre cells. These latter structures were nowhere abundant, but the few seen were well formed, and contained a single oat-shaped nucleus within them. The nuclei which composed the great mass of the new structure were oval bodies, larger than blood corpuscles; the largest being nearly double in long diameter, that of a blood corpuscle. The nuclei contained some granular matter, and mostly enclosed within them a single bright nucleolus. Some, however, contained only a few large granules. In places at the

edges of the section some of these nuclei were seen surrounded with a quantity of granular matter, but only in a few instances was this enclosed in a cell wall.

"The structure of the epididymis, and also of the cord, was essentially the same as that of the testis itself.

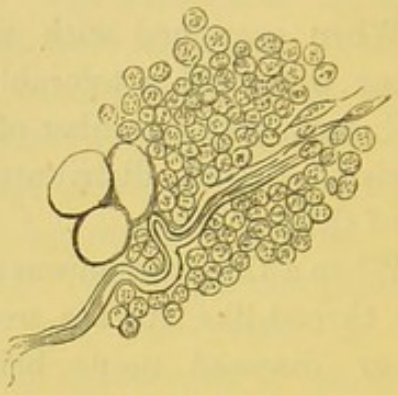
"From this description it will be seen that the disease

Fig. 56.



From the epididymis, showing nuclei with some fibres.

Fig. 57.



From the cord, showing a few ordinary fat cells, nuclei similar to those in the testis, and a small band of fibrous tissue.

differed in structure from a typical—e. g., a scirrhous—cancer in the remarkably uniform infiltration of the diseased tissues among the natural structure, and also in the absence of the varied forms of cell structure seen in such cancers. At the same time such an exuberant formation of cell elements, with but little tendency to the development of fibre, and the general dissimilarity of the tissues to the natural structure of the testicles, cannot be regarded without suspicion of malignancy.

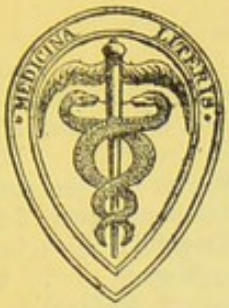
"Septimus W. Sibley.
"J. W. Hulke."

The disease in this case presents remarkable features, different in some respects from anything I have recognised before. I would particularly call attention to its double character. It is extremely rare to find diseases not originally constitutional—such as carcinoma, enchondroma, and cystic—attacking both testicles at the same time. I can find only one instance of encephaloid

cancer attacking both these organs simultaneously, the case of Professor Denonvilliers, referred to at page 331, and I know of no case on record of double cystic disease. Another circumstance of interest is the slow destructive power of the morbid growth. In carcinoma of the testicle the tubular structure sometimes remains intact for a time in consequence of being spread over the surface of the tumour, but when cancerous disease commences in the body of the gland, the tubuli seminiferi are rapidly destroyed, and all distinction between the testicle and the epididymis is soon lost. But in this specimen, though the disease occurred at an early period, both in the testicle and in the epididymis, the distinction between the two parts was well preserved after fifteen months, and the tubules, though degenerated, were largely present, and might be recognised even with the naked eye. The great abundance of cell structure, and the out-growth in the spermatic cord, indicate a probable recurrence of the disease in the internal parts, and lead me to conclude with Messrs. Sibley and Hulke, that the tumour is likely to prove to be malignant.

THE END.

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