

A practical treatise on the diseases of the testis and of the spermatic cord and scrotum / by T.B. Curling ; edited by P.B. Goddard.

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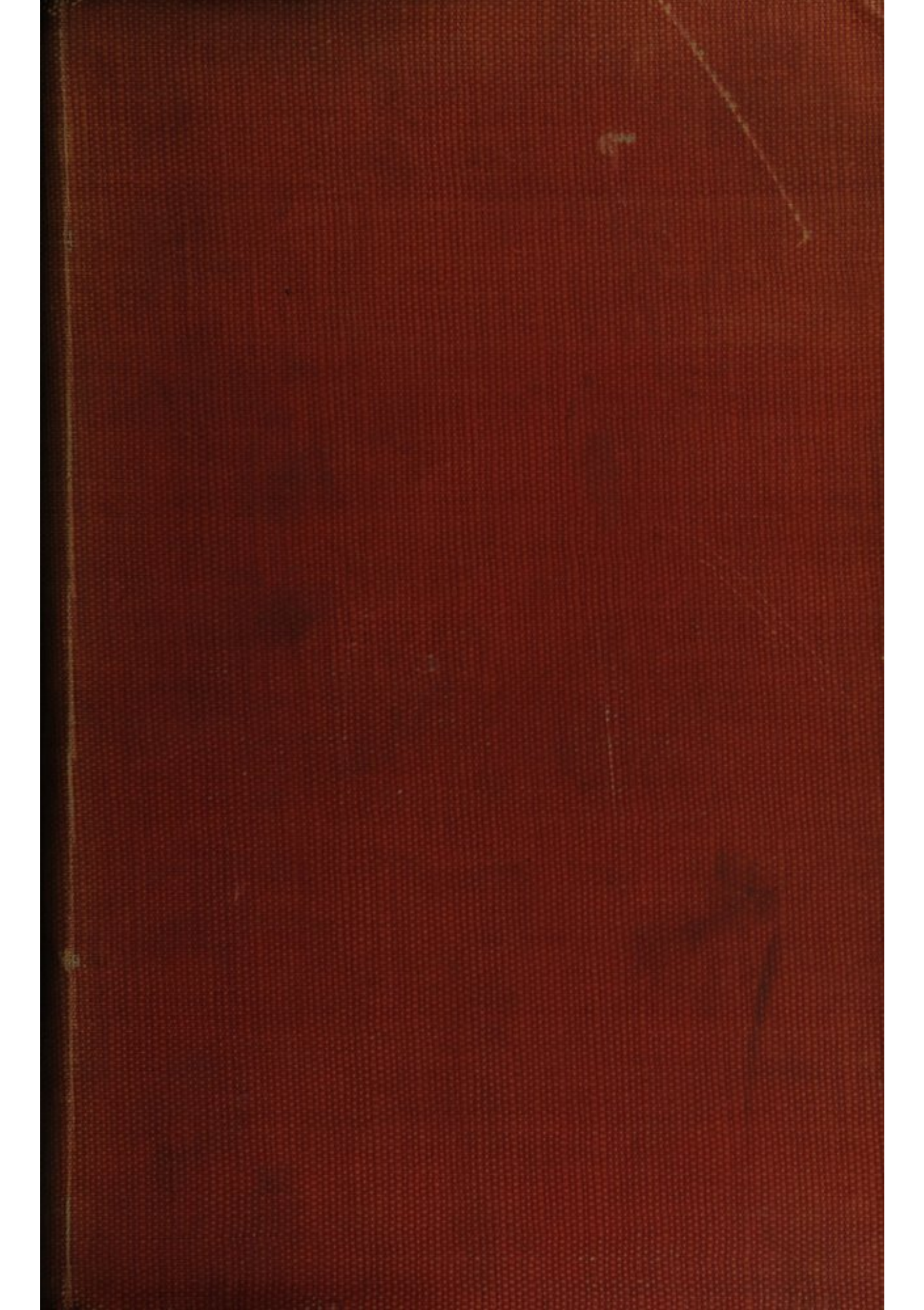
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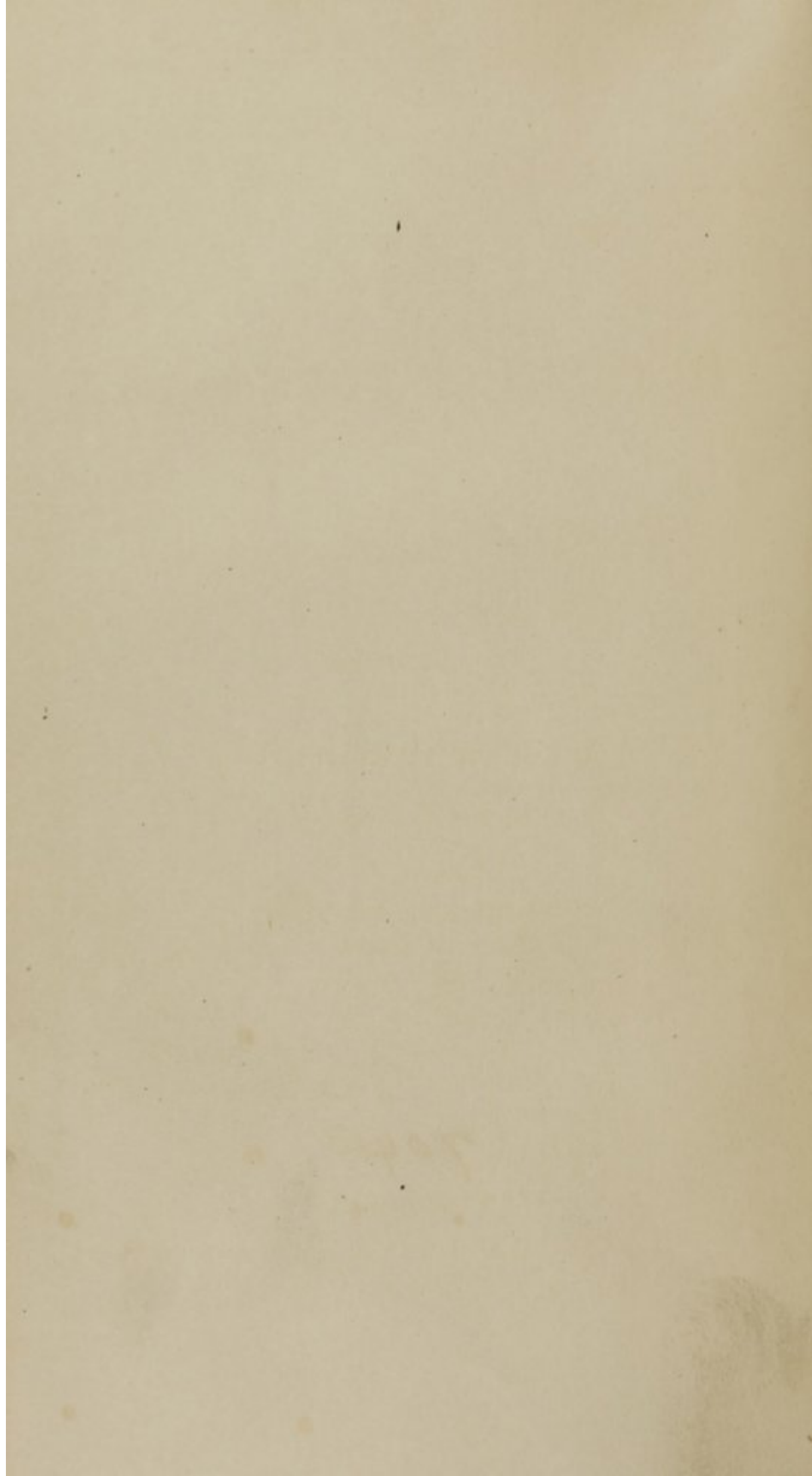
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A PRACTICAL TREATISE

Battheldar
ON THE

DISEASES OF THE TESTIS,

AND OF THE

SPERMATIC CORD AND SCROTUM.

With Illustrations.



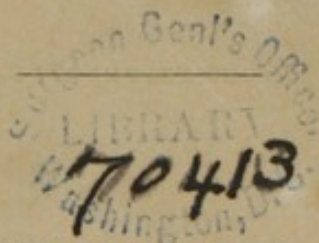
BY T. B. CURLING,

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Author's Dedication.

TO

SIR BENJAMIN C. BRODIE, BART. F.R.S.

SERJEANT SURGEON TO THE QUEEN,

ETC. ETC. ETC.

DEAR SIR,

The distinguished position that you have attained in our profession induces me to dedicate to you the following work, on a class of diseases the pathology and treatment of which you have successfully laboured to improve; and in availing myself of the permission you have kindly granted me, I gladly embrace the opportunity of expressing my unfeigned respect for your high professional character, and the grateful sense I entertain of the many obligations you have conferred upon me.

I am, dear Sir,

Yours faithfully,

T. B. CURLING.

37 New Broad Street, City,
May 15, 1843.

AUTHOR'S PREFACE.

My attention having been directed in the year 1835 to the subject of the Morbid Anatomy of the Testis, I have since lost no opportunity of studying the pathological changes to which this organ is liable. My inquiries have been much facilitated by a connexion formed very early in professional life with a large hospital and with a dispensary, which have supplied me with abundant means of acquiring a practical knowledge of the diseases of this important organ. The result of these investigations having furnished facts which appear of some interest and value in relation to certain affections of the testis but imperfectly understood, and to the treatment generally of the disorders of this part, I have ventured to submit them to the consideration of my professional brethren. In arranging the materials for publication I have endeavoured to give a tolerably complete view of the different diseases of the testis and of the spermatic cord and scrotum, which I have described principally from my own observations. I have at the same time availed myself of the labours of my predecessors ; by which, it is hoped, I have not only added a good deal to the value of the work, but have also been able to correct and modify my own views concerning many of the subjects treated of.

I was unwilling to overload a work which has somewhat

exceeded the limits desired, with elementary matter to be found in most anatomical treatises ; but as my researches on the structure of the testis have led me to describe certain parts rather differently from other anatomists, and have enabled me to throw some light on the interesting subject of the descent of the testis, I have prefixed a concise, but it is hoped sufficiently minute account, of the anatomy of the parts in the adult and fœtal states, which, comprising, as it does, the most recent information on this subject, will probably be acceptable to my younger readers.

In conclusion, I have to acknowledge the kind assistance which I have received in the progress of this work from several friends. To Mr. Bransby Cooper I am indebted for liberally permitting me to have engravings made from some of the preparations in the valuable collection formed by the late Sir Astley Cooper; to my colleagues Mr. Luke, Mr. Hamilton, and Mr. Adams, for the particulars of several interesting cases which have occurred at the London Hospital ; and to Mr. John Quekett and Dr. Letheby for aid in my microscopical inquiries. In justice to a talented artist, it is right to state that the wood-cuts by which the work is illustrated were, with a few exceptions, executed by Mr. Bagg.

PREFACE OF THE AMERICAN EDITOR.

A good monograph on the diseases of the testicle has been for a long time a desideratum. Sir Astley Cooper's work on the testis in a great measure filled up the vacancy, but it still left something to be desired, and at the same time, from its size and consequent high price, was placed beyond the reach of the great body of the profession. The present work is entirely free from both these objections; and having been carefully revised, and several additions made, it is hoped that its republication in this country will meet the hearty approbation of the profession.

The wood-cuts in this edition were executed by Mr. R. S. Gilbert,—and we owe our thanks both to him and the printer, Mr. C. Sherman, for the highly creditable manner in which their work has been executed.

C O N T E N T S.

PART I.

ANATOMY OF THE SCROTUM AND TESTIS.

THE SCROTUM - - - - -	28
Superficial or external spermatic fascia - - -	28
Cremaster muscle - - - - -	28
Cases of voluntary power over its actions - - -	31
THE TESTIS - - - - -	32
1. The protective parts or tunics - - - - -	33
Tunica vaginalis - - - - -	33
Tunica albuginea - - - - -	36
2. The glandular or secreting structure - - -	38
Tubuli seminiferi - - - - -	39
Rete testis - - - - -	43
3. The excretory parts - - - - -	44
Epididymis - - - - -	44
Vasculum aberrans - - - - -	47
Vas deferens - - - - -	49
4. The vessels and nerves - - - - -	50
Spermatic vessels - - - - -	50
Absorbents - - - - -	53
Nerves - - - - -	53
The testis in the fœtus, and its descent into the scrotum	54
Gubernaculum - - - - -	54
Causes of the descent of the testis - - -	60
Spermatic fluid - - - - -	61
The functions of the testis - - - - -	64
Effects of castration on the economy - - -	69

PART II.

DISEASES OF THE TESTIS.

CHAPTER I.

CONGENITAL IMPERFECTIONS AND MALFORMATIONS	-	-	74
Sect. I. Numerical excesses and defects	-	-	74
Supernumerary testis	-	-	74
Supposed cases of	-	-	75
Bodies mistaken for additional testes	-	-	76
Absence of one or both testes	-	-	77
Cases of	-	-	77
Union of the testes	-	-	82
Sect. II. Deficiencies and imperfections of the vas deferens	-	-	83
The origin of these defects explained	-	-	86
Their influence on the evolution and subsequent condition of the testis	-	-	88
Experiments on the vasa deferentia of animals	-	-	89
Sect. III. Imperfect descent of the testis	-	-	92
Causes of	-	-	94
The condition of the undescended testis	-	-	98
Liability of the gland to injury and disease when retained in the groin	-	-	104
Tendency to produce rupture	-	-	106
Diagnosis in cases of imperfect descent of the testis			113
Bubonocoele	-	-	113
Descent of the testis into the perineum	-	-	117

CHAPTER II.

ATROPHY OF THE TESTIS	-	-	118
Sect. I. Arrest of the developement of the testis	-	-	119
Cases of	-	-	120
Connected with defective organization of the brain	-	-	122
Sect. II. Wasting of the testis	-	-	123
Weight of the testis in health and disease	-	-	124
Changes in the form and structure of atrophied testes	-	-	125
Deposition of fat in the testis	-	-	125
Causes of wasting of the testis	-	-	126
Impeded circulation	-	-	127
Pressure	-	-	127
Want of exercise	-	-	128
Loss of nervous influence	-	-	130

CONTENTS.

xi

Inflammation	-	-	-	-	-	-	131
Use of iodine	-	-	-	-	-	-	132
Elephantiasis	-	-	-	-	-	-	132
Injuries of the head	-	-	-	-	-	-	133
Cases of wasting of the testis from	-	-	-	-	-	-	133

CHAPTER III.

INJURIES OF THE TESTIS	-	-	-	-	-	-	137
Sect. I. Contusions and incised and punctured wounds	-	-	-	-	-	-	137
Contusions	-	-	-	-	-	-	137
Squeezing the testis a mode of emasculating	-	-	-	-	-	-	139
Punctured and incised wounds	-	-	-	-	-	-	139
Sect. II. Self-castration	-	-	-	-	-	-	140
Cases of	-	-	-	-	-	-	141

CHAPTER IV.

HYDROCELE	-	-	-	-	-	-	145
Acute hydrocele, or inflammation of the tunica vaginalis	-	-	-	-	-	-	145
Pathological changes from	-	-	-	-	-	-	145
Table of the different varieties and complications of hydrocele	-	-	-	-	-	-	150
Sect. I. Simple hydrocele of the testis	-	-	-	-	-	-	151
Characters of the fluid accumulated in the tunica vaginalis	-	-	-	-	-	-	151
Situation of the testis	-	-	-	-	-	-	153
Multilocular hydrocele	-	-	-	-	-	-	154
Pouch formed by dilatation of the cul-de-sac between the testis and epididymis	-	-	-	-	-	-	154
Changes in the sac	-	-	-	-	-	-	155
Period of life at which hydrocele occurs	-	-	-	-	-	-	156
Side more frequently affected	-	-	-	-	-	-	158
Causes of hydrocele	-	-	-	-	-	-	159
Symptoms	-	-	-	-	-	-	161
Modifications in	-	-	-	-	-	-	162
Hydrocele sometimes varies in size, is smaller at night and increases during the day	-	-	-	-	-	-	165
Diagnosis	-	-	-	-	-	-	165
Scrotal hernia	-	-	-	-	-	-	166
Malignant disease	-	-	-	-	-	-	167
Treatment	-	-	-	-	-	-	168
Spontaneous disappearance of hydrocele	-	-	-	-	-	-	169

Treatment of hydrocele in infants	-	-	-	170
Cure of hydrocele in the adult by external remedies				171
Cure after rupture of the sac	-	-	-	173
Palliative treatment by operation	-	-	-	174
Operation of tapping	-	-	-	174
Acupuncture	-	-	-	178
Radical treatment of hydrocele by operation	-	-		182
Incision	-	-	-	182
Excision	-	-	-	184
Caustic	-	-	-	186
Tent	-	-	-	188
Seton	-	-	-	188
Injection	-	-	-	191
Mode of operating	-	-	-	192
Fluids injected	-	-	-	193
After-treatment	-	-	-	195
Hydroceles not to be injected when recent or of large size	-	-	-	197
Risks of the operation	-	-	-	199
Failures	-	-	-	201
Treatment of double hydrocele	-	-	-	201
Iodine injections	-	-	-	202
Concluding remarks on the treatment of hydrocele	-			205
Sect. II. Congenital hydrocele	-	-	-	207
Mode of formation	-	-	-	207
Symptoms	-	-	-	208
Diagnosis	-	-	-	209
Treatment	-	-	-	209
Sect. III. Encysted hydrocele of the testis	-	-	-	211
Developed in three situations	-	-	-	211
Encysted hydrocele of the epididymis	-	-	-	212
Of the tunica albuginea	-	-	-	214
Of the tunica vaginalis	-	-	-	216
Symptoms	-	-	-	217
Diagnosis	-	-	-	218
Treatment	-	-	-	218
Severe effects of puncturing the cysts when numerous	-			221
Sect. IV. Diffused hydrocele of the spermatic cord	-			223
Structural changes	-	-	-	223
Symptoms	-	-	-	225
Diagnosis	-	-	-	227
Omental hernia	-	-	-	227

Encysted hydrocele of the cord - - - - -	228
Treatment - - - - -	229
Sect. V. Encysted hydrocele of the spermatic cord - - -	230
Mode of formation - - - - -	230
Symptoms - - - - -	234
Diagnosis - - - - -	234
Simple hydrocele - - - - -	234
Hernia - - - - -	234
Treatment - - - - -	236
Incision - - - - -	237
Seton - - - - -	238
Operations apt to produce diffuse inflammation of the cord - - - - -	239
Sect. VI. Complications of hydrocele - - - - -	239
Simple hydrocele combined with encysted hydrocele of the testis - - - - -	240
Simple hydrocele combined with encysted hydrocele of the spermatic cord - - - - -	241
Simple hydrocele combined with diffused hydrocele of the spermatic cord - - - - -	242
Oscheo-hydrocele - - - - -	243
Simple hydrocele combined with inguinal hernia - - -	243
Encysted hydrocele of the cord combined with inguinal hernia - - - - -	246
Sect. VII. Hydrocele of the hernial sac - - - - -	249
Mode of formation - - - - -	249
Diagnosis - - - - -	252
Treatment - - - - -	253
Spurious hydrocele of the hernial sac - - - - -	256
Sect. VIII. Hydrocele in the female - - - - -	260
Diffused hydrocele of the round ligament - - - - -	261
Hydrocele of the canal of Nuck - - - - -	261
Encysted hydrocele of the round ligament - - - - -	261

CHAPTER V.

HÆMATOCELE - - - - -	262
Sect. I. Hæmatocele of the testis - - - - -	262
Extravasation of blood into the healthy tunica vaginalis	262
Extravasation in combination with hydrocele - - -	263
Changes which the blood undergoes - - - - -	264
Changes in the sac - - - - -	265
Position of the testis - - - - -	266

Effects of the extravasation on the testis	-	-	267
Symptoms	-	-	269
Diagnosis	-	-	270
Treatment	-	-	271
If the extravasation be small, an operation to be avoided			271
Operation of incision	-	-	272
Effects often severe	-	-	273
Sect. II. Hæmatocele of the spermatic cord	-	-	275
Diffused	-	-	275
Encysted	-	-	275
Symptoms	-	-	277
Cases recorded by Pott	-	-	277

CHAPTER VI.

ORCHITIS	-	-	280
Sect. I. Acute orchitis	-	-	280
Anatomical characters	-	-	280
Liability of the epididymis to disease in consecutive orchitis	-	-	282
Suppuration in the testis	-	-	282
Permanent effects of orchitis	-	-	285
Causes of orchitis	-	-	287
Its occurrence in cases of mumps	-	-	288
In gonorrhœa	-	-	289
The doctrine of metastasis in gonorrhœal orchitis	-		290
Effects of cubebs, copaiba, and injections, in giving rise to it	-	-	294
Side more commonly affected	-	-	296
Symptoms	-	-	297
Rheumatic orchitis	-	-	298
Acute orchitis in infants	-	-	299
Cases of	-	-	299
Diagnosis	-	-	303
Strangulated scrotal hernia	-	-	303
Treatment	-	-	304
Local applications	-	-	305
Tartar emetic	-	-	306
Mercury	-	-	307
Blood-letting	-	-	307
Compression by strapping	-	-	309
Old practice of inoculating the urethra in gonorrhœal orchitis	-	-	313

CONTENTS.

XV

Mr. Ramsden's views of the connexion between the urethra and testis	-	-	-	-	-	313
Sect. II. Chronic orchitis	-	-	-	-	-	316
Anatomical characters	-	-	-	-	-	316
Seat of the yellow deposit	-	-	-	-	-	317
Case in illustration	-	-	-	-	-	318
Granular swelling, or hernia testis	-	-	-	-	-	323
Mode of formation	-	-	-	-	-	323
Effects of chronic orchitis on the testis	-	-	-	-	-	324
Causes	-	-	-	-	-	326
Symptoms	-	-	-	-	-	328
Suppuration	-	-	-	-	-	331
Spermatic fistula	-	-	-	-	-	331
Obstinate character of cases of pus in the testis	-	-	-	-	-	332
Chronic orchitis in infants	-	-	-	-	-	334
Diagnosis	-	-	-	-	-	335
Encephaloid cancer	-	-	-	-	-	335
Hæmatocele	-	-	-	-	-	336
Treatment	-	-	-	-	-	336
Mercury	-	-	-	-	-	336
Compression	-	-	-	-	-	337
Constitutional remedies	-	-	-	-	-	338
Case in illustration of the treatment	-	-	-	-	-	340
Treatment of hernia testis	-	-	-	-	-	343
Excision of the fungus objected to	-	-	-	-	-	344
Sect. III. Syphilitic orchitis	-	-	-	-	-	347
Treatment	-	-	-	-	-	348

CHAPTER VII.

TUBERCULAR DISEASE OF THE TESTIS	-	-	-	-	349
Anatomical characters	-	-	-	-	350
Original seat of the deposit	-	-	-	-	352
Spontaneous cure	-	-	-	-	353
Cretaceous deposit an indication of cure				-	353
Symptoms	-	-	-	-	355
Softening and suppuration of the tubercular matter				-	355
Suppuration of the strumous testis in children				-	356
Cases in illustration	-	-	-	-	356
Diagnosis	-	-	-	-	358
Chronic orchitis	-	-	-	-	358
Malignant disease	-	-	-	-	359
Treatment	-	-	-	-	359

Constitutional	-	-	-	-	-	359
Local	-	-	-	-	-	360

CHAPTER VIII.

CARCINOMA OF THE TESTIS	-	-	-	-	-	361
Sect. I. Schirrus of the testis	-	-	-	-	-	362
Anatomical characters	-	-	-	-	-	362
Symptoms	-	-	-	-	-	362
Diagnosis	-	-	-	-	-	363
Treatment	-	-	-	-	-	363
Sect. II. Encephaloid cancer of the testis	-	-	-	-	-	364
Anatomical characters	-	-	-	-	-	364
Effects of the disease on the spermatic cord, lumbar glands, and distant parts	-	-	-	-	-	367
Period of life at which it occurs	-	-	-	-	-	368
Symptoms	-	-	-	-	-	369
Diagnosis	-	-	-	-	-	373
Hydrocele	-	-	-	-	-	373
Hæmatocele	-	-	-	-	-	373
Encephaloid cancer	-	-	-	-	-	374
Cystic sarcoma	-	-	-	-	-	374
Chronic orchitis	-	-	-	-	-	375
Case illustrative of the difficulties of the diagnosis	-	-	-	-	-	375
Treatment	-	-	-	-	-	378
Sect. III. Carcinoma of the tunica vaginalis	-	-	-	-	-	382
Cases	-	-	-	-	-	382
Sect. IV. Colloid cancer and melanosis of the testis	-	-	-	-	-	385

CHAPTER IX.

CYSTIC DISEASE OF THE TESTIS	-	-	-	-	-	386
Anatomical characters	-	-	-	-	-	386
Symptoms	-	-	-	-	-	390
Diagnosis	-	-	-	-	-	390
Hydrocele	-	-	-	-	-	390
Encephaloid cancer	-	-	-	-	-	390
Treatment	-	-	-	-	-	391

CHAPTER X.

FIBROUS TRANSFORMATION OF THE TESTIS	-	-	-	-	-	392
--------------------------------------	---	---	---	---	---	-----

CHAPTER XI.

OSSIFIC DEPOSITS IN THE TESTIS	-	-	-	-	-	394
--------------------------------	---	---	---	---	---	-----

CHAPTER XII.

LOOSE BODIES IN THE TUNICA VAGINALIS	-	-	-	396
Their mode of origin	-	-	-	397

CHAPTER XIII.

SPERMATOCELE	-	-	-	398
--------------	---	---	---	-----

CHAPTER XIV.

FÆTAL REMAINS IN THE TESTIS	-	-	-	399
-----------------------------	---	---	---	-----

CHAPTER XV.

ENTOZOA IN THE TESTIS	-	-	-	400
-----------------------	---	---	---	-----

CHAPTER XVI.

NERVOUS AFFECTIONS OF THE TESTIS	-	-	-	401
Sect. I. Irritable testis	-	-	-	401
Symptoms	-	-	-	401
Causes	-	-	-	403
Treatment	-	-	-	403
Case	-	-	-	404
Castration objected to	-	-	-	406
Case in illustration	-	-	-	406
Sect. II. Neuralgia of the testis	-	-	-	406
Symptoms	-	-	-	406
Causes	-	-	-	408
Treatment	-	-	-	409
Castration	-	-	-	411
Failures of	-	-	-	412
Sir A. Cooper's successful cases of castration examined				413
The operation proper only in certain cases	-	-		416

CHAPTER XVII.

SYMPATHETIC AND FUNCTIONAL DISORDERS OF THE TESTIS	-	417
Impotency from injuries of the head	-	418
Cases of	-	418
Constitutional indifference to the sex	-	421
Relative impotency	-	422
Impotency from want of self-confidence	-	423

Case in illustration, and treatment suggested by Hunter	423
Effects of diseases of the testis on the functions of the gland - - - - -	425
Question of the power of procreation for a certain period after castration - - - - -	426
Cases in illustration - - - - -	426
Effects of apoplexy and paraplegia on the functions of the testis - - - - -	429
Curious case in illustration - - - - -	429
Effects of chronic diseases on the functions of the testis	431
Phthisis - - - - -	431
Indigestion - - - - -	432
Diseases of the kidneys - - - - -	433
Abuse of the sexual organs a frequent cause of impotency	433
Also of affections of the digestive organs and kidneys -	435
Involuntary seminal emissions - - - - -	435
Symptoms of this complaint - - - - -	435
Causes - - - - -	436
State of the spermatic secretion - - - - -	437
Morbid changes in the urethra, prostate, and vesiculæ	438
Their effects on the mind of the patient and on the secretions of the testes - - - - -	440
Difficulty of detecting the disease - - - - -	442
Treatment - - - - -	442
Application of the nitrate of silver to the urethra -	442
Lallemand's caustic instrument described - - -	444
Constitutional treatment - - - - -	446
Propriety of marriage in these cases - - - - -	447
Castration objected to - - - - -	448
Solitary abuse in infancy - - - - -	449
Aphrodisiacs - - - - -	449
Cantharides - - - - -	450
Phosphorus - - - - -	450
Ergot of rye - - - - -	451
Indian hemp - - - - -	451

CHAPTER XVIII.

CASTRATION - - - - -	452
Diseases of the testis requiring the operation -	453
Mode of operating - - - - -	453
Retraction of the spermatic cord - - - - -	457
Secondary hæmorrhage - - - - -	459

Castration in cases of disease of the testis complicated with hernia - - - - -	460
Extirpation of a diseased testis retained in the groin	461
Cases of - - - - -	462
Slight fatality of castration - - - - -	463
Maunoir's operation of tying the spermatic artery for the cure of sarcocele - - - - -	463

PART III.

DISEASES OF THE SPERMATIC CORD.

CHAPTER I.

VARICOCELE - - - - -	465
Anatomical condition of the spermatic veins -	465
Side more frequently affected - - - - -	466
Relation between varicocele and varices in other parts	467
Causes of varicocele - - - - -	467
Anatomical - - - - -	467
Occasional - - - - -	469
Effects of this disease on the testis - - - - -	470
Age at which it occurs - - - - -	471
Symptoms - - - - -	471
Aggravated after sexual connexion - - - - -	473
Pain sometimes severe, and of a neuralgic character	474
Cases of varicose veins combined with neuralgia in other parts - - - - -	474
Acute varicocele - - - - -	475
Remarkable cases of, recorded by Pott - - - - -	476
Diagnosis - - - - -	479
Hernia - - - - -	479
Palliative treatment of varicocele - - - - -	480
Mr. Wormald's plan of supporting the testis -	481
Radical treatment of varicocele - - - - -	482
Excision of the scrotum - - - - -	482
Lehmann's operation for shortening the scrotum -	486
Operations on the veins - - - - -	487
Division of the vessels - - - - -	487
Ligature - - - - -	489
Dangers of - - - - -	489
Davat's plan - - - - -	489

Ricord's	-	-	-	-	-	-	490
Mr. Luke's	-	-	-	-	-	-	492
Case	-	-	-	-	-	-	492
Compression of the veins	-	-	-	-	-	-	494
Application of Breschet's forceps	-	-	-	-	-	-	494
Local compression to take off the hydrostatic pressure of the blood	-	-	-	-	-	-	495
Principle of this mode of treatment	-	-	-	-	-	-	495
Case cured by the application of Evans's patent lever truss	-	-	-	-	-	-	497
Excision of the veins	-	-	-	-	-	-	499
Concluding remarks on the treatment of varicocele							500

CHAPTER II.

ADIPOSE TUMOURS OF THE CORD	-	-	-	-	-	503
Liable to be mistaken for hernia	-	-	-	-	-	504
Case in illustration	-	-	-	-	-	505
Ossific tumours in the cord	-	-	-	-	-	506

CHAPTER III.

SPASM OF THE CREMASTER MUSCLE	-	-	-	-	-	506
Causes	-	-	-	-	-	506
Case of spasm arising from injury	-	-	-	-	-	507

PART IV.

DISEASES OF THE SCROTUM.

CHAPTER I.

INJURIES OF THE SCROTUM	-	-	-	-	-	509
Contusions	-	-	-	-	-	509
Lacerations	-	-	-	-	-	510
Case of injury by caustic potass	-	-	-	-	-	511

CHAPTER II.

PRURIGO SCROTI	-	-	-	-	-	511
Treatment	-	-	-	-	-	512

CHAPTER III.

VARICOSE VEINS OF THE SCROTUM	-	-	-	-	-	514
-------------------------------	---	---	---	---	---	-----

CHAPTER IV.

PNEUMATOCELE	-	-	-	-	-	-	515
--------------	---	---	---	---	---	---	-----

CHAPTER V.

ŒDEMA SCROTI	-	-	-	-	-	-	515
Symptoms	-	-	-	-	-	-	516
Causes	-	-	-	-	-	-	517
Diagnosis	-	-	-	-	-	-	517
Case of œdema confined to one side of the scrotum	-						518
Treatment	-	-	-	-	-	-	519

CHAPTER VI.

DIFFUSE INFLAMMATION OF THE SCROTUM	-	-	-	-	-	-	520
Mild form of	-	-	-	-	-	-	520
Cases	-	-	-	-	-	-	521
Severe form	-	-	-	-	-	-	522
Case	-	-	-	-	-	-	522
Diagnosis	-	-	-	-	-	-	523
Treatment	-	-	-	-	-	-	524

CHAPTER VII.

MORTIFICATION OF THE SCROTUM	-	-	-	-	-	-	525
From the effects of cold	-	-	-	-	-	-	526
Case	-	-	-	-	-	-	526
Treatment	-	-	-	-	-	-	526

CHAPTER VIII.

ELEPHANTIASIS SCROTI	-	-	-	-	-	-	528
Anatomical characters	-	-	-	-	-	-	528
Countries in which it occurs	-	-	-	-	-	-	530
Nature of the disease	-	-	-	-	-	-	531
Causes	-	-	-	-	-	-	531
Symptoms	-	-	-	-	-	-	532
Liabie to be complicated with hernia, and with hydrocele	-	-	-	-	-	-	535
Immense size of many of these tumours	-	-	-	-	-	-	535
Effects of the disease on the general health	-	-	-	-	-	-	536
Diagnosis	-	-	-	-	-	-	538
Treatment	-	-	-	-	-	-	538
Excision of the tumours	-	-	-	-	-	-	539

Remarkable cases of	-	-	-	-	540
Dangers of hæmorrhage in the operation	-	-	-	-	540
Fatal cases from loss of blood	-	-	-	-	540
Propriety of saving the genital organs	-	-	-	-	540
Delpech's case, in which they were preserved	-	-	-	-	541

CHAPTER IX.

HYPERTROPHY OF THE SCROTUM	-	-	-	-	545
----------------------------	---	---	---	---	-----

CHAPTER X.

CANCER SCROTI	-	-	-	-	-	546
Its mode of origin	-	-	-	-	-	546
Soot-wart	-	-	-	-	-	546
Progress of the disease	-	-	-	-	-	546
Ulcerative stage	-	-	-	-	-	547
Nature of the soot-wart	-	-	-	-	-	548
Remarkable case of cauliflower excrescence	-	-	-	-	-	548
Conical excrescences and elongated processes	-	-	-	-	-	549
Anatomical characters of the morbid tissue	-	-	-	-	-	549
Soot the exciting cause of the disease	-	-	-	-	-	551
Sir J. Earle's case of the gardener with the same disease on the hand	-	-	-	-	-	551
Scrotum far more liable to chimney-sweeper's cancer than the skin of other parts	-	-	-	-	-	552
May be produced by other irritating substances besides soot	-	-	-	-	-	554
Hereditary predisposition to the disease	-	-	-	-	-	554
Cases of	-	-	-	-	-	554
Age at which cancer scroti occurs	-	-	-	-	-	554
Seeds of the disease sown in early life germinate at a remote period	-	-	-	-	-	555
Illustrated by the case of a sailor affected with cancer scroti	-	-	-	-	-	555
Slight tendency of the disease to affect the lymphatic glands	-	-	-	-	-	556
Chimney-sweeper's cancer almost peculiar to Great Britain	-	-	-	-	-	557
Now a rare disease even in this country	-	-	-	-	-	558
Diagnosis	-	-	-	-	-	558
Treatment	-	-	-	-	-	559
Excision of the morbid scrotum	-	-	-	-	-	559

May be performed when the glands in the groin are enlarged - - - - -	560
Reappearance of the disease after operation - - - - -	560
To be treated on different principles from cancer in other parts, and a repetition of the operation advised - - -	561
Case in illustration - - - - -	562
Treatment when the inguinal glands are ulcerated - - -	562

CHAPTER XI.

MELANOSIS OF THE SCROTUM - - - - -	563
Case - - - - -	563

CHAPTER XII.

ADIPOSE TUMOURS OF THE SCROTUM - - - - -	564
--	-----

CHAPTER XIII.

FIBROUS TUMOURS OF THE SCROTUM - - - - -	565
Remarkable stony tumour excised by Dr. Mott - - -	565

APPENDIX.

Recent discovery by Mr. Liston of spermatozoa in the fluid of an encysted hydrocele of the testis - - - - -	567
The author's observations, and explanation of the occurrence of these bodies in this case - - - - -	568

A PRACTICAL TREATISE
ON THE
DISEASES OF THE TESTIS,
ETC.

PART I.

ANATOMY OF THE SCROTUM AND TESTIS.

THE SCROTUM.

THE scrotum is a pouch, formed of the common integuments, for the reception of the testicles. It is evenly divided externally into two halves by a prominent ridge, a continuation of the raphé, from the under part of the penis to the perineum. The skin of the scrotum is thin, like that of the penis and eyelids, and browner than in most other parts; in some individuals a colouring matter, similar to that which occurs in the skin of the negro, may be perceived beneath the cuticle. It is abundantly supplied with sebaceous follicles; and short hairs, obliquely inserted, are thinly scattered over its surface. It is very loose and extensible, a fact which is often witnessed in connexion with scrotal hernia, and various chronic enlargements of the testis. When corrugated it is thrown into numerous folds or rugæ, running at right angles with the raphé,

which give it a wrinkled appearance and greatly diminish its size.

Immediately beneath the skin, there is a thin layer of contractile tissue of a reddish-gray colour, termed the *dartos*, which is so intimately connected with the inner surface of the common integument, that their separation is difficult, and the one follows the movements of the other. The *dartos* has recently been carefully examined by Mr. Bowman, who considers it to be muscular, and composed of "unstriped elementary fibres," the presence of which, in consequence of the abundant admixture of areolar tissue, has not hitherto been clearly recognised.*

The movements of the scrotum, by the action of the *dartos*, are conspicuous enough; they are gradual, vermicular, and involuntary. Mr. Bowman states, that since satisfying himself of the existence of the unstriped fibre in the *dartos*, he has on many occasions detected a very decisive peristaltic action, advancing from one side of the scrotum to the other, and continued for a considerable period. This I have also myself observed. Contraction is excited by cold, and takes place under the influence of fright and during the venereal orgasm: relaxation is caused by heat: galvanism produces no effect.

Directly beneath the *dartos*, between it and the cremaster muscle, a large quantity of cellular tissue is found, remarkable for its looseness and not con-

* Cyclopædia of Anatomy and Physiology, art. MUSCLE, p. 518.

taining adipose matter, characters highly favourable to the free motions of the testicles, which can be drawn up towards the inguinal ring in such a way as to leave the scrotum empty. In the median line opposite the raphé, the cellular tissue is close and condensed, and forms the *septum scroti*. The septum, however, is permeable, as is shown by inflation and in œdema, in which air and fluid are found to pass from one side to the other.

The arteries of the scrotum arise on each side from three sources: the external pudic, the internal pudic, and the epigastric. The superior branch of the external pudic sends vessels to the front and upper part of the scrotum, and the inferior branch supplies its lateral portion. The perineal artery passes upon the septum scroti, and sends off numerous branches, which are tortuous, and form a complete network in the dartos. The scrotum also receives a few vessels from the branches of the epigastric sent to the cremaster muscle. All these vessels freely communicate with each other, and with the corresponding vessels on the opposite side. The veins of the scrotum are numerous, tortuous, and comparatively of considerable size, and take the course of their corresponding arteries. The absorbent vessels are large and numerous, and join the inguinal glands. The nerves of the scrotum are derived from three sources: 1, from the ileo-scrotal nerve which arises from the first lumbar nerve; 2, from the external pudic or spermatic, a branch of the second lumbar nerve; and, 3, from the perineal nerve.

In persons in health and vigour, the scrotum is corrugated and contracted, and contributes to support and brace the testicles; but in those of feeble frame, in a state of debility and ill-health, and in old age, it is pendulous and lax, and suffers the testicles to droop. The testicles being well braced by the scrotum is a sign, therefore, of good health and bodily strength, as well as of sexual vigour, a circumstance which did not escape the notice of the ancient sculptors.

The scrotum, including the dartos, is distinctly developed in the fœtus previous to the descent of the testis. It is a part, however, dependent on the testicles; and in cases where these organs have not descended the pouch is wanting, there being only a broad raphé running from the perineum to the penis, with distinct rugæ passing at right angles to it on either side. When one testicle only has descended, the scrotum is slightly developed on the opposite or empty side.

Superficial or External Spermatic Fascia.—Beneath the loose cellular tissue of the scrotum is situated a delicate layer of fascia, which is continuous with the superficial fascia of the lower part of the abdominal parietes, and, descending so as to form a sheath to the spermatic cord and an envelope to the testis, runs on to be continued behind into the superficial fascia of the perineum. This fascia is usually very thick and distinct in cases of large and old scrotal hernia.

Cremaster Muscle.—Directly beneath the superficial fascia is found the cremaster muscle, or, as it

has been appropriately termed by Mr. Hunter, the *musculus testis*. This muscle is usually considered and described as a part or process of the *obliquus internus abdominis*. It has, however, separate



attachments; and its office and connexions are so entirely distinct, that it ought to be regarded as an independent muscle. The cremaster has two fixed points of attachment; one external and one internal. The external, which is generally, but not always, the larger, consists of a number of fasciculi of muscular fibres, which take their origin from Poupart's

ligament within the inguinal canal. The fasciculi which arise at the upper part of the canal are blended with the fibres of the internal oblique, and often also with those of the transversalis; but the fibres properly belonging to the cremaster are usually separated from these muscles by intervening cellular tissue. The internal attachment of this muscle is to the os pubis and sheath of the rectus muscle by fasciculi partly tendinous and partly muscular. From these two attachments flat and slender bands of thin and very pale muscular fibres descend at the sides, in front, and often at the back of the cord, and form a successive series of curves or loops of various sizes and lengths, which increase as they descend. The lower loops spread out, and are intimately connected with a thin aponeurotic or fibro-tendinous structure, which invests the tunica vaginalis, and is attached to the posterior edge of the testis and lower part of the vas deferens. This muscle is abundantly supplied with nerves, branches of the external spermatic.

The developement of the cremaster muscle varies considerably in different individuals and at different ages. It is very distinct in adults of muscular frame, and remarkably so in certain cases of hernia and hydrocele, when its fibres are hypertrophied. Previous to puberty it is small and indistinct; and in persons much emaciated by disease or advanced in age its arches are so thin and pale as scarcely to be discerned. The actions of the cremaster, which, with a few exceptions, are involuntary, appear to be those of giving a tonic support to the testicles,

retracting them to the abdominal rings, and compressing them during the sexual act. In some instances in boys before the approach of puberty, this muscle has been capable of drawing the gland up into the inguinal canal. Persons are occasionally met with who possess a voluntary power over its actions in various degrees of perfection. Some are able to elevate the testicle on one side but not on the other; whilst others can retract both testicles to the abdominal ring, and retain them there at will. A very remarkable instance of the cremaster muscle being completely under the influence of volition, is recorded by Mr. A. C. Hutchinson. It was the case of a sailor who availed himself of it to cause tumours in the groins which simulated hernia, in order to avoid impressment in the king's service. On being detected he displayed several remarkable feats of the power he possessed over these organs. He pulled both testes from the bottom of the scrotum up to the external abdominal rings with considerable force, and again dropped them into their proper places with singular facility. He then pulled up one testis, and, after some pause, the other followed, as the word of command was given; he then let them both drop into the scrotum simultaneously. He also pulled one gradually up, whilst the other was as gently descending; and he repeated this latter experiment as rapidly as the eye could well follow the elevation and descent of the organs.*

* Practical Observations in Surgery, 2d edit. p. 186.

THE TESTIS.

The testes are universally known as the glands by which the semen or spermatic fluid is secreted : contained within the scrotum, they are suspended at a variable and unequal distance from the abdominal rings, one testis, generally the left, hanging a little lower than the other. This arrangement prevents any collision between these organs when the thighs are suddenly approximated ; one testicle slipping above the other, and thus eluding violence. In cases of transposition of the viscera and blood-vessels, it has been observed that the right testicle hangs lower than the left.

The shape of the testis of an adult is that of an oval with flattened sides. The organ has two extremities, an antero-superior, and a postero-inferior ; two edges, an antero-inferior, and a postero-superior ; and two lateral surfaces. Its position in relation to the body is rather oblique, its long axis or antero-posterior diameter passing from above downwards and a little inwards. Its edges and sides are convex. Its upper extremity is rounded and capped by the epididymis, which rises above the body of the gland like the crest on a helmet. The mean dimensions of the testis are one inch and three quarters in length, one inch and a quarter across or in breadth, and one inch in thickness or from side to side.* Meckel states its average weight

* According to Cruveilhier, the testis measures two inches in length, one inch in breadth, and three lines in thickness. Sir A. Cooper makes its long diameter two inches, its transverse an inch and a half, and its lateral one inch and one eighth.

to be four drachms, and Sir A. Cooper about an ounce. I have found the mean of these two estimates, viz. six drachms, to be the ordinary weight of the sound testis of a healthy adult. There are few organs subject to greater variations in size and weight than the testis, even in men of the same age and constitution. The testicles also of the same individual rarely agree, the volume and weight of the left testis being in general 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 five; in neither of these instances, however, was the difference more than a drachm. The organ feels tense, compact, and slightly elastic. Its degree of consistence depends more on the tension of the tunica albuginea than on the proper substance of the gland, but it is a good deal influenced by the quantity of seminal fluid contained in the tubular structure, and its state of activity or rest; the gland being tense and tumid when the organ is exercised and the tubuli are distended, and soft and flaccid when they are empty and the gland inactive.

The parts composing the testis may be described under four heads:—I. The protective parts or Tunics; II. The proper glandular or secreting Structure; III. The excretory Parts; IV. The Vessels and Nerves.

I. *The Protective Parts or Tunics.*

The Tunica Vaginalis.—This is a delicate serous membrane in the form of a shut sac, which consists

of two portions ; an outer one, free and loose, and an inner, reflected, or testicular portion, which closely invests the gland. Sir A. Cooper designates the loose portion the *tunica vaginalis reflexa*. In accordance, however, with the analogies afforded by the other serous pouches, I have termed the testicular the reflected portion of the membrane. In speaking, therefore, of the tunica vaginalis, without the addition of the term reflected or testicular, it will be understood that I mean to imply the outer and loose portion. The two portions are connected and continuous with each other. The outer one loosely invests the whole of the testis, except its posterior edge and inferior extremity, parts where it becomes attached to the gland. It is connected with the testis at about five lines from the lower extremity, and the junction of the two portions is marked by a white and rather irregular line. The uncovered portion of the testis corresponds to the original attachment of the gubernaculum. On the inner side of the gland the membrane, after investing the lower part of the cord to a greater or less extent, is reflected to the epididymis just below its head, and to the posterior edge of the body of the testis, being there separated from the epididymis by the vas deferens and blood-vessels of the gland. On the outer side the membrane entirely covers and closely invests the epididymis, and forms a cul-de-sac, which isolates its middle from the posterior border of the testis, and in cases of hydrocele is often distended into a good-sized pouch. At the bottom of this sac the tunica vaginalis on the two

sides comes into close contact, and sometimes there is a communication at this spot between the two. The smooth and polished surface of the shut sac thus formed by the tunica vaginalis is lubricated by a halitus, which, when condensed, forms a serum, having the ordinary properties of the secretions of the other serous membranes. The office of this membrane is to facilitate the movements of the testis, so as to enable it to elude pressure and escape violence.

In some adult subjects the tunica vaginalis, which was originally a process from the serous lining of the abdomen, still retains its connexion with that cavity. When the communication is free, the sac is very liable to receive a protrusion of some of the contents of the abdomen, and become the seat of congenital hernia. Sometimes the communication continues through a contracted tubular canal, which, though too narrow to admit the transit of any of the viscera, is open to the passage of fluid. In other cases the obliteration is partial, one or more isolated serous sacs being left along the cord. It more often happens, however, that after the upper aperture of this process has closed, a considerable part of it below remains unobliterated, so that the tunica vaginalis extends for some distance upwards in front of the cord. Frequently, also, although the obliteration is complete, remains of the prolongation may still be found in the form of a slender whitish filament, or fibro-cellular process, which is lost in the cellular tissue in the anterior part of the

cord, but may sometimes be traced as far as the tunica vaginalis.

A small body of an irregular shape and variable size, and of a pale red or pinkish hue, is commonly found attached either to the upper extremity of the testis, or at the angle where the tunica vaginalis passes from the body of the gland to the epididymis. It is composed of a duplicature of this membrane, containing some fine cellular tissue and a number of small vessels. I have seen this little body in the testis of the foetus whilst in the abdomen; and in early life it is often of proportionally larger size, and of a deeper red colour than in the adult. It is quite distinct from the pedunculated cysts often found attached to the head of the epididymis. This little appendage to the tunica vaginalis seems to correspond with, and to be a type of, the remarkable omental process attached to the superior part of the testis in the *Rodentia* and other animals. That it is an unimportant structure in the adult is shown by its being frequently wanting.

Tunica Albuginea or *Tunica Propria* is a dense, resisting, inelastic membrane, composed of fibrous tissue analogous to the sclerotic coat of the eye. It completely invests the body of the testis, but not the epididymis. Its external surface is covered by the tunica vaginalis reflexa, to which it intimately adheres. This tunic is divisible into two layers, which can only be separated by a tedious dissection, but which in certain animals may be detached without difficulty. The branches of the spermatic artery

and veins ramify in the substance of the tunica albuginea, in canals bearing in their arrangement some analogy to the sinuses of the dura mater; which membrane the outer layer is supposed to resemble. The smaller vessels are chiefly distributed on the inner layer, which, owing to its vascularity, has been compared to the pia mater investing the brain. At the postero-superior border of the testicle, and a little to its outer side, the tunica albuginea forms an internal projecting body or process, which lodges the blood-vessels, and a portion of the glandular structure of the testicle, called the *rete testis*. This body is named after the anatomist who first described it the *Corpus Highmori*. It has since, however, been called by Sir A. Cooper the *mediastinum testis*, and he describes it as being formed by the tunica albuginea, which at that part is divisible into three layers. The first layer turns upon the spermatic cord, and unites with the sheath which covers the vessels. The second layer unites with a similar layer on the opposite side, and forms a thick substance, between the fibres of which interstices are left for blood-vessels and absorbents; whilst the internal layer, uniting with that on the opposite side, as well as with the preceding layer of the tunica albuginea, forms the process called *mediastinum*, which projects into the testis between the tubuli; and it is in this substance that the seminal canals of the rete are placed. The *mediastinum* is therefore composed of two bodies; the upper placed towards the spermatic cord, the lower towards the centre of the testis; in the upper are placed blood-

vessels; in the lower the canals of the rete. Its length varies from six to eleven lines.

II. *Glandular or Secreting Structure.*

The glandular part of the testis is very simple, and more easily demonstrated than the glandular structure of most other organs. It consists of numerous seminiferous vessels or tubes, supplied with blood-vessels, lymphatics, and nerves. Its colour is a grayish yellow or brown, more or less tinged with blood, and is paler in infants and old men than in adults. The tubes are collected into numerous lobes or lobules, invested by a fine cellular tissue, which, detached from the interior of the tunica albuginea, penetrates the gland, and sends out lateral processes forming septa, which separate and sustain the lobules. These septa at their origin partake of the fibrous character of the tunica albuginea, but as they converge towards the superior border of the testis, occupied by the corpus Highmori, they become finer, and are gradually resolved into a delicate cellular tissue. The septa are traversed by numerous blood-vessels which minutely divide in them before being distributed on the seminiferous tubes.*

* Sir A. Cooper states, that the inverted portion of the tunica albuginea, forming the mediastinum testis, sends forth numerous ligamentous cords, some of which pass to the anterior edge of the testis; whilst others form shorter processes to support and invest the lobes, being met by similar ligamentous cords from the inner surface of the tunica albuginea. I have not been able to make out any such ligamentous processes, passing into the substance of the testis, as are

Tubuli Seminiferi.—These tubes, which form by far the bulk of the glandular structure of the testis, are very numerous, and radiate from all parts of the circumference of the organ towards the mediastinum, making numberless convolutions, which progressively diminish as they approach the rete testis. Two or more of the tubuli being collected together, and invested by a common cellular tunic, form a lobe or lobule of a conical form, its apex terminating at the corpus Highmori. The lobes thus formed are not entirely distinct, but communicate with neighbouring lobes; the processes investing them are therefore incomplete, and the lobes cannot be separated from each other without division of some of the seminiferous tubuli. Krause estimates the number of the lobes as varying from 404 to 484.* The tubuli are of a white colour and uniform size, but their calibre differs in different subjects, and varies a good deal according to the age of the subject and the state of activity of the testes, being larger in young adults and when distended with semen than in old persons and when the gland is in a state of rest.† The size of the ducts also often differs in the two testes of the same subject. In general the calibre of the tubuli

represented in Sir A. Cooper's work (part i. pl. 2, fig. 3.), which I have found to be an exaggerated view of the preparation from which it was taken. The cords described appear to me to consist chiefly of blood-vessels supported by slight fibrous processes from the tunica albuginea and cellular tissue. In a well-injected testis very little tissue of the nature of ligament can be found between the lobes.

* Müller, Archiv. für Anatomie, 1837, p. 22.

† The following is from a Table of Measurements of the Seminal

corresponds to the size of the testis. Observers do not exactly agree in their estimates of the diameter of the tubuli. The average diameter of the uninjected canal is estimated by Müller at $\frac{1}{18}$ of a line, by Lauth* at $\frac{1}{153}$ of an inch. Krause found the tubuli, when filled with semen, to measure about $\frac{1}{12}$ of a line, and in old men and youths $\frac{1}{16}$. Monro reckoned the number of the seminiferous tubes at 300; Lauth made the average number 840, and he estimated the mean length of all the ducts united at 1750 feet. He found the individual ducts

Tubes made by Mr. Gulliver. (*Proceedings of the Zoological Society, July 26, 1842.*)

Age.	Size of Tubes in Fractions of an English Inch.	State of Testes.
22	$\frac{1}{142}$ to $\frac{1}{77}$	Scarcely any fluid in testes. Died of phthisis.
42	$\frac{1}{133}$ to $\frac{1}{86}$	Some spermatozoa in epididymis. Died of phthisis.
60	$\frac{1}{46}$ to $\frac{1}{32}$	No spermatozoa. Died of phthisis.
86	$\frac{1}{60}$ to $\frac{1}{60}$	Died of pneumonia. Fatty matter in testes. No spermatozoa.
8	$\frac{1}{22}$	Died of phthisis.
18 months	$\frac{1}{60}$ to $\frac{1}{66}$	Died of pneumonia. Child puny and emaciated.
6 weeks	$\frac{1}{33}$ to $\frac{1}{30}$	Died of pneumonia. Body much emaciated.
still born	$\frac{1}{67}$	Well nourished fœtus; born at full period.
still born	$\frac{1}{60}$ to $\frac{1}{22}$	Fœtus weighed 6 lbs.

The enlargement of the seminal tubes of birds in the spring, and of the mammalia at the rutting season, and in young animals generally as they become capable of reproduction, has been noticed by Wagner (*Physiology, tr. by Willis*, pp. 23 and 27), and further illustrated by Mr. Gulliver in the table from which the above observations in man were taken.

* Mém. de la Société, d'Hist. Nat. de Strasbourg, t. 1.

to vary in length, the mean being 25 inches. Krause estimated their entire length at 1015 feet. The membrane composing the tubuli is of a mucous character, as has been clearly proved by microscopic examination, and it is continuous with the mucous surface of the genito-urinary system. There is no



A. Glandular structure of the testis, displayed by mercurial injection.—After Lauth.

a a a. Glandular substance of the testis subdivided into lobes, each lobe being composed of convoluted tubuli closely packed.

b. Rete testis.

c c. Vasa efferentia.

d. Inflected part of the vasa efferentia forming the coni vasculosi.

e e. Dilatations of the efferent vessels.

f. Body of the epididymis.

g. Tail of the epididymis.

h. Vasculum aberrans.

k. Straight part of the vas deferens.

appearance of an intertubular substance ; the ducts are merely connected by a loose network of vessels, and consequently readily admit of being separated and unravelled. The tubes, when successfully injected with quicksilver, form a beautiful anatomical preparation. Sir A. Cooper succeeded in filling the tubes with size injection ; but he has not described the mode in which it was effected, and other anatomists have failed in similar attempts.

When the tubuli seminiferi are unravelled, they are found to divide, and form numerous anastomoses which increase in frequency towards the circumference of the testicle (see diagram B $a^1 a^1$). The tubuli thus form one vast network of communication, so that it is impossible to isolate completely either a duct or a lobule. The credit of making this interesting discovery of the anastomoses of the seminal tubes is due to Lauth. In only one instance did he succeed in finding a duct terminating in a blind pouch, and this he regarded as exceptional. Blind ends have been found, however, more frequently by Krause. The anastomoses of the tubules have been observed in the rat and other animals as well as in man. The convolutions of the seminal tubes diminish in number as they approach the mediastinum, and cease altogether at a distance of from one to two lines, where two or more unite to form a single straight duct, termed *vas rectum*, which joins the rete testis at a right angle (a^2, a^2). The vasa recta are very slender, and easily give way when injected : their calibre, which is greater than that of the seminal tubes, is

estimated by Lauth at $\frac{1}{108}$ of an inch. Haller reckoned their number at twenty, which is, however, too few.



Rete Testis, as its name implies, consists of a plexus of seminal tubes, which occupies the corpus Highmori, or mediastinum testis. The vasa recta, after penetrating the walls of this body, terminate in from seven to thirteen vessels, which, running parallel to each other in a waving course, and frequently dividing and anastomosing, form the *rete testis* (b). Lauth found the mean diameter of the vessels of the rete in injected preparations $\frac{1}{72}$ of an inch. According to Prochaska, these vessels are

B. Diagram of the testis, after Lauth.

a a a. Tubuli.

a¹ a¹. Subdivisions and anastomoses of the tubuli.

a² a². Vasa recta.

The other references are the same as in fig. A.

supplied with valves, but such is not the case. Small dilatations, however, are often found in different parts of the plexus.

III. *The Excretory Parts.*

The *epididymis*, a continuation of the testis, is a body of a crescentic form, divided into an anterior and upper extremity, called *head*, or *globus major*, which is firmly attached to the testicle; a middle part or *body*, which is less in size, and separated from the gland by a pouch of the tunica vaginalis; and a *tail*, or *globus minor*, connected to the testis by cellular tissue. The volume and weight of the epididymis vary in different subjects, but are proportionate to the size of the testis. It is longer than the testis, measuring about two inches in length and four or five lines in width. Its name (from ἐπὶ, upon, and δίδυμος, testis,) indicates its position, which is along the postero-superior border of the gland. The epididymis is chiefly made up of seminal canals connected and supported by a firm resisting cellular tissue. The ducts which spring from the upper part of the rete testis to form the epididymis are termed *vasa efferentia*. They are usually about twelve or fourteen in number, but vary from nine to thirty. The inflections of each of these efferent ducts are so arranged as to form in the head of the epididymis a series of elongated conical figures called *coni vasculosi*. These ducts at their commencement run straight for a distance of about one or two lines, when they form convolu-

tions which become more numerous and close as the ducts recede from the testis. Their length varies, the upper ones being the shortest. Lauth found their average length to be seven inches four lines, and calculating their number at thirteen, he makes the united length of the vasa efferentia nearly eight feet. He states that the efferent ducts diminish in size from their commencement to their termination in the canal of the epididymis, where they are less than the seminiferous ducts of the testicle. (See fig. c.) As in the rete, round dilatations of variable size are often met with in these ducts. (See fig. A. ee.) The efferent ducts, after forming the coni vasculosi, successively join a single duct, the canal of the epididymis, at irregular distances, the intermediate portions of the duct varying in length from half an inch to six inches. The efferent ducts are more slender than the canal of the epididymis, and frequently give way under the pressure of the



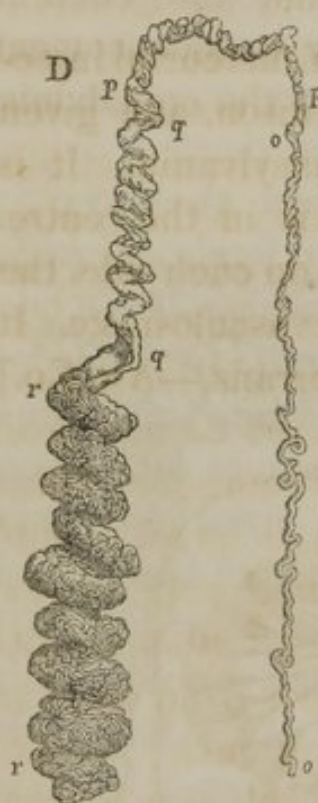
C. An efferent vessel and a portion of the head of the epididymis magnified, to show the progressive diminution of the canal of the cone, and the calibre of this vessel, in comparison with that of the canal of the epididymis.

c. Vas deferens.

d. Inflected portion of the duct.

ee. Head of the epididymis.—After Lauth.

column of mercury when injected. The body and tail of the epididymis are entirely made up of the convolutions of the single canal in which the vasa efferentia terminate, closely connected by cellular tissue. Monro described this canal as gradually increasing in size from the head to the



tail, and he estimated its calibre about its middle at $\frac{1}{80}$ of an inch.

Lauth states that its size is subject to great irregularities in different parts and in different subjects. This anatomist has particularly described the convolutions of this duct, and has shown that they are regularly arranged in four series, which successively increase in size, the first being the smallest, and the fourth the largest. The arrangement will be best understood by reference to fig. D. Monro estimated the length of the canal at thirty feet

eleven inches. Lauth found its mean length to be nineteen feet four inches eight lines. The parietes of the canal are strong and bear considerable resistance. The canal of the epididymis terminates

D. Canal of the epididymis partly unravelled to show the four series of inflections which the duct undergoes in the several divisions of the epididymis.

o o. First series of inflections.

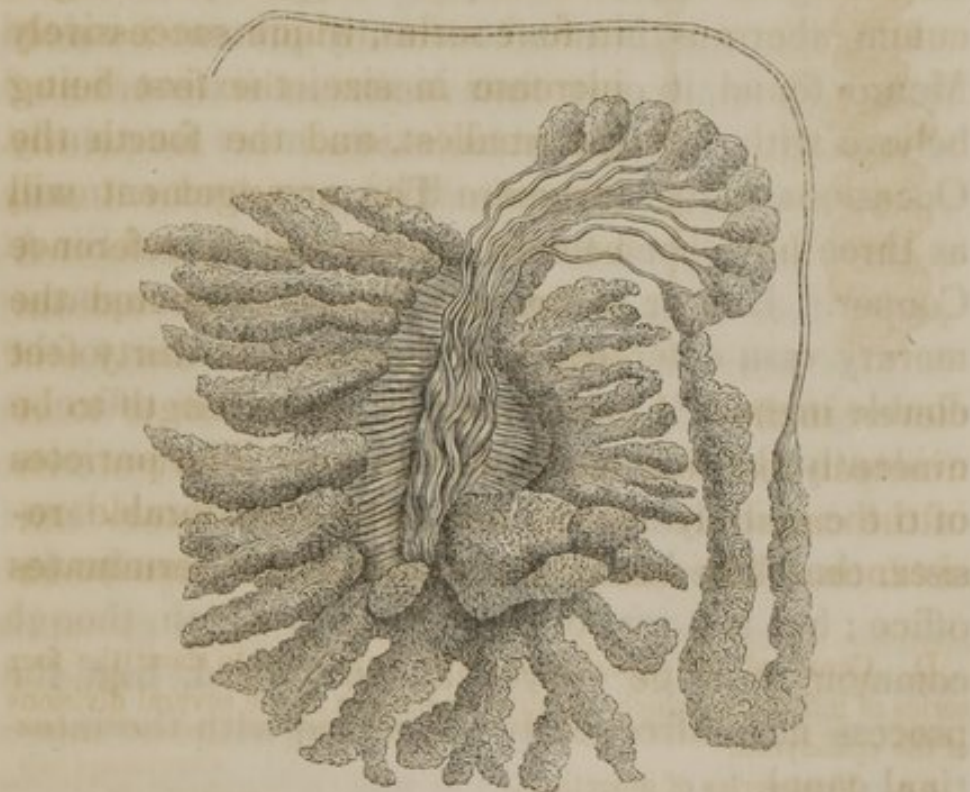
p p. Second series.

q q. Third series.

r r. Fourth series.—After Lauth.

in the excretory duct of the testis, the vas deferens, and is usually contracted at the part where the two join. It was calculated by Monro that the semen before arriving at the vas deferens traverses a tube forty-two feet in length. Lauth, however, makes the whole distance but little more than twenty-two feet.

[I annex a drawing made from a mercurial injection of the testicle, by J. P. Hopkinson, and given by him to the University of Pennsylvania. It is laid open so that the rete testis is in the centre. It shows well the tubuli seminiferi on each side, the vasa recta, the rete testis, the coni vasculosi, &c. It seemed to possess no vasculum aberrans.—AM. ED.]



Vasculum aberrans.—This name was given by

Haller to a blind duct or cæcal appendage often found connected either to the epididymis or vas deferens. It is more commonly attached at the angle formed by the termination of the former in the latter. (See figs. A. and B. *h.*) It forms a convoluted duct as large as the canal of the epididymis, which is contracted at its insertion, and terminates in a blind and often dilated extremity. Sometimes after being dilated for a certain distance it diminishes, and becoming very minute, is lost in the cellular tissue of the cord. It usually passes up the cord for about two or three inches, but has been found to extend as far up as the brim of the pelvis. The length of this appendage when unravelled varies from one to twelve or fourteen inches. The vasculum aberrans is not constantly present; indeed Monro found it only four times in sixteen, but I believe with Lauth that it exists more frequently. Occasionally there is more than one, and as many as three have been found both by Lauth and Sir A. Cooper. Hunter regarded these ducts as supernumerary vasa deferentia of a nature similar to the double ureters.* Müller states that their office is evidently the secretion of a fluid which they pour into the epididymis.† I am inclined to think, however, that the duct does not serve any particular office; but is a sort of diverticulum, which, though common, must be viewed as accidental, like the process not unfrequently connected with the intestinal canal.

* Works, by Palmer, vol. iv. p. 24.

† Physiology, trans. by Baly, vol. i. p. 456.

Vas deferens, the excretory duct of the testicle, commences from the tail of the epididymis, and terminates in one of the ejaculatory canals behind the bladder. Arising from the contracted part of the canal of the epididymis at an acute angle, it ascends along the inner side of this body, from which it is separated by cellular tissue and the spermatic arteries and veins. A right or left testis may thus always be distinguished by the circumstance that when the testis is in position, the vas deferens is situated on the inner or mesial side of the organ. In this part of its course, for the distance of about an inch and a half, or more, the vas deferens forms numerous convolutions (see figs. A. and B. *i*), which gradually cease as the duct mounts above the testis. The inflected part of the vas deferens, when unravelled, was found by Lauth to measure six inches and a half. It afterwards takes a direct course (*k*) up the spermatic cord to the inguinal canal, passing behind and at a short distance from the spermatic arteries and veins. On entering the abdomen at the internal ring, it quits the spermatic vessels and descends into the pelvis, passing at first by the side of, and afterwards behind and below the bladder on the inner side of the corresponding vesicula seminalis, the excretory duct of which it joins at an acute angle to form the ejaculatory canal. The vas deferens is nearly uniform in thickness until it reaches the vesicula seminalis, and is lined by a fine membrane of a mucous character, which is continuous with the urethra. It is round and indurated, and harder

than any other excretory duct in the body, by which character it is easily distinguished, when handled, from the other parts constituting the spermatic cord. Many anatomists have entertained the opinion that the parietes of this duct are muscular. It is distinctly so in the bear, bull, and other animals. On careful examination, however, of sections of the human vas deferens in the microscope, I could discover nothing more than simple fibrous tissue.

IV. *The Vessels and Nerves.*

Spermatic Vessels.—The spermatic arteries, the chief vessels supplying the testes, arise in pairs, at a very acute angle, from the fore part of the aorta, immediately below the renal arteries. Their origin is subject to considerable varieties. The two seldom arise at the same level, and the right is often a branch of the right renal artery. Sometimes one or both come off from the superior mesenteric. Occasionally there are two spermatic arteries on one or both sides, arising in the regular way. All these deviations are more frequently met with on the left than on the right side of the body. Each artery pursues a tortuous course downwards and outwards, passing behind the peritoneum obliquely across the psoas muscle and ureter, to which, as well as to the surrounding cellular tissue, it gives off several branches. The artery then enters the inguinal canal through the internal ring, and emerging at the external, passes down the cord,

being surrounded in its course by the spermatic veins. The further distribution of the artery is thus correctly described by Sir A. Cooper. When the artery reaches from one to three inches from the epididymis, varying in different subjects, it divides into two branches, which descend to the testicle on its inner side, opposite to that on which the epididymis is placed ; one passing on the anterior and upper, the other to the posterior and lower part of the testis. From the anterior branch the vessels of the epididymis arise : first, one passes to its caput ; secondly, another to its body ; and, thirdly, one to its cauda and the first convolutions of the vas deferens, communicating freely with the deferential artery. The spermatic artery, after giving off branches to the epididymis, enters the testis, by penetrating the outer layer of the tunica albuginea ; and dividing upon its vascular layer, they form an arch by their junction at the lower part of the testis, from which numerous vessels pass upwards ; and then descending, they supply the lobes of the tubuli seminiferi. Besides this lower arch there is another passing in the direction of the rete, extremely convoluted in its course, and forming an anastomosis between the principal branches. The testis receives a further supply of blood from another vessel, the artery of the vas deferens, or posterior spermatic artery, which arises from one of the vesical arteries, branches of the internal iliac. This artery divides into two sets of branches, one set descending to the vesicula seminalis, and to the termination of the vas deferens ;

the other, ascending upon the vas deferens, runs in a serpentine direction upon the coat of that vessel, passing through the whole length of the spermatic cord; and when it reaches the cauda epididymis, it divides into two sets of branches, one advancing to unite with the spermatic artery to supply the testes and epididymis, the other passing backwards to the tunica vaginalis and cremaster.

The spermatic veins spring in three sets from the testis, one from the rete and tubuli, and another from the vascular layer of the tunica albuginea, and a third from the lower extremity of the vas deferens. The veins of the testis pass in three courses into the beginning of the spermatic cord; two of these quit the back of the testis, one at its anterior and upper part, and a second at its centre; and these, after passing from two to three inches, become united into one. The other column accompanies the vas deferens. There is also a large vein just above the testis, which crosses to join the three columns. The veins of the epididymis are one from the caput, another from its body; one from its cauda, and another from its junction with the vas deferens, beside some small branches; they terminate in the veins of the spermatic cord. The veins, after quitting the testis, become extremely tortuous, and frequently divide and inosculate in the cord, forming a plexus termed *vasa pampini-formia*. These communications cease as the veins approach the ring, which they enter, and ascending along the psoas muscle in company with the spermatic artery, unite to form a single vein, which

usually terminates on the right side in the vena cava inferior, and on the left in the renal vein; though this is subject to some variety. The left spermatic veins pass under the sigmoid flexure of the colon. Many anatomists speak of the spermatic veins as being destitute of valves, which they assign as one of the reasons for the occurrence of varicocele. I have several times injected these veins with alcohol, and on laying them open, have observed valves in the larger vessels, and I have also found injections thrown into the veins arrested by the valves. They are seldom seen, however, very near the testis, or in the smaller veins, forming the plexus; nor have I observed them within the abdomen.

Absorbents.—The absorbent vessels of the testis are very numerous, and arise from every part of its internal structure and coats. They unite to form four or five trunks, which ascend along the cord, and traverse the inguinal canal, without communicating with the glands in the groin, but pass upwards in front of the psoas muscle, behind the peritoneum, and terminate in the lumbar glands, on the side of the aorta.

Nerves.—The nerves of the testis are derived chiefly from the renal plexus, but partly also from the superior mesenteric and aortic plexuses. These nerves descend in company with the spermatic artery to the cord, where, being joined by branches from the hypogastric plexus, which pass along the vas deferens, they form together the spermatic plexus, the branches of which are intermingled

with the vessels of the cord, and ultimately terminate in the substance of the testis. A few twigs from the external spermatic nerve may also be traced to the coverings of the gland. The minute distribution of these nerves forms a very difficult dissection.

The Testis in the Fœtus, and its Descent into the Scrotum.

The testes are first developed and situated in the abdomen. They originate from the lower part of the Corpora Wolffiana, and may be detected at an early period of fœtal existence immediately below the kidneys on the fore-part of the *psoæ* muscles, to which they are attached by a reflection of peritoneum. This membrane closely invests the testes in the same manner as it covers the other abdominal viscera. The position of the testis in the abdomen is nearly the same as it maintains after its descent into the scrotum. The epididymis, however, is relatively of larger size than in the adult, being about one third that of the body of the organ. Attached to each testis whilst in the abdomen is a peculiar body which was termed by Mr. Hunter, who first described it, the *gubernaculum*. It is a soft solid projecting body of a conical form, which varies somewhat in shape and size at different periods of the testicular descent, 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 reflection of

peritoneum. Its upper part is attached to the inferior extremity of the testis, 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 in the microscope, is found to consist of nucleated cells, the primitive cellular 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 testis, are surrounded by a layer of the soft elements of the cellular tissue similar to that composing the central mass; and in the same way as the testis the whole process, except at its posterior part is invested with peritoneum. On carefully 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 descends to the bottom of the scrotum, where it joins the dartos; the internal passes in the direction inwards, and has a firm

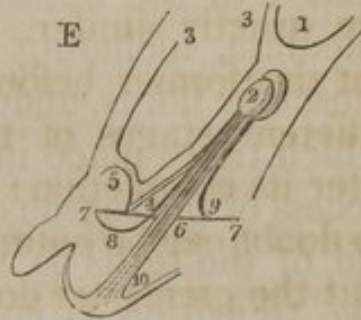
attachment to the os pubis and sheath of the rectus muscle. Besides these, a number of muscular fibres are reflected from the internal oblique on the front of the gubernaculum. It thus appears that the attachments of the muscle of the gubernaculum and those of the cremaster in the adult are exactly similar. I have succeeded in tracing out the former before the testis has descended, at different stages of the process, and immediately after its completion; and of the identity of the two no doubt can be entertained. Carus was of opinion that the cremaster does not exist before the descent of the testis; but that it is formed mechanically, by the testis pushing before it the lower fibres of the internal oblique, so as to form the loops of this muscle.* This view, which has been adopted by M. Jules Cloquet, and after him by many of the anatomists of this country, is, as I have shown elsewhere, clearly erroneous and inaccurate.†

The vessels of the testis in the fœtus arise from the nearest large trunks, and enter the substance of the gland at its posterior part. The artery of the vas deferens, from which the gubernaculum is chiefly supplied, is nearly as large as the spermatic. The long course taken by the arteries and veins of the testis when in the scrotum is thus explained by the original site of the organ, to which circumstance must also be ascribed the sharp turn

* Comparative Anatomy by Gore, vol. xi. p. 347.

† Vide Observations on the Structure of the Gubernaculum, and on 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.

upwards of the vas deferens from the epididymis, the two being continuous in a direct line, whilst the testis is in the abdomen. Between the fifth and sixth month of foetal existence, sometimes later, the testis 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. The testis, both during its passage to the ring, and through the inguinal canal, carries along with it its original peritoneal coat, adhering by the reflection of this membrane, during the whole of its descent, to the parts behind, in the same manner as whilst situated below the kidney. The testis, therefore, does not pass directly and abruptly into a pouch pre-



E. Diagram of the gubernaculum and testis previous to its descent.

1. The kidney.
2. The testis.
- 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.

pared to receive it, but carries the peritoneum with it, continuing to be connected to the parts behind by the reflection of the membrane, between the folds of which the vessels and nerves join the gland. In the passage of the testis 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 testis 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 front of the cord. As the testis approaches the bottom of the scrotum, the gubernaculum diminishes in size, owing to a change in the disposition of its cellular elements; the muscular fibres, however, undergo little or no diminution, and are very distinct around the tunica vaginalis in the recently-descended testis. 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 testis in the scrotum contributes to form the loose cellular 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

testis 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 cellular tissue, which requires division with the scalpel. This band is the remains of the middle attachment of the gubernaculum. In cases in which the testis 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 testis 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 descent of the testis, 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 testis 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

* Mr. Hamilton lately afforded me the opportunity of dissecting the parts in a lad aged fifteen, both of whose testes had not descended lower than just outside the external rings. He died of fracture of the skull. The body was well formed. I found a broad fibrous band proceeding from the lower part of each testis to the bottom of the scrotum. Mr. N. Ward, who examined this band for me in the microscope, states, that he distinctly recognised striped muscular fibres in it. The fact is interesting, but requires, perhaps, confirmation.

membrane. It sometimes does not take place at all,* or is delayed or only partially completed. Congenital hernia, or hydrocele, is the result of a failure in this process; and other forms of hydrocele are occasioned by imperfect obliteration of the canal, as will be hereafter explained.

Much difference of opinion exists as to the immediate cause of the descent of the testis. Hunter,



Meckel, and others, came to the conclusion that the muscular fibres of the cremaster are insufficient to bring the testis lower down than the abdominal ring, and complete the descent. They were not, however,

acquainted with the attachment of this muscle to the pubes external to the ring, or it would be difficult to understand why Mr. Hunter, after arriving at the conviction that the cremaster passes up to the testis whilst in the abdomen chiefly from analogy, was not induced by the same process of reasoning to conclude, that a muscle capable of

* The communication constantly remains open in quadrupeds, the chimpanzee, according to Mr. Owen, being the only animal in which the tunica vaginalis forms a shut sac.

F. Diagram of the testis immediately after its descent, the cremaster being everted.

- | | |
|--|--------------------------------|
| 1. The testis. | 2. The shortened gubernaculum. |
| 3 3. The peritoneum. | |
| 4. Portion of the cremaster arising from Poupart's ligament. | |
| 5. Pubic portion of the muscle. | |

This diagram is partly taken from a plan by Mr. Erasmus Wilson (*Anatomist's Vade Mecum*, second edition), who has adopted my views of the descent of the testis.

drawing down the testicle in animals would be adequate to accomplish the same purpose in the fœtus. The necessity for some active agent to effect this change in the latter would appear to be greater even than in animals, since, in the usual position of the fœtus in utero, the passage of the testis is contrary to gravitation, and unaided by the movements of respiration. Now, when we consider the attachments and connexions of this muscle in the fœtus, the perfect condition of its fibres as ascertained by microscopical examination, and the circumstance that there are no other means, no other motive powers by which this change can be effected, or in any way promoted, I think there is no reason to doubt that the cremaster executes the same office in the human embryo, as that which it undoubtedly performs in certain 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 below the abdominal ring, and the process descending to the scrotum to direct it to its final destination. As the descent approaches completion, the muscular fibres which perform so important a part in it gradually become everted, and, instead of drawing down the testicle, acquire the new functions of elevating, supporting, and compressing it.

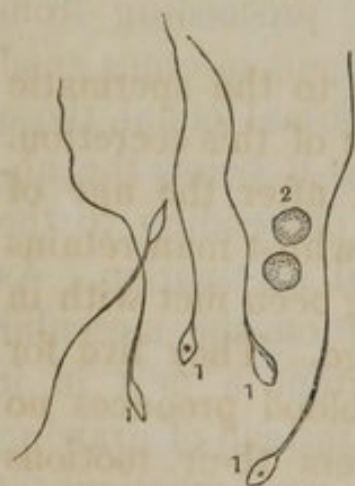
Spermatic Fluid.

The sperm or secretion of the testis is a thick tenacious fluid, of a whitish or grayish-white colour,

and of greater specific gravity than water. It has an alkaline reaction, and is composed of albumen, phosphatic and hydrochloric salts, and a peculiar animal matter called *spermatine*. According to the analysis of Vauquelin, human spermatic fluid consists of the following ingredients :

Water	-	-	-	90
Animal mucus	-	-	-	6
Free soda	-	-	-	1
Phosphate of lime	-	-	-	3
Peculiar animal principle	-	-	-	
				<hr/>
				100

When first voided, the sperm has a peculiar odour, which has been compared to that of the farina of the Spanish chestnut; but this odour appears to be derived from the secretions of the vesiculæ seminales, prostate, and the mucous glands of the urethra, which are always mixed with it when evacuated, as pure semen taken from the epididymis or vas deferens has no such smell. On



examination in the microscope, with a high power, this fluid is found to contain a multitude of minute bodies closely crowded together, which in recent semen display very lively movements. These bodies (1 1 1 1) are the *seminal animalcules*, or

spermatozoa, as they are more properly termed ; for it is yet a question amongst physiologists, whether they are independent parasitic animals, or merely animated particles of the organism in which they exist. A spermatozoon consists of a flattened oval and perfectly transparent body, terminating in a filiform tapering tail, which together measure from $\frac{1}{30}$ th to $\frac{1}{40}$ th of a line in length. The spermatic fluid also contains a number of minute round colourless granular corpuscles (2), which vary in quantity, but are usually much less numerous than the spermatozoa. Both these elements of the sperm are suspended in a clear transparent fluid, termed the *liquor seminis*. Wagner has shown that the spermatozoa are developed within cells, and originate from the spermatic granules being formed by the dispersion of the nuclei of these cells.*

The spermatozoa are peculiar to the spermatic fluid and the chief characteristic of this secretion. They are always present in it after the age of puberty, and do not disappear whilst man retains the power of procreation, having been met with in persons of a very advanced age. They live for many hours after ejaculation ; blood produces no effect on them, but urine renders their motions feeble, and hastens their death. The quantity of

* Much curious information respecting the spermatic fluid may be found in Wagner's Physiology, tr. by Dr. Willis, Müller's Physiology, tr. by Dr. Baly, and in Lallemand, Des Pertes Séminales Involontaires, t. 2.

spermatic fluid emitted in sexual union varies from one to two or three drachms.

The Functions of the Testis.

On surveying the structure of the testis, the anatomist cannot fail to remark the great extent of secreting surface afforded by the numerous, long and tortuous tubuli, and the length and complexity of the single excretory duct through which the seminal fluid has to pass. The extent of the duct is indeed so remarkable, that many physiologists have been led to suppose that the semen is further elaborated or perfected in its passage through its convoluted mass, constituting the epididymis. An examination of the spermatic fluid taken from the testis and its duct both in man and animals, under all circumstances and at all periods, and the varying state of the discharge in cases of spermatic fistula, leave little room to doubt that secretion takes place from the continuous membrane forming the tubular canals only during the period of sexual excitement, or under the influence of sexual feelings and desires.

From birth to the period of puberty the testes remain small, and increase very little in size in proportion to other parts;* but as the body on the

* The little alteration which the testes undergo before puberty may be seen by reference to the table of measurements of the seminal tubes at different ages in the foot-note at page 40. It will be noticed that the size of the tubes differed but little at the ages of eighteen months and eight years.

arrival of puberty becomes stamped with the characters of the male sex, these organs rapidly enlarge, their glandular structure becomes much more developed, and being excited begins to exercise its office of secretion, no spermatozoa being found in it until this period arrives. The age at which the testes thus become developed varies in different climates and in different constitutions, and is influenced by the mode of life and circumstances in which the individual is placed. The inhabitants of warm climates reach the age of puberty much earlier than those of cold countries. In this part of Europe it takes place from the age of fourteen to seventeen years, according to circumstances. A boy reared in the country of a moral disposition and active habits does not experience the force of the sexual appetite till the body is well developed, and nature permits the gratification of his passion without injury to the constitution. It is otherwise, however, with the young inhabitant of a city and the associate of the dissolute. Before puberty is complete and the body fully formed, desire is prematurely aroused by impure addresses to the imagination, and the developement of the testes is hastened, and they are called into action earlier than if they were left solely to the impulse of nature. Unlike the animal creation the testes in man are ready at all seasons to perform their office. The desires subside and the secretion of the semen becomes languid as life advances, though they seldom cease entirely till the age of sixty-five or seventy. Indeed, I have several times discovered

spermatozoa in the testes of men upwards of seventy years of age, and once in the testicle of a tailor who died at the age of eighty-seven ; and there are instances on record of persons retaining the procreative faculty to the age of one hundred years ; but in these cases, as in the well-known instance of old Parr, the general bodily powers were also preserved in a very extraordinary degree.*

“ To the use of the sexual organs for the continuance of his race man is prompted by a powerful instinctive desire, which he shares with the lower animals. This instinct is excited by sensations ; and these may either originate in the sexual organs themselves or may be excited through the organs of special sensation. Thus in man it is most powerfully aroused by impressions conveyed through the sight or the touch : in many other animals, the auditory and olfactive organs communicate impressions which have an equal power ; and it is not improbable that, in certain morbidly excited states of feeling, the same may be the case in ourselves. That local impressions have also very powerful effect in exciting sexual desire must have been within the experience of almost every one ; the fact is most remarkable, however, in cases of satyriasis ; which disease is generally found to be connected with some obvious cause of irritation of

* 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.

the generative system, such as pruritus, active congestion," &c.—“The instinct, when once aroused (even though very obscurely felt), acts upon the mental faculties and moral feelings, and thus becomes the source, though almost unconsciously so to the individual, of the tendency to form that kind of attachment towards one of the opposite sex, which is known as *love*. This tendency cannot be regarded as a simple passion or emotion, since it is the result of the combined operations of the reason, the imagination, and the moral feelings; and it is in the engraftment (so to speak) of the psychical attachment upon the mere corporeal instinct that a difference exists between the sexual relations of man and those of the lower animals.”*

The part of the brain which is the seat of the sexual appetite is supposed by the phrenologists to be the cerebellum, between which and the genital organs a close sympathy is said to exist. There are several facts which give countenance to this opinion, and on the other hand many equally unfavourable to, and totally incompatible with it. I shall not stop to investigate this curious question; but I may remark that the statements of the phrenologists have not always been remarkable for their accuracy, and that their reasoning in regard to it is often unsound and fallacious.† No doubt, how-

* Dr. Carpenter's Principles of Human Physiology, p. 619.

† The reader interested in this subject may consult Dr. Carpenter's able work on Human Physiology, p. 207. Professor Owen, in his lectures on the nervous system at the College of Surgeons, adduced many striking facts apparently irreconcilable with the views of the phrenologists respecting the office of the cerebellum.

ever, can be entertained that the mind is intimately connected with the procreative faculty, and that the brain controls and animates the desire for sexual enjoyment. An affection of the brain or the mind, as sudden disgust, arrests the secretion of the testes, and extinguishes all desire as quickly and effectually as a strong mental impression stops the secretion of the gastric juice and takes away all appetite for food; and in the chapter on Atrophy of these glands I shall have occasion to mention cases in which the genital function has been permanently annihilated, and complete wasting of the testes has resulted from injuries of the head. In respect to the mode in which these organs are called into action they bear considerable analogy to the lachrymal, salivary, and mammary glands, in which secretion is excited both by the influence of the mind, and by mechanical contact or local irritation of the extremity of the excretory duct, the glans penis holding the same relation to the testis as the mucous membrane of the mouth does to the salivary glands, or as the nipple does to the mamma.

The influence of the testes and brain upon each other appears, as has been already observed, to be reciprocal; for not only may desire be aroused by local irritation and exciting the testicles to secrete, but the passion itself never arises when these glands are removed before puberty, and is extinguished by their extirpation afterwards. Nothing indeed illustrates more forcibly the intimate relation which the functions of the testicles bear to the mind and

character of the individual, and the general organization of the body, than the effects of castration. When it is performed in early life, the changes characteristic of puberty never ensue. There is a deficiency of the beard, the muscles do not acquire the manly tone and vigour, the cellular and adipose tissues abound, the voice retains the high and clear tones of infancy, and the mind remains deficient in energy and strength. When the testes are removed after the period of puberty, the eunuch loses in part, though not entirely, his former masculine character. His beard grows less abundantly, his voice becomes shrill, and there is diminished energy and vigour in all his sentiments and actions. These changes in the constitution, as well as the loss of the sexual instinct which occur in men thus degraded, do not immediately succeed the removal of the testes, but take place gradually; and there are well-attested cases* in which desire has been experienced and connexion with emission accomplished many months after the loss of these organs. This shows that the passion is not solely dependent on the secretion of semen, though it invariably declines when the power of procreation becomes lost. The emissions in such cases are imperfect and fruitless, consisting merely of the secretions of the vesiculæ seminales and prostate. A man deprived of his testes, after arriving at puberty, fully estimates and acutely feels his loss, whilst a person

* Vide the cases mentioned in chapter xvii.

castrated when young is often indifferent to his peculiar condition, being less sensible of the loss of powers whose influence he is incapable of appreciating, and of a source of pleasure which he has never been able to enjoy.*

The testes 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 the functions of 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 testes 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.† It often happens that the passions are excited without an

* M. Mojon, who has studied the condition of castrated individuals, mentions as a constant fact, that they are subject to periodic bleedings, occurring generally from the hæmorrhoidal vessels: he supposes that the blood necessary to the developement of the genital parts and of the beard, as well as that destined to the formation of the sperm, is determined to the vessels of the rectum, which becoming congested and weakened, allow their contents to escape. *Mémoire sur les Effets de la Castration dans le Corps Humain*, p. 28.

† Vide further observations on this subject in chapter ii.

opportunity being afforded for their gratification. Under these circumstances the testes become encumbered with secretion, which would prove injurious to them were they not relieved by occasional nocturnal emissions, or ejaculations of the semen under the influence of dreams during sleep, which appear to be a salutary provision to obviate the inconveniences which might result as well from ungratified desires as from an accumulation of semen in the ducts. In the adult the moderate indulgence of the passions 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 connexion 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. Similar consequences ensue in the young from the pernicious influence of excessive indulgence or self-abuse. Whenever the sexual act is followed by a 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. 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, as is evinced in cases of excessive masturbation, in which the amount of

fluid evacuated bears no proportion to the exhaustion of the bodily powers, and the prostration of the mental faculties. 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 or in solitary abuse. 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. The impulse for commerce 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 with impunity. Indolent habits, and allowing the mind to dwell on subjects of a lascivious character, tend greatly to increase it. On the contrary, it is diminished by muscular exertion and mental occupation. The indifference of the hard student to such pleasures has been a matter of common remark ;* active gymnastic exercises also seem to have considerable influence in subduing sensual desires. He who experiences difficulty in restraining his passions should be warned that the more they are indulged the more difficult are they of control ; and before resorting to illicit pleasures,

* Love seldom haunts the breast where learning lies,
And Venus sets ere Mercury can rise.—POPE.

he will do well to have recourse to the sports of the field, or to such exercises as cricketing and rowing, combined with close mental application. Man best asserts his superiority to the brute creation and the dignity of his character by effectually restraining his erotic desires. The passions should be subject to the dominion of reason and moral influence; and in health, however strong, they are never so irresistible as not to be under the control of volition.

PART II.

DISEASES OF THE TESTIS.

CHAPTER I.

CONGENITAL IMPERFECTIONS AND MALFORMATIONS.

SECTION I.

NUMERICAL EXCESSES AND DEFECTS.

Supernumerary Testis.—CASES of supernumerary testis 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 very doubtful 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,* and with that of a man with four testicles alluded to by Blegny.† Blasius, an old writer not unworthy of credit, has, however, given an account of the examination of the body

* Eph. Nat. Cur. Dec. iii. Ann. v. vi. Obs. 89. p. 175.

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

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 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.* This is the only case of supernumerary testis 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. The two following are recorded as cases of the kind, but they were not verified by examination after death: Blümener, an army surgeon, states in Rust's *Magazin für die Gesammte Heilkunde* for 1824, that on examining a recruit, a robust peasant twenty years of age, he found on the right side of the scrotum a healthy testis, and on the left side two. One like that on the right side was situated at the bottom of the scrotum; the other, which was smaller, was placed above the first and nearer to the abdominal ring, and it had its own epididymis and spermatic cord. This testis felt as firm and as round as the first, and a similar sensation was experienced when it was compressed. Dr. Macann, staff surgeon, relates, that on examining a recruit, about twenty years of age, a body was found on the right side of the scrotum, which was so similar to the two testicles in size, form, feeling, and consistence, as to leave no doubt of its

* Ger. Blasius, *Obs. Med. Anat.* Obs. 20, p. 60.

being a third testicle. This body was situated between the groin and the proper testicle of the right side, with which, however, it did not seem to be in immediate contact, but to be suspended, as it were, by a shorter cord, or hung up in a separate sac. The right spermatic cord was much thicker than natural at its upper part, where, in fact, it consisted of two cords, one of which was distinctly traced into the upper testicle on this side, and the other, much longer, into the lower testicle, and in each of those parts, as well as in the cord on the left side, the vas deferens could be distinctly felt, like a piece of whipcord, between the fingers. The man stated that the third testicle had occupied its present situation as long as he could remember, and had never caused him any inconvenience.*

An epiplocele, a fatty or fibrous tumour in the scrotum, or an encysted hydrocele of the cord, might readily be mistaken for an additional testis. Morgagni mentions that he was once deceived by a portion of omentum. In the pathological collection at St. Thomas's Hospital is preserved the testis of the eccentric Dr. Monsey, who appeared during life to be supplied with three of these glands. The supposed additional testis consists of an indurated fibrous tumour attached apparently to the tunica vaginalis. My friend Professor Fergusson, of King's College, has communicated to me the particulars of the case of a man aged seventy-

* Provincial Medical Journal, Nov. 5, 1842, p. 113.

three, who had a tumour in the back part of the scrotum, about the size of a walnut, which so nearly resembled in shape, position, and size each testicle, as to render it difficult to distinguish the difference without a manual examination. It was removed, and found to be of a fibro-cartilaginous texture. It lay in close contact with the tunica vaginalis on one side, and in its removal care was required to avoid opening that membrane.

Absence of one or both Testes.—Many instances of *monorchides*, or persons having only a single testis, are also mentioned by the old authors; but as the data are very imperfect, and as little was known respecting the descent of the testis at the time these cases were recorded, they must be viewed with great suspicion. They were most probably cases in which one of the testes was either retained within the abdomen, or from some cause had been completely atrophied. I know no satisfactory reason why a deficiency of one or both testicles should not occasionally occur without any other malformation; but they are anomalies of which there are very few authentic examples in the annals of medical science. Mr. Paget, Demonstrator of Morbid Anatomy at St. Bartholomew's Hospital, has published a case in which he believes one testis was deficient at birth.* The subject of it was a robust man, aged seventy-one, who had died of acute inflammation of the œsophagus. The scrotum was small, and unusually narrow; on its

* London Medical Gazette, vol. xxviii. p. 817.

anterior surface there was no trace of raphé, but on its posterior part the raphé of the perineum was continued for a short distance. The penis was of ordinary dimensions, and the bladder, prostate, and vesiculæ seminales, were healthy and well formed. The left vesicula was rather smaller than the right: both contained the usual brownish fluid. The right vas deferens, testicle, and parts connected with them, differed in no respect from those of healthy men. The left vas deferens followed its usual course from a healthy ejaculatory duct to the internal inguinal ring, where, meeting with the other parts of the spermatic cord, it became larger and slightly tortuous. After two or three short curves, it terminated nearly opposite the external ring in a rounded cul-de-sac: it was pervious to its very extremity, and its canal was of the ordinary diameter. The remainder of the spermatic cord passed towards the outer and lower part of the left side of the scrotum, and there expanded into a small flat mass of an oval form, adhering to the surrounding cellular tissue, but clearly defined by its rather closer texture. In this part of the spermatic cord there was no trace of an obliterated duct: it seemed composed of little more than fine cellular tissue; and in the mass at its extremity there was neither a cavity nor any appearance of tubules, tunica albuginea, or any other part of a testicle. The left spermatic artery was derived from the left renal, and passed in its usual direction through the inguinal canal; but it was very small, and, not having been injected, it could not be

traced beyond the closed extremity of the vas deferens. No account of the man is attached to these particulars ; and it is therefore open to question whether the deficiency of the gland was not the result of atrophy. Mr. Paget, in some observations on this case, very justly attaches considerable weight to the absence of any trace of the tunica albuginea, and to the fact of the vas deferens terminating in a rounded cul-de-sac, as the testicle, when wasted even in an extreme degree, usually preserves some trace of its fibrous envelope, the tunica albuginea ; whilst the vas deferens, though diminished to a small impervious cord, can generally be traced on to the remains of the gland. These circumstances, though favourable to his view of the case, do not appear to me sufficiently conclusive. The fact of a descent having taken place, as shown by the remainder of the cord passing beyond the cul-de-sac to the lower part of the scrotum, and the advanced age of the man having allowed time for a more than usual obliteration of the organ, leave room for question whether the testis was originally altogether wanting. The case might possibly have been one of congenital imperfection in the vas deferens, as described, and the testis perhaps being likewise defective, and at any rate utterly useless as a secreting organ, might after its descent, have undergone a total wasting. The case is at least involved in some doubt.

The following case, recorded by Dr. Fisher of Boston,* is perhaps a more satisfactory example of

* American Journal of the Medical Sciences, vol. xxiii. p. 352.

absence of both testes. The deficiency was remarked from birth, and the perfect descent of the parts can be explained, as the cremaster muscle was found spread around a tunica vaginalis, and the vas deferens, which terminated as in the preceding case in a cul-de-sac, passed to the bottom of the cord, and must therefore have been connected as usual to the gubernaculum. The man was supposed to have been born a natural eunuch, and he died of pneumonia at the age of forty-five. The late Dr. Warren discovered the deficiency of testes soon after birth. At puberty the man's voice remained unchanged; he had no beard or whiskers, the skin of the pubes and scrotum was without hair, the penis was not larger than that of a boy ten or twelve years old, and the scrotum was contracted in size. On dissection, the skin, dartos, and tunica vaginalis were of a natural appearance, but no testes existed in the scrotum. The spermatic cord extended into the cavity of the tunica vaginalis about half an inch, and terminated abruptly in a point of a semilunar shape. It was much smaller than usual in adults. The cremaster muscle was seen extending in numerous small fibres beyond the terminus of the cord, which spread themselves out upon the tunica vaginalis. The vas deferens was properly formed, and nearly of natural size: its cavity terminated in a cul-de-sac at the end of the cord. The arteries and veins were exceedingly small, hardly distinguishable. The right spermatic cord differed in no respect from the left, except that it extended to the bottom of the scro-

tum, and turned upwards a quarter of an inch. The vesiculæ seminales were not examined. This man never exhibited any amorous propensities, or desire for female society.

Mr. Thurnam has published 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 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.* A case of monstrosity is related by Dr. Friese in Casper's *Wochenschrift*.† 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.

[On the 5th of June, 1838, I was called to examine the body of a supposed hermaphrodite, and found that the subject was a male. The penis was about an inch in length externally, and the scrotum scarcely perceptible. It contained two bodies,

* London Medical Gazette, vol. xx. p. 717.

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

which were attached by cords to the external ring. They were effete testes, presenting no remains of glandular structure, and scarcely any of tunica albuginea. The tunica vaginalis was present, and the remains of the vas deferens, spermatic artery and vein were visible. His squeaking voice, and the total absence of hair on the pubes, indicated that their wasting must have taken place in early life. The most rational conjecture is, that they were destroyed by the metastasis of cynanche parotidea during infancy.—AM. ED.]

Union of the Testes.—Geoffroy St. Hilaire has recorded the following remarkable, and, I believe, unique case, of union of the testes 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.*

* Hist. des Anomal. de l'Organ, t. i. p. 542.

SECTION II.

DEFICIENCIES AND IMPERFECTIONS OF THE VAS DEFERENS.

In Mr. Paget's case of supposed absence of the testis, it is stated that the vas deferens terminated nearly opposite the external ring in a rounded cul-de-sac ; and in Dr. Fisher's case of deficiency of both testes, that the vasa deferentia, though properly formed and nearly of natural size, terminated in cul-de-sacs at the end of the cord. Mr. Paget lately showed me a preparation contained 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 preternatural band of adhesion connected with the mesentery, and the testis 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 testis 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. Mr. Hunter, in dissecting a male subject for a side view of the pelvis, found a bag on the left side lying contiguous to the peritoneum, just on the side of the pelvis where the internal iliac vessels divide above the angle of reflection of the peritoneum at the union of the bladder and rectum. The left vas deferens

* The case is related by Mr. Lawrence in his *Treatise on Ruptures*, 5th edit. p. 271.

was seen passing on to this bag; and that of the right or opposite side crossed the bladder near its union with the rectum to join it. He traced the left vas deferens down to the testicle; but, on following the right through the ring of the external oblique muscle, he discovered that it terminated at once, about an inch from its passage out of the abdomen, in a blunt point, which was impervious. On examining the spermatic cord from this point to the testicle, he could not find any vas deferens; but by beginning at the testicle, and tracing the epididymis from its origin about half way along where it lies upon the body of the testicle, he perceived that it at first became straight, and soon after seemed to terminate in a point. The canal at this part was so large as to allow of being filled with quicksilver; which, however, did not pass far, so that a portion of the epididymis was wanting, and likewise the vas deferens, for nearly the whole length of the spermatic cord on the right side. On the left side the vas deferens began where the epididymis commonly terminates, and there was a deficiency of nearly an inch of the extremity of the epididymis. He then dissected the bag above mentioned, which proved to be the two vesiculæ. They contained mucus; but, upon the most accurate examination, he could neither discover any duct leading from them to the prostate gland, nor the remains of one. The caput gallinaginis had the common appearance, but there was no orifice to be found. The testicles were very sound, and the ducts from them to the epididymis were very

manifest, and contained semen.* In this case it appears that the vasa deferentia were not only deficient near the testicles, but terminated below in a single irregularly-formed vesicula seminalis, and had no communication with the urethra. There are a few other cases on record in which the vas deferens has been defective at the extremity which joins the ejaculatory canal. Thus Tenon, in the dissection of an infant affected with extroversion of the bladder, who died at the age of two months, 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.† 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, who died of peripneumonia, he accidentally 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 testis 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

* Works, by Palmer, vol. iv. p. 23. The parts are figured in Dr. Baillie's engravings of Morbid Anatomy, fasc. viii. pl. i. fig. 2.

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

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, according to all appearances, congenital, nevertheless the vesicula seminalis and ejaculatory canal had preserved their natural cavities.* 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.†

Mr. Paget has happily explained the origin of these several defects in the vas deferens by reference to the mode of developement of the special organs of generation. He observes,‡ after Müller and Valentin, that, in the normal course of human developement, 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 or oviduct. The testicle or ovary, as the case may be (and in their earliest periods they cannot be distinguished), is formed on the inner

* *Observ. Anat. sur les Vésicules Séminales*, Mem. de l'Acad. Roy. des Sciences à Turin, 1786-7, p. 625.

† *Diss. sistens Obs. de Vesiculæ Seminalis sinistræ Defectu, integris testibus, vase vero deferente clauso*, quoted by Dr. Vrolik, *Handboek der Ontleedkundige Ziektekunde*, 1st Deel. p. 210.

‡ *Loc. cit.* p. 818.

concave side of the corpus Wolffianum; and the seminal or oviduct, 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 developement 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 developement 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 just connexions, and become in the male the perfect vasa deferentia, and in the female the 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 testes 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.

Mr. Paget adds, that the cases by Hunter and Brugnone illustrate, in some measure, the mode of formation of the epididymis. In the former case the epididymis of the right side, "about half way along where it lies on the body of the testicle, at first became straight, and soon after seemed to terminate in a point;" and of that of the left side nearly an inch of the lower part was deficient. In the latter case "the right epididymis was almost entirely wanting; there was nothing but the head of it, which formed a number of tubules filled with semen." Müller says that the *coni vasculosi* are formed by the developement of a substance intermediate between the upper end of the primitive simple *vas deferens* and the testis, and that the body of the epididymis is produced by the mere growth and convolution of the *vas deferens*. These cases on the whole, confirm his account; but they prove also that a part of the body of the epididymis may be formed by the growth of tube from the side of the testis alone, for in all of them there was more of the epididymis than is formed by the *coni vasculosi*.

The inquiry is not without interest,—What influence have these deficiencies and imperfections in the *vas deferens* on the evolution and subsequent condition of the testis? In the case of the adult which occurred at St. Bartholomew's Hospital the

testis was small, and its structure appeared granular, like the undeveloped testis of a youth; but as it had not descended into the scrotum, and was combined with hernia, there may have been other causes impeding its due evolution. In Mr. Hunter's case, the testicles which were in the scrotum were very sound. In the case of the man related by Brugnone the testis 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 testis 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 impotency, these cases, nevertheless, tend to show that the absence or imperfection of the excretory duct does not prevent the development of the testis at the proper period, and has no direct influence in causing it to waste, and these inferences 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 testis upon that side on which the artery and vein were divided gangrened, and sloughed away. The testis 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.*—February 23d, 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. 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 testis 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 testis 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

* Anatomy of the Testis, p. 51. The testis is represented in the plate of full size.

the 25th of June following. The left testis was of its natural size, and contained spermatozoa. The right testis 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 testes 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 testes. They were plump, and filled with fluid which was found to contain abundance of lively spermatozoa.

The foregoing cases and experiments show, then, that the testes 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 organs of generation alone appearing to be the speciality upon which the sexual characters depend. The engorgement of the seminal ducts with sperm is liable, it is true, to

cause inflammation of the testis, which may end in atrophy, but this is only a secondary and occasional effect of the interruption in the excretory duct.

SECTION III.

IMPERFECT DESCENT OF THE TESTIS.

It occasionally happens that at birth one or both testes have not passed into the scrotum, being detained either in the abdomen near the internal ring, in the inguinal canal, or in the groin just outside the external ring. In a table of one hundred and three male infants examined by Wrisberg at the time of birth, it appears that seventy-three had both testes 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.* 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 cases examined, at different ages varying from five to sixty, eleven of which came under my own observation, the remainder being taken from the recorded experience of others, in ten the imperfection was on the left side, and in the same number on the right. Dr. Marshall states that in the examination of 10,800 recruits he had found five in whom the

* *Commentatio Soc. Reg. Scient. Goetting. 1778.*

right, and six in whom the left testicle was not apparent. In two of these cases there was inguinal hernia at the side where the testicle had not descended.* He met with but one instance in which both testicles had not appeared.† The testis sometimes remains permanently fixed in the situation in which it is placed at birth:‡ but in many 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 testes were retained in the abdomen, in one the descent took 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 testes had not appeared at the fourth or fifth week after parturition.|| My own observations lead me to believe that if the descent does not take place within a twelvemonth after birth, it is rarely or never afterwards fully and perfectly completed 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 descent of the testis. In cases where the testis

* Hints to Young Medical Officers in the Army, p. 83.

† Ibid. p. 207.

‡ Persons whose testicles had not descended were called *κρυφορχιδες*, or *testicondi*, by the ancients.

§ Lib. cit. p. 15.

|| Ibid. p. 203.

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.

The causes of a failure in the descent of the testis have not been much investigated; and as considerable doubt has long prevailed respecting the mode and agency by which this change is effected, no satisfactory explanation could be expected of the circumstances interrupting or preventing it. When we reflect on the nature of that process, as my researches have led me to describe it, it is clear that there must not only be a perfect adaptation of parts, a due relation between the body drawn down, 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 developement 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 descent of the gland, and that a failure in that process may be the result of deficient power in the musculus testis to accomplish the passage. May we not also conclude that this muscle is sometimes paralyzed, and that the faulty descent is owing to a want of a due supply of the nervous energy which we know is often denied to other muscles during fœtal ex-

istence, and is the cause of deformities in the feet and other parts with which infants are often ushered into the world? I think, indeed, we may fairly enumerate paralysis and defective development of the cremaster amongst the causes of the imperfect descent of the testis.

Peritonitis occasionally attacks the fœtus in utero,* and produces adhesions between the various abdominal viscera. It is well known, that in congenital hernia the testis is frequently united to a portion of intestine or omentum, and that the formation of these adhesions, previous to the testicular descent, is sometimes the cause of the displacement, the viscera being drawn down 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 descent. 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.† Wrisberg states, that on examining an infant which had only the right testicle in the scrotum, and died a few days after birth, he found the opposite gland

* Vide contributions to Intra-uterine Pathology by Dr. Simpson, Edinb. Med. and Surg. Journal, Nos. cxxxvii. and cxi.

† Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 24.

close to the ring and connected to the omentum by means of three slender filaments.* 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.† Jobert remarks, that he once found in the fœtus the cœcum adherent to the testicle, which was on the point of passing the ring.‡ In the examination of a man aged sixty, who died in the London Hospital, of phthisis, I found the right testis just external to the abdominal ring; it was small in size and closely adherent to a portion of omentum. A young man, aged nineteen, has been under my care the last twelve months, on account of an imperfect descent of the testis on the left side. The gland plays backwards and forwards through the external abdominal ring. By pressure above, it can be forced down sufficiently to admit of being examined. This testis is much smaller than the right, which is in the scrotum, and I can distinctly make out a portion of intestine closely adherent, which accompanies it in all its movements.

Mr. Hunter remarks, that the part where the testis meets with the greatest difficulty in its descent is in the division of the tendon of the external

* Lib. cit. p. 229.

† Edinb. Med. and Surg. Journal, No. cxc. p. 27.

‡ Traité des Maladies Chirurgicales du Canal Intestinal, t. ii. p. 332.

oblique muscle called the ring.* It is probable that the smallness of this opening is sometimes, also, a cause of the detention of the testis, especially in those cases in which the organ is retained within the inguinal canal. Mr. Wilson, an accurate anatomist, was of this opinion,† which is supported by the fact, that the testis is oftener found in the groin 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.‡

Mr. Hunter was inclined to suspect that the fault originates in the testicles themselves. It is difficult to understand how this can be, for as the gland is passive in this process, it can offer no obstacle, unless it grows 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 descent 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,|| and others. It may be concluded then, that the causes of a failure in the de-

* Lib. cit. p. 16.

† Lectures on the Urinary and Genital Organs, p. 405.

‡ Revue Médicale, Mars, 1840, p. 363.

§ Human Physiology, 3d edit. p. 411.

|| Ueber die Radicalcur des in der Weiche liegenden Testikels.

scent of the testis 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.

On the Condition of the undescended Testis.—Mr. 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. Mr. Hunter had seen only one case in the human subject where both testes continued in the abdomen, but this proved an exception to the above observation, since we are led to conclude that they were perfectly formed, as the person had all the powers and passions of a man. Mr. 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 a 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."*

There are very few accounts on record of the dissection of undescended testes ; and it is much to be regretted that the gland, when found in the abdomen or groin, has not oftener been subjected to a particular anatomical examination. In a case alluded to at page 96, in which M. Cloquet found the left testis situated within the abdomen, the gland was well formed, and of the same size as the right, which had descended into the scrotum. The parts taken from a young man, an apprentice of Sir A. Cooper, who unfortunately committed suicide in consequence of the infirmity, are preserved in the Museum of Guy's Hospital. I have examined the preparation ; and the testes, which are both within the abdomen, close to the internal ring, appear to be nearly, if not quite, the natural size, and it is stated that the ducts contained semen. In a lad aged 19, whose left testis was found by Dr. Bright within the abdomen, near the brim of the pelvis, the gland was considerably smaller than natural, but the ducts and secreting structure were

* Works by Palmer, vol. iv. p. 18.

quite perfect.* These are the only cases of testes situated within the abdomen, in which we have any account of the anatomical condition of the gland. In addition to the evidence they afford of the capability of testes thus placed to exercise their functions may be adduced the case of Mr. Hunter, just alluded to, in which a person, both of whose testes continued in the abdomen, had all the powers and passions of a man. On the other hand, Mr. Wilson mentions the case of a young man, twenty-five years of age, whose testes 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.†—John West, a lad aged 16, died in the physician's wards of the London Hospital, in a state of universal anasarca. The lungs were compressed by a large quantity of fluid on both sides of the chest, and the liver was extremely large. There was no appearance of beard, and only a few hairs were scattered over the pubes. My attention was particularly directed to the state of the genital organs, by observing that the scrotum, which was greatly distended with serous effusion, was not fully developed on the right side. I found the right testis within the abdomen, situated about an inch and a half above the internal ring. It was very small, not larger than that of a child two years of age,

* Hospital Reports, vol. ii. p. 258.

† Lectures on the Urinary and Genital Organs, p. 408.

and on cutting into it the gland presented the granular appearance usually remarked at that early period. The cœcum and its appendix were close to the testis, the vermiform process being connected to the part where the gland was detained by a small duplicature of peritoneum. A firm fibrous cord was connected to the lower part of the epididymis, and passing down through the inguinal canal terminated in the bottom of the scrotum, becoming less distinct in its descent. This was evidently the remains of the gubernaculum. The left testis, which was in the scrotum, was four times the size of the right. The vasa deferentia and vesiculæ seminales were sound, and of corresponding size.

It is not particularly stated in Mr. Wilson's case whether the testes were detained in the abdomen or in the inguinal canal: but assuming that they had not passed out of that cavity, as far as I can ascertain this is a solitary case of impotency occurring under such circumstances; and when we consider how various are the causes of defective sexual power, this single instance, and the case of West, which I have just related, are scarcely sufficient to confirm the opinion of Mr. Hunter, or to invalidate the general conclusion, that retention of the testes in the abdomen does not incapacitate them from performing their proper functions, a point on which it is obviously of great importance that surgeons should have it in their power to give a confident and satisfactory opinion, and relieve the anxiety of parents. At the adult period of life, the external characters of the body distinguishing the sex, and

the habits and disposition of the individual, will always materially assist in enabling the surgeon to arrive at a correct conclusion as to the efficiency of the organs when internal.

M. Cloquet gives the following account of a testis found in the left inguinal canal, of a subject forty years of age. It was flattened, elongated, and in a state of atrophy, and so small that it could not be felt externally. The epididymis was situated an inch below the testis, with which it communicated by fine white transparent vessels, running parallel to each other, and formed by the seminiferous tubes, unravelled and drawn out. The vas deferens came off from the lower part of the epididymis and entered the inguinal canal, where it passed by the side of, and internal to, the testis. The testis was situated in a hernial sac, which likewise contained omentum.* On inspecting the body of a man who died in the London Hospital of phthisis and aneurism of the aorta, at the age of forty-two, I found the left testis situated just outside the external ring. It was but little more than half the usual size, and surrounded by a tunica vaginalis, adherent in several places. On careful examination, no trace whatever of tubuli seminiferi could be detected, their place being supplied by a white but rather loose fibrous tissue. The epididymis was reduced to a few fibrous bands, and the vas deferens was small in size ; and on its being injected with quicksilver the metal passed no further than the commencement of the epididymis.

* Lib. cit. p. 23. pl. vii. figs. 2 and 3.

The other testis, which was situated in the scrotum, was of less than the average size, and the tunica vaginalis was continued for about three inches along the cord, but the structure of the gland was normal, and the tubuli were distinctly seen. In the case of an old man already referred to, and in another case of a middle-aged man, who also died of phthisis, in each of which one testis was situated just outside the external abdominal ring, the organ was found atrophied, but unfortunately in neither of these cases, which were examined before my attention was particularly directed to the pathology of the testis, have I preserved a more particular account of the state of the glands. Palletta examined the body of a man aged about fifty, who was supposed to be a *monorchis*. The spermatic vessels on the left side, as they approached the pelvis, gradually disappeared, a white transparent process alone remaining, which extended beyond the ring. The vas deferens, which was hollow near the ring, degenerated into a solid compact filament, which united to the remains of the spermatic vessels, and terminated outside the ring in dense cellular tissue near the os pubis, and connected to Fallopius's ligament. This cellular tissue sustained a series of threads of a light yellow colour, but not contained in any proper membrane, which might be considered as the remains of the testis, although the seminal vessels and vas deferens could not be distinctly traced to it.*

* Nova Gubernaculi Testis, &c. p. 112.

As far as may be judged from these dissections, the testis is more frequently found imperfect and atrophied when arrested in the inguinal canal than when confined within the abdomen. That such should be the case is not surprising. It has been seen that there is nothing in the situation of the testis in the abdomen calculated to impair its efficiency, and that its detention there may be owing to causes independent of its state of developement. No uneasiness or inconvenience is experienced, nor are the generative functions interfered with under these circumstances. When, however, the descent of the testis 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 testis, 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. When this is the case, the gland is liable to be caught at some particular part by a sudden contraction or spasm of the abdominal muscles, which gives rise to violent pain and suffering, and a sick-

ening sensation which lasts for some hours unless relieved by the hot bath, fomentations, and opiates. 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 testis was effected."*

We perceive, then, that when a testis 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 we find from dissection that such results are very liable to follow. A testis, 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 descent is seldom perfectly accomplished when delayed beyond the age of ten or twelve, I think it becomes a serious consideration in cases where the gland does not make its appearance till this late period, whether the well-being of the patient would not be best consulted by our employing some mechanical means

* Quoted in Lawrence on Hernia, 5th edit. p. 571.

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 descent of this organ, owing to the persistence of a sac ready prepared for the reception of a protrusion, and in many instances to adhesions between the testis and intestine or omentum. A hernia may occur whilst the testis is still in the abdomen, or after it has passed the ring, and the viscera may descend into the scrotum, the gland being detained in the groin. Cases of this kind are very embarrassing, as it is seldom practicable to fulfil the two opposite indications of preventing the protrusion of the viscera, and encouraging the descent of the testis. Some years ago, I had under my care a fine child, neither of whose testes 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 saw 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 appear-

ance of the testes. Now, if it be granted that a testis 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 descent, if it ever takes place, is frequently, if not commonly attended with rupture, it must, I imagine, likewise be admitted, that the advice usually given in these cases is unsound and injudicious. Had a different practice been adopted in the case of the boy just described, and a truss applied, I cannot but think that it would have contributed much more to his health and comfort than leaving him for several years subject to all the inconveniences and dangers of an unrestrained double rupture. It must not, however, be inferred, that the arrival of the testis in the scrotum is a matter of slight importance, for in all cases of imperfect descent, whether the gland be arrested in the abdomen or groin, it is nearly always small in size ; and it cannot be doubted, that the natural situation of the testis is the one best adapted for the efficient performance of its functions. Besides, the mind is very readily disturbed by any appearance of imperfection in the organs of generation, and the circumstance of the testes not having descended, is very liable to excite suspicion of impotency. I have already alluded (page 99) to an instance in which the unfortunate subject of this infirmity, a medical student, committed suicide under such an impression ; still, when there is no reasonable hope of the descent into the scrotum being fully and

completely accomplished, and when the patient is exposed to the serious inconveniences of hernia, feelings, which can generally be controlled by reason and judicious counsel, ought not to be indulged at the expense of the body. The surgeon may confidently assure his patient that the detention of the testes in the abdomen is perfectly compatible with his virility, and in cases where there are no external marks of effeminacy or other grounds for suspecting impotency, and the patient is subject to erections, I should not consider the imperfection as offering any bar to marriage. It occasionally happens, that a testis descends into the upper part of the scrotum accompanied with a reducible hernia without adhesion to the gland. In such a case the rupture may be reduced without the testis, and admit of the application of a truss, which serves the double purpose of preventing the hernial protrusion and preventing the testis from reascending. Cases, however, in which this practice can be adopted are very rare, for frequently the rupture cannot be returned without the testis, and, in many cases, it is impossible to apply the truss without painful pressure being made upon the gland.*

* The descent of the testis into the scrotum has been regarded as of such great importance, that in Germany operations have been proposed, and even practised, for the purpose of placing the gland in that situation. Rosenmerkel relates the following case, in which this proceeding was adopted. The patient was a man aged twenty-six, and the testis 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

Mr. Pott also justly remarks, in regard to the imperfect descent of the testis, "I do not know any particular inconvenience arising from the detention of a testicle within the cavity of the belly; but the lodgment of it in the groin not only renders it liable to be hurt by accidental pressure, &c., but, when it is so hurt, may be the cause of its being mistaken for a different disease, and thereby occasion its being very improperly treated. To which considerations this may be added, that there is no kind of disease to which the testicle is liable in its natural situation, but what may also affect it in any or all its unnatural ones."* The detention of the testis in the groin or abdomen must certainly be regarded as an unfortunate infirmity, and it particularly becomes so when the gland is attacked with disease. One great disadvantage of an imperfect descent, which especially attaches to the

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 testis, to which he readily assented. The skin over the testis 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 testis 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 testis 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 testis showed a disposition to return to its former position, and the cure proved tedious. Lib. cit.

* Chirurgical Works, 4to. edit. p. 352.

detention of the testis in the abdomen, was overlooked by Mr. Pott. It arises from the relation preserved with the peritoneal cavity, by which morbid actions originating in the testis are liable to extend to the parts in the abdomen; and I cannot but view the descent 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 testis 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 admitted into the London Hospital from a distance in the country, dangerously ill. His mother, who came with him, 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 seriously ill from the effects of 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; and 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. The boy's state was such, that no active means could be taken to relieve him, and he died in twelve hours after his arrival at the hospital. 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 testis was discovered close to the external ring, amongst a mass of cellular 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 testis and surrounding parts, which, extending to the peritoneum, caused the patient's death.—I was summoned one evening to the hospital to see a patient of Mr. Luke's, who was supposed to have strangulated hernia. On my arrival I found the patient, a stout labourer, aged 33, 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 testis which had been accidentally protruded at the external abdominal ring, and become 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 testis, though this appeared very probable. I ordered the man to be bled to 3xvj., 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 testis 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.

Diagnosis in Cases of Imperfect Descent of the Testis.—A testis retained in the groin at the external abdominal ring, or immediately below it, is liable to be mistaken for a bubonocoele. It often occurs that it can be pushed back partially, or completely, into the inguinal canal, but that it soon re-appears 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 testis 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 testis 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 passed 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 testis 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 testis, 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 bubonocoele on a young healthy seafaring man, who was suffering most acute pain in the groin and back. It appeared that, in the forenoon of the day before, he fell and 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 informed the apothecary, 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

* Delasiauve relates a case in which a testis retained at the groin, and inflamed, was mistaken for a strangulated hernia, and operated on. When the nature of the case was ascertained, the gland was extirpated. *Revue Médicale, Mars, 1840.*

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 bubonocoele. 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 enquiring 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.* 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 testis is to be overlooked, the deficiency not being ascertained until all attempts to reduce the supposed bubonocoele have failed, and the patient himself being often unaware of any thing unusual in the state of the parts. The late Mr. Gilbert Burnett has recorded a case in which he honestly acknowledges to having committed this error.† Two cases in which this important point was overlooked have also come to my own knowledge.

Dupuytren has recorded an interesting case of hydro-sarcocoele of the left testis 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

* Lib. cit. p. 352, case 1.

† Medical and Physical Journal, vol. lxii. p. 508.

eight or ten ounces of fluid, he extirpated the enlarged and indurated testis. The patient did well.*

Descent of the Testis into the Perineum.—Mr. Hunter first observed that the testis in changing its situation does not always preserve a proper course towards the scrotum, there being instances of its taking another direction, and descending 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 about the perineum, if these were in a perfectly natural state. The first instance of the kind that occurred to him, was the child of a shop-keeper in Oxford Street, but what became of the patient afterwards he did not know. He was consulted in a similar case by Mr. Hunt, a surgeon in Oxfordshire, who gave the following account of the patient:—"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 perinei, 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 testis or spermatic process be at any time felt in any part of the scrotum, though I can readily make the testis pass from its situation

* Leçons Orales, t. i. p. 74. edit Bruxelles.

quite up into the groin; but immediately upon removing my hand, the testis falls down into its pouch; and I can trace the spermatic cord from the body of the testis 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 testis is *in situ naturali*."

Mr. Adams has informed me that many years ago a little boy, one of whose testes had thus deviated from its proper course, was brought to the London Hospital. The testis was lodged in the perineum at the root of the scrotum. The irregularity is exceedingly rare, and the above cases are all with which I am acquainted.

This peculiar conformation is attended with great inconvenience and risk of injury to the testis, when the subject of it assumes the sitting posture, and rides on horseback. 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.

CHAPTER II.

ATROPHY OF THE TESTIS.

THE testes, like other organs formed for the exercise of temporary functions, do not arrive at a perfect state of developement until a certain period

of life, after which, their offices being no longer requisite, 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 small and contracted, and partially obliterated. In animals these changes are far more remarkable than in man; for as the functions of the testes 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 developement 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 suffers a premature decay. Under the head, then, of Atrophy of the Testis, I shall consider, 1. *Arrest of Developement*; and, 2. *Wasting*.

SECTION I.

ARREST OF THE DEVELOPEMENT OF THE TESTIS.

If the congenital lesions to which the testis is liable had not been already treated of, the cases of absence of that organ described in the preceding

chapter might be correctly referred to the present section, as the deficiency in these cases was no doubt the result of an arrest in the early developement of the organ. But the cases that I am now about to consider are those in which the subsequent evolution which the testes 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 youth 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 repeated erections, attended with 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.* 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.

* Lectures on the Urinary and Genital Organs, p. 424.

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 testicles appeared to belong to a child of from seven to eight years : he had never experienced erections or venereal desires.*—A young man was admitted into the physician wards of the London Hospital labouring under disease of the heart and dropsy, of which he died in about a month afterwards. On examination of the body, I found a considerable deposit of ossific matter in the mitral valve of the heart. Having been informed that there was something uncommon in the state of the genital organs, I made a careful examination of the parts. The youth 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 testes were very small, not larger than they are usually found in boys of three or four years of age. The two testes 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. These were clearly instances of arrest of development of the testes. As these organs are chiefly excited to action by an operation of the mind, it is easy to understand that they may sometimes remain

* Des Pertes Séminales Involontaires, t. ii. p. 380.

undeveloped owing to defective organization of the brain, an absence of sexual desires being invariably remarked in these cases. The cases which I shall hereafter adduce of wasting of the testes after injuries of the head, and the frequent absence of the venereal appetite in cretins and idiots, tend to strengthen this opinion.

The following is a marked example of defective developement of the sexual organs, accompanied with imperfection of the brain:—An idiot, aged nineteen, subject to epileptic fits, died of typhus fever in the workhouse of the Hackney Union. As the circumstances were curious, Mr. Hovell of Clapton, kindly informed me of the case, and allowed me to make an examination of the body. 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 testes 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 cremaster muscle was traced over the cord to the testis on both sides. The right gland had descended a very little way below the abdominal ring. The vessels of the cord were very small. The glandular structure and epididymis of both testicles were indistinct, and the vasa deferentia also ex-

tremely small. Nothing remarkable was observed in the structure of the brain. The vesiculæ seminales were unfortunately not examined. Mr. Hovell also showed me another inmate of the same work-house, 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.

In treating of the imperfect descent of the testis, I have remarked that this gland, when retained in the abdomen or inguinal canal, does not in general acquire its complete state of developement, and that, though frequently capable of secreting, it is commonly small in size. I have also noticed, in cases of congenital inguinal hernia, that the testis, 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 testis was not more than half or two thirds the size of the other gland. The arrest of growth in this latter case is 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.

SECTION II.

WASTING OF THE TESTIS.

In investigating the alterations in the nutritive condition of the testis, 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. According to Meckel, the weight of the testis 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 weighed numerous testicles taken from persons in health, who have been cut off suddenly by accidental violence, and from those who have died of various diseases. In healthy adults, the weight of the gland was found to vary from four drachms to one ounce and one drachm. I have fixed the mean weight at six drachms. 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 testis of an adult weighing less than three drachms as in a state of atrophy.

A testis in an advanced state of wasting, not arising from disease of the gland, usually preserves its shape, but feels soft, having lost its elasticity and firmness. Its texture is pale and exhibits few blood-vessels, 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 testis. 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 testis 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 testis. Mr. Gulliver has recently discovered fatty matter in the glandular substance of atrophied testes, and I have since had an opportunity of confirming this interesting observation. —A man aged forty-six died in the London Hospital of dropsy, consequent on disease of the kidneys. The left testis was found wasted to one fifth its natural size. In addition to the presence of adipose tissue beneath the tunica vaginalis testis, I recognised a quantity of yellow matter irregularly disposed amongst the wasted tubuli. This matter, on examination in the microscope, proved to be fat globules, and readily dissolved on the application of ether. The wasted testis with the fatty tumour above it is represented of its exact size in the accompanying engraving. The struc-



G. 1. Epididymis. 2. Body of testis. 3. Fatty deposit.

tures 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. A testis atrophied from disease is not only of diminished size and weight, but is 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. It loses its peculiar sensibility to pressure, but is sometimes the seat of morbid sensibility.

All those causes which produce decay in other parts likewise occasion wasting of the testis. Thus an impeded 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 effect the testis.

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.* Mr. Pott mentions an

* Note to his edition of Baillie's works, vol. ii. p. 315.

instance of varicocele, in which the testis became atrophied from the injudicious application of a truss which interfered with the circulation, and occasioned great distension of the vessels.* In other cases of varicocele, in which no truss has been applied, the impeded circulation caused by the dilated veins has been sufficient to produce partial wasting of the testis, a circumstance which I have observed in many instances. A ligature on the spermatic artery is sufficient to cause a total decay of the testis,† which induced C. J. Maunoir to propose its application for the removal of certain forms of sarcocele.

The influence of pressure in causing partial atrophy of the testis is sometimes remarked in old cases of hydrocele and hæmatocele, in which the gland has been long subjected to compression from the retained fluid. In long standing cases of irreducible scrotal hernia, the gland is often found much wasted, owing, it is said, to the pressure of the intestines; but I am inclined to attribute the atrophy in these cases to obstruction in the circulation through the vessels of the cord, caused both by the hernia and trusses improperly applied, as in many animals, and sometimes, also, in man, the testicles remain throughout life in the abdomen, where they are exposed to greater pressure from the intestines than in a rupture, without, however, undergoing any diminution in size. Wasting of the testes was supposed to have been produced

* Lib. cit. p. 471.

† I have repeatedly proved this by experiments on dogs.

by the compression occasioned by contraction of the cicatrix, after recovery from sloughing of the scrotum, in a case which occurred to M. Roux of Paris.*

It has been said, that the testes 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 abstinence from sexual intercourse, the testes 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, and one very hurtful to morality, to suppose that sexual connexion in early life is essential for the preservation of these organs. When the excretory duct of the testis is obliterated, so that there is no outlet for the fluid which is secreted, the organ becomes useless, and, it has been said decays. This, however, I have shown in a preceding chapter to be by no means a common result. The following is the most remarkable case I have met with of wasting of the testes, apparently from long-continued inaction:—A man fifty-two years of age, and much emaciated, was brought to the hospital in a half-insensible state, and sinking, in the severe winter of February, 1838. There was an extensive ulce-

*Jobert, *Plaies d'Armes à Feu*, p. 232.

rated sore in the perineum, through which the urine dribbled away, no water passing by the penis. The man could give no account of himself; but his wife stated that he underwent an operation in the perineum, at the hospital, about twelve years ago; that the water had passed from underneath ever since, and that he had long been out of health. He gradually sank, and died on the third day after his admission. On examination of the body both lungs were found hepatised, but the heart and abdominal viscera were sound. Both kidneys were diseased. The bladder was contracted and empty. The prostate was converted into a multilocular purulent cavity, the urethra covering it being riddled with the enlarged prostatic openings. Two ulcerated apertures, each a quarter of an inch in diameter, in the membranous part of the urethra, communicated with the sore in the perineum. The urethra was completely obliterated and impervious near the meatus, and strictured in other parts. Both testes were atrophied, being scarcely larger than hazel nuts, but the tubular structure was still apparent. There was a small hydrocele connected with the right testis. The severe disease of the urinary organs must have incapacitated this man for sexual connexion for a long period of years, and to this circumstance we must chiefly attribute the atrophy of the testes, since the organs were not otherwise diseased.

In cases of enlargement of the prostate the ejaculatory canals sometimes become completely obstructed. Under these circumstances, the semen

secreted under excitement having no means of escape encumbers the testes for a time, but afterwards becomes absorbed, and it is said that atrophy of these glands sometimes follows; but I cannot say that I have observed any instance of wasting of the organs from this cause.

As examples of atrophy of the testes, from loss of 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 testes 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.* In the xxth 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. It has been stated that the testes 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 testes gradually wasted away.†

The most common cause of atrophy of the testis is the disturbance in its organization consequent

* Cours d'Anatomie Médicale, t. v. p. 434.

† Baillie's Works by Wardrop, vol. ii. p. 315.

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 in which the testicle decayed in this way.* I have met with two 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 testis. Two cases of cynanche parotidea in the adult, in which atrophy took place in the gland chiefly affected, are related by Dr. R. Hamilton.† I have witnessed one case, in which the patient attributed the loss of the 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 consecutive inflammation, in which the epididymis is the part chiefly affected. One or both testes have been found to waste in persons who have indulged too much in sexual intercourse, or been addicted to onanism. Baron Larrey met with several cases of atrophy from excessive venery, and abuse of strong drinks, amongst the soldiers of the Imperial Guard.‡ Sir B. Brodie has recorded two cases in which wasting was occasioned by over-excitement; in one from onanism,

* Treatise on the Venereal Disease.

† Philos. Trans. Edinb. vol. ii. art. ix. p. 59.

‡ Mémoires de Chirurgie Militaires, vol. ii. p. 66.

in the other from sexual intercourse.* I have also witnessed an instance of total atrophy of the left testis from excessive masturbation. In this case, and probably in the others just quoted, the wasting was preceded by an attack of inflammation, induced by inordinate excitement.

It is a common belief that wasting of the testis is liable to be induced by the long-continued use of iodine. I have not met with any instance of it, and I know of no case 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.† Iodine has been employed much more largely and generally since the time that this opinion was promulgated, so that if it exerts the influence on the testis which has been attributed to it, we might reasonably expect that the fact would have been satisfactorily ascertained by recent experience. Such however is not the case; and I feel convinced that the effect of iodine in producing wasting of the testis, if it ever occurs, happens so rarely, that the liability to it cannot be regarded as any objection to the free and long-continued use of this valuable remedy.

Atrophy of the testes has been remarked in elephantiasis of the Greeks, a disease in which tubercles are developed in various parts of the skin.

* London Medical and Physical Journal, vol. lvi. p. 297.

† I have heard of the case of a medical gentleman who attributed loss of virile power and a diminution in the size of his testes to the continued use of iodine, but whether justly so I have no means of inquiring.

Dr. Adams, in an account of the cases of that disease, observed in the Lazaretto, near Funchal, 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.* Mr. Peacock also noticed a wasting of the testicles in several cases of elephantiasis in the Leper Hospital of Colombo, in Ceylon.† A similar condition of these glands was remarked in a case of this disease, so rare in this country, narrated by Mr. Lawrence,‡ and also in another case at the London Hospital, which I recorded many years ago.§

Wasting of the testes is liable to occur after injuries of the head. A few years ago a man who had met with an injury of this description, which had been followed by wasting of the testes, and the developement of tumours on each side of the chest, resembling mammæ, presented himself at the different hospitals in London. I saw him in March, 1828, at the London Hospital, when he had the appearance of a man who had seen hard service. He stated that 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 pre-

* On Morbid Poisons, p. 265.

† Edinb. Medical and Surgical Journal, vol. liii. p. 139.

‡ Medico-Chirurgical Transactions, vol. vi. p. 214.

§ Vide Medical Gazette, vol. vii. p. 447.

viously, in an attempt to jump over a trench in a retreat, he fell backwards, and injured the posterior part of his head. Whilst on the ground he received a bayonet wound on the left side, and a sabre cut on the forehead of the same side. 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 testis 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 traversed the extensor muscles of the head, and grazed the inferior occipital protuberance. He recovered from the injury, but the testes were reduced to a state of atrophy, and the penis shrunk and remained inactive. He also relates the 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, a portion of which was also removed. The patient lost the senses of sight and hearing on the right side, and experienced at the same time sharp pains in the course of the dorsal spine, and a sense of formication in the testicles, which organs sensibly diminished, and in fifteen days were reduced, especially the left, to the size of a bean. He soon afterwards lost all desire for, or remembrance of,

sexual enjoyment.* Hennen relates that a Portuguese soldier was struck by a shell, which shattered the superior part of the occipital bone, and drove in a portion of the left parietal. He recovered, but completely lost the generative faculty.† Lallemand had for some time under his care at the hospital at Montpellier a man thirty years of age, who, in the expedition to Algiers, had received a large sabre wound at the nape of the neck. His testes were wasted, and venereal desire as well as erections had entirely ceased.‡ We cannot doubt that in these cases the loss of sexual desire and the wasting of the testes 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 only be attributed 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.

* *Mémoires de Chirurgie Militaire*, p. 262.

† *Military Surgery*, 3d edit. p. 306.

‡ *Pertes Sémiales Involontaires*, t. ii. p. 41.

In fact, men have survived the power or desire of performing the sexual act many years without the testes being materially reduced in size. We have seen, too, that in animals the testes have been rendered useless by interrupting the vasa deferentia, without any such striking effect being produced on the glands as occurred in these cases of cerebral injury.

Wasting of the testis sometimes takes place without any apparent cause. A well-grown boy between nine and ten years of age was observed to grow more delicate in his figure for some months. His mother discovered that his testicles had almost disappeared. On examination, it was difficult to find them, and when discovered, they did not seem larger than two full-grown peas. The mother asserted that he was born with them of the usual size, and that they continued to grow for some time afterwards.* Baron Larrey relates, that in several soldiers of the army in Egypt, at the close of the campaign in 1799, the testicles almost entirely disappeared, for which he assigns no satisfactory cause.†

An investigation of the causes of atrophy of the testis is sufficient to show that we have little power by any mode of treatment to promote the development or arrest the decay of this organ. They are commonly the result of actions beyond the surgeon's reach or control. In certain cases, as in atrophy

* Lond. Medical and Physical Journal, vol. xxxvi. p. 174.

† Lib. cit. vol. ii. p. 62.

from pressure, or an impeded circulation, we may, by judicious measures, assist in retarding the wasting process; but a statement of the circumstances which conduce to this change is sufficient to indicate the means required to check its progress.

CHAPTER III.

INJURIES OF THE TESTIS.

ALTHOUGH the testes, 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.

CONTUSIONS AND INCISED AND PUNCTURED WOUNDS.

Contusions.—The testis 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 inflammatory affections of the gland 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, or in the cellular tissue beneath the tunica vaginalis. The effusion sometimes infiltrates the cord, and when the contusion has been particularly severe, it has been found to extend along the cord even to the kidney. A case of contusion of the testis, in which the extravasation reached as high as the diaphragm, is related by Petit.* 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 contusion of the testis are soon felt, and are often severe; the immediate effects of the injury resembling a good deal the symptoms produced by an injury of the viscera of the abdomen, owing to the connexion of its nerves with those of the organs in the abdominal cavity. 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, which is 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 testis, after remaining tender for a few days, is gradually restored to its former healthy state. The only treat-

* *Traité des Maladies Chirurgicales*, t. ii. p. 477.

ment 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 slowly developed shortly after the accident. These results will be considered in a future chapter of this work. So complete, however, are the disorganizing effects of a severe contusion on the gland, that squeezing the testis was one of the modes adopted formerly in the Oriental courts for emasculating the attendants of the harem;* 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 testes by compression.† 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 testis 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. These injuries must be

* A person rendered an eunuch in this way was termed *ἑλαιοῦς*.

† *Leçons Orales*, t. i.

treated according to the particular circumstances of the cases ; 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.

SECTION II.

SELF-CASTRATION.

Persons ignorant of surgery have been known, like the pious Origen, to perform double castration on themselves, 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. Yet 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 testes. 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 testes were found in the field where the act was committed. The cord was divided close to the testis 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. C. Hawkins for the following particulars of a case which occurred at St. George's Hospital at the time he officiated as house surgeon. 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.

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. 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.*

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

* Lancet, vol. i. 1838-9, p. 38.

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 his 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.*

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.†

It thus appears that these cases of self-mutilation usually do well, and that the state of mind under which the injury is inflicted does not operate prejudicially to the patient's recovery.

* Edinb. Medical and Surgical Journal, July 1837, p. 93.

† Leçons Orales, t. ii.

CHAPTER IV.

HYDROCELE.

THE term *hydrocele* is usually applied to a chronic swelling produced by a collection of fluid in connexion with the testis or spermatic cord. But before I treat of this affection it is necessary to 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. M. Roux injected, in the hospital of La Charité, the hydrocele of a middle-aged man: inflammation was developed, and appeared to be taking its ordinary course till the fourth day, when gangrenous erysipelas attacked the scrotum and surrounding parts, and caused the patient's death on the tenth day after the operation. On examining the tunica vaginalis he found that it contained a large quantity of whitish serum, in the midst of which floated flakes of albumen; other flakes of the same kind formed a thick coating over the testis, and on the internal surface of the membranous pouch. The serous membrane beneath

appeared slightly thickened, and of a deep red colour. The epididymis and the lower part of the cord were swollen, and constituted the more solid part of the tumour produced by the inflammation. The body of the testis was not increased in bulk, and it retained its natural consistence.* 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, which was presented to the college by Sir W. Blizard. It is represented in the annexed wood cut, 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 testis, though surrounded by an inflamed serous tunic, whilst the epididymis partakes in the disease, has been accounted for by Gendrin. He says, when the subserous cellular tissue, which always participates

* *Journal Général de Médecine*, &c. tom. lviii. p. 25; quoted from Gendrin, *Histoire Anatomique des Inflammations*, tom. i. p. 143.

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 testis; 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.

In the examination of a testis affected with acute consecutive orchitis supervening upon chronic, I had an opportunity of observing the effects of inflammation on the tunica vaginalis at a period somewhat later than in the case observed by Roux. The opposite surfaces of the membrane were connected throughout by loose cellular 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 changed in appearance, being thickly covered with vessels carrying red blood, and in two or three places minute branches could be traced penetrating the false membranes. The adhesions were every where so loose as easily to admit of being broken down with

the finger. On injecting with size coloured with vermilion a testis whose tunica vaginalis had been in a state of inflammation, both portions of the membrane presented a deep uniform scarlet hue. The lymph effused in inflammation becomes organized in the same way as in other serous cavities, and very often forms adhesions between the opposed serous surfaces. These adhesions after some time are rendered very firm and dense, and in old cases are often converted into a fibro-cartilaginous structure. The chief inconvenience which results from them arises from the greater exposure to injury of the testis, in consequence of its not being able to glide away from pressure so readily as before.

In a testis which I had an opportunity of examining some little while after an attack of acute inflammation, I found the lymph on both surfaces of the tunica vaginalis presenting a honeycomb or lace-like appearance, similar to that often met with on the pericardium. If inflammation of the tunica vaginalis be very violent, it may end in the formation of pus; suppuration, however, is a rare occurrence, except after the introduction of a seton or other foreign body for the cure of hydrocele, or after injections of too irritating a nature used for the same purpose. It was supposed at one time that the cure of hydrocele after injection was always accomplished by the complete adhesion of the two surfaces of the tunica vaginalis; but more recent observations have proved that in many instances these adhesions are only partial, and that in some

cases a cure is effected without any adhesion whatever. In the latter case, it seems that the inflammation produces an alteration in the secernent disposition of the vessels, so that they cease to pour out serum in a preternatural quantity as before the operation. We can thus understand how it happens that the cure of hydrocele by injection is not invariably permanent; for if the cavity remain either in part or wholly unobliterated, the vessels on the free surface of the membrane may again be called into action, in the same manner as before injection was performed. Inflammation of the tunica vaginalis is not only the most frequent disease of the testis, but it is also one of the most common affections to which the body is liable. In the different disorders of the gland this membrane usually becomes inflamed at some period or other, and adhesions between its opposed surfaces are scarcely less common than those of the pleura. In examining the testes of twenty-four adults, I found adhesions of greater or less extent in one or both glands in nine instances. 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 secondary orchitis, of which disease it is a very frequent complication. The following table exhibits at one view the different varieties and complications of hydrocele.

SECTION I.

SIMPLE HYDROCELE OF THE TESTIS.

The sac of the tunica vaginalis, like other serous cavities, is liable to dropsical effusion. In its natural state this membrane is filled by a halitus which lubricates its opposed surfaces; but when from any cause the action of its secernent vessels is increased, or the balance between the secreting and absorbent functions is disturbed, fluid accumulates in and distends the tunica vaginalis, giving rise to hydrocele. 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 almost as firm as gelatine. According to Dr. Marcet's analysis,* 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,† 100·00 parts of the specific gravity 1024 were found to contain

Water -	-	-	-	-	91·25
Albumen	-	-	-	-	6·85
Uncoagulable matter	-	-	-	-	1·1
Salts -	-	-	-	-	·8
					<hr/>
					100·00

* Medico-Chirurg. Trans. vol. ii. p. 372.

† Ibid. vol. iv. p. 72.

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. Messrs. Brett and Bird* found 500 parts of the fluid of a hydrocele, which was of a dark grumous appearance, and contained a number of brilliant crystalline lamellæ floating through it, to consist of

Water	-	-	-	-	441.50
Albumen and colouring matter of the blood	-	-	-	-	51.07
Cholesterine	-	-	-	-	5.40
Animal matter and salts soluble in alcohol	-	-	-	-	.90
Animal matter soluble in water	-	-	-	-	.76
Salts	-	-	-	-	.37
					<hr/> 500.00

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 only nine grains. In the examination of a testis taken from the body of a man of colour, who died at an advanced age from the effects of an enlarged prostate, 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, when dried, was found to be almost entirely composed of crystals of cholesterine.

* Lond. Med. Gazette, vol. xii. p. 764.

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.

The quantity of serum which is suffered to accumulate 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.* 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.†

In simple hydrocele the testis is usually 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 testis may be con-

* Sir A. Cooper's Lectures, by Tyrrel, vol. ii. p. 92.

† Gazette Médicale de Paris, 1838, p. 562.

nected to the membrane in front ; in which case the serum accumulates on each side of, or above and below, the organ. Sometimes there are several adhesions, producing a sacculated arrangement, and forming what is termed a *multilocular hydrocele*. 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, separating it into two distinct cavities, formed by a layer of false membrane. There is one kind of sac or pouch often met with in hydroceles which does not appear to have been described. It is situated on the inner side of the testis ; 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 in the Hunterian Collection were shown me by Mr. Paget. One of them is represented in the accompanying figure. In large hydroceles the epididymis is usually 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 testis.

1. Aperture of the pouch, between the body of the testis 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 only hernial sacs. The fibres, also, of the cremaster muscle, having to support an increased weight, frequently become remarkably developed, and extend around the tumour. This, however, is not constantly the case; for in some instances of hydrocele of large size I have found this muscle atrophied. The thickened sac after many years acquires a cartilaginous character, and it may even become more or less ossified. In cases which have been frequently tapped, the sac is sometimes found closely adherent to the skin of the scrotum at the various points perforated by the trocar. In the collection formed by the late Sir A. Cooper there is a preparation (*vide* figure) showing a long narrow band of adhesion, passing from the anterior part of the testis across the dilated sac of the tunica vaginalis to the membrane in front, which is supposed to have resulted from a wound of the testis in the operation of tapping. Scarpa was the first to notice that in all large hydroceles the spermatic vessels are separated and transposed, so that the artery with the vas deferens occupies one side of the



watery tumour, and the veins the other side; and sometimes both of these vessels, in the manner of a band, pass on both of the sides, or even upon the anterior surface of the vaginal coat at its lower part.*

In hydrocele the glandular structure of the testis is sound, and the organ capable of exercising its functions. The disease is strictly confined to the investing serous tunic. The testis 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 from the same cause.

Hydrocele is a very common disease in persons of all ranks in life, and in most climates, but more particularly in warm countries. It has been remarked by surgeons in extensive practice in London, that a large number of the patients who apply to them for the relief of this affection have passed several years in the West Indies, or some other warm country. Dr. Farret† has noticed the frequency of hydrocele in Barbadoes; and, according to Mr. Martin, it is a very common disease amongst the natives of Lower Bengal.‡

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

* Treatise on Hernia, tr. by Wishart, p. 74.

† Medical Records and Researches, p. 182.

‡ Trans. of Med. and Phys. Society of Calcutta, vol. vii. p. 204.

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*

In a table† of 1000 cases of hydrocele treated by iodine injection 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.

* *La Presse Médicale*, Mai, 1837.

† 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.

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	325	630	370	1000

Gazette Médicale de Paris, tom. xvi. 1838, p. 561.

Hydrocele is generally single, but sometimes occurs on both sides. It is said more frequently to form on the left side than on the right. Of forty-three cases which occurred to M. Velpeau, in thirty the hydrocele was on the left side, and in nine on the right; in four cases the side was not indicated. Of thirty-six cases observed by M. Gerdy,* in eighteen the disease occurred on the left side, in thirteen on the right, and in five on both sides. During the last few years I have carefully registered the new cases of hydrocele coming under my notice in public and private practice. Of fifty-four cases of simple hydrocele, forty-nine were single, and five double. Of the former, twenty-seven occurred on the right side, and twenty-two on the left. This result, which gives a slight predominance to the right side, does not therefore agree with the observations of Velpeau, Gerdy, and Dujat. In the table constructed by the latter, it will be seen that the disease prevailed rather more on the left side than on the right. Hydrocele in young infants is usually single, and, in my experience, more frequent on the right side. I have seen, however, a few cases of double hydrocele at this early period. A child six weeks old was brought to me on account of a hydrocele the size of a hen's egg on the right side, and another little more than half that size on the left; neither of them had any communication with the cavity of the abdomen.

Dropsy of the tunica vaginalis is usually regarded

* Archives Générales de Médecine, 111 ser. tom. i. p. 60.

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. I shall hereafter have occasion to mention that hydrocele is often combined with inguinal hernia; a disease obviously very favourable to the effusion of serum in the tunica vaginalis, owing to the pressure of the rupture on the veins of the spermatic cord, and which is often increased by the use of trusses and bandages. Hydrocele is occasionally developed after a violent strain or great fatigue, or after a slight blow on the gland 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 testes, 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 testis by the accumulation of fluid in the cells of 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 disease and enlargement of the testis, the swelling is termed *hydrosarcocele*. 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 testis is the original complaint and source of the irritation that excites an undue secretion from the tunica vaginalis, acting much in the same way as a tumour in the abdomen does in occasioning increased secretion from the peritoneum; or as a tumour in the chest, or carcinomatous disease of the lungs, in producing pleuritic effusion.

Symptoms.—Simple 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 testis. The swelling is movable, but remains constant under pressure; and in all positions of the body, and if not 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 testis is situated, the opacity there indicating the exact position of the gland. When the hydrocele is of considerable size, the integuments are rendered very 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. But its course 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* 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 within it the swelling assumes a pyramidal and elongated form, and the relative situation of the testis is

* Neue Medicinische-Chirurgische.

lower than in ordinary cases. Owing to a peculiar conformation of the tunica vaginalis, there is occasionally a slight contraction in the centre of the hydrocele, giving to the tumour the form of an hour-glass. When, too, the testis is adherent to the front of the sac, the serum accumulating on each side, or above and below, causes the swelling to assume an irregular shape. Fluctuation is sometimes obscure, and in other instances is not distinguishable at all, in consequence of the tension and thickness of the sac and membranes investing it. If the sac happens to be loose and not fully distended, the testis may sometimes be felt. This is often the case in children.

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."*

* Works, 4to. p. 394.

parency, as a sign of hydrocele, is rather 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 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 testis, which is always important before undertaking any operation. In cases of encysted hydrocele, or adhesion of the testis to the sac, the unusual situation of the gland may thus be detected, and risk of injury to it be avoided. The mode of making the examination generally adopted is to darken the room, and place a lighted candle so that the tumour may be interposed between the eye and the light. The testis is then readily recognised as an opaque object, and its situation exactly ascertained. In cases in which the parietes of the cyst are unusually thick, or the fluid is very dark-coloured, I have sometimes derived considerable assistance from using a wooden tube, about three quarters of an inch in diameter, open at both extremities. One end being placed against the swelling opposite the light, the surgeon,

on looking through the other, can observe the transparency with great advantage. If a more convenient tube be not at hand, a roll of writing paper will answer the purpose. 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 originated in and been kept up by some disease of the testis. 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. I have not exactly observed this change; but it has been so often mentioned to me by persons affected with hydrocele, that I entertain no doubt of the fact; and since the extent of surface afforded by the dilated tunica vaginalis is large, and the condition of the parts during day and night very different, such variations in size consequent upon alterations in the functions of secretion and absorption do not appear at all unlikely to occur. 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 testis can-

not 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 testis. 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 only be traced indistinctly along the back part of the swelling, and sometimes cannot be distinguished at all. The testis cannot be felt; but in hernia, unless congenital, the gland 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, nearly to or even into the ring, as in this case the cord cannot be felt; and the shape of the tumour nearly resembles that of a scrotal hernia, and there may even be a slight impulse transmitted to it on coughing; but attention to the other distinguishing marks which have been pointed out will always be sufficient to enable the surgeon to make an accurate diagnosis.

To distinguish simple hydrocele from malignant

disease of the testis is not difficult, unless the parietes of the sac containing fluid be much thickened. But when the cyst is so thick and dense as 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 testis 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 testis 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 testis, 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 not met with many 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 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 consist of a hydrocele, the sac of which was cartilaginous and much thickened, and the contents a soft oleaginous kind of 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 schirrous 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 schirrus, the case was found to be a hydrocele, with cartilaginous thickening of the tunica vaginalis.*

Treatment.—Though hydrocele is a disease free

* Leçons Orales, tom. i. p. 49, edit. Brux.

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 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 of the spontaneous disappearance of a confirmed hydrocele in the adult. 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.* Sir B. Brodie also mentions that he has met with two examples of the spontaneous cure of hydrocele. In one of them the removal of the disease appeared to have resulted from inflammation set up in the sac.† A hydrocele has also 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.

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, will generally cause the removal of the fluid. In many instances I have found it quickly disappear by occasionally painting the scrotum with the tincture of iodine. 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

* Lib. cit. p. 413 and 414.

† Lond. Med. Gazette, vol. xiii. p. 90.

needle, which will allow the greater part of the fluid to drain away. This is the only operation that I 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 states that he has succeeded in removing hydrocele by blisters;* whereas Sir A. Cooper remarks that he has tried repeated blistering without producing a cure.† I have applied blisters and the *linimentum hydrargyri* in several instances, and have also been unsuccessful.‡ In the two following cases I succeeded in removing hydrocele by external treatment.—A man aged forty-five, and in good health, came under my care at the London Hospital in 1838, on account of a chronic hydrocele on the right side which had appeared gradually without any obvious cause. It was first observed about three months before; but as it had attained an inconvenient size, and was getting somewhat painful, he was induced to apply for relief. The tumour being very tense, I at once

* Leçons Orales, tom. iv. p. 239, edit. Brux.

† Lib. cit. p. 178.

‡ Blistering the scrotum is not always free from risk. M. Gerdy relates a case in which gangrene of the scrotum occurred after the application of a blister for the removal of hydrocele in a man sixty years of age. Archives Générales de Médecin, 111 ser. tom. i. p. 70.

introduced a trocar, and drew off twelve ounces of serum. The testis was then felt healthy in size and structure. I saw the man again in three days, at which time the swelling had increased to nearly half its former size, and was tender on pressure. Being desirous of attempting the cure of this complaint on antiphlogistic principles, and considering a case seen at so early a period favourable for the experiment, I directed four or five leeches to be applied to the scrotum twice weekly, the parts to be supported and kept cool with an evaporating lotion, and the bowels to be gently acted on with saline purgatives. This plan of treatment was pursued steadily for three weeks, during which period the swelling gradually decreased, and when all but entirely removed the man discontinued his visits. —A corpulent gentleman, fifty-one years of age, called to consult me on account of a hydrocele of the right testis, 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 hydro-

cele 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 cellular 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. In a French periodical a case is mentioned by M. Serres 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.*

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*.

* Lancette Française.

Palliative Treatment of Hydrocele by Operation.

The palliative operation is exceedingly simple, of easy performance, and, if proper care be taken, free from danger; but the relief it affords is only temporary. 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 about the centre of the anterior part of the tumour; but the surgeon should first ascertain the situation of the testis, 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 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 treatment of hydrocele 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 vessels, which by pouring blood into the tunica vaginalis may change the case to one of hæmatocele. The operation is therefore generally performed with a trocar, the canula of which is about two inches long and a line in diameter. In selecting an in-

strument 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 testis 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, perpendicularly into the tumour 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 instrument should be inclined upwards, in order to avoid injury to the testis, and the trocar 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 testis 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 plaister to cover the wound: the scrotum is to be suspended in a bag truss. The patient should be enjoined 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.*

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 cellular tissue 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 testis. 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 persons suffer pain and uneasiness from only

* Lib. cit. p. 181.

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 cellular tissue surrounding the sac, whence it is afterwards removed by absorption. In this operation, which is termed *acupuncture*, anarsarca 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 communication by means of the cataract needle, between the cavity of the tunica vaginalis and the cellular tissue of the scrotum.* 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;† 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.‡ Mr. Lewis's practice is to puncture the tumour with a fine needle until a drop of fluid oozes out on withdrawing it, and in a few days the hydrocele will entirely disappear. 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

* Edinb. Medical and Surgical Journal, vol. xxiv. p. 97.

† Lancet, vol. ii. 1835-36, p. 206.

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

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 the œdema extend 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 cellular 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 re-accumulation 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 certainly accords with my own experience of this operation; for, in six cases in which it was performed, the relief proved so far permanent that there was no return of the hydrocele after a period

of many months, when I lost sight of my patients. Similar success has attended this practice in the hands of several of my professional friends with whom I have conversed respecting it.* The cure of the disease in these cases, as well as the slow re-accumulation in others, I conclude are owing to the support and compression afforded to the vaginal sac by the infiltration of the surrounding cellular tissue: they are not likely to arise from any inflammatory change in the containing membrane.

Acupuncture must be regarded, upon the whole, as a useful addition to our remedial measures for the treatment of hydrocele. 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; and the chance of permanent benefit which it offers is too slight to add much to its value as a means of treatment. 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

* Two cases cured by acupuncture have been published by my friend Mr. Walne in the Medical Gazette, vol. xxix. p. 949.

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.*

Incision.—The treatment by incision is the most ancient of all the methods which have been employed for the cure of hydrocele. 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 testis. The wound is then dressed; inflammation soon arises, and the tunica vaginalis becomes obliterated by adhesion; or else suppuration ensues, and the

* 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 has 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.

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 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."* 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.†

My brother, Mr. H. Curling of Ramsgate, informs me that when in Paris he witnessed 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 tunica vaginalis was evidently less disposed to inflammation than usual. Incision is an operation rarely

* Lib. cit. p. 441.

† Treatise on Hydrocele.

resorted to in the present day ; and I quite concur in the general opinion, that the disease can be successfully treated by milder and safer means. When, however, a hydrocele is found to depend on the presence of loose cartilages in the sac, a small incision for their removal is the only treatment that can be of service. The wound should afterwards be closed, and the admission of air as much as possible prevented.

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 testis 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.* 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 now nearly exploded. I have only once seen it practised, and that was in the case of a young man, in which the tunica vaginalis was remarkably thickened, after the operation of injection had failed. The symp-

* Treatise on Hydrocele, p. 136.

tomatic fever which followed was mild, and the operation successful, the wound having healed completely in three weeks.

Mr. Kinder Wood, a provincial surgeon, has practised a modification of the operation of excision,* which is deserving of notice. He opened the tumour with a broad-shouldered lancet in the customary situation, the lancet in consequence of its figure making a larger incision into the external covering than into the tunica vaginalis. After the evacuation of the water through the opening, a small portion of the tunica vaginalis which presented at the internal opening was slightly hooked with a small dissecting hook, and a portion so brought forward through the incision was cut off with a pair of fine scissors. The puncture was then closed, and supported with adhesive plaister. In three cases in which this operation was performed the wound afterwards healed by the first intention. In two of them there was no return of the hydrocele when the part was examined several years after the operation; and in the third he remarks, "A sufficient time has elapsed to decide upon its certainty." In these three cases the cure was completed without an abolition of the cavity. They were instances of a perfect cure of the disease, and not of one effected by the obliteration of a natural membranous sac. In a fourth case in which this operation was tried, it was succeeded by severe inflammation of

* Observations on the Cure of Hydrocele without procuring an Obliteration of the Sac: Medico-Chirurgical Trans. vol. ix. p. 38.

the testis ; the patient, however was an unfavourable subject. It is not recommended in cases in which the sac is much thickened and indurated.

This operation, being neither severe nor dangerous, must be viewed quite in a different light from the old method of excision. Mr. Wood's report, although his experience at the time it was published was very limited, is upon the whole favourable ; but the advantages which he claims for this mode are not such as appear to me to entitle it to any preference over injection. Dr. Titley states that he tried it on six patients in the West Indies ; and although in some of them a very considerable portion of the tunica vaginalis was removed, yet it proved in every case unsuccessful.* We must conclude, therefore, that the mild form of inflammation which Mr. Wood considers fit to supersede the morbid state of the vessels, the cause of the effusion, cannot be insured by his plan with that degree of security and certainty which alone would recommend its adoption in practice.

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 or granulation. The effects of the caustic are represented

* Treatise on the Diseases of the Genitals of the Male, p. 340.

in the woodcut at page 146. In the preparation there is a small aperture in the tunica vaginalis about a quarter of an inch in diameter, produced by a slough, 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, a cautious man, and 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.*

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.

* 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.

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 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.* 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 resorted to for the cure of hydrocele.

Seton.—The use of the seton is a mode of treatment the invention of which is ascribed to the

* Mémoires de Chirurgie Militaire, tom. iii. p 407.

Arabians. It appears to have remained in disuse for many years before the time of Mr. 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,* who states that in less than twenty-four hours after the introduction of a seton consisting of coarse sewing silk, 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 seton is a better mode of treating 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 produce more inflammation than is requisite for the cure of the complaint. It is still, however, employed, and is found a very useful remedy in certain forms of the disease. Thus in cases of children affected with hydrocele, which does not disperse under

* Treatise on the Hydrocele, p. 70.

the application of stimulating lotions, it is a common practice to pass an ordinary curved needle armed with a silk ligature through the skin and sac in front of the swelling, leaving a space of about an inch or an inch and a half between the ends of the ligature, which may be tied together to prevent its escaping. This soon excites inflammation in the sac, and causes the effusion of lymph; and in three or four days or a week the silk thread is removed, and the hydrocele is subsequently cured by adhesion. I have also adopted this plan with success in encysted hydrocele of the cord, and in ordinary hydrocele of small size in the adult, and once in a larger one after the operation of injection had failed. Mr. Green of St. Thomas's Hospital has recently advocated the plan by seton, in preference to that by injection.* His mode of performing the operation is nearly the same as that employed by Mr. Pott; but there is this important difference, that the seton is retained a much shorter period, the average time being twenty-four hours, though it will vary in different instances. In three of the eight cases treated on this plan which are reported, the reintroduction of the seton was necessary. In one case the cellular 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.

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

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, I think, induce few to prefer the seton to the treatment by injection in ordinary cases of simple hydrocele.

Injection is a plan of treatment alluded to by Celsus, who advised the use of a solution of nitre. Lembert, 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 of injection, however, appears 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.* 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,† surgeon of

* Munro on the Dropsy, 3d edit. p. 222.

† The first edition of his *Treatise on the Radical Cure of Hydrocele by Injection* appeared in 1791.

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.

The apparatus requisite for the operation of injection is a trocar and canula, and an elastic caoutchouc bottle or brass syringe, capable of containing about four ounces of fluid, fitted with a movable brass tube furnished with a stop-cock. I generally perform the operation on the patient standing; but it may be done equally well in the recumbent position, which is preferred by many surgeons. 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 elastic bottle is to be applied to the canula, and the stimulating liquid injected gradually until the tunica vaginalis is slightly distended. Before throwing in the fluid, the surgeon should endeavour to nip up the skin and tunica vaginalis around the canula with the thumb and forefinger. The quantity of liquid necessary to be injected is always much less than the amount of serum previously removed. The object of the operation is to apply a stimulating fluid to the entire surface of the sac; and this may be accomplished with a small quantity,

as an ounce or an ounce and a half, by handling the scrotum, and in this way putting the fluid in motion after it is injected, so as to bring it in contact with every part of the serous membrane. When the tunica vaginalis is fully distended, part of the fluid is liable to be forced out, or to escape by the side of the canula into the scrotum, where it may cause inflammation and gangrene. If the fluid should not pass easily, the surgeon must immediately stop injecting; for most probably the canula has slipped out of the sac, so that by persisting the surrounding cellular tissue would become infiltrated. Whilst the canula remains in its proper place there can be no impediment to the free passage of the fluid. After the injection has remained in for a few minutes, the stop-cock tube is to be withdrawn, and the fluid pressed out through the canula; which being removed, the aperture in the scrotum may be closed with a piece of adhesive plaister.

Different surgeons employ different kinds of stimulating fluids for injection. Sir James Earle gave the preference to dilute Port wine, which is still commonly used in this country, in the proportion of one third, or one half, water. Solutions of alum, or of the sulphate of zinc (3j—3xvi), are also frequently employed. Other fluids have been used, as cold and warm water, and dilute spirits of wine; and it is stated that the cure of hydrocele has even been effected by the injection of air and of chlorine gas.* The fluid which I generally employ is lime-

* British and Foreign Medical Review, vol. xi. p. 267.

water. Though a mild injection, it usually excites sufficient irritation to cure the disease; and I have rarely had occasion to resort to fluids of a more stimulating nature. Injections, composed of the tincture of iodine diluted with water, have lately been employed by several English and Continental practitioners, who have reported most favourably of their success. The peculiar advantages which iodine injections have been represented to possess will shortly be considered.

The fluid injected into the tunica vaginalis should be allowed to remain there from four to six minutes in the adult, and about two or three minutes in younger persons. In general the patient soon feels sick and faint, and experiences uneasiness in the course of the cord. The pain is sometimes so severe that the removal of the injection becomes necessary at the termination of a minute or two; in other instances it may be retained for ten minutes, or even a longer period. The amount of inflammation which may be excited cannot always be estimated by the degree of pain caused by the injection. There is great difference in the susceptibility of persons to stimuli; and although inflammation is more readily excited in some than in others, its amount and intensity do not equally depend on the irritability of the individual. When, therefore, the suffering produced by the injection is considerable, the surgeon must not be too hasty in removing the fluid; or he may find to his disappointment that, after the pain has subsided, sufficient action has not taken place for the cure of the complaint. Unless

the pain be very acute, the fluid should not be withdrawn before the usual time.

The success of the operation depends a good deal on the after-treatment. If too much inflammation 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 pain or other symptoms arise the surgeon must endeavour to excite it. Sir A. Cooper has laid down the following rules for the patient;—"If you be in much pain, lie down; if you suffer but little, take exercise;—if you be in much pain, eat very little, and drink only diluents; if you suffer but little, take your dinner, and two or three glasses of wine. Come to me to-morrow."* He observes, "If on the morrow there be redness in the scrotum, considerable tenderness, and some swelling, the suspensory bandage is to be worn, the exercise to be moderated, and the diet is to be light; but if there be little appearance of inflammation, it is right to grasp the scrotum in one hand, and gently tap it a few times with the other, to produce slight pain. Exercise and a generous diet are to be recommended until redness of the scrotum, swelling, and pain in the part be produced; for the inflammatory swelling from the injection should be nearly as great as the enlargement which had been previously produced by the disease." My own experience does not incline me to rely much on the prudence of the patient in regulating the measures

* Lib. cit. p. 187.

to be pursued after the operation. If, as generally happens, symptoms of inflammation arise in the course of a few hours, I usually recommend the use of a suspender to keep the testis supported, and direct the patient to remain in the recumbent position until the acute symptoms begin to subside. If these precautions be neglected, there is risk of more inflammation being excited than is necessary. 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 testis may be handled, so as to occasion slight friction between the surfaces of the tunica vaginalis, in order to induce the requisite vascular excitement. If the swelling should become considerable, and the pain and constitutional disturbance be great, the activity of the inflammation must be moderated by leeches, saline purgatives, or tartar emetic, as in the treatment of acute orchitis. It sometimes happens that the inflammation goes on to suppuration, and occasions an abscess in the tunica vaginalis. I have never witnessed this; but when it occurs an incision must be made through the integuments and sac, in order to permit the free escape of the pus. Granulation will then ensue, and the cavity of the tunica vaginalis will become completely and permanently obliterated. Sir B. Brodie remarks, that he has never known suppuration to occur after the operation by injection, except in West Indians, and in them only in three out of a great number of cases. In these cases the injected fluid was not made stronger than usual, but was

even retained a shorter time—in one case only a single minute—and yet the inflammation was excessive; there was violent pain, and great constitutional disturbance.* It may be well to bear this observation in mind, so that in operating on persons from warm climates the injections may be of a mild character.

I never inject a recent hydrocele, or one, however small, the first time of tapping, as it occasionally happens that the fluid ceases to collect after its evacuation. When the fluid amounts to more than ten or twelve ounces the hydrocele is unfit for injection, because the extent of the serous surface in large hydroceles is liable to render the effects of this treatment more severe than is desirable. In these cases it is better to draw off the fluid, and then wait until a smaller quantity is formed, when the operation may be undertaken with less risk. The surgeon should also be careful to ascertain that the dropsical effusion is not dependent on existing disease of the testis. 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 testes, 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

* London Medical Gazette, vol. xiii. p. 93.

the diseased condition of the testes would probably have been detected, and injection, which could only have operated injuriously, would have been abandoned. The fluid effused around the diseased testis by producing pressure sometimes causes pain, and it may then be evacuated with benefit; but I need scarcely add that to attempt the permanent removal of the hydrocele whilst the original disease remains unsubdued, would be both fruitless and hurtful. The disease producing the enlargement of the gland must be treated without reference to the effusion, and it will commonly be found that as the affection of the testis subsides the hydrocele likewise disappears. Thus in several cases of hydrosarcocele consequent on an attack of orchitis, in which after drawing off the fluid the testis has been found tender as well as enlarged, I have succeeded by the exhibition of small doses of mercury, and by strapping, or by applying mercurial or iodine ointment to the part, in subduing the chronic inflammation of the gland and effecting the cure of the hydrocele. In some instances, however, in which inflammation of the testis or epididymis is the primary disease, the hydrocele and disposition to an increased secretion remain long after all morbid action has ceased. The case must then be regarded in the same light, and treated in the same way, as ordinary hydrocele; but the surgeon will do right to recollect that where inflammation has once been excited, its return is usually induced more readily and by slighter stimulating causes than before. An enlarged and indurated testis or epididy-

mis 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 the operation of injection is followed by only slight pain, tenderness, and swelling, and by scarcely any constitutional disturbance; and when performed with care it is devoid of danger. The chief risk arises from the stimulating fluid being injected into the cellular membrane around the tunica vaginalis instead of into the sac, owing to the canula slipping out of the opening. This accident is commonly succeeded by diffuse inflammation of the cellular substance of the scrotum, which is very liable to produce suppuration and gangrene, and in persons advanced in life or of a debilitated constitution it has caused the loss of life. An unfortunate case of this kind must be treated upon the same principles as a case of extravasation of urine. Free incisions should be made into the scrotum at a depending part, in order to allow of the escape of the irritating fluid, and fomentations and cataplasms afterwards applied. If gangrene ensue, the patient's powers will probably require to be supported by wine, brandy, and bark or ammonia. This accident never ought to happen, for it may always be avoided by proper care and caution: even when it does occur, it is 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 liable

to attend this operation is an attack of tetanus. I am informed by my friend Mr. Edwin Quekett of Wellclose Square, that a patient upon whom he had performed the operation was afterwards seized with locked jaw, which proved fatal. It is stated that in a native of the South of Spain, whose hydrocele had been injected by Sir A. Cooper, tetanus supervened: the patient fortunately recovered.* Mr. Travers mentions that similar consequences have attended this operation in the West Indies.† An attack of tetanus is, however, so rare an occurrence, many thousands having undergone injection without an attack, that so remote a liability cannot be regarded as constituting the slightest objection to the performance of the operation.

In six or seven days after the operation the pain and swelling generally begin to subside, and in about three weeks the cure is usually accomplished, all the effused fluids having been removed. But sometimes, especially if the inflammation has been unusually severe, this process takes place more slowly, the cure not being completed for two or three months. I have already observed that though injection sometimes effects a cure by producing complete adhesion of the surfaces of the tunica vaginalis, it more commonly happens that the adhesions are only partial, and that the effusion is often checked merely by an alteration in the secernent disposition of the vessels. When adhe-

* *Prov. Med. and Surg. Journal.*

† *Inquiry into Constitutional Irritation*, part ii. p. 293.

sion is complete the cure is permanent, and the patient free from all liability to a relapse; but if the hydrocele is 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 reappeared at the end of ten, and even twenty years. In cases in which the operation fails, the injection may be repeated with a more stimulating fluid. We sometimes find the tunica vaginalis indisposed to contract adhesions, or to undergo any change in its actions, since highly stimulating injections repeatedly fail to prevent the return of the dropsy. In such cases the surgeon is compelled to resort to some of the other operations for the radical cure which are of greater severity than injections; as the seton, or incision.

In double hydrocele injection should not be performed on both sides at the same time; for not only may the effects of a double operation prove very severe, the degree of inflammation and suffering produced being always uncertain; but the injection of one 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 Hotel 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.* I am inclined to think these patients were fortunate, and that few surgeons have met with similar success from a single operation. The second hydrocele may be injected as soon as the effects of the first operation have subsided, and its result has been ascertained.

Iodine Injections.—These were first tried by Mr. Martin, a surgeon in India.† He used the tincture in the proportion of ʒij—3vj 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 recent report of cases of hydrocele thus treated at the Native Hospital of Calcutta,‡ 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	“	Mahomedans,
52	“	Christians.
<hr/>		
2393		

And it appears that the failures were rather under one per cent.; a result which must be regarded as remarkably successful. The success and safety of iodine injections must be in a great measure attributed to only a small quantity of fluid having been

* *Lancette Française*, Février, 1837.

† *Transactions of the Medical Society of Calcutta*, vol. vii.

‡ *Lancet*, April 30, 1842.

thrown into the sac, so that risk of cellular effusion was avoided, and to the retention of the fluid insuring the excitement of sufficient inflammation to cure the disease. Iodine injections have since been tried in Europe, by Velpeau, Ricord, and others, at Paris; by Oppenheim at Hamburgh; and by several surgeons in this country. The success which attended the practice of the former, as appears from their reports,* has not been greater than that commonly obtained in England with other injections in the hands of judicious practitioners. Mr. Walne has published an account of the results of his practice with iodine injections in this country,† and has narrated four cases, selected from many others, in which they were successful. He reports very favourably of the plan, which, he states, produces a mild degree of inflammation, but slight suffering, and an expeditious cure. He allowed, however, the injection afterwards to escape from the sac instead of retaining it, as practised by Mr. Martin. Mr. Bransby Cooper also states that he has employed iodine injections in hydrocele with marked success. He injected two drachms of the fluid of the same strength as that used by Mr. Martin, and also left it in the sac.‡ I have found injections of lime-water answer so well that I have had no inducement to make trial of new remedies, and cannot therefore speak from personal experience of the

* Vide Dublin Journal of Medical Science, vol. xiv. p. 219. La Presse Médicale, Mai, 1837.

† Medical Gazette, vol. xxix. p. 949.

‡ Prov. Med. and Surg. Journal.

efficacy of iodine. But I much question whether this injection possesses such superior advantages as have been represented by many who have employed it. I do not believe that it exerts any peculiar or specific influence on the serous sac ; like other injections it can only act as a stimulant exciting to inflammation,* and like them it is liable occasionally to fail, owing to differences in the susceptibility of individuals. Indeed, several of my medical friends, including Mr. Busk, surgeon of the Dreadnought Hospital, who have tried iodine injections, have assured me that though usually successful, they did not answer better than port wine, and that in many cases their effects were equally severe. The evidence, however, in favour of this injection in hydrocele is so strong, that we cannot hesitate to admit that it is a valuable and efficacious mode of treatment, and perhaps as successful as any other injection which has been resorted to for the cure of the disease. We must too, in justice, allow that it is a remedy which has been skilfully and judiciously employed, and that the strength of the injection, as first used by Mr. Martin in India, is well adapted to excite the exact amount of inflammation required.

In employing this injection, Mr. Walne recommends that those parts of the instruments which are metallic should be protected against the action

* In a case of hydrocele successfully treated with iodine injection, M. Velpeau had an opportunity some time afterwards of examining the parts ; he found cellular adhesions established through the whole of the tunica vaginalis. Archives Générales de Médecine, Janvier, 1837.

of the iodine by being carefully oiled beforehand, and freed from what may remain upon them by being dipped into a solution of potassa immediately after being used. If some care of this kind be not bestowed, they will quickly be corroded and injured, the affinity of iodine for metallic substances being very strong, and its effect destructive.

[*Electro-puncture* has been recently proposed for the cure of hydrocele. It is performed by introducing two acupuncture needles into the sac and connecting one to the positive and the other to the negative pole of a Daniel's constant battery. The action may be kept up from ten minutes to an hour. Dr. Ruschenberger of the U. S. Navy succeeded in curing a case after both seton and injection with iodine had failed, by a single introduction of the needles kept excited for half an hour. Dr. Washington of New York has at this time a case under treatment which promises to be entirely successful.—AM. ED.]

A careful examination into the merits of the various modes of effecting the radical cure of hydrocele fully establishes the superiority of the treatment by injection. The great error formerly committed by surgeons in endeavouring to excite a high degree of inflammation arose from a mistaken view of the object to be attained; for not perceiving that the exudant secretion could be arrested by altering the action of the vessels of the part, they thought it necessary to obtain the ob-

literation of the natural cavity, which, moreover, they endeavoured to effect by producing suppurative inflammation of the membrane, instead of by the milder process of adhesion. In recent days, surgeons have sought to improve the treatment of hydrocele by reducing the amount of inflammation to the lowest possible standard, and have nearly fallen into the opposite error of suggesting plans too mild to be efficacious and sure. 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; if properly performed, it is free from danger; and it frequently 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, if not a probability, of a relapse at some future period, many of the causes conducing to hydrocele still remaining; whilst the inconvenience produced by an impediment to the free movements of the testis, in cases cured by adhesion, is regarded as too trivial to be any disadvantage. But, in the absence of data* showing the degree to which the

* These data cannot be readily obtained, since, to be satisfactory, the result of the operation must be noted to the close of the patient's life. I have lately tapped a hydrocele which had been removed by

disease is liable to return after the cure without adhesion, I feel perfectly satisfied with such a result, and much prefer leaving a patient exposed to the doubtful chance of a relapse, than subjecting him to severer treatment in order to make sure of exciting sufficient inflammation to secure adhesion and obliteration of the sac. Injections, however, are not capable of effecting a cure in every case, nor are they adapted for every constitution. The judicious surgeon, therefore, whilst resorting to them as his ordinary remedy, will be prepared to avail himself, in particular and difficult cases, of other means more certain in their effects, such as the seton and incision.

SECTION II.

CONGENITAL HYDROCELE.

In simple hydrocele the original communication between the cavities of the peritoneum and of the tunica vaginalis remains permanently obliterated; but it sometimes happens that fluid accumulates around the testis in cases in which the obliteration has not been completed, constituting a variety of this disease termed *congenital hydrocele*. The opening of communication between the two cavities is usually small in size, not larger than sufficient

injection by Sir A. Cooper twenty-five years before, and had not returned till within the last six months. Sir B. Brodie mentions two cases of the return of the disease after injection; one after the lapse of seventeen years, and the other after a period of twenty years. *Medical Gazette*, vol. xiii. p. 93.

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 the pressure of a truss, 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 descent 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 testis 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 experienced a tremulous and peculiar rustling sensation in pressing the fluid into the abdomen.*

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 testis 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.

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

* Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 95.

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 very rarely requires injections for its cure, and the operation should never be performed unless the surgeon is fully satisfied that a communication no longer exists between the sac and abdomen. If the sac is injected before closure of its neck, peritonitis is very liable to ensue, and to endanger the life of the patient. Desault, Dupuytren, and other surgeons, after puncturing the sac and evacuating the fluid, have injected a stimulating liquid, firm pressure being made upon the ring, and continued for some time after the operation; and the practice has in some instances been attended with success. But in other cases peritonitis has been excited, and death has followed. It would not be difficult, by a little cautious management, to avoid injecting fluid into the peritoneal cavity; but as the object of the operation is to excite inflammation in the sac of the hydrocele, the great risk is of the extension of the inflammation along the continuous serous surface to the peritoneum generally, the prevention of which cannot be secured by the pressure afterwards maintained at the ring. This proceeding, therefore, is not sanctioned by the surgeons of the present day; for no one is justified in undertaking an operation exposed to such danger for the permanent removal of an incon-

venience which can be partially remedied by other means free from risk. A strong motive for persevering in the attempt to cure congenital hydrocele in early life by means of pressure, is the risk of inflammation to which the testis 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 the undescended testis. 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 testis, and the extension of inflammation from the tunica vaginalis to the peritoneum.*

SECTION III.

ENCYSTED HYDROCELE OF THE TESTIS.

In encysted hydrocele of the testis, the fluid is contained in an adventitious cyst or cysts distinct from the sac of the tunica vaginalis. The cyst is composed of a thin delicate serous membrane; it may be developed in three situations: 1, beneath that part of the tunica vaginalis investing the epididymis; 2, between the tunica vaginalis testis and tunica albuginea, which are thus separated from each other; 3, between the layers of the outer or

* Lib. Cit. p. 144.

loose portion of the tunica vaginalis. The first is by far the most common situation, the two latter being very rare. These cysts are analogous to the aqueous encysted tumours which are developed in the kidney and other parts, the fluid being of a similar nature, and differing from that of simple hydrocele in being perfectly limpid and colourless, and containing no or only a slight trace of albumen, so that it does not coagulate on the application of heat or by the action of acids.

1. Small serous cysts not larger than a pea, and even smaller, frequently exist immediately beneath the tunica vaginalis 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 of this kind are so embedded in the substance of the epididymis, that they cannot be recognised without dissection. Though these minute cysts generally contain a limpid serum, I have found them filled with fluid of a milky hue, and I have even observed matter like pus

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 testis, described at page 36.

tinged with blood. These accidental cysts, developed in the upper part of the epididymis, 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 developement of those small pendulous pedunculated cysts containing an aqueous fluid often found hanging from the head of the epididymis, which were erroneously supposed by Morgagni to be hydatids. I have on many occasions observed them in the different stages of their production (*vide figure*). Thus I have seen a pedunculated cyst attached at one part, whilst close to it there was a serous cyst precisely similar 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 the narrow neck. In all these cases the prolongation of the tunica vaginalis investing the cyst could always be demonstrated by a little cautious 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 testis, 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.

So common are small serous cysts connected with the epididymis in the various states and stages I have described, that no one can examine many testes without finding them. Now when one or more of these cysts, instead of becoming pedunculated, enlarge so as to form an evident tumour in the scrotum, they constitute a form of hydrocele called, from its original seat, an *encysted hydrocele of the epididymis*. I have observed this description of hydrocele in all its various modifications, from the enlargement simply of a single cyst to the complication occasioned by the varied dilatation of several of them. In this form of hydrocele



the epididymis becomes flattened, and is displaced to one side, whilst the testis is found either in front of the cyst or cysts, or at the bottom of them. It is sometimes at the side, but very rarely indeed at the posterior part of the swelling. In the adjoining wood-cut of a specimen which I dissected for the Hospital museum, the cyst is above the testis, which is so displaced by it that its anterior edge is directed downwards. The tumour is generally of smaller size than a simple hydrocele, the fluid seldom exceeding three or four ounces in

quantity. In a case, however, which I saw with Mr. Crowdy of Brixton, as much as twenty ounces were removed from a single cyst. 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 number. The sacculated arrangement produced by the development of several cysts may be seen in the annexed figure, taken from a preparation dissected by myself; the anterior parietes of the cysts are cut away to exhibit their interior. The cysts are liable to inflammation, which causes a considerable alteration in the quality and appearance of the fluid contained in them. The fluid may become 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 sometimes also become filled with blood, constituting a variety of hæmatocele.



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 very closely adherent to each other. This is a very rare form of hydrocele. I have only met with one specimen, which was discovered accidentally

after death; it is represented in the annexed wood-



cut. The cyst contained about two drachms of fluid, and is situated along the front of the testis; it is a little thickened. One section of it is preserved in the museum at the London Hospital; the other I have presented to the College of Surgeons. Sir B. Brodie has described a very similar case. A man who died in St. George's Hospital was discovered after death to have had encysted hydrocele of one testicle. The cyst was composed of a thin membrane, containing a co-

lourless 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.* 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 testis, separating the tunica vaginalis from the tunica albuginea.

3. In examining a healthy testis I once found six

* Lond. Med. and Phys. Journal, vol. lvi. p. 522.

or seven small serous 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 transparent fluid. I have since seen a similar kind of cyst, the size of a large pea, in the same portion of the tunica vaginalis. Accidental serous cysts have also been observed in the sac of a simple hydrocele, and a preparation of this kind is contained in the museum of the College of Surgeons. If a cyst thus situated were to increase to any size, it would constitute a swelling which might be appropriately termed an *encysted hydrocele of the tunica vaginalis*.

Symptoms.—An encysted hydrocele of the testis or 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 testis appearing of an irregular or lobular 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 testis, forming a tense fluctuating tumour, connected with the gland, and moving with it. In other cases the cyst continues to increase until it forms a tense elastic swelling, twice, thrice, or even four times the size of the testis, but which seldom becomes so large as a simple hydrocele. In tumours of some

size the situation of the testis may be ascertained, as in simple hydrocele, on examination of the swelling by means of transmitted light; by the more solid feel of the cyst at one particular part, and the peculiar pain experienced there on pressure. This form of 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 two cases of hydrocele of the epididymis 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, which I ascribe to the tension produced by the distension of the tunica vaginalis reflected over the testis, and the more direct pressure thereby made on the gland. In these cases the pain was immediately relieved on puncturing the cysts.

Diagnosis.—An encysted hydrocele of the testis is distinguishable from simple hydrocele by the different position of the gland, which is generally found in front or at one side of the tumour; by the smaller size of the swelling; and by the limpid and colourless character of the fluid evacuated. When the hydrocele consists of two or more cysts, fluctuation and transparency are also less distinct than in simple hydrocele. As the position of the testis is liable to variation in ordinary hydrocele, the nature of the case cannot always be determined with accuracy until the cyst has been punctured.

Treatment.—An encysted hydrocele of the testis

should not be interfered with when of small size and unattended with pain or inconvenience. When painful or troublesome from its large size, the tumour may be removed temporarily by acupuncture or the trocar, applied either at the back or side of the hydrocele, in order to avoid risk of wounding the testis, the exact situation of which should first be ascertained. The fluid, however, generally again collects, and it becomes necessary to resort to some method of affording permanent relief. The radical treatment by injection is not found to succeed so well in this variety of the disease as in ordinary hydrocele. It frequently fails in exciting a sufficient degree of inflammation, and cannot well be employed in those cases in which several cysts are developed. I prefer myself the seton used in the mode recommended at page 190, which I have found to be both safe and effectual: it is a plan equally well adapted for the treatment of an encysted hydrocele composed of two or more cysts, as to one consisting simply of a single cyst. The inflammation and constitutional effects are usually, however, more severe after an operation upon several cysts than when there is only one.

Mr. Laing, one of the surgeons of the hospital at Aberdeen, has published an account of two remarkable cases of what he terms "cystic or hydatoid disease of the testis;" but which I entertain no doubt were cases of encysted hydrocele of the epididymis.*—A man, aged twenty-nine, was admitted

* London Medical Gazette, vol. xxvii. pp. 456, 457.

with a large swelling of the left side of the scrotum, which was pyriform, somewhat elastic, had an indistinct fluctuation, but by no means the feel of hydrocele. It began several years before without any known cause at the lower part of the scrotum. The opposite testis was considerably enlarged and hard; and there was a cicatrix at the lower part of the scrotum, the result of suppuration two years before. An incision was cautiously made through the integuments of the scrotum and tunica vaginalis, when a bluish semi-transparent membrane presented itself. Into this a small trocar was cautiously pushed, but only about half an ounce of transparent serum escaped. On withdrawing the instrument another similar membrane appeared, which was drawn outwards with dissecting forceps, and punctured, and found to contain only two or three drachms of serum. In this manner many similar cysts were successively drawn forward and opened, to the number of upwards of thirty, as the quantity of serum amounted to sixteen ounces. The wound was then closed with adhesive plaister. The operation was followed by fever, erysipelas of the face, delirium, and inflammation of the scrotum; but the part healed, and the patient was dismissed cured at the end of five weeks. The patient was seen fourteen months afterwards, when the testis operated on was found quite sound, and not larger than natural.—A man aged thirty-five was admitted with a large tense elastic swelling of the left side of the scrotum, neither affected by coughing nor change of position, but extending up the cord as

far as the abdominal aperture. It gave him little uneasiness, unless what arose from its bulk. On the whole the symptoms closely resembled those of hydrocele; but the tumour was not transparent, and the fluctuation was less distinct. It commenced about twelve months ago, without any known cause, and extended gradually upwards. An incision was cautiously made through the integuments and the tunica vaginalis, when a hydatid of considerable size presented itself. This was punctured, and was immediately followed by another, which was also punctured, exactly as described in the preceding case; and thus ten or twelve ounces of serum were evacuated. When the scrotum was reduced nearly to the natural size, the edges of the wound were brought together with adhesive plaisters. The operation was followed by severe inflammation and sloughing of the scrotum, and the wound was not healed until two months afterwards. The testis was reduced nearly to its natural size.

It is clear that these were not cases of cystic disease of the body of the testis, from the circumstance of the cysts having been exposed without division of the tunica albuginea, and the gland itself being unaffected, and remaining sound after the operation. Those pathologists who have often examined the testis after death, and observed how frequently small serous cysts, varying in size and number, are connected with the epididymis, even where nothing of the kind has been detected or suspected during life, will readily concur in the opinion that such was originally the nature of the

disease in these cases. It is rarely, however, that so thick a cluster of them increases to so large a size. The cases indeed are interesting in several points of view ; and the severe effects which followed the operation of puncturing them with a trocar in both instances will induce practitioners to be cautious in thus meddling with similar tumours, unless they should become very painful, or enlarge to such an extent as to occasion serious inconvenience. In October last, a man aged fifty-six, in a bad state of health, and suffering from a chronic bronchial affection, was referred to me by Dr. Aldis, Physician of the London Dispensary, on account of a swelling of the left testis. On examination I found the testis situated at the lower part of the scrotum ; and immediately above the gland, and connected with it, two distinct fluctuating cysts, each somewhat larger than the testis, which together produced a considerable lobular swelling. The cysts proved to be distinct, fluctuation not being communicable from one to the other. The patient stated that the swellings had been forming between seven and eight years, but had only latterly given him pain. I easily recognised the affection to be encysted hydrocele of the epididymis. Two punctures were made with a cataract needle in each of the cysts. A few drops of pellucid serum escaped, and next day I found the two swellings above the testis entirely removed ; the man also expressed himself much relieved. There was, however, a third cyst, the size of a filbert, with which I did not think it necessary to interfere.

The cysts again filled with fluid, and as they became tense the pain returned. As the patient's health did not admit of the performance of any operation for his permanent relief, I again punctured the cysts, and with the same result as before; and he has since continued to apply to me about every five or six weeks to have the operation repeated.

SECTION IV.

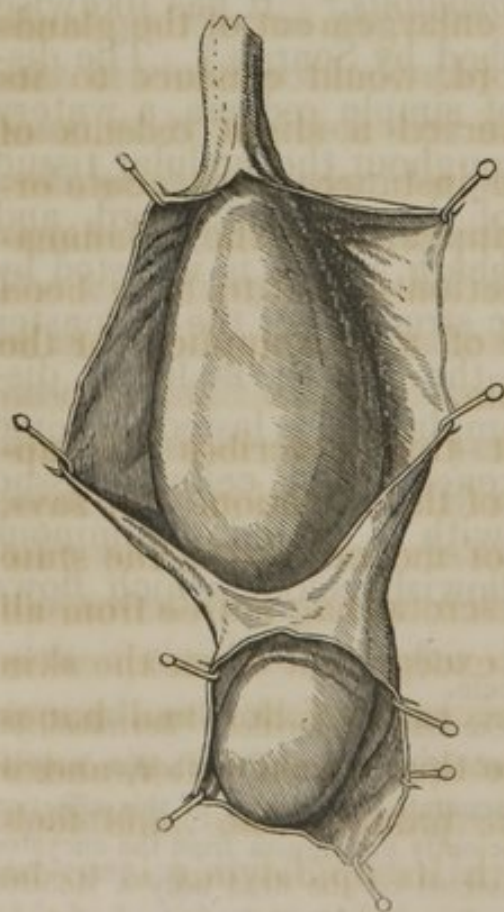
DIFFUSED HYDROCELE OF THE SPERMATIC CORD.

Mr. Pott has given an admirable account of this affection, under the denomination of *hydrocele of the cells of the tunica communis*.* It has likewise been particularly described by Scarpa.† The disease is of the nature of simple œdema, a watery fluid being diffused throughout the cellular tissue connecting the vessels of the spermatic cord, and enclosed in a cellular sheath, 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 cellular tissue beneath is infiltrated with a limpid albuminous serum of a white or yellowish colour, which flows

* Vide his Treatise on Hydrocele.

† Memoria sull' Idrocele de 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.

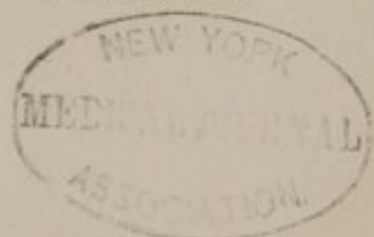
out in the course of the dissection. It is owing to the confinement of the fluid by this investing sheath that the swelling assumes an uniform surface and definite shape. The cells infiltrated with serum, which in their natural state are scarcely visible by the unassisted eye, are converted into large vesicles, some of which are big enough to admit the end of the finger. These cells appear 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, which will be presently described. In the annexed figure of this affection, taken from Scarpa, the sheath of

the cremaster is laid open, exposing the pyramidal swelling enclosed in its firm cellular envelope. The testis and tunica vaginalis are seen below it. In general anasarca the cellular membrane of the spermatic cord is frequently distended with serum, as well as the scrotum; but œdema of the cord alone is certainly a very rare affection. Sir A. Cooper makes no allusion to it in his work on the diseases of the testis; 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 testis, 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.

Symptoms.—Mr. Pott thus describes the appearance and symptoms of this affection. He says, “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 testis. How-

* Lib. cit. p. 370.

ever much the swelling may increase, it has been remarked that the penis never appears so much retracted as in simple 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.”* Mr. Lawrence remarks, that “The distinction of the two cases must rest on the following points:—the impulse on coughing in the rupture; the com-

* Sull Ernie, *Mém.* 1, § xxxii.; quoted from Lawrence on *Hernia*, 5th edit. p. 251.

plete 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 sometimes a visible enlargement of the inguinal canal and its neighbourhood when the fluid is pressed upwards."* 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 adopting any operation. Scarpa, indeed, frankly confesses the imperfection of our art with respect to the diagnosis in these cases.†

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 testis 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 cha-

* Lib. cit. p. 252.

† Treatise on Hernia, tr. by Wishart, p. 99.

racteristic 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 either with the nature of lymphatic extravasation or absorption, or with the frequent consequences of wounds inflicted on parts merely membranous.”* This form of hydrocele admits of temporary if not permanent relief, with perhaps 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 cellular tissue of the scrotum, from which it will soon be removed by absorption. The danger of free incisions into the distended cellular tissue arises from their being liable to excite diffuse inflamma-

* Lib. cit. p. 371.

tion, which is apt to spread along the cord to the cellular tissue of 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.*

SECTION V.

ENCYSTED HYDROCELE OF THE SPERMATIC CORD.

This term is applied to a tumour caused by the developement of a cyst containing fluid in the loose cellular tissue of the spermatic cord. The cyst is formed of a thin transparent membrane possessing the ordinary characters of a serous membrane; and its contents consist in general of a limpid aqueous liquid containing little or no albumen, but sometimes of a straw-coloured serum, similar to the fluid of simple hydrocele. It is of an oval form; and its size, though variable, seldom exceeds that of a hen's

* Lib. cit. Case X. p. 377.

egg, and is usually smaller. It is loosely attached by cellular tissue to the vessels of the cord, which become separated and displaced by it, but are situated at its posterior part. 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 scrotum in the middle of the cord, or just below the abdominal ring, and it has been met with 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 appears to originate in general in a partial or imperfect obliteration of the prolongation of peritoneum, drawn down at the period of the descent of the testis. At page 35 I have described the different appearances presented by the remains of this prolongation, which, it has been remarked, sometimes consist of a single cyst, or of two or more sacculi moistened by a serous fluid. When this fluid accumulates in any quantity, an encysted hydrocele is the result. Such is the mode of origin of this affection when occurring in infants. I believe that in adults it is frequently, if not generally, produced in the same way. M. J. Cloquet has remarked, that the remains of the peritoneal process, accompanying the descent of the testicle, 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 subject.* My own dissections agree with the observations of this accurate anatomist. In the museum at the London Hospital there is a preparation showing the tunica vaginalis continued 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, who died of pneumonia, I found an encysted hydrocele of the cord above the testis 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 testis is so changed that its 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

* Description of the Parts concerned in Inguinal and Femoral Hernia, tr. by M'Whinnie, p. 25.

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. The spermatic cord below appearing full, I made an incision into it, and found a large serous cyst exactly resembling the peritoneum in structure, which extended into the inguinal canal, and contained a small quantity of transparent fluid. Observing a small orifice at its upper part, I introduced the point of a blow-pipe; it passed into the centre of the pedunculated cyst, which was thus shown to be a process from the cyst connected with the cord. In Section 6 of this Chapter, I have described and given a representation of an inguinal hernia, combined with an elongated encysted hydrocele of the cord; and in Chapter V., Section 2, I have related a case of 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 that has been taken of the more general mode of origin of encysted hydrocele of the spermatic cord. In two or three instances, however, I have found a small, thin, delicate serous

cyst in the loose cellular tissue of the cord, very like the cysts sometimes developed in the cellular tissue of the neck and in other parts, which very probably originated independently, and had no connexion with the process of peritoneum consequent on the descent of the testis.

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 testis, which feels even and tense, and has a manifest fluctuation, and may be handled freely without pain, and which is more or less transparent, and quite movable upwards and downwards. The distance of the tumour from the abdominal ring and testis 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.

Diagnosis.—An encysted hydrocele of the cord is liable to be mistaken for a simple hydrocele, and for a hernia. In both instances the diagnosis may generally be made without difficulty. It is distinguished from simple hydrocele by the tumour being felt distinct from the testis, and by its being situated higher up in the scrotum, and above the gland.

When the cyst is of large size the diagnosis may be less easy, in consequence of the testis being partly imbedded in the tumour; but, by a careful examination, the gland may always be distinguished independent of the hydrocele.

This affection differs from hernia in the uniform size and defined shape of the tumour, which does not extend upwards to the ring; in being transparent, very movable, 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.

Treatment.—In children, encysted hydrocele of the cord, like simple 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 the application of a stimulating lotion, an operation comparatively trifling will effectually remove it whenever it attains such a size as to be productive of inconvenience. But it is better 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.

In the first instance a stimulating lotion may be directed to be constantly applied to the part. Should the tumour not disperse in the course of two or three weeks under this treatment, and continue to be a source of annoyance from its bulk, it may be punctured in two or three places with a cataract needle, and the fluid pressed out into the surrounding cellular tissue. In many instances, especially at an early period of life, this proves a permanent remedy. But if the swelling returns, and it does so generally in the adult, other measures must be resorted to.

The radical cure of encysted hydrocele of the

spermatic 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. The injection of the cyst of an encysted hydrocele is a plan of treatment which is not in much favour with practical surgeons. There is more difficulty in performing the operation, and a greater risk of the fluid being forced into the surrounding cellular tissue, than in the injection of the enlarged tunica vaginalis, and the operation is not so generally successful as in the latter form of hydrocele. Mr. Hey, of Leeds, used with success the following method, which is similar to that proposed by Mr. Douglas for the cure of simple hydrocele :—" The operator must grasp the integuments and spermatic cord in his left hand at the posterior part of the tumour, till he makes it project and draws the skin tight over it. He must then divide the skin and layers of fascia longitudinally, by repeated gentle strokes of the knife, till he arrives at the cyst, which is generally quite transparent. The projection of the cyst increases as the parts which cover it are divided ; and when it is laid bare almost the whole of it is exposed. The cyst is then punctured with a lancet, and all that appeared perfectly transparent before the puncture, must be cut off with the knife or scissors. The posterior part of the cyst must be left untouched. After the extirpation of the transparent part of the cyst, the integuments should be brought over the spermatic cord, and united by the interrupted suture, otherwise they are apt to

The radical cure of encysted hydrocele of the

shrink back, and leave the cord projecting out of the wound.”* This is a very certain mode of treating the disease ; but I prefer the seton, the effects of which are less severe than those of incision, whilst the plan is equally effectual. The surgeon may proceed as follows:—Let the scrotum be tightly grasped with the left hand, so as to render the tumour tense and prominent. Then let a large-sized curved needle armed with a double silk ligature be introduced at the lower part of the swelling, and brought out above at a distance of an inch and a half or two inches from the part where it was introduced, and the ends tied together to prevent the seton escaping. The fluid will afterwards dribble away along the silk, and in a few days after the operation, and perhaps in twenty-four or thirty-six hours, sufficient inflammation will be established. The threads can then be withdrawn, after which the cyst becomes permanently obliterated by adhesion, no other trace of it remaining but a slight induration at the part, which disappears completely in a short period. This I have found to be an effectual and safe proceeding. In cases of encysted hydrocele very high up, the surgeon must bear in mind the near proximity of the cyst to the peritoneum, and the consequent risk of the extension of the inflammatory action to this important structure. He must be careful not to excite too active inflammation. It appears that operations on cysts developed in the spermatic cord are liable to excite

* Practical Observations on Surgery, p. 559.

diffuse inflammation of the cellular 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 cellular tissue of the pelvis and loins. The subject of the operation was, however, in a bad state of health.* I have lately been informed by my friend Mr. Morton, of University College Hospital, of a case in which such severe inflammation of the cellular 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.

SECTION VI.

COMPLICATIONS OF HYDROCELE.

The following are the principal complications of hydrocele :

1. Simple hydrocele, combined with encysted hydrocele of the testis.
2. Simple hydrocele, combined with encysted hydrocele of the spermatic cord.
3. Simple hydrocele, combined with diffused hydrocele of the spermatic cord.
4. Oscheo-hydrocele, including both simple hydrocele and encysted hydrocele of the cord, combined separately with inguinal hernia.

* Lib. cit. Case XIV. p. 390.

1. The first is not an uncommon complication. In the dissection of these parts 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 aqueous 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 increased quantity of fluid 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 during life; but when the amount is considerable, the distension of the tunica vaginalis completely masks the cysts developed in the testis or epididymis, rendering it impossible for the surgeon to detect the nature of the case. They sometimes attain so large a size as to require the fluid to be removed, 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 is only diminished, not removed. If, however, the trocar be afterwards passed into the fluctuating swelling which still remains, exit is given to a

limpid fluid which does not coagulate on the application of heat.

2. Simple 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 pathological collection at the London Hospital, 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 testis being a good deal enlarged. 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 testis, which had previously been concealed by the fluid collected in the vaginal sac. The skin covering it was painted with a strong solution 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 case of this complication, in an infant not many weeks old, is recorded in the London Medical Gazette.*

3. Simple 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

I. Simple hydrocele combined with diffused hydrocele of the cord. After Scarpa. 1—1. Furrow marking the division between the tumours.

* Vol. xxix. p. 757.

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 simple hydrocele of the hour-glass form, by fluctuation being limited to the separate swellings.

4. *Oscheo-hydrocele*.—It is remarked by Mr. Lawrence, that “Scrotal hernia is combined not unfrequently with hydrocele, each disease being marked by its peculiar symptoms. A close examination may be necessary, in order to detect the true nature of the case. The hydrocele and the rupture may form two distinct swellings, an upper and a lower one; or they may meet together, the distinction being marked externally by a constriction; or they may be completely blended into one swelling, without any distinction recognisable externally. In the latter case, their relative situations might be expected to depend on the order of their occurrence. If the rupture should have taken place after the formation of the hydrocele, we might expect the former to descend in front of the latter. On the contrary, if fluid should be effused into the tunica vaginalis of a ruptured patient, the swelling would probably rise in front of the rupture. Mr. Stanley met with two instances in which hydrocele was placed directly before scrotal hernia, and the component parts of the spermatic cord were sepa-

rated by the tumour, which seemed to have been forced between them. These specimens, with three others, are preserved in the museum of St. Bartholomew's Hospital. In all five the hydrocele is in front of the rupture, and in most of them it ascends nearly to the ring. The same relative position of the two diseases has been observed by others, and may therefore be considered as the ordinary arrangement."* 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 external 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

* Treatise on Ruptures, 5th edit. p. 256.

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.* If the rupture were occasioned by the weight and traction of the hydrocele, as is evidently presumed by M. Cloquet, this case would tend to invalidate the conclusion of Mr. Lawrence, in respect to the relation of the parts, when the hernia succeeds the formation of the hydrocele. 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 wood-cut. In the figure at page 146 the sac of an inguinal hernia is represented at some little distance above a small hydrocele. Dupuytren states it sometimes occurs, when a hydrocele is placed in front of a hernia, that 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



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

testis. 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 testis.* This complication is of the nature of the *hernia infantilis*, described by Mr. Hey, and called by Sir A. Cooper *encysted hernia of the tunica vaginalis*.

The co-existence of hernia and hydrocele does not in general constitute an objection to the performance of the radical operation for the latter. But the surgeon should be particularly cautious not to excite too much inflammation; and in cases where the contiguity of the two sacs is close and extensive, and in those in which the hernial sac projects into the hydrocele, he should recommend the patient to be content with the palliative treatment. The hernia should always, if possible, be reduced before the tunica vaginalis is punctured.

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

* Leçons Orales, Brussels edit., t. iv. p. 233.

behind the hernia ; which body was undoubtedly not the testicle, as the gland was felt distinctly by the touch 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 hernial 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.* This is a very rare complication: I have met with it in only two instances; in both on the right side. The patients were adults. In one, who died of peritoneal inflammation, with the hernia unreduced, I had an opportunity of making a careful 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

* 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 testis hung lower than natural, and was so displaced that its antero-inferior edge presented directly downwards (see figure). In the other 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 testis 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 225, 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.

SECTION VII.

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 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.* Mr Pott has narrated two interesting cases of a collection of fluid in the sac of a congenital hernia.† In one the opening of the sac was closed by adherent omentum; in the other it was blocked up by intestine. The first was the case of

* *La Lancette Française*, Fevrier, 1837.

† *Lib. cit.* p, 463, Cases XXXIV. and XXXV.

a man *æt.* 25, who had a large scrotal swelling, accompanied with a remarkable fulness of the spermatic process. He had had a rupture, and worn a truss for many years; upon taking his truss off, his rupture always came down immediately, and was very easily returned. After leaving his truss off, and substituting in its place a bandage, which was buckled on very tight, his scrotum gradually became larger, with considerable pain and uneasiness. Pott made no doubt that the tumour contained a considerable quantity of fluid, but hesitated respecting the disease being a hydrocele. He made a puncture, and let out about a pint of brown serum. This discharge removed the swelling from below; but made little or no alteration in the upper part of the process. He endeavoured to reduce it; but found it impracticable, and desisted, advising the man to wear no bandage; and if it became troublesome desired that he might see it. In about a year the fluid had collected again. Mr. Pott then made an incision from the middle of the scrotum quite up to the groin. The true nature of the case was now discovered. He found in the lower part of the bag, which contained the fluid, the testicle; and in the upper part or neck of the same bag a considerable portion of omentum, the upper part of which was hardened in texture, and so perfectly adherent to every point of the neck of the sac as to prohibit the return of even a fluid from thence into the belly: but the lower part was in its natural state, loose, soft, and capable of being expanded. All the loose part he cut off; the upper part he left as he

found it, filled the wound lightly with lint, and treated the case as for the radical cure of a hydrocele. In about seven weeks the man got well. The other was the case of a man aged twenty-two, who had long been subject to a rupture which never came lower than his groin. When a child he had worn a truss, but had for some years disused it. For a month or two past his rupture had been constantly down, and he had not been able to return it. For three days symptoms of strangulation had existed. There was a large scrotal swelling, which bore very much the appearance of a hydrocele; but the upper part or spermatic process was hard and painful, and seemed to be girt tight by the tendon of the abdominal muscle. Mr. Pott divided the integuments, 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.

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. Though the diagnosis was satisfactorily established, he very properly proceeded with much caution in the operation, and instead of puncturing the tumour cut carefully down, as in the operation for strangulated hernia. In both cases the hydrocele was cured by the ordinary operation of incision.* A true hydrocele of the hernial sac is certainly a rare affection; and since my connexion with the London Hospital I have witnessed only one case of it. The hydrocele was double; the tumours were very large on each side, quite unconnected with the testes, 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.†

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

* Clinique Chirurgicale, tom. iii. pp. 22, 108.

† Observations on Surgery, tr., Case LXXV. p. 260.

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 testis being distinct from the tumour at the bottom of the scrotum, are sufficient to distinguish hydrocele of the hernial sac from simple hydrocele. I conceive that some little 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 testis, 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 occurring 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 distinguishing marks, and to the history of the case, would leave but little room for doubt.

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 simple 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. When symptoms of strangulation arise, as in Mr. Pott's second case, the removal of the hydrocele becomes a matter quite of secondary importance. 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."* He has related an example of hydrocele of the hernial sac, complicated with intestinal scrotal hernia, which illustrates the difficulty of the diagnosis 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, being obliged to make a rapid journey on

* Treatise on Hernia, tr. by Wishart, p. 230.

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 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 redu-

cing 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.

The term *hydrocele of the hernial sac* should, I think, be restricted to 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. The above case was clearly not of this description. It was an instance of strangulated scrotal hernia attended with a remarkable effusion of fluid, which may be denominated a *spurious hydrocele of the hernial sac*; a term that would apply to all cases of a hernial descent coupled with serous effusion, whether the communication with the abdomen be closed or open, and the fluid reducible into the abdomen. 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.* Nothing is more common than the presence of fluid in the sac of a strangulated hernia, though it rarely

* Lond. Med. and Phys. Journal, vol. lvi. p. 18.

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 testis, remained after the operation, but became absorbed as the patient recovered. Had Scarpa, in the case related above, examined the 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 re-

sembled 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 testis was imperceptible. On making gentle pressure the swelling disappeared *rather suddenly*, and then the testis 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.* The testis, 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.† —“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 confined 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 every where else. Neither the water nor solid substances could be pushed into the belly. The

* *Recherches sur les Causes et l'Anatomie des Hernies Abdominales*, p. 97.

† *Medical Essays and Observations*, vol. v. p. 314.

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, I should think 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.

SECTION VIII.

HYDROCELE IN THE FEMALE.

Tumours analogous to hydrocele occasionally occur in the female, in connexion with the round ligament of the uterus, at its termination in the groin and pudendum. Three varieties of this affection may be distinguished.

1. *Diffused hydrocele of the round ligament*, which is simply an œdema of the cellular tissue of the part corresponding to the diffused hydrocele of the spermatic cord. It is an affection of no moment, and needs no particular description.

2. *Hydrocele of the Canal of Nuck*.—A diverticulum or pouch of peritoneum may commonly be observed in the fœtus, prolonged through the abdominal ring with the round ligament of the uterus. This pouch, which was first noticed by Nuck,* and has been named after him, often remains unobliterated during life. When examined in the adult it usually consists of a serous pouch, about half an inch in length, external to the abdominal ring, which communicates with the cavity of the abdomen by an aperture so contracted as scarcely to be capable of admitting the passage of a probe. This little pouch may become the seat of dropsical effusion, and form a fluctuating cystic tumour, the contents of which are reducible into the abdomen, thus corresponding to the congenital hydrocele in man. The only treatment required for this affection is the application of a truss to obtain the obliteration of the sac, after which the fluid usually disappears.

3. *Encysted hydrocele of the round ligament* is produced by the obliteration of the neck of the peritoneal pouch, the lower part remaining patent, and being distended with serum. The cyst is situ-

*Adenographia Curiosa.

ated in front of the round ligament, either in the inguinal canal or immediately below the abdominal ring; and it occasions a tense fluctuating tumour, which sometimes acquires the size of a hen's egg. It may be mistaken for a hernia, from which it can be distinguished by applying the same rules as those given for the diagnosis of an encysted hydrocele of the spermatic cord. It is to be treated also on the same principles as those applicable to that affection. As in hydrocele of the cord high up, the proximity of the peritoneum must be borne in mind by the surgeon, if he has recourse to active means for obliteration of the cyst.

CHAPTER V.

HÆMATOCELE.

HÆMATOCELE is a term applied to the swelling occasioned by effusion of blood in the sac of the tunica vaginalis, or in the substance of or cyst in the spermatic cord.

SECTION I.

HÆMATOCELE OF THE TESTIS.

In hæmatocele of the tunica vaginalis, which is by far the most common seat of sanguineous effusion, the extravasation may take place in a healthy state of the parts, or it may succeed or be combined

with hydrocele. The first form occurs from the accidental rupture of some blood-vessel into the vaginal sac. It is usually produced by a blow. Thus it is liable to happen to a person on horse-back, from the testicle being struck against the pommel of the saddle; or may be occasioned by violent efforts made in straining, as in the attempt to raise a heavy weight: sometimes the effusion takes place without any apparent cause. In these cases the testis immediately enlarges, sometimes to more than double its natural size, from the sudden distension of the tunica vaginalis with blood.

The second form of hæmatocele, in which the extravasation takes place in combination with hydrocele, is of more frequent occurrence than the first. It may be produced by a blow, or by the wound of some vessel in the operation of tapping. The testis, owing to its free mobility, does not often suffer from mechanical violence; but when hydrocele exists a tumour is formed, which, from its prominence and size, is necessarily more exposed to injury. A blow occasions a rupture into the tunica vaginalis of some of the enlarged vessels ramifying outside the sac, and the blood which is extravasated, mixing with the fluid of the hydrocele, produces a sudden increase in the size of the tumour. The quantity of blood effused under these circumstances varies considerably. It may be merely sufficient to impart a red tinge to the serum. In general, however, it is greater; and it sometimes exceeds the serum in amount, occasioning a rapid enlargement of the swelling to more

than double its previous volume. 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 cellular tissue of the scrotum, pours its blood into the sac of the hydrocele. This accident sometimes occurs when the operation is performed with a trocar, but it 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 testis or spermatic artery. A case in which a hæmatocele was occasioned by a wound of the artery in this operation is recorded by Scarpa.*

In hæmatocèles consequent upon injury, few opportunities are afforded of tracing the source of hæmorrhage. When the parts are in a healthy state, the bleeding probably proceeds from the vessels ramifying between the tunica albuginea and the tunica vaginalis testis, in consequence of the rupture of the latter delicate membrane. Sir B. Brodie remarks, that a rupture of a vessel producing hæmatocele may arise from a diseased condition of the arteries, analogous to that which occurs in the brain under the form of sanguineous apoplexy, in old persons whose arteries are ossified.† In hæmatocele combined with hydrocele, and caused by a blow, the tunica vaginalis is ruptured, and the blood

* Treatise on Hernia, tr. by Wishart, p. 76.

† London Medical Gazette, vol. ix. p. 927.

is derived from some vessel distributed on its external or adherent surface. 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 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.* In general, when the blood effused is of small amount, it becomes dissolved in the fluid of the hydrocele, which is tinged of a red colour. If a larger quantity be extravasated, coagula are formed, and these remain undissolved in the fluid. In hæmatoceles which have existed for a long period, 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. In many instances the effused blood is felt as a foreign body, and produces inflammation in the tunica vaginalis, which becomes coated with lymph. Under these circumstances, the tumour undergoes a further increase; and the lymph effused becoming mixed with the blood and serum, modifies the ap-

* Lib. cit. p. 212.

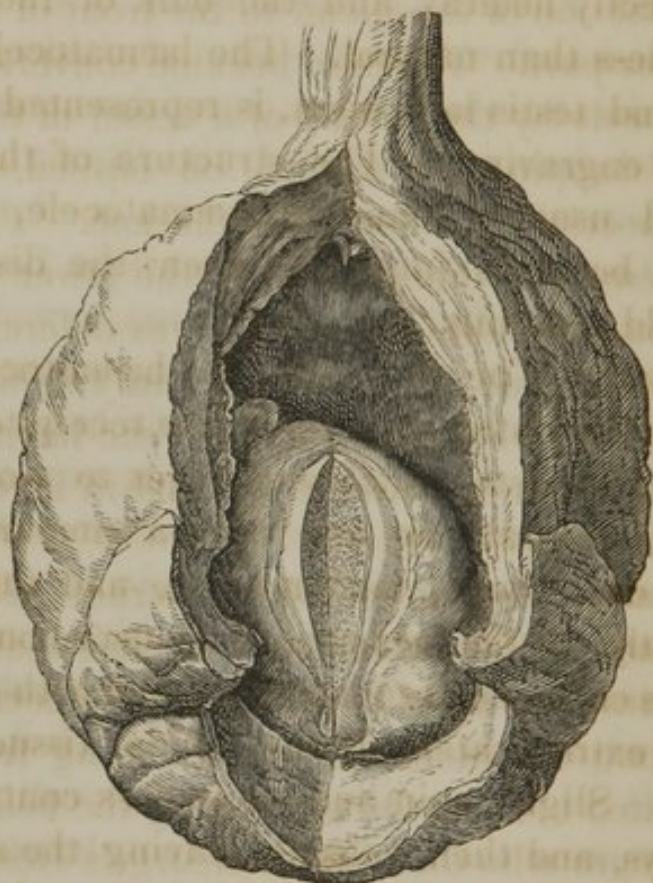
pearance of the contents of the cyst, which is rendered soft, turbid, and of a light colour. Sometimes the inflammation goes on to suppuration, in which case pus is also found in the sac. The inflammation usually extends from the tunica vaginalis to the cellular tissue and fascia external to the sac, which in recent cases are found infiltrated with serum and lymph, and in cases of old standing become greatly thickened, indurated, and compacted. 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. I have found the tunica vaginalis and tissues investing it as much as half an inch in thickness, and very firm and dense. These changes in the sac are produced by a more chronic form of inflammation of the fascia and cellular tissue investing the sac. In these old cases, the internal surface of the tunica vaginalis, instead of presenting its natural smooth and polished surface, is rough, granular, and irregular, and feels as dense and tough as a piece of leather, having lost all the characters of a serous membrane.

In hæmatocele the testis preserves the same relation to the remainder of the tumour as in simple 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 testis being out of its usual position. A young man had a hydrocele, which had succeeded to an attack of secondary orchitis, occasioning an adhesion of the gland to the front of the sac at its lower part. The case became 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 hæmatocele the glandular structure of the testis sometimes disappears in the same manner 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 in St. George's Hospital 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 appear-



ances 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.* 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 testis, I found the tunica

* Lond. Med. and Phys. Journal, vol. lviii. p. 299.

vaginalis nearly half an inch thick, and full of a soft friable substance of a chocolate colour; the testis, which was situated at the posterior part of the cavity, was somewhat flattened, and partly imbedded 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 testis laid open, is represented in the opposite engraving. The structure of the testis is indeed usually sound in hæmatocele, but its nutrition becomes impaired when the disease is of very old standing.

Symptoms.—The first form of hæmatocele appears suddenly after a strain or the receipt of some injury. The testis 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 hæmatocele be occasioned by a blow, this enlargement is accompanied with appearances of extravasation in the cellular tissue of the scrotum. 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 form, 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 general 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 many years, producing no inconvenience beyond that which arises from its bulk and weight.

Diagnosis.—A 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 testis; 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 enlargement of the testis, whether from malignant deposit or other disease, the gland loses for the most part its natural sensi-

bility; but in hæmatocele pressure on the back part, where the testis 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 before any further operation is undertaken. Swelling of the scrotum from extravasation of blood in its loose cellular 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 testes, doughy feel, and red colour of the skin, are characters too clearly expressive of the nature of the case to mislead the practitioner.

Treatment.—In the first form of hæmatocele, if the quantity of blood effused into the tunica vaginalis be small, the treatment should be simply antiphlogistic. The patient is to be kept in the recumbent position, with the testis supported; a cold lotion is to be applied to the part, and the bowels must be gently acted upon. 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. 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 it is often many months 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 nu-

trition of the testis, it becomes necessary to lay open the sac by a straight incision, and to remove the blood. Means must afterwards be taken to subdue the inflammation which ensues, and the part then heals by granulation.

When hæmatocele is combined with hydrocele, the usual practice is at once to make an incision into the tunica vaginalis, and discharge its contents, leaving the cure to be effected afterwards by the process of inflammation. Sir B. Brodie observes, "If on drawing off the contents of the sac I find that the fluid is tinged with blood, I allow the fluid again to collect, and repeat this operation at certain intervals until it is voided perfectly clear. You may then perform the common operation for hydrocele by injection and with success."* I have adopted this proceeding in two cases, in which the blood effused was small in quantity, and found it obviate the necessity for a severer operation.

If much inflammation arise, the tunica vaginalis ought to be laid open without delay, and the source of irritation removed. No advantage is gained by deferring a proceeding which must subsequently be resorted to; whilst, on the contrary, if the operation be delayed, it is rendered more painful and severe by the parts becoming thickened and enlarged. When, too, the quantity of extravasated blood is large, it is hopeless to await its absorption; it should be removed at once by an incision. The tunica vaginalis may be punctured with a lancet at

* Medical Gazette, vol. ix. p. 928.

its upper part, a director or the finger introduced, and the whole extent of the membrane 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 testis.

If in a recent case the spermatic artery or a vessel of any size has been wounded, and continues to bleed, it can then be easily secured. In the case related by Scarpa, previously alluded to, the wounded spermatic artery was found, after the tunica vaginalis had been laid open, pumping out blood. The removal of the pressure occasioned by the extravasated blood will be favourable to the recurrence of the hæmorrhage. In dressing the wound, the surgeon may leave a piece of lint between the edges 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 frequently follow this operation: they are occasioned by acute inflammation of the exposed sac, which being much enlarged and dilated in this disease affords a considerable extent of surface. In a few hours the skin becomes hot; the pulse full, frequent, and bounding; the face flushed; the tongue white and furred, and the part hot and painful. The patient becomes restless, and sometimes delirious. By antiphlogistic treatment these symptoms may soon be moderated, and in a few days entirely removed. Their severity depends in a great measure upon the age and natural con-

stitution of the patient, as well as upon his state of health at the time of the operation. 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 persons of an unhealthy constitution. The danger consists in exciting too much inflammatory action, and the object of the after-treatment is to moderate that which is almost certain to follow from the nature of the parts exposed in the operation. I have noticed, however, that the inflammation and febrile disturbance are less severe after the incision of old-standing hæmatoceles, in which the sac is much consolidated, and its contents are thick and grumous, than in more recent cases of the disease. In these old cases, the tunica vaginalis having pretty well lost the characters of a serous membrane, the inflammatory action which arises in it is less active, granulations soon form, and in general the wound heals readily. Castration is very rarely required for this disease. It has been recommended in preference to incision in cases of consolidated hæmatocele in old people; but the former is a much more severe operation than the latter, and would only be necessary in cases of ossific deposit in the sac.

SECTION II.

HÆMATOCELE OF THE SPERMATIC CORD.

This affection, which was first noticed by Mr. Pott, is generally 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 cellular 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. It may happen to persons in good health, and whose genital organs are free from disease; but it is a complaint of rare occurrence. In contusions of these parts, blood is often effused amongst the structures of the cord, as well as in the cellular tissue of the scrotum; but the symptoms of the two are so combined, that it is impossible to make any distinction in practice, and they must be viewed and treated as common cases of ecchymosis.

An encysted hydrocele of the spermatic cord may become converted into a hæmatocele. In the pathological museum of St. Bartholomew's Hospital,* there is a preparation of encysted hæmatocele of the spermatic cord. The cyst is empty; but it is described to have contained blood, and its walls are deeply stained with the colour of partially de-

* Series 22d, No. 11, in printed Catalogue.

composed blood. Its lining membrane is wrinkled



and coarsely granular; and the tissues around it are thickened, brawny, and adherent together. I lately examined a preparation in the Hunterian Collection, which I have no doubt is a specimen of old encysted hæmatocele of the spermatic cord. (See figure.)

There is a good-sized cyst, lined by a membrane, polished and a little wrinkled, filled with a soft tawny-looking granular matter (3), resembling the altered coagulum of blood which I have 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 testis. 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, which does not communicate either with the tunica vaginalis or the hernial sac. I am unacquainted with any case in which such a change has been detected during life; but I should expect that it would be attended with

* In the preparation the hernial sac is laid open behind, instead of in front, as represented in the figure, in order to bring it into view.

pain and sudden enlargement of the swelling, which would lose its transparency, fluctuate less distinctly, and feel more firm and solid than before.

The symptoms produced by a diffused hæmatocele of the spermatic cord are very similar to those of diffused hydrocele; from which, however, it may be distinguished by its sudden appearance. 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 for 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 testicle below it was perfectly distinct. The appearance of a tumour, the suddenness of its formation, the distinct fluctuation of the testicle below, and an accidental 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.* 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 cellular tissue, it may become necessary to make an incision, in order to secure the bleeding vessel. The only case that I know of, in which the operation was really necessary, is detailed by Mr. Pott.—A young fellow straining at stool felt a sudden pain in his left groin; and, upon examination, found 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 con-

* Lib. cit. Case XXX. p. 456.

siderable, 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.* 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, I should think it might have been found and secured.

An encysted hæmatocele of the cord would probably require to be treated in the same way as a hæmatocele of the testis. In slight cases sufficient relief may be afforded by rest and antiphlogistic measures: if the tumour should become painful and inflamed, and 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.

* Lib. cit. Case XXXI. p. 458.

CHAPTER VI.

ORCHITIS.

INFLAMMATION of the testis 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 testis 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 by the course of the vas deferens. In this latter form of orchitis, which is familiarly known by the term *hernia humoralis*, the epididymis is first attacked, and the tunica vaginalis generally participates in the disease.

SECTION I.

ACUTE ORCHITIS.

Few pathologists have examined a testis 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. I have twice been able to inspect

a testis 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 testes affected with gonorrhœal inflammation recorded by M. Gaussail.* The tunica vaginalis is more or less distended with lymph, or albuminous matter infiltrated with reddish serum, which form 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 testis appears very little, if at all increased, the great bulk of the tumour being occasioned by the 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 effusion of a brownish deposit in the cellular tissue between the convolutions of the duct. The coats of the vas deferens are thickened, and the vessels ramifying near them injected,

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

sometimes along the whole extent of the duct. Albuminous deposit is found in the cellular tissue around the tortuous part of the vas deferens and tail of the epididymis, which frequently forms the bulk of the swelling observed in these cases. Owing to the epididymis being the part chiefly and most constantly affected in consecutive orchitis, some of the modern French writers have denominated the disease *epididymitis*.

In treating of the acute inflammatory changes in the tunica vaginalis (page 145), I particularly remarked that the inflammatory action was very liable to extend to the substance of the epididymis, but not to the body of the testis; 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 testis. 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 consecutive inflammation the formation of pus in the substance of the gland is of rather rare occurrence. I do not mean, however, to imply that the glandular structure of the testis never suffers in consecutive orchitis, for I believe that it does so in

some instances ; but, according to my observations, and I have paid some attention to the subject, it very commonly escapes, the inflammation not extending further than to the epididymis.

When inflammation terminates in suppuration, owing to the density, thickness, and low organization of the tunica albuginea, the matter is so slow in making its way externally, that it generally burrows in various directions, producing numerous sinuses throughout the gland, and disorganizing its delicate structure. The matter sometimes becomes encysted, forming a separate abscess. In these cases, when the matter effused is small in quantity, after all inflammation has subsided, the more fluid particles are absorbed, and 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, and the structure of the testis will be perceived to be more or less altered from its healthy state ; whereas in tubercular disease the morbid deposit is in immediate contact with the tubular structure, which, though atrophied by pressure, is usually in other respects sound. Concrete pus may likewise be mistaken for the firm yellow 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 diffused amongst and connected with the convoluted tubuli around it. The



distinctive characters just described will be easily recognised on comparing the accompanying representation of concrete pus encysted in the testis from a preparation in the collection of the late Sir A. Cooper, with the figures at pages 315 and 349. I examined two enlarged testes 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 testis, 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 fibrous tissue: the sac of the tunica vaginalis was obliterated by close adhesions. The tunica vaginalis of the right testis contained about 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 very little diseased. Pus existing in this concrete or inspissated state often keeps up pain and irritation for

a long period, and renders the testis liable to repeated relapses of inflammation. Suppuration occasionally takes place in the epididymis. In two cases of consecutive orchitis which came under my care, at a late period of the disease an abscess formed in the cellular tissue around the termination of the epididymis and inflected portion of the vas deferens, and burst at the most depending part of the scrotum.

In many instances, after acute orchitis has subsided the testis is restored to its natural condition; in other cases, permanent changes of a serious nature are the consequence. I have observed in testes that have been affected with 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 small 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. Sir B. Brodie gives the following account of the dissection of a testis which had been attacked with inflammation from a gonorrhœa twenty years before. It was smaller than the other testicle, and part of it was considerably indurated. On making a section of the gland, he found that about two thirds of the *tubuli testis* remained in their natural condition, while the remainder had become converted into a white substance, having the consistence but not the fibrous structure of ligament.* In these

* London Medical Gazette, vol. xiii. p. 219.

cases the fibrinous matter effused in the cellular tissue connecting the tubuli, not having been absorbed after the cessation of inflammatory action, had occasioned partial atrophy of the proper structure of the organ, and been converted into the dense tissue just described. Complete atrophy is one of the most serious results of acute inflammation of the testis. In Chapter II., the disturbance in the organization of the testis consequent upon inflammation was noticed as the most common cause of wasting, and several examples of it were adduced. Consecutive orchitis seldom subsides without leaving behind distinct traces of its existence, which never disappear 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. In old cases the epididymis acquires the density and consistence of cartilage, and sometimes even those of bone. These changes 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 testis have been observed, in some instances, co-existing 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. The absence of pressure, owing to the unresisting nature of the membrane investing the epididymis, appears to prevent the obliteration of the duct of which it is composed, and thus accounts for atrophy occurring much more rarely after consecutive orchitis than after inflammation originating in the body of the gland, where the delicate seminal tubes are enclosed in the firm unyielding tunica albuginea.

Acute 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. It sometimes appears to arise from exposure to the vicissitudes of the weather, in which case the inflammation is liable to assume somewhat of a rheumatic character. 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.

An inflammatory swelling of the testis sometimes

follows an attack of cynanche parotidea, or mumps. It occurs generally about the period of puberty, and when the swelling of the parotid and sub-maxillary glands is on the decline: it is supposed to be owing to a metastasis of the inflammation from the salivary glands to the testis. The inflammation is usually slight, and seldom requires any other than mild treatment. It is commonly believed that wasting of the testis is a frequent result of this complaint. Sir A. Cooper states that he has not met with any instance of the kind in his own practice;* and no case has come under my observation,† nor have I heard of any amongst the different medical friends of whom I have made inquiries. Dr. R. Hamilton, the first writer who gave a particular description of this affection, has, however, related two cases of atrophy of the testis succeeding the orchitis occurring in mumps. 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

* Lib. cit. p. 77.

† A middle-aged married man in the London Hospital on account of lumbar abscess had one of his testes completely wasted, which he attributed to an attack of mumps in his youth; but whether correctly so I had no means of ascertaining.

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.*

I have already observed that inflammation of the testis 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 testis, 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 this part, 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 testis,

* Trans. of Royal Society of Edinburgh, vol. ii. Art. IX. p. 59.

and thus give rise to orchitis. Of all the causes here mentioned as more or less liable to lead to inflammation of the testis, gonorrhœa is by far the most common. Orchitis 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. Secondary orchitis differs, however, from the latter, in many important respects.

Orchitis 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 commences when the pain and discharge begin to subside. It is a common observation, that when inflammation of the testis 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 testis. The doctrine of metastasis, to explain the phenomena of disease, has been too often adopted on insufficient grounds. It is extremely questionable whether any thing of the kind ever takes place in gonorrhœal orchitis. Assuredly it does not in those, the more numerous cases, in which the inflammatory action may be gradually traced creeping along the vas deferens to the epididymis. The origin of orchitis is here clearly made out, without the necessity of being accounted for by a metastasis. 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 writers have taken considerable pains in investigating the connexion supposed to exist between the state of the discharge and the inflammatory action in the testis. 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.* 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 increased, 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 testis. In only three cases did the running, after having been suppressed at the commencement of the affection, re-appear and increase as the acute symptoms of orchitis subsided.† Mr. Hunter states, that he has known cases where the testicle has

* Recherches sur l'Epididymite Blennorrhagique, Archives Générales de Médecine, Mai, 1841.

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

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.* 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 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

* Treatise on the Venereal Disease, 4to. 55.

testicle the cause of the cessation.”* Inflammation frequently attacks the epididymis and testis of persons labouring under gonorrhœa, apparently without any previous affection of the vas deferens. It is in such cases only that the orchitis 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 orchitis becomes developed; and how seldom orchitis occurs when the discharge is quickly arrested by specific remedies or injections;—we cannot readily admit that the affection of the testis commonly owes its origin to the sudden cessation of disease in 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 testis is attacked, apparently without any previous affection of the vas deferens, the inflammation likewise commences generally in the epididymis. This form of the disease, 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,

* Lib. cit. p. 55.

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 inflammation of the testis most frequently arises in cases in which the discharge has been somewhat suddenly arrested by the administration of cubebs or copaiba, or the use of 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 orchitis than others treated differently. Mr. Broughton mentions that out of fifty cases of gonorrhœa treated with cubebs, swelling of the testicles occurred in only two instances ;* a proportion so small that it would be unfair to attribute the occurrence of the orchitis to the use of the remedy. Sir B. Brodie states, he is satisfied that he has seen this disease quite as often where no remedies, such as cubebs and injections, were used, as where they had been had recourse to.† 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 orchitis. 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 testis.

* Medico-Chirurgical Transactions, vol. xii. p. 100.

† Medical Gazette, vol. xiii. p. 218.

According to my observation, orchitis 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 testis are increased in direct ratio to the continuance of the disease in the urethra.* Certainly most practitioners will allow that the occurrence of orchitis 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 testis often feels heavy and uneasy, and tender on pressure; and being 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, much exercise, any excess in stimulating drinks, and neglect of the use of a suspender, are commonly sufficient to induce the disease. We cannot doubt, though it is difficult to account for it, 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

* British and Foreign Medical Review, Oct. 1840, p. 392.

testis, 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 orchitis. We do not find, too, that those who suffer most severely from gonorrhœa are the most liable to orchitis. 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 the most acute form, sooner get rid of the disease, and more commonly escape its after-consequences, orchitis and stricture.

Secondary orchitis is generally supposed to occur more frequently on the left side than on the right, but recent 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 only lately registered the cases coming under my notice. Of thirty-six cases of consecutive orchitis, twenty-one occurred on the right side, and fourteen on the left; one only was double. My observations, therefore, agree with those of the

* Lib. cit. p. 190.

† Lib. cit. p. 443.

above writers in indicating the right testis to be the one most frequently attacked. Taking the three series of observations together, we have 138 cases of orchitis; of these, the right testis was the seat of disease in seventy-eight, the left in forty-nine, and both glands in eleven. Reasons have been assigned for the more frequent occurrence of orchitis on one side than on the other, but they are very unsatisfactory; and we can no better explain why inflammation extends along the vas deferens to the right testis in preference to the left, or why both are seldom attacked simultaneously, than we can account for the fact that the right lung is more liable to pneumonia than the left, or satisfactorily explain the comparative rarity of double pneumonia.

Symptoms.—A testis attacked with acute inflammation in a few hours becomes swollen, hard, and tender, and feels heavy and painful. It increases to twice or 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, usually very distressing to the patient. It sometimes resembles the uneasiness produced by squeezing the testis, and is accompanied with the same sickening sensation. The pain extends upwards to the loins, where it is often very 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 testis

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 are usually severe. The pulse is rapid and hard, the skin hot, and the tongue white and furred. If blood be taken from the system, it is found cupped and buffed. The patient often, also, suffers from nausea and vomiting, and occasionally from pain in the lower part of the abdomen, which have even been mistaken for symptoms of enteritis. After these 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.

I have stated that inflammation of the testis, when arising apparently from cold, sometimes assumes somewhat of 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 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."* I am not able to confirm the observation of Dr. Macleod in respect to the tunica albuginea being the seat of the affection, nor have I in any case found the rheumatic character of the symptoms very decidedly marked.

I do not recollect having met in medical works with any notice of acute inflammation attacking the testes of young infants. I have seen, however, a few cases of orchitis at this early period. The symptoms were acute, and the swelling was considerable; but the disease soon subsided, and it was always confined to one testis. 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

* On Rheumatism, p. 20.

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 testis, but the cord still remained thickened and hard. Three weeks after the attack first commenced, I found the parts perfectly natural.

In November, 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 testis. 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 testis 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 testis. 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 testis as well as the cord was still enlarged and indurated. A small quantity of matter continued to be discharged. I ordered

quinine and a nourishing diet ; and a month afterwards 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.

Consecutive orchitis 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 swelling at the back of the testis, which is sometimes 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. In general the tunica vaginalis participates sooner or later ; 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. In the sympathetic form of the disease, the swelling of the epididymis and testis 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 of the gland, 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 testis, which often lasts for many months, and in many 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 expe-

* Lib. cit. p. 435.

† Lib. cit. p. 211.

rience it much exceeds the period usually occupied by acute orchitis 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 testis 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.

Diagnosis.—But little difficulty is experienced in distinguishing a testis swollen from inflammation from a strangulated inguinal hernia. In both there may be a scrotal swelling, accompanied with pain and tenderness of the abdomen, frequent 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 testis 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 much swelling of the spermatic cord, being clearly defined at its upper part. When a testis detained in the groin becomes inflamed, the diagnosis is much more difficult, a tense inguinal swelling being coupled with sickness, pain in the abdo-

men, 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. (See p. 112.) The active character of the symptoms renders acute orchitis unlikely to be mistaken for the more chronic diseases of the gland.

Secondary orchitis differs from inflammation originating in the body of the testis in being preceded 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 usually leaves the epididymis enlarged and indurated.

Treatment.—Acute orchitis, from whatever cause it may originate, 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 all cases in which it can be managed without inconvenience, I direct the patient to place himself in the recumbent position, either to repose on a sofa or rest in bed. The marked relief derived in inflammation of the extremities from promoting the return of blood to the heart is so fully appreciated, that it is unnecessary

to insist on the importance of thus obviating the effects of gravitation in orchitis. In very acute cases, this object may be more fully obtained by elevation of the pelvis by means of a pillow placed under the nates. The scrotum and its contents must also be well supported by a suspensory bandage. Those usually 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. In case of greasy or coloured applications being employed, the suspender should be lined with oiled silk for the sake of cleanliness. A silk, or, better still, a cambric handkerchief, doubled so as to form a triangle, the middle of the base being applied to the perineum, and the extremities tied behind, the point being carried forwards and attached in front to a band around the waist, will effectually sustain the scrotal parts. Patients suppose that the recumbent position obviates the necessity for support; but this is a mistake, much relief being experienced, and the effects of gravitation a good deal counteracted, by raising the testis from its position upon or between the thighs. A cold evaporating lotion, composed of lime-water, or the goulard and rectified spirit, in the proportion of one ounce of the latter to seven ounces of the former, or of a lotion consisting of a drachm of the hydrochlorate of ammonia dissolved in five ounces of cold spring water, with the addition of an ounce of rectified spirit, may be applied to the scrotum and frequently renewed. In the early stage of acute orchitis, lotions sometimes afford a good deal of

relief; but on the whole they are less useful than warm applications, and can only be employed to advantage whilst the patient remains at rest in bed, as it is necessary to keep the clothes away from the parts in order to favour evaporation. A good-sized dossil of lint, surrounded with oiled silk to keep it moist, will commonly be found the most grateful and soothing application. Poultices, if not light and thin, occasion uneasiness from their weight, and when dry and harsh become disagreeable. The patient must abstain from taking animal food, and the bowels are to be acted on by a smart purge. Two grains of calomel, with five of the compound extract of colocynth, may be given at night, and followed in the morning by a draught composed of the potassio-tartrate of soda and the infusion and tincture of senna. A quarter of a grain of tartar emetic may be exhibited every three or four hours, and the dose, if necessary, increased until nausea is produced. This is one of the most valuable remedies that can be employed in acute orchitis: and when patients are desirous of avoiding the trouble, mess, and exposure consequent upon the application of leeches, the exhibition of tartar emetic will generally render local depletion unnecessary, whilst its depressing influence being only temporary, the patient quickly regains his health and strength. I have seen most acute orchites arrested and subdued in thirty hours by keeping up constant nausea by means of this remedy. When there is much pain or constitutional derangement, two or three grains of calomel, combined with eight or ten grains of

Dover's powder, or with small doses of morphia, may be given at bedtime. In consecutive orchitis, in which the tunica vaginalis is so generally affected, considerable benefit is derived from mercury, and experience fully confirms what reason would lead us to expect from its remarkable efficacy in inflammation of the other serous membranes. The value, indeed, of mercury in the treatment of this form of orchitis, scarcely appears to be fully appreciated by the profession. In acute cases, after the bowels have been freely acted on, and the pulse has been lowered by tartar emetic, I usually prescribe mercury, and continue it until the gums become slightly affected. I am confident that by this treatment the duration of this form of the disease is often materially abridged, and, what is of some importance, it is succeeded by much less induration and thickening of the epididymis than when the exhibition of mercury has been deferred to a later period.

In treating cases of orchitis in private practice, it is generally desirable to avoid bloodletting, especially local; but in cases of a severe or obstinate character, depletion sometimes becomes necessary. Bleeding from the arm is only required when the inflammation and symptomatic fever are unusually acute. In a robust person, one full depletion at the onset of the attack in many instances considerably abridges its duration, and renders local abstraction of blood afterwards unnecessary. This is a practice which might be resorted to more frequently than it usually is, especially in treating the working classes, to whom time and the expense of

leeches are objects of consideration. Local depletion, however, is more commonly employed than general. From eight to twenty leeches, according to the circumstances of the case, are applied to the scrotum; and if no relief be afforded in from twelve to sixteen hours, they are repeated. A light poultice applied when the leeches are removed promotes the bleeding for some hours afterwards. The hip bath is also of service in encouraging the flow of blood, and also contributes to the relief of pain. After the application of leeches many persons experience no trifling annoyance from an intolerable itching, which disturbs their rest at night, and induces them to scratch the scrotum until the leech-bites form troublesome sores. The best application in this state is the dilute citrine ointment; but the itching may be obviated by applying the leeches to the skin in the course of the spermatic cord towards the groin, the parts being previously shaved.

When objections are made to the application of leeches on account of the exposure it occasions in families, a sufficient quantity of blood may sometimes be abstracted from the veins of the scrotum. The patient being in the erect position, distension of the veins is to be encouraged by fomenting the scrotum with warm water, or exposing it to the heat of a fire. Three or four veins are then to be punctured with a lancet. When enough blood is withdrawn, the patient must be directed to lie down, and the bleeding will almost immediately cease. I have removed blood in this way in several cases, but have not always found it flow with readiness,

and I have even failed in removing a sufficient amount. The scrotum is not always tense and distended, nor are the veins always apparent and prominent. Many surgeons recommend cupping on the loins : abstraction of blood in this way generally affords relief.

The cure of acute orchitis has been much facilitated, of late years, by the application of a mode of treatment which has been found of great service in relieving certain forms of acute inflammation in other parts of the body, viz. *compression*. The object of compression is to afford support to the weakened vessels ; and in acute 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 Hamburgh, I believe, first suggested the practice of treating both acute and chronic orchitis by compression, applied to the testis by means of adhesive plaister. 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.* This practice has since

* Zeitschrift für die Gesammte Medicin, as quoted in the Gazette Médicale de Paris, Année 1836, p. 182.

been adopted in Paris by Cullerier and Ricord ; and in this country by Mr. Langston Parker, Mr. Acton, my colleague Mr. Hamilton, myself, and others, and, I am informed, by the army surgeons generally. Some care is required in making the application, which I perform as follows. The patient being placed in the recumbent position, with the testis 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 *emplastrum plumbi* must be cut into strips, about three quarters of an inch in width, and eight or nine inches in length. The opposite testis 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 testis, as tightly as the patient can bear it. The second strap is to be placed in an opposite direction, from behind forwards, at the side of the testis 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 testis 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 reapplied in the course of twenty-four hours. When the patient rises after its application he feels completely relieved from the aching pain and sense of weight ; and patients who have remained in bed in consequence of the pain have immediately been able to get up and walk about. Some surgeons recommend the application of compression at the onset of the inflammatory attack ; and if the inflammation be moderate this may be done with advantage, so that when concealment is desirable the patient may be able to continue his usual avocations. But in decidedly acute orchitis it is better to commence with an active purge, the tartar emetic, and, if necessary, depletion, and to enjoin rest ; and then, after twenty-four or forty-eight hours, to resort to compression : for in active inflammation of the testis compression is not always sufficient without other antiphlogistic means, and if solely depended on, may disappoint expectations. But after the more acute symptoms are relieved compression greatly facilitates the cure, affording relief from pain, causing the rapid subsidence of swelling, and removal of all effused matter. In cases of a chronic character, or to remove the thickening and induration of the epididymis and cord so commonly observed after acute consecutive orchitis, the testis may be strapped with the *emplastrum ammoniaci cum hydrargyro* ; or iodine or mercurial ointment may be first applied to the scrotum, and then the strapping, so as to combine the advantages of these applications and of compression. The

removal of the chronic enlargement and induration may be further promoted by the exhibition of small doses of mercury. In these cases I sometimes keep up counter-irritation by painting the scrotum on the side of the affected testis with the following solution—*Iodin.* ʒj. *Potass. Iodid.* ʒss. *Sp. Vin. Rect.* ʒj.; repeating the application every third or fourth day, until the gland is restored to its healthy state. Blisters are sometimes used; but they are too irritating to be applied to the scrotum, and are even liable to cause mortification.

In some constitutions, after the more active symptoms of orchitis have subsided the inflammatory action persists, and continues unchecked even by local depletion, which, if persevered in, weakens the patient without subduing the disease. This is observed in persons of a weak frame, who usually appear pale, and as if they did not habitually enjoy good health, and in whom the orchitis at first is neither very acute, nor accompanied with much constitutional disturbance. In this sub-acute form of the disease the pulse is quick, hard, and jerking; there is but little or no fever; but the digestion is usually impaired, and the testis remains swollen, tender, and painful. These patients do not bear depletion well. Eight or ten leeches applied day after day make very little impression on the inflammation of the testis; but they render the patient weak and irritable, and retard his recovery. If three or four grains of blue pill, combined with four or five of the extract of hyoscyamus, or five grains of the *hydrargyrum cum cretâ* and of

the *pulvis ipecacuanhæ comp.*, be exhibited night and morning,—if the diet be improved a little by allowing light broths and puddings, and the diseased testis be steadily strapped, I have generally found that the inflammatory action soon ceases, and that the swelling of the gland gradually subsides.

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 injection, must not, however, be employed so long as any active disease is going on in the testis; and even after all 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,* to show that chronic enlargement and induration of the testis, 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

* Practical Observations on the Sclerocele and other Morbid Enlargements of the Testicle, &c.

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 testis, 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 testis, which exists more commonly than was supposed. In cases of stricture, it often happens after an attack of acute orchitis 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 testis has subsided, without any other treatment being necessary than simply supporting the organ. I believe, too, that in the majority of cases in which the inflammation of the testis 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, of consecutive orchitis of an indolent or obstinate character, it is often prudent to pass a bougie in order to ascertain the state of the urethra.

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 consecutive inflammation 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 made any difference in the treatment of primary and of consecutive orchitis, the same general principles being applicable to both forms of the disease. But the pathological distinction which has been observed is not without practical interest, and should not be altogether lost sight of in the treatment of these cases. As inflammation originating in the body of the testis 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 primary orchitis should be more active than that of consecutive, and this form of the disease more generally requires local depletion. The prognosis in consecutive orchitis is more favourable than in primary: on the other hand, after inflammation has ceased, consecutive orchitis is more exposed to re-

lapses, and the swelling and induration accompanying it subside less readily and quickly than in primary orchitis.

SECTION II.

CHRONIC ORCHITIS.

The testis 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 inflammation is the deposit of a peculiar yellow, homogeneous, inorganic matter in the structure of the testis. This substance when first formed is of 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 some instances there is a single deposit of this substance in the centre of the glandular structure, as in the preparation from which the annexed wood-cut was taken. In others several are interspersed throughout the testis, portions of sound gland intervening. In a case of chronic enlarge-



ment of both testes, 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 testis, and a single one only in the body of the left. The small masses as they enlarge coalesce, or the single one increases until the whole testis presents an uniform yellowish-white appearance. The epididymis is frequently invaded at the same time by a similar kind of morbid deposit, which also tends to obliterate its tubular structure. This, however, is not, as some pathologists suppose, a constant occurrence; for in the majority of testes thus diseased that I have examined, the epididymis had entirely escaped. The inorganic nature of this deposit is clearly apparent on injecting the testis, by the contrast which it offers to the surrounding structure. I have never succeeded in tracing vessels into it. But the vessels of the testis generally are enlarged, and appear more numerous than usual.

Pathologists have not yet determined in what particular tissue this yellow matter is deposited. Sir A. Cooper states that when a section is made of a testicle thus enlarged, on throwing it into water and agitating it a whitish yellow-fluid proceeds from the seminiferous tubes, which are extremely dilated, and which then appear emptied. But still the same bulk of testicle remains, owing to the cellular membrane of the part being loaded with a yellow fibrine or coagulable lymph; the rete is filled with the same secretion as the tubuli; the epididymis is similarly diseased; and sometimes the vesiculæ

seminales and vasa deferentia are distended with a similar morbid secretion.* Sir B. Brodie is of opinion that it is secreted from the inner surface of the tubuli testis. He has given an account† of the examination of a testicle enlarged, and containing a considerable quantity of this solid yellow unorganized substance, where, on slitting open the canal of the epididymis, and also the vas deferens, he found some of this same yellow substance adhering to their inner surface, having been manifestly secreted by the lining membrane; and as the epididymis is only the termination of the tubuli testis, he concludes that in the latter the yellow substance has the same origin. I have recently had an opportunity of inspecting a testis affected with this disease in what seems to me to be its early stage, from which examination I think I have been able satisfactorily to ascertain the original seat of the yellow deposit. The appearances were peculiar.—A stout-looking brewer's labourer, aged thirty-eight, a married man, was admitted into the hospital, under the care of Mr. Luke, for an affection of the left testis. It appeared that four days previously he had strained himself in lifting some heavy casks. The next day the testis began to swell, and at length became so painful that he was induced to apply to the hospital for relief. He stated that he had never suffered from any affection of the urethra, and always enjoyed good health. There was a considerable swelling of the epididymis, which was

* Lib. cit. p. 37.

† London Medical and Physical Journal, vol. lvi. p. 309.

at least four times its natural size, hot, and very tender; but the body of the testis was natural, and could be pressed without giving pain. He was kept in bed, the scrotum was repeatedly leeches, and mercury was given so as to affect the mouth, but without reducing the swelling. The tumefaction steadily increased; fluid was effused in the tunica vaginalis; the veins of the scrotum became prominent; the pain continued; and about six weeks after the patient's admission a distinct fluctuating swelling appeared at the upper part of the tumour, which shortly evinced a disposition to point. This was punctured, and about four drachms of matter were evacuated, with some relief from pain, but very little diminution of the swelling. The testis afterwards continued for several weeks in a chronic indolent condition, with a fistulous opening discharging pus, and showing no disposition to heal. The man experienced no pain, and suffered scarcely at all in his general health; but at length getting tired of a disease which seemed likely to prevent his returning to his employment for a long period, he readily consented to lose his testis. The operation was performed rather more than three months after the commencement of the disease.

The testis was injected, and a section then made of it. The surfaces of the tunica vaginalis were partly adherent, and about three drachms of serum were collected in one part of the sac. The body of the testis was not much enlarged; it contained, however, an abundant deposit of a firm opaque matter. Near the anterior edge of the testis this

deposit appeared in the section like round isolated yellowish-gray bodies, separated from each other by portions of the sound structure of the gland: about the centre of the organ it assumed a beaded arrangement, and towards the mediastinum formed a number of closely set yellow lines or processes, radiating towards the posterior part of the testis, where they were amalgamated into one uniform mass. Further examination perfectly satisfied me that this matter was lymph deposited in the tubuli seminiferi. The isolated and beaded appearances in the section resulted from breaks in the lymph thus deposited; the real seat of the effusion was very evident, from the arrangement described near the mediastinum. With a good lens some of the convoluted tubuli could be distinctly seen, filled with and dilated by the morbid deposit. A portion was carefully examined in the microscope by Dr. Letheby, who arrived at the same conclusion respecting the seat of this deposit as myself. The epididymis was much enlarged; its head was filled with soft concrete matter, surrounding an irregular cavity with which the fistulous sinus communicated; its tail contained a similar substance, without any external opening. The various appearances described are depicted in the opposite figure, which was drawn from the recent specimen by Mr. Bagg.

The morbid appearances noticed in this case, though, I suspect, very little known to British pathologists, have been accurately described and figured by Cruveilhier, in his *Anatomie Patho-*

logique.* He states, that of all the forms of sarcocele this is without doubt the most frequent. It is that which appears constantly to succeed to venereal affections incompletely cured, and to chronic inflammation consequent upon contusions; in fact it is the most general form of sarcocele, developed under the influence of an accidental cause; and he has been led by a great number of facts to regard this alteration as the result of a chronic inflammation of the epididymis. The disease proceeds from the swollen head or extremity of the epididymis towards the tail. The body of the testicle is only affected consecutively. I believe myself that the yellow deposit is the ordinary result of chronic inflammation of the testis, in whatever way produced; but that the peculiar appearances noticed in the case just related, and which have likewise been described by Cruveilhier,—I mean the small isolated masses in the substance of the gland, and radiated form of the deposit towards the mediastinum,—are only observed in those cases in which



* Liv. v. pl. 1, and liv. ix. pl. 1.

K. 1. Fistulous sinus leading to the suppurating cavity in the head of the epididymis.

2. Concrete abscess in the tail of the epididymis.

the disease originates in the epididymis, and thence spreads to the body of the testis, and in which the part is examined before the organ has become extensively diseased. These appearances are not often seen, because it is not often that it becomes necessary to remove a testis in that condition, which is indeed a curable one, unless complicated with suppuration. Cruveilhier supposes that this matter is effused in the cellular tissue of the testis, and radiates along the fibrous prolongations from the corpus highmori. I feel satisfied, however, from my own observations, that he is mistaken, and that the interior of the tubuli is the original seat of the deposit.

This yellow substance has been called the *yellow tubercle of the testis*; but as it differs from tubercular deposit, which is also developed in the testis, the term is objectionable, and liable to lead to error. It appears to be coagulable lymph, which becomes more solid in the testis than in most other parts, owing, perhaps, to the condensation consequent on the firm resistance offered to any enlargement of the gland by the unyielding tunica albuginea. That lymph effused in a part so well supplied with vessels should long remain unorganized scarcely seems remarkable, when we recollect what little disposition it evinces to undergo this change when deposited on mucous membranes, and in the interior of other glands. Lymph may remain for years in the cells of the cellular tissue without becoming organized, as is often observed around a diseased joint; and the compactness and firmness of this deposit

within the testis are circumstances unfavourable to the developement of new vessels. This disease is often accompanied with effusion of serum into the tunica vaginalis, seldom amounting, however, to more than three or four ounces. Lymph also is sometimes poured out on this membrane, and the sac becomes partially or totally obliterated by adhesions.

The peculiar matter effused in this disease under appropriate treatment undergoes complete absorption, the testis 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, or as it is sometimes termed *granular swelling*, may without impropriety receive 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 constituted of the tubuli testis mixed up with this yellow substance, and also of ordinary granulations which spring up from the seminiferous structure. (See wood-cut, p. 342.)

It is only in recent years that this hernial protrusion of the structure of the testis has attracted particular attention. In 1808, Mr. Lawrence explained the true nature of the affection in a paper illustrated with several cases;* and his observations on its causes, symptoms, and progress have been confirmed by all succeeding writers on the diseases of the testis. Though this hernial growth occurs most frequently in an advanced stage of the chronic form of inflammation, it is developed in other diseases of the organ which occasion ulceration of the tunica albuginea, and thus afford an opening for the escape of its contents. It is occasionally the result of an attack 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 organ, 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, and the seminiferous structure is more distinctly apparent, owing to the absence of the yellow matter; but there are generally sinuses which furnish a purulent discharge, sometimes mixed with semen. Tubercular matter deposited in the testis may also lead to suppuration, and the formation of a granular swelling.

* Edinb. Medical and Surgical Journal, vol. iv. p. 257.

A testis, 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 partly displaced and atrophied by the pressure of the yellow matter; and it often happens after some time that both undergo a slow process of wasting, so that an enlarged and indurated gland is progressively reduced, until scarcely any thing remains beyond a mere nodule 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 testes, 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 testis there was a yellowish deposit almost as dense as cartilage, and exhibiting very little trace of vascularity. A testis in this indolent state, when examined in the hand, often feels as hard nearly as a stone; and formerly the term *schirrus* was commonly applied to such enlargements. Its employment to designate this morbid state of the testis is scarcely exploded even now; but the term is objectionable, being liable to convey the erroneous impression that the

disease is of the same nature as schirrous mamma, whereas it is of quite a different nature, and rarely if ever assumes a malignant character. In these indurated testes, 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 testis. If the inflammation 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 ulceration of its tunics and the escape of the glandular structure in the shape of a fungous growth, or by the slower process of wasting and absorption.

The causes of chronic inflammation of the testis are various. It often takes place after a slight contusion, the first effects of which were so inconsiderable as to be very little regarded by the patient, the testis not beginning to swell nor to give pain till some weeks after the accident. 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. It occurs also after excess in venery and frequent masturbation. Persons suffering from stricture, and other affections of the urinary organs causing irritation in the urethra, are peculiarly liable to it; and the inflam-

mation may sometimes be traced creeping along the vas deferens to the epididymis, and thence to the testis, as in consecutive orchitis. It occasionally arises during an attack of gout, and in persons suffering from rheumatism, in which cases it has partaken of the characters of these constitutional maladies. Sir A. Cooper's observations on this subject are very valuable, as the result of large experience. He remarks, "With respect to the causes of this disease, it is wrong to view it merely as a local affection; for there is in persons prone to this complaint a constitutional tendency to the malady. It often occurs in those who have been scrofulous in their youth. It is frequently the product of a constitution worn and broken by intemperance. It often follows a long-continued course of mercury; and it arises in habits in which the vital powers are diminished, and in which we so often find sloughing of the cellular membrane, in the form of chronic carbuncle. Frequent exposure to wet, cold, or fatigue, and an excessive indulgence of the passions, also dispose to its production. The most frequent occasional cause is urethral disease, whether it be irritation only, exciting a sympathetic influence, or an organic change in the mucous membrane; and many of those causes which I have mentioned, in speaking of acute inflammation of the testes, are in different cases, the precursors of this disease; the chief difference in the nature and production of the two complaints being in the state of the constitution."*

* Lib. cit. p. 39.

Symptoms.—The symptoms of this disease are uniformly of an indolent character. At the commencement of the inflammatory action the testis 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 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. Formerly the term *sarcocele* was indiscriminately applied to this morbid state of the testis, as well as to other enlargements of the gland of a very different nature. The confusion produced by confounding various affections under one common appellation is a sufficient reason for the discontinuance of the use of this term, which is now seldom met with in surgical works. There is often some effusion in the vaginal sac around the enlarged testis, constituting

the affection to which the term *hydrosarcocele* has been applied. The effusion is seldom considerable ; indeed I have rarely found it exceed eight ounces. It is frequently collected at one spot, its diffusion throughout the sac being prevented by old adhesions.

It often happens that both testes 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 testes.

So little inconvenience is usually experienced from this disease, that the testis often 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 hernial protrusion of the substance of the testis, which gradually increases,

until the part presents the characteristic appearance of the granular swelling. 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. This 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. Very few cases of hernial protrusion of the testis have come under my notice within the last few years. The disease appears to reach this stage less commonly in the present day than was the case formerly. Cases of granular swelling were certainly of more frequent occurrence in 1826, when I first commenced attending the practice of the London Hospital, than they have been of late years.

The circumstance must be ascribed to the profession generally having become better informed in the diseases of the testes, and to the success attending their improved treatment of the earlier stages of the affections of this gland.

I have spoken at page 276 of the deposition of matter in the substance of the testis 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 formation of the yellow deposits of lymph. Both pus and lymph may be effused in the substance of the testis; or lymph may be deposited in the testis, whilst suppuration occurs in the epididymis alone, as in the case related at page 342. 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 testis. When effused in the body of the gland it disorganizes the delicate structure; and when ulceration ensues and the matter escapes, leaves behind sinuses communicating with the interior of the organ, which evince but little disposition to close. These sinuses discharge a thin pus, mixed in some cases with the seminal fluid, forming consequently a *spermatic fistula*. We cannot, of course, treat these sinuses as we should similar passages in other parts, by injecting them, or laying them open from the bottom. We can only endeavour to remove any existing disease by the

ordinary remedies for chronic inflammation, in the hope that as the health improves they may be induced to heal. Their cure may be a good deal promoted by keeping the testis steadily compressed by means of strapping. In some instances these fistulous passages prove so tedious, and so affect the general health, that it becomes desirable to resort to the operation of castration. I have already described a case in which it became necessary to adopt this proceeding, and I once witnessed the removal of a testis from an elderly man on the same 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 testis was quite sound. The patient had suffered from the disease for eight months, and it had resisted the ordinary treatment. In cases, too, of pus effused in the testis without finding any vent, there is often an indolent intractable enlargement 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 re-

quested to visit the master of a ship, a man aged forty-three, in consequence of a chronic enlargement of the right testis, 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 testis 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 septa of ligamentous tissue.

In some instances, when pus is pent up in the testis, 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 testis, a chronic abscess in the centre, which kept up irritation of the part, and repeatedly reproduced the inflammation."* In cases of this nature the presence of pus cannot be ascertained with any degree of accuracy. No surgeon, therefore, would think of resorting to castration till after a persevering trial had been made, with the usual remedies for the reduction of chronic inflammation of the gland.

Sir A. Cooper has remarked that the testis, 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 re-

* Lib. cit. p. 44.

sumes its natural state.* No case of this description had come under my notice till, very recently, Mr. Hamilton kindly showed me an infant ten months old, who was under his care at the London Hospital on account of a chronic enlargement of both testes. 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 under Mr. Hamilton's care three weeks, during which time they had remained stationary. I have no means of ascertaining the pathological nature of this chronic enlargement of the testis in young infants; but I question whether Sir A. Cooper is correct in describing the disease as of a tubercular character. The fact that the enlarged gland usually resumes its natural state, and the even character of the swelling, are unfavourable to this view of the nature of the tumour.

Diagnosis.—A chronic inflammatory enlargement of the testis 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 many cases the origin of the

* Lib. cit. p. 97.

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 the present disease that the diagnosis is extremely difficult. 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 hernial 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 gland may be detected through the fluid.

Treatment.—Chronic orchitis, if treated early, is usually very amenable to remedies. Depletive measures are seldom necessary. A few leeches may sometimes be applied with benefit after a fresh or sudden accession of inflammation; but even local depletion is not often required. Mercury is the chief remedy; and there are few other diseases in

which its effects are more uniformly beneficial, or in which it is better entitled to be regarded as a specific, than in chronic orchitis before the occurrence of suppuration. 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. No object is gained by making the mouth very sore; but it is desirable to affect the gums slightly, and to keep the patient under the influence of the remedy until all swelling has subsided, and the induration is nearly removed, which takes place slowly, and usually occupies three or four weeks. I prefer the blue pill, because the continued action of the remedy in this form produces less irritation in the system than calomel. It must not be understood that chronic orchitis cannot be cured without mercury; but this remedy is so eminently beneficial, that where the constitution can bear it its exhibition should always form an important part of the treatment. At first I generally recommend the patient to keep 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 and when the inflammation is slight. 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 mer-

cury 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*. Dr. Fricke of Hamburgh and Mr. Langston Parker* also speak favourably of the effects of compression in chronic orchitis. The reduction of the swelling and induration may also be promoted by applying to the scrotum the strong mercurial ointment, or by counter-irritation from the application of the *Unguentum Iodinii C.*, or the *Ceratum Hydrargyri C.* In cases in which I have been desirous of not increasing the mercurial influence, I have sometimes kept up irritation 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 cases where I have found it necessary to discontinue the use of

* Lancet, vol. ii. 1839-40, p. 640.

mercury in consequence of its injurious effects on the constitution, the decoction of sarsaparilla, with five or six grains of the iodide of potassium, has been given with much apparent benefit in getting rid of the swelling and induration. In gouty and rheumatic constitutions, colchicum combined with anodynes may often be exhibited with advantage. During the treatment the patient must strictly abstain from the excitement of venery; and the diet should be light, and malt liquors and stimulating drinks must not be allowed.

The successful result of this 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 testis 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 testis 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.

As the inflammation of the testis 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 testis, 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 injection; a remedy which, under these circumstances, must be employed with some caution, in order to avoid exciting fresh inflammation in the substance of the gland.

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, æt. 27, 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 testes. 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 of the scrotum, and could without difficulty detect the testis 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 was of an oblong shape, and 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 testis, which was evidently enlarged and indurated. It was rather tender, but not much more so than usual, and 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 straw-coloured serum from the hydrocele on the right side with a trocar, and then found this testis larger even than the left, and also very hard. In both the induration was in the body of the gland, and not particularly in the epididymis. The spermatic cords appeared to be unaffected. He 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 it was with some hesitation consented to, being attended with serious inconvenience. 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.—Oct. 17th. Although the pills

had been increased to four daily, the mouth was scarcely at all affected by the mercury. The testes 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 22d the mouth was rather sore, and the fluid was entirely absorbed from the left side; and the testis was softer, and partly reduced in size. The right testis and hydrocele were also diminished. The treatment was continued.—Nov. 3d. The mouth was very sore: the blue pills had been omitted since the 27th ult. Both testes 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*. 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 testes were restored to their natural size, a little induration only remaining at the end of ten weeks after I first saw him.

Not many years back a hernial protrusion of the testis was regarded as so formidable and incurable a disease, that no other treatment was resorted to but castration. A better acquaintance with the

pathology of this gland has led to improvements in practice, and now the majority of cases of this affection are found to be remediable without recourse to so severe an operation. Indeed, I believe with Mr. Lawrence 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.* The chief obstacle to the healing of the wound is the impediment offered by the protuberant fungous mass. The first object, therefore, is to reduce this projecting growth to the level of the surrounding skin. Mr. Lawrence recommended its removal with the knife, as the shortest and most effectual mode of treatment. Sir A. Cooper states that he has several times successfully practised the following plan:—“An elliptical incision is made in the skin around the projecting granulations, and then the knife is carried under the whole of the swelling, and close to the tunica albuginea; by which the part is excised, leaving the epididymis and testicle uninjured. Then the edges of the skin are approximated over the new surface, and it is healed by adhesion, if possible; but, if the adhesion be not complete, by pressure with adhesive plaister; and by approximation of the integuments over the orifice of the tunica albuginea, the granulations are prevented from becoming again prominent.”† The protrusion may be remedied and the sore healed without recourse to the knife, and I must confess that the

* Lib. cit. p. 258.

† Lib. cit. p. 45.

operation of excising it scarcely seems to be a very scientific mode of proceeding. It has been seen that the projecting fungus partly consists of tubuli seminiferi, and in some instances includes nearly the whole of the glandular part of the testis, so that its removal becomes an operation which in effect is but little less than that of castration. It may, indeed, be doubted whether the secreting structure protruded in this affection can ever be so far restored as to be enabled to perform its proper function; and in some instances, after the fungus has receded and the part become healed, the testis has been reduced to an atrophied and useless condition. Still it is by no means clear that in most of these cases of *hernia testis* the glandular structure, though more or less injured, is wholly destroyed, or incapable of recovery. That the tubuli are capable of secreting whilst projecting from the scrotum has in a few instances been proved by the appearance of semen in the discharge; and I see no reason why they should not be able to continue their functions after the testis has resumed its situation, and the sore has closed up. I think the object of the surgeon should be to endeavour to place the diseased organ as nearly as possible in its former healthy 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 appears to me to be objectionable, especially as it seldom happens that the healing of the wound cannot 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 resorted to by some surgeons of tying a 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 certainly more tedious than the knife. The following is the method which I usually adopt, and I think it will generally be found to succeed in these cases:—The patient is directed to keep in bed; and if there is any tenderness or pain in the testis, to take four or five grains of blue pill night and morning, until all symptoms of existing inflammatory action are removed. A piece of lint of sufficient size to cover the sore, having been dipped in a strong solution of the nitrate of silver in the proportion of five grains to the drachm, is placed on the part. One or two compresses of lint are applied over this, and tolerably firm compression is then made by several strips of adhesive plaister, and the whole is secured by a bandage. This is to be repeated daily; and as the protrusion recedes the scrotum is drawn over it, and the edges of the wound are gradually approximated by narrow strips of plaister. Under this treatment cicatrization takes place, and the testis gradually resumes its place in the scrotum, but remains firmly adherent to the new skin. In cases where there is no occasion for the exhibition of mercury, or after its discontinuance, if the general health be impaired, the sulphate of quinine, iodine, steel medicines, or bark and soda, may be combined with the local remedies. Sir B. Brodie recommends the following

treatment :—Let the patient be kept in bed in the horizontal posture ; give him mercury internally ; sprinkle the surface of the fungus every day with very finely powdered and levigated nitric-oxide of mercury, and over this apply some simple dressing. What with the application of the nitric-oxide of mercury to the part, and what with the mercury administered internally or by inunction, in the course of a short time the surface of the fungus becomes covered with red healthy granulations. As soon as this takes place the application of the nitric-oxide of mercury may be left off, and a weak solution of sulphate of copper in camphor mixture may be used as a dressing. A grain of the former may be dissolved in an ounce of the latter, and a piece of lint dipped in it may be laid on the fungus and changed night and morning, a little simple dressing being applied over the whole merely to keep the parts moist.* There are many other escharotic applications which will answer the purpose of checking the growth of the granulations and causing their disappearance. Equal parts of powdered savine and the sulphate of copper, sprinkled on the parts, will be found to answer very well, acting partly by producing a slough, and partly by promoting absorption.

* Medical Gazette, vol. xiii. p. 222.

SECTION III.

SYPHILITIC ORCHITIS.

In persons affected with secondary syphilis, the testicles are liable to undergo a chronic morbid enlargement, which is known by the term *venereal inflammation*, it being supposed to be one of the sequelæ or constitutional effects of the syphilitic poison. Though this affection of the testis is not an ordinary symptom of secondary syphilis, it is far from being rare: when present it is usually accompanied with a pustular or scaly eruption of a venereal character, with periosteal inflammation, and not unfrequently with iritis. The symptoms of this affection closely resemble those of the chronic form of inflammation described in the preceding section; indeed the local symptoms of venereal orchitis only differ from those of chronic inflammation of the gland, in the testis becoming occasionally more tumid and painful during the evening exacerbation, or in the occurrence in some cases of nocturnal lumbar pains. The enlargement takes place slowly and in the same manner, is accompanied with the same dull pain and sense of weight, and the disease maintains the same indolent character throughout its entire course, as in chronic orchitis. It commonly commences in the body of the gland, and rarely terminates in suppuration, or in the production of a hernial fungus. Sir A. Cooper thinks that, in the majority of cases, the disease

attacks both testicles.* The eight examples recorded in his work do not, however, bear out this remark; for in only two of them does it appear that both organs were attacked. According to my observation, the disease is more commonly confined to a single gland, though it occasionally affects both; and this also appears to be the opinion of Ricord.† Sir A. Cooper has had no opportunity of dissecting a testis in this state; nor have I. Sir B. Brodie mentions one instance in which he examined the venereal testicle, and found the morbid appearances to correspond with those observed in chronic inflammation.‡

Syphilitic inflammation of the testis should be treated for the most part on the same principles as ordinary chronic orchitis. The striking efficacy of mercury in this affection has been already explained: in the venereal form of orchitis this remedy is also most generally required for the disease of the testis, as well as for the relief of the other syphilitic symptoms; and it will commonly be found necessary to continue its use, so as to keep up its influence on the system for a longer period than in treating simple cases of chronic orchitis. Syphilitic inflammation of the testis may, however, be cured without mercury; and in cases where the constitutional debility has been such as to render its exhibition unsafe and injurious, I have seen the inflammatory enlargement of the gland completely subdued and

* Lib. cit. p. 105.

† *Traité Pratique des Maladies Vénériennes*, p. 640.

‡ *Medical Gazette*, vol. xiii. p. 379.

the health improved by local depletion, counter-irritation, and rest, combined with the decoction of sarsaparilla and the iodide of potassium, and other remedies adapted for the relief of the constitutional symptoms. Sir B. Brodie has recorded an instructive case, in which the testis enlarged and suppurated whilst the constitution was suffering from the effects of syphilis and the continued use of mercury. The patient was ordered to take sarsaparilla ; and in six weeks the testis diminished and the abscess healed.* It should be borne in mind, therefore, that although in the majority of cases of syphilitic orchitis mercury is the proper remedy, there are others in which it is productive of no benefit, or actually injurious, the system being unfitted for the use of this remedy, or already suffering from the combined effects of the syphilitic poison and mercurial action. In many instances, when large doses of mercury cannot be safely exhibited, advantage may be obtained from giving sarsaparilla with the sixteenth of a grain of the *hydrargyri bichloridum*, or the sixth of a grain of the *hydrargyri iodidum*.

CHAPTER VII.

TUBERCULAR DISEASE OF THE TESTIS.

THE testis is sometimes the seat of tubercular disease. This deposit is commonly met with in

* London Medical and Physical Journal, vol. lvi. p. 311.

the crude state, forming a yellow caseous substance, similar to the tubercular matter occurring in the lymphatic glands. It is sometimes developed in a single mass; at other times several distinct depositions are formed in different parts of the organ; in both cases at the expense of its glandular structure, which becomes atrophied as the disease advances. The disease also attacks the epididymis,

which is, indeed, more frequently affected than the body of the testis.



I have examined many testes attacked with strumous disease. In a specimen given me by Mr. R. Robinson of Peckham, which was removed from a man who died from the same disease in the lungs (see figure), the whole of the epididymis was observed to be occupied by tubercular matter, with scarcely any trace of tubuli; whilst the body of the gland, though small, remained perfectly sound and unaffected. In some cases



two, three, or more distinct tubercular deposits were found in the testis and epididymis, separated by portions of healthy gland. This was the case in two testes which I removed from a middle-aged man who died of phthisis. They were injected, and a section of one of them is represented in the adjoining wood-cut. In several

instances these isolated masses appeared to be contained in cysts formed by the processes from the tunica albuginea, which separate and support the lobules. Sometimes the separate deposits seemed to be coalescing and joining together, so as to form one continuous mass; and I have found a single mass of tubercular matter surrounded by the glandular structure expanded into a thin layer. In another specimen the whole testis was occupied by a homogeneous cheesy mass, without any trace remaining of the original structure of the gland. In some cases in which the disease was thus advanced there was very little increase in the size of the testis; it only felt heavier and harder than when in the natural state. In others, again, there was either a general uniform enlargement, or an irregular swelling at some part, more commonly at the head of the epididymis. Some of these testes, in which the disease was not much advanced, when injected made beautiful preparations, the yellow inorganic tubercular matter contrasting in a marked degree with the vermilion hue of the intervening sound portions of the organ. On several occasions I found a small quantity of serum in the tunica vaginalis, with partial adhesions and depositions of lymph. In a more advanced stage of this disease the characteristic deposit becomes softened down and converted into a yellow pultaceous substance, evidently tubercular matter mixed with pus. The abscess extends to the scrotum; and after it has burst and the matter has escaped externally, cavities and sinuses are left which may be said to resemble the tubercular cavi-

ties in the lungs. The course of the affection, however, in the testis, more nearly resembles the changes which ensue in tubercular disease of the absorbent glands.

It has not been very clearly made out whether the tubercular matter is originally formed in the cellular tissue connecting the tubuli, or in the tubuli themselves. I have certainly seen this deposit in the vas deferens near the testis, and in the interior of the ducts forming the epididymis; and Mr. Busk of the Dreadnought Hospital once showed me a preparation of scrofulous disease of the testis, in which the duct of the epididymis could be distinctly seen dilated and filled with this matter. Dr. Carswell, in his *Pathological Anatomy*, has also given a representation of a testis from a young man who died of phthisis, containing a multitude of pale yellow-coloured granular bodies of various sizes, which he says were obviously formed by the accumulation of tuberculous matter in the tubuli seminiferi. The epididymis was as thick as the little finger, and its convoluted ducts were obviously filled with a similar deposit. I believe that tubercular matter is deposited in both situations, within as well as between the tubuli.

It is a question as yet undetermined whether tubercular matter once deposited in the testis is ever got rid of without inflammation, suppuration, and the discharge of the morbid product through an ulcerated opening. We sometimes meet with cases of disease of the testis, the indolent character of which and the marked scrofulous diathesis of

the patient would favour the presumption that the gland was the seat of tubercular formation; and yet under appropriate treatment, or even spontaneously, the induration or enlargement subsides, and all evidence of disease disappears. My friend Mr. R. Robinson had a patient who died of tubercular disease in various parts of the body, whose testis during life, after having acquired a considerable magnitude, slowly diminished to its natural size. I am not aware that any dissections have been made bearing upon this point. In some of the above cases the enlargement was probably owing in a great measure to the effusion of fibrine or albuminous serum in the tunica vaginalis, consequent upon the inflammation with which this disease is often attended; which deposits, as the inflammation subsided, became absorbed, the tubercular matter being left but little changed, and the testis itself unaltered in size. Laennec considered the cretaceous matter found in the lungs as an indication of the cure of phthisis; an opinion which appears to be confirmed by the researches of Dr. Carswell and others. A cretaceous matter is sometimes found in the testis, but more commonly in the epididymis (the most frequent seat of tubercular deposit,) which is exactly similar to the dry, putty-looking, chalky matter observed in the lungs and bronchial glands. I think it highly probable that in some of these cases the gland had, at some former period, been the seat of tubercular deposit; but the circumstances under which this earthy matter has hitherto been found in the testis were

such that I was unable to make any satisfactory inquiries on the subject. A



good specimen of this cretaceous matter in the epididymis, from the collection of the late Sir A. Cooper, is represented in the annexed wood-cut. The epididymis is enlarged, and contains three separate deposits of this matter, whilst the body of the testis is perfectly sound.

Tubercular matter, though sometimes formed in the testis 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 testis, as compared with other organs. In Laennec's table the epididymis is placed in the order of frequency before the body of the testis, which accords with general observation. In the tables of Louis, Lombard, and Papavoine, no mention is made of the testis. In many instances only one testis is attacked; but not unfrequently both glands are affected simultaneously, or one shortly after the other.

The occurrence of this disease in the testis must, no doubt, be viewed as one of the manifestations of the peculiar morbid state of constitution commonly known by the term *scrofula*. It appears, however, that a weak condition of the organ, or an impaired organization consequent upon previous disease,

tends greatly to favour the developement 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 consecutive orchitis 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 testis, 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 often with semen, particularly after venereal excitement. Similar changes may take place in other parts of the testis, occa-

sioning 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 sometimes 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. The bursting of the abscess and escape of the tubercular matter are sometimes followed by a hernial protrusion of the testis, as after chronic inflammation of the gland. Strumous disease of the testis 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 testis. 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 three grains of the iodide of potassium, to be taken three times a day, and some iodine ointment to be applied to the enlarged testis. In May the skin became adherent to the lower part

of the testis ; 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 testis 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 have lost sight of the patient. Mr. Lloyd relates the following case.—A child three years and a half old was brought to him with the right testicle affected. The whole scrotum was distended with matter, and appeared like a scrofulous abscess in any other part of the body, and the skin was so thin that you might see the matter through it. A poultice was applied, and in a few days the abscess burst ; and the aperture soon enlarged so much that full half of the gland projected through the scrotum, and was converted into a mass of yellow scrofulous matter, which a few days after separated, leaving the remainder of the gland enlarged and hardened. This was, however, rapidly diminishing, and seemed likely to entirely waste away.*

This disease is frequently connected with scro-

* Treatise on Scrofula, p. 93.

fulous affections of other parts.* The patient is either phthisical, or subject to strumous swellings of the lymphatic or mesenteric glands ; or affected with disease of the spine, hip, knee, or some other articulation, 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 testis 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 testis.

Diagnosis. — Tubercular disease of the testis may be mistaken for chronic, inflammatory, and malignant enlargements of the gland. Writers on the diseases of the testis often confound the former of these affections with the tubercular disease, being misled by the indolent nature of the swelling and the yellow appearance of the morbid deposit in chronic orchitis. The strumous disease 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 epididymis 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 di-

* When the testes become tubercular, the vesiculæ seminales are also very liable to be affected with the same disease.

agnosis, however, is not always easy, as in both cases the character of the swelling is often masked by the effusion of fluid in the tunica vaginalis. 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 and vegetable food; and stimulating viands and drinks must be strictly 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 to be exhibited. Steel medicines, as the *vinum ferri*, the citrate or sesquioxide of iron, the decoction of bark with the sesquicarbonate of soda, the sulphate of quinine with sulphuric acid, the infusion of gentian or decoction of sarsaparilla with the liquor potassæ long continued, are all more or less

serviceable, and may be occasionally suspended or varied, one being substituted for the other. There is, however, no remedy which exerts a more beneficial influence in this affection than iodine, or the iodide of potassium. I usually prescribe for the adult the *decoctum sarzæ*, with five or six grains of the iodide of potassium, to be taken three times a day for some length of time, directing it to be discontinued for two or three days or a week, and again resorted to. When the patient is in a good air the constitution and local symptoms often mend in a remarkable degree under this treatment. Mercury, which is so eminently beneficial in chronic inflammation of the testis, is seldom of service in this disease: indeed, as in strumous affections generally, its influence is usually prejudicial. Small alterative doses, as four grains of Plummer's pill, taken at night, or the sixteenth of a grain of the bichloride of mercury given in the *decoctum sarzæ* twice or thrice in the day, have sometimes been resorted to with advantage; but my experience generally leads me to think unfavourably of the use of mercury in any form in this affection.

When inflammatory symptoms exist they must be combated by the application of leeches, cooling lotions, and rest in the recumbent position. Anti-phlogistic measures are not often necessary. In all cases the gland must be supported. In the indolent stage of the disease the local treatment consists in painting the scrotum with the tincture of iodine every alternate day, or oftener; or the *Ung. Iodini Comp.*, mixed with an equal proportion of lard, may

be rubbed on the part. Strapping the testis with the *Emplast. Ammoniaci cum Hydrargyro* has, in several instances, appeared to promote the disappearance of the swelling and induration. When suppuration ensues the part may be poulticed; and after the abscess has burst the orifices of the sinuses must be kept well open, to allow of the free escape of the morbid deposit. In some cases in which the testis is completely disorganized and useless, and when the sinuses prove very obstinate and troublesome, castration may be necessary; but this operation is seldom required, and it should never be performed whilst there is any evidence of disease in the lungs, or organic affection elsewhere.

CHAPTER VIII.

CARCINOMA OF THE TESTIS.

THE testis, like other glandular organs, is liable to carcinomatous disease. A schirrous testis was formerly spoken of as a common affection; but then all chronic enlargements possessing much induration were usually designated schirrus. Surgeons have since learned to discriminate the enlargements consequent on inflammation from those produced by malignant disease: the latter are now known to be comparatively rare. Carcinoma is met with in the testis under the four forms of *Schirrus*, *Encephaloid*, *Colloid*, and *Melanosis*.

SECTION I.

SCHIRRUS OF THE TESTIS.

Schirrus never occurs in the testis in the dense form which it commonly assumes in the breast. Sir A. Cooper, however, describes* a schirrous disease of the testis, in which a hard white mass in lobes or tubercles, and possessing little vascularity, is found in the place of the tubuli seminiferi. This is sometimes interspersed with small portions of cartilage or bone. The epididymis contains a similar firm fibrous mass; and the spermatic cord is enlarged, and has small white tubercles in it. The glands of the abdomen become converted into a white solid texture, very unlike that of the fungoid disease. The disease appears, from this description, to correspond with that form of schirrus described by Müller under the name of *carcinoma reticulare*, the consistency of which ranges between that of ordinary schirrus and encephaloid, and which consists fundamentally of a gray globular matter, embedded in meshes formed of fibrous fasciculi, and has a greater tendency to lobular arrangement than simple schirrus. I have not witnessed any case of this disease, which must be exceedingly rare.

Symptoms.—Sir A. Cooper describes this kind of cancer as beginning in an enlargement of the body of the testis, accompanied with great weight

* Lib. cit. p. 150.

and severe occasional pain; never becoming soft nor so large as the encephaloid cancer, nor producing a fungoid or very vascular bleeding surface, but feeling tubercular, irregular, and excessively hard. The pain extends to the loins; the spermatic cord becomes enlarged, hardened, and tuberculated; and a smaller tumour than that of the fungoid disease forms in the abdomen. Some water is secreted into the tunica vaginalis; the cellular membrane of the leg and thigh of the diseased side becomes dropsical, and afterwards the other leg is similarly affected. Ulceration he had seen occur once: the testis gradually wasted under it; the glands of the groin became diseased, and the man after some months died. But this state rarely happens; for generally, without ulceration, the patient's countenance becomes sallow, and he sinks under impaired digestion, pain and tumour in the abdomen, and an irregular state of the bowels, which are frequently accompanied with ascites.

Diagnosis.—This form of cancer is characterized by its slow progress and great hardness during the whole continuance of the disease, and also by its weight and irregular and tuberculated feel. It does not become soft like encephaloid cancer, and it occurs less in different parts of the body at the same time, and is slower in proceeding to its fatal termination.

Treatment.—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. Sir A. Cooper relates the case of a man aged 44, whose testicle was attacked with this form of cancer. The gland was removed in Guy's Hospital nine months after its first appearance, and the wound healed; but the thigh and leg, which were œdematous at the time of the operation, remained swollen, and he died a month after his return home.

SECTION II.

ENCEPHALOID CANCER OF THE TESTIS.

This is by far the most frequent disease of a malignant character to which the testis is liable. It is called by different writers *pulpy testis*, *medullary sarcoma*, *soft cancer*, *fungoid disease*, or *fungus hæmatodes*. I have adopted the term *encephaloid* given to this cancerous growth by Laennec, as it is the one now most generally employed by pathologists.

Encephaloid cancer, when first observed in the testis, is found in one or two masses amongst the tubuli, which gradually become destroyed as the morbid deposit accumulates. In some instances, examined at the commencement of the disease, the glandular structure has been found expanded around a solitary deposit in the centre of the organ. The matter is very rarely infiltrated. The testis at this early period is extremely firm and hard, owing not to the solid nature of the substance effused, but to the excessive distension of the unyielding tunica albuginea by the morbid growth within. 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. At this stage the tunica vaginalis is often distended with serum; not, however, in any considerable quantity. The effusion is caused by inflammation, excited by the presence of the encephaloid matter within the testis: the inflammation sometimes produces adhesion, and partial or complete obliteration of the cavity of the tunica vaginalis. The tunica albuginea next gives way, and a portion of the morbid growth protrudes, forming a mass projecting from the body of the gland; 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 a case I recently examined, the canals at the head of the epididymis (the only part of the gland not destroyed) were distinctly seen filled with a white matter, which on examination in the microscope was found to be carcinomatous. The scrotum in a short time becomes fully distended by the diseased mass, which presents the well-known appearance of encephaloid cancer;* viz. a homogeneous substance of the con-

* I do not think it necessary to give here a detailed account of the characters of encephaloid cancer and its mode of developement, my object being to describe the general appearances and modifications which it presents in the testis. For a more minute description of this morbid deposit, I must refer the reader to works on Morbid Anatomy, but especially to the admirable article on cancer by Professor Walshe, in the Cyclopædia of Surgery.

sistence of brain, and easily broken down with the fingers, of an opaque white colour, and variegated with patches of a pinkish hue. It is sometimes mixed with small cysts containing serum and yellow deposits of lymph resembling that effused in chronic orchitis.

These small depositions of yellow fibrine, occasionally interspersed amongst the carcinomatous matter, I believe to be peculiar to this disease in the testis, as I have not observed cancer it in of other parts. When the scrotum gives way, the morbid growth projects as a bleeding fungus. The enlarged 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 network, usually mixed up with the morbid deposit. On macerating these 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 progress of 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 testis 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.* As the lumbar glands enlarge, the peritoneum covering them and the various viscera are 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 also found in the

* Observations on Tumours, p. 52.

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 testis which occasions solid enlargements of so great a magnitude as encephaloid cancer. M. P. Boyer removed, at the Hôpital St. Louis in Paris, a testis converted into an encephaloid tumour which weighed more than nine pounds.* 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 testis occurs at all periods of life: no age, indeed, can be said to be exempt from it. Mr. Cline operated for this affection on a boy five years of age; the disease unfortunately returned. Sir W. Blizard extirpated the testis of a child two years and a half old, on account of a carcinomatous tumour of the organ, measuring an inch and a half in its greatest diameter, and one inch in its smallest. The diseased gland is preserved in the museum of the College of Surgeons. The late Mr. H. Earle published an account of a case in which the disease attacked the testis of a child 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.† Mr. Langstaff preserved the carcinomatous testis of a child, which began to enlarge when he was only ten months old.

* *Revue Médicale*, Nov. 1839.

† *Medico-Chirurgical Transactions*, p. 59.

It increased rapidly, and in the course of 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 disease, however, more commonly occurs in the middle period of life, or between the ages of twenty and thirty; but I have met with it at a much more advanced age. A patient lately died in the London Hospital of carcinoma of the testis at the age of sixty. Mr. Byles of Spitalfields sent to my house a pauper aged sixty-four, whose left testis 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 testis 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. It very rarely happens that both testes become affected; and in this case the right, though completely enveloped in the morbid deposit, was found after death quite sound.

Symptoms.—The disease commences in an enlargement, with considerable induration of the body of the testis, which preserves its oval form and even surface. The enlargement is attended with slight tenderness, a dull pain, and occasionally with a

* Catalogue of Preparations, p. 372.

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. Its growth is liable to be accelerated by a slight blow or exercise. As the gland enlarges it becomes uneven, and feels irregular and tuberculated. It loses, too, its indurated character, and becomes soft, but more so in one part than in another, and acquires an elastic feel. As the disease thus advances the pain increases, but still amounts to little more than a dull sense of weight extending up to the loins. 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. The surgeon may in a short time distinguish the swellings on the side of the spine by making pressure on 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. 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 in the functions of the important internal organs. The diseased testis sometimes attains a very large size without the appearance of a bleeding fungus, as the scrotum admits of great distension before ulceration ensues. Mr. Wardrop remarks, indeed, that in no case has he even 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.* At page 369 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 testis 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 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 lately died in the

* Lond. Med. Gazette, vol. xiii. p. 408.

London Hospital to which I have referred, life was destroyed by internal disease before even the tunica albuginea had given way.* Sir B. Brodie has remarked that in many cases the tumour in the loins gives the patient no pain, and but little inconvenience, while at other times it is attended with the most extraordinary suffering. He supposes this to depend on the accidental circumstance of it sometimes pressing upon nerves, and in other cases lying clear of them. A gentleman with whom he was acquainted many years ago had this disease in the testis. Mr. Cline was consulted, and he recommended the amputation of the testis, and performed the operation. A year afterwards the patient became weak in his lower limbs, and at last they became completely paralytic. He died; and on examining the body after death, there was found a large tumour in the loins, which had affected the vertebræ so as at last to press on the medulla spinalis, thus accounting for the paraplegia.† Cruveilhier has recorded the case of a man aged twenty-seven, whose testis was extirpated on account of alveolar cancer. 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.‡

* In this case carcinomatous matter was found deposited in the muscular substance of the heart, and also in the lungs.

† Lib. cit. p. 408.

‡ Anatomie Pathologique du Corps Humain, liv. v. p. 1.

Mr. Pott met with a case of carcinoma affecting a testis detained in the right groin in a man fifty-five years old. There was a large ulcerated sore with high callous edges, which discharged an offensive gleet, at times bled profusely, and was extremely painful. After death the lymphatic glands about the vertebræ of the loins, and the liver and right kidney, were found affected with the same disease.*

Diagnosis.—Encephaloid cancer of the testis 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 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,

* Works, 4to. edit. p. 357.

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 practitioner 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 the bleeding would soon cease, and the wound being closed by plaister would probably heal, and no ill consequences result. 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 the 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 to distinguishing encephaloid disease in its early stage from the

enlargement produced by chronic inflammation ; and as the success of an operation in cases of this 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 inflammation, 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 testis 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.

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 testis. 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 testis, 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 testis 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 testis 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 hæmatocele there was not only the irregular surface, varying consistence, and impossibility of detecting the testis 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 developement 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 testis 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.

Treatment.—There is no disease of a more dangerous and fatal tendency than encephaloid cancer. No medicine or local treatment of any kind is able to arrest its progress, and the only alternative left for us to adopt when it attacks the testis is that of amputation of the affected organ. Unfortunately this resource is exceedingly liable to fail, the disease generally reappearing in the lymphatic glands connected with the testis, in the wound, or in some internal organ. Numerous cases in which the disease has thus returned have been published by various surgeons; and so unsuccessful has this operation proved, that the propriety of having recourse to it under any circumstances has been strongly called in question. I scarcely know an instance of castration having been performed for this disease in which the patient has survived for any lengthened period. Sir A. Cooper, whose experience was very great, has recorded five cases, in all of which the disease returned after the operation, but not one attended with a successful result; and Sir B. Brodie states that he has known but one

instance in which there was no recurrence of the disease. The patient was a French courier, and had the disease in one testicle, which was amputated. Three or four years after the operation Sir B. Brodie learned that he was going on favourably. The operation may, however, have succeeded in some few cases which have afterwards been lost sight of.*

It has been shown, by the recent microscopical inquiries of Müller and others, that the intimate texture of carcinoma consists of a mass of nucleated cells, very similar to the primary cells of development met with in healthy tissues, and which seem to possess similar independent powers of growth, new cells being formed from the nuclei, which, like the parent cells, have the property of multiplying their kind. There are many reasons for concluding that the origin of carcinoma is local—that the disease is produced by some local irritating cause, and is confined for a time to the part in which it is developed; but, being once formed, it is very prone to spread to other parts, owing probably to the passage of the cells or cancerous germs into the blood. This liability to the formation of secondary deposits is greater in certain forms of cancer than in others, and also in cancer of certain parts than in that of others. Our present experience of carcinomatous disease is sufficient to prove, that in some instances a cancerous growth may be removed

* Much valuable information might be gained, if surgeons would endeavour to ascertain and register the results of their operations of this disease.

before the disease has been communicated to distant parts, patients having survived an operation for years without the appearance of secondary growths, and without experiencing any fresh developement of carcinomatous matter, and having died of another disease ; that carcinomatous matter is sometimes developed in a particular part of the body, and produces death by its irritative effects on the constitution, without being conveyed to or contaminating any other parts, except those immediately connected with its original seat ; and that in other cases, though the removal of the part primarily affected may be too late to eradicate the disease from the constitution, it having ceased to be local, its developement in other parts previously contaminated may take place so slowly, and make such tardy progress, that the extirpation of the cancer from its original seat, where it was rapidly advancing, tends more or less to prolong the patient's existence. The tendency of carcinoma to spread is particularly rife in the early period of life, when the powers of growth are in active operation, as is evinced by the almost constant failure of operations for cancer of the testis and of the eye in infants. This tendency seems to diminish with age. Thus in advanced life carcinoma makes slower progress, and, if extirpated, is by no means so apt to reappear as in early life ; so that the prospect of security from a return of the disease after an operation, *cæteris paribus*, increases with the age of the patient. Of all the forms of carcinoma, encephaloid cancer is the most prone to form secondary growths, and consequently the most

difficult to eradicate by operation. Nevertheless, believing the origin of the disease to be local, I think the attempt to remove a malady of so fatal a character well deserves a trial; and I am therefore by no means disposed to agree with those practitioners who condemn the extirpation of the testis when affected with encephaloid disease, more especially as castration is not, under ordinary circumstances, an operation dangerous to life. The chance of success may be a poor one; but it is better that the patient should have that chance, poor as it is, instead of the case being abandoned as hopeless, and the sufferer being left to the consequences of an early and painful death. But to afford a reasonable hope of success, castration should be performed at the earliest period possible, in a suspicious case as soon as the surgeon can make up his mind that the disease, whether carcinomatous or not, is of a nature incurable by ordinary remedies; for there are few diseases in which a prompt decision is more necessary than in this. The operator must of course make a very careful examination of the important internal organs, especially of the lumbar and inguinal regions and spermatic cord, as an affection of these parts would destroy all hope of benefit from the operation, and render its performance improper. He should also make, just previous to the operation, one or two punctures in the tumour, in order to set at rest any doubt that might exist in regard to the nature of the disease.

SECTION III.

CARCINOMA OF THE TUNICA VAGINALIS.

Carcinomatous disease has, in some few instances, been found to originate from the tunica vaginalis, the glandular part of the testis remaining for some time unaffected. An important peculiarity in these cases is the circumstance that the effusion of fluid into the sac of this membrane, to which the carcinomatous deposition gives rise, renders it extremely difficult to ascertain the real character of the disease at the early period at which an operation would be desirable. The following case is recorded by Sir Everard Home.*—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 it would be necessary to perform an operation, which would effectually cure him. From that time to the beginning of 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

* Observations on Cancer, p. 125.

they would see him again. In the mean time he was advised to apply 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 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 on the lower and left side of the abdomen was observed. He was sent to sea; but the swelling increased, and he became weak, hectic, and died. On examining the body there were found large

masses of swellings, which were not much firmer than strong coagulated milk with the whey in it. These masses extended 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, about the size of a bean, of the same structure; and the spermatic cord out of the belly had become thickened in the same way.

Sir A. Cooper has described a similar case of carcinoma originating in the tunica vaginalis.*—Mr. T., aged sixty, rather of a bloated unhealthy appearance, fifteen months ago observed a swelling on the left side of the scrotum, which was unattended with pain, but was accompanied by a formation of water in the tunica vaginalis. He applied to Sir B. Brodie, who directed the mercurial treatment, the application of leeches, and the recumbent posture; but the swelling yielded little to this treatment. About two ounces of fluid were then drawn from the tunica vaginalis by puncture. The operation was repeated, but still the enlargement and hardness remained. Sir A. Cooper was then consulted, and he recommended the same treatment. After a lapse of several weeks it was agreed that the diseased part should be removed, if, upon puncturing, the quantity of fluid should be found inconsiderable. On passing a lancet into the part in three different places, although fluctua-

* Lib. Cit. p. 207.

tion was apparently distinct, no water was found. The testicle was then removed by Sir B. Brodie, and upon dissection the appearances were as follows:—The testis was perfectly sound. The vas deferens could be injected to the beginning of the epididymis only. The epididymis was drawn to a great length by the swelling, and terminated in a membranous cord. The cavity of the tunica vaginalis was occupied by a spongy effusion, which had all the character of incipient fungus. The tunica vaginalis was thickened, and had a large piece of ossific matter in it. The spermatic cord was unaffected. This patient died of erysipelas; and upon examination, his body was found in other respects free from disease.

I have not myself met with any case of this kind.

SECTION IV.

COLLOID CANCER AND MELANOSIS OF THE TESTIS.

The two forms of carcinoma termed colloid or gelatiniform cancer, and melanosis, scarcely ever attack the testis. The only instance of the former that I know of, is a preparation very characteristic of the disease contained in the museum of Guy's Hospital. The organ is enlarged to four or five times its natural size, but preserves its oval form: there is scarcely any trace of the natural structure remaining. No history is attached to the preparation.

Cruveilhier has related the case of a man who

died at the age of forty-six of melanosis affecting the hand, lungs, heart, stomach, and other parts.* The right testis contained a little of the same matter, and the left a deposit the size of a nut. This is also the only case of melanosis of the testis on record with which I am acquainted.

CHAPTER IX.

CYSTIC SARCOMA OR CYSTIC DISEASE OF THE TESTIS.

THIS is a rare affection, which has been described by Sir A. Cooper under the name of "the hydatid disease of the testicle." But as the cysts are not of the nature of animal hydatids, the term is an improper one, and should not be retained.

The cysts constituting this disease contain fluid, and are developed in the substance of the testis. They vary very much, both in number and size, and in the appearance of their contents. They may be only two or three in number, or they may exist in a countless multitude throughout the gland. They vary also in size, from that of a millet seed to the dimensions of a pigeon's egg. At an early period they generally consist of smooth and slightly vascular cysts, closely adherent, and containing a transparent light-coloured fluid. The fluid is liable, however, to lose its transparency,

* Anatomie Pathologique, liv. xix. pl. 3 and 4.

and sometimes becomes thick, viscid, and albuminous, and even tinged with blood. Inflammation occasionally occurs, and coagulable matter is effused into them, and they become more or less thickened. Sometimes small lobulated growths arise from a part of the walls of the cyst, and increase until the cavity is partly or wholly filled and obliterated by them, in the same manner as in cystic disease of the mamma. The cysts usually increase at the expense of the secreting structure of the testis, which becomes atrophied and displaced from the pressure they produce. When inflammation takes place, fibrine is effused between as well as within the cysts, and becomes organized; so that eventually no trace is perceived of the natural structure of the testis: the whole character and appearance of the part are completely changed, the organ being partly solid, and partly composed of cysts containing fluid. At an advanced period, particularly when the volume of the testis is much increased, the surfaces of the tunica vaginalis are more or less adherent, and, as well as the tunica albuginea, thickened. In old cases also the tumour is intersected with fibrous bands, and the parietes of the cysts are sometimes transformed into cartilage or bone.

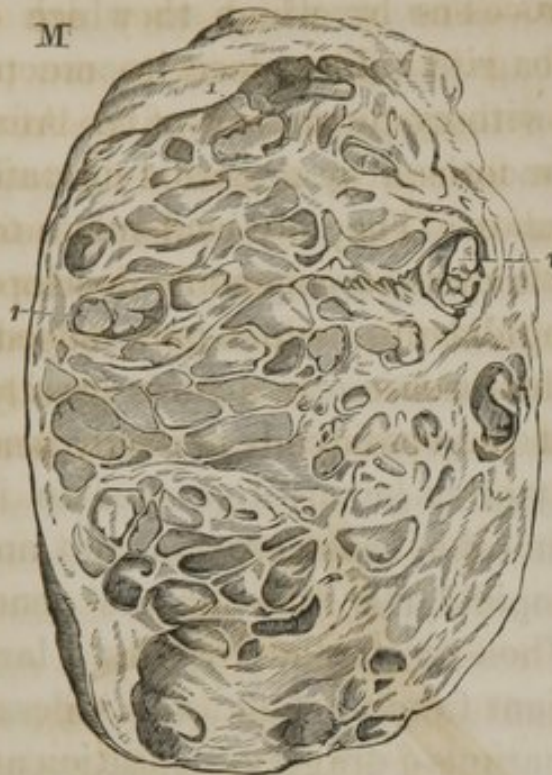
The mode of origin of these cysts has not been satisfactorily made out. Sir A. Cooper was inclined to the opinion that they are formed of enlarged and obstructed seminiferous tubes; for he remarks, "Although at first sight they appear to be cysts, yet when traced they are not distinct bags, but send

out solid processes by which they are connected with other bags."* They seem to me to be analogous to the sero-cystic tumours of the breast; which appear to be formed by a morbid dilatation of the lactiferous tubes. They are evidently quite distinct from the little cysts so commonly developed in the head of the epididymis; which part, indeed, is rarely affected in this disease. In a testis greatly enlarged by it, I found the epididymis perfectly healthy.



* Lib. cit. p. 83.

L. Section of a cystic tumour of the testis, showing a multitude of cysts of various shapes and sizes, with solid matter interposed between them. The natural structure of the gland is wholly destroyed.



Some splendid specimens of cystic disease of the testis are preserved in several of the pathological museums in the metropolis. The accompanying wood-cuts, which exhibit the various characters and appearances presented by the disease, are taken from two specimens contained in the museum of the College of Surgeons. They are reduced in size about one half. One of the specimens measures five inches in its longest diameter, and three inches in its smallest.

The origin of this disease is sometimes attributed to a blow, but it usually commences without any apparent cause.

M. Section of another tumour of the same kind; the cysts of larger size.

1, 1, 1. Lobular growths from the parietes of the cysts filling and obliterating them.

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, which seems to fluctuate indistinctly, and is scarcely at all tender or painful. The surface of the tumour is generally smooth and even, but it is sometimes irregular; and the disease being confined to the body of the gland, the epididymis may often be distinguished in its healthy state. But in other cases, especially at an advanced period, the epididymis is lost in the general tumefaction. 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; but I have not myself met with it later than between the ages of forty and fifty.

Diagnosis.—Cystic disease of the testis may be mistaken for hydrocele and encephaloid cancer of the testis, and the diagnosis is often very difficult. 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 testis in hydrocele. The swelling also is not transparent. Notwithstanding these distinctive marks, the surgeon is very liable to err; and Sir A. Cooper 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.* Where there is any doubt the grooved needle should be used. The characters of the tumour occasioned by cystic disease are in general so similar to those produced by encephaloid cancer, that I can give no satisfactory directions for distinguishing them. The surgeon 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.

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 diseased gland, which should be performed as soon as the size and weight of the tumour are productive of inconvenience and suffering; and the disease being confined to the testis, there is no liability afterwards to a return of the affection in other parts.

* Lib. cit. p. 84.

CHAPTER X.

FIBROUS TRANSFORMATION OF THE TESTIS.

THE testis has in some few instances been found transformed into fibrous tissue, its secreting structure having wholly disappeared. It seems that the cellular tissue naturally entering into the composition of this organ becomes thus changed, and that new fibrous tissue is developed, which, by its pressure, causes atrophy and a total obliteration of the seminiferous ducts. In some instances, the structure into which the testis is converted is a loose fibrous tissue infiltrated with a watery fluid; more frequently, it is close, dense, and firm, and even cartilaginous, exactly resembling the fibrous tumour of the uterus. Occasionally it is interspersed with two or three small cells containing a serous fluid. The size of the testis sometimes remains unaltered; at other times it is increased or slightly diminished. This lesion differs from the fibrous remains of the atrophied testis, since the organ chiefly consists of newly developed or transformed tissue, and not merely of the *debris* of old. This disease is not unfrequently accompanied with adhesions of the tunica vaginalis.

The fibrous transformation of the testis is rather a rare pathological change. At page 78 I have described a case of imperfect descent of the testis, in which the gland, though reduced in bulk, had evidently undergone this conversion. In Cruveil-

hier's *Anatomie Pathologique*,* there is an excellent representation of the disease. The testis 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 number of grayish-white fibres intersecting each other and arranged in lobules, similar to the fibrous tumour of the uterus.

So far as I know, this disease is unattended with pain or any peculiar symptoms besides great induration of the whole organ; and the change is one over which neither general nor local treatment can exert much control. Sir B. Brodie mentions, 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. The disease is not of a malignant character; and as in general it produces little or no inconvenience, the extirpation of the gland is rarely required. The operation is occasionally undertaken from apprehension of the disease being scirrhus or malignant. Mr. Travers mentions a case in which the gland was removed, owing to the person affected being impa-

* Liv. v. pl. 1. fig. 3.

tient for its extirpation on this account.* The gland being quite useless when in this state, there is no particular objection, after other means for the reduction of the induration have failed, to castration to allay the patient's fears, and to remove a constant source of uneasiness from his mind; but it is not a disease which absolutely requires the operation.

CHAPTER XI.

OSSIFIC DEPOSITS IN THE TESTIS.

EARTHY matter is met with in the testis under two forms: 1. Laminated, and often mixed up with cartilage; and, 2, as an inorganic cretaceous deposit. In the first form it is usually deposited between the tunica vaginalis testis and the tunica albuginea, in little bony or cartilaginous patches, in which a fibrous arrangement may be recognised. I have frequently found one or two irregularly-shaped projecting ossific bodies scarcely larger than a pin's head attached to the tunica vaginalis, covering the upper part of the testis. Ossific matter occurs also on the adherent surface of the tunica vaginalis in old cases of hydrocele, where it has been found so abundant as to form a complete ossific capsule. It has been said that the epididymis alone may be

* Medico-Chirurgical Transactions, vol. xvii. p. 327.

encased in bone, the testis being free; but this I have never seen. Earthy matter in this form is not often observed in the substance of the testis. The gland, however, when atrophied and reduced to a mere fibrous tissue, occasionally undergoes both the cartilaginous and osseous transformation. The accidental cysts developed in the testis are likewise liable to similar changes.

100 parts of ossific 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
				<hr/>
				100*

These changes possess more pathological interest than practical importance. The following case, however, is interesting.—A soldier, about seventy years of age, whose left testis was partly converted into bone, and felt extremely firm and indurated, was an out-patient at the London Hospital under Mr. Adams for many weeks. He applied 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 ossific matter came away by degrees in small pieces, which amounted to nearly one hundred, and the patient ultimately recovered with an atrophied testis.

* Sir. A. Cooper on the Diseases of the Testis, p. 245.

In the second form the earthy matter is deposited in an irregular cretaceous mass containing very little animal matter; in appearance resembling mortar, and very similar to the earthy substance found in the lungs and bronchial glands. It is generally met with in the globus major of the epididymis, and sometimes in the globus minor, but very seldom in the body of the testis. I am inclined to believe that it results from the transformation of tubercular matter deposited in the testis in early life. (See observations at page 349, and the accompanying figure.) Andral mentions that he once discovered a calculous concretion about the size of a nut between the tunica albuginea and the tunica vaginalis, which latter was elevated over the tumour, the testis and tunica albuginea being unaltered.*

CHAPTER XII.

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 their surface is smooth and polished. Their texture is in most instances elastic and homogeneous, resembling the unattached cartilages found in joints; and points

* Précis d'Anatomie Pathologique, tom. iii. p. 669.

of ossification are often contained in their interior. In some specimens I have observed the cartilaginous matter to be arranged in concentric laminæ. The loose body is sometimes entirely composed of bony matter. On examining a thin lamina of one in the microscope, I could distinctly see small oval corpuscles, with a number of lines proceeding from them, very similar to those of bone represented in pl. 1, fig. 13, of Müller's Physiology by Baly. Richter of Göttingen met with three round bodies in the tunica vaginalis, which were quite hard, and of the size of a very large hazelnut; but they rarely attain so large a size as this.* 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.

The manner in which these loose bodies originate does not differ essentially from the mode of developement of loose cartilages in the interior of joints. Deposition takes place between the tunica vaginalis testis and the tunica albuginea; and the former membrane is gradually protruded, until the cartilaginous or ossific body forms a pendulous

* Medical and Chirurgical Observations, tr.

tumour, which, being attached merely by a slender stalk, is accidentally separated in the motions of the testis, and is thus left loose in the cavity of the tunica vaginalis. These bodies have been observed in the various stages of their developement. 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.* But in general there is no trace of the original attachment left on either the loose body or the tunica vaginalis.

CHAPTER XIII.

SPERMATOCELE.

THIS term implies a tumour formed by a collection of the seminal fluid ; but it has occasionally been applied by writers to swellings produced by varicocele and other affections of these parts. I have sometimes noticed in testes, 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 ; but, with this exception, I know of no affection of the testis to which the term *sper-*

* Cooke's Morgagni, vol. ii. p. 429.

matocoele can be properly applied. It is possible that the semen might collect in and dilate one or more of the seminiferous ducts in the testis, 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 testes I have examined, I have not met with a single instance of the kind.*

CHAPTER XIV.

FETAL REMAINS IN THE TESTIS.

THE remains of a foetus have in rare instances been found in the scrotum in connexion with the testis. Several examples of the kind have been collected by Ollivier (D'Angers).† In all these cases it was evident that the scrotal inclusion had succeeded to an inclusion originally abdominal ; that is to say, that the organic *debris* were first situated in the abdomen along with the testis, having accompanied the gland in its progression out of that cavity. In two of the cases in which the particular testis was indicated, the right was the one affected. M. Velpeau has recently communi-

* I have found the semen thus collected in the lower part of the epididymis of the dog, some months after excising a portion of the vas deferens.

† Mémoire sur la Monstruosité par Inclusion ; Archives Générales de Médecine, tom. xv. p. 540.

cated to the Academy of Sciences an account of the case of a man, twenty-seven years of age, whose right testis he removed by operation for a congenital enlargement, which was found to be occasioned by the presence of nearly all the anatomical elements of a foetus.*

Dr. André removed by ligature a tumour containing hair and several teeth from the right testis of a boy seven years of age. The boy was well formed at birth; but at the end of a year his parents observed that the right testis was larger than the left. In six months afterwards the child was operated on for hydrocele: a little serum escaped, but the testis remained larger in size than natural. When he was nearly seven years of age the gland became swollen and painful: a sore formed in the scrotum; and a fleshy growth protruded, which was found to contain several long hairs and teeth.†

CHAPTER XV.

ENTOZOA IN THE TESTIS.

THE Entozoa very rarely indeed infest the testis; in the examination of a large number of testes I have not met with a single example. Sir A. Cooper

* Gazette Médicale de Paris, Fev. 15, 1840.

† Mémoires de l'Académie Royale de Médecine, tom. iii. p. 480.

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 once met with a *filaria medinensis*, or Guinea-worm, in a firm cyst adherent to the testicle.

CHAPTER XVI.

NERVOUS AFFECTIONS OF THE TESTIS.

We may distinguish two kinds of nervous affections of the testis. One which, in my experience, is 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 TESTIS.

A patient suffering from an irritable testis cannot in many cases bear the least pressure on the gland, not even the contact of his dress: he shrinks when the part is handled in the most gentle manner; and the motions of the testis often occasion so much uneasiness that he is prevented from taking exer-

* Lib. cit. p. 90.

cise, and is compelled to remain constantly at rest in the recumbent position. The morbid sensibility is not always confined to the testis, 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 testis without support. It is frequently referred to one particular spot on the gland, which possesses more exquisite sensibility than the surrounding parts. In some instances both testes 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 or mental exertion. In 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 testes 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 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 a person of chaste habits thus affected, I was informed that the morbid sensibility disappeared on marriage. The testes, like the mammæ, often also become affected with morbid sensibility about the period of puberty. The complaint sometimes succeeds an attack of orchitis. Though troublesome, it generally disappears either spontaneously or under treatment after a longer or shorter duration.

Treatment.—In the treatment of morbid sensibility of the testis 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 eye-douche bath, or a kettle, will answer the purpose very well, and the application should be made at least once daily. Enclosing the scrotum in a belladonna plaister, and supporting the parts, also sometimes afford relief. The testis may at the same time be preserved 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 *æt.* 22, a sack and tarpauling 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 testes were small in size; the latter were extremely tender when handled, so that he could scarcely suffer me to touch them. He stated that he had no discharge

from the urethra, and had never been affected with syphilitic disease. I directed the testes 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, purging, blisters to the loins, &c. had been tried without any decided improvement, 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 of the urethra by means of Lallemand's instrument (see page 444.) 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. I have treated, with a similar application of the nitrate of silver to the prostatic part of the urethra, and with the same success, two other cases,

in which the morbid sensibility of the testis was less severe, but dependent on the same cause as in the one just related.

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,* 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 castration 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 testis ; but this its owner preferred keeping, the marriage being at hand, and he very soon recovered completely. The testis 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 TESTIS.

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

* *Lehob der Nervenkrankheiten*, S. 142.

free from pressure or rough contact with the dress. The nerves of the testis 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 it is commonly attended with forcible retraction of the testis 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.* During the intervals of the paroxysms the testis may sometimes 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 neuralgia testis, there is no disease or alteration in the gland; but when the pains have been long-continued and intense, the

* Dublin Journal of Medical Science, vol. xiv. p. 371.

testis occasionally becomes swollen and tender, and affected even with a slight degree of inflammation.

This painful affection is unaccompanied with fever; but the digestive organs are usually out of order, and the health 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 testis occurs at all ages, and is a complaint which appears to arise from various causes. We have examples of it in the uneasiness in the testis 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 testis; 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 is in some way the cause of the neuralgia. But the pathological cause of neuralgia of the testis is seldom so obvious as in the above instances. The testis has been accurately examined, and the nerves of the cord have been carefully dissected out, but nothing to account for this distressing complaint has been discovered.*

* A perfectly healthy testicle, extirpated by Sir W. Blizard on account of this disease, is preserved in the museum of the College of Surgeons.

Its primary seat has been referred to the spinal cord; in some instances it has appeared to depend on derangement of the digestive organs,* and in others it was evidently connected with a disposition to gout. In several cases, also, it has succeeded an attack of orchitis, continuing to distress the patient after all inflammation has subsided, and recurring or increasing whenever he gets out of health; but in the majority of instances it is very difficult and even impossible, to make out either the cause or origin of the neuralgic pains.

Treatment. — In cases of neuralgia testis 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 its origin. The pains may, however, be mitigated by opiates, warm baths, and fomentations of hops or poppy heads. 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 neuralgia testis, in which neither the cause or 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 the *liquor arsenicalis*. In Dr. Graves' acute case of neuralgia previously alluded to, the

* Vide an interesting case related by Sir B. Brodie, London Medical Gazette, vol. xiii. p. 620.

complaint yielded to large doses of the sesquioxide of iron 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. It may be given in the form of linctus, prepared as follows:—Take the yolk of one egg; oil of turpentine 3iij; syrup of orange peel and of tolu, of each 3ij; and of laudanum 3j. Three table spoonfuls to be taken daily.

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, conium, and aconitum, often afford, however, temporary, if not permanent relief; and they greatly contribute to mitigate the patient's sufferings, when 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. The application of a belladonna plaister often gives relief. 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* properly prepared, and applied to the scrotum with a piece of sponge, produces a numbing sensation, and is efficacious

* Unless care be taken that these expensive preparations are genuine, the practitioner will often be disappointed in their effects.

in relieving both the morbid sensibility of the testis and neuralgic pains. I have sometimes known benefit derived from the extract of hyoscyamus, in doses of five grains, combined with half a grain of the acetate of morphia, taken twice a day.

Local bloodletting seldom proves of more than temporary service, and is sometimes hurtful by lessening the patient's powers. I have no confidence in counter-irritation, or the veratria and iodide of mercury ointments, which too often cause additional suffering without the compensation of mitigating the nervous disease. No benefit is derived from the action of mercury, except when given in small doses to improve the state of the secretions. In the treatment of these obstinate and protracted cases, the practitioner often labours under a disadvantage, owing to the patient not obtaining the speedy relief he expected, losing confidence in his attendant, and seeking other advice; so that he goes from surgeon to surgeon, without affording any one the opportunity of steadily persevering in the management of the case.

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 his patience is exhausted, and 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 the

more extended our experience 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 neuralgia testis, in which, after a long period of suffering, the gland was extirpated in the usual manner, but the disease returned in the cord.* Mr. Russell has given a brief account of 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

* Essay on the Marsh Fever and Neuralgia, p. 77.

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.* Sir A. Cooper has resorted to castration in three cases of neuralgia testis, in all of which the result appears to have been satisfactory, the patients having recovered, and afterwards continued free from any return of their distressing complaint. — Case 1. Mr. G., in October, 1815, contracted a gonorrhœa, and in consequence had inflammation of the right testicle, for which he applied fomentations, and took aperient medicines. The testicle continued swollen and painful until June, 1816, when the employment of plaisters removed all inconvenience. A slight degree of pain returned at intervals until June, 1817, when he was again relieved by plaisters, and thought himself sufficiently well to join his regiment. The exercise which his duty obliged him to take soon occasioned so much pain, that during the winter of 1817 and spring of 1818 he scarcely had a moment's respite. In May he returned to England, and bathed in the sea till September, at which time the pain was nearly removed; but he was unable to walk or ride. He subsequently became unable to walk ten yards without experiencing considerable pain. The only thing which appeared to relieve him was violent motion in a rough carriage. On account of the continued

* Observations on Diseases of the Testicle, p. 186, et seq.

pain, confinement, consequent depression of spirits, and loss of health, he determined on having the testicle extirpated. It was removed on the 1st of March, 1819. The wound healed slowly, and one or two small abscesses formed in the scrotum; but he ultimately did extremely well, having no return of pain in the spermatic cord.—Case 2. Captain P. had an irritable state of the left testis, which commenced in March, 1818. The veins of the spermatic cord felt distended; the part was exquisitely tender to the touch; and exercise produced a degree of suffering which was intolerable, if the part was not supported. He could not rest on the side, or bear the slightest pressure on the testis. He had increased pain in coition; and after it the part felt full and loaded. He was somewhat, but only for a time, relieved by the hot bath or fomentations. He tried blistering at five different times; applied two hundred leeches on separate occasions to the affected part; employed various lotions, opium, and belladonna, with every medicine which seemed likely to be useful in lessening the irritability, but all without effect. Sir A. Cooper removed the testicle for him in 1823. He quickly recovered from the operation, and felt very grateful for his restoration to comfort and society.—Case 3. This subject was a gentleman who came from America for advice, having tried every variety of medicine and local treatment without advantage. At his request Sir A. Cooper removed the part; and he has since heard that the patient remains quite well. He said for several years past his left

testicle had been larger than his right; at times considerably so, especially when he had taken cold. In August last, after exposure to unusual fatigue, he had pain for the first time in the left thigh and groin, also in the testicle, which was much enlarged. In September a surgeon made an incision into it, and let out a large quantity of water. In a few days after the part again became painful: he applied poultices and fomentations. The pain continued; in about six weeks the operation was repeated, but very little water was drawn off. He took mercury until his mouth became sore, and lay in a horizontal position. A blister was subsequently applied to the scrotum. These remedies gradually reduced the testicle, but the pain continued; sometimes a sharp shooting pain in the groin, but generally a heavy, dull constant pain. He then applied leeches which produced debility; since which he used a lotion of lead and opium. The pain was constant, and he could not stand ten minutes without increasing it considerably. There was great sensibility in the part, and the slightest touch was painful. He was subject to headache and other dyspeptic symptoms, and a long residence in warm climates had injured his constitution.*

The details of these three interesting cases should be carefully examined, in order that the practice of so eminent a surgeon may not be made to countenance the indiscriminate performance of an operation the general results of which are less

* Lib. Cit. p. 69, et. seq.

satisfactory than might be inferred from these examples. Their success may, 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 combined with varicocele ; a complication which, it will be shown,* is of occasional occurrence, and admits of perfect relief by castration, the cause of the disease, viz. a morbid condition of the veins, being thereby removed, together with the testis. In the two other cases, it appears that the neuralgia was originally induced by an 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 testis, which having been removed, the painful symptoms all ceased. In such 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 testis 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. 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 testis at the earnest entreaty of the sufferer, it would be his duty, as it would be his policy, fully to apprise his patient of the uncertainty of the result.

* Vide Part III. Chap. 1.

CHAPTER XVII.

SYMPATHETIC AND FUNCTIONAL DISORDERS OF THE TESTIS.

IMPERFECT as is our knowledge of the sympathetic and functional disorders of the secreting glands, no organs present greater difficulties in this respect than the testes. Their functions are so involved in those 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 them, when disordered, necessarily becomes of a complex and difficult character. The product, too, of these glands is one the qualities of which it is almost impossible to appreciate, and which during life is never afforded in a pure and unmixed state ; and further, taking into account the repugnance felt to such inquiries it is scarcely surprising that the subject has been but imperfectly investigated, and rarely treated of by the pathologist and practitioner. Indeed, the little information we possess respecting it is chiefly to be found under the head of Impotency in works on Medical Jurisprudence, in which it is cursorily considered, principally in relation to points of medico-legal interest, and scarcely at all in reference to practice.

The functions of the testicles may, like those of

many other secreting organs, become suspended, and be incapable of excitement; or they may be exerted to excess, and be so abused as to be called into action by the slightest exciting causes. I shall in the first place, consider the former of these disorders, which will include the subject of impotency, so far as it depends on an imperfection in the action and condition of the testes.

In speaking of the functions of the testes (page 67) I pointed out how much these glands are under the influence of the brain, and noticed the striking effects of impressions on the mind in arresting their secretions; and in Chapter II. Section 2, several cases have been mentioned in which the testicles had completely wasted after injuries to the head and brain, and also cases of idiots, whose generative organs were imperfectly formed, who had experienced no desire for sexual pleasures. I will now adduce some additional facts in relation to this subject.—Hildanus mentions the case of a man accused of 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.*"*—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 vio-

* Opera Observationum et Curationum Medico-Chirurgicarum, p. 574.

lence. 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, however, regained 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 a time seriously affected.* 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,

* Case related by Dr. Fisher. *American Journal of the Medical Sciences*, Feb. 1839, p. 357.

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 of 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.* 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.†

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 remedial treatment for 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 testes. When otherwise, however, the surgeon must not despair of the patient regaining his sexual powers

* The Lancet, August 28, 1841, p. 784.

† On the Functions of the Cerebellum, tr. by Combe, p. 46.

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 would chiefly be 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-galvanism, applied from the occiput along the spine, might also prove of service.

The reader will recollect the singular case of arrest of the development of the testis related at page 120, 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 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 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 testes 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 developement 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 testes. When, however, the

emotion subsides, and the mind becomes tranquilized, the generative instinct may again be incited to action. 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 natural aversion, or the uninviting person of their companion. For such cases of relative impotency the remedy is obvious.

Not an unfrequent 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 accustomed 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.* Modes of varying this advice in 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.

* Treatise on the Venereal Disease, 4to. p. 203.

Diseases which destroy the substance or produce wasting of the testis 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 testis is to a great extent disorganized by the effusion of tubercular matter or lymph, and forms an open fungoid sore, secretion may still go on under excitement, as is evinced by the stiffened state of the dressings, and a microscopic examination of the discharge. This fact shows the importance of the surgeon striving to save the testis when mutilated either by accident or disease. In double hydrocele we know that the functions of the testes may still be performed. In inflammatory affections of the epididymis and vas deferens, it is very rarely that the matter effused amongst the convolutions of the duct obstructs the tube through which the semen has to pass, which is in a great degree owing to the absence of a fibrous envelope, and the yielding nature of the serous membrane by which it is invested; whereas after inflammation of the body of the testis, wasting and disorganization are not uncommon. In cases of congenital deficiency of the vas deferens,—in others in which this canal or the ducts of the epididymis are obstructed by tubercular matter formed in their interior, or by deposits or tumours of any other kind, however sound may be the substance of the testis, the course of its secretion must necessarily be arrested, and the

organ thereby rendered useless. Severe varicocele tends gradually to impair the nutrition and diminish the secreting powers of the testis. On the influence of detention of these organs in the abdomen and in the groin external to the cavity on the sexual functions, I have fully expressed my opinion in Chap. I. Sect. 3. Certain affections, as carcinoma and the cystic disease, generally extend until the glandular structure is wholly destroyed. It is seldom, however, that both sides are affected, or that both testes are disorganized by disease; and the remaining one, if sound and well developed, is fully sufficient for the purpose of reproduction. The same holds good when one testis has been removed by operation; but when both are extirpated or destroyed the patient becomes absolutely and permanently 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 testes removed in 1799. In June, 1801, the other testis 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 testis. 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.†

* Lib. cit. p. 53.

† Lectures on the Urinary and Genital Organs, p. 133.

In determining the question alluded to, we must not confound the power to copulate with that of procreation. It has been seen that the loss of the testes so affects the brain as completely to extinguish the sexual instinct; but this is an effect which, as is clearly shown by Sir A. Cooper's case, is not immediate, but takes place gradually; hence we must admit that the castrated individual may experience desire, have erections, accomplish the coitus, and emit fluid for several weeks after recovery from the operation. But the fluid which is essential for the propagation of the species is the secretion of the testes, none of which can of course be elaborated after the removal of the two 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 testis or testes 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 reproduce; 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 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 testes were sound and capable of secretion at the time of castration, it must be concluded that a sufficiency of the spermatic fluid 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, improbable as such an occurrence must undoubtedly be regarded.

An attack of apoplexy often permanently extinguishes all desire as well as capacity for sexual enjoyment. Diseases and injuries of the spinal cord, producing paraplegia, have little effect on the testes, but destroy the power to copulate. In the chapter on Atrophy (page 118), I have given two instances of wasting of the testicles succeeding an injury to the spine; but such is a rare result of this accident. 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. 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."* We must suppose that in this case, although the sensibility of the penis was destroyed, the connexion between the brain and testes was still maintained by the sympathetic system, which communicated the necessary influence; and that their functions were, accordingly, as little disturbed by the affection of the medulla spinalis as are those of the important organs of the abdomen in the same disease.† But, notwithstanding the success of this old soldier, there are few in a state of paraplegia who would not find themselves

* *Recherches Experimentales sur le Système Nerveux*, 2d edit. p. 280.

† 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 testes 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.

physically incapacitated. The nux-vomica which would be adapted to relieve the paralytic symptoms would likewise tend to restore the sexual powers. My colleague, Dr. Pereira, states that nux-vomica has been used as a remedy against impotence by Trousseau, who found it successful both in males and females. In some cases, however, its good effects were observed only while 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.* We might expect benefit too in these paralytic cases from electro-galvanism, so applied as to stimulate the nerves from the loins to the testes.

Some error has prevailed respecting the effects of chronic diseases in impairing the functions of the testis. 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

* Elements of Materia Medica, 2d edit. vol. ii. p. 1305.

affection.* The accuracy of this statement is confirmed by my own observations and inquiries. I examined the testes 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 testes 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.† Rayer has also remarked that the vesiculæ of phthisical patients afford few or none of these bodies.‡ 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 of the kidneys. It has been noticed in men subject to deposits of

* Pathological Researches on Phthisis, tr. by Cowan, p. 224.

† Dr. Davy examined microscopically the fluid taken from the divided substance of the testis of twelve persons who died of phthisis, but in no instance discovered spermatozoa; but he found them in several instances either in the vesiculæ seminales or vasa deferentia. Edinb. Medical and Surgical Journal, July, 1838, p. 1.

‡ Archives Générales de Médecine, Août, 1842, p. 487.

the oxalate of lime, that the sexual power is generally deficient, and often absent.* A middle-aged man, who had led rather a dissipated life, and was subject to pains in the loins and deposits of the phosphates, assured me that when suffering from these attacks he lost all desire for connexion, and was quite unable to indulge in it. Other instances of defective power in persons subject to lumbar pains and urinary deposits have come under my observation. In diabetes, and Bright's disease of the kidney, the reproductive organs are much debilitated, and often quite inactive. Again, diuretics, or remedies that excite the secretions of the kidneys, as the nitrate of potash, digitalis, &c., are found to act as anaphrodisiacs. The testes of persons who die of chronic lingering diseases are almost invariably soft and inelastic. When incised, their internal 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 spermatozoa.

Abuse of the sexual organs is a frequent cause of impotency, and of impotency the most difficult to treat and remove; as moral equally with 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 abstinence and self-control as to prescribe for the patient's health. Persons who indulge to excess sometimes become suddenly impotent, and a con-

* Dr. Bird. Medical Gazette, vol. xxx. p. 750.

siderable 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,* 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, and are familiarly distinguished by the quaint appellation of "God's geldings."† 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 testis: persons affected with chronic inflammation and other disorders of the gland frequently, and I believe with justice, refer their complaints to an unrestricted indulgence

* *Voyage en Syrie et en Egypte*, tom. ii. p. 444.

† *Observations on the Testicles*, p. 35.

of their passions. 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, now invariably suffers from pains in the loins, and alkaline urine, after intercourse with the sex.

One of the most common results of inordinate excitement of the genital organs is an excessive secretion of the spermatic fluid, evinced by involuntary seminal emissions. For obvious reasons I shall not enter minutely into the history of these cases, but must refer the reader to the work of Professor Lallemand of Montpellier,* in which the subject is fully treated of, and numerous cases are detailed. The complaint 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

* *Des Pertes Séminales Involontaires*. Mr. Philipps has lately published some cases of this distressing affection in the 31st volume of the Medical Gazette. As this sheet is passing through the press I have received the British and Foreign Medical Review for April, 1843, which contains an instructive article on "involuntary spermatic discharges," that cannot fail to be read by the profession with much interest. I fully concur in the strictures of the writer on the exaggerated views and bad taste exhibited by Lallemand, especially in the concluding volume of his work.

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 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, pale, and feeble ; has impaired vision, and a sickly languid look ; suffers pains in the head and back ; is hypochondriacal and apathetic, and totally 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 commonly 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.

This obstinate and distressing complaint may be produced either by excessive indulgence in sexual intercourse, or by long-continued and frequent self-abuse, those who give way to these vicious habits being little aware of the evils they engender. They occasionally acquire 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 finds great difficulty in abstracting his attention from them, and occupying himself with other matters, and eagerly peruses any thing 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 to insanity or suicide.

The matter emitted in these cases 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.*

* Lib. cit. tom. ii. p. 407.

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. 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 microscopic examination of the fluid, in order to detect the spermatozoa.

Although this complaint is usually considered and treated as a functional derangement, there are few cases in which the parts remain even in the early stage in a perfectly sound state. It will be found that the patient usually experiences a frequent desire to void his urine; that the evacuation is attended with scalding; that he frequently 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 violent 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 testes, the hasty ejaculations, and inordinate desire for sexual indulgence or self-abuse very greatly depend on this diseased condition of the mucous membrane. Nor

is it surprising, considering how much this part of the urethra is concerned in the functions of generation, that a permanent state of disease should be produced by the frequent excitement of unnatural excess. Involuntary spermatic discharges have in some instances been 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 I have not met with any case of involuntary emissions occurring from these causes independently of local irritation in the urethra. Very few opportunities are afforded of making an anatomical examination of the parts affected, especially 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

* Lib. cit. t. i. p. 13, et seq.

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 much affected, 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. In inveterate cases of the disease, the mucous membrane of the bladder becomes inflamed, and secretes a ropy mucus. The urine is ammoniacal, and the disease extends along the ureters to the kidneys.

The irritation attending the morbid condition of the mucous membrane of the prostatic part of the urethra, tends in a very material degree 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 in the conjunctiva, as an inverted eyelash, a discharge of tears. So it is with the testis 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, judging from the experience which I have had in these cases, is the object to which our treatment should be first directed. Certainly in 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, and irritability of the bladder and incontinency of urine in early life.

* This is a truth, I fear, not sufficiently impressed on the minds of medical men. One would be loth to offer any apology for the vicious habits and indulgences to which, it is well known, old men are occasionally addicted,—a melancholy example of the kind in the higher ranks in life having lately been brought under public notice. I cannot but think, however, that in many instances these cases are not undeserving of professional sympathy, and 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, the former inciting and producing the morbid desires. If these propensities were regarded and treated as symptoms of disease (and that they frequently occur in connexion with affections of the urinary passages is well known to practical surgeons), I believe they would often subside, and the distressing results to which they lead would be altogether avoided.

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 unwillingness to confess, patients are apt to refer their complaints to any thing but the true cause. They complain of indigestion, palpitations, pains in the head, &c., but neglect to mention the emissions; so that much tact and cautious inquiry are often necessary in order to discover the nature of the malady with which they are afflicted.

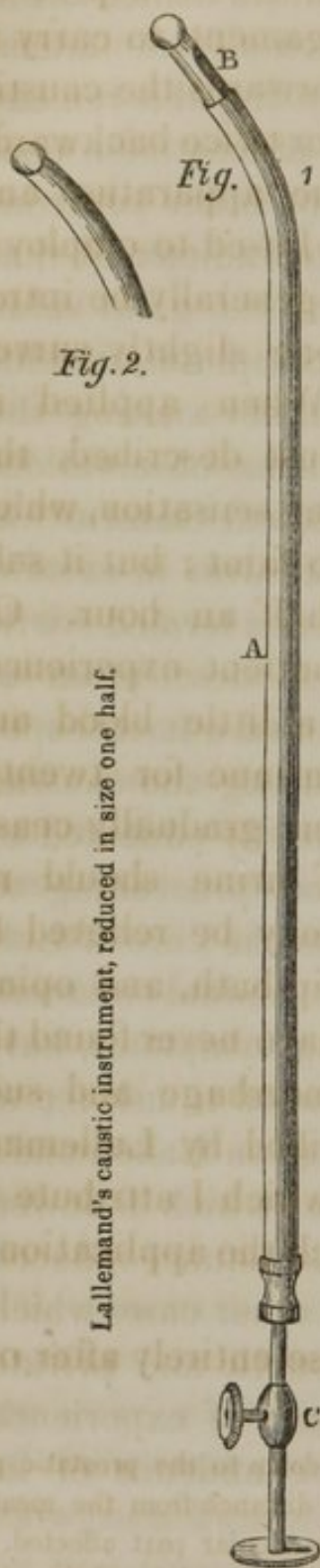
In most cases of this disease the local application of the nitrate of silver is by far the most effectual means of restoring the prostatic part of the urethra to a sound state. It allays the morbid sensibility and corrects the altered condition of the membrane and orifices of the ejaculatory canals, and thus arrests the excessive secretions of the testicles 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,* has recorded two cases of seminal

* Vol. ii. p. 427.

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 great value of the caustic treatment of this complaint, and for devising an improved instrument for making the application. In January, 1839, some observations were published by me in the Medical Gazette* on the employment of the nitrate of silver in certain kinds of stricture, and in the affection termed "irritable urethra," in which I gave a description of Lallemand's instrument, and pointed out its superiority over other modes of applying the caustic. Shortly afterwards a gentleman partly educated to the profession, who contemplated proceeding to Montpellier to place himself under the care of Lallemand for the cure of involuntary seminal emissions attended with the most distressing symptoms, having seen the paper alluded to, called to ask me to undertake the treatment of his case on Lallemand's plan. I did so; and the success which followed the use of the lunar caustic in this instance induced me to employ the same remedy in other cases which came under my care, both in public and private practice; and a considerable share of experience now induces me to speak with confidence of its beneficial effects.

* Vol. xxiii. p. 596.

Lallemand's instrument consists of a slightly-curved platina canule or tube, rather smaller than a middle-sized catheter (*Fig. 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 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. 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. An one time I used to employ a straight instrument, which may generally be introduced without difficulty; but one slightly curved is rather more convenient. When applied in the transient manner I have just described, the caustic occasions a sharp smarting sensation, which sometimes causes the patient to faint; but it subsides in from ten minutes to half an hour. On making water afterwards the patient experiences scalding, and usually passes a little blood and purulent discharge, which continue for twenty-four or thirty-six hours, and then gradually cease. If much pain or retention of urine should result from the application, it may be relieved by leeches to the perineum, the 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.

In general, the emissions cease entirely after one

* At first I used to pass a wax bougie down to the prostatic portion of the canal, in order to ascertain its distance from the meatus, that I might be exact in cauterising the particular part affected, but after a little practice in the use of the instrument I found this unnecessary.

or two applications of the caustic, though it is sometimes necessary to make three or four before they are completely arrested. Opium or henbane may at the same time be given at night to procure rest and allay irritation, and the cold douche may be daily applied to the pelvis and genitals. The determination of blood to the prostate and neighbouring parts may be restrained by an enema of cold spring water, administered by the patient before rising in the morning, which also tends to relieve constipation. I have found that the *Pulv. Cubebis*, in small doses of from gr. xv. to gr. xxx. combined with the tincture of henbane, taken twice a day, by its influence on the urethra materially aids the cure of this affection. Indeed in very slight cases this remedy, and the occasional introduction of a catheter or bougie, are sufficient to correct the morbid condition and sensibility of the mucous membrane without the caustic. As the local affection subsides, we must have recourse to other remedies to improve the general health. Thus steel medicines, quinine, cold 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. I have previously had occasion to notice the salutary influence of active bodily exercise in subduing the ardour of the sexual passion. The same means, in moderation, are also efficacious in allaying the morbid excitement of which I am now treating. It need scarcely be added, that no method of treatment is likely to be successful or

permanent, without the most rigid and persevering abstinence in respect to the exciting causes of the complaint. 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 involuntary seminal emissions are often recommended to marry. 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 excitements 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, and the constitution fully invigorated. 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.

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 anxious for the removal of the testes, to get rid of a complaint so completely destructive to their health and happiness: and individuals have even been known to perform the

operation of castration on themselves in consequence.* A short time since 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 my friend Mr. Avery, surgeon of the Charing Cross Hospital, who, as well as myself, was teased with repeated solicitations to castrate him.† This operation can scarcely be, in any case of involuntary seminal emissions, justifiable. 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 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

* Several cases of self-castration are related in Chap. III. Sect. 2.

† I have recently been informed that a surgeon had been induced to perform the operation, and that the patient was well pleased with the result.

with an action at law for performing so unwarrantable an operation.

Solitary abuse is sometimes practised in infancy ; and in two cases which have come to my knowledge 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 fear 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 developement of the sexual powers. As in the adult, it produces a morbid sensibility and condition of the urethra, which is also to be treated on the same principles.

I have little to add to the observations already made respecting the treatment of the different forms of impotency. In several instances, whilst explaining the cause of the power being lost, I have suggested the remedies necessary for its re-establishment. Certain medicines, reputed to possess the property of restoring the sexual functions, 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. Some of them 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. Such appears to be the nature of the influence produced by the cantharides, the most common of this class of medicines, and the chief ingredient of quack remedies for impotency. There are, however, few cases of defective sexual power in which the use of cantharides would be proper. In many it would certainly be injurious, producing an unnatural excitement when repose is most desired; so that even if it enabled the patient to have connexion, its ultimate effects would rather tend to render the impotency more permanently hopeless. Almost the only description of case in which I should be induced to recommend this remedy is an atonic state of the organs consequent on long disuse, in which, though the desires are strong, the erections are feeble, and take place with difficulty. In such case ℥xx. of the *Tinct. Cantharidis*, with the same quantity of the *Tinct. Ferri Sesquichloridi*, may be given twice or thrice a day. Bayle states that Leroy and Bouttatz experimented on themselves with phosphorus, and found that it produced strong excitement on the genital organs. The same was observed in animals to whom Leroy gave this remedy.* 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

* Bibliothèque de Thérapeutique, tom. ii. p. 124.

would be equally injurious in many cases of impotency. In the class of atonic cases alluded to above, we might hope for some benefit from the ergot of rye, which in man appears to act as a stimulus to the generative organs, as well as to the neighbouring parts; but further experience is required of the effects of this remedy in cases of impotency. The aphrodisiac most wanted is one capable of stimulating the sexual organs, and exciting the secretion of the testes by its influence on the sensorium, or on that particular part which is the seat of the reproductive function. I know no remedy which possesses this power, except, perhaps, the Indian hemp, or *Gunjah* (*Cannabis Indica*). It is well known that the use of this drug is indulged in by the inhabitants of certain countries, on account of the pleasurable excitement to which it gives rise. According to Dr. O'Shaughnessy of Calcutta,* its effects, when given in small doses, is to cause an increase in the fulness and frequency of the pulse, a glow on the surface of the body, remarkable increase of appetite, unequivocal aphrodisia, and great mental activity and cheerfulness; and no headache, delirium, sickness, or other unpleasant symptom followed its use. The dose reported to be capable of causing these effects is a quarter of a grain of the resinous extract, or half a drachm of the tincture, once or twice repeated,

* On the Preparations of Indian Hemp, &c. Transactions of the Medical Society at Calcutta, 1839; and Provincial Medical Journal, Jan. 1843.

until the remedy produces its exhilarating influence on the system.

I have lately made some experiments with the extract of hemp, obtained from Mr. Squire of Oxford Street, which is understood to be genuine; but it certainly produced no marked aphrodisiac effects. I gave a gentleman five grains of it at a dose; it produced a feeling of intoxication, dilatation of the pupils, and dizziness, but did not quicken the pulse: there was a feeling of desire, but no expression of power to indulge. I believe that its effects on the European constitution are in some degree different from those which it exerts on the Asiatic, and that in the former larger doses are required to obtain its influence. On the latter the concurring testimony of different observers leaves no room to doubt its aphrodisiac powers, and its general use by the inhabitants of the East for the purposes of erotic excitement.

CHAPTER XVIII.

CASTRATION.

CASTRATION, or the extirpation of the testis, is well known to be 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 and unchristian 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 of the testis which may lead to the necessity for castration are the different forms of carcinoma, incurable strumous disease, tedious sinuses and fungoid growths consequent on inflammation, cystic disease, and varicocele combined with severe neuralgia. 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. The surgeon should endeavour, therefore, to perform it with expedition. Before he commences the hair must be cleanly shaved off from the pubes and scrotum, or it will interfere with the plaister in the dressing of the wound. The only instruments required are a straight bistoury or large scalpel, a pair of forceps, tenaculum, and curved needles armed with ligatures. 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 skin-deep 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 testis, 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. 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; or if the compression employed by the assistant be sufficient to check the hæmorrhage, the surgeon may at once proceed to dissect the tumour from out of the scrotum. This part of the operation may often be much facilitated by traction, so employed as to lacerate and detach the cellular connexions of the diseased gland. In chronic cases, the cellular tissue of the scrotum 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 testis and the scrotum requires division with the knife. When the tumour is of large size, care

is necessary in detaching the testis from the scrotum to avoid wounding the urethra and corpus cavernosum, and also the opposite gland, which should be drawn aside by an assistant.

Many surgeons recommend that the testis should be detached from the scrotum before the division of the cord; but, as Sir A. Cooper has remarked,* this obviously prolongs the time of the operation, and adds considerably to the sufferings of the patient. On the other hand, when the cord is first divided, the testis is easily drawn forth from the scrotum by means of the cord itself, and the adhesions that may exist are cut or broken down with greater facility and rapidity than by any other mode.

The bleeding mouth of the spermatic artery is soon found, and is to be secured separately by a silk ligature. 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 bleeding 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 very numerous. In securing vessels in the loose cellular tissue of the scrotum and other parts much assistance may be derived, especially if the assistants be unaccustomed to operations, from the employment

* Cyclopædia of Surgery, art. CASTRATION, vol. i. p. 704.

of a clumsy-looking but very useful pair of forceps, with broad blades coming abruptly to a point, to slip the ligature on the vessel. The oozing of blood from many of the smaller vessels may be arrested by torsion, or bathing the parts with cold water.

The ligatures attached to the cord being carried to the upper angle of the wound, the divided edges are to be brought together by two or three sutures or more, according to the length of the incision. Strips of plaister are not sufficient, as the natural contractility of the scrotum tends to separate and evert the edges of the wound. The closure of the wound is to be completed with narrow strips of adhesive plaister applied transversely, and the part is to be covered with a dossil of lint: the scrotum must afterwards be supported, and the dressings retained by a T bandage. When the patient returns to bed the parts must be kept cool by a cradle placed over the pelvis under the bed-clothes. The upper part of the wound often unites by the first intention; but the lower usually heals by granulation in from twenty to thirty days.

There are a 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, which is very liable to occur, and retard the healing process when this point is neglected. If the gland is of great size, or the skin

adherent to it or 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 very 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. The retraction of the cord after its division is liable to become a source of embarrassment and delay. The retreat of this part 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, I attribute the retraction chiefly to the elasticity of this part, which, after the cord has become relieved of the weight of the enlarged testis by which it was pulled down, enables it to recover 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.* 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. Professor 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.† When the vessels of the cord are not properly secured, and afterwards bleed, the cellular membrane 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. It was formerly the practice to arrest the bleeding from the cord by tightly tying all the parts composing it in a single ligature. This un-

* Treatise on the Hydrocele, &c. p. 265.

† Practical Surgery, p. 540.

scientific proceeding occasioned severe pain and suffering; produced inflammation; and in many cases was the cause of tetanus. It is needless in the present day to offer any caution against a practice so rude and unskilful, which has been long abandoned by British surgeons.

There is perhaps no operation more frequently succeeded by secondary hæmorrhage than castration. In morbid enlargements of the testis, 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.* I have myself found the spermatic artery of a testis, 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 many of the vessels of the scrotum often 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 many 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 dis-

* Treatise on the Operations of Surgery, p. 52.

turbance of the dressings and re-opening the wound to arrest a secondary hæmorrhage; and this precaution I should always recommend, 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 strips of plaister or a bandage, and keeping the parts cool by an evaporating lotion, are usually, however, sufficient to prevent a return of hæmorrhage. There is certainly less bleeding from the vessels of the scrotum when the cellular connexions of the testis have been lacerated, than after they have been divided by the knife. In one case in which I operated in this way, although the testis was of considerable size, not a single scrotal vessel required ligature, and there was no after-hæmorrhage. This practice may be adopted with advantage in other operations; as in the removal of a diseased gland from the loose cellular tissue of the axilla, and in amputations of the mamma. The surgeon may thus save time and trouble, and procure a readier cure of the wound, fewer ligatures being present to interfere with the healing process.

The disease of the testis 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 testis, 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."* If the 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. Dr. Wedemeyer of Hanover removed the left testis 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.†

A few instances are on record in which a testis retained in the inguinal canal has become so diseased as to lead to the necessity of castration. Mr. Pott mentions a case of diseased testicle in the groin successfully removed by operation at St.

* Observations on Cancer, p. 236.

† Journal für Chirurgie, band. ix. stuck 1; as quoted in London Med. and Phys. Journal, vol. lvi. p. 482.

George's Hospital.* In 1823, Manzoni of Florence extirpated a cancerous testis retained within the abdominal ring. A similar operation was shortly afterwards performed at Pisa for the removal of an enormously enlarged cancerous testis, 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.† Professor Naegele extirpated an enlarged and diseased testis 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.‡

There would be no great difficulty in extirpating a testis seated in the inguinal canal. The first incision should be made in the same direction, but a little higher up, as in operating for inguinal hernia; and the tendon forming the anterior boundary of the canal might be divided upon a director introduced at the ring, so as fully to expose the diseased gland. The danger would certainly be greater than after the extirpation of a testis from the scrotum, owing to the liability of wounding the peritoneum, opening a vaginal sac communicating

* Lib. cit. 4to. edit. p. 356. Case III.

† Fragments d'un Voyage Médicale en Italie, par T. J. E. Petrequin; Bulletin Médicale, Belge, Juin, 1837.

‡ Quoted from a German Journal in Archiv. Gén. de Médecine, t. xiii. p. 423, 1837.

with the abdomen, or interfering with a testis adherent to a piece of intestine. The surgeon should not, therefore, interfere hastily with a morbid gland in this position, especially if the case be one of malignant affection; since it would be impossible to determine beforehand, with any degree of accuracy, to what extent the disease had reached.

I have remarked that castration is not, under ordinary circumstances, a dangerous operation. I have witnessed, during the last seventeen years, about a dozen cases of it, and not one of them terminated fatally. In a table of operations performed at the Hôtel Dieu,* it appears there were five deaths in twenty-nine cases of castration, being in the ratio of 1 in $4\frac{1}{4}$, which I feel satisfied is a much higher rate of mortality than would be afforded by the results of British practice.

C. T. Maunoir, in 1820, suggested a new operation for the cure of sarcocoele, without recourse to the extirpation of the testis.† It consists in cutting down upon and tying the spermatic artery, and thus interrupting the supply of blood to the organ. Two cases in which this plan was adopted are detailed. In the first the nerves were tied, as well as the artery, and the operation was followed by abscesses in the course of the cord. From this

* Gazette Méd. de Paris, Dec. 17, 1842. It should be observed that at the Hôtel Dieu the mortality from operations is well known to be very great.

† Nouvelle Méthode de traiter le Sarcocoele sans avoir Recours à l'Extirpation du Testicule.

cause the cure proved tedious; but the testis underwent absorption, until scarcely any vestige remained. In the second case the artery only was tied, and the operation was followed by wasting of the enlarged gland, and the absorption of the fluid collected in the tunica vaginalis. That the tying of the main artery should cause the reduction of a gland swollen from a chronic inflammation (as was probably the case in the above instances), and receiving so little blood from other sources, is not surprising. There are, however, very few forms of morbid enlargement to which this operation is 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 malignant affections such an operation would be quite out of the question. One great objection to its adoption is the degree of doubt which often exists, in cases of morbid enlargement requiring operation, respecting the true character of the disease.

PART III.

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 *circocoele* is used to denote a varicose state of the veins of the cord and testis ; but as the scrotal veins are not subject to any degree of enlargement that merits the name of disease, I shall, as is generally done, apply 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 testis, 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 good specimen of these dilated

veins which I recently examined, the vessels were arranged in three clusters (see figure).



One formed of the larger vessels proceeded from the inferior extremity of the testis; the second, in which the vessels were less in size, but more numerous and tortuous, arose from the upper extremity of the testis; whilst the third and smallest cluster surrounded and accompanied the vas deferens (1). The dilatation is not confined to the veins exterior to the gland: even those in the organ itself are found varicose, and enlarged veins may often be distinctly seen ramifying between the tunica vaginalis and tunica albuginea. The veins occa-

sionally contain phlebolites, which are lodged in round dilatations of the vessels.

The veins of the left testis 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.* Pott met with this disease on both sides of the body in only one instance, which is recorded in his treatise on Hydrocele.† The disease, however, is far from

* Landouzy, *Du Varicocele*, p. 24.

† Case XXXVIII.

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 always much less than that of the left. 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 testis 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. I have several times examined the veins of the lower extremities in persons affected with varicocele, but I have only once observed varicocele of the left side in connexion with a varicose state of the veins of the left leg.

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 testis to the second dorsal vertebra. Many of the Continental writers mention the absence of valves as a circumstance conducing to this disease: but this is 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. 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 testis, since the two currents pursue a different direction. The left testis 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 testis, especially in persons whose bowels are habitually constipated. Some persons subject to varicocele suffer from it only when the bowels are in this condition. But even the natural daily accumulation may be sufficient to produce some obstruction to the return of the blood by these veins. To this cause, I imagine, 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. I have had many opportunities of making this observation; and Sir A. Cooper remarks that he has never met with a

varicose state of the veins of the right ovary, which cannot be attributed to any variation in the height of the column of blood, since the two ovaria are on the same level.

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 testes, 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 orchitis. The second class comprehends tumours developed in the abdomen, enlargement of the lumbar glands, hernial swellings which press on the cord, trusses improperly adjusted, an accumulation of fat in the omentum and mesentery, and belts worn round the abdomen. Certain kinds of exercise greatly prolonged, as riding and rowing, and sudden and violent efforts, as in straining, also give rise to varicocele. That the latter 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. Patients, too, often ascribe the origin of the disease to some sudden effort or straining. Want of the proper support afforded to the testes 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 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 more frequently meet with this disease, the dilatation of the spermatic veins produces no injurious effects on the gland; but when highly or rapidly developed, a varicocele interferes so much with the circulation of the testis as to occasion a diminution in its size. This effect of varicocele upon the nutritive condition of the testis was originally noticed by Celsus.* Sharp observed, in a case of this disease, a gradual wasting of the body of the testicle, which at length was diminished to the size of a hazel-nut.† A partial atrophy of the gland, co-existing with varicocele, has come under my observation in more than a dozen instances; indeed, in nearly all cases in which there was a decided dilatation of the spermatic veins on one side only, the testis of that side was the smaller of the two. In one instance I found the gland diminished to half the size of the one on the sound side; and in a man aged fifty-six who was found drowned, and had a varicocele on the left side, the testis was so reduced that it scarcely exceeded the usual size of the organ in an infant. Some years ago a tall, seafaring man, about forty-five years of age, was under my care at the London Hospital on ac-

* Lib. vii. chap. 18.

† Critical Inquiry, p. 100.

count of a varicose ulcer on the left leg, who had a large varicocele on the left side, and a testis on the same side so wasted, that it could scarcely be felt even through the tunica vaginalis, which was loosely distended with fluid.

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

This result very nearly agrees with my own experience in the cases in which I have had an opportunity of ascertaining when the disease first commenced. They show that the period of puberty is the time at which varicocele most commonly occurs. I have only once met with it before that age. The patient was a lad aged thirteen, and the varicocele was on the left side, and was first observed a week before, after a fall. The periodic enlargement of the testes had not commenced, but the left gland was smaller than the right.

Symptoms.—A varicose distension of the spermatic veins in general takes place so gradually, and produces so little inconvenience, that it is seldom detected until the affection has made some progress, and is then only discovered accidentally. When some-

what advanced it occasions a sensation of weight in the testis, 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. A pyriform swelling is observed in the course of the cord, occasioned by the enlarged veins. This 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 testis being nearly in the centre, and the varicose veins above and below it. 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 often 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.* 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 as exists on the left. In all cases varicocele on the right side is less voluminous, occasions less uneasiness, and leads to consequences less grave than the same affection on the left, and very rarely requires any operation or even treatment for its relief.

If a patient affected with slight varicocele avoids fatigue and the exciting causes of the disease, and wears a suspensory bandage, its progress is usually arrested; but if permitted to increase it becomes

* Lib. cit. p. 76.

a source of continual suffering. Slight exertion, warmth, or excitement of any kind increases 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 cases of varicocele of large size the pain is sometimes very slight ; whilst in others small in volume it is occasionally very severe. Persons affected with it at an early age, on the whole, suffer more than those who are attacked when advanced in life. The pain in some cases is dull and heavy ; in others it assumes a neuralgic character, darting and shooting, supervening suddenly, and occurring in irregular exacerbations. The pain is sometimes 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 patient by Gooch,* Sir B. Brodie,† Mr. Key,‡ and others.

Severe neuralgic pains are not, however, to be regarded as an essential or common character of this disease ; and, as before mentioned, they are not dependent on the degree of vascular dilatation. A combination of a varicose state of veins and neuralgia or morbid sensibility is occasionally observed

* Practical Treatise on Wounds and other Chirurgical Subjects, vol. i. p. 244.

† London Medical and Physical Journal, vol. lvi. p. 299.

‡ Sir A. Cooper's Observations on the Testis, p. 224. Vide Case by Mr. Thompson of Stalybridge, Lancet, vol. ii. 1839-40, p. 137.

in other parts. Sharp mentions, in his *Critical Inquiry*, a case where the cephalic and median veins in the bend of the arm were varicose for near two inches, and so extremely painful that the patient could find no relief till he cut them away.* I have myself noticed in some cases a degree of neuralgia attending varicose veins of the lower extremities; and a few years back I extirpated from the wrist of a girl eleven years of age a small plexus of varicose veins situated at the ulnar side and edge of the lesser vola, near the prominence of the pisiform bone, the skin covering which was so exquisitely tender that she could scarcely bear me to touch the part, and was nearly deprived of the use of the hand. The operation effectually removed the morbid sensibility and pain.

Though varicocele usually occurs as a chronic affection, 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.

* P. 101.

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 testis.*—1. A young man after a fatiguing journey was seized in bed with a violent pain in the back, which (to use his own words) shot down into his stone. The pain was so great that he sent for immediate assistance, and was bled, but without relief. There was no tumour of the testicle or scrotum. The pain continued without remission all the next day, and he was again bled and purged. On the third day, toward evening, the pain totally left him, and a fulness appeared in the groin tending down towards the testicle. This made him so uneasy that he got into a post-chaise and came home to London. His journey brought on a return of the pain; but by losing more blood, keeping in bed, and suspending the parts, he became easy, and all the tumefaction dispersed except a small fulness of the spermatic cord occasioned by the varicose state of its vessels. But the testicle was so diminished as to be hardly perceptible.—2. An ostler was thrown from his horse, and struck his groin against the pommel of the saddle. It gave him exquisite pain. He was brought immediately to the hospital. When he was examined, there was no apparent swelling of the testicle or spermatic cord. He was largely bled and purged: his pain continued two days, and when it left him the spermatic vessels became greatly vari-

* Lib. cit. p. 469. Cases XXXVI. XXXVII. and XXXVIII.

cose. He left the hospital free from pain, but his testicle on that side was scarcely discernible.—
3. A gentleman aged twenty-five, after being heated by exercise went to bathe. In the ensuing night he was seized with coldness and shivering, followed by heat, thirst, and a slight sweat. He was bled, purged, and kept in bed. For three days his fever was unremitting; but on the fourth he became cooler, and was seized with a most acute pain in the loins, for which he was again bled and purged. On the fifth day his back became easy; but both testicles, though very little swollen, were extremely tender: in a very few hours the spermatic vessels were so distended as to make an apparent tumour. By fomentation, poultice, and rest, all uneasiness was removed in about a fortnight; but at the end of that time both surgeon and patient were excessively astonished at not being able to find the testicles. The patient came to London immediately and consulted Mr. Pott, who found the spermatic vessels full and varicose; the vasa deferentia too large, and rather too hard, as also the epididymes; but there was not on either side the least appearance of a natural testicle: a flattened, compressed kind of membranous substance, which he supposed was the tunica albuginea, seemed to hang from each epididymis; but there was not any trace or vestige of the glandular or vascular parts of either testis.

The concise history which Mr. Pott has given of these cases seems to afford grounds for suspecting that there was some further cause than a

varicose affection of the veins of the testis for the acute symptoms by which they were characterized. In all three the complaint was preceded by the sudden occurrence of acute pain, without tumefaction of the testis, scrotum, or cord; and when the pain subsided, which happened in a few days, the swollen vessels then became apparent, and the testes rapidly disappeared. In the two first cases this took place on one side only; in the third, in which the complaint was preceded by fever, the symptoms were more severe than in the two former, and both testes wasted away entirely in a fortnight. Now such is not the history of varicocele as I have met with it, nor does it correspond with the accounts usually given of the disease. Its progress is in general chronic; and though sometimes acute, I have certainly never known it to become developed with such rapidity as in these cases. The pain, too, is rather heavy and dull than violent, and does not precede, but seems consequent on, the varicose enlargement; and instead of the testes decaying rapidly, the atrophy takes place in the most slow and gradual manner, being often imperceptible in varicoceles of many years' duration, and rarely going on to the entire destruction of the gland. I scarcely know in what way such a rapid and total wasting of the testis as appears to have taken place in these cases could have been produced, unless from some cause cutting off the chief supply of blood by the spermatic artery. The same cause might likewise obstruct the spermatic veins. In the last case, it is observed that the vasa deferentia

were too large and rather too hard, as also the epididymes; which would seem to indicate that these parts, if not the testis, had been the seat of inflammation. I think, therefore, there is sufficient reason to question the propriety of considering these cases as simple examples of varicocele.

Diagnosis.—The symptoms of varicocele slightly resemble those of a scrotal hernia. Like hernia, the tumefaction 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 placed himself in the recumbent position, the testis 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 reappears; but if it be a hernia, the descent of the omentum is prevented by the pressure. As the tumefaction 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 distinguishing the disease from other affections of the part.

PALLIATIVE TREATMENT OF VARICOCELE.

Varicocele is almost an incurable disease; but as it is an affection which, in the mild form that is more commonly met with, produces little suffering or even inconvenience, the treatment chiefly required is to keep the scrotum and testes well supported with a suspensory bandage, in order to diminish the length of the vessels, and the weight of the column of blood circulating in them. As it is desirable that the parts should be kept cool, the suspender should be made of open silk net. A cold evaporating lotion is usually recommended in these cases; and no doubt benefit might be derived from its constringent effects, if the parts were kept free from the clothes around, so as to permit evaporation to take place, but this is seldom convenient. The lotion used should be free from smell. The parts may be freely soused with cold spring water

morning and evening, or the patient may daily use the shower bath. The dress ought to be as light as comfort will admit of, and not tight about the abdomen. Fatiguing exercise, warm baths, much indulgence in venery,—every thing, in fact, which tends to determine the blood to the testes 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 warm water thrown well up into the colon every morning, in order to remove the feculent 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 testis in cases of varicocele, Mr. Wormald of St. Bartholomew's Hospital makes use of the following plan.*—The lower part of the scrotum, whilst the patient is in the recumbent position and the veins comparatively empty, is 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 pressed towards each other with sufficient force to prevent the scrotum escaping. Mr. Wormald represents that great relief has been experienced in cases of varicocele from this simple contrivance. I have tried this plan, but have not found that it possesses

* Medical Gazette, vol. xxii. p. 194.

any particular advantage over the suspensory truss: it is equally annoying to the patient's feelings, and cannot always be steadily fixed, so as to answer the purpose intended.

As the above means are only palliative, and in severe cases do not always afford sufficient relief, and as patients, especially at the age at which varicocele usually occurs, do not much like being condemned to wear a bandage for the remainder of their lives, further assistance is often required from the surgeon.

RADICAL TREATMENT OF VARICOCELE.

In order to afford a permanent and more complete support to the testis, and to render a suspensory bandage unnecessary, Sir. A. Cooper suggested 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 states that the operation is safe, effectual, and by no means painful; and he directs its performance in the following manner.—“The patient being placed in the recumbent posture the relaxed scrotum is drawn between the fingers; the testis is to be raised to the external ring by an assistant; and then the portion of the scrotum is removed by the knife or knife-scissors: but I prefer the former. Any artery of the scrotum which bleeds is to be tied; and a suture is then made to bring the edges of the

diminished scrotum together. The patient should be kept for a few hours in the recumbent posture, to prevent any tendency to bleeding; and then a suspensory bag is to be applied to press the testis upwards, and to glue the scrotum to the surface. The only difficulty in the operation of removing the scrotum by excision is in ascertaining the proper quantity to be removed; but it adds but little to the pain if a second portion be taken away, if the first does not make sufficient pressure on the spermatic cord. It is of no use to remove a small portion of the scrotum, for from doing this I have failed. When the wound has healed the varicocele is lessened, but not always entirely removed; but the pain and distressing sensations cease, if sufficient of the scrotum be removed.”* Sir A. Cooper recommended this operation only in those cases of varicocele in which the patient suffers great local pain; in cases in which he is most urgent to have the swelling and deformity of the part removed; and more especially in those instances in which the function of digestion suffers, and there is a great degree of nervousness and of mental depression. For slighter cases a suspensory bandage must still be recommended.† In the paper from which I have quoted, five cases are related in which the painful symptoms of varicocele were fully relieved by this operation: four of them were operated on by Sir Astley himself, and the fifth by Mr. Key. The son of a medical gentleman of my acquaintance, when sixteen

* Guy's Hospital Reports, vol. iii. p. 9.

† Ibid. p. 13.

years of age, had part of his scrotum excised by Sir A. Cooper in May, 1840, in consequence of varicocele. The effects of the operation were mild; very little confinement was necessary, and the parts healed in little more than a week. In December, 1842, he had continued relieved from all uneasiness; and the testis was of proper size, though the veins still remained enlarged. In a case operated on by Dr. Watson of New York, the patient was permanently relieved of the dragging sensation and pains of which he complained before the operation.* Mr. Bransby Cooper has recorded† another case of severe varicocele, in which the operation was attended with a very beneficial result; but the effects described were extremely severe,—indeed fully as much so as after operations performed on the veins, and not altogether devoid of danger: the cure also proved very tedious. A short time since I examined a man, part of whose scrotum had been excised by Sir A. Cooper on account of varicocele, but who derived so little benefit from the operation that he afterwards submitted to castration; and a medical friend lately informed me that in one of the published cases of success the disease subsequently returned as bad as ever. Mr. Luke made trial of the operation in the following case at the London Hospital.—W. Dudley, an engineer aged twenty-one, was admitted into the London Hospital in May 1841, with a varicocele on the left side. He stated that

* New York Med. and Surg. Journal, Oct. 1840.

† Guy's Hospital Reports, vol. iv. p. 201.

it came rather suddenly after he had exerted himself in lifting a plank of wood. The veins were greatly enlarged, and formed a plexus which descended below the testis; the scrotum was lax and pendulous, and the left testis was smaller than the right. The affection was attended with a heavy aching pain in the testis and groin, and uneasiness in the loins, which were so much increased by any exertion that he was obliged to abstain from hard work. The symptoms were only partially relieved by a suspensory bandage and cooling lotion; and as he was anxious to obtain permanent relief, he was admitted into the hospital for the purpose of having part of the scrotum excised. A considerable portion of the integuments was removed with the knife, so as to expose both testes. The edges of the wound were brought together with three ligatures, and closed with strapping; but the testes were with difficulty prevented from protruding at the intervals of the sutures, especially the right, the tunica vaginalis of which contained a small quantity of fluid. There was very little bleeding, and only two vessels required ligature. The wound healed up very slowly, and was not entirely closed till six weeks after the operation, during the greater part of which time he was kept in bed. The testes were then found to be well braced up and supported, and the man was a good deal, but not wholly relieved, of the uneasiness in the groin and cord he had previously experienced. He complained for some time afterwards of pain in the loins; but as he regained his health and strength this left him,

and he resumed his work. I have not since been able to obtain any further account of the case.

This operation has not been generally adopted by operating surgeons, and considerable doubt is entertained of its efficacy. I have taken some pains to ascertain the amount of benefit which it is capable of affording; and from the inquiries that I have been able to make it appears to me that excision of a portion of the scrotum is calculated to arrest the progress of varicocele, and afford full and permanent relief, only in those cases in which the painful symptoms of the disease admit of being temporarily but completely removed by suspending the parts in the hand, or in a well-adjusted suspensory bandage; when the contraction of the scrotum succeeds in compensating for the previous laxity of the tissues, gives adequate support to the dilated veins, and sufficiently diminishes the pressure of the column of blood circulating in them.

The objects contemplated in the preceding operation, viz. shortening of the scrotum and permanent support to the testis, have been attempted to be obtained in another way by Dr. Lehmann, a German surgeon. The mode of operating is very similar to that which he states he has in several cases adopted successfully for the radical cure of hernia. A portion of the relaxed scrotum is pushed up on the fore finger, and *invaginated* into the part above it, till the finger reaches the abdominal ring. A broad curved needle, with a double thread passed through an eye near its point, is then carried through the bottom of the inverted portion of the

scrotum, and made to penetrate the integuments immediately over the external ring. The thread is next removed from the eye, and the needle drawn back, and again carried through the scrotum and integuments at the distance of about half an inch from the parts previously penetrated. The threads passed through the two apertures being drawn, the invaginated portion of scrotum is pulled up to the desired height. The threads are then tied in a knot, and the parts are left for eight or nine days, by which time adhesion takes place between the opposed surfaces of the inverted portion of the scrotum and that into which it is pushed. The author relates six cases in which this mode of operating was adopted with success, but in none of them had sufficient time elapsed to enable him to determine that the treatment was permanently beneficial.* This plan does not appear to possess any advantages over the operation of excision of part of the scrotum; and I should think it must be liable to even a greater risk of failing in its object than the latter operation.

Various attempts have been made to obtain a radical cure of varicocele by causing obliteration of the dilated veins. This has been effected in four different ways. 1. By division of the vessels; 2. By ligature; 3. By compression: and 4. By excision.

1. *Division of the Vessels.*—This operation was first practised by Sir B. Brodie. A man twenty-

* Med. Zeitung, Dec. 2, 1840; as quoted in Brit. and For. Med. Rev. No. xxii. April 1841, p. 529.

one years of age was admitted into St. George's Hospital with a varicocele on the left side, principally situated at the posterior part of the epididymis, which, though not very large, caused a very considerable degree of pain, especially in the evening, when the veins were more distended than in the morning. Finding that the pain was referred almost wholly to the cluster of varicose veins situated at the posterior part of the epididymis, he was induced to believe that the sufferings of the patient arose from the pressure of the tumour on some contiguous nerve or nerves, and that if the dilated veins forming it could be obliterated the pain would be relieved. With this impression on his mind, Sir B. Brodie performed the following operation. He divided, with a sharp-pointed bistoury, the skin and cellular texture at the posterior part of the scrotum, so as to expose the varicose cluster; and then, by a second incision, he divided the varicose cluster itself, cutting through its centre. When first exposed the cluster was of about the size of a horse-bean, of a purple colour: on being divided it immediately collapsed, and there was a slight venous hæmorrhage. Some cold lotion was applied, the wound being allowed to remain open, in order to favour the escape of blood, and prevent its effusion into the cellular texture of the scrotum. Some inflammation and tumefaction of the scrotum followed the operation; but there was no fever, nor much uneasiness of any kind. A month after the operation the wound was healed, and the patient was free from pain. A slight

degree of hardness remained where the divided cluster of veins was situated. I have not heard that this operation has been adopted in other cases of the disease.

2. *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.* It is open also to the further objection of occasioning atrophy of the testis. 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 testes were found after death wasted and soft.

To avoid the risks consequent upon the simple application of a ligature, many modern 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.† This plan consists in

* Lond. Med. Gaz. vol. xiii. p. 379. I have been informed that several of the patients whose spermatic veins had been tied by Roux in Paris, for the cure of varicocele, died from the operation.

† Vide Archives Générales de Médecine, 11 ser. t. xi. p. 1. 1833.

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 tightness 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 soon 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* have practised this operation with success in several cases, and it has also been performed in America,† and in this country by Mr. Liston‡ and other surgeons, with favourable results. The pins should not remain in longer than four or five days, or they are liable to occasion ulceration of the veins, and suppuration in the cellular tissue of the scrotum. In large varicocoeles it is necessary to introduce a second or third pin at the distance of from half an inch to an inch from each other.

M. Ricord of Paris also has recourse to the ligature, which he applies in the following ingenious manner:—The vas deferens is separated from the mass of veins; and the latter being taken up with a fold of the scrotum, a flat lance-shaped needle, armed with a double-looped thread, is passed beneath them.

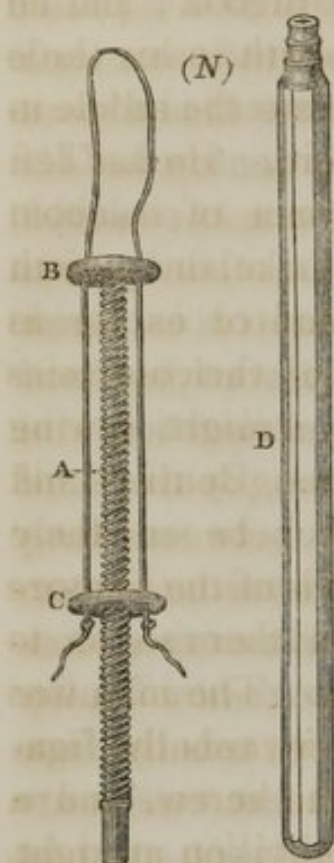
* Bulletin Générale de Thérapeutique, Août, 1837.

† American Journal of the Medical Sciences, vol. xxiii. p. 300.

‡ Practical Surgery, 3d edit. p. 446.

When the needle has been passed completely through the skin from one side to the other, the veins are let go, the skin alone being now held up; and then a second needle, similarly armed, is passed through over the veins, entering at the same hole by which the first needle was thrust out, and passing out at the same hole by which it entered. The bundle of veins is thus fixed between two double threads, of which one passes over the other beneath it. The ends of each double thread on each side are then 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 kind of ligature the vessels may either be suddenly constricted, or be tied gradually, in a manner something like that practised by Breschet; or most conveniently by a properly adapted *serre-nœud*, after the fashion of a tourniquet. It is usually from the tenth to the twentieth day that the vessels are divided by this means; and their division may be easily recognised by the freedom with which the ligatures may be drawn from one side to the other without being, as they were before, retained by the parts which they inclosed. Sometimes a slight œdema of the scrotum supervenes after the operation, and Ricord has twice observed rather a considerable serous effusion in the tunica vaginalis. In one patient also, who a few days afterwards exposed himself to great fatigue, a slight abscess formed in the cellular tissue; but with these exceptions there has been no important accident. If the patient is strong and plethoric, he is to be bled

from the arm directly after the operation; the horizontal position must be maintained till the vessels are cut through, and the bowels must be carefully kept open. Twelve patients had been operated on in this manner at the Venereal Hospital, and in all the most complete and satisfactory result had been obtained.*



Mr. Luke has lately cured a case of varicocele at the London Hospital with the ligature, applied by means of an instrument termed a "fistula tourniquet," with which he has successfully treated several cases of fistula in ano.—Matthew Quin, a tall and muscular Irishman, aged twenty-four, was admitted in August, 1842, on account of varicocele on the left side. The left testis was about half the size of the right, and above it there was a considerable swelling formed by the varicose spermatic veins.

* British and Foreign Medical Review, July, 1840, p. 270. (From Bulletin Générale Thérapeutique, Mars, 1840.) Several other modifications of the operation by ligature have been practised by different French surgeons; but they are not important.

(N) Mr. Luke's tourniquet for the cure of fistula and varicocele.

A. The screw.

B. Button upon which the screw turns.

C. Movable nut.

D. Key for turning the screw in order to tighten the ligature.

He experienced a dragging pain in the course of the cord, and an uneasy sensation of weight, which were only partially relieved by supporting the parts. He had been a private in the Light Dragoons, and he attributed the origin of his complaint to his testis having been accidentally struck against the saddle in riding about fourteen months before. He had left the regiment invalided in consequence of it about two months.—September 3. Mr. Luke, the patient standing before him, having separated as far as possible the whole of the plexus of varicose veins from the vas deferens, passed a straight sewing needle armed with a ligature of strong dentist's silk through the root of the scrotum between these parts; and having attached the ends of the ligature to the fistula tourniquet, secured them so as to make gentle pressure on the veins. The man was then sent to bed. Three days afterwards the ligature was tightened by turning the screw, and a grain of calomel was directed to be taken at night. As the ligature cut through the included parts and got slack it was again tightened, the turning of the screw being stopped immediately the patient complained of pain. He had continued so free from pain during the treatment that at the end of ten days the calomel was omitted, and he was allowed to walk about the ward and take his diet as usual. The ligature came away on the 28th, and on the 30th the wound was healed. A few dilated veins were still felt in the lower part of the scrotum. The man was greatly relieved, though he was not quite free from the sensation of weight without

wearing the suspensory bandage. The testis was not diminished in size.—Oct. 4. He was discharged from the hospital.—Dec. 20. He was still quite well, and had taken a situation as policeman. The testis was about the same size as before the operation, and the tumefaction of the veins removed.

3. *Compression*.—In the preceding operations the veins are pressed upon by the pin or ligature with which they are immediately in contact, and are thereby liable to become inflamed. To obviate this disadvantage M. Breschet has contrived a pair of forceps, to cause obliteration of the veins, by making firm pressure on them from outside the scrotum. By means of this instrument, the blades of which are well padded, and admit of being closed by screws, the walls of the dilated veins are at once brought into contact; blood coagulates in the vessels; and adhesion taking place, the danger to which the other plans are liable is said to be avoided, and by securing the spermatic artery from compression atrophy of the testis is also prevented. In thirteen cases in which this operation was performed there was only one relapse, which was owing to a vein not being included in the forceps.* A writer who witnessed the treatment of several of Breschet's cases, and has reported favourably of the operation, has nevertheless represented the inflammation and swelling consequent upon it as being considerable, and the cure as proving tedious.†

* Landouzy, lib. cit.

† Vide Observations on M. Breschet's Operation for the Radical Cure of Varicocele, by W. H. Walshe; Medical Gazette, vol. xv. p. 369.

Under the head of Compression must be mentioned a mode of relieving varicocele, which, as far as may be judged from the few cases in which it has hitherto been tried, bids fair to become a valuable acquisition to our means of treating this obstinate disease. The history of the plan is as follows. 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 Mr. Aston Key, who was accordingly induced to adopt the same principle in the treatment of cases of varicocele; and in a private communication with which I have been kindly favoured by Mr. Key, he has assured me that he believes the practice resorted to is effective, and applicable to the majority of cases of varicocele.

In a patient affected with this disease, if the spermatic cord be pretty firmly compressed between the fingers while 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

* This may seem incompatible with the account given at page 479, of the mode of distinguishing a varicocele from a hernia; but such 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 gradually become 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 retained 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 testis by

not the case, since for the latter purpose a much less degree of pressure on the veins is required than to produce the effect described in the text.

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; but the force required is such, that unless it be skilfully applied patients are unable to submit to it. Two cases have been mentioned to me in which it was tried, but the instrument caused so much pain and inconvenience that the patients were obliged to discontinue its use. In the following case of varicocele successfully treated by compression, for which I am indebted to my friend Mr. Daldy, he had recourse to a truss, which appears calculated to meet the exigencies of this mode of treatment better than any other mechanical contrivance with which I am acquainted.—F. U., æt. 21, who had been the subject of varicocele, attended with a sensation of dragging and weight from the loins, for four years, at length became alarmed by the increase of the varix and the diminution of the left testis, which was reduced to about half the size of the right. At that period, now a twelvemonth ago, Evans's patent truss was applied to the external abdominal ring; and at the present time, no other means having been used,

the varix has disappeared, the pain has subsided, and the left testis has resumed its natural size, no appreciable difference now existing between the two. The truss has not yet been discontinued; as some slightly distended veins, on a careful examination, may still be felt above the testis. Mr. Daldy remarks, "It appears to me that I gained considerable advantage in the treatment of this case by the use of Evans's patent lever truss, as the patient was enabled to wear it without the slightest inconvenience, and to regulate the pressure at will, so that he never suffered any pain from it." He was induced to adopt this treatment in the case in consequence of a gentleman of his acquaintance, twenty-seven years of age, who was affected with a rapidly-increasing varicocele, having been recommended by Mr. Key to have recourse to pressure on the spermatic vein by means of a truss. He wore it for two months, and clearly derived benefit from it; when he quitted the country for Canada, since which no intelligence has been received of the case.

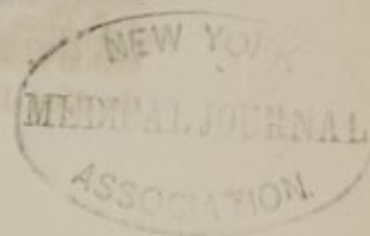
The truss employed in the above case certainly appears to possess many important advantages. Being made without any circular spring, it is not so liable to be displaced as the ordinary trusses. The lever spring enables the patient readily to regulate the pressure of the pad, to increase or diminish it as may be necessary; whilst the pad itself, being stuffed with a material* of remarkable lightness and

* This substance, called "moc-main," is the produce of the silk cotton tree, *Bombax heptaphyllum*, a plant which grows abundantly in the East Indies.

elasticity, allows of the application of greater force than could be tolerated under other circumstances.

4. *Excision of the Spermatic Veins.*—This operation has been practised by Petit and other surgeons. It is performed in the following manner. An assistant first separates the vas deferens, which he is to hold firmly and carefully between his thumb and forefinger. An incision from two to three inches in length is then made in the integuments over the cluster of dilated veins. The veins which then protrude are excised with a pair of curved scissors, or divided with a bistoury, first above and then below. If any troublesome hæmorrhage afterwards ensue, the bleeding vessels are secured by ligature. A needle and ligature are sometimes passed under the veins at the upper part of the wound, in order to secure them from retraction after their division. The wound is closed by a single suture and adhesive plaister; it often heals by the first intention. Dr. Warren states that he has been in the practice of doing this operation for a number of years; that he has found it give great relief; that in no instance has it been necessary to repeat it; and that it has never been attended with unpleasant consequences, except in a single instance. In that case, bleeding ensued after the operation, from which the scrotum became so enormously distended that it caused inflammation and sloughing of the cellular membrane and testicle; after which the patient recovered.*

* Surgical Observations on Tumours, p. 441.



This is a more-severe operation than the ligature, and it is equally, if not more liable, to be followed by phlebitis and wasting of the testis; and besides is attended with risk of hæmorrhage, and the production of a considerable and troublesome suppurating wound.

In the treatment of cases of varicocele, the surgeon should bear in mind that as the complaint is not dangerous, seldom produces pain amounting to more than an inconvenience, and usually admits of relief by palliative means, it is not justifiable in ordinary cases to risk the loss of the testis, or to perform severe operations for its removal. For this reason, ligature and excision of the veins, and such operations as are severe or at all liable to induce phlebitis, are never resorted to by judicious and cautious practitioners, except in the few instances in which palliative means fail to afford relief and arrest the decay of the testis, and the pain and annoyance are really so great as to require something to be done to alleviate the patient's sufferings. The indication for the perfect cure of varicocele is not merely to aid and support the dilated and weakened vessels, but so far to relieve them of the superincumbent weight of the blood as to enable them to return to their natural dimensions, and recover their tone so as duly to carry on the circulation. The first indication may be fulfilled to a certain extent by the suspensory bandage, and in some cases permanently by the excision of a portion of the scrotum; and in mild cases these plans are

sufficient to give all the relief required, and to prevent the extension of the disease: the latter proceeding may be resorted to whenever the patient is tired of wearing a bandage, and is willing to submit to an operation which, though painful, is not under ordinary circumstances attended with danger. But neither artificial support, nor excision of the scrotum, is capable of fulfilling the second indication—of reducing the size and thickened coats of the dilated veins. The only plan which appears to be fully adapted to effect this object is firm, steady, and continued pressure on the spermatic veins at the ring by means of a well-adjusted truss. At present our experience of this mode of treatment is too limited to admit of any opinion of its efficacy being confidently expressed; but I look with no slight interest to the result of further trials of a remedy which seems to me to be based on sound views of the pathology of the disease. This plan appears to be particularly applicable to cases of varicocele in young persons, whose reparative powers would be sufficient to restore the veins when relieved of pressure to a healthy state. In acute or severe cases of varicocele, when the distress is considerable, or the symptoms partake of a neuralgic character, and when the methods of treatment just alluded to fail in affording sufficient relief, it may become necessary to have recourse to the ligature for the obliteration of the varicose veins; and as in these cases life is embittered by the disease, the patient being incapacitated by it from earning a livelihood, and that too at an early age, it would certainly be

justifiable in such cases to incur the slight hazard of phlebitis incidental to the ligature, and to risk even the loss of the testis, which would undoubtedly suffer if the disease continued, in order to obtain the relief and comfort which the operation is calculated to afford. The plan adopted in the case reported at page 492, is the one to which I should be inclined to give the preference ; for, with the ingenious tourniquet devised by Mr. Luke, the surgeon has it readily in his power to tighten or relax the constriction as the circumstances of the case may require ; and no treatment could have been milder than the ligature thus applied in the case related. An important point supposed to be gained by this mode of treatment, is the effect of the gentle pressure first produced in exciting sufficient irritation to cause obliteration of the veins before the constriction afterwards made by tightening the ligature cuts the vessels through ; by which means the risk of phlebitis is in a great degree, if not entirely obviated, the ligature acting in fact on an impervious cord instead of on a tubular canal. The ligature should be applied as high up as possible ; for the plexus of enlarged veins is small above, and increases in size towards the testis. I should never, however, recommend the application of a ligature to the veins in a person far advanced in life or not in a good state of health ; for the surgeon cannot, under the best of circumstances, divest his mind of all fear of the occurrence of inflammation of the veins.

In some of the cases which have been operated on by ligature the testis has not been found to

suffer. In these instances, no doubt, some of the veins—for it is difficult to include them all—especially the plexus running close to the vas deferens, had escaped the effects of the ligature, and proved sufficient to return the blood from the testis. Such appeared to me to have happened in the case which I have detailed. Hence it becomes a question whether the surgeon should endeavour to include all the spermatic plexus in the ligature, or be satisfied with tying only a part of the veins; since, by including the whole, the loss of the testis, which is of importance at the period of life that this disease occurs, is very likely to result.* It may, however, be objected to the latter plan, that the attempt would only increase the risk of the operation failing, without insuring sufficient means of circulation to preserve the integrity of the testis; but upon this point further experience is required.

CHAPTER II.

ADIPOSE TUMOURS OF THE SPERMATIC CORD.

I HAVE already treated, under the head of *Hydrocele*, of the serous cysts occasionally developed in the course of the spermatic cord. This part may

* In the unfortunate case in which Delpech tied the spermatic veins, atrophy of both testes resulted. I have heard of other instances in which the gland has wasted after operations for the obliteration of the veins. It is not improbable that in some of these cases the spermatic artery was also included in the ligature.

also be the seat of abnormal depositions of fat. They generally occur in persons advanced in life. The adipose matter is formed in the loose cellular tissue, and is often interposed between the parts composing the cord. It occurs at different parts of the spermatic cord, as high up as the inguinal canal, and as low down as the epididymis. In examining the testes 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 testis. I have lately met in another case with some small isolated masses of fat, coupled with a small encysted hydrocele of the cord. Morgagni in one instance met with a similar deposition extending to the testis.* He also remarks, "On one occasion when the testis was enlarged, I found a little fat deposited within the innermost substance, which, in other respects, was not much diseased. From this case I inferred that tumours of the testis may occasionally originate from an unnatural generation of fat, and its subsequent increase."†

When fat is developed in the cord in considerable abundance, it sometimes forms, in front of the spermatic vessels, a loose and movable tumour, having the soft doughy feel and lobular character of ordinary adipose swellings. 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

* Cooke's Morgagni, vol. ii. p. 435.

† Ibid. p. 437.

them under the denomination of "*hernie graisseuse*."* I once dissected a lobulated fatty tumour, surrounded by the thickened sheath of the spermatic cord, on the 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 wood-cut. 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.† 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‡—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, there-



* Clinique Chirurgicale, t. iii. p. 33.

† Recherches sur les Causes et l'Anatomie des Hernies Abdominales, p. 26.

‡ Surgical Observations, p. 291, note.

fore, 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.

Fatty deposits in the spermatic cord might easily be mistaken for a varicocele; and some tact and experience are required to distinguish the peculiar swelling caused by the dilated veins from a soft, inelastic, undefined adipose tumour. The latter is constant, whilst varicocele diminishes or disappears in the recumbent position.

Ossific tumours have in some rare instances been observed in the spermatic cord. In the London Hospital Museum there is a preparation of a stone, the size of a small walnut, in the cellular tissue at the upper part of the spermatic cord of a man who died of strangulated hernia.

CHAPTER III.

SPASM OF THE CREMASTER MUSCLE.

SPASM of the cremaster muscle is an occasional symptom in different affections of the urinary organs. It occurs in diseases of the kidney and in the passage of a calculus down the ureter, and also in affections of the prostatic portion of the urethra,

being the result of irritation transmitted from these parts. In the two first cases, it may be explained by the connexion which exists between the spermatic plexus of nerves and the renal, and in the latter one by the connexion of the same nerves with the hypogastric plexus along the vasa deferentia. The spasm comes on suddenly; so that the testes are forcibly drawn up and retained, whilst it lasts, at the external abdominal rings, the patient suffering more or less pain. This affection is to be treated with the warm bath, fomentations of hops or poppyheads, opiates, &c., attention being at the same time paid to the source of 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 London Hospital, on account of an uneasy state of the testes. 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 testes had become drawn up. Pressure on the pubes gave pain, and when made at the part where the cremaster is attached the testis 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

* I once observed the same circumstance in a case of spasmodic retraction of the testes, symptomatic of irritation at the prostatic part of the urethra.

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 gonorrhœa and a return of the spasm in the cremaster, which subsided as the disease in the urethra became relieved.

PART IV.

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 generally effused beneath the skin. The cellular tissue, like that of the eyelids, is exceedingly loose, so that a slight blow produces rupture of vessels and abundant ecchymosis. The swelling which arises is considerable: the testes 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 testes have escaped injury, is rest, support to the swollen scrotum with a bandage or pillow, and the application of a cold evaporating lotion. A lotion composed of the hydrochlorate of ammonia, or a poultice of oatmeal and vinegar, appears to accelerate the absorption of the effused blood. 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, and only follows 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. Under other circumstances this operation is highly objectionable, and must never be resorted to for the relief merely of the extravasation, as incisions are very liable to be followed by sloughing of the cellular tissue and severe constitutional symptoms.

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. This must be cleansed, the coagula removed, and the edges brought together and retained by sutures and adhesive plaister. 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 testis 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.

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.

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 by 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, often 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 affection by internal remedies. The bowels should be occasionally acted on by saline purgatives. It has appeared to me that benefit has been derived in some cases from ʒss. to ʒj. of the sulphate of magnesia dissolved in the infusion of roses, with five or six minims of the dilute sulphuric acid, given three times a day. If the general health should suffer from want of rest at night, as sometimes happens, the acetate or muriate of morphia may be taken at bedtime. Alteratives, as five grains of the *Pil. Hydrargyri Chloridi Comp.*, given daily or every other day, will tend to correct the state of the

secretions, which are often disordered in this affection.

The patient should be enjoined to refrain from scratching the parts; his dress should be light and loose; and he ought to avoid exercise in warm weather and a stimulating diet. A warm bath should be taken two or three times a week, as it promotes cleanliness, which is very essential in these cases. The parts ought to be kept cool with a lotion of vinegar and water, or of the bichloride of mercury, in the proportion of two grains to the ounce of water. The yellow wash, and lotions composed of the carbonate of potass in the proportion of four drachms to twelve ounces of rose water, have also proved of service. I have found the *Unguentum Hydrargyri Nitratis Dil.*, 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. Local cinnabar fumigations, applied by means of an apparatus adapted for the purpose, have been strongly recommended by M. Bielt in this troublesome and distressing complaint.*

* 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 dilations 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. In severe cases of varicocele the veins of the scrotum sometimes partake in the dilatation of the vessels of the spermatic cord.

CHAPTER IV.

PNEUMATOCELE

Is a term employed to designate a distended state of the scrotum from the presence of air in its loose cellular 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 by others for the purpose of imposing on the charitable. 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 SCROTI.

THE cellular substance 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 pendent 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.

On cutting into the scrotum when thus affected, the cellular tissue is found loaded with a white or pale straw-coloured transparent serum, which readily drains off through the opening. The cells are distinctly seen of large size, some of them being capable of admitting the extremity of a goose's quill, or even of the little finger. The testes are wholly surrounded with the serous infiltration: the vaginal membrane covering them is found to be loosely attached amidst the cellular tissue. The blood-vessels appear small, indistinct, and few in number.

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 an uniform, indistinctly defined tumour, with a soft and doughy feel, and pits on pressure; but, owing to the large size of the cells, the fluid traverses the cellular 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 testes 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. It is occasionally caused by the accidental rupture of a hydrocele of the tunica vaginalis, and in the attempt to cure this disease by acupuncture.

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, and when of great extent for elephantiasis of the scrotum. In œdema the tumefaction is soft and diffuse, pits on pressure, occupies both sides of the scrotum, and conceals both testes: 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, æt. 45, 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.* 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

* *Chirurgical Works*, 4to. p. 336.

fluid had partially escaped into and infiltrated the cellular tissue around the sac. The limitation of the œdematous swelling to one side of the scrotum was a very unusual occurrence; for although the cellular 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.

The smooth surface of the skin, the softness and laxity of the tumour, its ready retention of the impression of the finger, and its comparatively small size, are the characters by which œdema of the scrotum may easily be distinguished from elephantiasis.

Treatment.—Œdema of the scrotum being in general only a symptom of disease elsewhere, and not of itself 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 cells so freely communicate with each other, that one or two punctures with a darning 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 exten-

sive mortification followed incisions of the scrotum for this complaint, one of which proved fatal.*

CHAPTER VI.

DIFFUSE INFLAMMATION OF THE SCROTUM.

DIFFUSE inflammation of the scrotum, though not particularly noticed by writers on surgery,† 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 well known to practitioners of experience, and 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 gentle antiphlogistic 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

* Lib. cit. Case VI. p. 365.

† Some cases of this affection have been published by Mr. Liston, under the denomination of "Acute Anasarca of the Scrotum," in the twenty-second volume of the Transactions of the Medico-Chirurgical Society.

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, a hot skin, and furred tongue. This affection usually occurs to persons exhausted by fatigue and want of rest and nutriment.—A lad, twenty years 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 depend-

ing 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 testes are entirely denuded of their integuments. The sloughing is attended with symptoms of a low typhoid character, a hot skin, feeble pulse, and a brown and dry tongue, 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. The following case is recorded by Mr. Liston.—W. R., aged forty, admitted into Royal Infirmary, July 21st, 1834. Received a kick on the perineum from a cow about a fortnight ago. There was much pain at the time; but the injury was followed by no further inconvenience until about eight days ago, when the pain returned, and was followed by considerable and rapid swelling of the scrotum. Upon examination the scrotum was found to be much swelled and extremely tender. At the lower part it was of a dark livid colour; and, on pressing it, an emphysematous crackling was distinctly felt. There was little swelling in the perineum; but on the right side, about an inch anterior to the rectum, there was a small opening, irregular in its appearance, through which the dead cellular tissue protruded, and a small quantity of

what was, at first, believed to be urine, escaped. The pulse was small and rapid; the tongue dry in the centre and moist round the edges. Bowels reported open; and states that he passes his urine freely. Immediately after his admission free incisions were made into the scrotum, and the opening in the perineum enlarged. In both places the cellular tissue was found in a state of gangrene; and a considerable quantity of thin foetid fluid, mixed with air, escaped from the scrotum. The man was a habitual drunkard and of weak intellect. He gradually sunk and died on the 28th of July, before the sloughs had separated. On dissection, the whole urinary apparatus was found in a perfectly healthy state.*

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

* Lib. cit. p. 293.

inflammatory redness of the skin, and the general febrile disturbance which accompanies it.

Treatment.—In the milder form of this affection gentle purgatives, antimonials to determine to the skin, and 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. It is bad practice to apply leeches in these cases, as they are very liable to induce sloughing. 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 cellular 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. Incisions are very painful, and when large produce a considerable shock to the nervous system; which the patient, in his weakened state, is not well able to bear. It is also of great moment to avoid the loss of blood: consequently, if bleeding ensue from any of the divided vessels, an active assistant should be at hand to place his fingers upon them, and restrain the hæmorrhage by pressure. These vessels pour

out blood profusely when first divided ; but they soon contract, and do not in general require ligatures. There is often a free oozing from the skin generally, which may be checked by the application of small dossils of dry lint. 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 quinine, ammonia, 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. Where this is neglected, the mortification which ensues adds greatly to the danger and urgency of the case.

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 cellular 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 following case.—A patient in Guy's Hospital, who was in the retreat with the Duke of York's army in the Netherlands, and exposed to excessively severe cold, had his scrotum become frostbitten, and sloughed away, exposing the tunica vaginalis and tendon of the cremaster muscle, which were, when he was in the hospital, covered by granulations, but had not a new scrotum formed. The slough had extended to the penis, and divided the vessels of the penis, which was swollen to an enormous size.*

Treatment.—Sloughing of the scrotum, from whatever cause it may proceed, is seldom free from danger, being attended in most instances with a

* Lib. cit. p. 20.

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 poultices, which may be moistened with the *Liquor Calcii Chloridi*, to correct the offensive fœtor. 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, as would be expected from the vascularity of the scrotum, proceeds with activity. Large sloughs come away, leaving behind an extensive, open, and formidable-looking sore, with the testes 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 proper investments of the cords; cicatrization has taken place all around from the edges of the wound; and partly by liberal demands upon the integuments of the pubes, groins, and perineum, and partly by the production of new skin, the exposed testes and spermatic cords have become invested with a new covering adequate for the protection of these important organs. The new scrotum is not exactly like its predecessor; it is thin, tense, and without colour, and closely in-

vests the testes; and sometimes, when there is much contraction of the cicatrix, these glands 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. Officious interference by sutures, plaisters, and bandages for the purpose of approximating the edges of the wound, avails very little in accelerating the healing process.

CHAPTER VIII.

ELEPHANTIASIS SCROTI.

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. As I have never witnessed a case of this affection, the following description is taken from an examination of some of the tumours removed by operation, which have been preserved, and from the accounts of elephantiasis given by the best writers on the subject.

Elephantiasis consists in a morbid thickening 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, and very dense. The chief bulk, how-

ever, of the tumour is formed by the conversion of the loose cellular tissue of the scrotum into a large mass of fibro-cellular tissue, infiltrated with a thick jelly-like fluid, evidently albumen, as it coagulates on the application of heat, acid, or alcohol, and sometimes on cooling, after its removal from the body. The areolæ of this tissue vary a good deal in size, but 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 conversion into bone. The testes are buried in the morbid mass towards its posterior part, but they are usually sound in structure. Occasionally there is a small quantity of serum in the tunica vaginalis. In a case operated on in Calcutta, there was a hydrocele on both sides imbedded in the diseased parts, the largest of which contained between five and six pints of fluid.* The spermatic cords are elongated several inches, owing to the testes 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.† 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.

* Calcutta Quarterly Journal, No. 3.

† Medical Gazette, vol. viii. p. 95.

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. This disease 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. Very few cases of this disease have occurred in Europe. Sir W. Blizard presented to the College of Surgeons a good specimen of a 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.* Mr. Liston excised at 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.† Delpech operated on a patient aged thirty-five, a native of Perpignan in the south of France,

* Delonnes, *Operation de Sarcocèle*.

† *Edinb. Medical and Surgical Journal*, vol. xix. p. 566. This tumour is now deposited in the Museum of the College of Surgeons in London.

whose scrotum was converted into a large mass weighing sixty French 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 in warm climates are subject to a similar change, though not to the same extent nor so frequently as the scrotum.

Elephantiasis has been attributed to inflammation of the lymphatic glands by Dr. Hendy, and of the lymphatic vessels by M. Alard. The inflammation of these parts, which is in general only temporary, is probably the effect rather than the cause of elephantiasis; and in many cases in which there has been great enlargement the inguinal glands have been found quite free from disease. Dr. Wise, who appears to have seen a good deal of this disease amongst the natives of Bengal, believes that it is produced by an inflammation of the veins, and that it is a complaint analogous to phlegmasia dolens.† Bouilland also inclines to the opinion that elephantiasis is caused by an affection of the venous system.

* Chirurg. Clinique de Montpellier, t. ii. p. 5.

† Transactions of the Medical and Physical Society of Calcutta, vol. vii. p. 156.

An obstruction of the lymphatics or veins can scarcely, however, be adequate to account for the remarkable hypertrophy or thickening of the cutaneous tissue, which occurs in this disease. We find, in cases of cancer affecting the axillary glands and obstructing the course of the lymphatics, that although great distension of the arm is produced by infiltration of the subcutaneous cellular tissue, it is not accompanied by a thickened state of the skin ; nor is this change the ordinary result of venous obstruction or of phlebitis. The disease would appear to be something more than mere inflammation or obstruction, either of the lymphatic or venous system.

Dr. Titley, who has published much interesting information on the subject of elephantiasis, states that we are totally unacquainted with the causes which give rise to it. In Barbadoes it was thought to depend on some local peculiarity ; but the disease having now extended throughout the other islands, in which the same local causes do not exist, at once negatives that supposition, and we must confess our ignorance of the circumstances on which it is dependent ; nor is it easy to account for the great frequency of the disease now in many islands in which it was forty or fifty years ago entirely unknown, and in which the climate, soil, customs, &c., were the same formerly as at present. He remarks, peculiarity of food or clothing, or exposure to the vicissitudes of the weather, cannot be considered to give rise to it ; for the children of the gentry, who are not exposed to these causes, are frequently af-

fect. It is not infectious, though he thinks that children born of parents labouring under the disease are more liable to suffer from it than such as are descended from a more healthy stock.*

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 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 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. Where the penis is also affected, these parts enlarge together in an equal ratio; but if the scrotum only be affected, then the penis, as the scrotum enlarges, becomes drawn in, so as ultimately to disappear,

* Dr. Titley on Diseases of the Genitals of the Male, p. 300.

and become completely imbedded in the tumour; the prepuce being distended elongates, and opens by a navel-like aperture on some part of the anterior surface (see figure, page 536), 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

* Lib. cit. p. 301, et. seq.

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.

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,* 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 accompanying figure of a black man

* Case cited from "Ephémérides d'Allemagne," by Larrey, *Mémoires de Chirurgie Militaire*, t. ii. p. 115.

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 to mortify. Dr. Hendy of Barbadoes has related the case of a black man who had a scrotal swelling, which measured six feet in circumference, and twenty-four inches in length. A mortification of the part terminated the miserable existence of this poor creature.* Dr. Hendy

* A Vindication of the Facts and Opinions contained in a Treatise on the Glandular Disease of Barbadoes, p. 117.

states that five other cases had come within his knowledge where the scrotum, being much enlarged, had sloughed, leaving the testicles denuded.



[The above plate gives the appearance of a negro suffering from *Elephantiasis Scroti*, and the same individual two months after its extirpation by Dr. Picton of New Orleans. The operation was performed on the 3d of October, 1837, in the presence

of twenty physicians and surgeons of New Orleans. The disease had existed ten years, and the weight of the tumour was fifty-three pounds. The preparation is in the Anatomical Museum of the University of Pennsylvania.—AM. ED.]

Diagnosis.—The symptoms of this disease are so remarkable, that it can scarcely be confounded with any other affection. Œdema of the scrotum is the only disease which bears any resemblance to it. The rough and indurated state of the skin, the firm and solid nature of the tumour, and its large size, are characters quite sufficient to prevent elephantiasis from being mistaken for simple œdema.

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. The surgeon rarely meets with this disease at a sufficiently early period to afford a fair hope of his being able, by remedies, either to obtain its removal or even to arrest its progress. At its first commencement it should be treated by mild antiphlogistic remedies, the repeated application of leeches, and protracted counter-irritation; the scrotum being well supported, and the patient kept in the recumbent position. Iodine is a remedy which seems to be very applicable to this disease; but I am not aware that it has yet been fairly tried in the early stage. Free scarifications and firm compression long continued have been found of decided service in reducing elephantiasis of the leg. Pressure,

however, cannot be applied with equal effect to the scrotum, owing to the want of some resisting point.

When the enlargement of the scrotum has reached such a magnitude as to occasion serious inconvenience and render the patient's life miserable, there is no other remedy but its removal by the knife; an operation which has been performed in several instances with a favourable result. I have already noticed cases in which considerable tumours of the scrotum have been successfully removed by Delonnes, Mr. Liston, and Delpech. Tumours even of a much larger size have also been excised, 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 536. Clot-Bey excised one weighing one hundred and ten pounds.* 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; its structure is not very highly organized; integuments are the parts affected; and the only organs in any way involved are the testes and penis,—parts of importance, but not essential to life. 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 a very formidable and dangerous affair; and patients have died from hæmorrhage during or immediately after its per-

* Histoire d'une Tumeur Elephantiaque du Scrotum.

formance. 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, at Guy's Hospital, 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; but the patient died a few minutes after its termination from loss of blood.* A tumour 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 important to determine whether the penis and testes can be preserved.

* Medical Gazette, vol. viii. p. 93.

† Calcutta Quarterly Journal, No. 3.

‡ Diseases of the Genitals, p. 317.

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 proposed that no further attempts should be made to save the penis and testes, which were accordingly excised. Clot-Bey and Dr. Titley succeeded in saving the penis, but they were obliged to remove the testes. The elongation of the spermatic cords, and the difficulty of finding healthy integuments to cover the genital organs, are further reasons for not making the attempt to preserve them when the elephantiasis is of great magnitude. Delpech succeeded, after a tedious and difficult dissection, in saving these parts in his operation, which was performed in the following way.—Three flaps, two lateral and one in front, having been marked out on the tumour with ink, the operation was commenced by the division of the integuments so as to form the flaps. Several vessels then required to be secured. An incision several inches in length was next made on the right side of the tumour; and, at the depth of two inches, a cluster of vessels was discovered proceeding towards the bottom of the scrotum. These, which were branches of the external pudic, were cut and tied near the groin. A similar incision was made on the left side, and

the corresponding vessels in like manner were divided and secured. Afterwards, on cutting deeper, the operator recognised the spermatic cord much enlarged. This was easily detached with the finger, which served as a guide for an incision through the whole depth of the tumour, in order to expose the testis, which was situated at a distance of a foot from the ring. This organ was enlarged without effusion in the tunica vaginalis, but it was rather firmly fixed at its posterior part to a kind of cavity in which it was lodged. The testis and cord, having been entirely disengaged, were deposited on the abdomen. A similar proceeding was pursued on the right side ; but with less difficulty, the testis not being so adherent. An attempt was next made to reach the penis by transverse incisions through the soft parts situated between the two rings ; but the great density of the tissues rendering this hazardous, the finger was introduced into the orifice at the bottom of the tumour through which the urine escaped, and the prepuce was divided upwards, the distance of a foot, as far as the penis. The incision was afterwards prolonged to the base of the organ and the symphysis pubis. The penis was carefully dissected out, and the prepuce cut away from around the base of the glans ; and the organ was then deposited, with the testes, on the abdomen. The peduncle of the tumour was detached with great care, in the course of which the different structures of the perineum were all exposed. The tumour having been at length entirely cut away, several arteries required to be secured ; including the artery of the septum scroti, the dorsal arteries

of the penis, the transverse artery of the perineum, the arteries of the bulb, and several branches of the inferior hæmorrhoidal. All these vessels were tied separately, and the ligatures cut short. The testes were placed in the perineum at the sides of the penis; but the spermatic cords, owing to their great length, being arranged in tortuous folds in order to occupy the limited space allotted to them, were with difficulty retained in their position. The two lateral flaps of integument were brought together, and their borders united by the interrupted suture, from the anus upwards, for four fifths of their extent. The anterior flap was then rolled round the penis, and united by suture, the anterior border being left free to form the prepuce; and, in order to prevent the penis from slipping from its new sheath, a little of its cellular tissue was included in the sutures. The sides of this flap were then connected by suture to the remaining fifth of each lateral flap. The parts were afterwards supported and kept in contact by compresses of charpie and a double T bandage. The patient recovered, and the wound completely healed in two months. He returned to Perpignan, where he led an intemperate life, and died of a large abscess in the liver six months after the operation.

The quantity of blood lost in this operation is not stated; but we may infer that it was considerable, for immediately afterwards the pulse was imperceptible, the face pallid, and the limbs were cold. The tumour weighed sixty pounds; and the time occupied in its removal, which, if we may judge from the minute details of the operation re-

lated by Delpech, was skilfully executed, was fifty-seven minutes,—a long period for the patient to be under the knife; and the time subsequently taken up by the approximation of the flaps and dressing of the wounds of course greatly added to the duration of the operation. Notwithstanding the recovery of Delpech's patient, the case seems to me to afford but little encouragement to attempt the preservation of the genital organs in operations for the excision of tumours of so large a size.

When no attempt is made to save the genital organs the operation is of a simple nature. The peduncle of the tumour is to be divided near its attachment to the body by rapid strokes made with a large bistoury, or a scalpel-shaped amputating knife, including in one sweep the penis and 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 testes 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. Active assistants must be ready with their fingers to close the mouths of the bleed-

ing 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. Stimulants and the transfusing instruments should be at hand in case of need. It appears that patients who recover from the first effects of the operation generally do well, and that the large wound which is made heals readily.

CHAPTER IX.

HYPERTROPHY OF THE SCROTUM.

THE scrotum is liable to a hypertrophied affection of the same nature as the knotty and lobulated growth of the skin occasionally observed on the nose. In this affection the integuments appear as if composed of lobes divided by fissures. In the museum of St. Bartholomew's Hospital there is a preparation of this kind. It belonged to Mr. Abernethy; but no history is attached to it. The hypertrophied scrotum appears to have been removed during life; and I am informed by Mr. Paget that the sebaceous and hair follicles are remarkably developed in it. This disease is liable to be confounded with elephantiasis, but differs from it in the circumstance that the morbid en-

largement is entirely confined to the skin, the subcutaneous cellular tissue being unaffected. When the disease increases so as to cause inconvenience, it may be excised without difficulty or danger. I witnessed an operation in a case of this kind, which was performed by M. Velpeau at La Charité in Paris. The patient was a young man, whose scrotum was hypertrophied to about four times its natural size. He afterwards did well.

CHAPTER X.

CANCER SCROTI.

CANCER scroti, or as it is commonly called *chimney-sweeper's cancer*, is a disease of the skin of a carcinomatous nature, which attacks the scrotum of persons who have been exposed to the contact of soot. It is originally 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, possessing the ordinary characters of a carcinomatous ulcer on the skin; thick, indurated, and everted edges, and an irregular excavated base, the surface of which discharges a thin sanious fluid. 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 testis. This organ, in time, also becomes involved in the disease, and forms the seat of a deep excavated sore. The glands in the groin often enlarge at an early period from irritation; but at length these as well as the lumbar glands become indurated and diseased. The inguinal glands sometimes suppurate, and form intractable 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 glands remain unaffected; but ulceration con-



- O. 1. Small soot-warts.
 2. Cancerous ulcer succeeding the wart.—From a preparation in the London Hospital Museum.

tinues to proceed slowly in the direction of the cord, and in time extends to the groin and abdomen, its progress being attended throughout with severe darting pains. The patient's sufferings are protracted for many months, and sometimes for years; a frightful sore is produced; 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 developement. It was removed by Mr. Headington from an old man about sixty-four years of age, who afterwards left the hospital cured. Both testes 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. Mr. Bagg has made an excellent representation of it in the annexed engraving. The warty processes closely resemble the elevated

growths abundantly developed about the cancerous ulcer, produced by soot on the back of the hand and wrist, preserved in the museum at St. Bartholomew's Hospital. The case will be described presently. 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, and when very long is occasionally twisted like the horn of a ram. Some curious excrescences of this kind are represented in the clever etchings of Mr. Wadd.* The figure on the next page, taken from one of them, exhibits the process of its exact size. Upon dissecting a scrotum affected with chimney-sweeper's cancer, the part is found to present very much the same appearances as carcinoma of the lip. The tissue at the base of the ulcer is dense,

* Cases of Diseased Prepuce and Scrotum, Pl. x. xi. xii.

indurated, and distinctly laminated; but it is not always easy to make out clearly any trace of heterogeneous deposit. The morbid structure possesses very little vascularity. On recently examining some matter scraped from the base of a soot-wart shortly after its removal from the body, I distinctly perceived a number of caudate and spindle-shaped nucleated cells. Professor Walshe has likewise re-



cognised the microscopical characters of cancer, in a specimen of carcinoma scroti examined immediately after excision.* On examining some diseased glands in the groin, in a case of chimney-sweeper's cancer, I found them enlarged and indurated, and composed of a whitish brown or yellowish white substance, mixed up in some places with a soft curd-

* Cyclopædia of Practical Surgery, vol. i. p. 650.

like matter, or grayish pus, contained in thin white cysts.

Carcinoma scroti is, with few exceptions, confined to chimney-sweepers; and the action of the soot on the skin of the scrotum is no doubt its exciting cause. That such is the case seems to be pretty clear, from the following interesting case, recorded by Sir James Earle.—Allan Spragg, aged forty-nine, came into St. Bartholomew's Hospital on account of a large cancerous sore, which reached from the bend of the wrist to the knuckles, occupying almost the whole of the back of the left hand. He had been under the care of many persons, and various applications and internal remedies had been given. The circumference of the sore rose in large ulcerated tumours, and seemed inclined to spread. In some parts of the middle it appeared in a healing state, in other parts ulcerated; but he said different parts of it had often healed, and broke out again, as we afterwards found it inclined to do. The complaint having very much the appearance of the sooty-wart, or chimney-sweeper's cancer, particular inquiry was made into this person's life and occupation. He said he was a gardener; that about five years before he was employed in a garden at Low Layton in Essex; that in the spring of that year he was engaged about two hours every morning to strew soot on the ground round the young and tender plants, to preserve them from the slugs; that he carried the soot in an old garden-pot, which hung on the left hand by a handle over the top, while he strewed it with the right. About this time he conceived the wart commenced near the

knuckles, and continued not very troublesome all that year. The next spring he was again employed to distribute soot: the wart was then increased and ulcerated, and continued growing worse all that year. The spring following he again used soot in the same manner: the sore then spread, and grew larger, which made work of any kind very difficult to him. For the last two years he had not used soot, but the sore continued to spread rapidly: however he kept on working till he was incapable of using the hand. Various means were used, both internally and externally, to cure the disease, but without any material service; and at last he submitted to amputation, after which the excruciating pains which he had suffered soon left him, the wound healed kindly, and he got perfectly well.* From the appearance of the disease in this case on that part of the body where alone the soot was able to lodge, and its occurrence on the scrotum only in persons exposed to its contact, it is reasonable to conclude that this substance is the exciting cause of the disease.†

This form of cancer, though occasionally developed on the face, prepuce, glans penis, and other parts of the body of chimney-sweepers, occurs so much more frequently on the scrotum than elsewhere, that the term "*chimney-sweeper's cancer*" is generally understood to imply a cancerous disease of the scrotum. The marked preference for this

* *Chirurgical Works of Percival Pott*, by Sir James Earle, vol. iii. p. 182.

† According to Dr. Ure, soot contains some sulphate and carbonate of ammonia, along with bituminous matter; but it has not, that I am aware of, been very minutely analysed.

part, in cases in which the skin of nearly the whole body is more or less exposed to the same source of irritation, is a circumstance worthy of notice. It is attributed to the scrotum being better adapted to harbour the soot than the integuments of any other region, the skin being loose and rugous, its sebaceous follicles large and numerous, and the part being usually moist and seldom cleansed. It would appear as if a lengthened contact of the soot was essential to excite the disease. In the case of the gardener just related, it was remarked that the right hand, which strewed the soot, was unaffected ; but the left, being two hours daily exposed to the vapours or dust arising from the soot as it was continually stirred up, a lodgment of it was probably made on the thin skin at the back of the hand. In the case of a very old man, whose face was wrinkled from age and therefore liable to retain the soot, mentioned by Sir A. Cooper, the sore was seated in the centre of the cheek.*

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 developement, and attribute a minor influence to the soot ; which, it would seem, does not generate the disease, but by its long-con-

* Lib. cit. p. 227.

tinued irritative action becomes the exciting cause of its production. Other irritating substances may excite a similar disease. Dr. Paris states that the smelters are occasionally affected with a cancerous disease in the scrotum, similar to that which affects chimney-sweepers.* 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.†

The predisposition to cancer scroti appears in some instances to be hereditary. The late Mr. Earle extirpated the testis and diseased integuments from a sweep aged 35, a patient in St. Bartholomew's Hospital, whose grandfather, father, and one brother had all perished from the effects of the disease.‡ A father and son were once in St. George's Hospital at the same time on account of it.§ 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.||

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, and this accords with the experience of Mr. Earle.¶ Those exposed, however, to the action

* Pharmacologia, vol. ii. p. 89.

† Surgical Observations on Tumours, p. 328. ‡ Lib. cit. p. 304.

§ Mr. Hawkins' Lectures on Tumours, London Medical Gazette, vol. xxi. p. 842.

|| Dublin Journal of Medical Science, vol. xxi. p. 137.

¶ Lib. cit. p. 299.

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 an undoubted case of the disease as early as at eight years of age. It is liable also to attack the scrotum of sweeps far advanced in life. The age at which cancer scroti usually first appears is a point of some interest. 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 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. 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 commenced on the scrotum about three years before. The

diseased part of the scrotum was excised, but the man left the hospital before the wound was completely cicatrized. In a few months ulceration commenced in both groins, and eight months after the operation he was re-admitted into the hospital with extensive ulcers in the inguinal regions, and in very impaired health, with a sallow complexion and much emaciated. About a fortnight after his admission, a considerable hæmorrhage took place from the left groin, from the profunda artery (as was ascertained by dissection after death). Bleeding recurred at intervals, and in a week he died. In this case, therefore, the injurious influence of soot must have been exerted nineteen years before the appearance of disease, during which long period he was entirely removed from the effects of what is supposed to have been its exciting cause. It has sometimes happened, after the morbid parts have been completely extirpated, and the wound having healed the patient has 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 then, and similar facts, unfortunately lead to the conclusion that abandonment of his occupation, though it may render the adult chimney-sweeper less liable to cancer, 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 for forty years, and had undergone three operations for its removal, yet even then the glands in the groin were unaffected.* In a case also of a chimney-sweeper who had been repeatedly attacked with this disease during more than twenty years, and had submitted to no less than five operations for its removal, which I have related at page 561, it was only recently that the glands in one groin became affected. The inguinal glands are frequently enlarged from irritation, but the swelling generally subsides after removal of the morbid parts. It must not be supposed, however, that these glands constantly escape carcinomatous invasion. I have myself witnessed three instances, in which they were enlarged and indurated, and afterwards suppurated and became the seat of a true cancerous ulcer; and similar cases have occurred in the practice of other surgeons.

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‡ and other French writers inform us that it does not occur in France. Pit-coal, from which soot is produced, is very sparingly employed as fuel abroad; whilst in this country its almost universal use by all classes, and the inhuman custom of employing climbing-boys to cleanse our chimneys, only very recently abolished, are sufficient to account for the occasional occurrence of this pe-

* Mr. Hawkins' Lectures on Tumours, lib. cit.

† Loc. cit. ‡ Nosographie Chirurgicale, tom. iv. p. 300.

culiar disease. But chimney-sweeper's cancer is by no means a common affection even in Great Britain. Mr. Russell states that it is rare at the Royal Infirmary in Edinburgh, and that he has seen but few cases of it.* Mr. Syme makes a similar statement. Within my own recollection the complaint has become much less common than formerly in the large Hospitals of London, which I believe to be owing to the general use of machinery in the cleansing of chimneys during the last few years. The legislative enactment to prevent the employment of climbing-boys for this purpose, which has lately come into operation, we may fairly expect will in the course of a few years, render the disease even far more rare than it is now. It will not have the effect, as some have hoped, of completely removing this description of cancer from the list of human maladies; for master-sweeps, unless very cleanly in their habits, will still be liable to it; but as a cause of mortality its influence will be very materially reduced.

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 which sometimes form on the scrotum; but the history of the case, and more especially the occupation of the patient, would always excite suspicion,

* Observations on the Testicle, p. 98.

and in most instances be sufficient to indicate the true nature of the disease.

Treatment.—Cancer scroti 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 escharotic applications, but nothing hitherto tried has proved of any avail in arresting its destructive progress. There is, indeed, no 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. If the base of the ulcer be adherent to the tunica vaginalis, so that the morbid parts cannot well be removed without excising a portion of that membrane, the surgeon, instead of attempting to save the testis, should at once perform castration. The disease indeed has not much tendency to spread to the testes, and it often makes extensive ravages in the parts around without reaching them; but in a complaint of so fatal a nature, it is better to err on the safe side by removing more than is absolutely required, than incur any risk of a return of the disease. When the testis even is ulcerated, it is now admitted, contrary to the opinion entertained by Mr. Pott, that an operation may be undertaken with a fair prospect of a successful result.

The inguinal glands are so seldom contaminated, till a late period of the disease, and the swelling to which they are liable in this affection is so rarely of a specific character, that, as a practical rule, simple enlargement of them does not constitute an obstacle to the excision of the diseased scrotum. If they should be much indurated as well as enlarged, and the seat of lancinating pains, there would be sufficient reason to apprehend that the disease had extended to them; but unless decidedly carcinomatous, I should be inclined to afford the patient the chance of relief from so terrible a malady as cancer by an operation which in itself is neither severe nor hazardous. A case has been published* in which, after excision of the diseased part of the scrotum, several indurated glands in the groin which were the seat of lancinating pains were carefully dissected out by the eminent surgeon who operated. I do not know what was the ultimate result of this case, but I should scarcely anticipate success from such a proceeding. If the glands were merely enlarged from irritation, their extirpation would of course be unnecessary; but when affected with carcinomatous deposit, I should fear that the disease had become too deeply rooted to admit of being wholly and successfully removed by operation.

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,

* *Lancet*, 1840-1, p. 793.

what is remarkable, it does not in general return in or near the cicatrix of the wound, as ordinarily occurs after operations for cancer in other situations, but is often developed in a different part of the scrotum. Now I believe that in these cases the reappearance of the disease is not in general the result of previous contamination, or of imperfect removal of the morbid tissues, but that the cancer is generated altogether anew. The effect of the operation would seem to be the eradication of all existing disease, but unfortunately not to destroy the inherent susceptibility to its developement 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, exactly apply to these cases the principles which regulate his conduct in treating cancer in other parts, in which a repetition of the operation is generally inadmissible, and rarely successful. On the contrary, if cancer appear after extirpation in a fresh part of the scrotum, it must be met as if it were a new disease, and 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 have heard, indeed, of two interesting examples in which life had evidently been prolonged by a second and third operation; and of another instance in which after the performance of a second operation the patient lived for years, and ultimately died of another disease. The following case, which has recently come

under my notice, likewise illustrates the above views of this disease.—William More, aged fifty-one, a man of stunted growth, who had been a chimney-sweeper since the age of seven years and still followed the occupation, applied to me April 27, 1843, on account of a painful swelling in the groin. It appeared that he had been affected with chimney-sweeper's cancer for many years. As long ago as the year 1821, a portion of his scrotum affected with this disease had been excised at St. Bartholomew's Hospital; and he had since undergone two operations of the same kind in that hospital, in consequence of a return of the cancer. Another part of the scrotum was afterwards removed at Guy's Hospital; and in March last a portion of integument at the under part of the penis was excised by a surgeon in the city,—making in all five operations. The scrotum was much contracted, and marked by several cicatrices. The scar under the penis, which was still sore, was separated from the scrotum, by some sound skin. There was a tumour in the groin, which was soft in the centre and fluctuated, but had a very indurated base; and the man complained of experiencing pricking and shooting pains in it. This swelling in the groin, which was obviously of a carcinomatous character, had only appeared since Christmas last, though he had been subject to the disease in the scrotum for two and twenty years.

When the inguinal glands are ulcerated, or the cancerous disease has extended too far to admit of its 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. Henbane and the acetate or muriate of morphia may be given internally, and a lotion containing the chloride of lime and tincture of opium applied to the sore; or it may be covered with a poultice composed of an ounce of the dried leaves of conium, three ounces of bread, twelve ounces of water, and a small quantity of the chloride of lime.

CHAPTER XI.

MELANOSIS OF THE SCROTUM.

I HAVE not met with any account of melanosis occurring in the scrotum; but the following case appeared to be an instance of it.—A cabinet-maker in the Commercial Road, 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 resem-

bled 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 fibrous, and of a schirrous 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 morbid growth is preserved in the London Hospital museum. The wound healed favourably, and as yet there is no appearance of a return of the disease.

CHAPTER XII.

ADIPOSE TUMOURS OF THE SCROTUM.

COLLECTIONS 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.* I am indebted to Mr. Kiernan for a

* Cook's Morgagni, vol. ii. p. 435.

section of a large scrotal tumour entirely composed of adipose tissue in the lobulated form. As the cellular tissue of the scrotum naturally never contains fat, the latter, when present in any quantity, must be regarded as an adventitious formation. Such tumours, however, are of exceedingly rare occurrence.

CHAPTER XIII.

FIBROUS TUMOURS OF THE SCROTUM.

A SMALL fibrous tumour has in some few instances been developed in the cellular tissue of the scrotum. It may acquire the size of the testis, and, being firm and of an oval form, resemble a supernumerary gland. At page 75, I have described a tumour of this kind, which was removed from the scrotum by Professor Fergusson.

Dr. Mott, of the United States, excised an enormous diseased 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 open-

ings. 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.* I suspect this disease was originally a fibrous tumour similar to the small one which I have described as having been removed from the scrotum by operation. The calcareous matter and other changes resemble those occasionally observed in large fibrous tumours of the uterus.

* Philadelphia Journal, as quoted in the London Medical and Physical Journal, vol. lviii. p. 516.

A P P E N D I X.

AFTER Chapter IV., Section 3, which contains an account of encysted hydrocele of the testis, had passed through the press, I was informed by Mr. Liston that on recently examining some rather milky-looking fluid removed by operation in a case of this affection, he had discovered myriads of spermatozoa in it in a lively state, and he has favoured me with a view of some of them which were preserved. Mr. L. thinks that this interesting fact may indicate the mode of developement of encysted hydrocele ; and if further observation should prove that the cyst originates in a dilatation of one of the tubes of the epididymis, that the mucous character of the sac would explain the difficulty which exists in procuring their obliteration by injection. According, then, to this supposition, encysted hydrocele of the testis very much resembles, in its mode of developement, the swelling formed by a dilatation of the duct of the submaxillary gland termed *ranula* ; but as this view is opposed to that which I have been led to take of the origin of this affection, I

availed myself of an early opportunity of carefully examining, in several recent testes, the small serous cysts which are so commonly developed in the head of the epididymis ; and in which I concluded, after numerous dissections, that this form of hydrocele commonly originates. (See page 214.) I can now state that I have found no reason to question the accuracy of this explanation. In the testis with a single cyst at the head of the epididymis, removed from a man aged twenty-one, who died of fever, abundance of spermatozoa were observed in the contents of the epididymis, but none could be detected in the clear pellucid fluid of the cyst. The cyst was distinctly seen to be unconnected with the seminal ducts; and on examination in the microscope its internal surface exhibited the characters of a serous membrane. I am inclined, therefore, to believe that the occurrence of spermatozoa in Mr. Liston's case was accidental, owing probably to the rupture of the seminal canal, which permitted an escape of the spermatic fluid.

THE END.

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