

Further considerations on the anatomy of oblique inguinal hernia / by John H. Packard.

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ANNALS OF SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE

EDITED BY

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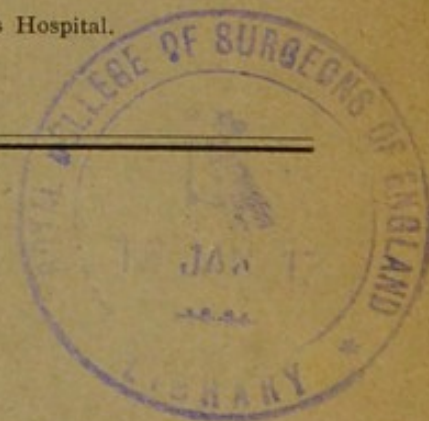
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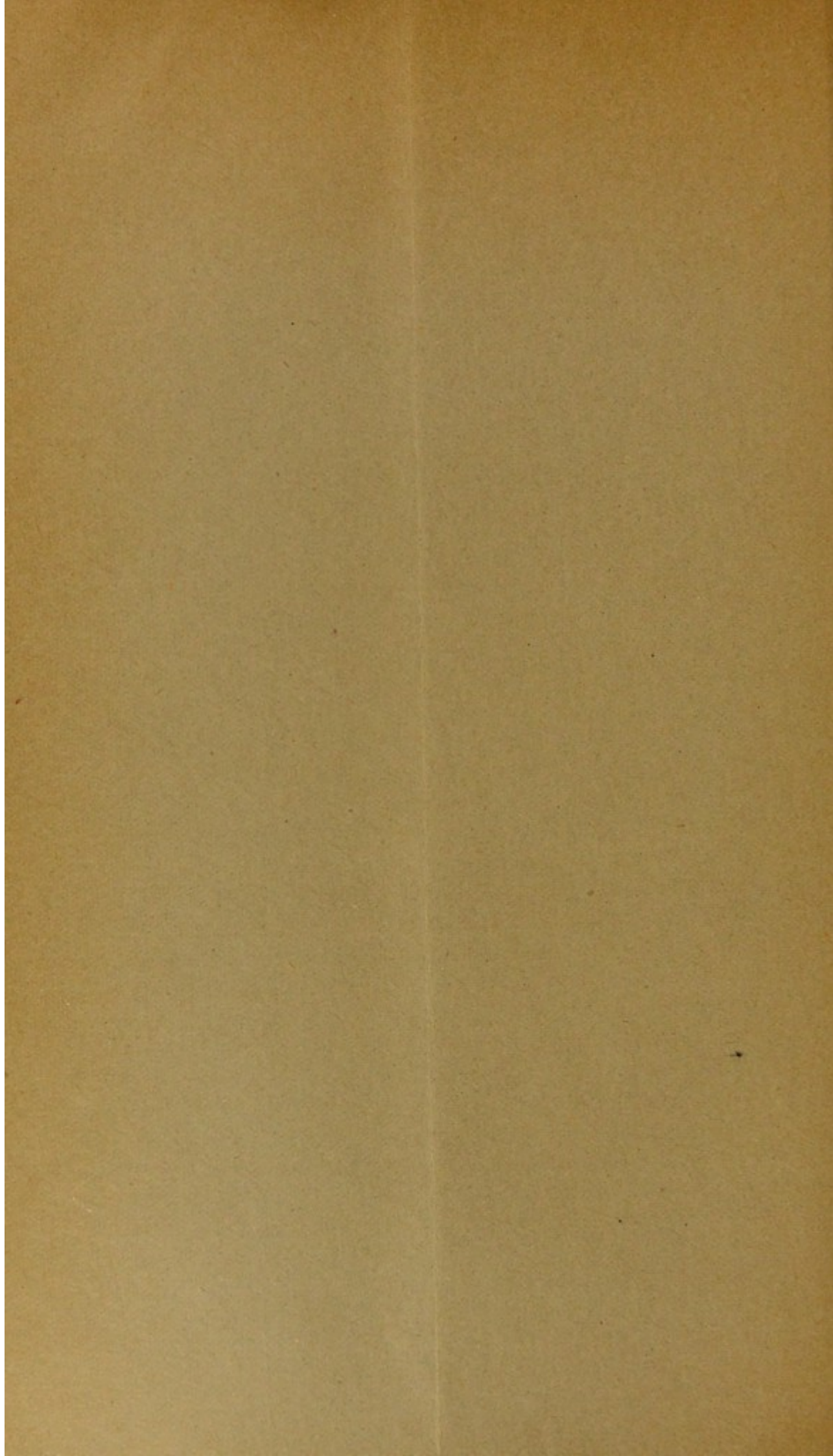
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FURTHER CONSIDERATIONS ON THE ANATOMY OF OBLIQUE INGUINAL HERNIA.

By JOHN H. PACKARD, M.D.,
OF PHILADELPHIA,

Surgeon to the Pennsylvania Hospital and to St. Joseph's Hospital.





With the Author's Compliments.

[Reprinted from the Transactions of the American Surgical Association, 1895.]

ON THE ANATOMY OF OBLIQUE INGUINAL HERNIA, WITH SPECIAL REFERENCE TO THE OPERATION FOR ITS RADICAL CURE, AND A DESCRIPTION OF A MODIFIED PROCEDURE FOR THIS PURPOSE.

BY JOHN H. PACKARD, M.D.,
SURGEON TO PENNSYLVANIA HOSPITAL AND TO ST. JOSEPH'S HOSPITAL,
PHILADELPHIA.

ACCORDING to the accepted teachings of standard authorities on anatomy and surgery, the hernial sac, in cases of the oblique or indirect inguinal variety, comes down from the abdominal cavity through the tube, derived from the transversalis fascia, which encloses the spermatic vessels and duct, and the lumen of which is the so-called inguinal canal. Among the coverings of this species of hernia is always mentioned the *infundibuliform fascia*, which is easily demonstrated as a close investment of the constituents of the cord.

On this view a soft knuckle of bowel pushes before it the parietal peritoneum, and forces its way into the narrow tube, alongside of the spermatic duct and vessels, stretching the tube open until it emerges at the external ring. One writer distinctly says that the hernia "forces the internal ring." And in a work of wide reputation the canal is figured as partly so distended, the dilated and undilated portions being readily distinguishable.

It seems to me that if this idea be correct every scrotal hernia would be of the variety known as *infantile*, having only sac and tunica vaginalis between the bowel and the testis. Moreover, it would seem that the occurrence, rare as it is, of properitoneal

or interstitial hernia, is inexplicable, unless it be admitted at least that there are exceptions to this rule; that the bowel may descend with its sac entirely clear of the so-called inguinal canal, and be not in its course along with the constituents of the cord by the envelope which surrounds them.

Again, we often find the sac easily isolated, so that it can be readily lifted up clear of the cord, leaving the spermatic vessels and duct lying surrounded by the intact infundibuliform fascia. This, I presume, is a matter of common observation with others, as it has been with me.

A few words now as to the anatomy of the inguinal region, and especially of the so-called canal, of which several anatomical writers admit that it is such only in name. Having become interested in this matter, I have made within the last month dissections of this part of the body in over twenty adult subjects, three of which were injected, the rest fresh. Opportunity has not offered for me to make any investigation of the condition in early life, and only once in a case of hernia.

I have not found in any instance any dimpling or pouching of the peritoneum, or anything in the nature of an adhesion of it at or near the inguinal ring; in other words, any such arrangement as would seem to predispose to an extrusion of the bowel at that point more than elsewhere. Nor has there been any such pouching of the transversalis fascia; in making the dissection from within I found the internal ring almost always by following up the spermatic duct from within the pelvis. Sometimes I found at this point a crescentic fold or thickening of the fascia at the inner or median side of the ring; sometimes there was besides this another fold at the outer side, but more generally there was no such arrangement. I was never able to push my finger along the course of the cord, within the infundibuliform fascia, without rupturing this latter; but I did not often make the attempt, and perhaps might have used more care when I did.

The length of the canal, measured from the entrance of the spermatic duct to the point of divergence of the columns of the external ring, was never over an inch. In one large and well-

developed adult male it was only half an inch. Circumstances prevented my making memoranda in all the cases.

Some weeks since, in talking of this matter with Prof. Brinton, he asked me to examine the subject he was using at the time in his lectures upon hernia. On complete dissection we found the mouth of the hernial sac a full inch above the point where the constituents of the cord entered the canal.

Cloquet, Scarpa, Bourgery, and Cooper give representations of hernial sacs, drawn from dissections, in which so far as appears there is no trace of connection with the cord. (Cloquet, *Recherches Anatomiques sur les Hernies de l'Abdomen*, Plate I., Figs. 4 and 5; plate V., Figs. 1, 4, 5, and 7; plate VI., Figs. 6 and 7. Scarpa, *Atlas*, Plate VI., Figs. 1 and 4, and Plate VII. Cooper, *Anatomy and Surgical Treatment of Abdominal Hernia*, Am. ed., Plate V, Fig. 7.)

In view of the facts now presented, I venture to question the correctness of the prevailing conception of the course of oblique inguinal hernia, namely, that the bowel, enclosed in the sac, follows exactly in the track of the testicle, entering the canal at the internal ring, passing through it, and emerging at the external ring. Of course, it will be understood that this remark has reference only to hernias which are acquired after the complete closure of the peritoneal process, and not to the congenital variety. The anatomical conditions by which the descent of the testis is determined are well-known. But in the case of the bowel the immediate cause is pressure from above, driving it in the direction of least resistance.

My conviction is *that the hernial sac does not usually occupy the inguinal canal at all, but that in a large proportion of cases, at least, an oblique inguinal hernia is really ventral*, only making its way out at the external ring, and therefore *seeming* to have passed through the canal.

When the abdominal wall is rendered tense in any muscular effort, and the contents are compressed, it will easily be seen that at the lower part on either side, just above the groin, there will usually be less firm resistance than elsewhere. Peritoneum and transversalis fascia may yield; but the transversalis and

internal oblique muscles, backed by the tendon of the external oblique, will oppose too firm a barrier, except at their lower edge, along which the bowel may be crowded behind the last-named tendon, until at the external ring the lax intercolumnar fascia allows it to come forward and form a tumor perceptible externally. As it must always be that the beginning of this outward passage of the bowel and sac is low down, and not far from the point where the cord enters the canal, the hernial sac and the cord must lie very nearly if not exactly parallel to one another.

Perhaps it may seem a presumptuous thing to question views which have so long been universally accepted; but my earnest hope is that the statements I have now made may be tested, as they can readily be by anyone having opportunities for dissection. If they are well founded, as I believe them to be, they may have some bearing on the question of the radical operation for hernia.

If the hernial sac and the cord are quite separate, or if in contact are independent of each other, why is it necessary to interfere with the cord? If we can effectually obliterate the sac and prevent the descent of the bowel without disturbing the cord or dissecting up the abdominal wall, it would seem a desirable thing to do, for it is a good rule in surgery to accomplish our objects with the least possible disturbance or sacrifice of healthy structures.

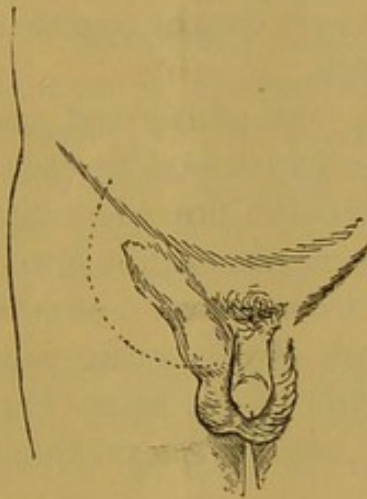
I beg to present to the Association a method of operating which I have myself employed in a number of cases, and which has withstood some severe tests; although I must admit that in no instance has sufficient time elapsed for me to speak of ultimate results.

This method consists in complete isolation of the sac, and its invagination so as to convert the whole of it into a solid mass, plugging its mouth, and anchoring it by a suture passing through the tendon of the external oblique muscle.

A curved incision is first made, describing a semicircular flap of ample size. (Fig. 1.) This flap being reflected up, the hernia is exposed, and the sac is completely isolated, which

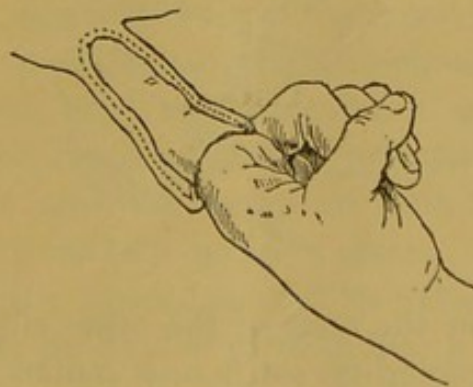
can often be done simply by tearing with the fingers. Two silk sutures are now passed through the empty sac, one on either side, at a point close to the external ring; a hæmostatic forceps is applied to the ends of each. The sac being thus

FIG. 1.



under control, its fundus or tip is inverted, and with the forefinger of the left hand is pushed up as far as it will go. (Fig. 2.) I believe that in so doing the tip of the finger, and, of course, the fundus of the sac, can generally be carried as far as

FIG. 2.



the mouth of the sac—the orifice by which the bowel emerged from the abdominal cavity. Now a slightly curved needle, with an eye near the point, and carrying a thoroughly sterilized silk thread, is passed up along the finger, to be pushed out at one

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FURTHER CONSIDERATIONS ON THE ANATOMY OF OBLIQUE INGUINAL HERNIA.¹

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ABOUT a year ago I presented before this Academy a paper describing a modified procedure for the radical cure of inguinal hernia. The operation consisted in the invagination of the emptied sac, crumpling it up into a plug, and securing this to the under surface of the external oblique tendon at the abdominal orifice, by means of a suture passing through the tendon and tied over it.

During the discussion of this paper, a doubt came into my mind as to the accuracy of the prevailing view of the anatomy of these lesions, or at least of the oblique form. It seemed to me very questionable whether the neck of the hernial sac corresponded with the internal abdominal ring, or bore any constant relation to it; and very unlikely that the sac was, as a rule, in cases of acquired hernia, within the sheath of the cord and enclosed by it. The history of the development of this doctrine is not without interest, belonging as it does entirely within the present century. Let it be remembered that until even within a very few years our acquaintance with hernia in the living subject was limited to what we learned by a very timid approach from below. When a strangulated hernia was operated on, the surgeon was only too glad to get the bowel back into the abdomen on almost any terms. It was a case in which the return of the property was sought, and no questions asked. No one thought of isolating a hernial sac in a living man. It has been taken for granted, and is still, that the explanation of Sir A. Cooper as to

¹ Read before the Philadelphia Academy of Surgery, January, 1896.

the formation of oblique inguinal hernia, handed down since 1804 as an integral part of the surgical creed from writer to writer, and from one generation of surgeons to another, is sound and sufficient.

For the most part the writers of the last century recognized the external ring only, tracing the hernial sac no farther upward.

Pott¹ speaks of the descent of the testis (to be more fully described by Hunter at a later period), and says, "Though the passage remains in general forever shut, yet the place where its orifice or mouth was may always be known by a kind of cicatricula; . . . at the place of which cicatricula, the peritoneum is generally weaker than elsewhere." He says, further, that "this weak part is necessarily opposite to the natural opening in the tendon of the external oblique muscle." To this error, which shows that he had no idea of any other than the direct form of inguinal hernia, attention was called by Lawrence.²

Sharp,³ in 1761, speaks of "the rings of the abdominal muscles," and of the hernia getting inside of the cremaster and of the investing fascia of the cord. But it does not appear that he had a clear conception of any but the direct form of inguinal hernia. He only refers to the epigastric artery as liable to be wounded in operations for strangulation.

Hey, of Leeds, whose excellent work⁴ may be read with respect and profit by the student of to-day, says nothing of the inguinal canal, and it is clear that he had no idea of any relation between the cord and the sac beyond the external ring.

It was in 1804, probably, soon after the appearance of Hey's book in England, that Sir Astley Cooper published his elaborate work on the anatomy of hernia, containing the announcement of his discovery of the transversalis fascia, with the fibrous sheath given off from it to invest the spermatic cord, and his view as to the engagement of an oblique inguinal hernia within that sheath.

These views were accepted by Lawrence, in the prize essay before referred to, and were elaborated by him in the numerous subsequent editions through which it passed.

¹ Treatise on Ruptures; Works, Vol. II, p. 21.

² Treatise on Hernia, Prize Essay, 1807.

³ A Critical Inquiry into the Present State of Surgery. Fourth Edition, 1761.

⁴ Practical Observations in Surgery, American Edition, Philadelphia, 1805.

Scarpa, who wrote in 1809, and whose work was translated by Wishart in 1814, seems to have known nothing of Cooper's researches. From a careful study of the translation, and of the plates in the original folio Atlas, I cannot make out that he had any idea analogous to that of the English surgeon. He describes the cord accurately enough; but for him the inguinal hernia always came down at the inner side of the epigastric artery, and he makes a singularly confused attempt to explain how this relation of the vessel and the sac sometimes becomes reversed.

An admirable thesis by Jules Cloquet appeared in 1817, embodying views based upon original observations, with reference very largely to the formation and shape of the hernial sac. With regard to the mode of descent of the bowel through the inguinal canal, this author agreed very fully with Cooper, whose ideas he obtained through their quotation by Lawrence.

Opinions put forth by men of such authority as Cooper in England and Cloquet in France, would naturally carry great weight, and one can hardly be surprised at their ready acceptance by subsequent writers on anatomy, surgery, and surgical anatomy.

Hence the teaching of all anatomical writers of this century has been that the knuckle of bowel, covered by peritoneum, forces its way through the internal ring into the infundibuliform fascia, distends that tube, and makes its way along with the constituents of the cord to and through the external ring.

Quotations to this effect might be made from Wilson, Quain, Gray, MacLise, Owen, Holden, Macalister, Malgaigne, Jarjavay, Tillaux, Hyrtl, and many others.

Gray gives a cut,¹ taken from a preparation in the Museum of the Royal College of Surgeons, representing the canal partly distended by a hernial protrusion.

Mr. W. H. A. Jacobson says,² "The inguinal region should be studied as to the posterior aspect of its so-called rings and canal, as these have to bear the early stress of a commencing hernia. It is against this aspect that a piece of omentum or intestine is constantly and insidiously pressing, and endeavoring to make its way out."

¹ Anatomy: Descriptive and Surgical, Thirteenth Edition, 1893, Fig. 624, p. 1069.

² Morris's Human Anatomy, p. 1139.

Yet this author had already said¹ that the inguinal canal "is not a canal in the usual sense, but a chink or flat-sided passage in the thickness of the abdominal wall."

Another author, Richet,² has likewise objected to the use of this term. He says, "The ilio-inguinal region is traversed at its lower part by the vas deferens in man, by the round ligament in woman; and to the oblique course which they follow in the thickness of the abdominal wall has been given the name *inguinal canal*. But is there an actual canal? I do not hesitate to say that there is not; the cord insinuates itself between the musculo-aponeurotic walls, just as vessels and nerves do in all other parts of the body. It is, then, to better explain the mode in which the spermatic vessels traverse the ilio-inguinal region, that this alleged canal has been described, with walls and two orifices, which only exist pathologically, and when the intestine has forced a veritable hernial canal. The student should therefore understand clearly that he will not find in the normal state anything resembling a canal with distinct walls; and for this reason I have employed the term *trajet* inguinal, which cannot be equivocal."

Let me now quote the views of three writers who have treated specially of the subject of hernia.

Teale³ says,³ "Those fibres of the transversalis muscle which encircle more or less completely the commencement of this infundibuliform process of the internal aponeurosis, or in other words, the spermatic sheath, form an aperture of an oval form, but not generally well-defined, which is the *internal abdominal ring*. . . .

"The spermatic sheath is wide at its commencement, but is soon reduced to a smaller size. . . .

"Oblique inguinal hernia is a protrusion of the abdominal viscera into the sheath of the spermatic vessels."

Mr. John Wood⁴ says, "The cause of inguinal hernia lies in the failure of the valvular action of the walls of the canal."

¹ Op. cit., p. 1137.

² Anatomie Médico-Chirurgicale, Tome II, p. 566.

³ A Practical Treatise on Abdominal Hernia, London, 1846, pp. 213, 215, and 235.

⁴ On Hernia, London, 1863, pp. 36.

Mr. Jonathan Macready,¹ in his admirable work of late date says, "An oblique hernia carries before it the peritoneum and subperitoneal fat. As it enters the canal it receives a covering from the infundibuliform process of the fascia transversalis, which invests the cord under the name of the infundibuliform or internal spermatic fascia. In passing through the canal the sac is further protected by the cremaster, which, together with the tissue connecting its muscular bundles, forms the cremasteric fascia."

Perhaps it may seem as if such an array of authority ought to settle the matter in favor of the ingenious and convenient theory of Cooper. But with all due respect to the writers referred to, and to the authors of works on general surgery who have taken the same view, I cannot think that the handing down of a theory, and its manifold repetition, must be looked upon as placing it beyond honest criticism. Alike in operations on the living and in dissections of the dead body, the idea that the sac of an oblique inguinal hernia is contained within the sheath of the cord has been dominant.

As I have already said, the doubt which had arisen in my own mind as to the correctness of this belief led me to make a number of dissections of the region concerned. A brief statement of the results of these inquiries will, I trust, lead others to examine into the matter for themselves.

A survey of the peritoneum from within—on the posterior aspect of the abdominal wall—shows it to be raised slightly in the median line by the obliterated urachus, and on either side of this by the obliterated hypogastric artery. Still farther from the median line is another fold, formed by the epigastric artery. Between these folds the peritoneum is sunk into rounded pits or fossæ, one of which, between the urachus and the hypogastric artery, is very shallow and small, and of no importance. The one to the outer side of this is deeper; it is where a direct inguinal hernia escapes. But the most important one is at the outer side of the epigastric artery. At the lower part of this fossa there may be found, by tracing up the spermatic duct, and in an injected subject the spermatic artery, the point at which the constituents of the cord join to pass outward into the so-called

¹ A Treatise on Rupture, Philadelphia, 1893, p. 125.

inguinal canal. This point, marking the so-called internal inguinal ring, is close to Poupart's ligament, and belongs to the transversalis fascia alone. All the elements of the cord, vessels, nerves, and duct are quite behind and outside of the peritoneum. Not a dimple nor depression marks the peritoneum, which is free throughout, and can be easily stripped up everywhere. This was the case in all subjects, of whatever age and of either sex. Sometimes there was in the transversalis fascia, either at one or both sides of the point of entrance, a small crescentic thickening, like a sort of guard to reinforce and protect the orifice through which the constituents of the cord passed.

Dissecting from in front so as to expose the sheath of the cord, the so-called deep spermatic or infundibuliform fascia, it is found to be a firm well-developed fibrous tube, closely investing the elements of the cord, and coming off at an angle more or less acute from the transversalis fascia.

In none of these dissections, then, did I find any condition which seemed to favor the approach of the intestine to the point of exit of the spermatic vessels and duct,—its attraction, so to speak, to that point. Nor was there any evidence of an aperture or even dilatability of the tube constituting the sheath of the cord. By Hunter and others it is distinctly stated that after the descent of the testicle the peritoneal pouch closes first at its upper part; if it were otherwise, congenital hernia would be met with even more frequently than it is.

Let me now offer some considerations as to certain points in reference to the formation of oblique inguinal hernia, and the conditions observable when it has descended.

When a portion of bowel or of omentum, or both, comes down so as to form a hernia, it is contained, as we all know, in a sac constituted of a pouch of peritoneum, pushed out from the lining membrane of the abdominal cavity, and covered also by a layer derived from the transversalis fascia. In some old and thickened sacs there may be separated by careful and dexterous dissection several layers of fibrous covering, which are, however, wholly artificial.

As we know, also, the bowels are very movable. A hernial protrusion may occur an infinite number of times, and be as often reduced. Have we any assurance whatever that the same por-

tion of intestine comes down every time? Is it not rather almost a certainty that the bowels change their relative position with the movement of their contents, and that sometimes one and sometimes another loop becomes engaged in the hernial sac?

Of course, this would not be so where adhesions have formed, or in old irreducible herniæ, unless the permanent contents of the latter should consist of omentum only, bowel being but occasionally and temporarily protruded.

When there is a descent of a portion of bowel beyond the normal limits of the peritoneal cavity, it must be due either to a pressure forcing it in any direction of least resistance, or to a special condition favoring its escape, such as an open canal. Or both of these conditions may be present,—an excessive pressure, and a weak spot in the wall.

Now, if the hernia did come down within the so-called inguinal canal, it ought to be found lying close to the elements of the cord, and within the same enveloping fascia. The sac of the hernia ought to be so enclosed. But if so, how can it be easily separated and lifted up, leaving the cord with its fibrous envelope intact? This I have many times done myself, and have many times seen it done by others.

And in some of the operations for the radical cure, as, for example, in Bassini's, we lift up the cord in its entirety, enclosed in the infundibuliform fascia. If the hernial sac came down within this fascia, its complete exposure would involve the division of the fascia, and the laying bare the constituents of the cord. It would be these, and not the whole cord with its envelope unopened, which would be transposed so as to insure the retention of the bowel within the abdominal cavity.

When a hernia becomes strangulated, it is very rarely by the neck of the sac itself. Possibly this may occur in a case of long standing, with inflammatory thickening about the neck, but it cannot happen often.

In general, when the hernial sac is dissected free from the surrounding tissues, it is curious to note how slack its neck is, and how easily it is stretched open. Macready¹ quotes from Berger the statement that from the examination of a considerable

¹ A Treatise on Ruptures, Philadelphia, 1893, p. 312.

number of herniæ he found that "the most rigid necks, and those apparently least capable of dilatation, became much wider and more extensible when they were separated from their connections with the fibrous rings through which they passed;" and that "the neck in itself, isolated from all its relations, is very rarely capable of forming the veritable stricture."

The constriction would seem to be from outside pressure, the fibres of the internal oblique and transversalis muscles compressing the neck of the sac against the resistance of Poupart's ligament below.

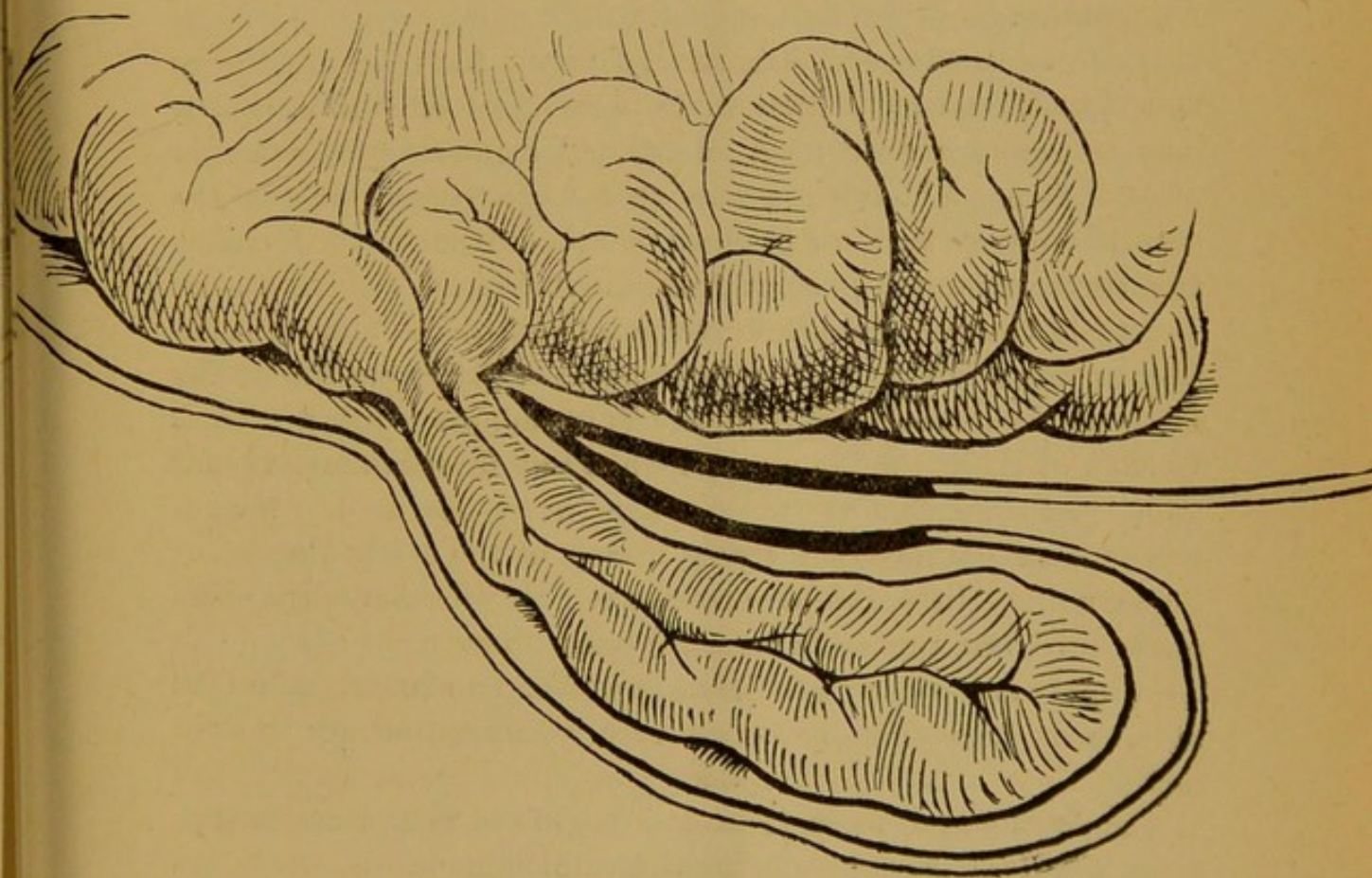
Another cause of strangulation, merely hinted at by one or two writers, seems to me to be worthy of serious attention. The sac, when fully formed, is pressed upon by the tissues in front of it, so as to bring it at a somewhat acute angle with the parietal layer of peritoneum, and so as to cause its neck, on the side towards the median line of the body, to form a doubled fold of serous membrane. When the sac becomes filled, and the tension begins which constitutes strangulation, the pressure of the mass of intestines within the belly must come against this fold, which would then act as a valve. Thus the greater the straining efforts the more tightly this valve would be closed. In the accompanying diagram, the heavy black line represents the valvular doubling of the serous membrane. The doubled edge need, of course, have a more or less crescentic shape.

Distention of the sac itself, whether by congestion of the walls of the bowel, by accumulation of fæcal contents, or by effusion of liquid, can and does take place much more readily than at the neck, which is more or less closely surrounded and constricted by the neighboring tissues. Such distention occurs not merely below the external ring, but in the part of the sac which, according to the accepted theory, is within the infundibuliform fascia. Would not the pressure of this tube of fascia narrow that portion of the hernial protrusion, and cause it to take the form of a sort of stem towards the freer part outside of the external ring?

Another important consideration, to my mind, is that if the hernia lay within the infundibuliform fascia along with the constituents of the cord, upon the occurrence of strangulation the vessels of the cord, and especially the veins, would also be com-

pressed, and would be found engorged and swollen. But this I have never seen, and I do not know that it is mentioned as a feature of any of the recorded cases.

Let it be remembered that the constituents of the cord lie wholly outside of the peritoneum, and that the internal ring, where they enter the so-called canal, is also outside of that membrane, in the transversalis fascia, and close to Poupart's ligament. The bowel, on the other hand, although it is also, in strict fact, outside of the peritoneum, is practically enveloped by it, and to



become herniated must either rupture the parietal layer or pouch it out before it.

Some significance may attach to the fact that hernia does sometimes occur at other portions of the abdominal wall, as showing that the presence of a condition like that afforded by the so-called inguinal canal is not essential to it. The numerous instances on record, notably one by Cooper, in which there were six protrusions, might be cited; but every surgeon has seen cases of the kind.

The occurrence of properitoneal or interstitial hernia is rendered even more difficult of explanation if the sac is regarded as enclosed within the sheath of the cord. It is true that in many such instances the testicle is undescended, and very probably the formation of the cord is defective. But in many the testis has reached the scrotum; and it seems to me likely that in every such case the sac would be found to be quite separate from the cord, entering the wall at a point near it, but not along with it in its fibrous investment.

My attention has been called by Mr. Macready, from whose valuable work I have already quoted, to the fact that some years ago views somewhat similar to those which I have ventured to present were advanced by A. Broca. But a careful examination of Broca's paper¹ has shown me that his argument was merely that the direct form of inguinal hernia was of more frequent occurrence than it is generally supposed to be.

Only two opportunities have occurred to me, since I have been engaged in the study of this matter, of dissecting the bodies of persons who had been the subjects of oblique inguinal hernia. In each of these the sac was pouched out from the peritoneum above and somewhat to the inner side (nearer the median line) of the point of entrance of the constituents of the cord into the inguinal canal. In neither was there any firm adhesion to the spermatic cord, but the sac was easily lifted up by itself, leaving the cord undisturbed and its sheath intact. The two tubes, the infundibuliform fascia and the sac, were parallel, but not closely united.

Being dissected out, each sac was found to present a wide mouth, soft, distensible, and free from thickening.

To recapitulate: I venture to doubt the correctness of the idea that in oblique inguinal hernia (acquired after the closure of the processus vaginalis of the peritoneum) the sac is, as a rule, contained within the infundibuliform fascia, on the following grounds:

The anatomical conditions obtaining in the normal state of the parts in the inguinal region.

The improbability of a soft, rounded, smooth knuckle of

¹ Bulletin de la Société Anatomique de Paris, 1888.

bowel being able to force its way into a narrow orifice like that at the inner end of the inguinal canal.

The fact that the hernial sac can so generally be stripped up away from the cord, leaving the latter with its sheath intact.

The occurrence of hernia at other portions of the abdominal wall; and,

The occasional occurrence of interstitial hernia.

I do not lay stress upon my two dissections of herniated subjects, but hope to add to them, and should be glad if those who have greater opportunities would investigate the question.

My belief is that in oblique inguinal hernia the sac takes its origin in the outer fossa (at the outer side of the epigastric artery) near the internal ring, but above it; that it follows the direction of least resistance, going downward and inward, approaching the cord and becoming parallel with it, in fact, usually coming in contact with its sheath and accompanying it through the external ring. If this is so, then the neck of the sac does not correspond with the internal ring, and the relations between the sac and the cord are far less intimate than they would be according to the generally accepted view.

