Title: Notes on the Anatomy of the groin with reference to the position and relations of regional nerves.

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It may appear that little can be said that is new, on the anatomy of a region of the body so well known to anatomists, and so constantly dealt with by Surgeons as the Groin. In the following pages however I hope to bring forward much which is not wholly new, is of interest as being at variance with commonly accepted descriptions of the Inguinal Region, and also to produce facts to which I believe attention has not been previously directed.

The practical work of which this Thesis is the expression was carried on in the Anatomical Institute at Leipzig under the guidance of Professor Brunn, and I would at once express my appreciation of his kindness and valued...
valued advice, and thank him and Professor Sts, Director of the Anatomical Institute, for the courtesy with which they placed at their disposal the material at their command.

My object has been to render clear and intelligible certain points in the anatomy of the groin, with regard to which as it appeared to me, the usually accepted descriptions were at variance with the condition found on dissection — At the same time I sought for the true explanation of the fact, that herniae commonly occur at certain well defined and recognized points in the wall of the abdomen, and from this one led to investigate other factors in the etiology of herniae occurring in the groin.

It is not so much my purpose now to give a topographic description of the groin, as to
allude to the various structures in so far as they are related to the production and progress of hernia, more especially dwelling on the description of those the importance of which appears hitherto to have been somewhat overlooked.

With a view to obtaining by comparison and criticism a nearer approach to the truth of the matter, an abstract of the views of various surgeons and anatomists will be added to the notes made from actual dissection.

It may be well at the outset briefly to describe the mode of dissection which was adopted; in doing so it is needful to explain that, as shall appear from the following remarks, I have been led to regard the Transversalis muscle as a structure of the highest moment both in relation to the anatomy and etiology of hernia; the
dissection was therefore so performed as accurately to determine what
structures constituted part of that
pelvis and what did not.

The surface anatomy was
first observed, and special note
made if any lesion were present
or any obvious tendency to their
occurrence.

The abdominal wall was
then divided transversely at a
level slightly above that of the
anterior perineum. Other organs,
and the abdominal contents were
removed.

The lower portion of the
wall was then paired so as to
obtain a view of the hypogastric
and inguinal regions, the folds
and pouches of the peritoneum being
carefully observed, and the latter
were measured for reasons after
words to be stated.

(Note: If necessary in order to gain
free access, longitudinal sections were made.

from
from the subcutaneous of the transverse ab.
thoracic division, to the diaphragm - so that the anterior abdominal wall might be fully
turned down.)

The peritoneum having been
studied was stripped off; the fat
beneath pulmonary was removed and
the fascia transversalis then brought
under notice. This fascia was then
divided along a line running
transversely inward from the anterior
superior iliac spine to the middle
line, and was reflected upward and
downward along that line.

The Transversalis muscula-
was first cleaned and examined;
the Douglas fold was defined and
followed to its extremities by means
of a blunt instrument; the internal
ring was defined, and the posterior
aspect of the Transversalis and
Rectus muscles was carefully studied.

From this point the dissection
was performed from the superficial
portion of the wall.
A flap of skin was reflected from the groin, and the fascia superficialis similarly treated. The external oblique tendon was then cleaned, and the external abdominal ring, its pillars, and the fossa ovalis with the parts around them were defined. The direction was performed to cut the plexus as to the decision of the opposite muscles.

The external oblique aponeurosis was then divided immediately above the level of the external ring, and the lower portion thrown down. The internal oblique was then cleaned and its relations to the external oblique noted, after which the cremaster was divided at its origin. The internal oblique reflected as was the external.

In doing this very special attention was paid to the relations and connections between the internal oblique and the transversus.
The latter muscle was then fully examined from the foot, and discriminated from the Ischiocavernous. (Both Ischiocavernous muscles were wholly removed in section, Plate IV) and its study thus rendered complete.

This dissection was performed with the greatest care in some twelve cases, and its main points were substantiated in almost all the cases examined. These were in number thirty-four; with one exception, the subjects were male; hermaphrodite in five cases.

From so few specimens one can obviously form no general conclusion with justice, but the facts of each dissection are in themselves of sufficient interest.

The statistics of the Varieties of Hermaphroditism may be found in such works as those of Cloquet (Physiologie Pathologique) and Zamenoff (in Mexico).
In the following pages on
the anatomy of the groin I have
followed very much the course of
the direction save that the oblique
muscles are not considered until
the study of the Transversus is
complete.

At the end of the volume is
a bibliographical index, to the works
in which individual references are
given throughout the thesis, the title
of the book not being repeated in every
instance. In order to discover if
the index may be consulted,
individual references to the
Plates have not been given, but in
several references, in connection with
each subject. To each plate how-
ever is appended a description where
all the points are noted.
Part I
The Anatomy of the Groin.

The structure which first demands notice in dissecting this region from within the abdomen is the peritoneum, which in this part of its extent has received very special attention, because of certain well-marked folds into which it is thrown by the presence of subjacent structures, viz.: the Vessels, the Arteria Umbilica and Hypogastrica Obliterata, and the Arteria Epigastrica.

Between these folds lie three, on either side two; one is between the Vessels and the Obliques Hypogastrica, the second is between this latter and the Epigastric Artery.

External to the Epigastric is a third depression on either side, while a fourth is found to the inner side of the lower extremity of the Epigastric.
Epigastriac fold; this is the oesophageal pouch, the others being the three
pyloric.

Whilst that may be so.

Judged as expressly generally the
descriptions given of the part, yet
we find varieties of opinion
amongst anatomists as to the
nomenclature and significance of
these pouches.

By certain anatomists the
pyloric pouches are regarded as being
three in number i.e. external, middle
and internal as stated above (Luschka,
Richter, Vilsean &c); others describe
only two pouches divided by the
hypogastric fold (Cloquet, Scapa);
while a third description is that the
epigastriac artery constitutes the
boundary between the external and
internal pyloric pouches (Hgill, Synter).

Whereas like Cloquet divides two
pouches, but divides the internal of
three into two "intestinal pouches" or pouches
between which lies the epigastriac.
In our present study, however, such differences of denomination are of little importance; it is the sig-
ificance of those pouches in the occurrence of hemia that concerns us. When we come to study the
application of these "hotes" to the physical anatomy of hemia, this
question as to the significance of
those pouches must be fully advert
into. At present we shall merely
note that hemias are described
as occurring in all of these forms
the pelvis of which forms their
immediate investment, or sarc.

We shall presently see
what the structures are which lie
in relation to each of these forms
anteriorly, a relation of the utmost
moment to our present inquiry.

In studying the pelvis
the question arises, whether by its
disposition in this region the hemia
itself may determine the point of
exit of a hernia.
It might appear that the broad-er and the deeper the fornice, the more likely are they to be the rest of demm-

Noting in the first place that these variations in the fornice are brought about by the position and condition of subjacent neural structures already referred to, one must observe further that measurements made in a series of twenty cases showed that such a proportion cannot be laid down. In only four of these cases was the so-called middle forme broader than the internal, and yet we shall see hereafter it is in the formen that hernaie more usualy occur. In twelve cases the internal forme was the greater, and yet hernaie are rare - in four cases the forman even of equal evide-

Note. This measurement was made at a point 1 centimetre above the pubic crest - that point being fixed upon merely that one might have
have a reliable relative measure.

Next to the force (utricular
and middle) the one of which
mission, the other decreases
in width as one approaches the Pubis.

To detail the measurements is
needless, but the following facts
with regard to them may be noted.

In all cases the pelvic breadth
was measured between the Anterior
superior iliac spines, and also
the pelvic conjugate, in order to
obtain an index of the size of
the individual.

In a skeleton with a conjugate
of 8.6 cent. and a pelvic breadth
of 20.7 cent., the internal conjugate
breech measured 1.1 cent. and the
middle breech 3.4 cent.; this being
the smallest internal and the broader
middle force which was measured.

In a cadaver with a conjugate
of 9.1, the relations of the force was
recorded, the internal measuring 1.9 cent.
and the middle 1.4 cent.
It was found also that in bodies with a pelvis conjugate of 11.2 or 10.3 cm, the bilateral penises were even narrower than those mentioned. There is, therefore, no reliable relation to be established between the size of the pelvis and the size of the penises.

The bearing of these remarks on the etiology of hermaphroditism will come to be considered in the second part of this paper.

It must likewise be noted with regard to the width of the middle and internal penises, that the obliterated hypogastric artery, whose portion determines the width is movable, and thus important variations in the relations of the two forms must occur (extend into on p. 94).

The bilateral penile pouch cannot well be measured — until the peritoneum has been removed when the distance from the bilateral vaginal ring to the hypogastric artery is formed to
to vary from 1 to 5 cent.

The depth like the breadth of the peritoneal pouches varies much,
and is likewise dependent on the state of sub-peritoneal structures.

The obliterated hypogastric artery passes from the pelvis to the
umbilicus without having any intermediate point of attachment,
so that where it is contracted and phrenic the peritoneum is raised
into a prominent fold and the pouches on either side are cor-
respondingly deepened, whereas where the artery is all its curve
lies in contact with the wall, the peritoneal fold is but slightly marked.

The same holds true, though to a less extent of the Epigastric Artery.

Before passing from this brief consideration of the peritoneum,
mention may be made of a condition first written, not without
importance in relation to the arteries.
of himia, and that is the occasional presence of abnormal peritoneal ridges and pouches.

Such a condition I have had an opportunity of examining (cf. Plate XI); the so-called middle inguinal pouch was divided by a tense subperitoneal band passing down to the pelvic brim where the obliterated hypogastric crosses it, and presumably losing itself on the abdominal wall.

When the peritoneum was stripped off it was found that this peritoneal band was attached to the inner margin of the femoral canal and to the pubic brim on the one hand and on the other, to the peritoneum, resembling somewhat the vestiges of the Phrenicus Vaginalis peritonei, which were also present.

Such a band would doubtless have had some important influence in determining the point of exit of a hernia had one existed.
Subject to the peritoneum lies a fatty layer which, behind the pubis and its neighbourhood is of special thickness; anterior to this and separating the peritoneum from the muscular part of the abdominal wall is a thin fascia. The fascia Transversalis abdominis is fascia Transversalis abdominis.

This membrane forms a continuous endoabdominal lining, and corresponds to the Fascia Propria described by Vulpian and to the “true fascia transversalis” of Thompson.

Note. It is important that one should have a clear notion as to the difference existing between a fascia and an aponeurosis, seeing that the former term is applied to many structures which are truly tendinous in their nature.

A true fascia (e.g. cervical fascia, Axillary fascia, Transversalis fascia) is composed of fibres which interlace uniformly and take
take no definite course in the aggregate, as it appears to me; while in the aponeurotic "fascia" the fibers chiefly tend in one direction (e.g. Fascia lumborum, Fascia lata—in its outer part) passing merely from a point of origin to one of insertion.

In the hypogastrium and inguinal regions, one notes that the Fascia transversalis covers the deep surface of the muscles, but has no anatomical continuity with them, and especially that it arises from the deep aspect of the tendon of the Transversalis or to the posterior surface of the lower third of the Rector, without forming any attachment to the outer border of the latter muscle.

At the internal abdominal ring the Fascia is carried off the margin, or to the structure passing into the canal, of which structure
structures it thus forms the most
intimate covering, being carried
on by them into the Scutum.

At the Femoral or crural
ring it is in similar fashion
carried down on the Femoral vessels
of which however it only covers
the anterior surface, their sheath
being completed by the iliac fascia.

From this point out to the iliac
crest, the Fascia is continuous with
the iliac fascia, and covers the
deep aspect of the internal inguinal
ligament.

Further description of the
Fascia is resumed up in repeating
the fact that it is a continuous
endo-abdominal lining covering at
all parts, the deeps surface of the
muscles composing the wall - in
different regions it receives different
names, which do not pertain to
our present study.

In reflecting the Fascia as noticed in
the introductory remarks, the Muscular
Layer
layer is exposed, the deepest
stratum of which is the great transverse muscle of the abdomen.

So the usual description of this muscle we shall presently refer, in the meantime one may truly allot to two well known points in it.

(1) That above a certain point situated between the umbilicus of the pelvis, the tendon passes behind the Rectus to gain the linea alba, while below that point it passes in front of that muscle.

(2) That the lowest fibres of the tendon join with the internal oblique to form the Tendo conjuncta, and come into no immediate relation to the internal abdominal ring, nor the Spermatic cord. The lowest muscular fibres are said to take some part in the formation of the roof of the inguinal canal.

As a corollary from these statements
statements are may then pay, that at the point when the spermatic cord makes its way through the abdominal wall, there is distinct weakness over and above the presence of the inguinal canal itself, in that the first two muscular layers instead of three. Indeed in that important area which lies between the ligament of Poupart and the lower edge of the transversalis muscle, there is, according to most descriptions, only a thickened transverus fascia, and the aponeurosis of the external oblique between the peritoneum and the superficialis. One would have expected on a priori grounds, that the wall at this part would be of more than the usual strength, the usual elements being set about, but pattern thickness and strengthening it often repeated and careful direction on is lead to believe that as far from being about.
absent or blended with another muscle, the tendon of the Femoral. 
vesicle is in this region thicker and stronger than elsewhere and 
as arranged as to do far as possible compensate for the weakness 
neccessarily present. And not only 
but that the tendon forms a 
very integral part of the inguinal 
channel, which in relation to the 
ocurrence of hernia its importance 
is second to that of no other 
muscle.

The notes which follow are 
arranged simply in the order of 
the direction which was performed. 
Recalling the fact that 
at a certain point the Femoral 
vesicle's tendon changes its relation 
to the Rectus, let us first study 
the disposition at this point. 

Note. The following descriptive notes 
refer to Plate V of the plate at 
the end of this paper.
The folk of Douglas is the
name given to the free lower
margin of the posterior examiner
of the Rectus sheath, it having
been first described in the year
1707 by Jac. Douglas (Hyalline spec.
imen). It is constituted by hilar
oblique and transversalis, and has
always a characteristic arch from.
Certain anatomists have
purported it as rarely an oblique
line (Gallner) but this I have
never seen, unless indeed from
destruction of the arrangement in direction.
Being then if an arch from
this fold must have pillars, and
seeing that the concavity of the
arch is downward these pillars
must descend.

Braun has indicated (Appendix
to Atlas of Veres) that these pillars
are attached to the pelvis, but
does not make clear when that
attachment precisely occurs.

If in the first plan we
follow the fold of Douglas inwards, we find that it descends at first in a gentle curve, and then perpendicularly to the pubic symphysis where it is attached. Along the middle line it is united to the corresponding pillar from the other Douglas fold. The two in reality form part of the linea alba and ending at the Pubes as a triangular expansion known as the median umbilical ligament (described by Heber, v. Maciel in Fig. 32 A where however its superior connection is not shown).

When we turn our attention to the outer pillar of the Douglas fold we find that the marginal fibres take two directions, some passing outwards and upwards are those from the belly of the muscle, others passing outwards and downwards to the level of the internal abdominal ring.

It is with these latter
that we have now to do.

They form a tenacious band of varying breadth and strength, which Ehrlich has named the band of Henle, but it having been first described by that anatomist under the name *ligamentum suspensorium internum* (v. de ortu et progressu humanum p. 10); it is the *ligamentum suspensorium internum* mediale of Stiles, or rather forms its edge. In some instances, it may almost escape our notice, and can sometimes be with difficulty followed to its limits. It is imperative to use a blunt instrument in defining its fibres, if we would avoid the production of an artificial appearance. I have never failed however to find it present, when care has been exercised in the removal of Peritoneum and Fascia transversalis.

We may recognize this band to have the following relation to the main tendon of the transversalis. Seeing that below the Douglas for...
the main tendon ceases to pass behind the Rectus, the band of Hesseltine (as we shall call it with Proust), though belonging to the broad tendon in that it is continuous with the Douglas fold, comes to lie in a more posterior plane, i.e., in opposition with the posterior surface of the main tendon.

Internally it presents a free concave margin, which forms the inner boundary of a gap which internally is bounded by the linea alba (i.e., the internal pillar just described).

In this gap covered only by the transverse fascia lies the Rectus with the epigastric vessels, and the obliterated hypogastric on its deep surface.

Note. This gap in the sheath of the Rectus has been the object of much study, and various theories have been propounded to explain it. Rectus, often when it has been sometimes
sometimes named "Carum praeparitomale Recti" believed
it to be, for the accommodation of the expiratory bladder, and
in this Giedeon of Halle and after him Lusenbah
had that the gap existed to relieve the epigastriae ventre
from pressure.
I would be inclined to take another view of its significance
and as which, so far as I know, has not previously been
advanced. One can see very different need for protection
of the epigastriae from pressure but in this region there is a
vessel which, if in the adult a more fibrous cord, was in the
fetal state a vessel of vital consequence. Had this vessel
been amidst dense tendinous layers, one can see that circulation through it would have
been often impaired by their action.
action; whereas lying so it
does between the muscular
layers of the Rectum (which is
especially soft relaxed in the
position of flexion assumed by
the patient in utero) and the
soft contents of the peritoneal
cavity do such a sense of
obstruction to the blood flow

It may be however that
this part of the abdominal wall
lay in relation to the foetal
urinary bladder, and remained
in an apparent gap, where
that organ assumed its position
in a pelvic organ.

Actually the Hemorrhoidal band
is joined to the main lemn of the
Haemorrhoids, and thus has the
appearance of an ablative posterior
hemorrhoids. It is not always readily
decided whether or not it is continued
beneath the Rectum to the true anal,
but, as stated above, the internal stran.
is to be regarded as free—

The lower extremity of this band, and its relations to the internal abdominal ring, demand further notice. The fibres then pass to the inner side of that opening or, to speak accurately, they form its external pillar or boundary.

They then spread out after a fan-shaped fashion somewhat; the most internal pass downwards to the ligaments covering the pubic rami, and to the peritoneal fascia internal to the cremasteric ring and on the abdominal aspect of the ligaments of Poupart and Timbrett.

Other fibres pass to the margin of the deep creural arch and are then attached, for the most part, though a certain proportion of them may be traced under the arch, and forming the deep layer of the fascia lataformis.

The more external fibres of the edge of Hesselbach can however be traced further, forming a curve round
round the internal ring (if we can so describe the arrangement for convenience) they constitute the inferior pillar named by Heuer, ligaﬁamentum infraioenium externum. Ex

This pillar like the internal is compact of closely aggregated ﬁbres, but these gaining further on spreading, and may be regarded as in the main assuming three courses.

1. Certain ﬁbres pass upwards and outwards to reach the main tendon of the muscle, 2. others downward and outwards in the outer pillar of the deep crural arch, which brings them to the Os peroneum, while 3. an intermediate group runs along the deep surface of the superﬁcial crural arch until they are lost in the neighbourhood of the anterior spur of the Scutum.

Such may be regarded as a description of the tendon of Peroneus as I have in many preparations been able to follow it.
The fact I would here insist on is, that it is a part of the transverse tenon, continuous with the Douglas fold, and constituting the edges or pillars of the internal abdominal opening.

Brattel (loc. cit. p. 69) has also noted a second descending limb of the outer pillar of the fold of Douglas, which passes from the upper end of the Hesselbach band, obliquely downwards and inwards to the Pubic bone just external to the Rectus tendon, to which it is in its whole length intimately united. This he has named the band of Hesselbach, for though Hesselbach did not describe it as a distinct band, he pointed out its connection with the Rectus. It is much more readily recognized than the band of Hesselbach, though it likewise varies much in strength and more especially in breadth. (op. p. 17 infra)
So far we have been considering the abdominal aspect of the Transversalis tendon, but in order rightly to study this band of muscle and complete our description of the whole tendon, we must also look at it from the anterior as well as from the posterior aspect. (p. 6) Passing over in the meantime the direction of the oblique muscles, we shall direct our attention to the Transversalis muscle, and may at once make the general statement regarding this direction, that after reflection or (if it be preferred) complete removal of the oblique muscles, there still remains a well-marked tendinous expansion separating them from the peritoneal cavity (Plate IV).

It must be remembered that the fascia Transversalis has already been removed; this tendinous exp.
Passion these must belong to the transversalis muscle.

Before entering on a more detailed examination of this tendon, however, we must note that in reflecting the internal oblique muscle certain fibres are found passing between that muscle and the subjacent transversalis. Sometimes they are so numerous that they almost equal in strength the internal oblique itself; in other cases I have found them very scarce and weak.

The tendon resulting from this union is known as the tendo conjunctus, and is commonly regarded as very largely formed by the transversalis. In my opinion although that muscle very often takes part in its formation, it does not always do so, and in all cases the more important role in this respect is played by the internal oblique.
If the fibres passing from the 
rectus femoris to this so-called 
conjoined tendon be divided, the 
internal oblique can be thrown in 
rounds as far as the linea 
altera, and the iliacus is fully 
exposed.

Note. The following observations are 
illustrated by Plate IV.
The fibres of this muscle 
arch from their origin on the super 

t, to the Pubic 
region where they are attached in 

(1) Through the fibres joining the 

tendon of the internal oblique as 
just described (cp. description of 

(2) By an independent tendon on 
a plane posterior to the last named 

This tendon extends 
as far as the outer border of 
the Rectus tendon with which 

for some inches above the pubis.
it is firmly incorporated.

To this fact great attention should be paid in add to this second fact, that the most internal fibres of this tendon are always the strongest, and form a distinct band, lying along the outer margin of the Rectus tendon as high as the fold of Douglas, and disappearing in front of that fold.

This is the band of nuclei already noticed, but now seen from the front.

We have seen (p. 31) that Braune regards this as being continuous with the outer extremity of the Douglas fold, but it would appear to belong to a different portion of the Transversalis tendon, or a more anterior plane.

It may be specially noticed that when the anterior fascella of the sheath of the Rectus has been wholly removed, this branch of nuclei and the other contiguous portion of the
The Traenversalis tendon remain
undisturbed (as seen in Plate 70).

Besides these attachments
to the pubic bone, when one follows
the Traenversalis insertion afterwards,
one finds it to be attached behind
the pubic spine, and for a varying
distance along the iliopectinal
line; from this point the attach-
ment ceases to be to bone, but is
to the pectineal fascia behind the
attachment of Glutemalis ligament,
along with fibres of the Hesselbach's
band (v. p. 29). This last point
is better studied from the deep
aspect; one then finds that the
tendinous expansion extends along
the pectineal fascia and pelvis bone
for some 2-4 centimetres in many
cases, and often extends from their
altogether Glutemalis ligament and
the inner end of the deep crural
arch. (v. Plate 7 v Plate 71 Fig. 1)

The tendon of the Traenversalis ex-
ceed beyond that of the internal
obliterated, its edge indeed (as seen in Plate III or IV) forms the inner margin of the internal abdominal ring, being strengthened posteriorly by the band of Hesselbach, and a strong band of fibres curves outward to enter the deep coxal arch and form an important part of it; these are quite wide, pendulous of the internal inguinal ligament (p. 30), and may be traced some 1.5 centimetres along the line of the superficial coxal arch, some of them curving again upward to the femoral musculature.

These fibres take an important part in the formation of the inguinal canal in which relation we must again allude to them.

Before leaving the subject we must for a moment return to the plastic of the deep aspect of the tendon. Let us recall the description of the bundle of Hesselbach passing from
the fold of Douglas to the internal ring, and of the band of Hesselbach to the strong circumferential edge of the transversalis tendon in intimate union with the border of the Rectus.

Between the two bands is a triangular space, the base being formed by the pubic rami or patten by fibres passing from the perineum binarum alba to the crural arch (cf. Heale, v. Plate V), and the apex by the crossing of the two bands in different places.

In this space the tendon of the Transversalis is thinner in most instances than at other points.

Note. In these points v. Plate VI.

In some cases I have found this part of the tendon to equal any other in strength, the Heale band could not be observed as a definite band, but was extended as it were indefinitly forwards; whereas in other directions it was especially thin, and yet a third group there was an actual
actual gap in the tendon between
the two bands.

These variations in the form of the tendon will be found to be
of supreme importance with reference
to the subject of hernia.

In concluding this description
of the transverse muscle I shall for
the sake of clearness present its insertions
in a tabular form (cp. Plates 15 & 16).

I. Anterior fibres — passing to Int. Oblique
II. Intermediate fibres — to Iliac crest
(a) (Halo band) — Pubis just ad. to Rectus
(b) Pubic crest as far out as Spina.
(c) Ilio-patellar line to Rectus femoris
(d) Deep crural arch —
(c) Superficial crural arch —
In Patellar fibres. (a) Pubis through the
Adtrunculum lineae alter
(b) Crural anchor (Knee-bone
band)

One point further may
be allowed to before leaving the
subject
Subject - Lischka (Anatomi des 
Bauches p.63) describes the strengt-

hen of the Hessellach band (which 
however he does not describe) by the 

small muscle named Pubo-semi-

nus or Pubo-pubesalis, but beyond that 

strengths I believe been paid of it. 

I have had opportunity to 

examine it in a good 

many specimens, and in one I 

was able to trace three very delicate 

tendons attaching themselves to the 

foreskin over the horizontal pubic 

races, the bullies extending out to 

the Hessellach bourse (v. Plate XII fig.1). 

It would appear to be a 

structure of any significance. 

Such are the views which 

one has been led to hold regarding 

the transverseis foreskin and breast. 

It is now fitting that 

attention be directed to other 

views expressed regarding them.
These differ widely in many instances from that just unfolded, and one cannot fail to be surprised at the many versions which have been given of the same anatomical matter of fact.

Cooper, Cloquet, Vilsean and others have given descriptions of these structures which one would find it a hard task to harmonize, and by their study the mind is thrown into confusion on these very points which it is their object to elucidate.

It is possible that this arises from an undue minuteness of description, but the varying statements are confusing from this more than from anything else, that they are based on a confusion between the State of the abdominal wall, that being in them regarded as Fascia Transversalis, which is in reality Musculus Transversalis.
This distincion, as we shall see, is no mere figure of speech, but an actual difference in one of the greatest importance, with reference to both the production and the progress of hernia.

Sir Astley Cooper first described and named the fascia transversalis, and after him Celsus made it an object of careful study: Cooper's description will be found on page 6 of his "Anatomy and Surgical Treatment of Abdominal Hernia, Part I."

In the Recherches Anatomiques sur le Herme de l'abdomen, Cloquet has given a most detailed account of this fascia, the concluding sentences of which I shall quote:

"From what has been said," he says (p. 29) "one sees that the fascia transversalis is a membrane the thickness of which varies. It springs from the posterior border of the umbilical arch..."
arch, the aponeurosis of the iliac muscle, and the internal border of the tendon of the Rectus, and is continuous upwards with the cellular tissue on the inferior aspect of the abdominal muscles; below of towards the middle of the ventral arch, this membrane gives rise to a canal which begins in a wide opening directed backwards and downwards, the internal border of which is thicker than the outer. This canal encloses the spermatic vessels so as to form their intimal covering."

(Linnaeus in describing this fascia says that the peritoneal parts of the abdominal or lumbar region is formed in the ligament region of greater strength, elasticity and resisting power--comprising the ligamentum inguinale internum, medialis et lateralis. The likewise states expressly (Anat. des Memb. II p189) that it clothes the whole abdominal cavity.
cavity, and that it forms the internal abdominal ring by a process of folding upon itself. (Duplication der reich in der Leistenwand distilgreulien fasicken Wandungen. (ib. p. 169).)

The internal pillar of the ring i.e. the branch of Hesselbach being described as part of it in the following words;

"Nicht aus Anflage des Dignage in der Leistenwand tritt in der Richtung des seitlichen Randes der Rinde hervor, sondern dass sich also sog. Ligament um Ingenialum Interum medio, der kleinerner Schenkel des Ingenialum Interum des drei schenkeln." (ib. p. 160.)

Furtwängl with regard to this branch he pays that it may be followed to the upper edge of the pubic bone, and is not superficially strengthened by fleshy fibres (ep. description of Mus. Pubis. Samuel p. 50) which constitute the muscle referred to him "pubo transversalis."
identifies the Fascia transversalis with the carniosi externa peritonei of Langenbeck, and states that "it clothes the peritoneum surface of the Rectus", is very thin and carries much fat in its tissues. In this description there is a confusion between the fascia in question, with the hemorrhage border often with fat which one finds between the peritoneum and the Fascia transversalis.

Further on Kréline mentions a confusion between their fascia, which is "thinner between in the groin", with the crural arch (Schenkelbogen), confirming their one's opinion as to the confusion of plates into which he has fallen.

Neure in describing the Intestinal ring (Ganglien) mentions the well defined inner border (i.e. the Peritoneal band) as a portion of the Fascia transversalis, which is attached to the crural arch but does not end there (Schröher p. 458).
Hiele in his Hautbuch gives the following description of the Fascia
neurovasc. (Mustill, loco p. 71).

"The strongest part," he says, "is in the groin... it stretches from
the region of the iliac crest to the
iliac pectineal line in two directions."

He describes two special bands
in this fascia one running from
the region just named, outwardly
parallel to the crural arch, which
he names Liggamentum pectinale intimum
cruralis (op. p. 30), and the other
descending vertically—the Ligamentum
pectinale intimum medialis (op. p. 26).

Entering more into details, Hiele says that the former arises
from the iliac pectineal line, the
fascia of the pectineus behind it.
Some ligament, and has also
fibres of origin from the Adductor
biceps above. It passes over
the crural arch, and when the
external ilio-pectineal ligament (Prehn)
leaves the Fascia ilium, its fibre,
spread
spread in three directions; (1) up
on to the deep aspect of the wall;
(2) into the base fossa; (3) into the
external inguinal ligament, these
being known from in December.
The lower fibres arch down,
wards and round off the outer
curve of the external opening of
the femoral canal.

This ligament (lateral internal) pays
flexor fibres, which the external oblique
closes the groove for the end
(cp. note on inguinal canal, below).

With reference to the second
of these bands. Hooke pays it "varies
in extension and strength from a
few fibrous bundles arising from
the iliopectineal line near the
Rectus, and lying along the edge
of that muscle as if only a part
of the tendon (cp. p. 31), to a ligament
whose base reaches along the margin
of the ligament described above, the
outer fibres arising from the internal
arch and losing themselves in the
Fascia"
Fascia transversalis near the Rectus.

All these authorities and many others whom I have consulted describe the Fascia transversalis, as a continuous sub- abdominal lining and yet as likewise continuous with admitted muscular or ten- dinous structures, e.g. with the Rectus muscle (Hale, Sappey &c.), with the deep crural arch (Haeusel), with the Douglas fold (Sommering &c.).

Further, certain anatomists make a division of this so-called Fascia transversalis into two.

Thus Cooper (loc. supra cit.) notes an external and an internal portion separated by the internal ring, and bleeding above it with one another (v. Anatomy of Human ph. 2. Plate iii fig. 5).

Screunung agrees in this, and

Based on this fascia (Vol.iii p.218) that it arises from the pubic body and its ligaments, between the
the abdominal muscles, posteriorly behind the lower end of the posterior layer of the rectus.

Similarly, Lawrence in his treatise on hernia (p. 189) describes external and internal divisions of the fascia, and also Vilppu (A) in his Regional Anatomy (translated by Harwood) p. 218,

Another view of the arrangement is expressed by the French authority Vilppu (Alf. A. L. P.) in his work on Surgical Anatomy.

He describes the fascia transversum as being of two layers, but they are superficial or anterior, deep or posterior.
The latter is the Teresia
species of D. Vilpianus (v. infer) and
the true Teresia transversalis of Thompson;
it clothes the lower portion of the
Rectus posteriorly. The superficial
and stronger layer in Vilpianus (v.) is
regarded as the only genuine Teresia
transversalis and he describes in
its three sets of fibres.

(1) An external set which runs
parallel to and are attached to the
Rectus, lose themselves partly
by interlacing with the Tensor Fascia
Latae.

(2) An internal set parallel to the
former. They descend to the edge
of the iliac crest, where they
curve upwards below the arc (cf.
description of Kondoch's bands on p. 29),
to accompany the "sacadelti ilio-
pubis," to the iliac crest.

They form the internal ring
and above interlace with the Ilio-
versal muscles, and are continuous
with the muscular substance of the
Rectus.
Rectus

(3) An anterior set which pass anteriorly from the Rectus border to which they are attached (Ibid. Op.
cit. p. LXXXI).

It follows says Vilppula (it p. LXXI) that all these fascias, being continuous with the
Rectus and Transversus - They
interlace with the latter for an
inch or two above the pubic
crest.

This might be taken as
an accurate description in many
respects, provided one regard the
depth layers of Vilppula as the true
Fascia transversalis, and the very
fully described superficial layer as
Transversalis fascia.

The first set of fibres there
would be the band of rectus, the
second the band of Abdominalis, and
the third these fibres of the Ad
eminulum linere albae (often
well marked) passing to the naval
arch.
arch as used by *Reed* (op. p. 46). The condition is not one of
pertaining but of true continuity
with the *Innervosali* muscle.

On *p. LXVI* of Alg. *Vulpiani's* work
the *fascia propria* of A. *Vulpiani* is
listed as covering the whole wall and
joining on intimate adhesion.

The original description may be
found in the work of A. *Vulpiani* already
referred to, *op. p. 221* – it would seem to
refer to the membrane between the
*pericardium* and the *Innervosali* fascia
and is said (*ib* p. 238) to terminate by
uniting with that *fascia in the
borders*.

*Richter* is of the opinion that
this *fascia propria* of *Vulpiani* is a
creation of the *Sculpel*, and that
the *fascia innervosali* is merely a
*thicker* *fascia propria* between the
*pericardium* and *Innervosali* muscle.

(*p.p. 575–576*)

In further describing this
fascia he says, "The median part of

*For title of work v. Bibliographical Index at the
end."
the fascia transversalis is found. Though not always behind
the rectus in its lower segment,
and beneath this is the "cruceal
allulain" very lax and abundant
at this point (p. 585).

"In the superior lateral region of
the abdomen, a layer of cellular
tissue beneath the transversus is
by Valsalva (A) improperly called
cruceal fascia; in the groin it
becomes thick and apneumotic
and is named fascia transversalis
by Cooper, Cloquet & Henlebach."

Richter mentions (p. 621) two
sets of fibres in the fascia
abdominali; (A) a transverse group attached
to the rectus, passing from it over
the cruscal arch to the cruscal phalanx.

They send fibres under the
cruscal arch into the cruscal phalanx.

(B.) A vertical group parallel to the
rectus and joining to the femoral lig.
across the deep cruscal archs.

This fascia Richter has named the
The fascia transversalis fibrosa, and
plates that it is not constant in its character; to the deeper layers
he gives the name Fascia transversalis
cellulosa.

This needless multiplication of
names is avoided by following the
description of the part, which I
have given above, and regarding
the fascia fibrosa as muscular (Muscular
Transversus) and the fascia cellulosa as
the true Fascia transversalis.

Guthrie likewise describes an
anterior fibrous, and a posterior cellular
layer (Op. cit. infra p. 11-).

Morton in his surgical anatomy
also states that there are two
laminae (p. 243), and that the
fascia is of special strength on
the inner side of the internal
ring (p. 246 fig. 3 m and l).

Bichat on the other hand denies
the existence of any fascia between
the muscular layer and the peritoneum.
Sillars believes that the fascia transversalis only exists in the subumbilical portion of the belly — lying itself above in cellular tissues (Op. cit. infra p. 623).

Cruikshank's description tallies very much with that of Cloquet, but this anatomist thinks that it simplifies matters to regard the thicker portion of the so-called fascia as being really a posterior element of the transversalis muscle to the tendon of which its fibres join themselves, as stated above (pp 50-51). These fibres Cruikshank regards simply descending and horizontal. Here one finds the truth most told, these fibres not only being joined to the transversalis muscle, but constituting a part of its tendon.

Sappey (Op. cit. infra vol II, p 244) thus describes the posterior attachment of the fascia transversalis:

"...se décale il p'adhere au ligament..."
The trick in these cases is that on the tenth day, by the time the amount of the detachment has grown, it is possible for the core to be preserved, or rather to the edge of a band-like, fibrous edge on triple the height.

This corresponds exactly to one of the arrangements which I have attributed to the 

leaves on the leaves, (cp. p. 36).

Sappho, especially with H. Pillemer, as to the arrangement of fibres in the family, he notes that it gives a delicate separation below the lower portion of the "Pericarp."
Transversalis muscle. It is there.

one of interest, and indeed read

ple that we should not plety

The descriptions given by the Same

authorities of that muscle.

And first with reference

to the fold of Douglas, one finds the

following lines in Lenekha (Op. cit

in p.117): "the ends of this arch

fold are inclined downwards in

such fashion that the one soon is

lost in the linea alba;...or in other

cases cleaves to be attached to the

upper border of the Pubic symphysis.

The other is lost near the inner

border of the Rectus, and it is in con

nection with the longitudinal tendons

of the muscle Pubo-transversali."

In describing the "Adenin.

iculum, Lenekha (cit. p.18) does not

dention it's relation to the Transver.

al muscles.

Note. It may hae be met with in an

instance of the Cephalic variety.
as to the relation of the various parts of the abdominal wall, the
Loeschke at one place (p. 33) describes the iliopsoas transversalis
in relation to the transversalis
fibers (p. 43). He describes it as being
in relation to the muscular layer.

Loeschke's description is worthy of
special notice at this point, as being
a new approach to the truth.

In Scarpa's remarks on this
muscle (Op. cit. infra p. 25) one finds
mention made of an independent
attachment to the Pubis, "believe the
attachment of the Internal Oblique."

Hansemer and Ely, Volpean
satisfy themselves with the state-
ment that, below the Douglas fold,
this muscle is completely merged in the
internal oblique.

Seppp describes the transversalis
as forming, "believe the corresponding
portion of the Internal Oblique to the
Iliac alba," as if quite independent
of that muscle; and he further states
that
that "among its fibres those lying nearest to the coccyx arch so to insert themselves on the pubic body (Op. cit. p. 232.) -

This attachment Hyrtl regards as being merely the Rectus abdominis, named by Heubner. Hyrtl in his atlas plan (Table XIV) the continuity of the Douglas fold with the Transversalis fascia, and also the tendon of that fascia passing to the Pubis; in Table I the outer descending limb of the Douglas fold is shown, and also the internal pillar of the deep abdominal ring. But the continuity between them is not shown.

Gallieze (Op. cit. p. 13) makes an important departure from the usually accepted descriptions, in looking upon the lower fibres of the Rectus as splitting to form the internal ring, and Cloquet (Path. Anat. p. 23 note) has seen this arrangement.

So this we shall again allow in
in speaking of the ring itself (p. 91.)

While most authorities regard

this branch as being blended with

the internal oblique, Cloquet

(loc. cit. p. 23) looks with a rather

blended with the fascia transversalis,

this being attached to the outer

border of the Rectus.

Fraser states the descent and

attachment of the transversalis tendon

to the Pubis (Skeir, c. xi) that A. Cooper

states that "it descends much

down below the internal oblique,

and towards the Pubis, forming a

ligament from a peritoneal epaxia

which is connected with the fascia

proximally to be described" (i.e. Dr. Samson

ab.). In his work on the structure

and diseases of the Testis, Cooper

says, "But the lower edge of the

transversalis has a very peculiar

insertion. It begins to be

fixed in Pubis: ligament almost

directly below the internal ring,

and it continues to be inserted
behind the Spinalic cord into
Porpart's Lajement, as far as the
attachment of the Rute.

(Note. The italics are my own.)

Such a study as the fore-
goin of the views expressed by
various authorities reveals an
amount of discrepancy, as in des-
crption, and incompatibility even,
that to formulate a typical
description would be a work of so
little difficulty. I have there-
fore resided to discussion as a
more satisfactory basis of descrip-
tion, and compared with results thus
obtained the many views the
were expressed.

In all the account of
the anatomy of the groin alluded
to above, disregarding many minor
points, the points this in general,
that the fascia transversalis be-
come thicker, and that it
compresses certain will marked bene-


of aponeurotic nature, which have
I think been sufficiently alluded
to in these pages.

In Sture's elaborate de-
cription we recognize at once the
ligament or band of Nesselbach
of Hekel under the golden hairs.
Now the relation of the band
of Nesselbach to the internal ring
(and consequently to oblique semic)
and the relations of both bands to the direct
variety of hemia, make it a
matter of importance to decide
whether they are an adjacent to
or rather a part of a tendon, or
whether they are in held by Sture's
directly named fascial bands, or
directly influenced by muscular action.

In clarifying with Bsliger
that these bands are of the muscular
stratum, I appeal to the following facts
as reasons for my opinion.

(1) Direct continuity can be traced
between them and the transversal tendons,
since they have already noted in detail
(7) Removal
(3) Removal of the Fascia transversalis
when performed with care leaves these structures intact.
(3) A further and theoretical reason
is, that the continuity of a fascial
lining with the muscle, which it
lines, is rather probable an
reasonable as an anatomical re-
relationship. Yet if these layers or
fascia, they have indisput-
ably such continuity with Fascio-
tendu.

These notes on the transversalis
muscle and fascia have been ex-
tended perhaps somewhat further
than might be desired - as
has been known but on by the in-
terest of comparing criticizing so many
diverse descriptions, and further
the discrimination between these two
layers, is so ultra-fine of description
as already stated, but has the
most important bearing on the
mode of production of hernia and
their
Their translation. In considering these questions we shall have frequent occasion to refer to that part of our subject which is just completed.

From these notes on the Trausumalic muscle it must be clear that accepted views with regard to the Obligens internus require some modification before we are able to harmonize them with the foregoing description.

We shall merely note two points which merit attention in our present study, viz.: the attachment of the muscle to the Pubis and its relation to the Trausumalic.

With regard to the latter of these I have noted that the Trausumalic above a certain point (a little below theDiaphragm) joins the Obligens Internus about 1 centimetre external to the Rectus, whilst below that point the union takes place only
only through a series of strong tendinous bands passing between the two muscles, after division of which bands, the muscles are readily separable and the oblique can be reflected to the linea alba and pubes. (For direction, op. p 6.)

In order fully to reflect the pubic attachment the tendon was not only divided as here described, but the lower edge of the muscle was also divided, so far as the horizontal line of division.

The number and strength of these bands varies very greatly (op. p.32); thus in one case I have noted that the oblique is joined by a strong tendon from the ilio-mastoid, whilst in another the former tendon was reflected to its insertion in the Pubes without using the knife.

I would therefore repeat at this point that the so-called conjoined tendon is mainly and in some cases wholly formed by the internal oblique.
It is inserted on the Pubis in front of the tendon of the Rectus Abdominis, and extends out so far as the Pubic Spine.

Note. For three other points to the rectus see Plate II.

Semon (op. cit.) describes this tendon as attached "to the spine of the Pubis, directly beneath the two tendinous pillars of the lower abdominal ring." (p. 23.)

Solomon (op. cit. p. 199) states that "the lower muscular fibres pass in isolated tendon fibres to attach themselves to the Pubis spine by their means, beneath the outer limb of the abdominal ring, and beneath Sphincter Ejaculatus." This last attachment is also mentioned by Luckett and Morton (op. cit. p. 23.)

In the notes on one of my dissections I find the following obseration on this point—"Towards the pubes it (i.e. the internal oblique) is joined by a strong tendicus"
tendinous band from the Iliosacral and is attached to the Pubic crest, and spine; also further out below the iliopectineal ligament to the pelvic fossa. (v. Plate 11.4.)

The remarks which now External Oblique
follow on the Obliquee Internus will be of a fragmentary nature.

They are the results of direction which were afterwards compared with previously existing descriptions.

In this connection I shall also join some notes on the structural arrangement of the Sinus as being a subject closely related to the description of the External Oblique muscle.

It has been suggested that the two External oblique muscles of the abdomen form in truth a digestive muscle, and whether that be so or not it is indubitable that a continuity of a most regularly ordered nature...
nature exists between them. This arrangement is deemed as the cleavage of the extensor oblique, and on careful dissection are led to describe it as follows.

Note. See Plate I on these points.

1. Superiorly one finds digitations ending in tendinous bands, whose fibers cross and interlace with a corresponding band from the opposite side. (These are not shown in Plate.)

2. But in order one finds digitations ending in tendons which become, and may be traced to a great distance on the opposite side, forming the fibers variously named Retinaculae, the reform. In pantor, Collectorels, or the Fascia Thiogyesis, which passes to the upper end of the extensor abdominal ring and the superficial crural arch.

3. Digitations descending as in Group 1.

4. A definite tendinous band which crosses the corresponding band of the other muscle, and passing beneath the internal Jefferd of the upper abdominal ring of the opposite side forms
forms the ligamentum Colliii, often
otherwise named Fascia Triangularis, or
the middle pillar of the ring.
It attaches itself along the
pubic ligaments at the part which
corresponds with the attachments of
Simpson's ligament and the inner
cord of the superficial concord arch.
(5) A definite tendonous band, forming
the internal pillar of the outer ring
of its own side, at which also
decomposes and is attached to the
anterior surface of the pubic body
of the opposite side.
(6) A band forming the internal pillar
of the ring on its own side, decomposes
on the pubic symphysis and passes into
the internal adductor fascia on the
opposite side. It also forms some
fibres to the adductor fascia on its
own side before decomposition. (Not shown)
To certain of these fibres
a little more careful attention must be
devoted.
As to the Intercolumnar fibres
it is of much importance to
recognize that they come from
or at all events are continuous with
the opposite external oblique, and
are therefore influenced by its con-
traction. The importance of this
feature is due to their intimate
relation to the internal abdominal ring.

Sir A. Cooper makes only paren-
thetic reference to them.

Steel regards them as being
fibres from the external inguinal ligament,
which pass round the lower edge of
the external oblique and on to its
front surface in the neighbourhood of
the ring (op. cit. p. 60).

Scarpa says the fibres bear
thereupon in the inner border of
the ring (op. cit. p. 110).

Alf. Ormson states that they
come from the opposite muscles, and
pass in two directions;

(1) round the outer ring of the pubis
where they help to form Frühne's
ligament.

(2) over
(2) over the ring to the superficial crusel arch passing up to the iliac crest.

They vary greatly in number and strength, but are of importance in the surgical anatomy of feminine in that when drawn up by the tendons of the opposite side they compress and narrow the inguinal canal.

With regard to the ligaments. Lig. Collie.

Collie's views of autonomy vary somewhat. Thus Hyrtl looks on it as a reflection from Gimbel's ligament, which passes upward and inward behind the ring and joins the Rectus sheath, whereas Schweitzer looks on it as a reflection of the internal pillar of the ring.

Richet & Schweitzer have recognized it to be a continuation of the opposite tendon passing behind the internal pillar of the ring, and this I doubt as is the correct view to take of it.

Seeing that this ligament...
though details varying much in
strength and importance, lies in
that region where lumbar root
commonly protrudes, its study and
the determination of its relations is
most needful in our present
study.

I have, made the following
note with regard to it; "The Ligamentum
Collis is seen in the triangular
interval between the pillars of the ring.
It has a distinct concave upper
and outer margin; the lower margin is
attacked along the same line as the
ligament of Simonds (hence called the
lig. Simondsii reflex), and corresponds,
in part also to the attachment of
the external inferior ligament (Poste),
being also attached to the pubic
apex and adjacent bone. When
its fibers are drawn upon, they may
be distinctly seen and felt pressing to
the opposite muscle, forming a bundle,
just superior to those of the internal
pillars of the ring."
As to the pillars of the
uterus abdominal ring and their
attachment to the Pubo, authorities
are tolerably agreed.
I have noted that in the
decorations the left internal pillar
usually appears beneath that of
the right side. (cp. Plate I)

It may now be noted
that towards the Pubo the tendin
of the External oblique is quite
free from the subjacent muscle or
only united to it by sparsely
plaited bands, and may be
separated from it so far as the
liver allow without the division
of any structure; and also
that the ligament of Colla is
raised along with it, being most
evidently a part of the same layer
in the wall.

As one caries the direction
upwards one finds that the two ob-
lepic bands begin to unite near
the liver allow, but that gradually
the
The line of fusion is carried further and further out until in the upper part of the wall, only about half an inch of the outer tendon is free from the other.

We cannot leave the study of the external oblique until we come allusion to the structure known by many names, most commonly perhaps as Poupart's ligament. Its importance to the surgical anatomy of hernia lies mainly in its relations to the inguinal canal.

The most commonly accepted view of this ligament is that it is the in solute lower border of the external oblique tendon. It forms a groove the outer part of which gives origin to the external oblique and transversalis, the inner forms the floor of the inguinal canal.

This groove is described as being
Being completed by the fascia transversalis which is attached to the posterior edge of the ligament (cp. Villers, Op. cit. p. 623, plate), and indeed Cloquet says that “The fascia transversalis is a reflection of the internal oblique tendon.”

From this mode of description one finds, however, not a few dissentients, who hold that this structure is not essentially tendinous, but an independent ligamentous band.

Steele (Op. cit. p. 60, fig. 26) gives the following description. The fascia ilica at the joint of exit of the ilio-psoas muscle, is joined by fasciculi of horizontal direction among which is a band of special strength, the retinal muscular ligament, which unite the lower edge of the retinal oblique from Payrante's ligament.

He further very accurately notes the attachment to this ligament of the fascia transversalis, and the fascia joined to...
Richter (Op. cit. p. 615) says so far as to say, that "Paparati" is a true ligament analogous to the Pectoral ligament, i.e. in the morphological phylum of the bones of the foot, and this Paparati also held. Richter specifies two parts in the ligament viz:—

1. A broad superficial extending from the iliac to the pubic spine, the broad iliac pubis of Thompson.

2. A broad profundus which passes to the pelvic crest through the median of the bones, to the pubic crest through the median of the iliacos pubis ligament; this is the broad iliac pectine pubis. pubic of Thompson.


Richter's view is that with which my own observations have led me to concur, but it is not, notwithstanding convenience to retain the name of Paparati ligament or the superficial cornel arch to denote
whole, provided one keeps in view the fact that it is a structure with many component parts.

The parts may then be summarised:

1. The fundamental 'external inguinal ligament'.
2. Fibres of the external oblique tendon.
3. Fibres of the transversalis fascia tendon.
4. Fibres of the internal oblique tendon

(cp. p. 66.)

(1) and (2) would appear to correspond to

Transversalis external inguinal ligament

of (3) to the internal inguinal ligament.

Inasmuch as our study of these various structures now described, has reference chiefly to

the anatomy of herniae and their relations, it is expected that

special reference be made at this point to the inguinal canal

through which so many herniae descend.

The name 'inguinal canal'

has been given to the oblique

plane
placed passage in the abdominal
parietes through which the sperm
atic cord or in the female subject
the round ligament of the uterus makes
its way to the superficial region of
the body.

We shall study first the
abdominal opening, proceeding the
external opening and finally the
intervening portion of the canal.

The External abdominal
ring is usually described as lying
half-way between the iliac spine and
the pubic symphysis. This is
perhaps sufficiently accurate for all
practical purposes, but in fourteen
preparations in which I made meas-

urements, there were only five in
which it was strictly true; in the
other nine the ring lay reliably
nearer to the iliac spine (i.e. - .8
-2.6 centimeters, a noteworthy difference in
a distance of 11-16 cm. altogether).

The ring may be held to
lie 1 to 1.5 cent. above the line of the superfi- 
cial cruscal arch (Poupart). A more important object 
of study is the constitution of the 
ring, and on this point a short 
note must be made.

Various authorities already 
got the point in the fascia transversa. 
their term, speaking of 
the fascia (p. 7). (Br. med. recch. p. 7)
The two internal inguinal ligaments 
form an obtuse angle rounded off 
by arching fibres, lying from above 
the cruscal arch. The lower boundary is 
sharply defined, formed by the fascia 
and the processes vajinales which is 
continues with it; the superior 
limit of the ring has as such edge.

As to the position of the 
transversalis muscle Stekel pay that 
the end faces under it and derives 
so covering the pons.

Lachmann mentions a 
Jalifon fibres band 'analog to 
the
the border of Simmonds' formed by the fascia transversalis on the inner side of the ring (Op. 34 p. 342).

Lawrence describes the ring as the lower end of the division between the two parts of the fascia transversalis (Op. p. 49) appearing below the edge of the transversalis and internal obturator.

Luschka and Richer describe the fascia doubling on itself post to form the inner edge of the ring.

There can be no doubt that in relation to the abdominal opening of the inguinal canal, the fascia transversalis does assume this condition, and that the result is the presence of a band of doubled fascia at the inner margin of the ring, but while admitting that the cannot agree to the proposition that the internal pillar or limb of the opening is formed by the fascia.

We must here revert to the notes on the Anatomy of the Transversalis.
tendon, and more especially the lower extremity of the band or
ligament of Stosselbach (cp. p. 29),
from a glance at which, and at
the corresponding Plate (V), it may
be seen that this band or ligament
forms the internal pillar in question,
being covered no doubt by the fascia
but left intact when it has been
removed.

The Travemusceli tendon then
forms the deep ring by means of
the band of Stosselbach described in
a previous passage. We may
only recall the fact, that the distinct
pillar forms only vertically and
infinity; superiorly, and inferiorly
the ring cannot be said to have
any defined boundary.

In virtue of the fibrous band
previously described (pp. 30-31) as
passing up from the transverse
to the Travemusceli tendon again, that
musculature may always be described as
forming the ring on all sides (cp. Plate 10).

This
This it must be observed is a statement of great importance, that the deep abdominal opening is found not by inter fascia but by the tendon of a muscle, liable therefore to be directly acted on by the change in that muscle.

This is made no novelty to take of the anatomical arrange.
- Donders has stated lately that the internal oblique and transversus form the pillars of the ring, and Guthrie held that this opening was actually in the muscular substance of the Transversus (op. p. 59) admitting that usually the portion of the muscle below the cord was more tenuous than truly muscular.

Cooper also held that the deep ring was muscular, this according to him being brought about by the internal layer of the fibres of the Transversus turning down beside the ring to the superficial crural arch.
These views are cannot sub.  

phantes by direction, although  
in cases of 1d standing, when the  
pants have become so altered that  
occasionally the muscular fibres  
of the Transversalis appear to enlarge  
the rect of the face, yet in the  
usual condition the internal  
abdominal ring is formed by the  
head of the Transversalis muscle.

The superficial abdominal  
ring has already been sufficiently  
explained in the note on the external  
oblique muscle (q.v. pp. 68-72)

Surely the attention was  
to the caudal to while these two  
loops were entwined, one may  
in the meantime accept the ordinary  
description of it as formed of a  
rectus floor and anterior posterior  

If the first study these  
walls one finds that the foregoing  
description
Description of the abdominal muscles necessitates some modification in our views as to the constituents of the transversalis fascia in. Scarpie's opinion that the transversalis fascia muscles play an important part in the formation of the canal.

The following extract may be given: (Op. cit. p. 42, § 16) "In fact the muscular fibres of the transversalis fascia at the point where the peritoneum and fascia tend to become united and its aponeurosis in the point of the oblique becomes extremely thin, in the neighbourhood of the inferior recess and along the canal arch. From this it follows that the peritoneum gains no support of any "solidity" except from the external oblique and the inferior pillars of the inguinal ring."

And as also Richter says that behind the external ring there is no muscle, only cellular tissue and peritoneum.
Nor can one agree to the description of Villanu, Sappey & Richet, who state that the anterior wall is formed by the External oblique, the posterior by the Fascia transversalis, while the Intestinal oblique and Transversalis muscles by their lower borders form the roof.

Vulpian looks upon the Intestinal oblique as taking part by the presence of a few fibres in the anterior wall, and regards the roof as really non-existent.

Gegenbaur approaches nearer what appears to me to be the truth, when he says (Op. cit. p 370) "At the inner ring the Ima-coccgeal muscle strengthens the anterior wall, and at the outer ring it strengthens the posterior along with the Intestinal oblique."

Ziehen (Op. cit. i. p. 63) mentions the Ima-coccgeal as taking some part in the anterior wall, tho' in insignificant degree.

At the upper end of the

Canal
caval there is actually no post-
erior wall, and the structures
in the anterior wall, exposed between
the limbs of the deep ring lie in
relation to the peritoneum.
At this point we find the
following layers in the anterior wall
poring from within outward:
1. Fascia transversalis
2. Hemal
3. Internal Abducens fibres closely
nearest to the testes
4. External Abducens fibres
5. More superficial tissues.

Lower down the canal the
conditions are greatly altered, the
anterior wall being constituted only
by the internal oblique with the Super-
face tissues. The two deep obliques
have passed upward and
innerward, arcing over the cord as it
passed down from the internal ring,
and then passing behind the cord to
the insertions already made (cp. p.36-37
+ p.66). They then join (the internal
oblique to a very slight degree) with the
Fascia transversalis the posterior wall.
of the canal. The transversalis
is especially strong at two points viz:
(1) at the inner margin of the deep
ring, when the ligament of Henlethall
arises in the posterior wall, behind
the tendon, and
(2) at the extreme inner end of the wall
where lies the ligament of Walker.
At the outer end of the canal
the anterior wall fails, so the posterior
close is the inner end, and the
posterior wall lies exposed between
the pillars of the superficial ligament
ring.

The structures thus exposed
have already been noticed; one
may now regard them in this com-
mon relation.

Appearing then from beneath
the internal pillar is the middle
pillar or ligamentum Collaric, &c.
which and projecting beyond it is
the Internal Oblique tendon (Plate I.A),
and deepen still appearing further
at still does so to fill up the whole
intercollicular.
interecumen area is the tender of the
Tausenelis (Plate I C, II III 8).
Beneath lies Tausenelis
and piericen, unre
The two forts called structures
it must be observed have relations
only to the inner part of this area,
but the whole area in adm of ten-
dom, contrary to the leading of Scarpe
Richter (t. caps).
With respect to the so-called roof
one must only remember that the
Siculum oblius, which forms it, really
is carried down by the end as the
cremaster and becomes more plainly
part of the contents of the canal.
The floor of the canal in its
other part is constituted by the Siculum
bijament in the thick race, which is
joined by the Siculum oblius (the
century-wall) and the Tausselini mem-
er (patroin-wall), but by Tausenelis
cases, as stated by antiquarian sects (p. 76).
Toward the lower end of the
canal the floor is wider owing to
the
the insertion of Simbecuti's bijunct into its formation along with the
requisite bijunct.

Note. For points in relation to
the Inquique Canali v.
Plate III.

Having thus made a
detailed examination of these
various structures and their ana-
tomical relationships, one is in
a position to discuss more
particularly their influence
on the production and on the
anatomical relations of Semene.
This forms the second part
of this thesis.
Part II

The surgical Anatomy
of Hernia

One may readily enter upon this portion of these notes by a consideration of the peritoneal relations of herniae, and must at the outset refer to the remarks on the peritoneum in an earlier part of the thesis, where the inguinal pouches were described.

It was at that point in the anatomical description stated that the full significance of these pouches would engage the attention in this the second part of the paper, which deals with their relations to inguinal herniae. It is not in fact discovered in which of these pouches hernial protrusion may occur, and why one or all of them become the seat of rupture.
Two varieties of inguinal hernia have long been recognized, and, named external and internal or oblique and direct; the first occurring outside the epigastria fold, in the external inguinal pouch; the second, in relation with the deep abdominal ring, and finds a path of least resistance in the inguinal canal; the internal or the other hand occurring to the inner side of that fold, in the triangle of Riolan. Becaue, finds no such opening, and can protrude only by stretching or rupture of the abdominal wall. This variety of hernia, the direct inguinal, merits the closest attention in that the local condition which determines its site is not so apparent as in the oblique variety.

With reference then, to the relation of this direct hernia to the peritoneal sacs and the various views, thus Laennec declares that the protrusion occurs between the uraemia and the obliterated hypogastric artery.
artery in most instances, and
Leccehka pays that it does occur
in this situation.

Ayres, on the contrary, states
that the peritoneal area between
these folds is not truly a hernial
pouch (Op. cit. p. 462 note) while Sommerring
as has been already noted (p. 11)
describes only two pouches, looking on
the "intimal pouch of Other Anomalies"
so as of no significance.

Hibbs regards this pouch as
"intimal injury" but "para-rectal",
and states that it is practically
never a seat of hernia, and in this
Brevis I believe success.

Alleyne, while naming the
pouch "Intimal Hernia", regards it as a
possible site of hernia, which he
dedicates to three "intimal varieties"
intimal, middle and external (Op. cit.
p. 638). To this he adds, however,
that the intimal variety forms only
obliquely outwardly to form the super-
official abdominal ring; he admits
that it is very rare and further all but indistinguishable from the "middle" variety.

Rickett believes that hernia in what he names "foetale vesico-pudendum" is commoner than is supposed. Lawrence and Closet admit this most internal form, so a species of hernia.

From all this it is evident that we cannot assume that a direct hernia may leave the peritoneal cavity between the bladder and the obliterated hypogastric artery, for though weighty authority persists in the view that it may, yet the fact that such experienced and learned anatomists as His and Braue among others have reason to disbelief in the occurrence of rupture at this point in the abdominal wall, encourages one to devote further attention to the question. In endeavouring to form a judgment on the evidence which appears
appears to support one or other of
these views, one must bear in mind
a fact observed by Luschka with
reference to the obliterated hypogastric
fold. It has been already alluded to (p. 12).

Luschka says with regard to
this fold "Its relation to the pubic
vane is peculiar, that when
the bladder is moderately filled it
tingines lies some centimetres external
to the pubic spine, sometimes internal
to that point, so that the fold may
be met with external or
interna to the spine corresponding to
the external abdominal ring, or even
between the limits of that area."

(Oper. cit. p. 115.)

With these remarks compare those of

This possible allusion
in the situation of this, the boundary
between the fascia in question,
is not without importance, and
may influence the site of protrusion
of a direct hernia most materially
and this it does only by changing
the relation between the peritoneum and
the muscular layer of the wall.
Before passing to the study of
what these relations really are, one
may allude to the remarks already
made (p. 12) with reference to the
influence of the breadth of the inguinal
pouches on the position of hernial pro-
tumors, in order to emphasize what
we have stated that the broadest
pouch is not the commonest seat of
such protrusions; indeed our present
inquiry is whether it is correct to
look upon it as a "hernial" pouch
at all. But may also here repeat
the statement that the solution
of this problem lies in the study
not of the peritoneum itself, but of the
arrangement of the muscular layer of
the wall, and the relations between
that layer and the peritoneal fossae.
The following remarks then:
for being so back to the study
of the Saccovomai tessen which from as we have seen, the deepest portion of the muscular layer.

It being expedient to learn what exactly were the structures which lie in relation to the internal and middle infiltrate sheaths respectively, the following means of determining this were adopted in the course of the direction. Before in any way disturbing the peritoneum, a needle was passed at right angles to the surface so as to pierce the hypo.

gastic fold; the peritoneum was then stripped off, the needle remaining in situ, and one observed at what point it pierced the muscular or tendinous layer of the wall.

In all cases the needle was found to have pierced either the Rectus tendon or the ligament (or band) of Heule. From this it follows then that the internal process is in relation
relation anteriorly with the Rectus tendon and deep ligament of Heber, while the middle lies in relation to the interval between the ligaments of Heber & Finselback (op. p 38).

In view of this fact it may I think be admitted that we find strong anatomical grounds for the belief that hernia protrusion can occur in the internal pouch, where the Rectus & Heber's band may be assumed to resist any such process. On the other hand in relation to the middle from one finds a portion of the Tannen's tendon which is notably less resistant than the adjoining parts; hence therefore one may fairly expect hernia to be of more usual occurrence, though as we have seen such an opinion would be contrary to that expressed by many anatomists.

In view however of the statement quoted from Liudkevitch, as to the possibility of the hypogastric join
in certain circumstances lying further out than usual, and in view also of the statements of Velpian, Cooper and others referred to above, one must admit the possibility of hernia occurring in the internal inguinal canal. Such a rupture must pass very obliquely downwards and outwards, and must traverse the transversalis tendon outside the ligament of Poult.

While admitting such a possibility, one is driven by the facts just given to conclude that Velpian's internal oblique hernia is most rare and that ordinarily the protrusion occurs in the middle fossa, to which from this point of view, one would feel disposed to give the name of internal, denoting the other as the supra-inguinal or supra-pubic fossa.

We are now in a position to proceed further, and may state that all direct herniae (inguinal) leave
Leave the abdomen between the ligaments of Hebra and Hesselbach.

In other words, they burst through or are covered by the transversalis tendon between these bands.

It would appear advantageous to cease this interval between these bands. Hesselbach's triangle, immense as the inner portion of that triangle is at present described, has no important relation to service.

Hesselbach's triangle would then lie between pubis, epigastrium and obliterated hypogastrium.

The less resistant the tendon in this triangular area, the more easily may a hernia be produced, and we have already seen (p. 38) that in this respect there is most noteworthy variation; the breadth of this area also varies greatly. (Cf. Plate VI on these points.)

When the tendon is strong and resistant, the tendency to hernia is small, when it is thin or above all where a gap
gap exists, one expects and finds predisposition to the occurrence of hemia.

From a series of measurements of the distance between the bands of Hurl and Hommelbeck in healthy specimens, and in those which presented direct hemia, one finds no reason to believe that greater breadth gives increased liability to hemia.

The number of cases examined however was not sufficiently great to justify one in forming any general conclusion of this point.

Various directions made it manifest that while the direct riguid hemia always passed out between the ligament of Hurl and Hommelbeck, that yet its exact relation to these bands varied.

Note. v. Plate VII

In certain specimens (Fig 1) the rest of the fascia lay simply between the two bands (ep. Plate VII Fig. 3) which were felt tense on either side.
In other specimens (Fig. 2) the neck lay between a very pliable, sharply defined and tense Heuke's band, and that portion of the tendon which passes to the pelvic brim (op. p. 36 & Plate V. 6).

In a third group of specimens the neck lay external to this portion of the tendon, between it and the ligament of the pelvic brim (Fig. 3).

In these cases where the bands were separated by an actual gap in the tendon, the hemic had naturally passed out by that opening.

In certain cases the tendons rested directly on the pubic rami, in others on the sharp edge of the fibrous bridle passing from the quadriceps femoris to the crural arch.

It may have been noted that in several instances there was found passing up on the ligament of Heuke, a considerable branch of the internal pudic artery; it lay therefore
therefore in close relation to the inner aspect of the neck of the hernial sac. (Plate VII. Fig. 2).

While the transverse: tendon is thus recognized to be a structure of primary importance in relation to direct hernia, with the oblique inguinal hernia it has no less important relation.

With respect to the relation of the oblique muscle of the abdomen to
to the occurrence of a hernia, one or two observations only will be made here.

The external oblique tendon lies in the region where the direct variety protrudes, and when well developed must tend to prevent the descent of a hernia.

It is in relation between only to a very small extent of the area between the bands of Hesselbach, lying mainly in front of the former ligament, the rectus tendon projecting but slightly beyond them as a rule.

By the cremasteric fascia it covers the indirect variety of hernia but cannot be regarded as having any importance in its prevention or production.

A more important role is played by the external oblique muscle which forming as it does the superior abdominal ring, has an immediate
immediate relation to all jejunal herniae; in determining or precluding a tendency to hernial protrusion it must obviously be an important factor.

Thus a large and patent internal ring will predispose to hernia by producing a loss of support to the posterior wall of the jejunal canal opposite the ring.

The size of the ring is determined by the strength of the position of the pillars, but also by the condition of the fibrous interlaminaris, which when strong r pull 1 tend to strengthen and contract the ring, with the rest of the jejunal canal.

The ligament of Collins or middle pillar is likewise an important means of preventing the occurrence of direct herniae, when strongly developed, plying that it with the internal oblique tense, being some relation to, and strengthens the lower part of the area between the
bands of Hanil and Desmoulins where
the variety of hemia protrudes.

Sometimes it may be thus noted,
these tendinous structures extend further
out than usual, and afford most
reliable support to this the weak
point in the posterior wall of the
inguinal canal.

Through the median ligament
of the interminuncus pileus, and
the ligament of Callea, the external
oblique muscle of one side of the
body can contract and support
the inguinal canal on the opposite
side. (op. p. 71)

In concluding this part of
the subject one may briefly con-
sider the various structures with
which in their descent inguinal
hemies have relation, and first
one may take the direct hemia.
Covered by the peritoneum
and extra-peritoneal fat, the hemia
must either be covered by the
Bursa ovarii.
Transversalis fascia and muscles, or by the former only, having passed through the tunnel either in a natural gap or one produced by its passage.

More commonly I believe the tunnel is stretched so as to yield from a covering (cp. Plate XV).

By this process the hernia comes to lie in the inguinal canal opposite the internal abdominal ring.

Note. It is not strictly in the canal unless it have passed through the Transversalis tendon which forms the posterior wall.

It is therefore covered by the internal oblique fascia and the superficial tissues, so soon as it passes out of the canal.

To its inner and upper side is the well rounded outer edge of the internal oblique tendon (conjoined tendon) fibres which may also pass under its back going to the cranial arched - the internal oblique does not fuse a covering to the hernia - nor in its
its tendon torn nor split by the rupture in its passage.

Note. Though not unusual the condition might occur of the tendon being torn in that manner, as stated on p. 105.

The ligament of Collis has its curved outer border in relation to the inner and inferior aspect of the hernial sac. (v. Plate XV Fig. 2)

Should the hernia ever occur in the supra-umbilical fossa, it might derive covering from or burst through the internal oblique tendon, and ligament of Collis. It is described as especially piercing the internal pillar of the superficial abdominal ring, in projecting from that opening.

Looking for a moment at the Oblique Variety.

progress of an oblique inguinal hernia, one finds that it enters the deep abdominal ring above the vas deferens and to its outer side, the vessels of the cord lying quite beneath the hernial sac.
The hernia passes down the canal in all its length; its relations then need no further; its coverings are likewise those of the syrinx cord. In certain cases one passes the transverse muscle, taking it as a

stable part in the formation of the circumcrescentic covering, but this is not the rule according to most anatomists, though many hold a contrary opinion.

It is needless to remind the reader of the great attention to all these anatomical relations in an old standing case of hernia. The practical difficulty often in to recognize clinically the direct and the obtuse varieties of

The only reliable guide in diagnosis is the relation of the cord to the sac. It lies, of course, inside the obtuse but outside the direct hernia, but in many cases it is so spread on the face as to render its primary relation unrecognizable.
Part III

On certain causes of Hernia.

Into the multitudinous conditions which have been sum-
marized as causes of herniae in the inguinal region one need not
enter here; they probably, so regard their mode of action, may be resolved
into one of two causal factors, namely, increased intra-abdominal pres-
sure and diminution of local resisting power.

That either of these conditions alone and in fortissimo with
acting together should lead to the protrusion of a hernia will not I
think be regarded as others know reasonable.

The points which I have
seen to make bear upon the
subject of diminished local resistance
As a cause of rupture, and will be based upon the anatomical considerations which have been brought forward in this thesis.

One may readily believe that when the transversalis tendon is well developed the resistance to any hernial protrusion will prove great; this latter has already been alluded to (p. 99) and the important influence in this relation of the especially strong portion of that tendon (ligaments of Hernbach & Heube) has also been emphasized. Yet it may with reason be suspected that, when the dispropportion between the resisting power of these ligaments and the rest of the tendon is very marked, there may be brought about a tendency to hernia.

In dissections of hernia where the protrusion did not appear to be of old standing these bands or ligaments were found specially well developed.
Naturally if the whole uterus be equally well developed (as in Plate VI. Fig. 2) retention would not readily occur, but that inequality of local resisting power should prove a causal factor in the production of haemorrhage, is I think what one would anticipate.

Then in cases of oblique vaginal service, one may hold that, the ligament of Herbstbach being especially developed, the intra-abdominal pressure with more readiness pushed forward the outer limits of the deep abdominal ring, separated them from the resistant external pillar, and so opened up the entrance to the canal.

Alf. A. L. M. Ulpian puts the matter thus; he says that the abdomen and wall to breaken between the cliem and the internel ring than between the ring and the palm, and yields in the former region so as to form a groove leading to wards the canal. — Some
Some such view is indeed necessary to explain how a hernia can be produced in this situation by an equal pressure which the usual method expects to close the vascular opening of the canal.

It being borne in mind that the internal pilar of the ring is a part of the Transversalis tendon, it must be noted that it will become more tenuously resistant when drawn up by the contraction of that muscle. This will render tense the posterior wall of the whole inferior canal (op. Valsalva, Op. cit.) and open the deep entrance so that the peritoneum will form a niche ready for the descent of a hernia.

Such a condition is most completely brought about where the body is flexed on the thighs, and one knows how frequently an oblique hernia descends while a patient is sitting, or while he stoops to lift a weight.
In the latter case he often first becomes conscious of the accident on recovering the erect posture from which the wing is so far as possible closed against cause and force on the unequal protrusion.

Some confirmation of the belief that this position of the body, open the deep wing and allows of the ascent of a derm, is obtained in the fact that in this fluid condition of the parts reduction by tavis may most readily be effected.

In the other hand, and Direct herein... produced herein especially when direct, and where a real weakness of the wall existed, may be expected to occur from sudden increase of pressure on the posterior aspect of the wall, in the erect position, or in Richter plates in the class fluid condition of the body. The weak part of the tendi between the ligaments of the tendo is weakly pressed on and yields.
In the case where the hernia is at once produced during many cases, pre-operated, the tendon has presumably been ruptured.

One recognizes then the importance of intra-abdominal pressure, and abdominal weakness at certain spots in the production of hernia, and one may look upon the latter element as essential, such weakness of course being either natural or morbid.

But it may be readily recognized, that the same pathological state may be brought about in a wholly different fashion; in other words, that a peritoneal sac may be not extruded from the natural abdominal cavity but drawn out of it.

That traction upon the peritoneum from without is an incipient cause of hernia, is however, due to mere imagination, but a recognizable.
able anatomical fact; while engaged in the dissection of the groin I had an opportunity of examining several cases in which there had been developed the condition of Hernia Adiposa.

This morbid state has been recognized as we shall see by many observers, and its significance is pointed out by some among them.

The specimens I examined were not very numerous, nor were the herniae of large size, but taken in groups they illustrated very fully the origin, the process, and the influence of the condition.

One may describe a fatty hernia as a localized increase of the subcutaneous fat, usually observed in relation to the abdominal opening of the inguinal or crural canal. Accurate as there is at these spots a natural depression into which it may develope.
The result of this eventually is to open up the canal by continuous growth of the fatty mass.
In the instance of the deep abdominal ring the interval of this process is very great, for so we have already seen, the walls of that inguinal canal lie normally in close apposition, and the intra-abdominal pressure tends to maintain that relation.
If, however, a mass of such form in the external inguinal fossa adheres to the Poupart's ligament, as it increases it tends to insinuate itself in front of that ligament and separate it from the anterior wall of the canal. Such a process may begin so as till the canal is wholly occupied by the elongated fatty projection which ultimately projects as the external ring.
I have observed it in the sacrococcygeal region, and also quite separate therefrom, lying above it. As the fat mass increases in size...
size and weight, it renders the canal more patent still, and by its weight and also by means of adhesion which it forms with the superficial tissues, the peritoneum gets drawn down after it.

This process begins as a mere puckering of the membrane at the point where the fat mass is attached to it; this increases until a distinct digital depression is formed which increases in size and depth, passes into and through the canal, and forms a sac ready for the reception of the bowel or other contents.

Note. All these stages I have had opportunity of seeing in actual dissection. v. Plates IX, X.

The method by which this is brought about is two-fold; in the first place the peritoneum being easily displaced by stretching of the loose subperitoneal tissues, passes down the required canal by sliding on the subjacent layer, if one may...
use the expression; but subsequently
though not in the first instance, there
occurs a stretching of the tissues
of the membrane itself.

The supposition that the
contents of a hermion enter a previously
formed sac, finds support in the
developmental fact that the testicle
in like manner descends into a
Scrotal sac made ready for its re-
ception.

At this point one finds seemingly
concurring with Sanger that the
Scrotal pouch exists before the descent
of the testicles has advanced so far that
a peritoneal pouch has been formed by
the gland pushing the membrane

And likewise (Dunkelhaw p.73)

pays that the proxiem vagintis has
heired the structure with all its layers
before the testicles are left the abdomen.

An relation to the formal formal
causal fact hernia may even more
commonly be noticed, if the direction
be
be carefully performed. The fascia lies in the ticienmost compartment of the femoral sheath, and gains the groin, where it forms a lumbrum of varying size. It often forms, just ad

descem to the superficial fatty layer and if of small size may be removed with that layer and so escape notice. (Plate VIII) In this case also the peritoneum becomes puckered, from into a digital depression (Plate IX) which ultimately become a deep sae filling the canal and reaching to the groin (Plate X).

Acute rapid movement, or in
cresed abdominal pressure from any cause, may determine the passage of a knuckle of bowel into the sac, then
formed, whether injured or not.

In one interesting direction Direct Superior

the same mode of origin was observed in relation to Nesselbruck's triangle.

The condition was in the earliest phase, inasmuch as the peritoneum was not seen puckered;
Yet on stripping it off it was found to be attached to a small fat mass lying just external to the ligament of Hulse. On removing the fat, it was found to project into a fossa bounded internally by that ligament large enough to admit the point of a finger, which pressed inward in front of the ligament and projected at the superficial abdominal ring.

Such an appearance would lead one to surmise that the de-velopment of a direct ligament hereina may sometimes pursue the following course.

(1) The formation of a hollow or depression of the wall, the transversali tendinum, between the heads of Hulse and Hemelrick yielding under the pressure of a mass of fat (v. Plate IX)

(2) The filling of this fossa after a time by a peritoneal fluid.

(3) The entrance of the intestine &c., into the sac thus formed.

The same specimen—
In this condition, also showed a
tumour in the right femoral canal
in the left inguinal canal.
It showed also "lipoma of the
inguinal alba". This morbid state
is referred to by Richter (Op. cit. p.74.)
and J. Hutchinson Junr. (Trans. Path. Soc.
London 1886 p.451)

The facts of such a case
can afford some explanation of the
clinical experience of many observers
namely these Richter, Coper, Dr. C.
Coper & Cloquet, that individuals
who become rapidly emaciated are
prone to the occurrence of hernia.
It is obvious that in the
absorption of the fat in such a
form as I have just described, the
hollow becomes a natural path for
the peritoneum to enter; similarly
in the case of the inguinal and
femoral canals when the irritating
fat is absorbed in the general process.
of excision, they are left empty and lay; also it is conceivable that
through the process of absorption, the
peritoneum will become drawn still
more into the canal.

In the cases which I have ex-
amined the fat did not to any
practicable degree envelop the peritoneal par-
but was attached to its funder only
so that in the progress of an
operation, when the neck of the sac
would attract attention chiefly, its
presence might readily be overlooked.

The pressure exerted by a
hernia of any size, it may also
be said, might cause the absorption
of the fat mass which was, so to speak,
the pillow of the hernia itself, or so
attent it as to prevent its recognition a
as tissue distinct from the superficial
fat.

It is known not uncommonly
met with and recognized in operation
on hernia, and must therefore be
kept.
Kept in remembrance for while to mistake it for suppurative flat will only cause delay and temporary difficulty to the surgeon, another form of much greater moment must be founded against that is mistaking the for a portion of intestine, and attempting to reduce it along with the whole face. If such attempts proved successful one might return just in a state of strangulation unrelieved into the abdomen.

This condition of **Mesui Adiposa** has as I know, Rarely been recognized. The earliest reference I have found is that by Morgagni in the year 1743; in his work "De Motlris Cometis" he reports a case recorded by one Peschier of whom no more is known.

In the year 1810 Pellegrini described with great fulness case of the kind occurring in the Anatomy rooms of Paris, and the clinical cases on which he operated.
His notes of these cases are most interesting, and may be found in his Clinique Chirurgicale vol. iii p. 33-42.

The facts were described by Piletan, and as I always met with it, added, bearing as it were before the sentence, but believing the same, and projecting into it. In all cases Piletan was able to reduce the mass. This was certainly impossible in most if not all of the cases I examined.

Piletan further believes that this condition purely is followed by that of intercostal.

Amongst British writers not much notice is taken of fatty herniae. Sir J. Page has made allusion to them, and Mr. Gay in 1842 referred to them in the London Pathological Society.

Professor Akedew in his Edinburgh Medical Journal for 1870 describes some most interesting instances, and directs attention to the importance of carefully examining the fatty mass, to ensure that it contains no bone.
in its interior, in to distinguish it also from cæcum (loc. cit. p. 776).

Of the cases he then recorded
was of cæcum adhesæ in the intestine circular form; in another case the growth projected "through" the conjoint tendon.

In 1886 J. Hutchison first comm.
nunicated a number of cases of this
condition to the Pathological Society of
London, together with a very complete
table of the recorded instances of fatty
peritonæum (Trans. Vol. XXVII p. 251.)

Mr. Hutchison's remarks on the origin
and value in producing lesion, of
these fat-masses are most instructive,
and interesting.

By another French person, these fatty
peritonæum have been frequently alluded to.

Thus Tilly (op. cit. p. 624) has
observed that such masses in the sub-
peritoneal tissue may pass into the
bowel, and draw after them the peritoneum.

Volpean and the German, Kauferinck
Rüdinger make passing allusion to the
condition.
condition, the former describing the fatty hernia as hypertrophied adipose bodies of the harena propria.

Cloquet (Aechmeus Path. p. 25) says, "presses were similar to those of Jelluy,
and for one to describe. An example of Jelluy's in the trunal canal.
In the Aechmeus Path. (p. 41) it
states that pressure from within, or
traction from without, or both combined
may prove the efficient cause of
a rupture.

These hernia offer in the
inguinal or trunal canal, very much
in size. In one of Professor Aechmeus' cases, the hernia was as large as a
small orange. Most commonly, they are
so small as to escape notice during life,
but as small, bumpy pimple, they became
in the region when hernia occur, and
painful to pressure and imprompty to
impulse or coughing might always
suggest to the mind the possibility of
lest of a hernia of sub-peritoneal fat.
If cut down upon the fat would
be
found enveloped in a delicate mem. 
braum chette, and divided into 
lobes of large size.

As I before stated the specimens 
which I have had the opportunity 
of examining were all small, vary 
ingen in size from that of a silkw 
thread of a large chenonce; yet they 
illustrated very clearly the early 
phases of the process, and the mode of 
development of a true henize as 
a sequel of it.
Part IV

Notes on the strangulation of Struvius

A matter of great practical interest in the study of Struvius must necessarily be a consideration of the cause, and means of strangulation, and it will now be fitting to note one or two points in this relation which have engaged the attention, in the preceding pages.

It may be said that two causes of strangulation from herniated viscera, have been generally recognized viz:- pathological change, and altered anatomical relations; their relative importance has by been a matter of dispute.

With the former as an initial cause we are not so much concerned here - it may consist of a change in the neck of the sac, or in the structure.
structures about the neck, cancer frequency is of importance in cases of old standing disease.

Hepat indicates looks upon it as the main cause in all cases, and

Oëvra, Schenck's V Leuk, ascribe most condition of pharyngitis to thickening of the neck of the larynx.

Scharp holds that the chief

malignant cause is "increase of the contents of the larynx by gas, fluid, toxins," while thickening and contraction of the larynx at its neck predispose to the condition.

There can be no doubt that strangulation these various changes play a role of much importance in the production of pharyngitis in the case of many disease, but neither would it seem in reason to doubt that unchanged anatomical structure may prove no less effective agents. In this ques-

tion we may devote a little attention. Guttierio (Op. cit. p.1) combats the prevailing view of his time, giving
the definite opinion that the
"inner opening of the Canal is a
muscular opening... capable of a
great deal of contraction, which is
usually the cause of strangulation in
recent herniae."

If Cooper be consulted
one finds the same cause of stran-
gulation admitted by him; he his-
tantly records cases of strangulation
of oblique inguinal herniae above the
external ring, and in describing
the Transversalis muscle says, "It is
this circular insertion of the Trans-
versalis which is the cause of ple-"dix
in inguinal herniae... in the course
of the canal and nearly at the upper
ring." (Structure & Disease of the In-
testine, p. 14).

Alf. Esque + Righter also allow
that "perimodal strangulation" may
occur the deep ring having "contracti-
ble power."

I have had unfortunately no
opportunity of determining by actual
dissertation the agent of stranulation in any particular case, and
whether it was in a healthy or in a pathological condition; the con-
clusions arrived at are therefore the results of a study of the
relations of herniae which were not strangulated, but although less
reliable in those based on the positive
evidence of dissipation, they are
I believe supported by clinical ex-
perience especially as to the mode of
onset and the extreme severity of
stranulation in many cases.

While quite leavable to con-
firm the views of Galenius that the
crystallisation may be produced by
the contraction of muscle fibres directly
are it nevertheless inducible to believe
that the internal pillar of the deep
ring, i.e., the ligament or band of ilio-ischial,
and the pillars of the outer ring may
so close the rings when the herniae
have contracted with which they have seem to
be continuous, that a hernia of present
will
will be strangulated.

Such a view was long ago expressed by Lister, Resp. Indeed, what the con-
stricting effect was, he did not state, entitling himself with saying that
at least some of the constriction might occur.

I have already alluded (pp. 112, 113) to the mode by which an obsti-
nuephalum may be supposed to enter the deep ring and become con-
stricted by the ligament of Hendachi, being drawn up forward time by
time contracting fasciculi muscles.

By some peculiar theory these frequent cases may be explained in
which the rupture occurred for the first time on the occasion of some
violent effort having been made (such as struggling to raise a heavy weight),
and in which reduction could not be

Such cases are probably often con-

bral or the rupture is preceded by

-
a Struria Rectae (v. supra).

With regard to strangulation occurring at the inter-abdominal ring, there would seem to be at least some probability judging purely from anatomical grounds, that it may be produced by the various fibrous structures which lie in relation to that opening, the two pillars and the intercoliumus fibres.

These last, as Vilrayeau looked upon as a principal cause of constriction (Op. cit. Intro. p. 145). They and the ligament of Colles may at all events be regarded as of some importance in this relation.

Richter & Princip Polo regarded open muscular strangulation as being chiefly due to the external oblique i.e. as occurring at the superficial ring. There are however numerous cases where that muscle is not involved in this manner, and it is not impossible, with reference to the ligament of...
Homestead, or as he called it "Times
victoria docked," the ring Lusheka
pays. One can scarcely believe that
when its usual strength this wound
could produce pharyngitis, but in
old-standing cases might do so...being
hypopharynx and pharyngitis (Op. cit
Il No. p.59) .

Scarpa denies that sperm
can be regarded as a cause of pharyn-
gitits (Op. p.126), and describes cases
in which he found the backs of the
parasites and resistant. So as to be
withe difficulty phlegm by Leblanc
injection, when the ring was very

With respect to the other ring
the same author holds that the
contraction of the natural oblique
line on the Obbo alone could not
diminish the ring (Op. 149). He also
cites the instances of the opening for
the true case in the pharynx to
prove that opening in leucemias are
not liable to variations in their size.

But
But that variety differs very widely from both abdominal rings in that the tension fibres radiate from it in all directions, and the effect of the muscular belly acting on them all alike is to keep the opening patent.

An objection to the idea of strangulation from narrowing of the canal, on the ground that the cord would likewise be affected, this preoccupation would seem ground for objection for pressure sufficient to reduce the strangulation of a bundle of bowel might readily exist without any degree disturbing the cord.

Attention we have been confining our attention to the in.}
That when the ring has been divided by operation the condition is necessarily relieved.

It must be recalled that the variety of hernia lies in relation to two well-defined tendencies, one of the transverse muscle, i.e. the ligaments of Heel & Hardcastle; it is more than conceivable that they should prove agents of construction not alone when pathologically thickened and swollen, but also in the normal state, especially as one finds that from the relaxation and traction exercised by a hernia these ligaments become very tense. The Heel band in particular often presents a very distinct sharp edge.

Seeing that this band is not acted on independently, by muscular contraction, it will not be able to constriction is a perfectly recent hernia, save in those cases in which the tendon has been torn by the hernia, or a gap has existed in the tendon so
Cloquet (Rich. Ann. p. 34) describes a case of this disease in which however he says the gap was in the tendons of the Recti.

It would then seem to be of importance with respect to the mode and rapidity of manipulation, whether the third division takes place by rupture of the Transversalis tendon, or by its extension under pressure.

One may at this juncture add a short note on the constitution of the Transversalis muscle, for though they are not directly covered in our present study, yet by reason of the importance in this connection of the Transversalis muscle, one may perhaps be allowed to allude to them.

It has been seen (p. 36) that the insertion of the Transversalis extends out as far as the pelvic fascia below, but it is not the case that structure from
from view posteriorly, so to form
to all appearances the internal
boundary of the deep opening of
the crural canal.

It has in many cases a
well marked bay (Plate VI Fig 144).
so that one may fairly suppose
that it might prove in general
heuristic, a cause of strangulation.

In this relation the following
from Astley Cooper's work is of interest;
he says "the tend that produces the
contraction is not entirely a
division of the popliteal ligament, but
is also formed by a tendineous
band on the fore part of the femoral
patella, where the fascia lata continues
passes in a tunnel from below
the biceps ligament to be inserted

If the finger be introduced
into the crural canal from the lower
end, the edge of this structure may
be felt deeper than that of the
ligament of the biceps, which is often
less pronounced, and is separated
from the other by varying in

terms.

The practical import of such
a fact should be to make one through
in the "nicking" of the constriction,
but this is anticipating points
into which we shall presently
enter.

That peritoneal hernia may also
be strangled by Giebert's ligament
is undoubtedly, and Hepp's ligament may
likewise prove a constricting agent.

These notes on the strangu-
lation of Hernia may be summed
up in these prepositions.

While pathological change in
the sac or the structure about it, may,
and do cause stranguation, there is
such a condition as spasmodic
stranguation, or stricture of the
passage through which the hernia
does pass, by the structures
which bound it.

Conclusions.
This may be due either to the action of the External Oblique, or of the Transversalis muscle.

Pain and inflammation very commonly are found combined.

The importance of recognizing the occurrence of phlegmation by the Transversalis is apparent; for if we ignore it we run the risk of "reduction in bloc" of the tumour, or of failing to recognize and relieve the somewhat rare condition described by Villaroy as "Fascia Intervisceralis" in which the gut enters the deep ring, passes up through the so-called oval of the canals (i.e. fibres of internal oblique) and lies between the external oblique and the transversalis. This direction of passage is supposed to be determined by remnants of the superficial ring. In such a condition the deep ring is the seat of constriction and must be divided.
Part V

Deductions as to the treatment of Hernia

Without fully entering on this part of the subject, we may perhaps refer to certain points on which these foregoing notes have a more direct bearing.

(1) Belief in "spasmodyc strangulation" gives one great confidence in the use of chloroform when the reduction of the swelling is not readily effected, and also in the exhibition of quinin and the use of warm baths at the proper stage.

(2) The possibility of the Transversalis Fascia muscle being the constricting agent makes one careful in employing laxis, thoroughly to relax the deep ring (cf. p. 129) and to secure the reduction of the tumour within the cavity of the abdomen, beyond that ring.
also in operating to divide the deepest constricting bands.
(3) The same fact should likewise be borne in mind during operation for relief of stranguination, lest the peritoneum be wounded. This accident has occurred at the back of the sac and might also befall the membrane internal to that point.
(4) In the question for the real cure of hernia, one's object is not alone the closure of the existing hernial channel, but the prevention of all future prol.ulsion so far as may be possible. If one consider in this relation the preceding remarks on the causation of hernia, it would appear that to gain the desired end one must by the oper.ation leave the inner aspect of the peritoneum as far as possible without depression, and secondly absolutely close the inguinal canal from the...
The internal ring downwards.

On theoretical grounds then one would advocate ligature of the neck of the sac as high as possible, and removal of the sac, the stump being returned within the abdomen. If the neck of the sac were perforated by the needle carrying a ligature, it could be tied in two portions, which would enable one to cut the stump short with greater safety, and would also give less marked depression on the scrotal surface.

With reference to the closure of the canal one would place before oneself in the first instance as an object, the firm stitching of the ligament of Hesselbach (the internal pillar of the ring) to the anterior wall of the inguinal canal, in such fashion as to close the entrance without compressing the spermatic cord. Therefore the canal in all its extent would be
be dealt with, the posterior wall i.e. Transversus and Intercus obliquin
 Conjunct tendon) tendons being stitched to the anterior wall i.e. Spinae co. of
 the Intercus obliquin. Finally the superficial ring would be closed by
 drawing together the two pillars and also including the middle
 pillar in Ligamentum Collicii in one of the stitches.

The exact method by which
 these results are arrived at is of
 minor consequence; such an oper. 
 ation as that of Mr. MacEwen
 seems to fulfill the conditions so
 far as his treatment of the walls
 of the canal is concerned.

The deepest and first stitch
 could readily be inserted in some
 such way as this; the operator's
 forefinger (the right in the case
 of a left inferior laryngeal nerve) is introduced up the canal and
 hooked round beneath the Ligament
 of strap. A fine needle such

Closure of Canal.
Plate XVI. Fig. 2.
so that of Dr. Beecroft, threaded with carbolized silk is made to pierce the external oblique, to traverse the vaginal canal above the everted forefinger, and to pierce the Transversalis and Transversalis fascia.

The point should then be guided downwards by the finger in the canal, so as to pierce again the Transversalis, to cross the canal below the finger but above the corn, and appear through the aponeurosis of the external oblique. The end of the thread being secured, the needle is withdrawn, and when the two ends are drawn together, the loop brings the ligament of Philiberte firmly against the anterior wall of the canal, without at all incriminating the corn.

One or two similar stitches would secure the canal, and as already stated the length of the series should when tightened draw together all these pillars of the outer ring.
This it will do if passed from the ring one end through the middle and internal pillars from their deep aspect, the other end similarly through the outer pillar.

It may be supposed that when in old standing cases the canal has become shortened and unnaturally direct, there may be no space for any intermediate stibbe or all and two might prove insufficient.

While all such theoretical considerations cannot be accepted as other than tentative, until applied in practice one may yet regard them as legitimately proceeding from the anatomical and other facts recorded in the pages of this thesis.
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