

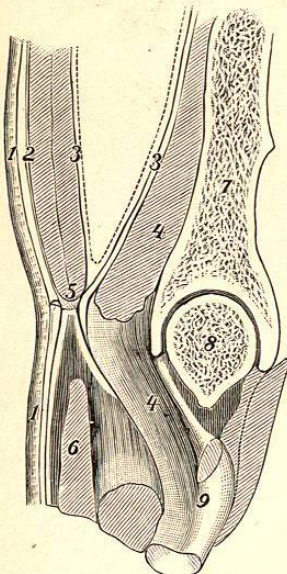
CHAPTER XXII.

VARIETIES OF HERNIA.

INGUINAL HERNIA.

AN inguinal hernia leaves the abdominal cavity above Poupart's ligament, which stretches between the anterior spine and the symphysis, and consists chiefly of the lower free margin of the aponeurosis of the external oblique muscle. This ligament is reinforced by the iliac fascia, by the fascia transversalis, by the superficial fascia, by the superficial layer of the fascia lata, and by the femoral portion of the iliac fascia. After separating the skin the cord will be seen at the side of the symphysis, covered with loose fat and connective tissue. The testicle develops at about the level of the third lumbar vertebra, and lies upon the fascia immediately behind the peritoneum. The spermatic vessels enter through the mesorchium, the spermatic artery on the left side from the aorta and on the right side from the renal artery; the spermatic vein on the left side from the renal vein and on the right side from the vena cava; and the spermatic nerve from the genitocrural. At the end of the third month a cord can be detected connecting the lower end of the testicle close to the epididymis with the internal oblique and transversalis muscles, and leading down along the track which the testicle follows later. This strand is the gubernaculum Hunteri. The testicle descends into this and becomes partially surrounded, and at the end of the seventh month reaches the fundus of the sac. The testicle is intimately adherent to the peritoneum, and the external covering becomes blended with this membrane, so that on descending it drags the peritoneum down with it. The peritoneum previously forms a pouch in the region of the internal ring, and the testicle enters this at about the sixth month and then follows along the inguinal canal down into the scrotum. The portion of

FIG. 237.

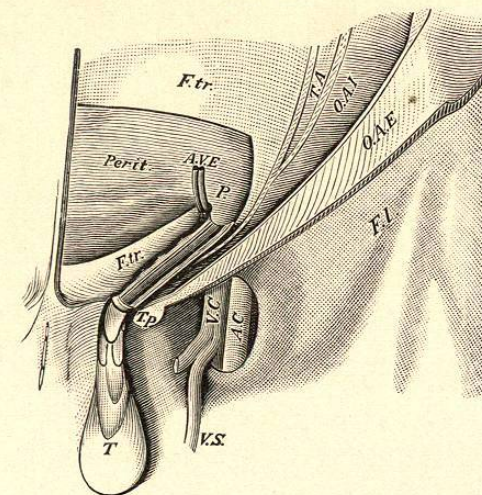


Sagittal section through the lacuna muscularis to show the fascia: 1, superficial fascia; 2, aponeurosis of the external oblique; 3, abdominal fascia, transversalis in front and iliac behind; 4, psoas; 5, Poupart's ligament; 6, sartorius; 7, ilium; 8, head of the femur; 9, lesser trochanter; two layers of the fascia lata pass from below to Poupart's ligament; the dotted line is the peritoneum. (Henle.)

descending it drags the peritoneum down with it. The peritoneum previously forms a pouch in the region of the internal ring, and the testicle enters this at about the sixth month and then follows along the inguinal canal down into the scrotum. The portion of

the peritoneum accompanying the testicle into the scrotum is called the processus vaginalis peritonei, and the first bulging of the peritoneum is called Seiler's blind sac. After the testicle has reached the scrotum the larger part of the tunica vaginalis above becomes obliterated. Only that portion remains which surrounds the testicle itself and forms the tunica vaginalis propria testis. The internal abdominal fascia, or the fascia transversalis, is also pushed down ahead of the testicle, and covers the whole structure as the tunica vaginalis communis funiculi spermatici et testis. This layer is covered with structures taken from the external abdominal wall, such as muscle-fibres

FIG. 238.



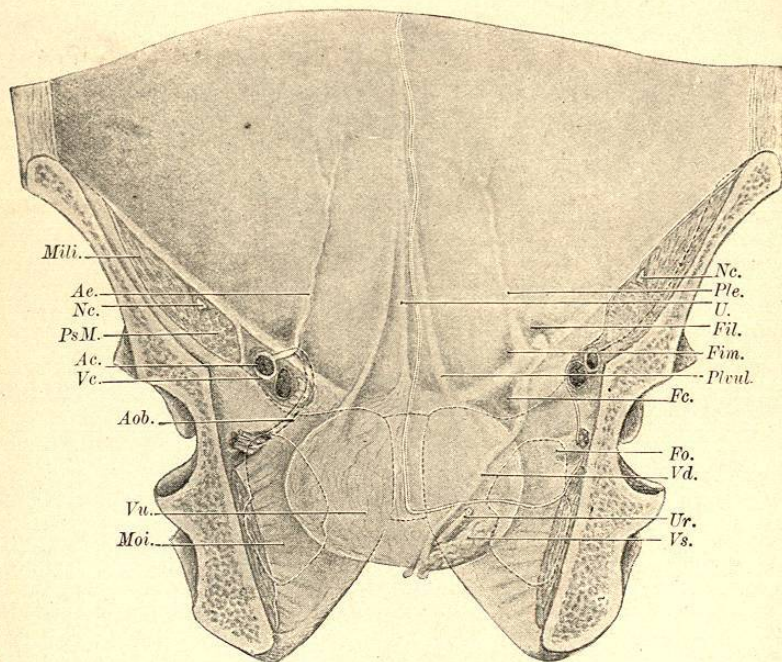
Showing the inguinal canal, abdominal muscles and fascia transversalis partially removed. Tunica vaginalis communis removed in front. OAE, external oblique; OAI, internal oblique; PA, transversalis; Tp, tuberosity of pubes; AVE, deep epigastric artery and vein; Ftr, fascia transversalis; FI, fascia lata; P and Perit, peritoneum; T, testicle; AC, femoral artery; VS, saphenous vein.

from the internal oblique and transversalis (cremaster), and connective-tissue fibres over the opening of the external abdominal ring (inter-columnar fibres).

If the cord is made tense in an adult, it is possible to pass the finger into the inguinal canal through the external abdominal ring, formed by a split in the aponeurosis of the external oblique muscle. The external angle is pointed, and the margins are inserted into the symphysis and spine of the pubes. These margins are called the pillars of the ring, and in women are about 7 to 10 mm. (0.28 to 0.39 inch) apart, while in men they may be 27 mm. (1 inch) apart. This split in the fascia is made a ring by the archiform fibres above and externally, and by the ligamentum collesii below and internally. The cord is surrounded by considerable connective tissue, which is attached to the margin of the ring above and represents originally the superficial abdominal fascia, or fascia of Cooper.

If the external oblique is removed, the internal oblique, which in this region is intimately adherent to the transversalis muscle, will be seen. These muscles are attached to the lateral portion of Poupart's ligament, but soon pass horizontally inward to the sheath of the rectus muscle, while Poupart's ligament runs downward and inward. Between the muscles and the ligaments is a free space for the passage of the cord. This split also varies considerably in males and females, and in men may be 3 cm. (1.4 inches) broad. Toward the median line it is covered by the sheath of the rectus muscle. Beneath this is the

FIG. 239.

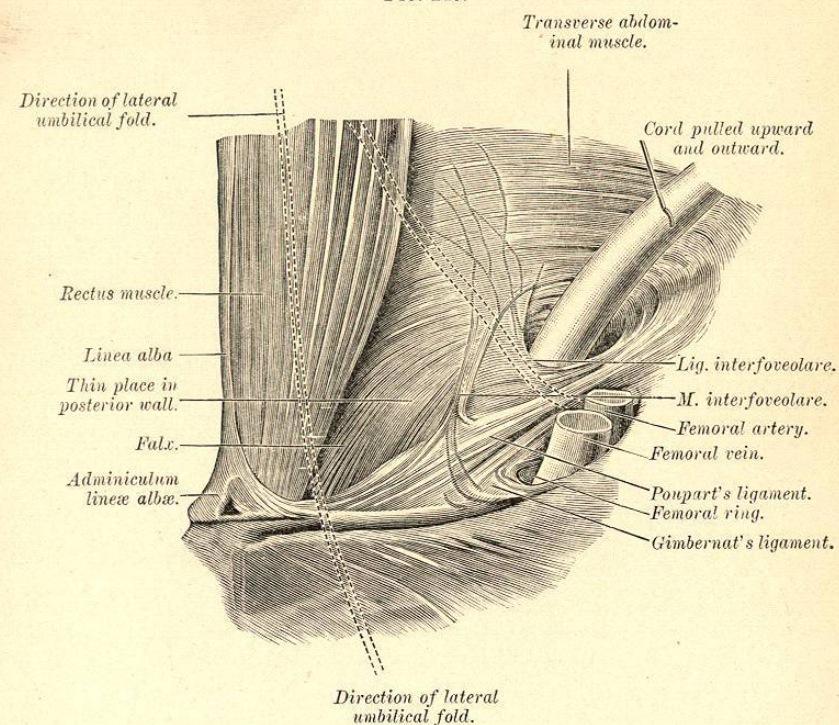


Anterior abdominal wall from within, peritoneum removed on the left side: *Mili.*, internal iliac muscle; *Ae.*, epigastric artery; *Ne.*, crural nerve; *PsM.*, psaos; *Ac.*, art. cruralis; *Vc.*, femoral vein; *Aob.*, abnormal course of obturator; *Vu.*, bladder; *Moi.*, obturator internus; *Vs.*, seminal vesicle; *Ur.*, ureter; *Vd.*, vas deferens; *Fo.*, obturator foramen; *Fc.*, femoral fossa; *Pivul.*, lateral vesico-umbilical fold; *Fim.*, internal inguinal fossa; *Fil.*, external inguinal fossa; *U.*, urachus; *Ple.*, epigastric fold.

fascia transversalis, and then comes the subperitoneal fat, and finally the peritoneum. If the abdominal wall is seen from within, and a little tension made upward, five folds will be seen. There is, first, the plica vesico-umbilicalis medialis, reaching from the summit of the bladder to the umbilicus, and containing the obliterated urachus. Then there are two lateral folds, reaching from the side of the bladder to the umbilicus, which are the plicæ vesico-umbilicalis lateralis, and contain the obliterated hypogastric arteries. Still farther out, about half-way between the anterior superior spine and the symphysis, are

the remaining folds, which pass vertically upward and contain the deep epigastric arteries. Poupart's ligament forms a distinct band, and the places where the above-mentioned folds cross this structure are more resistant, so that the intra-abdominal pressure produces fossæ at their sides. Only those at both sides of the deep epigastric arteries are of interest to the surgeon. These are called the inguinal fossæ, one internal and one external. The internal one is on a level with and directly behind the external ring, while the external inguinal fossa is a little higher and corresponds to the place where the testicle

FIG. 240.

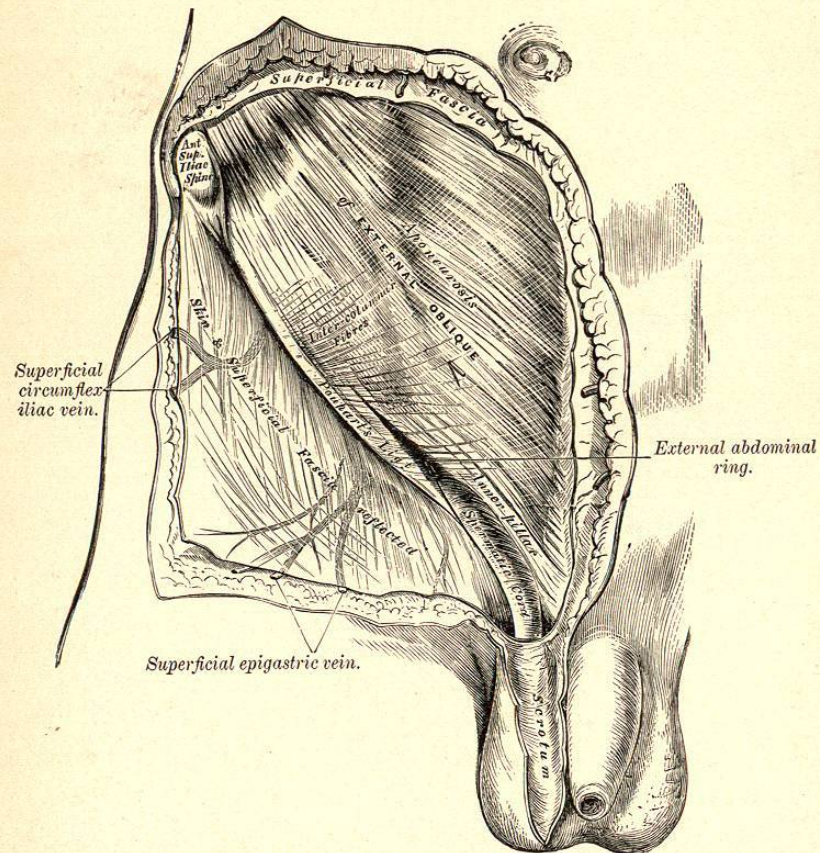


Internal inguinal ring from within after removal of the peritoneum and fascia intra-abdominalis. (Spalteholz.)

left the abdominal cavity, pushing the peritoneum and the transverse fascia ahead. The beginning of the inguinal canal is in this fossæ, and the opening is called the internal abdominal ring. If the region is inspected a little more closely, several other bands will be noticed to meet in this region. The spermatic vessels and nerves and the vas deferens meet in this region to form the cord. The canal itself between the external and internal ring is 2.5 to 5 cm. (1 to 2 inches) long, and is directed from without downward and inward. The walls are made up of various structures in the oblique course, and the opening of the canal is completely filled by the structures contained in the

cord that are held together by the common tunica vaginalis. The coverings of the testicle in the scrotum are: the tunica vaginalis propria testes, the visceral fold of which becomes united with the tunica albuginea and is formed of peritoneum. The tunica vaginalis communis consists of various parts—fascia transversalis, cremaster muscle, and intercolumnar fibres. These coverings of the testicle are surrounded by the layers of the scrotum itself, and between the two there is always a layer of loose connective tissue which allows the

FIG. 241.

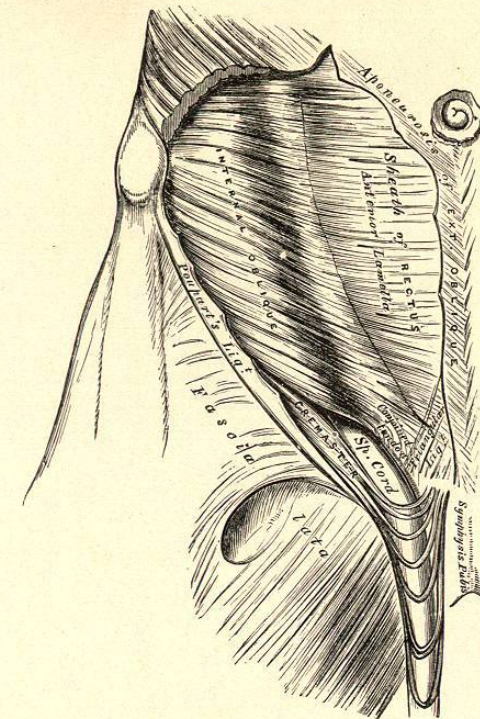


Inguinal hernia. Superficial dissection. (Gray.)

testicle to be freely movable. In the fundus of the scrotum there is a point of union between the testicle, which is a remnant of the gubernaculum. The tunica dartos is a membrane containing many smooth muscle-fibres, and is a prolongation of the superficial fascia, never containing fat. This is covered by the skin itself, containing many sebaceous cysts and hair-follicles. This skin is thrown into many folds, is very elastic, and presents in the median line a raphé extending from

the penis in front to the anus behind. The conditions are very similar in the female, although the canal is much narrower, and contains the round ligament which comes from the muscular substance of the uterus and finally becomes lost in the labia majora. This structure also contains fibres of the internal oblique. The ovary descends just as the testicle, but usually remains in the true pelvis. The gubernaculum Hunteri is partly lost in the round ligament, and a vaginal process of peritoneum is formed which soon closes. Sometimes it persists after birth, and is known as the canal of Nuck. In rare cases the

FIG. 242.



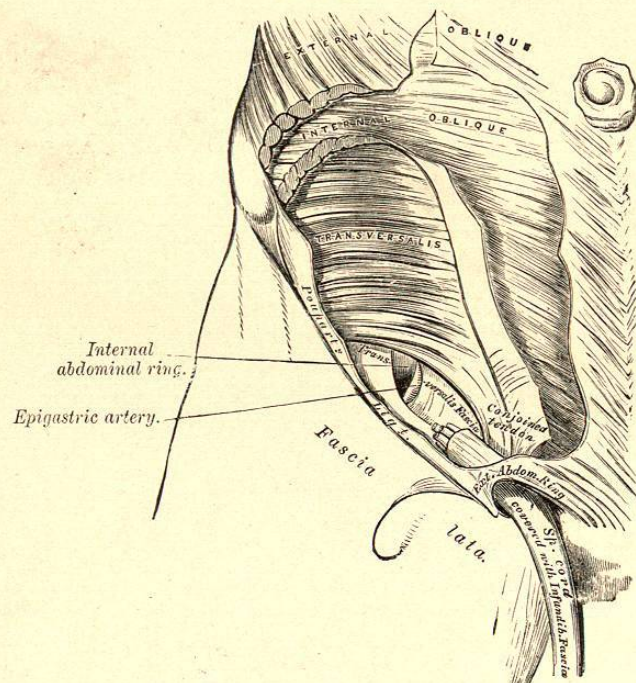
Inguinal hernia. Dissection showing the internal oblique and cremaster. (Gray.)

ovary comes down as far as the inguinal canal, and the conditions then resemble very closely those of an undescended testicle. The gubernaculum Hunteri, which originally forms the round ligament, is at first hollow, which explains how cysts of the round ligament occur at times. Other cysts may develop in the canal of Nuck.

The inguinal region predisposes to hernia because in males at about the seventh month of foetal life there is a well-developed typical hernial sac, the processus vaginalis. It is, however, very uncommon to have any viscera enter this canal during foetal life, and normally it closes at a time when the intra-abdominal structures are not pressed against this

weak place. After the testicle has descended, the track is surrounded by structures of little resistance, which favors the escape of viscera and explains how inguinal hernia is so much more common in boys. The inguinal canal, which is the seat of exit of a structure of considerable size, is always insecurely closed, and the tunica vaginalis communis, especially the funnel-shaped commencement, the so-called fascia infundibuliformis, favors the development of hernia. The internal inguinal fossa is produced by pressure over this less resistant region of the abdominal wall, for in the region of the external inguinal ring the wall

FIG. 243.



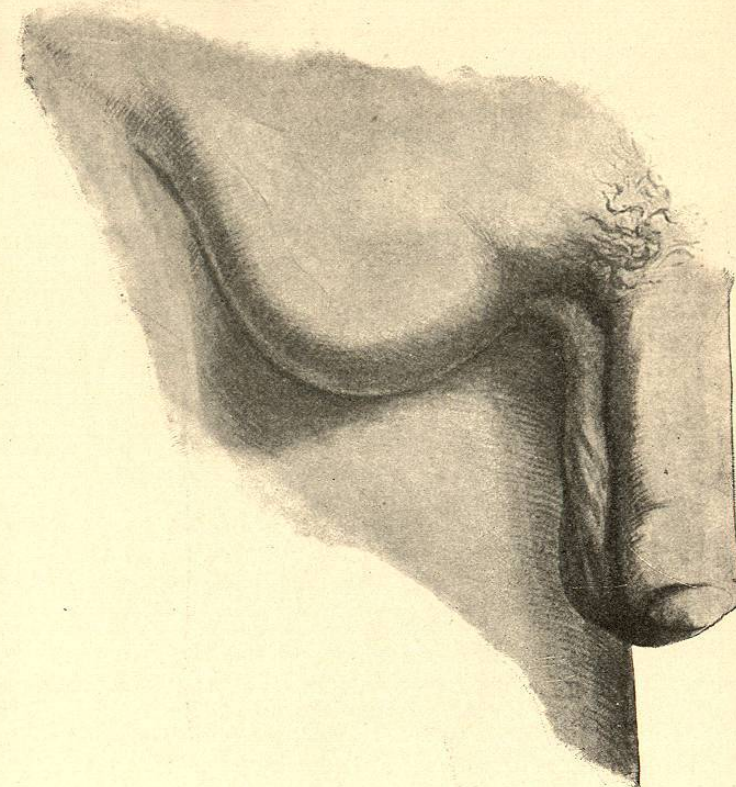
Inguinal hernia. Dissection showing the transversalis muscle, the transversalis fascia, and the internal abdominal ring.

is more or less completely devoid of muscular structure, and as the two places correspond so closely it can readily be understood why rupture not infrequently takes place in this region.

Oblique Inguinal Hernias.—These follow the same course that the testicle took to reach the scrotum. The route is pointed out by the course of the cord, and the hernia enters the tunica vaginalis communis which surrounds it and guides its course downward. For this reason the vast majority of oblique inguinal hernias sooner or later enter the scrotum. If an inguinal hernia is of any size and does not enter the scrotum, it is in all probability not oblique. The cord is usually behind the hernia in the region of the internal ring and throughout the entire

inguinal canal. Outside of the external ring the cord may be in front of the hernia, or it may be split up so that its structures are spread out over the sac. A fresh hernia of this sort always has an oblique course and is covered by peritoneum, subserous connective tissue and fat, tunica vaginalis communis, cremaster fibres and connective-tissue fibres from the intercolumnar fascia, superficial fascia, which in the scrotum contains smooth muscular fibres, the tunica dartos, and finally skin.

FIG. 244.

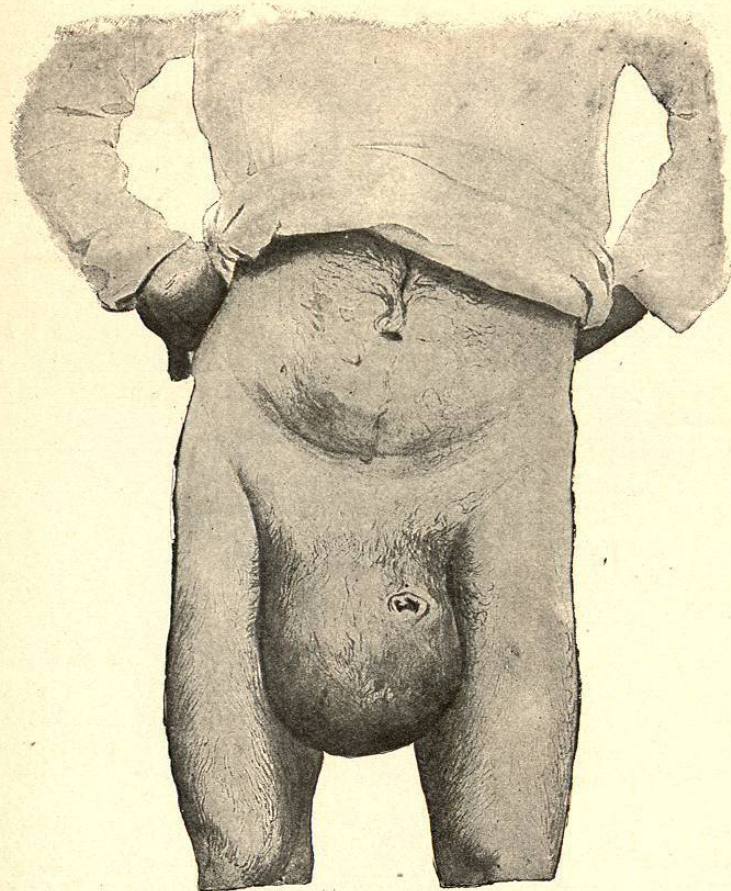


Indirect inguinal hernia (bubonocoele).

Between the tunica dartos and the tunica vaginalis, and between the tunica vaginalis communis and the hernial sac, there is always some loose connective tissue, which favors separation of the layers. It is not always possible to find all of these layers, because they undergo more or less change in the course of time. A recent inguinal hernia passes through two tight places in its course—the internal and the external hernial ring. As the hernia increases, the relations change somewhat. The rings become enlarged—*i. e.*, the median portion of the internal ring and the lateral portion of the external ring—so that finally the

two almost overlie each other. The intervening structures become adherent, so that there is no longer an internal and an external opening, but a simple ring surrounding the neck of the sac. When this condition exists, the term "oblique" no longer applies, of course, for the direction is just as direct as with hernia in the internal inguinal fossæ. The relations, however, to the deep epigastric artery are unchanged. Enlargement of the inguinal rings is usually associated with

FIG. 245.

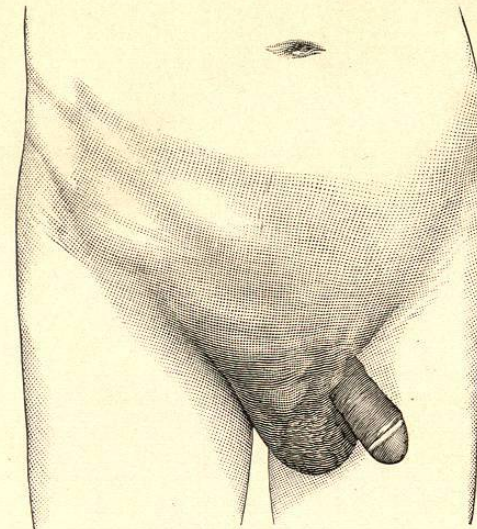


Scrotal hernia (Massachusetts General Hospital, Dr. H. H. A. Beach).

relaxation and atrophy of the muscles, especially in the region of the lower free margin of the internal oblique and transversalis. Oblique inguinal hernias are subdivided according to the stage they are in and according to their size. The inguinal ring may admit a finger easily, and on coughing an impulse of the peritoneum will be detected. This in itself is not absolute proof of a hernia; but when this condition is

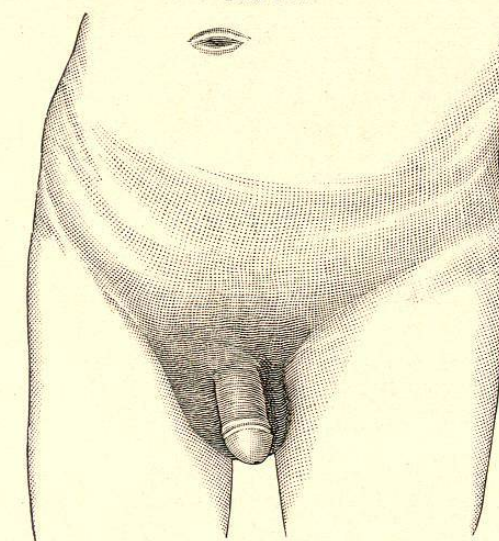
much more marked on one side than on the other, usually on the right side, it may be of corroborative diagnostic significance. If on coughing or straining some viscera enter the hernial sac and go back after

FIG. 246.



Interstitial hernia.

FIG. 247.



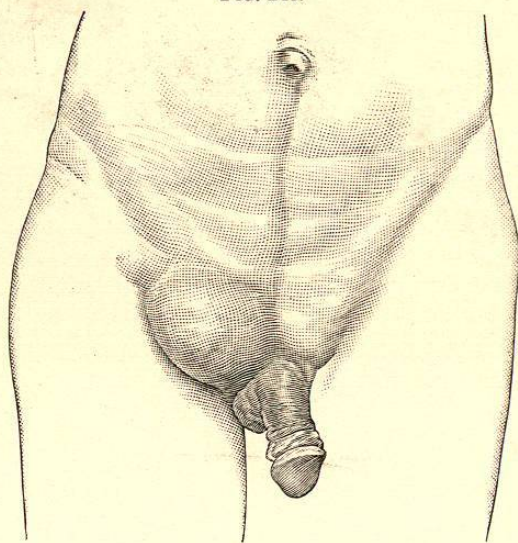
Interstitial hernia.

cessation of the applied force, and the inguinal canal is sufficiently large to admit a finger as far as the abdominal cavity, the condition is

known as a hernia incipiens—*i. e.*, a beginning hernia. The region of the inguinal ring shows much less resistance on palpation.

Kocher has reported many interesting details with reference to this stage, based on numerous early radical operations. On coughing, the inguinal canal bulges as an oval swelling, which disappears as soon as the pressure diminishes without it being necessary to replace any contents. There is a conical pocket of peritoneum produced by intra-abdominal pressure because the thin fascia transversalis and the supporting fibres in the region of the internal have finally become less resistant, and have allowed the deep abdominal muscles to be pressed apart. On operation this sac-like conical bulging will be found to be about 1 to 2 cm. (0.4 to 0.8 inch) long with the base in the region of the internal

FIG. 248.



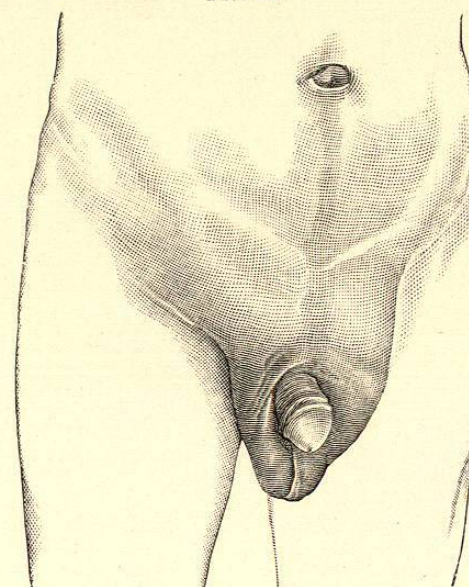
Bubonocoele.

ring. The resistance of the external ring—*i. e.*, of the aponeurosis of the external oblique—is diminished, the pillars are separated, and the intercolumnar fibres considerably stretched and pushed to one side. It is possible to press the anterior wall of the inguinal canal far inward into the abdominal cavity, and with any exertion viscera enter the conical pouch of peritoneum, but go back again immediately. A hernia proper develops as soon as some abdominal organ remains permanently within the sac; a condition that may appear suddenly due to overexertion, or gradually. Individuals with an incipient hernia are only able to escape a hernia proper by avoiding any exertion.

The third variety is made up of those cases in which the inguinal canal always contains a hernia, but in which there is no bulging of the parietes. This condition is known as an incomplete inguinal hernia. The next group consists of the cases in which there is a distinct bulging in

the inguinal region, a condition known as a complete hernia or bubonocoele. Then there are the cases in which the hernia reaches into the scrotum, known as scrotal hernia; and finally there are cases in which the scrotum is very much distended, so that the entire skin in the region, including the penis, forms a covering for the rupture. Not infrequently the opening of the penis appears much like the umbilicus, and there will be much difficulty in deciding on which side the hernia belongs, because the raphé is considerably displaced. An increase in the size of the hernia is usually associated with enlargement of the hernial ring, and in very extensive cases it may be perfectly possible to introduce the entire hand through the ring. In these cases it is

FIG. 249.



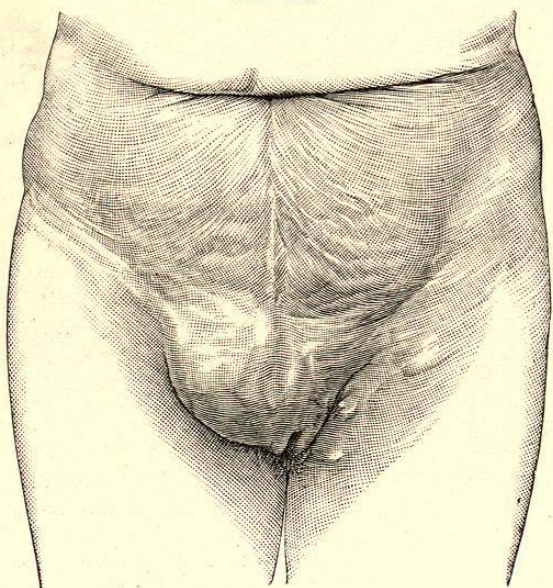
Scrotal hernia.

uncommon to have any strangulation, but the hernia is very apt to be irreducible, partly because of adhesions, partly because the hernial contents can no longer find room within the abdominal cavity. There may be very extensive evisceration, reaching down as far as the knee, and with distinct pulsation. The total of the arteries contained in one of these larger hernias is so great that each systole produces a distinct pulsation of the entire mass. The skin over large inguinal hernias is usually much changed, sometimes ulcerated or eczematous, sometimes contracted by scar-tissue, due to improper appliances or frequent wetting with urine.

Congenital Oblique Hernia in Males.—Since J. Hunter's investigations relative to the descent of the testicle, it is customary to subdivide oblique inguinal hernias into congenital and acquired. These names do

not apply to the time that the hernia appeared, but to the anatomical conditions. A congenital oblique hernia is one where the abdominal viscera have descended into the processus vaginalis peritonei, that remained partially or completely open—*i. e.*, where the testicle and the hernial contents are surrounded by one and the same serous covering. As a rule only the sac itself is congenital in these cases. With acquired oblique inguinal hernias the testicle has already descended, the processus vaginalis has closed up to the internal ring in typical cases, and the hernia is produced by a fresh bulging outward of the peritoneum, which passes along the cord into the scrotum, but which is not in direct

FIG. 250.



Labial hernia.

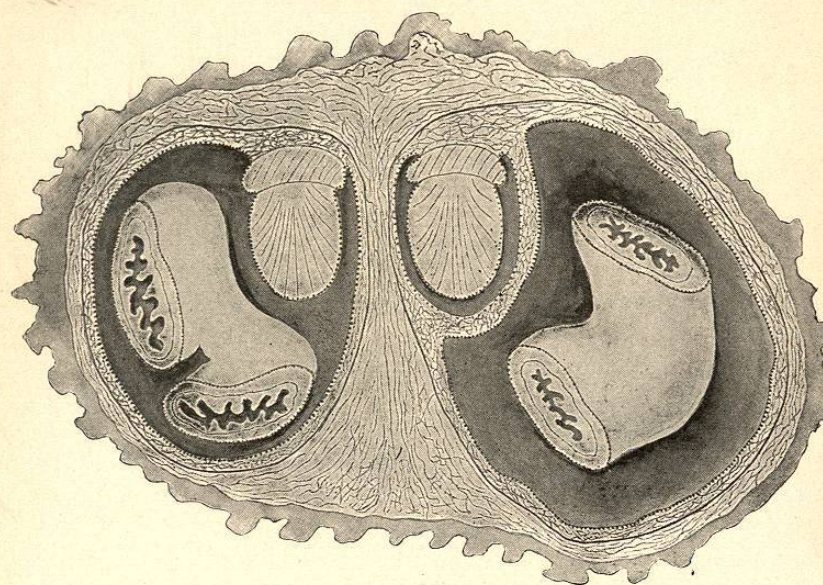
contact with the testicle. If a hernia of this sort has descended as far as the testicle, the abdominal contents and the testicle are separated by two layers of peritoneum, the tunica vaginalis propria testis and the new hernial sac. (Fig. 251.)

Congenital inguinal hernias in the strictest sense of the word—*i. e.*, those present at birth—are extremely uncommon. Even in cases in which the vaginal process is not obliterated at birth the abdominal contents do not come down immediately. Some accidental cause during the first years of life, or even when the individual is full grown, furnishes the necessary impulse to drive the viscera into the open canal. There are, however, inguinal hernias that are congenital in the truest sense of the word and are complete at birth. These have usually broad or strand-like adhesions between the hernial contents and the testicle, and it is to be assumed that these adhesions formed before the testicle

descended, and that the hernia was dragged down into the scrotum with the testicle.

The processus vaginalis is a prolongation of peritoneum not produced by traction of the testicle, but independently, and as a rule reaching farther down than the testicle itself, and being present even when this organ remains undescended. As a rule this process of peritoneum closes within the first few months after birth. Obliteration commences in the median portion of the portio funicularis and progresses downward more rapidly than upward. Even when this canal does not become obliterated there is apt to be evidence of abortive

FIG. 251.



Diagrammatic section through the scrotum of a man with two inguinal hernias. Left side of picture, congenital inguinal hernia (testicle and intestine within a common serous cavity). On the right side, acquired inguinal hernia with separate serous cavities.

attempts, represented by prominent folds or circular contractions of the sac, and which, according to Ramonede, occur rather regularly in three places: (1) in the region of the internal opening, (2) in the region of the internal ring, and (3) in the region of the external ring. Sometimes a similar condition is noted where the tunica vaginalis propria testis joins with the canal above. It is not uncommon to have the canal remain entirely patent or have it partially obliterated. Several varieties may be distinguished in this connection. The vaginal process, according to Sachs, is subdivided into the funnel, the inguinal portion, the funicular portion, and the vaginal portion (*propria*). The first group consists of the cases in which obliteration takes place in the middle of the funicular portion and the funnel remains open with a long tunica propria, which is wide and extends upward. In the second