

MODERN SURGICAL TECHNIC

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VOLUME FOUR

Hernias

Gynecology and Genito-urinary Surgery



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Second Edition

VOLUME FOUR

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Hernias

Although hernia is a term which refers to no specific organ, the abdominal viscera, especially the intestine, usually are involved in herniation. Other organs which may herniate abnormally are the bladder, the ureter, the ovary, the oviduct, the uterus and the appendix.

HISTORICAL BACKGROUND

Primitive man probably treated hernia with the simple measures at hand, and was guided by his instinct. Reducible hernia was retained by a bandage or girdle, and strangulated hernia was treated by palliative measures (light diet, rest, purgation and the application of cool water). Massage was practiced. Taxis was crude; reduction was aimed at by partially inverting the patient. For strangulated hernia, astringent plasters were used, or bleeding was resorted to.

History indicates that the treatment of hernia began with the Phoenicians in 900 B.C. They employed a compress or girdle appliance to truss the protrusion. Hippocrates (400 B.C.) relied upon plasters in the treatment of hernia.

Celsus (first century A.D.) ligated and excised the unopened sac and removed the testicle. He operated for umbilical hernia and to a lesser extent for inguinal hernia. For inoperable nonstrangulated hernias he used the ancient *emplastrum contra rupturam* and kept the patient in bed for forty days. His method of bandaging umbilical hernia in children differs only slightly from the methods used today. Celsus practiced the ligation and the excision of hernial sacs, and he sutured the hernial opening.

Aretaeus of Greece wrote on hernia in

the first century; his methods were similar to those of Celsus. Soranus of Ephesus (first and second centuries A.D.) was the first to describe hernia of the ovary and the oviduct. Heliodorus (second century) freed the sac from the cord, twisted and tied it, and then excised it. Oribasius (fourth century) employed ligature and excision of the free sac supplemented by cauterization, in order to encourage fibrotic changes to support the walls of the region. Praxagoras of Cos and Coelius Aurelianus both spoke of hernia. Praxagoras practiced taxis for strangulated hernia. Paulus Aegineta wrote extensively on hernia; he used the transverse abdominal incision in operating.

Famous Arabian surgeons were Haly Abbas (994), who operated extensively for hernia, and Avicenna (980-1037), who described the differential diagnosis of enterocele and omentocele. Terapion, Avicenna and Albucasis (1122) treated hernia by cauterization after having exposed the sac by incision.

In the thirteenth and the fourteenth centuries the most notable hernia surgeons were Roger of Salerno (1210), Roland (1250), William of Salicet (1230), Theodoric in Bologna, Lanfranc (1315), in Paris and Guy de Chauliac of Montpellier.

Guy de Chauliac (fourteenth century) was not satisfied to turn his work over to barbers and hernialists but did the operating himself. He was the first to distinguish umbilical from inguinal and femoral hernias. Guy de Chauliac appears to have been the first to note hernia in the thigh; Nicholas LeQuin referred to it in 1665. In his *Chirurgia Magna* Chauliac differentiates



FIG. 1949. Ancient Greek terra-cotta piece showing hernia. (Collection of Prof. Steineg.)

between ventral and umbilical hernias. He exposed the hernial sac, ligated and excised it, and finished with suture.

Pol reported the first case of hernia of the uterus; Plater, the first case of hernia of the bladder. Diaphragmatic hernia was described by Fabricius Hildanus; partial enterocoele, by Paré; and the operation for strangulated hernia, by Roussetus. The so-called "royal stitch," snaring the hernial sac with wire and separating it from the cord to enable one to ligate the sac alone in inguinal hernia, was practiced by Fabricius ab Aquapendente and the *punctum aureum* by Ambroise Paré. Paré (sixteenth century) obliterated the sac by means of a tension suture applied over a bone plate, thus inducing sloughing.

All of these fourteenth to sixteenth century studies took an upward surge in the seventeenth century. Lavater's book appeared in 1691. Ruysch suggested the possibility of hernia of Meckel's diverticulum; Barbette, Verheyen, Lowe and Scultetus wrote on the different varieties of hernia. Dionis advised dividing the external ring in strangulated hernia. Although operation for strangulation was general at this time,

the theories of the ancients as to the cause of strangulation still were prevalent. In Denmark the treatment in vogue at that period was to keep the patient in bed for a period of six to twelve months! Many cures were reported following these confinements.

The eighteenth century witnessed a separation from the beliefs and practices of the ancients. Littré and Méry noted cases of hernia of Meckel's diverticulum. The difficulties of diagnosis in diaphragmatic hernia were stressed by Stehilinus. The duodenal fossae were described by Hensing, Haller and Bordenave. De Garengot described hernia of the appendix and hernia through the linea alba. He dissected the sac, rolled it into a pad and sutured it into the inguinal canal. With regard to large hernias, Petit commented that they "had lost their right of domicile." Gimbernat described the ligament that bears his name. Mauchart wrote on the anatomy of femoral hernia. Papen and Smellie observed perineal hernia in women. Le Dran wrote on hernia in the linea semilunaris, partial enterocoele and reduction en masse; La Chausse described ventral hernia. Arnaud, Pott, Sharp, Monro, Richter, Haller and Verdier, and Camper wrote important treatises on hernia.

The nineteenth century witnessed the classic monographs of Cooper and Scarpa and the inauguration of the modern era in publications on surgery of hernia. In this century crude attempts were made to cure hernia by the induction of local sepsis, peritonitis and sclerosis by setons and issues (Bonnet, 1836; Wutzer, 1840), and by the injection of *Quercus alba* extracts (Heaton, 1843) and of iodine (Pancoast, 1844). Velpeau (1851) tried opening the sac and applying iodine directly. Wood (1857) devised an operation for subcutaneous ligation of the sac. Annandale (1876) operated on a strangulated inguinal hernia by median laparotomy.

Lawson Tait operated for hernia by median laparotomy. In 1833, he proposed this method as a routine for all cases of

inguinal hernia. He advocated it strongly in 1891 at the annual meeting of the British Medical Association. Annandale first advocated it in the *Edinburgh Medical Journal* in 1876. He reported a strangulated hernia operated on by median laparotomy. It is thought that Tait got the idea from Annandale and from Edinburgh colleagues. Macewen (1886) plugged the internal ring on its abdominal aspect with the rolled-up sac. He first freed the sac to a point about one inch beyond the internal ring, then folded it into a pad and sutured it into the ring.

Henry O. Marcy, Lister's first American pupil, brought back to America a knowledge of how to prepare catgut. He closed aseptic wounds in layers without drainage and worked on the reconstruction of the inguinal canal.

In 1871, when Marcy was operating on strangulated hernia, he repaired the internal ring with carbolized catgut. He gradually developed the pre-Bassini herniorrhaphy and foreshadowed the long succession of modern procedures. Harold Edwards¹ stated that Marcy's work evolved high ligation of the sac, transplantation of the cord, and reconstruction of the inguinal canal. For tying the sac he used a double suture of kangaroo tendon, excised redundancies, repaired the internal ring and sewed the conjoined tendon to Poupart's ligament with kangaroo sutures.

Since all operations designed nowadays for the reconstruction of the inguinal canal succeed or fail with about equal regularity, W. J. M. Brandon² published a clever parable which reads:

The House That Bassini Built. Once upon a time a man called Bassini built a beautiful house on the side of a hill. It soon became the envy and admiration of everyone, but for some reason this house kept falling down and had to be rebuilt over and over again.

Now Bassini was a very popular man, and he suffered from no lack of helpful advisers. Some of his brother architects reinforced the walls for him; some introduced new and indestructible materials; some redesigned the

house completely, making the plan so complicated that the onlookers were unable to understand it and naturally considered it a great advance; a few rebuilt it from within outwards, working on the principle that if a house is built the hard way it will be harder for it to fall down; while the rest paid little attention to the designs of the master-builders, and were thus able to produce new and original methods in enormous quantities. But to the amazement of everyone the house continued to fall down, though on one occasion it stayed up for a whole day longer.

As time went on a great many people became interested in this house because there were a lot of houses to be built and it seemed only right that a house should last the owner its lifetime. But the onlookers were confused by the dissension among the builders, and still more by a curious blindness that seemed to affect them. Each group were unable to see the ruins of their own house, however often it fell down, yet when others failed with the same design they decided that the workmanship must have been bad, and offered correspondence courses on how it ought to be done. . . . At this stage it became necessary to add a new wing to the local library.

INGUINAL HERNIAS

INDIRECT (OBLIQUE) INGUINAL HERNIA

Anatomy (Figs. 1950-1956)

The structures concerned in operations for oblique inguinal hernias are the following:

The Skin, Subcutaneous Fat and Superficial Fascia. In dividing these structures, the following blood vessels are encountered: (1) the superficial epigastric, (2) the superficial external pudic and (3) the superficial circumflex iliac. These are all branches of the femoral.

The aponeurosis of the external abdominal oblique muscle is encountered with its contingent structure, viz.: the external abdominal ring, which is a triangular aperture in the aponeurosis of the external oblique muscle. It serves as the place of exit of the spermatic cord. It is bounded laterally and mesially by a thickening of the fibers of the external abdominal oblique

fascia called respectively the external and the internal pillars. The external pillar is continuous with Poupart's ligament (ligamentum inguinale) and is attached to the spine of the os pubis. The internal pillar is attached to the anterior surface of the body of the pubic bone. The hypogastric branch of the iliohypogastric nerve emerges, just above and somewhat medially to the exter-

inferior portion joins the transversalis muscle, becomes tendinous, and forms the conjoined tendon, which is inserted into the crest of the os pubis and pectineal line. The ilio-inguinal nerve courses along the surface of the internal oblique muscle (Fig. 1954).

The cremasteric muscle and cremasteric fascia form a series of curved loops which become longer as they progress down-

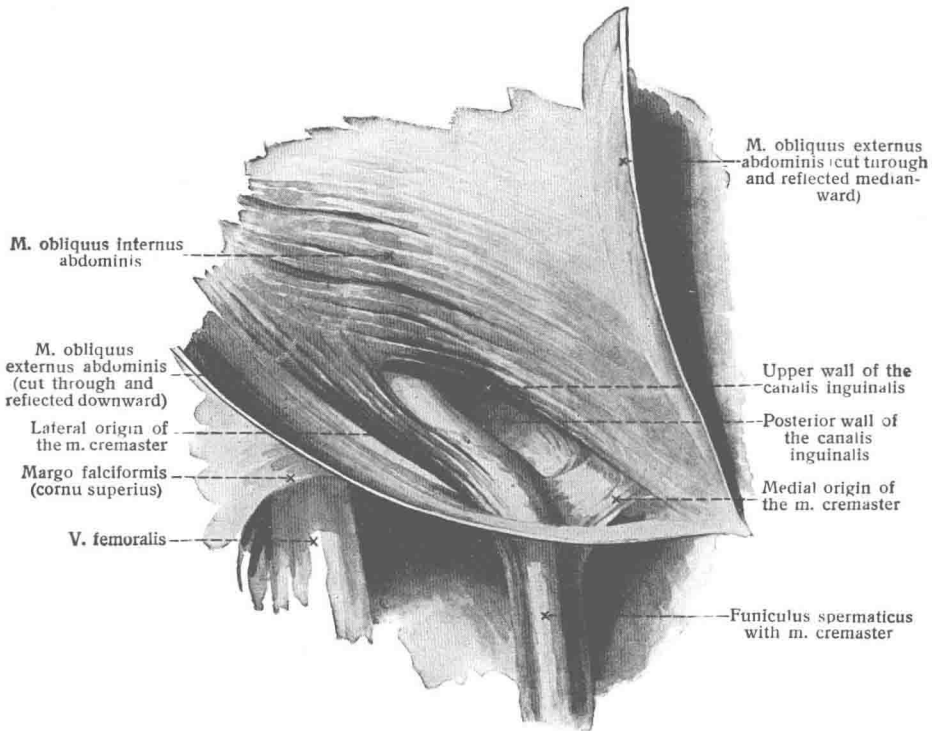


FIG. 1950. Right inguinal canal in the male (second layer), viewed from in front. (Spalteholz: Hand-Atlas of Human Anatomy, Philadelphia, Lippincott.)

nal inguinal ring, on perforation of the aponeurosis of the external abdominal oblique muscle. The pillars are reinforced by the arcuate fibers.

The Internal Oblique, Transversalis Muscle and "Conjoined Tendon." The arched fibers of the internal oblique muscle take origin from the outer third of Poupart's ligament, arch over the spermatic cord and are inserted into the outer edge of the sheath of the rectus abdominis muscle. Its

ward; the lowermost loop reaches the testes and becomes attached to the tunica vaginalis. These muscular loops are held together by the cremasteric fascia.

The Spermatic Cord (Funiculus Spermaticus). Its principal structures are: the spermatic artery, the spermatic veins (plexus pampiniformis) and the vas deferens. The spermatic artery is a branch of the aorta. The right spermatic vein empties into the inferior vena cava. The left sper-

matic vein empties most frequently into the left renal vein. It is well to remember that the vas deferens is supplied by a fine vessel, the arteria deferentialis, derived from the middle or inferior vesical artery. The fascial and muscular structures of the cord derive their blood supply from the deep epigastric and other vessels.

The processus vaginalis plays an im-

inal wall through which the cord passes. These from within outward are: (1) the internal spermatic fascia, (2) the cremasteric fascia and muscle (from the internal oblique) and (3) the intercolumar fascia (from the external oblique muscle).

Poupart's ligament (lig. ilio-inguinale) extends from the anterior superior spine of the ilium to the spine of the os pubis.

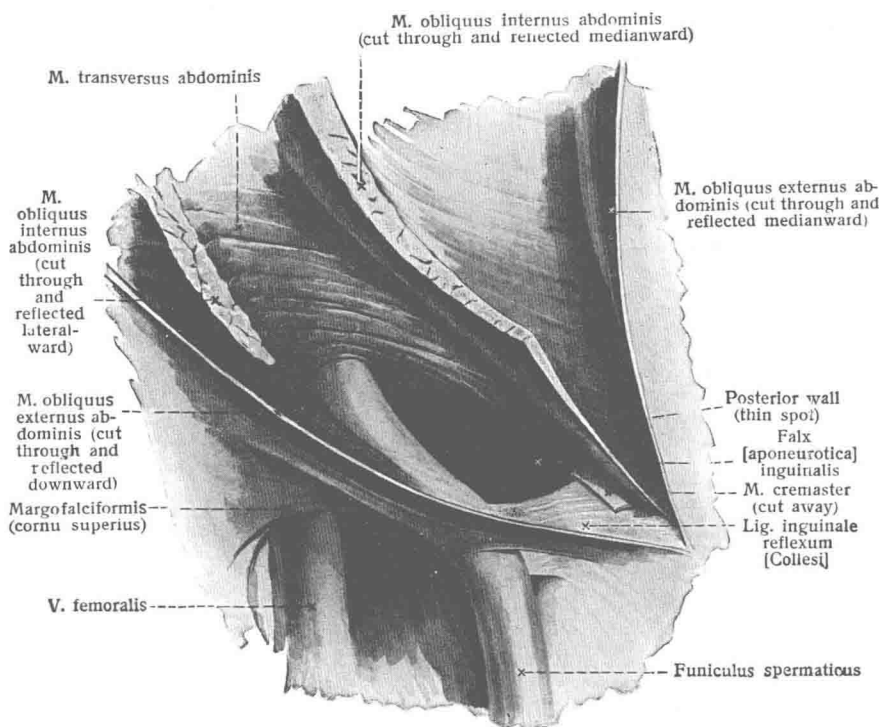


FIG. 1951. Right inguinal canal in the male (third layer), viewed from in front. (Spalteholz: Hand-Atlas of Human Anatomy, Philadelphia, Lippincott.)

portant role in congenital hernia; this develops when the process remains open. In the adult it is obliterated and remains as a cord of tissue within the spermatic cord. The nerves of the spermatic cord are derived from the sympathetic and the genital branch of the genitocrural nerve. The lymph vessels empty into the iliac and the lumbar vessels.

The coverings of the spermatic cord are composed of a fibrous sheath formed by the continuation of the structures of the abdom-

The deep epigastric artery plays an important role as a landmark in determining whether a hernia is direct or indirect.

Hesselbach's triangle is bounded internally by the outer margin of the rectus abdominis muscle, externally by the deep epigastric artery and below by the inner half of Poupart's ligament. Examined from within the abdomen, this space is delineated by three folds. In the central fold lies the urachus, in the outer fold the deep epigastric artery and between the two the

obliterated hypogastric artery. There are three depressions between these folds: the outer depression (external inguinal fossa) is situated in the outer side of the deep epigastric artery and corresponds to the site of the internal abdominal ring. The middle depression (middle inguinal fossa) lies between the deep epigastric and the obliterated hypogastric arteries, while the inner depression (internal inguinal fossa) lies between the obliterated hypogastric artery

through which the spermatic cord and an indirect inguinal hernia pass. Its proximal opening is a depression in the transversalis fascia, the so-called internal inguinal ring; its distal opening is the external inguinal ring. Its posterior wall is made up of the transversalis fascia, upon which courses the deep epigastric artery, and the falx inguinalis. Its inferior boundary is Poupart's ligament. It is covered by the internal oblique muscle at its internal extremity,

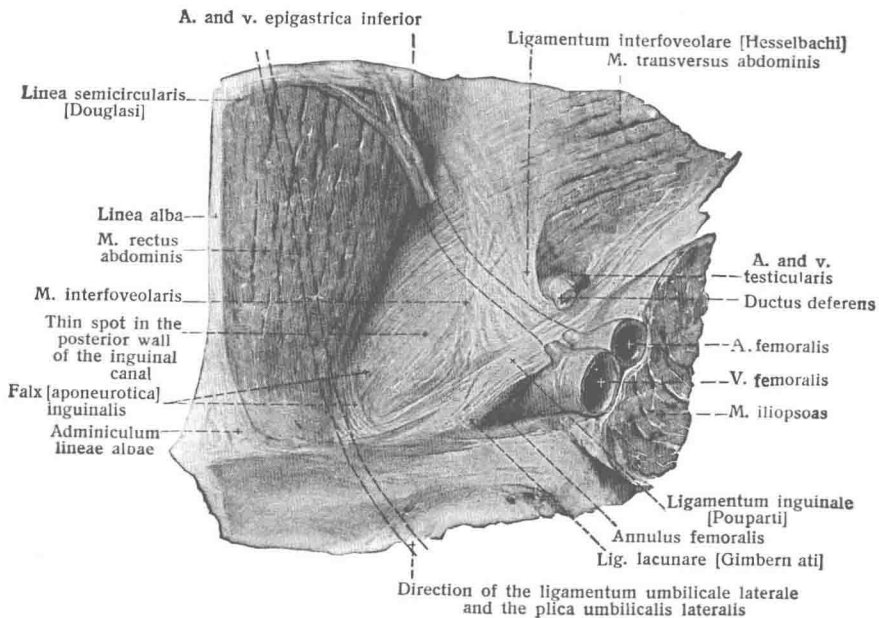


FIG. 1952. Posterior wall of the right inguinal canal in the male, viewed from behind. (Spatteholz: Hand-Atlas of Human Anatomy, Philadelphia, Lippincott.)

and the urachus. An oblique or indirect inguinal hernia always passes through the external inguinal fossa. A direct inguinal hernia may pass through the middle or internal inguinal fossa (Fig. 1955).

The Transversalis Fascia, Internal Inguinal Ring, Properitoneal Fat and Peritoneum. Normally the peritoneum smoothly covers the upper surface of the internal inguinal ring. In case of hernia, the peritoneum bulges into and through the internal inguinal ring.

The inguinal canal is the channel

and for the rest of its extent it is covered by the aponeurosis of the external oblique muscle only.

The femoral point is medial to the midpoint of Poupart's ligament, where the external iliac artery becomes the femoral artery.

The Relative Unimportance of the Conjoined Tendon and the Great Importance of the Transversalis Fascia in Hernia Operations. Zieman³ pointed out that only two specimens taken from the inguinal regions of 20 cadavers possessed a

conjoined tendon definitely discernible as a distinct structure (Fig. 1956). Blake dissected 25 normal muscular subjects and found no instance in which the conjoined

Zieman was impressed by the relative unimportance of the conjoined tendon either as a causative or a corrective agent in inguinal hernia, and agreed that it "seems

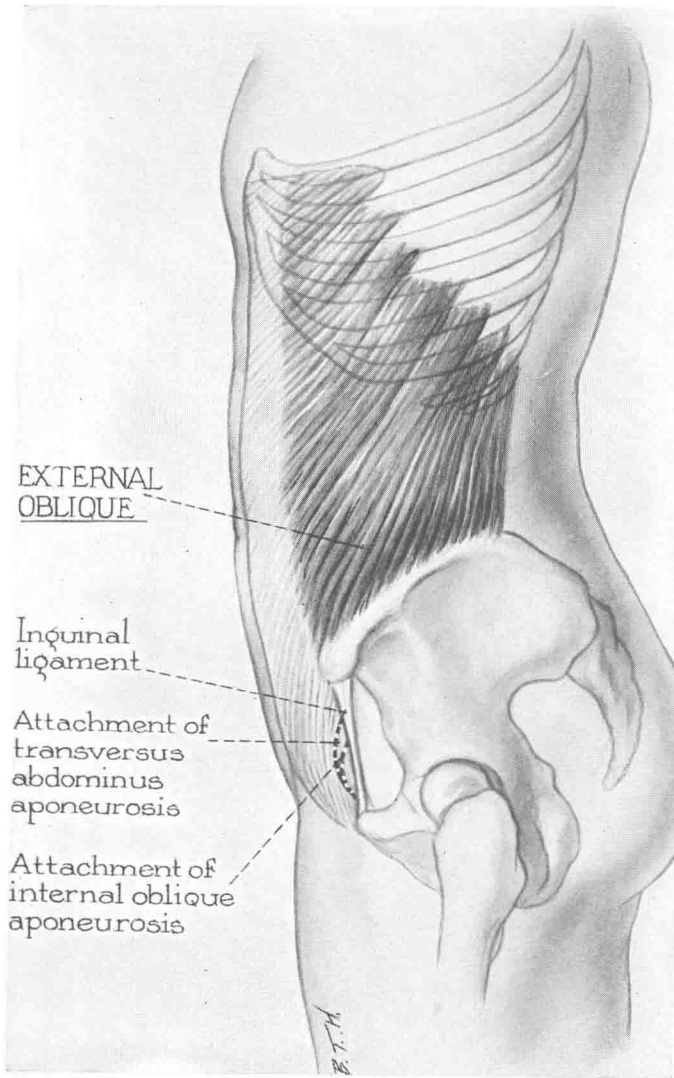


FIG. 1953. Surgical anatomy of inguinal hernia (semidiagrammatic).

tendon extended more than $\frac{5}{8}$ inch laterally from the insertion of the rectus muscle. Several recent publications have emphasized the wide structural variation present in this part of the body.

illogical to attribute properties to a structure so inconstant, and erroneous to incorporate it in the operative technic for the cure of hernia."

At present, the structural relations of the