AIN SHAMS UNIVERSITY

FACULTY OF MEDICINE

M. S. THESIS

Title :

COMPLICATIONS OF THE INGUINAL HERNIAE

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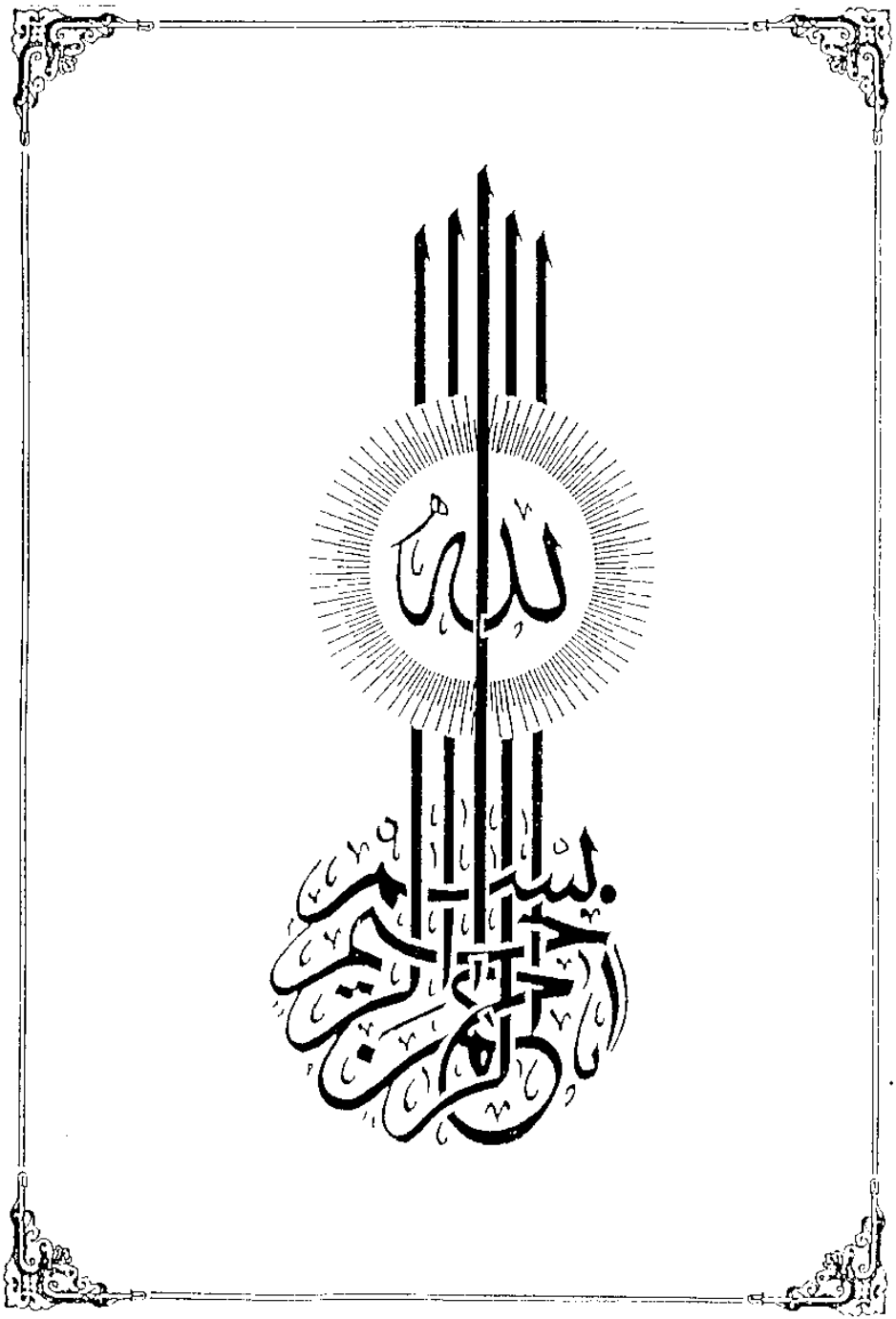

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ANATOMY OF THE INGUINAL REGION

The inguinal region is that portion of the anterior abdominal wall below the level of the anterior superior iliac spines .

Landmarks :

- The pubic tubercle : is palpable at the lateral margin of the body of the pubis just above the origin of the adductor longus muscle , which can be brought into prominence by adduction of the hip . (Nyphus & Condon, I978)

-The superficial inguinal ring : lies I.25 Cm above the pubic tubercle .

- The deep inguinal ring : lies I.25 Cm above the inguinal ligament midway between the pubic tubercle and the anterior superior iliac spine . (Rains & Ritchie , I982)

Inguinal ligament (Poupart's ligament) :

It is the lower border of the aponeurosis of the external oblique muscle and stretches from the anterior superior iliac spine to the pubic tubercle , it is convex towards the thigh . (Davies , I969)

Lacunar (Gimbernat's) ligament :

It is triangular and almost horizontal , about 2 Cm from base to apex , its base is directed laterally and forms the medial boundary of the femoral ring , its apex corresponds to the pubic tubercle

Falx inguinalis and conjoined tendon :

The aponeurotic fasciculi of the lower portion of the transversus

abdominis layer turn more sharply dounwards to insert into the superior pubic ramus for a variable distance lateral to the rectus tendon , in some cases this part is quite dense and is known as the falx inguinalis . Sometimes the fibres of the transversus abdominis aponeurosis are joined by fibres from the internal oblique aponeurosis to form a true conjoined tendon . (Nyphus & Condon , I978)

Transversalis fascia :

It is merely a portion of the continuous layer of endoabdominal fascia that completely encloses the abdominal cavity and covers the transversus abdominis internally and continues with the lumbar , iliac , psoas , obturator and rectus fasciae .

Cooper's ligament :

This ligament is constant in form and extent and forms a condensation of the transversalis fascia along the inner aspect of the superior pubic ramus . (Nyphus & Condon , I978)

Inguinal canal :

Itis a triangular potential cleft begining at the lateral margin of the deep inguinal ring and ends at the medial margin of the superficial inguinal ring . In adults its average length is 4 Cm through it the spermatic cord travels from a preperitoneal to a subcutaneous position .

- The anterior wall contains : the superficial inguinal ring medially and the external oblique aponeurosis in the remainder .
- The inferior wall : supported by the superior pubic ramus ,

and is formed by the inguinal ligament , the middle part by the pectineus muscle and fascia , the lateral third formed by the anterior and medial walls of the femoral sheath .

- The posterior wall (floor) : is formed in its lateral third by the internal inguinal ring , and the medial two thirds are buttressed medially by the edge of the rectus sheath or the falx inguinalis .
- Superiorly it is composed of the transversus arch .

Hesselbach's triangle :

This is bounded by the rectus sheath medially , the inferior epigastric vessls laterally and the inguinal ligament inferiorly.

Deep inguinal ring :

It is an opening in the transversalis fascia and is reinforced by aponeurotic fibres from the transversus abdominis . It transmits the ductus deferens , the spermatic vessels , the vessels supplying the ductus and cremaster muscle , and the genital branch of the genitofemoral nerve . It cannot be palpated externally . The inferior epigastric vessels lie at its medial margin .

Nerves in relation to the inguinal region :

- Iliohypogastric nerve (L I,2) : It pierces the internal oblique 2-3 Cm anterior to the anterior superior iliac spine and pierces the external oblique 2-3 Cm superior to the superficial inguinal ring to become subcutaneous .

- Ilioinguinal nerve (L I,2) : It enters the inguinal canal through the deep inguinal ring and turns with the spermatic cord or round ligament thruugh the superficial inguinal ring .

- The genital branch of the genitofemoral nerve (L I) :

It enters the inguinal canal through the deep inguinal ring then it emerges from the superficial inguinal ring to give motor branches to the cremaster muscle and sensory branches to the scrotum and medial aspect of the skin of the thigh .

INCIDENCE & AETIOLOGY OF THE INGUINAL HERNIA

Definitions : (Ziemmerman & Anson , I967)

Inguinal hernia : is one which emerges through the inguinal triangle this triangle is a space of variable size which is bounded by the rectus sheath medially , the inguinal ligament laterally , and the lowermost fibres of the internal oblique muscle above .

Indirect or oblique inguinal hernias : are those that leave the abdomen through the abdominal or internal inguinal ring and course through the spermatic cord .

Direct inguinal hernia : it is a disruption of the posterior wall of the inguinal triangle , medial to the cord and resulting from insufficiency of the internal oblique and transversus abdominis muscles or aponeuroses in this area .

Incidence :

About 85 per cent of all hernias are of the inguinal variety and of these the proportion of male to female sufferers is about 5 : I

The relative incidence of indirect and direct hernias varies in different reported series. The indirect was formerly the most prevalent variety, but in the more recent studies as a result of the agieng of the surgical population, the incidence of the two types is much more even. Direct hernias are extremely uncommon in childhood and rarely occur in females, this may be due to the fact that once the infant is seen to have a hernia it is concluded by many

automatically that an indirect hernia is present and no further attempt is made at differential diagnosis . (Ponka, I980)

In general it may be estimated that the incidence of direct hernia ranges between I5-25 per cent . (Zimmerman, I967)

Aetiology of indirect inguinal hernia :

The testis begins as an intraabdominal structure , during the latter months of fetal life , it traverses the abdominal wall pushing ahead of itself a fold of peritoneum to reach its ultimate position in the scrotum , this peritoneal fold , the processus vaginalis or the funicular process has an analogue which accompanies the round ligament of the uterus in the female. A persistent vaginal process in the female is called the canal of Nuck. In both sexes the processus vaginalis normally becomes obliterated during the last month of intrauterine life . Failure of complete obliteration of the vaginal process is the congenital predisposing factor essential to the development of indirect inguinal hernia .

Zuckerkandl (I930) in a study of I00 infants found the process open on both sides in 20, on the right side in I2, and on the left side in 5 .

Anson (I960) found a patent process in 20 out of I00 specimens .

In absence of a preformed peritoneal sac of congenital origin , indirect hernia does not occur irrespective of the amount of force to which the abdomen may be subjected .

In spite of the presence of a patent funicular process, one may

go for years and sometimes throughout life without developing an indirect hernia because some anatomical mechanisms tend to prevent this herniation these are :

a) The internal ring is a funnel shaped hiatus which permits only the cord structures to pass , it must be dilatd to allow for the passage of the hernial contents .

b) The valvular mechanism : the inguinal canal is a long oblique valvular opening with internal and external rings not superimposed upon each other , and its internal end resembling the enterance of theureters into the urinary bladder obliquely , so with increased abdominal tension the anterior and posterior walls tend to approximate to prevent visceral descent .

c) The shutter like action of the internal oblique : contraction of the abdominal muscles causes the arching fibres of the internal oblique to approximate themselves to the inguinal ligament closing the region of the internal ring like ashutter (Zimmermann, I967).

Certain factors tend to help the development of an indirect hernia in the presence of a preformed sac : increased intraabdominal pressure either continuously as in obesity, pregnancy and ascites , or intermittently such as lifting, straining, coughing, sneezing or vomiting tend to overcome the resistance at the internal ring and produce herniation .

Fallis (I936) described the mechanism of herniation , when the subject lifts a heavy object ,,if the foot slips the thigh becomes flexed with subsequent relaxation of the tension in the external

oblique aponeurosis , in this manner the internal ring lacks the outer guard against herniation .

The preformed sac is a prerequisite , and the increased intraabdominal tension is the exciting factor which forces bowel or omentum into the sac .

Aetiology of the direct inguinal hernia :

Direct inguinal hernia represents a disparity between the strength of the musculoaponeurotic layers of the abdominal wall in the region of the inguinal triangle and the intraabdominal pressure to which it is exposed .

Anson, Morgan, and McVay (I960) showed that it is specifically the deviation from the ideal patterns that determine the liability to direct hernia .

In ideal anatomical subjects , the internal oblique muscle and its aponeurosis are a continuous layer which extends caudally to an insertion into the pubic tubercle . The inguinal triangle in such subjects is a narrow cleft between the lowermost fibres of the muscle and the inguinal ligament, barely wide enough to accomodate the spermatic cord, as in fig.(I). If all abdomens were so muscled , direct hernia would be a rare phenomenon .

Unfortunately there are various degrees of incompleteness of this layer , the lowermost border ends a considerable distance superior to the pubis , the inguinal triangle in such subjects is much wider, the absence of this musculoaponeurotic support

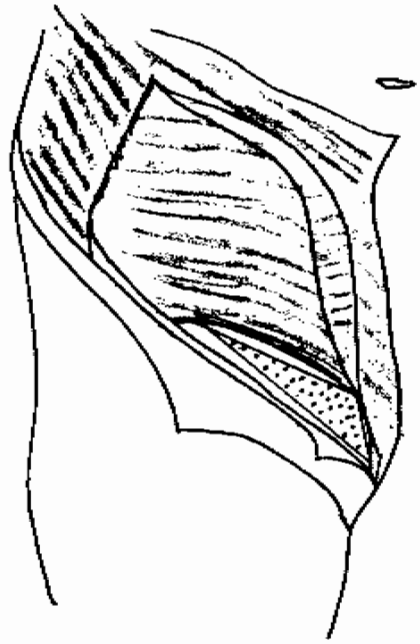

Figure (I) : Inguinal triangle as is seen in strong abdomens without predisposition to direct hernia (After Ziemmerman & Anson , I967)

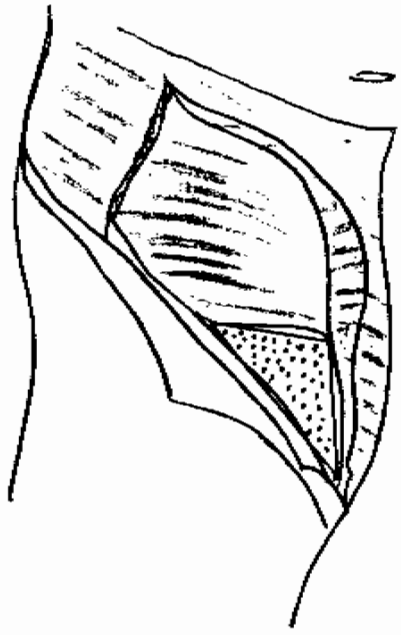

Figure (2) : Inguinal triangle in abdomens likely to develop direct hernia (After Ziemmerman & Anson, I967)

in this area is the congenital predisposition to direct hernia.(Zimmermann, I967)

Anson and McVay (I938) estimated the size of this defect by measuring the length of the medial border of the inguinal triangle in 95 unselected anatomical specimens as follows :

Table I

Length (Cm)	No of specimens	Length (Cm)	No of specimens
0	I6	3.0	I2
0.5	4	3.5	2
I.0	I2	4.0	4
I.5	I4	5.0	2
2.0	I8	9.0	I
2.5	I0		

The frequent bilateral distribution of direct hernia is explained by the fact that the anatomical structure is usually symmetrical on both sides .

The rarity of direct inguinal hernia in the females was explained by Greene and Neuhof (I942) who reported 2 cases of direct hernia in female patients. They found that the narrow steep android type of pelvis to favour the formation of direct hernia in which the conjoined tendon inserts high in the lateral margin of the rectus sheath , and this type of pelvis projects the force of intraabdominal pressure against the undefended space in the lower part of

the anterior abdominal wall ,,while the female or gynaecoid pelvis which is more common does not favour this type of hernia .

Harris and White (I937) studied the relation of the length of the inguinal ligament to the susceptibility to hernia and found that hernia rarely occurs in individuals with an inguinal ligament less than II Cm , those with ligaments from II to I5 Cm are subject to indirect hernia , whereas a length in excess of I5 Cm predisposes to direct hernia .

Generally , in direct hernia the weakness of the musculo-aponeurotic layers of the lower abdomen principally in the form of absence of the lower fibres of the internal oblique muscle is the predisposing factor , while the increased intra-abdominal tension is the immediate cause of protrusion .