Incisional Hernias

By

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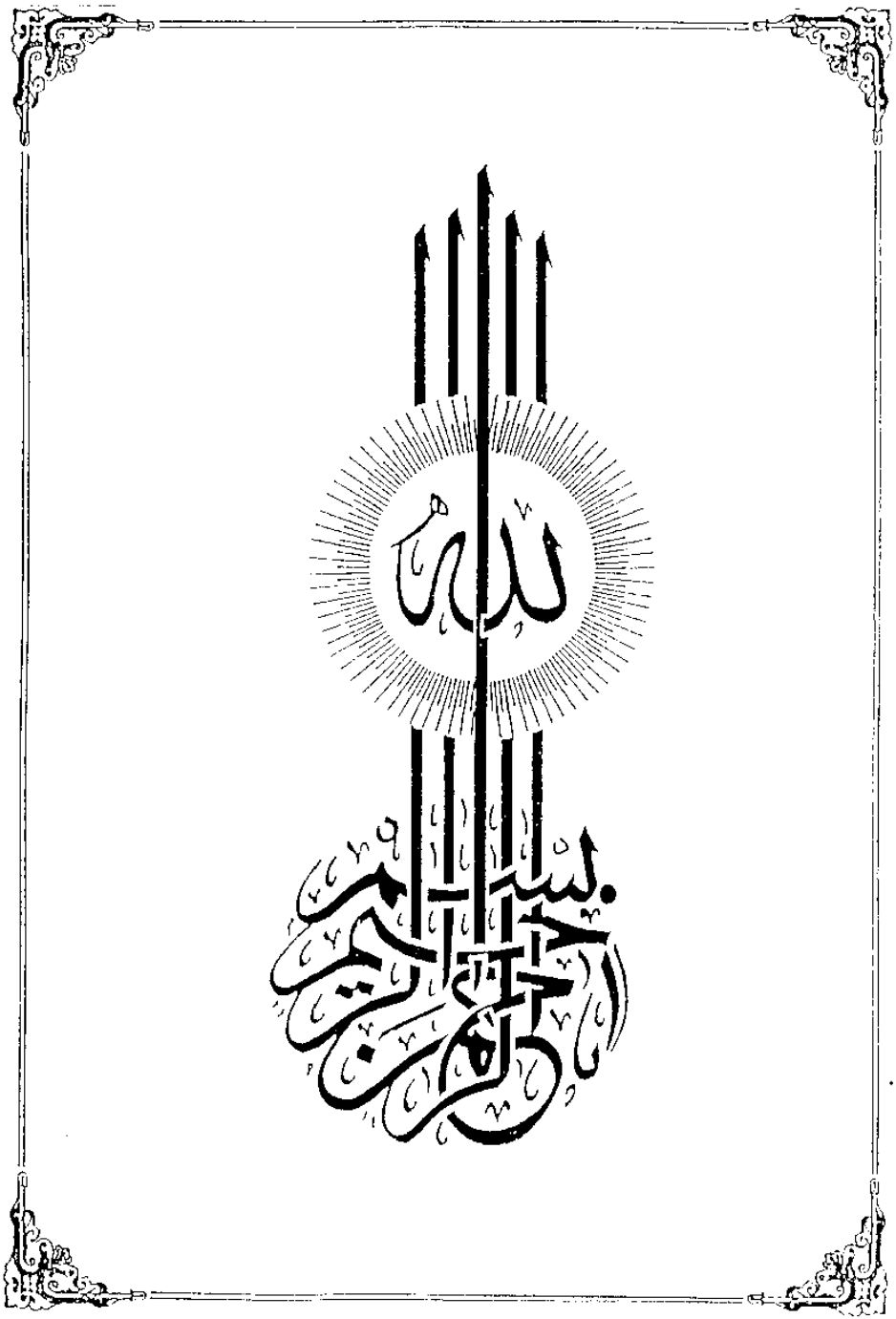

ANATOMY OF THE ABDOMINAL WALL .

1- Cutaneous Nerves :

The skin of the anterior abdominal wall is supplied by the lower six thoracic and the first lumbar nervs (anterior rami) . The former give off anterior and lateral branches, but the lateral branch of the last thoracic nerve crosses the iliac crest to supply the skin of the buttock . The first lumbar nerve is represented by (1) the anterior branch of the iliohypogastric nerve, which pierces the external oblique aponeurosis about 1 inch above the superficial inguinal ring, and (2) the ilioinguinal nerve, which emerges through the superficial inguinal ring.

The nerves (T.7-L.I) supply successive and practically horizontal bands of skin, T.IO supplying the band which includes the umbilicus .

2 - The Superficial Veins of the anterior abdominal wall form upper and lower groups on each side . The upper group returns the blood via the lateral thoracic and internal mammary veins to the superior vena cava, and the lower group returns the blood via the femoral vein to the inferior vena cava. All four groups anastomose freely with one another , and their position amongstthe soft, yielding fat of the abdominal wall allows the anastomosing channels to bedome widely dilated in obstruction of either the inferior or the superior vena cava, or in obstruction of the external or common iliac veins .

The radicles of the para-umbilical veins communicate with both groups, constituting an important connexion between the portal and the systemic venous systems .

3 - The Superficial Lymph Vessels of the infra-umbilical region drain into the superficial inguinal lymph nodes , and those of the supra- umbilical region into the pectoral lymph nodes .

In the lower part of the wall the deepest layer of the superficial fascia is membranous in character. Its upper border is indefinite, but inferiorly it is firmly connected to the deep fascia on the front of the thigh just below the inguinal ligament . Medially, it is attached to the body of the pubis, but instead of being attached to the pubes across the median plane, this portion of the sheet passes down into the perineum, where it forms the superficial boundary of the superficial perineal pouch .

4 - Muscles of the Anterior Abdominal Wall . The principal function of the abdominal muscles is to assist in respiration and defecation , and by their normal tonus, to exercise an important influence over the position of the abdominal viscera. They are also essential to other less common expulsive efforts, such as vomiting and childbirth .

a - The External Oblique is the most superficial of the three lateral abdominal muscles . Its fibres pass from above downwards, forwards and medially . It arises from the lower eight ribs, interdigitating with the serratus anterior, and latissimus dorsi. Tracing these fibres to their insertion consecutively , the lowermost fibres of origin descend vertically to be inserted into the anterior half of the iliac crest (outer lip) . The remaining fibres end in a broad aponeurosis

so that no fleshy fibres are found below the line joining the anterior superior spine to the umbilicus. Between its attachments to the anterior superior spine and the pubic tubercle the lower border of the aponeurosis is folded backwards on itself, constituting the inguinal ligament, which is firmly attached to the deep fascia of the thigh . Above the pubic tubercle the aponeurosis is pierced by the spermatic cord, over which it is continued as a thin covering termed the external spermatic fascia. The artificial gap, created by severing the connexion of this fasica with the aponeurosis, constitutes the superficial inguinal ring . Medial to the ring the aponeurosis is attached to the pubic crest and symhpysis, and then along the linea alba to the xiphoid process . The uppermost fibres, stretching from the fifth rib to the xiphoid, are therefore practically horizontal

The pectineal part of the Inguinal ligament occupies the small angular interval between the medial end of the inguinal ligament and the anterior end of the pectineal line. Its lateral border is free and forms the medial boundary of the femoral ring as the lacunar ligament . Directly continuous with the inguinal ligament , it constitutes an additional insertion for the external oblique muscle .

b - The Internal Oblique lies deep to the external oblique and its fibres run upwards, forward and medially . Tracing these fibres of origin consecutively , the lowest fibres arise from the lateral half, or more, of the grooved surface of the inguinal ligament . The next fibres arise from the

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intermediate area -(middle lip) of the iliac crest, from the anterior superior spine backwards for two-thirds of its extent, where they meet the lateral edge of the lumbar fascia , up which theline of origin extends .

Tracingthesefibres to their insertion in the reverse order , the highest fibres of origin, fleshy throughout, are inserted into the lower borders of the twelfth, eleventh and tenth ribs and costal cartilages. The remaining fibres form a broad aponeurosis, the line of whose attachment extends upwards along the costal margin to the xiphoid process and then down the linea alba to the pubic symphysis. The lowest fibres arch medially above the spermatic cord and then descend behind it ot reach the pubic crest and adjoining part of the pectineal line . Towards their insertion these fibres become tendinous and are joined, on their deep surface, by the lowest fibres of the transversus, to constitute the conjoint tendon .

The conjoint tendon has a free lateral border, but medially it is continuous with the rest of the aponeurosis of the internal oblique and , therefore, with the lowest part of the anterior wall of the sheath of the rectus abdominis muscle;

c - The Transversus is the deepest of the three lateral abdominal muscles, Its fibres run horizontally forwards . Tracingthe line of origin continuously, as in the case of the internal oblique, the highest fibres arise from the deep surfaces of the seventh to the twelfth costal cartilages,

interdigitating with the diaphragm . The muscle gradually widens from above downwards, and the line of origin next descends along the lateral edge of the lumbar fascia to the iliac crest, and is then continued forwards along the anterior two-thirds of its inner lip to the anterior superior spine. Finally, the lowest fibres arise from the lateral third of the inguinal ligament .

Tracing the insertion, which is entirely aponeurotic, in the same way , the highest fibres are short and pass medially to the xiphoid process, and the line of insertion then follows the linea alba to the pubic symphysis . The lowest fibres help to form the conjoint tendon (vide supra) . In its upper part the aponeurosis is very narrow, and fleshy fibres of transversus lie behind the rectus muscle. As it is traced downwards, the aponeurosis widens out, but inferiorly it again becomes narrow .

d - The Rectus Abdominis, which is enclosed within a strong aponeurotic sheath, arises from the front of the pubis and the pubic crest, and widening out as it ascends, crosses the costal margin to be inserted into the xiphoid process and the cartilages of the seventh, sixth, and fifth ribs. In the living subject its lateral margin corresponds to a conspicuous furrow, termed the linea semilunaris, which descends from the tip of theninth costal cartilage and inclines medially at its lower end towards the pubic tubercle

Its anterior surface is crossed by three tendinous intersections, one opposite the umbilicus , one opposite

the xiphoid process, and a third midway between the other two . The muscle is firmly adherent to the anterior wall of the sheath where these intersections occur, but as the latter do not penetrate its whole depth, the muscle is nowhere adherent to the posterior wall of its sheath . The rectus abdominis is developed from portions of the lower six thoracic myotomes and the tendinous intersections represent persistent intersegmental tissue .

The Rectus Sheath is formed by the aponeurosis of the three lateral abdominal muscles . Above the costal margin the posterior wall is absent and the anterior wall is formed by the external oblique aponeurosis .From the costal margin to a point, roughly midway between the umbilicus and the pubic symphysis, the internal oblique aponeurosis splits into two lamellæ , of which the anterior blends with the aponeurosis of the external oblique, and the posterior with that of the transversus muscle to form the corresponding walls of the sheath. It must be remembered , however, that fleshy fibres of the transversus muscle lie behind the upper part of the rectus . In its lower part the anterior wall of the sheath is formed by the aponeuroses of all three muscles, while the posterior wall, which possesses a free curved lower border termed the arcuate (semicircular) line, is entirely deficient, the rectus here coming into contact with the fascia transversalis .

The Linea Alba, which extends from the pubic symphysis to the xiphoid process, is a strong fibrous raphe formed by

the interlacement of the aponeuroses of the lateral muscles of the two sides . Narrow below the umbilicus, it widens out superiorly . It contains no blood vessels of any size and can therefore be incised freely without hæmorrhage . In the muscular young adult it can easily be identified in the interval between the two recti .

e - The Pyramidalis, which arises from the front of the pubis and is inserted into the lower part of the linea alba, is a small triangular muscle which lies between the rectus and the anterior wall of its sheath . It acts as a tensor of thelinea alba, and is supplied by the last thoracic nerve It is frequently absent .

5 - The Nerves of the Anterior Abdominal Wall run at first in the interval between the internal oblique and the transversus muscle and then enter the rectus sheath. The seventh and eighth nerves pierce the posterior lamella of the internal oblique aponeurosis at the costal margin . They then run upwards and medially behind the rectus muscle before piercing it . The ninth nerve runs medially with a slight downward inclination, but the tenth, eleventh and last thoracic nerves descend appreciably as they pass medially . All four pierce the posterior layer of the internal oblique aponeurosis at the lateral edge of the rectus sheath, and continue medially behind the muscle before they pierce its substance. All these nerves supply the three lateral abdominal muscles and the rectus abdominis . In addition, the last thoracic

nerve supplies the pyramidalis . Finally they pass out through the anterior wall of the sheath to end by supplying the skin .

Both the iliohypogastric and the ilioinguinal nerves supply branches to the internal oblique and the transversus, but neither enters the rectus sheath .

6 - The Transversalis Fascia forms a complete fascial lining for the anterior and lateral abdominal walls, deep to the muscles and their aponeuroses . It may be regarded as a part of an abdominopelvic fascial envelope, which lies immedialtely outside the extra-peritoneal fat . The principal arterial trunks of the abdominal walls and pelvis lie, at first, inside this fascial envelope, and the femoral sheathe may be regarded as a downward prolongation of the envelope behind the inguinal ligament . The principal nerves, on the other hand, lie outside the fascial envelope and so it comes about that the femoral nerve is not enclosed inside the femoral sheath .

The fascia transversalis is attached to the inner lip of the iliac crest and the lateral half of the inguinal ligament , in both situations becoming continuous with the fascia iliaca. It is then drawn downwards to form the anterior part of the femoral sheath, and more medially is attached to the pectineal line and the pubic crest . Above the middle of the inguinal ligament it is pierced by the spermatic cord at the deep inguinal ring, and the edges of this opening are continued on to the cord as the internal sperma-

tic fascia .

7 - The Inferior Epigastric Artery arises from the external iliac just above the inguinal ligament . It runs upwards and medially in the extraperitoneal fat along the medial side of the deep inguinal ring .After piercing the transversalis fascia it comes into direct contact with the posterior surface of the rectus muscle, and runs upwards, passing in front of the arcuate line . Its terminal branches enter the rectus and anastomose with the superior epigastric artery .

8 - The superior Epigastric Artery is one of the terminal branches of the internal thoracic . It passes downwards between the sternal and costal origins of the diaphragm, crosses theupper border of the transversus, and so enters the rectus sheath . It descends vertically , supplying the rectus muscle, and anastomoses with the inferior epigastric artery .

ABDOMINAL WOUND HEALING

The skin provides a flexible covering, in some places hick, tough, fixed to underlying structures and resistant o truama, in others mobile and delicate. The elasticity s due to the fibers of elastine embeded in the dermis. hen it is incised it gaps owing to pull of its elastic ibers, but extent to which it gaps depends upon the direct- on of the incision. Collagen bundels and elastic fibers - ie parallel to skin creases or wrinkles, at operation it important to incise the skin in the same direction and oid incisions across the crease lines where tension will use the wound to gap and to heal with broad scar. llignowith 1979).

ectronic microscopic picture of collagen :

The collagen molecules is a complex helicle whose mecha- cal properties are responsible for strength and regidity scar tissue. The units of collagen protein are triple lical chains called tropocollagen.

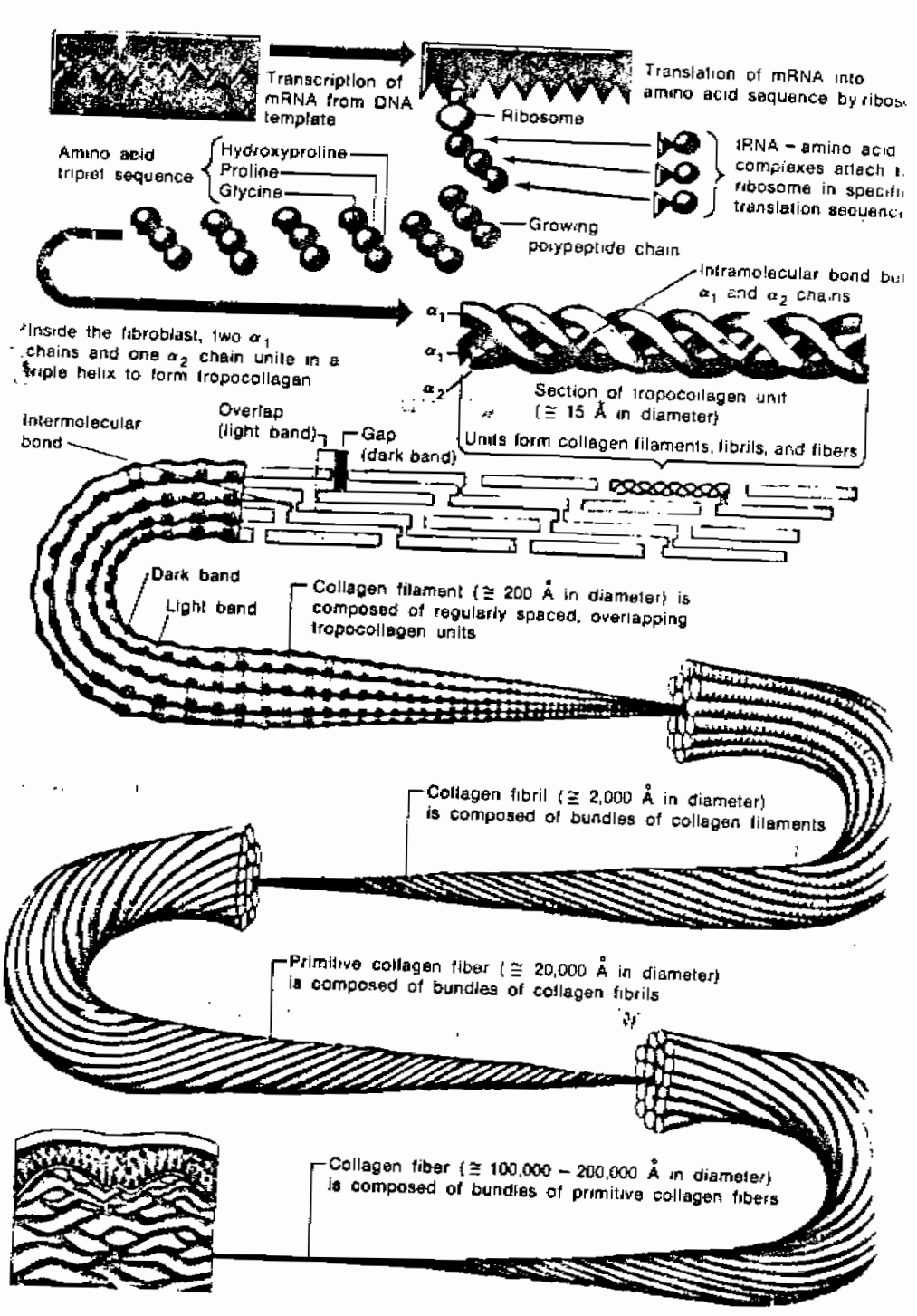

Fig. 1