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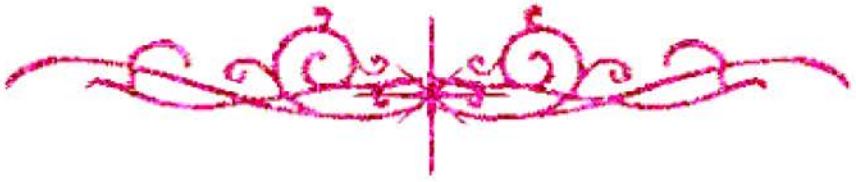

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"Acute Appendicitis up to 10 Years" Clinicopathological Evaluation

Thesis

Submitted for partial fulfillment of the Master Degree in General Surgery

By

Mostafa Mahmoud Nafady

M.B.B.Ch. (Assiut University)

Resident in General Surgery, Unit (A)

Supervised by

Prof. Dr. Fawzy Mohamed Mostafa

Professor of General Surgery,

Faculty of Medicine, Assiut University

Dr. Salah Ibrahim Mohamed

Assistant Professor of General Surgery,

Faculty of Medicine, Assiut University

Dr. Mohamed Galal Mostafa

Lecturer of Pathology,

Faculty of Medicine, Assiut University

Faculty of Medicine

Assiut University

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بسم الله الرحمن الرحيم

وَأَنزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا

" صدق الله العظيم "

((سورة النساء .. آية ١١٣))

Surgical Anatomy of the Appendix in Children

The vermiform appendix is a narrow vermian (worm shaped) tube arise from posterio-medial caecal wall, 2 cm or less below the end of ileum. The canal of the vermiform appendix is small and communicate with the caecum by an orifice which is placed below and little behind the ileocaecal opening the appendix varies from 2 cm to 20 cm in length the average being about 9 cm it is longer in children and may get atrophy or diminish after mid adult life (Williams and Warwicky, 1989).

The surface marking for the appendicular base which is the point of convergence of the three taeniae coli on the posteriomedial wall of the caecum is at the junction of the lateral and middle thirds of the line joining the right anterior superior iliac spine to the umbilicus on the surface of the abdomen this point is called (McBurney's point" (McMinn, 1990).

The appendix is the only organ of the body that has no constant anatomic position in fact its only constant feature is its mode of origin from the caecum where it arise from the site at which the three taeniae coli coalesce.

The various positions of the appendix are paracolic (the appendix lies in the sulcus on the outer side of the caecum), retrocaecal (the organ lie behind the caecum and may even be totally or partially extra-peritoneal) preileal, posteileal, promontory of the sacrum, pelvic and midingunial (subcaecal) (Ellis, 1985).

Fig. (1.) : Caecum and appendix viewed from the front.

The retrocaecal position is the most common :

In 10000 cases at postmortem the location of the appendix is as follows (65.28%), pelvic (31.01%) subcaecal (2.26%), preileal (1%) and right paracolic and postileal 0.4% (Wakeley, 1933).

Willamson et al (1981) found that of 105 retrocaecal appendices removed at operation, 12 (11.4%) extended retroperitoneally, in this position the appendix may extend upward as far as the kidney and in 2 of these 12 cases the patient experienced pain in the right flank. The appendix may be situated in the left lower quadrant of the abdomen in cases of transposition of the viscera. Here the clue may be the observation that the patient has dextrocardia.

Fig (1) : The various positions of the appendix.

A long appendix may also extend into the left side of the abdomen and if inflamed, procedures left iliac fossa pain.

In cases of malrotation of the bowel where the caecum fails to descend to its normal position the appendix may be found in the epigastrium against the stomach or beneath the right lobe of the liver (Ellis, 1985).

Robinson in 1952 while reporting a case of congenital absence of the appendix was able to collect only 680 then examples, a figure sufficiently indicative of great rarity of this condition, congenital absence of the appendix is extremely rare 0.009 percent (Collins, 1951) publication of the appendix is an anomaly of extreme rarity and fewer than 100 cases have been reported.

Duplication of the appendix was classified into three types :

Type A : Partial duplication of the appendix on a single caecum.

Type B : Has single caecum with two completely separate appendices.

Type C : There is a double caecum each of which bears an appendix (Khanna, 1983).

The ileocaecal valve :

The ileum opens in to the posteriomedial aspect of the large intestine at the junction of the caecum and colon. A surface marking of this structure is the intersection of the right lateral and transtubercular planes about 2 cm below this

the vermiform appendix open into the caecum. The ileocaecal orifice has a so-called valve consisting of two flaps projecting into lumen of the large intestine (Decarvalho et al, 1987) in the distended fixed caecum the flaps are semilunar. The upper approximately horizontal, and is attached to the junction of the ileum and caecum at their ends the flaps coalesce, continuing as narrow membranous ridges, the frenula of the valve. The anterior or left tend of the aperture is rounded the right or posterior is narrow and pointed. in the natural state the valvular lips project as thick folds into the caecal lumen the orifice appearing like a slit or oval. Circular, and longitudinal muscle layer of the terminal ileum continue into the valve to form a sphincter.

In nine cases studied by caecostomy, the ileal projection was papillary in shape radiological evidence also contradicts the concept of an effective ileocaecal valve at this junction.

Fig. (...a,b) : Difference between prolapse(a) and prominent ileocaecal valves (b). In the former the central slit-like valve orifice is not filled with barium, whereas in the latter it stands out clearly. This is a posteriorly situated valve (From Hinkei, 1952).

Fig. (...) : The interior of the caecum and commencement of the ascending colon, showing the ileocaecal 'valve'.

Accumulation of circular fibers sometime described as sphincters, have been observed at various levels in all parts of the colon (Di Do and Anderson, 1968; Rosenberg and Di Dio, 1969). The functional reality of most of those remain doubtful such sphincter mechanisms must of course, be balanced by antagonistic dilatatory actions.

The margin of the ileocaecal valve is a reduplication of intestinal Mucosa and circular muscle, longitudinal fibers are partly reduplicated as they enter the valve (Jit and Jingh, 1956), but the more superficial and the peritoneum continue uninterruptedly from the small to large intestine.

The ileal valvular surface are covered with villi and have the structure of the mucosa of small intestine their caecal aspect display No Villi But numerous orifices of tubular gland peculiar to the colonic mucosa. It is usually said that the valve not only prevent reflux from the caecum to ilieum but is probably also a sphincter regulating the passage of ileal content to the caecum. The valve is kept in tonic contraction by sympathetic innervation entry of the food into the stomach initiate contraction of small intestine expelling ileal conteat into the large intestine (gastro ileal reflux).

· Blood Supply of the Appendix ·

· Arterial supply :-

The appendix is connected by a short mesentriole to the lower part of the mesentery of the ileum. This fold, in the majority of cases is more or less triangular in shape and as a role extends a long the entire length of the tube. The appendicular artery is a branch of the lower division of the ileo-colic artery, run behind the terminal part of the ileum and enters the mesentriole of the appendix a short distance from the base of the appendix here it gives a recurrent branch of the posterior caecal artery.

The main appendicular artery runs towards the tip of the appendix lying at first near to and after wards in the free border of the appendicular mesentriole. The terminal part of the artery however lie on the wall of the appendix and may become thrombosed in inflammation of the appendix resulting in gangrene of the distal part of the appendix.

Venous supply :

The veins from the appendix drain into the ileocolic vein which in turn empties into the superior mesenteric vein (Ellis, 1985).

Lymphatic drainage :

The lymph vessels of the vermiform appendix and caecum are numerous, since there is a large amount of lymphoid tissue in the walls of these parts of digestive tube. From the body and tip of the vermiform appendix eight to fifteen vessels ascend between layers of its mesentery, one or two being interrupted in the lymph nodes which lies in this peritoneal fold. They unit to form three or four vessels which end partly in the lower and partly in the upper lymph nodes of the ileocolic chain. The vessels from the root of the vermiform appendix and from the caecum comprise an anterior and posterior group. The anterior vessels pass infront of the caecum and end in the anterior ilieocolic lymph nodes the posterior vessels ascend over the back of the caecum and terminate in the posterior ileocolic lymph nodes (Warwick, 1973).

Histology of Appendix

The appendix is lined by columnar cell intestinal mucosa of colonic type crypts are present but not numerous. In the base of the crepts lie special cells (kulchitzky cells) which give rise to carcinoid tumours.

The appendix is the most frequent site for these rare tumours and appendicitis can be caused by them.

The submucosa contains numerous lymphatic aggregations (follicles) this profusion of lymphatic tissue has promoted the description of abdominal tonsil" for the appendix and draws attention to this feature as a revenant to the relevant cause of appendicitis.

The muscular coat consists of two complete layers of smooth muscles inner circular and the outer longitudinal the latter is formed by the Joining of the taeniaecoli at the base of the appendix. The visceral layer of the peritoneum envelops the appendix completely. Except for the narrow line of attachment of the meso-appendix (Rains and Mann, 1992).

The longitudinal muscular fibers do not form three bands as in the greater part of the large intestine but form a uniformly thick layer which invests. The whole organ, except at one or two points where both the longitudinal and circular layer may be deficient. the circular muscular fibers form a thicker layer than the longitudinal fibers and are separated from them by small amount of connective tissue (Johnston, 1958).

The muscular coat in areas however may be so deficient that. The peritoneum and mucous membrane are separated only by thin layer of connective tissue through which infection can spread easily (McVay, 1984).

Fig. (...) : Transverse section of human vermiform appendix.
Magnification x20.

Pathological Aspect of Acute Appendicitis

Incidence :

Acute appendicitis occurs at all ages but is most frequent in the second and third decades of life (Schwartz, 1989). Its incidence declines at both ends of the age spectrum, such that about 10% of cases occur in children under the age of 10 years.

Acute appendicitis is rare before the age of two it becomes increasingly common during childhood and adolescence, thereafter there is a gradual decline, but no age is exempt (Rains and Mann, 1992).

A well defined difference in sex incidence occurs after puberty, male/female ratio is about 2: 1 because no difference exists before puberty. female hormones are believed to be slightly protective (Lewis, 1987).

The frequency of perforation varies with age with the highest incidence at both age extremes.

In children under the age of 10 years incidence of perforation is about 35-60% (Berry and Malt, 1984).

Although the overall incidence of perforation at time of surgery has fallen in recent years to 15-20% it remain high in children and elderly and form the single most important factor in the High morbidity and appreciable mortality in this age groups (Cuschieri, 1988).

Aetiology and pathology :

Acute inflammation of the appendix ranges from trivial catarrhal inflammation with complete spontaneous resolution to a fatal supportive necrosis with perforation, abscess formation or generalized peritonitis (Krukwiski, 1990).

Acute appendicitis is not associated with any specific bacterial, viral or protozoal invader. The bacteriology of the inflamed organ is that of the normal bowel flora suggesting secondary invasion of the damaged tissue from the lumen of the bowel (Ellis, 1985).

Bacteriology of appendicitis :

The bacteria present are principally bactericides and enterococci and secondary the gram negative aerobes. This mixture of organisms produce arch cocktail of proteolytic enzymes that effectively lyse the collagen and other connective tissue proteins and lead to micro-vascular thrombosis eliminating further the perfusion of the appendiceal wall. The connective tissue integrity of the appendix is thereby lost. Consequently the bacteria which proliferate rapidly because of the available provision of protein nutrients in the wall and lack of granulocyte access to them spread through the wall and begin to involve adjacent abdominal structures (Lau et al, 1985).

A detailed study of the bacteriology of 50 inflamed appendixes gave both aerobic and anaerobic isolates from all cases. Anaerobic bacteria were found more frequently than aerobic, Escherichia coli was the most common aerobic bacterium. Ten patients also harbored other aerobic bacterium rod including klebsiella, proteus and pseudomonas. Enterococci (streptococcus faecales and streptococcus faecium) were found in 15 patients and streptococci (Mitior, Milleri and Salivarius) in 21 patients of anaerobic strains, bactericides fragilis predominated. Anaerobic gram +ve cocci were next in frequency, while clostridium perfringens was cultivated from nine patients (Pieper et al, 1982).

Catarrhal appendicitis :

It is initially a mucosal and submucosal inflammation in early cases the appendix may appear quite normal externally or may merely show hyperemia. On slitting it open however the mucosa will be seen thickened, oedema tow and