
ASSISTED LAPAROSCOPIC MANAGEMENT IN CASES OF HIRSCHSPRUNG'S DISEASE

Thesis

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ABSTRACT

In this study the use of laparoscopy found to be useful in management of cases of Hirschsprung's disease either for diagnosis or definitive management. The use of laparoscopy has many advantages being; one stage procedure, less post operative pain, less hospital stay, early post operative recovery of intestinal motility and minimal intraabdominal dissection without abdominal incisions.

The early results seems very favorable, but longer period of follow up and larger number of cases is needed to assess anal continence and function. Learning curve of laparoscopy needs longer period to improve and needs suitable instruments

Key Word

Assisted , Laparoscopic ,Management in Cases , Hirschsprugs disease longer period to improve

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ANATOMY OF THE COLON, RECTUM AND ANAL CANAL:

The large intestine extends from the terminal ileum to the rectum; larger at the caecal end and smaller at the rectum. It is divided into the caecum, the colon the rectum and finally the anal canal ⁽¹⁾.

Parts of the large intestine:

The first and largest part of the large intestine is the caecum which lies in the right iliac fossa .It is a large cul-de-sac continuous postrolaterally with the terminal ileum and superiorly with the ascending colon .In infants; the caecum is conical in shape with the appendix extending downwards from its apex. It is usually entirely enveloped by peritoneum, but sometimes the peritoneal covering is incomplete. It is related posteriorly to the right iliac fossa muscle and iliacus; separated from them by their covering fascia and peritoneum .Internally; the ileo-caecal junction is guarded by the ileo-caecal valve whose lips may help to prevent some reflux into the ileum guards the ileo-caecal junction, but its sphincteric action is poor ⁽²⁾.

The ascending colon following the caecum and extends from the caecum inferiorly to the hepatic flexure superiorly. The latter lie in front to the lower pole of the right kidney in contact with the inferior surface of the liver .It doesn't have a mesentery; being covered by peritoneum anteriorly and laterally. It lies on the ileac fascia and the anterior layer of the lumbar fascia ⁽²⁾.

Transverse colon is the longest and most mobile part of the colon. It passes with a downward convexity from the right hypochondrium across the abdomen to the left hypochondrium where it curves sharply upon itself beneath the lower border of the spleen to form the splenic flexure. The convexity of the greater curvature of the stomach lies in the concavity of the transverse colon; the two being connected together by the gastro-colic omentum. It has a complete investment of peritoneum and is connected posterosuperiorly by the transverse mesocolon to the inferior border of the pancreas. The Transverse mesocolon extends from the inferior pole of the right kidney, across the second part of the pole of the right kidney, across the second part of the duodenum & the pancreas, to the lower pole of the left kidney (2).

Then the descending colon comes, it doesn't have a mesentery and it is covered by peritoneum anteriorly and laterally. A peritoneal fold (the phrenico-colic ligament) attaches its upper end (the splenic flexure) to the diaphragm at the level of 10th and 11th ribs. It is smaller caliber than the ascending colon. It descends lateral to the left kidney & left psoas muscle then descends lateral to the left kidney and left psoas muscle then ends at the pelvic brim to become the sigmoid colon (2).

The descending colon continues as sigmoid colon. It is called also the pelvic colon as it lies in the pelvis. It starts at the pelvic inlet as a continuation of the descending colon and ends at the commencement of the rectum in front of the 3rd piece of the sacrum. It is completely surrounded by peritoneum, which forms the sigmoid mesocolon. The sigmoid mesocolon diminishes in length from the center to the ends of the loop; where it disappears, so that the loop is fixed at its ends but has a considerable range of mobility in its central portion. Its relations are variable. Laterally: the left external iliac vessels, the obturator near the

left ovary (in females) or the vas deferens (in males) & the lateral pelvic wall. Posteriorly: the left internal iliac vessels, the left ureter, the piriformis muscle & the sacral nerve plexus. Inferiorly: the urinary bladder (in males) or the uterus and urinary bladder (in females). Superiorly and to the right, it is in contact with the terminal coils of the ileum (2).

At the end of sigmoid colon the rectum comes as a retro-peritoneal structure that is continuous above with the sigmoid colon & below with the anal canal. It begins opposite the third sacral piece and passes downwards; lying in the sacro-coccygeal curve to end about 2.5cm in front of and a little below the tip of the coccyx, then it bends sharply backwards into the anal canal. Therefore, it has two antro-posterior curvatures. Moreover, it deviates from the midline in three sides-to-side curvatures; each of them being marked on the anterior of the rectum by a sickle shape musculo-mucosal shelf (rectal valve of Houston), two to the left & one on the right in-between them lying across half of the circumference of the rectal lumen. At its commencement, the rectum is similar in caliber to the sigmoid colon, but near its termination it is dilated to form the rectal ampulla. The rectum has no sacculations compared with the colon. It has no appendices epiploicae or a mesentery. The peritoneum covers the anterior & lateral aspects of the upper 1/3 of the rectum and covers only the anterior surface of the middle 1/3 where it is reflected forwards on the seminal vesicles in males (forming the recto-vesical pouch) or on the posterior vaginal wall in females (forming the recto-vaginal or Douglas pouch). The level of the peritoneal reflection is higher in males than in females. The rectum is surrounded by a dense tube of fascia derived from the endo-pelvic fascia but is fused posteriorly with the fascia covering the sacrum and coccyx. The fascial tube is

loosely attached to the rectum by areolar tissue to allow its distention ⁽¹⁾. This fascial covering has specific division:

- a) Fascia of Waldeyer: A vascular condensation of the presacral fascia passing forward to the posterior aspect of the ano-rectal junction.
- b) Lateral ligaments of the rectum: they are fascial condensations around the middle rectal vessels passing from the postero-lateral wall of the lesser pelvis (at the level of S-3) to the rectum.
- c) Denonvillier's (recto-vesical) fascia: It connects the anterior surface of the rectum to the prostate & seminal vesicles ⁽²⁾.

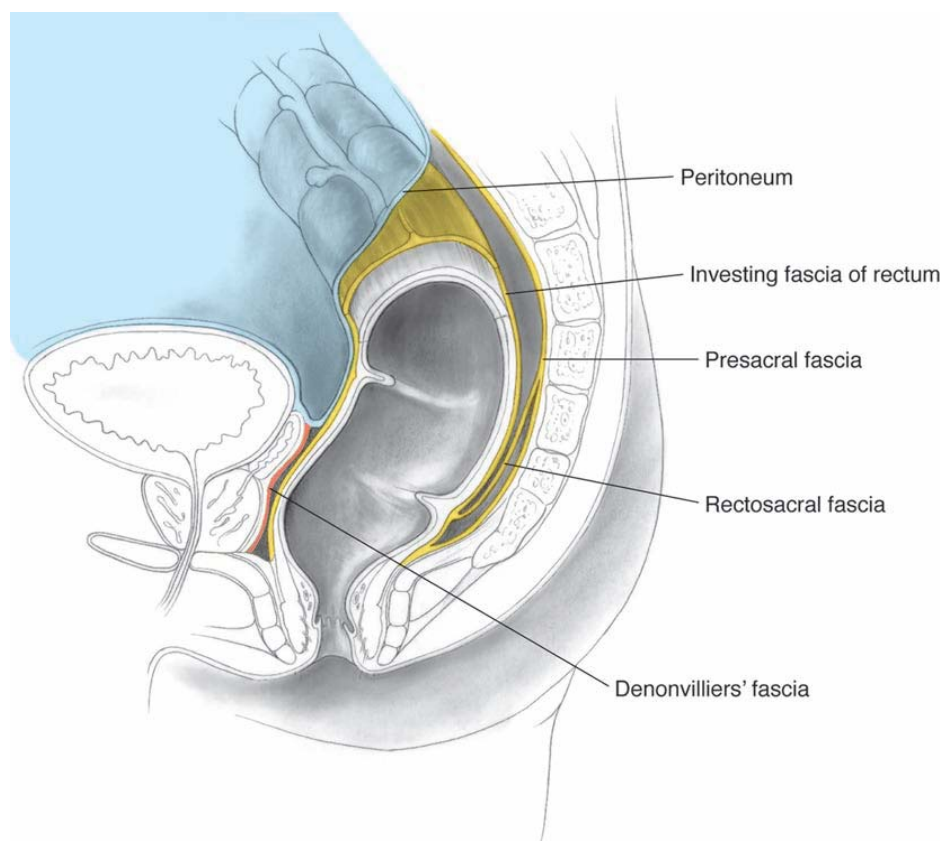


Fig. (1) Denonvilliers' fascia (Gordon, Philip H., 2007)⁽⁵⁾.

It has been suggested that the rectum consists functionally of two parts separated by the middle valves of Houston; the upper part containing feces & being free to distend towards the peritoneal cavity, while the lower part is empty in normal individuals.

Some authors consider that the sigmoid colon acts as a fecal reservoir and the rectum is empty in normal individuals (though it may contain feces in cases of chronic constipation) and the passage of feces in the rectum normally excites the desire to defecate ⁽¹⁾.

Relations of the rectum:

In the midline, it is related posteriorly to the lower three sacral pieces, the coccyx, the median sacral vessels, the ganglion impar and branches from the superior rectal vessels. On each side of the midline, it is related to piriformis muscle, the anterior primary rami of the lower 3 sacral nerves, the coccygeal nerve & the levator-ani muscle.

The anterior relation of the rectum differs between male and female:
a) in males: above the peritoneal reflections; it is related to the base of the urinary bladder, the seminal vesicles & the recto-vesical pouch. Below the peritoneal reflection it is related to the base of the urinary bladder, the prostate & the vasa differentia.

b) In females: It is related; above the peritoneal reflection; to the uterus, the upper 2/3 of the vagina & the Douglas pouch. Below the peritoneal reflection, it is related to the lower 1/3 of the vagina ⁽¹⁾.

The last part of the colon is the anal canal: It begins at the level of the apex of the prostate where the ampulla of the rectum suddenly narrows. It is directed downwards & backwards. Its lumen has the shape of an antro-posterior longitudinal slit. It has no peritoneal covering, but is invested by

the internal anal sphincter, supported by the levator-ani muscle and surrounded by the external anal sphincter. Behind the anal canal, there is a fibro-muscular mass separating it from the coccyx; namely the ano-coccygeal body. In front of it; in males; there is connective tissue separating it from the bulb of the prostatic urethra & the fascia of the urogenital diaphragm. In females, a fibro-muscular mass; namely the perineal body; separates it from the lower end of the vagina ⁽¹⁾.

The lining of the anal canal is not uniform although its length. The upper 1/2 is lined by mucous membrane and is plum-colored due to the subjacent internal rectal venous plexus. This upper 1/2 presents a number of longitudinal infoldings of the mucosa (columns of Morgagni) which are separated from each other by furrows called the rectal sinuses. These sinuses end below by valve-like folds called the anal valves. These sinuses are very deep on the posterior wall of the anal canal and may retain fecal matter and become infected leading to abscess formation in the wall of the anal canal. Moreover, the anal valves may be torn by hard feces producing an anal fissure. The line along which the anal valves are situated is called the pectinate (dentate) line. It lies opposite the middle of the internal anal sphincter. This dentate line is the line of division between the columnar rectal epithelium & the stratified squamous anal epithelium (thin hairless skin). It also separates the blood supply, nerve supply & lymphatic drainage above and below it. The venous drainage above the dentate line goes to the portal circulation while below it to the systemic circulation ⁽¹⁾.

Anal musculature:

a) The internal anal sphincter: It is a thickened tube of circular smooth muscles. It surrounds the upper 3/4 of the anal canal. Superiorly, it is continuous with circular muscle layer of the rectum & inferiorly it ends with a well-defined round edge 6-8 mm below the level of the anal valves ⁽¹⁾.

b) The external anal sphincter: It surrounds the whole length of the anal canal & extends further downwards than the internal sphincter. Traditionally it is considered to be composed of three parts; namely the subcutaneous, the superficial & the deep parts. However, these parts blend with one another to form a continuous tube ⁽²⁾.

1. The subcutaneous external sphincter: it is thick ring of muscle not attached to bone. It lies horizontally immediately beneath the skin of the anus below the lower border of the internal anal sphincter. It is separated from the superficial external sphincter by the facial attachment of the white line. It is easily palpable by the examining finger tip ⁽¹⁾.

2. The superficial external sphincter: It lies above the subcutaneous part & surrounds the lower part of the internal sphincter. It is an elliptical muscle attached to the tip of the coccyx posteriorly & to the perineal body anteriorly ⁽¹⁾.

3. The deep external sphincter: This is again an annular muscle not attached to bone. It encircles the lower part of the internal anal sphincter. Posteriorly it blends with the embracing loop of puborectalis muscle, but anteriorly it forms a complete ring which is separated from the

puborectalis and fills the space between the 2 halves of it in front of the recto-anal junction ⁽¹⁾.

It has been suggested that the external anal sphincter is a one muscle sheet as follows: It is an elliptical cylinder of muscle which surrounds the anal canal. On the lateral aspect it is continuous with puborectalis & pubococcygeous muscles. Posteriorly, it is attached at the lowest level to the skin of the perineal region. At a slightly higher level, the external sphincter fibers form ano-coccygeal raphe which runs backwards to be attached to the coccyx. Above this raphe the external sphincter is devoid of posterior attachment but extends up to the level at which the median raphe of the levator-ani muscle insert into the front of the coccyx behind the anal canal. Between the upper raphe of the levator-ani & the ano-coccygeal raphe below, lies a space filled with fatty tissue (the retro-sphincteric space) ⁽²⁾.

Anteriorly many of the lower fibers of the external sphincter are inserted into the peri-anal skin. At a higher level the external sphincter fibers decussate at the central point of the perineal body to merge into the perineal muscles. Above this level most of the peripheral fibers seem to proceed forwards at the puborectalis. The more centrally placed fibers join there fellows of the opposite side to complete the encirclement of the anal canal anteriorly up to the level of recto anal ring ⁽²⁾.

4. The conjoint longitudinal coat of the anal canal: This is a fibro-muscular layer between the internal and external sphincters. Downwards they break up; opposite the lower end of the internal sphincter; into a number of septa. These septa are composed largely of elastic fibers. They radiate circumferentially towards mainly through the subcutaneous part of the external anal sphincter to become attached to the circumanal skin ⁽¹⁾.

5. The ano-rectal ring: This term was named by **Milligan & Morgan (1939)⁽³⁾** to denote the functionally important muscular ring which surrounds the recto-anal junction. It is composed of the upper border of the internal and external sphincters which surrounds the anorectal junction on the posterior and lateral aspects intermingled with the strong puborectalis muscle. As a result, the ring is stronger posteriorly and laterally than anteriorly ⁽⁴⁾.

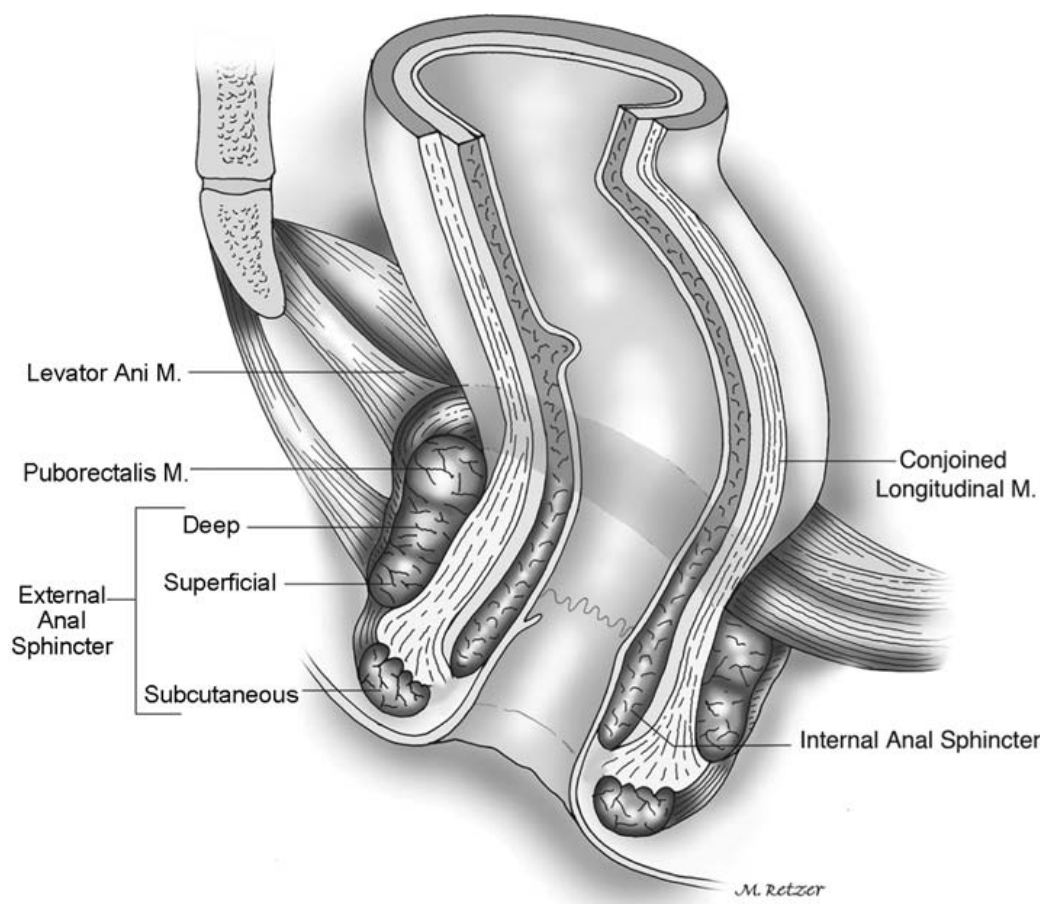


Fig. (2) Muscles of the anal canal (Gordon, Philip H., 2007)⁽⁵⁾.

The ano-rectal ring of muscles is formed of the puborectalis, the deep part of the external sphincter and the internal sphincter. This ano-rectal ring can be easily felt by P-R examination. Recognition of it is very important as its complete division results in stool incontinence while its preservation; despite sacrificing all the rest of the sphincteric musculature; at least ensure that there will be no gross lack of continence, through a minor degree of incontinence may occur ⁽⁴⁾.

Actions of the anal muscles in anal closure:

Muscle tone in both internal and external sphincters keeps the canal and anus closed except during defecation, their contraction increases when the intra-abdominal pressure rises e.g. in forced expiration, coughing, etc.

The external sphincter can be also voluntarily contracted to occlude the anus more firmly. It is likely that the external sphincter is more effective at closure than the internal, which appears unable to seal off the anal canal completely. When the puborectalis contracts, it pulls the upper end of the canal forward to form the ano-rectal angle, thus assisting its closure ⁽²⁾.