

Q: Discuss the Anal Canal.

A:

The anal canal is the last part of the gastrointestinal tract. It is about 3 to 4 cm long and lies completely extraperitoneally. It begins at the anorectal junction distally from the perineal flexure and ends at the anus. It is located within the anal triangle of the perineum

The anal canal may be subdivided into the columnar, intermediate and cutaneous zone.

Columnar zone - The lumen has folds of mucous membrane (anal columns) produced by arterial cavernous bodies (anal cushions) in the submucosa. These columns are connected to each other at their distal ends by transverse folds (anal valves). Behind the anal valves lie crypts (crypts of Morgagni) into which the excretory ducts of the anal glands open. All anal valves together form the dentate (or pectinate) line, a serrated line where the intestinal mucosa merges with the squamous epithelium of the anal canal.

Intermediate zone - Distally from the dentate line lies a 1 cm long zone with anal mucosa (anoderm).

Cutaneous zone - This zone below the anal verge (anocutaneous line) is a hollow between the internal and external anal sphincter and has regular perianal skin. The tension of the corrugator cutis ani muscle gives it its fan-like look.

Histologically it is divided into colorectal, transitional, anoderm, and cutaneous zones

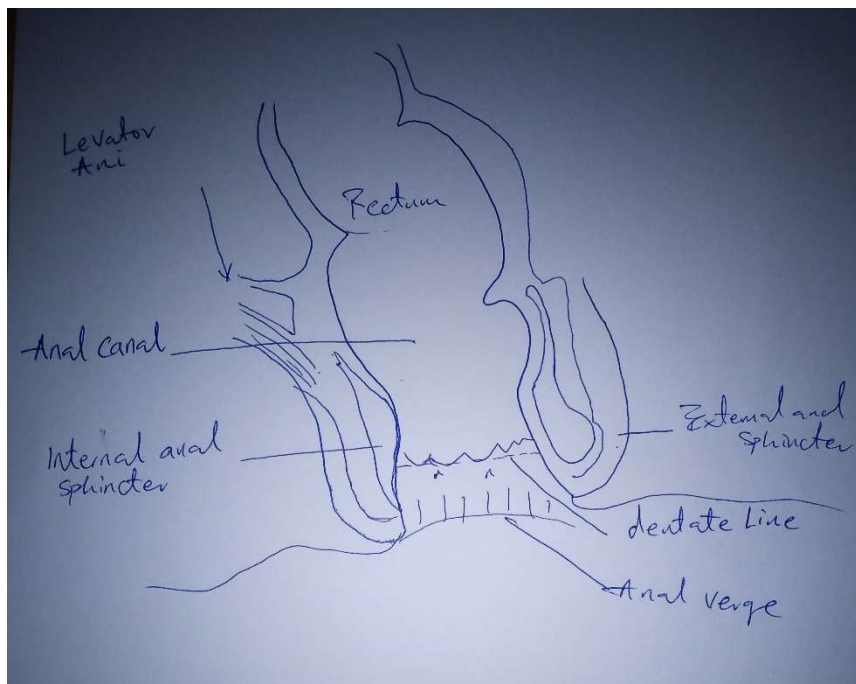


DIAGRAM OF THE ANAL CANAL

Anatomical relations

<u>Anteriorly</u>		<u>Posteriorly</u>	<u>Laterally</u>
<i>Male</i>	<i>Female</i>	Anococcygeal ligament Coccyx and sacrum	Ischional fossae
Perineal body Urogenital diaphragm Urethra Bulb of the penis	Perineal body Urogenital diaphragm Vagina		

Blood supply and innervation

The blood supply, innervation and lymphatic drainage is influenced by the dentate line.

The columnar zone derives from the endoderm whereas both the intermediate and cutaneous zone develop from the proctodeum (cloaca). As a result of the different embryologic origins, the zones have separate supplying structures. Hereby the dentate line serves as an important marker.

Above the pectinate/dentate line The arterial blood is supplied by the **superior rectal artery** (branch of the inferior mesenteric artery). The venous blood flows through the **internal hemorrhoidal plexus** into the **superior rectal vein** (→**hepatic portal system**). The lymph drains into the lumbar (paraaortic) lymph nodes.

The sympathetic innervation is carried by the **inferior mesenteric plexus**, while the parasympathetic innervation by the pelvic splanchnic nerves and **the inferior hypogastric plexus**.

Below the dentate line The blood supply comes from the **middle** (branch of the internal iliac artery) and **inferior rectal arteries** (branch of the pudendal artery from the internal iliac artery). The venous blood drains via the external hemorrhoidal plexus into the middle and **inferior rectal veins** (→body circulation). The lymph flows into the superficial inguinal lymph nodes.

The pudendal nerve is responsible for the sensory innervation

Function

1. The anal canal is an important part of the continence organ. It is surrounded by a muscular sphincter system which tightly closes the lumen. The internal anal sphincter is permanently contracted through the sympathetic tonus and relaxes under parasympathetic influence. The external anal sphincter surrounds the anal canal like a clamp. It is in close relationship to the puborectalis muscle (part of levator ani muscle) which encircles the rectum from behind (puborectal sling) and thus forms a bending closure. Both the external anal sphincter and the puborectalis muscle are voluntarily controlled.

2. The anal cushions play an important role in the fine control. Physiologically they are filled with arterial blood. During defecation, the internal anal sphincter relaxes so that the blood in the cushions drains away, allowing a smooth passage of the stool through the anal canal. A pathological enlargement of the anal cushions leads to haemorrhoids.
3. The human anal glands are rudimentary. Their secreted scent does not play a role for humans anymore. For many animals the scent still fulfils important functions, e.g. territory marking or sexual stimulation

Clinical Relevance

Haemorrhoids-These are vascular cushions found within the anal canal of healthy individuals which help maintain faecal continence. This may become swollen and distended(**pathological haemorrhoids**). It may result during constipation, raised intra-abdominal pressure (e.g pregnancy).

The haemorrhoid are typically located at the 3,7 and 11 o'clock positions and may result in bleeding and itchiness depending on the severity. It could be managed conservatively or surgically