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MATRIC NO.: 18/MHS01/343

DEPARTMENT: ANATOMY

COURSE CODE: ANA 212

**ASSIGNMENT:** Discuss the Anal Canal

**ANSWER:**

## The anal canal is the terminal segment of the [large intestine](https://en.wikipedia.org/wiki/Large_intestine) between the [rectum](https://en.wikipedia.org/wiki/Rectum) and [anus](https://en.wikipedia.org/wiki/Anus), located below the level of the [pelvic diaphragm](https://en.wikipedia.org/wiki/Pelvic_diaphragm). It is located within the [anal triangle](https://en.wikipedia.org/wiki/Anal_triangle) of [perineum](https://en.wikipedia.org/wiki/Perineum), between the right and left [ischioanal fossa](https://en.wikipedia.org/wiki/Ischioanal_fossa). As the final functional segment of the bowel, it functions to regulate release of excrement by two muscular sphincter complexes. The aperture at the terminal portion of the anal canal is known as the anus.

**STRUCTURE OF THE ANAL CANAL.**

In humans, the anal canal is approximately 2.5" to 4" long, from the anorectal junction to the [anus](https://en.wikipedia.org/wiki/Anus). [[1]](https://en.wikipedia.org/wiki/Anal_canal#cite_note-1)[[2]](https://en.wikipedia.org/wiki/Anal_canal#cite_note-2) It is directed downwards and backwards. It is surrounded by inner involuntary and outer voluntary sphincters which keep the [lumen](https://en.wikipedia.org/wiki/Lumen_(anatomy)) closed in the form of an anteroposterior slit.

The canal is differentiated from the rectum by a transition along the internal surface from [endodermal](https://en.wikipedia.org/wiki/Endodermal) to skin-like [ectodermal](https://en.wikipedia.org/wiki/Ectodermal) tissue.

Anal canal is traditionally divided into two segments, upper and lower, separated by the [pectinate line](https://en.wikipedia.org/wiki/Pectinate_line) (also known as the dentate line):

* upper zone (zona columnaris)
  + mucosa is lined by [simple columnar epithelium](https://en.wikipedia.org/wiki/Simple_columnar_epithelium)
  + features longitudinal folds or elevations of tunica mucosa which are joined together inferiorly by folds of [mucous membrane](https://en.wikipedia.org/wiki/Mucous_membrane) known as anal valves
  + supplied by the [superior rectal artery](https://en.wikipedia.org/wiki/Superior_rectal_artery) (a branch of the [inferior mesenteric artery](https://en.wikipedia.org/wiki/Inferior_mesenteric_artery))
* lower zone
  + divided into two smaller zones, separated by a white line known [Hilton's line](https://en.wikipedia.org/wiki/Intersphincteric_groove):
    - zona hemorrhagica - lined by [stratified squamous non-keratinized](https://en.wikipedia.org/wiki/Stratified_squamous_epithelium) epithelium
    - zona cutanea - lined [stratified squamous keratinized](https://en.wikipedia.org/wiki/Stratified_squamous_epithelium) epithelium, which blends with the surrounding perianal skin
  + supplied by the [inferior rectal artery](https://en.wikipedia.org/wiki/Inferior_rectal_artery) (a branch of the [internal pudendal artery](https://en.wikipedia.org/wiki/Internal_pudendal_artery))

The *anal verge* referes to the [distal](https://en.wikipedia.org/wiki/Anatomical_terms_of_location#Proximal_and_distal) end of the anal canal, a transitional zone between the epithelium of the anal canal and the [perianal skin](https://en.wikipedia.org/wiki/Perianal_skin). It should not be confused with the [pectinate line](https://en.wikipedia.org/wiki/Pectinate_line) between the upper and lower zones within the anal canal.

[Anal gland](https://en.wikipedia.org/wiki/Anal_gland) secretes lymphal discharge and built up fecal matter from the colon lining. In some animals this gland expungement can be done routinely every 24 – 36 months to prevent infection and fistula formation.

**FUNCTION OF THE ANAL CANAL.**

The external anal sphincter muscle is the voluntary muscle that surrounds and adheres to the anus at the lower margin of the anal canal. This muscle is in a state of tonic contraction, but during defecation, it relaxes to allow the release of feces.

Movement of the feces is also controlled by the involuntarily controlled internal anal sphincter which is an extension of the circular muscle surrounding the anal canal. It relaxes to expel feces from the rectum and anal canal

The anal canal is the final segment of the gastrointestinal tract.

It has an important role in defecation and maintaining faecal continence.

In this article, we shall look at the anatomy of the anal canal – its position, structure, relations and neurovascular supply.

**ANATOMICAL POSITION OF THE ANAL CANAL**

The anal canal is located within the anal triangle of the perineum between the right and left ischioanal fossae. It is the final segment of the gastrointestinal tract, around 4cm in length.

The canal begins as a continuation of the rectum, and passes inferoposteriorly to terminate at the anus.

**ANATOMICAL STRUCTURE**

Except during defecation, the anal canal is collapsed by the internal and external anal sphincters to prevent the passage of faecal material.

### Anal Sphincters

The anal canal is surrounded by internal and external anal sphincters, which play a crucial role in the maintenance of faecal continence:

* **Internal anal sphincter** – surrounds the upper 2/3 of the anal canal. It is formed from a thickening of the involuntary circular smooth muscle in the bowel wall.
* **External anal sphincter** – voluntary muscle that surrounds the lower 2/3 of the anal canal (and so overlaps with the internal sphincter). It blends superiorly with the puborectalis muscle of the [pelvic floor](https://teachmeanatomy.info/pelvis/muscles/pelvic-floor/).

### At the junction of the rectum and the anal canal, there is a muscular ring – known as the**anorectal ring**. It is formed by the fusion of the internal anal sphincter, external anal sphincter and puborectalis muscle, and is palpable on [digital rectal examination](https://teachmeanatomy.info/abdomen/gi-tract/rectum/). Internal Structure

The superior aspect of the anal canal has the same epithelial lining as the rectum (columnar epithelium). However, in the anal canal, the mucosa is organised into longitudinal folds, known as anal columns. These are joined together at their inferior ends by anal valves. Above the anal valves are small pouches which are referred to as anal sinuses – these contain glands that secrete mucus.

The anal valves collectively form an irregular circle – known as the pectinate line (or dentate line). This line divides the anal canal into upper and lower parts, which differ in both structure and neurovascular supply. This is a result of their different embryological origins:

Above the pectinate- derived from the embryonic hind gut

Below the pectinate-derived from the ectoderm of the proctodeum.

Inferior to the pectinate line, the anal canal is lined by non-keratinised stratified squamous epithelium (known as the anal pecten). It is a pale and smooth surface, which transitions at the level of the inter-sphinteric groove to true skin (keratinised stratified squamous).

**ANATOMICAL RELATIONS**

It lies in close proximity to several other important structures in the pelvis and perineum:

|  |  |  |  |
| --- | --- | --- | --- |
| **Anteriorly** | | **Posteriorly** | **Laterally** |
| Male | Female | Anococcygeal ligament  [Coccyx](https://teachmeanatomy.info/pelvis/bones/coccyx/) and [sacrum](https://teachmeanatomy.info/pelvis/bones/sacrum/) | Ischioanal fossae |
| [Perineal body](https://teachmeanatomy.info/pelvis/areas/perineum/)  Urogenital diaphragm  [Urethra](https://teachmeanatomy.info/pelvis/viscera/urethra/)  [Bulb of the penis](https://teachmeanatomy.info/pelvis/the-male-reproductive-system/penis/) | [Perineal body](https://teachmeanatomy.info/pelvis/areas/perineum/)  Urogenital diaphragm  [Vagina](https://teachmeanatomy.info/pelvis/female-reproductive-tract/vagina/) |

## Anatomical Relations

It lies in close proximity to several other important structures in the pelvis and perineum: clinical importance : haemorrhoids

|  |  |  |  |
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## NEUROVASCULAR SUPPLY AND LYMPHATICS

As discussed above, the pectinate line divides the anal canal into two parts – which have a different arterial supply, venous drainage, innervation and lymphatic drainage.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Modality** | **Above Pectinate line** | | **Below Pectinate line** | |
| **Arterial Supply** | Superior rectal artery (branch of [inferior mesenteric arter](https://teachmeanatomy.info/abdomen/vasculature/arteries/inferior-mesenteric/)y)  Anastomosing branches from the middle rectal artery. | | Inferior rectal artery (branch of the [internal pudendal artery](https://teachmeanatomy.info/pelvis/vasculature/arterial-supply/))  Anastomosing branches from the middle rectal artery. | |
| **Venous Drainage** | Superior rectal vein, which empties into the [inferior mesenteric vein](https://teachmeanatomy.info/abdomen/vasculature/venous-drainage/) (portal venous system). | | Inferior rectal vein, which empties into the [internal pudendal vein](https://teachmeanatomy.info/pelvis/vasculature/venous-drainage/) (systemic venous system). | |
| system). | | Inferior rectal vein, which empties into the [internal pudendal vein](https://teachmeanatomy.info/pelvis/vasculature/venous-drainage/) (systemic venous system). | |
| Nerve Supply | | Visceral innervation via the inferior hypogastric plexus.  Sensitive to stretch. | | Somatic innervation via the inferior anal nerves (branches of the pudendal nerve)  Sensitive to pain, temperature, touch and pressure. |
| Lymphatics | | Internal iliac lymph nodes | | Superficial inguinal lymph nodes |

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