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## 18/MHS01/205

## ANA 212

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Question: describe the anal canal

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).

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).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* refers 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 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/).

**Function**

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.

**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). |
| **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 |