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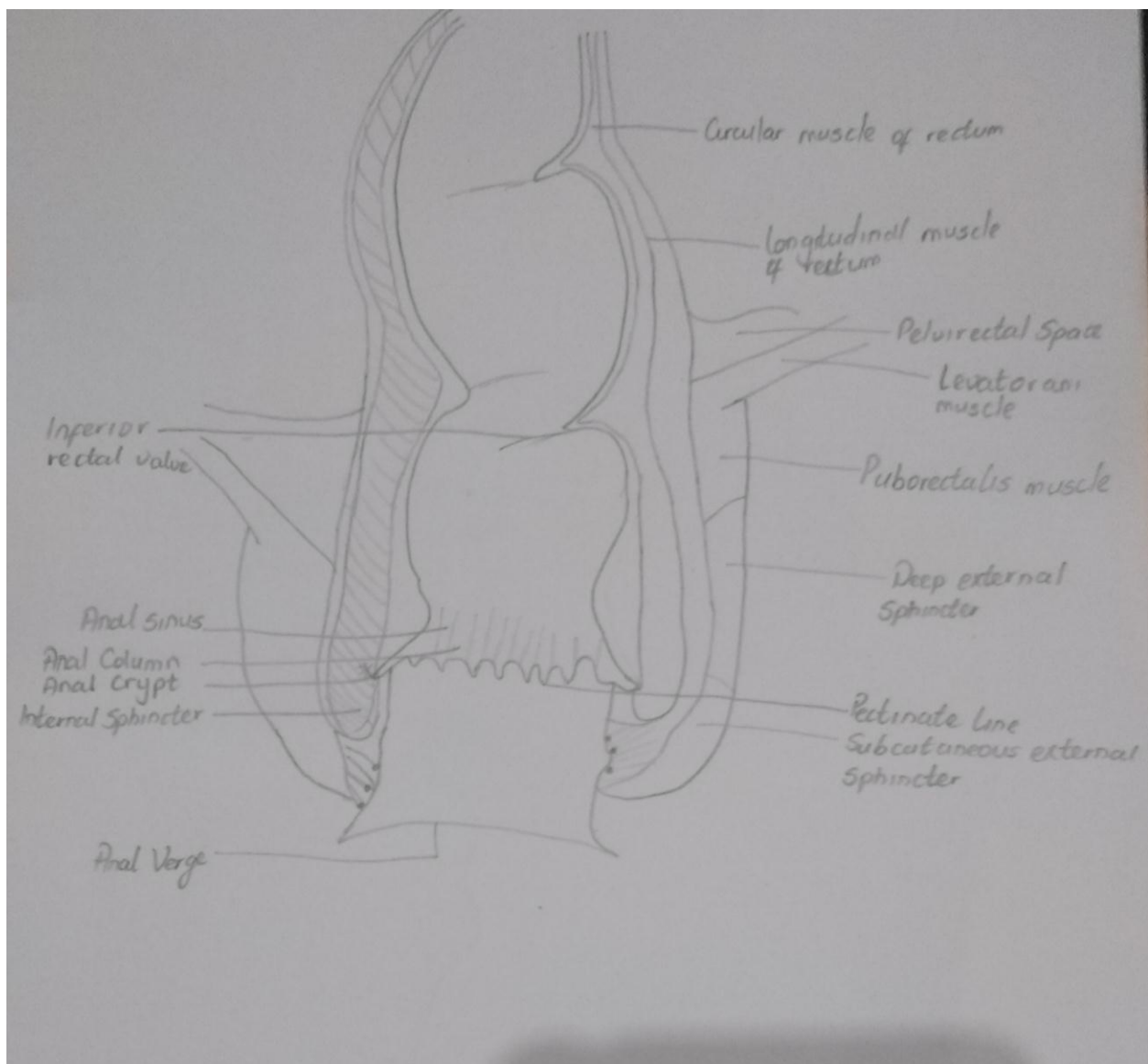
DEPARTMENT:- ANATOMY

COURSE:- ANA 206

ASSIGNMENT

Discuss the Anal canal

ANSWER



LABELLED DIAGRAM OF THE ANAL CANAL

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. The anal canal serves as the continuation of the rectum to the end of the alimentary system, the anus. It has two sphincters; the internal anal sphincter and the external anal sphincter

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.

### **Blood supply and innervation**

The columnar zone derives from the endoderm whereas both the intermediate and cutaneous zone develops 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. Blood supply and lymphatic of the anal canal is to consider the supply above and below the pectinate line and that which supplies both.

Above the pectinate (dentate) line:

This area is supplied by the terminal branches of the superior rectal artery. This artery is a branch of the inferior mesenteric artery. The lymphatic drainage above the pectinate line is to the inferior mesenteric lymph nodes.

Below the pectinate line:

This area is supplied by the middle rectal artery and the inferior rectal artery. The middle rectal artery is a branch of the internal iliac artery while the inferior rectal artery is a branch of the internal pudendal artery. The lymphatic drainage below the pectinate line is to the superficial inguinal lymph nodes.

## Portosystemic Venous Connection- The Overlap:

The venous drainage above the pectinate line is to the superior rectal veins which drain into the inferior mesenteric vein and ultimately drain into the systemic veins. The venous drainage below the pectinate line is to the internal pudendal veins which drain into the internal iliac vein and ultimately into the portal venous system. Present between these two systems of drainage is a portosystemic anastomosis which allows for these systems to be connected. This connection can have consequences when one system has much more pressure than the other and can result in the development of anorectal varices. Not unique to the anal canal, these portosystemic anastomoses are also present at the level of the esophagus and the umbilicus.

## Nerve

Above the pectinate (dentate) line:

This region receives autonomic innervation from the inferior hypogastric plexus. The parasympathetic innervation inhibits the tone of the IAS and evokes a peristaltic contraction to allow defecation. Sympathetic innervation works oppositely to maintain the tone of the IAS and preserve continence. This region of the anal canal is sensitive to stretch.

Below the pectinate line:

This region receives somatic innervation derived from branches of the pudendal nerve. This region of the anal canal is sensitive to pain, temperature, and touch.

## Clinical Significance

### 1. Incontinence

Incontinence is a term that describes any accidental or involuntary loss of urine from the bladder or bowel motion, faeces or wind from the bowel. It can be due to stress factors, such as coughing, it can happen during and after pregnancy, and it is more common with conditions such as obesity. The chances of it happening increase with age. Bladder control and pelvic floor, or Kegel, exercises can help prevent or reduce it.

Stress incontinence

Pelvic floor exercises, also known as Kegel exercises, help strengthen the urinary sphincter and pelvic floor muscles – the muscles that help control urination.

## Bladder training

- Delaying the event: The aim is to control urge. The patient learns how to delay urination whenever there is an urge to do so.
- Double voiding: This involves urinating, then waiting for a couple of minutes, then urinating again.
- Toilet timetable: The person schedules bathroom at set times during the day, for example, every 2 hours.
- Bladder training helps the patient gradually regain control over their bladder.

## Medications for urinary incontinence

Medications include;

- Anticholinergics calm overactive bladders and may help patients with urge incontinence.
- Topical estrogen may reinforce tissue in the urethra and vaginal areas and lessen some of the symptoms.
- Imipramine (Tofranil) is a tricyclic antidepressant.

## Medical devices

- The following medical devices are designed for females.
- Urethral inserts: A woman inserts the device before activity and takes it out when she wants to urinate.
- Pessary: A rigid ring inserted into the vagina and worn all day. It helps hold the bladder up and prevent leakage.
- Radiofrequency therapy: Tissue in the lower urinary tract is heated. When it heals, it is usually firmer, often resulting in better urinary control.
- Botox (botulinum toxin type A): Injected into the bladder muscle, this can help those with an overactive bladder.
- Bulking agents: Injected into tissue around the urethra, these help keep the urethra closed.
- Sacral nerve stimulator: This is implanted under the skin of the buttock. A wire connects it to a nerve that runs from the spinal cord to the bladder. The wire emits an electrical pulse that stimulates the nerve, helping bladder control.

## Surgery

Surgery is an option if other therapies do not work. Women who plan to have children should discuss surgical options with a doctor before making the decision.

- Sling procedures: A mesh is inserted under the neck of the bladder to help support the urethra and stop urine from leaking out.
- Colposuspension: Lifting the bladder neck can help relieve stress incontinence.
- Artificial sphincter: An artificial sphincter, or valve, may be inserted to control the flow of urine from the bladder into the urethra.

## **2. Hemorrhoids**

Hemorrhoids are a common anal disorder which involves the engorgement of veins in the lower part of the anus and rectum. A variety of factors predispose individuals to the development of hemorrhoids such as pregnancy, age, diarrhea, chronic constipation, sitting for too long (especially on the toilet), heavy lifting, anal intercourse, obesity, and genetics.

There are two major types of hemorrhoids: (1) internal hemorrhoids and (2) external hemorrhoids. Internal hemorrhoids are deep within the anal canal and are usually painless because of the lack of sensory innervation in that region, being above the dentate line. These hemorrhoids often present with painless bleeding and, upon straining, may prolapse out of the anus and External hemorrhoids exist within the skin around the anal opening and are often painful and itchy.

Treatment include; Eat high-fiber foods, Use topical treatments, apply an over-the-counter hemorrhoid cream or suppository containing hydrocortisone, or use pads containing witch hazel or a numbing agent, Soak regularly in a warm bath or sitz bath, Take oral pain relievers.

## **3. Anal Cancer**

Anal cancer is a disease in which the normal cells of the anus become malignant. Most cases are related to the human papillomavirus (HPV). Factors that enhance the risk of anal cancer include smoking and immunodeficiency. The prognosis of anal cancer is mostly dependent on the size of the tumor and whether cancer has spread to the lymph nodes. Following the identification of anal cancer, it is staged from 0 to 5 based on size and spread with stage 5 carrying the worst prognosis.

Treatment of anal cancer often includes surgery, radiation therapy, chemotherapy, or some combination of these methods.