

# ***Navigating Anorectal Anatomy: Terms, Planes, Spaces, Structures***

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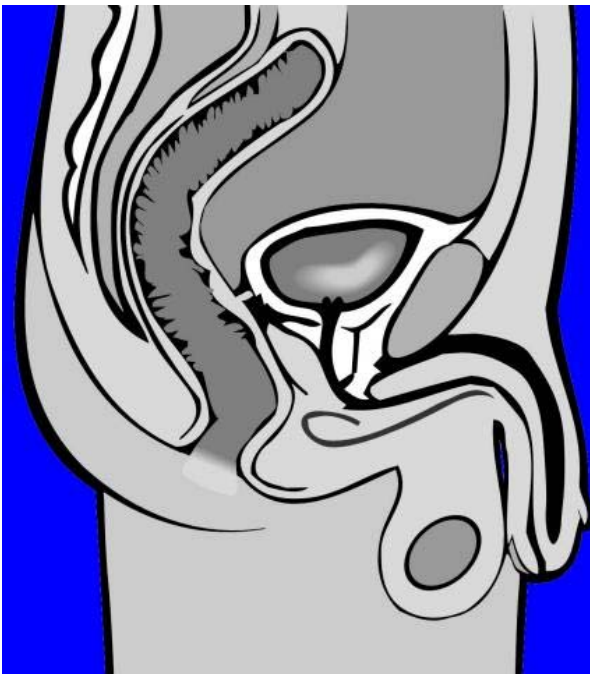
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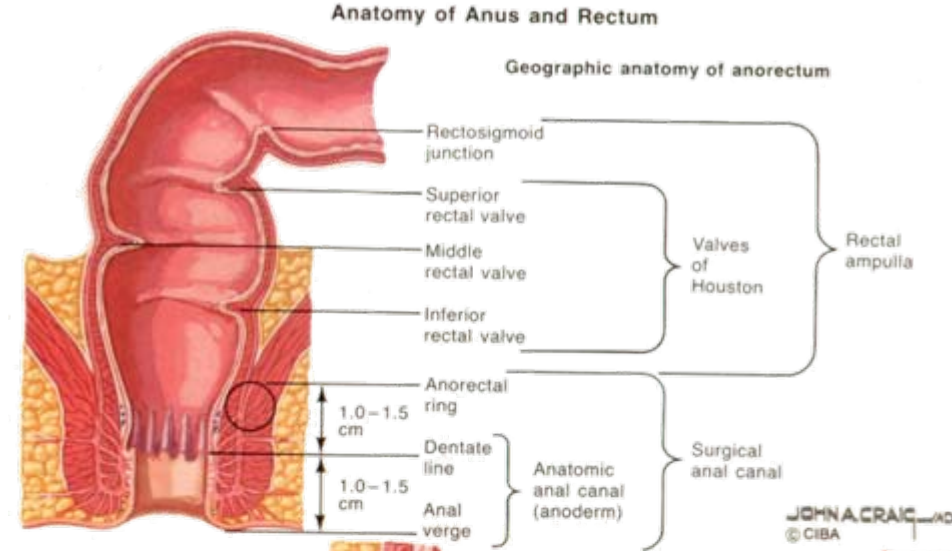
# Terms

## Rectum:

- no haustra, app. epiploicae
- taeniae coalesce to form a continuous longitudinal coat
- **Ampulla**: differing definitions
- **Houston's valves**
  - middle most constant
  - don't contain all layers

## Anal canal:

- **Anal verge**: between perianal skin and anal canal
- **Dentate line**: mucocutaneous jct.
- **Anal columns** of Morgagni
- **Anal valves**: largest posteriorly
- **Anal sinuses**: deep to valves
- **Anal crypts**: receive ducts of anal glands
- **Anal glands**: often tunnel into internal anal sphincter



### Anorectal anatomy

Longitudinal muscle of rectum

Circular muscle of rectum

Muscularis mucosae

Mucosa

Puborectalis muscle

Rectal columns

Anorectal ring

Internal hemorrhoidal plexus

Deep external sphincter

Intersphincteric plane

Internal sphincter

Anal crypt

Anal gland (lies in intersphincteric plane, opens into crypt)

Superficial external sphincter

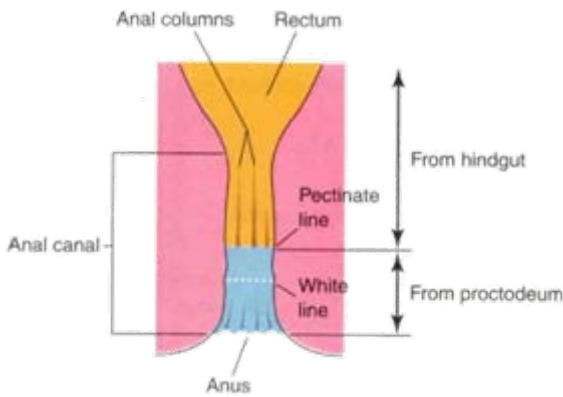
Dentate line

External hemorrhoidal plexus

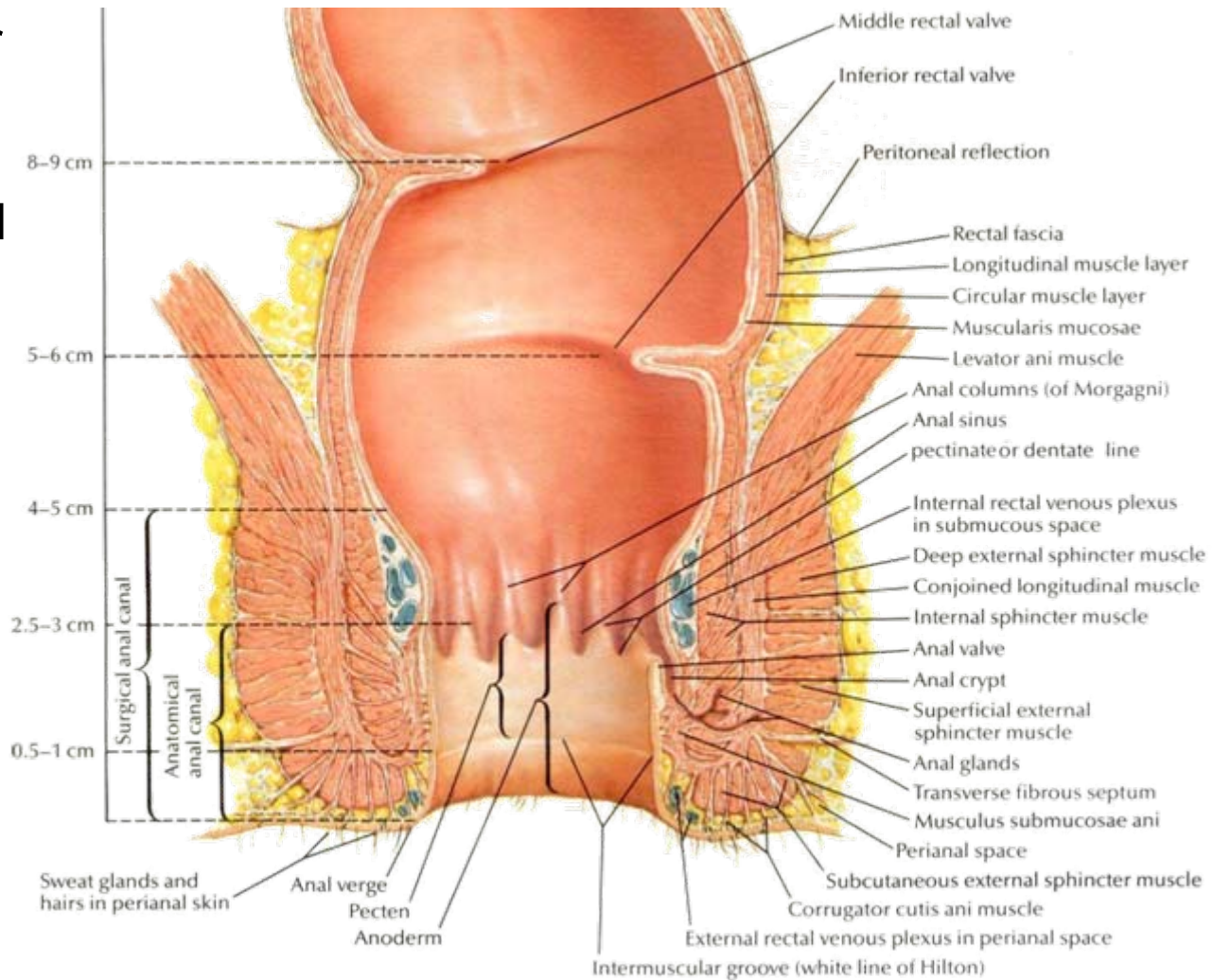
Subcutaneous external sphincter

# Terms

- **Anorectal ring:** upper border of sphincteric/puborectalis complex
- **Anoderm:** skin devoid of follicles & glands
- Anatomical vs. surgical anal canals
- **White line of Hilton:** intersphinct. groove



From Moore & Persaud (1998)

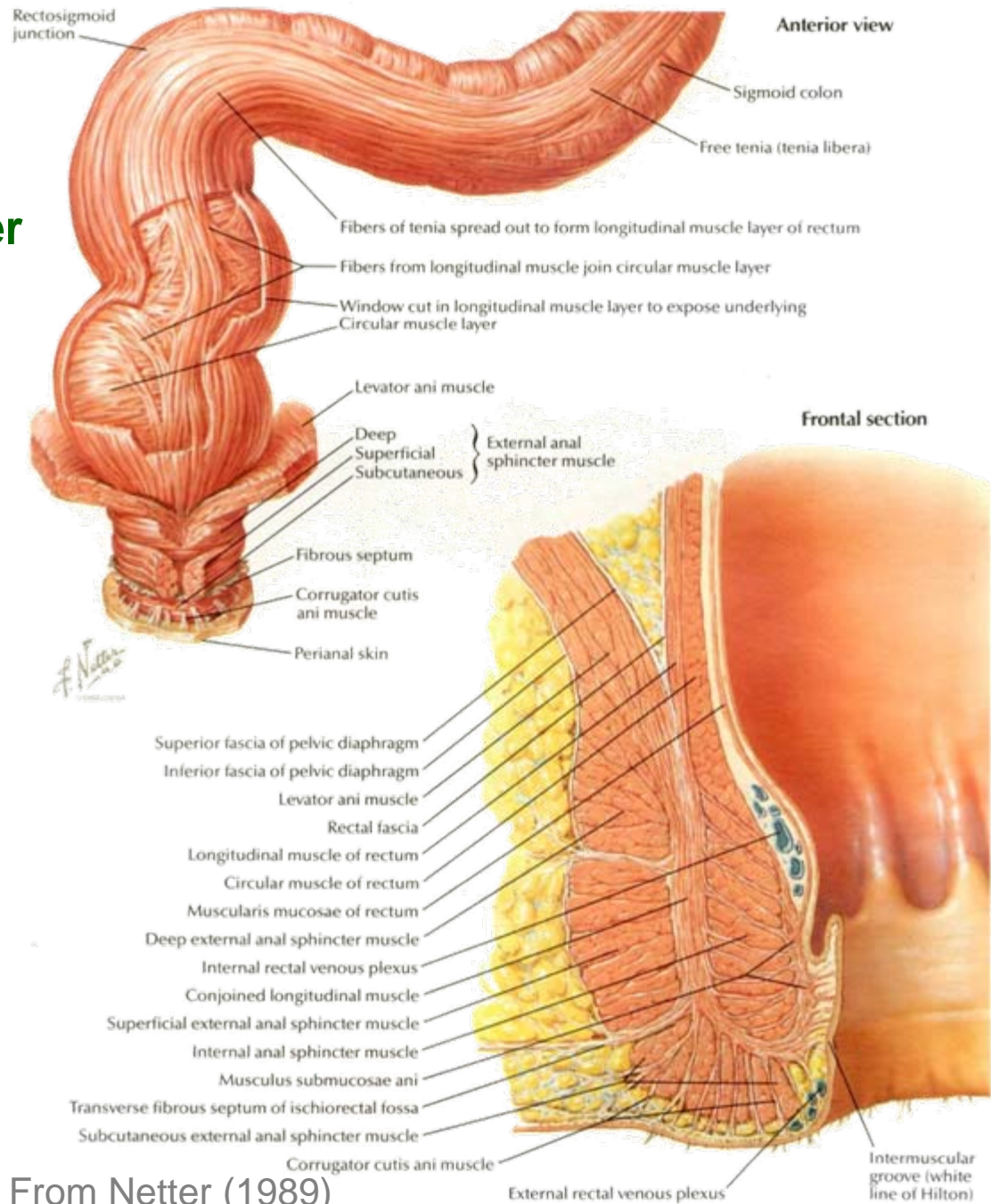


From Netter (1989)



# Anorectal Muscles

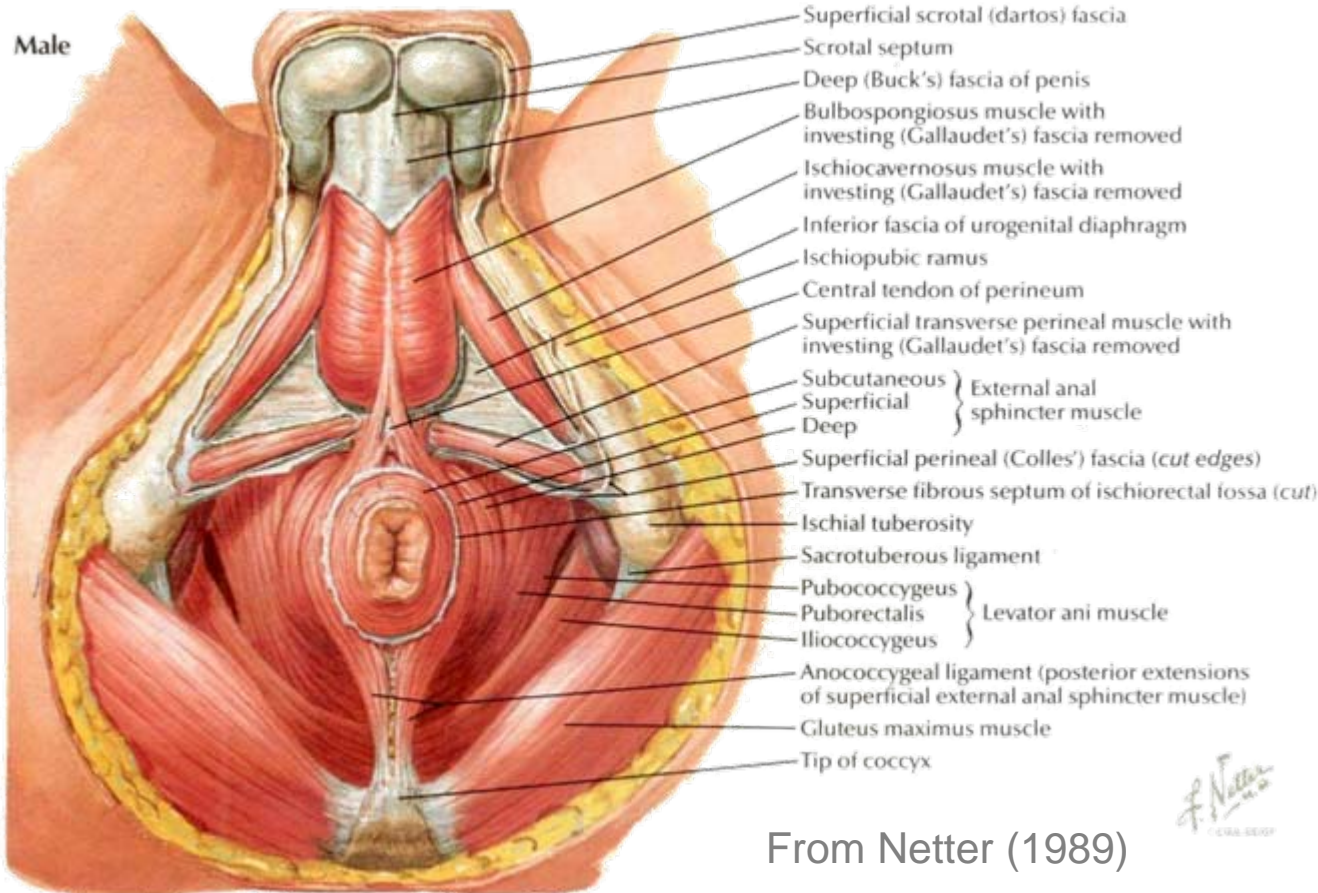
- Circular layer of rectum becomes **internal anal sphincter**
- Longitudinal layer of rectum becomes **intersphincteric fascial plane**
- **External anal sphincter** is composed of three parts
- **Levator ani** contributes **puborectalis**, which is continuous with deep external anal sphincter
- Tube within a tube
  - Inner tube: internal sphincter (smooth muscle)
  - Outer tube: puborectalis/ext. sphincter complex (skeletal muscle)



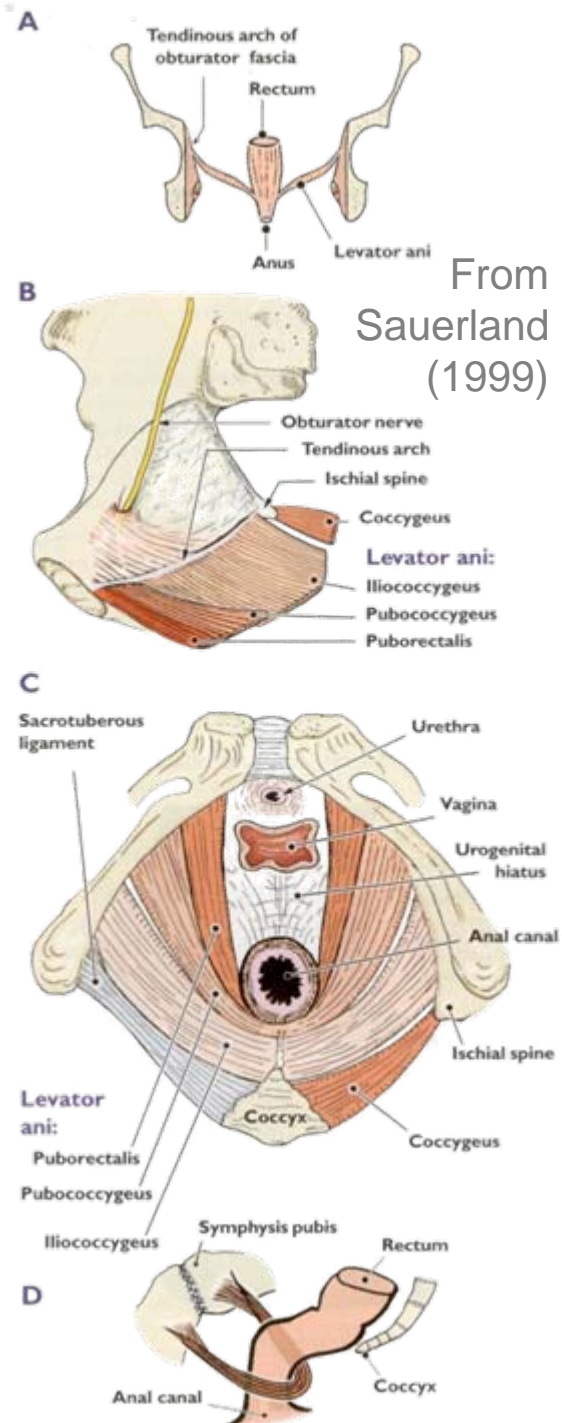
From Netter (1989)

# Anorectal Muscles

- **Levator ani:** major support of pelvic floor
- **Puborectalis**
  - forms muscular sling around anorectal junction
  - controls anorectal angle and hence plays an important role in fecal continence and defecation

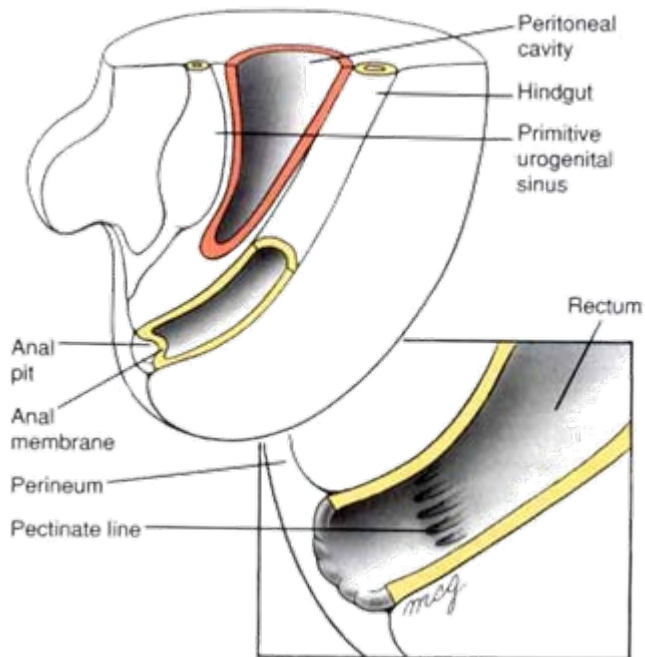
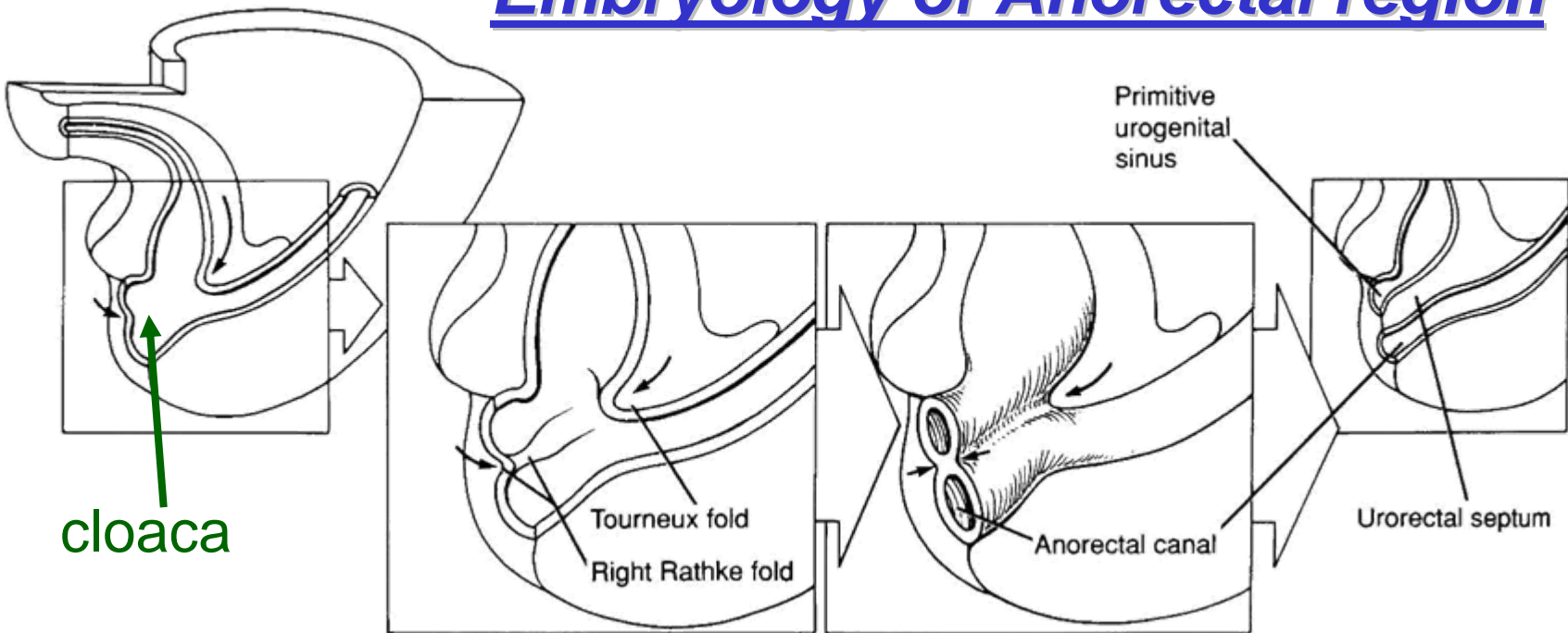


From Netter (1989)





# Embryology of Anorectal region

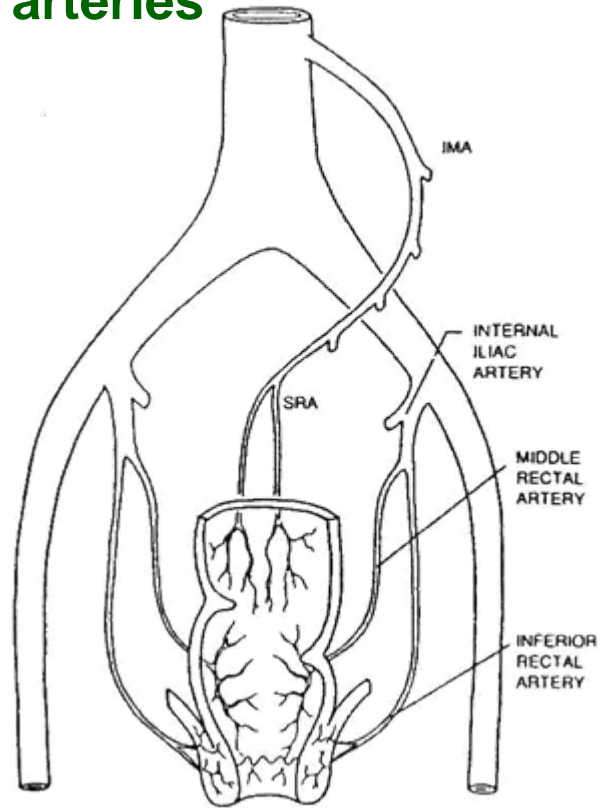


- Subdivision of embryonic cloaca by urorectal septum
- Ectodermal anal pit and membrane rupture and meet the endodermal anorectal canal
- Dentate (pectinate) line is the juncture

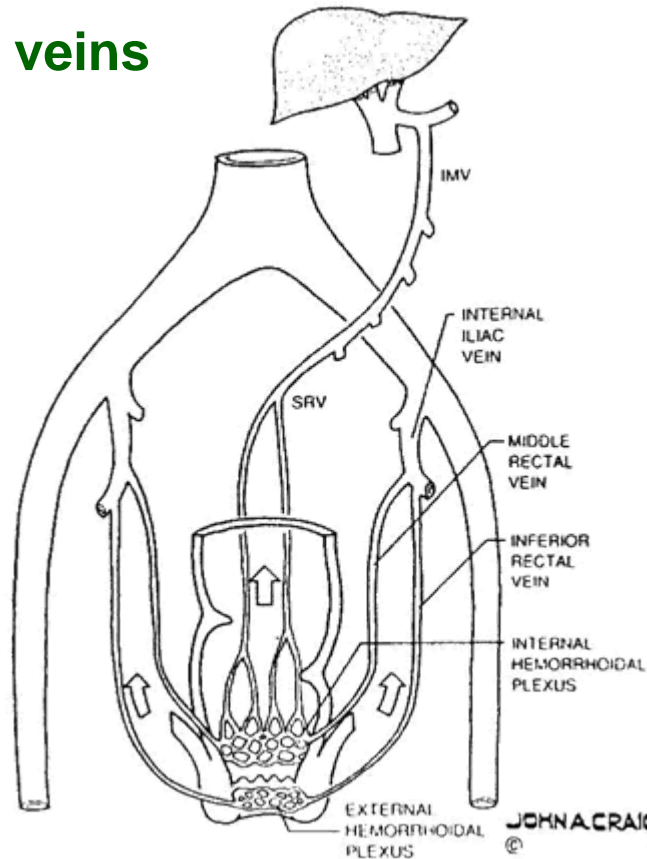
From Larsen (1997)

# Blood Supply & Lymphatics: The Dentate Line as a Watershed

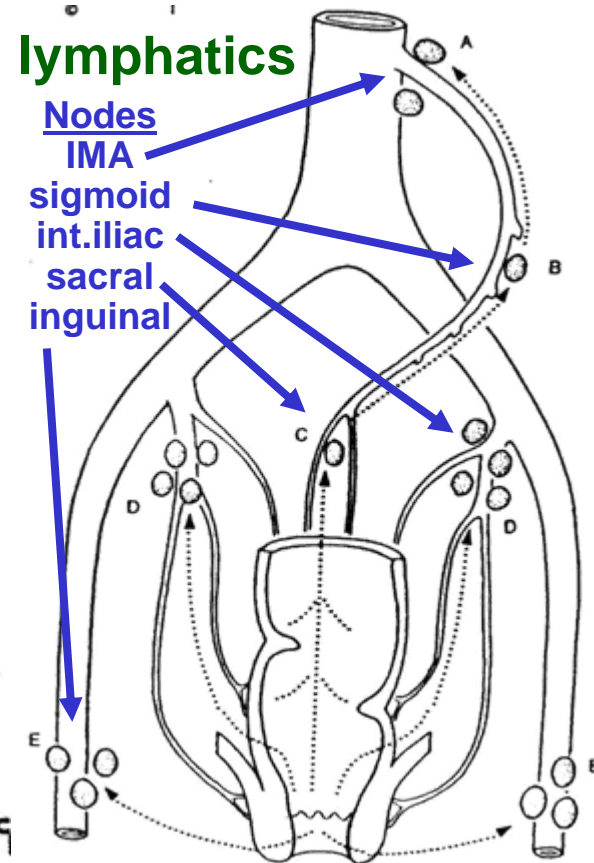
arteries



veins

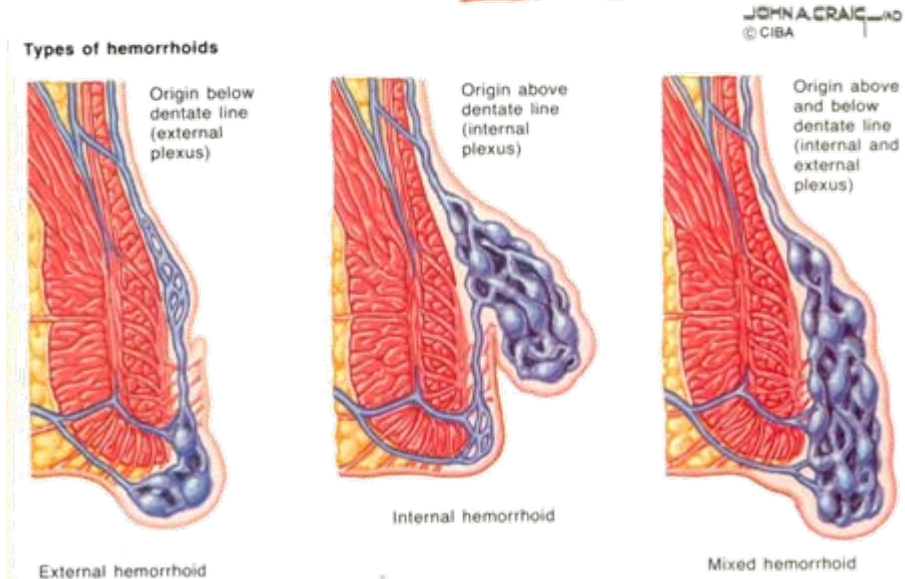
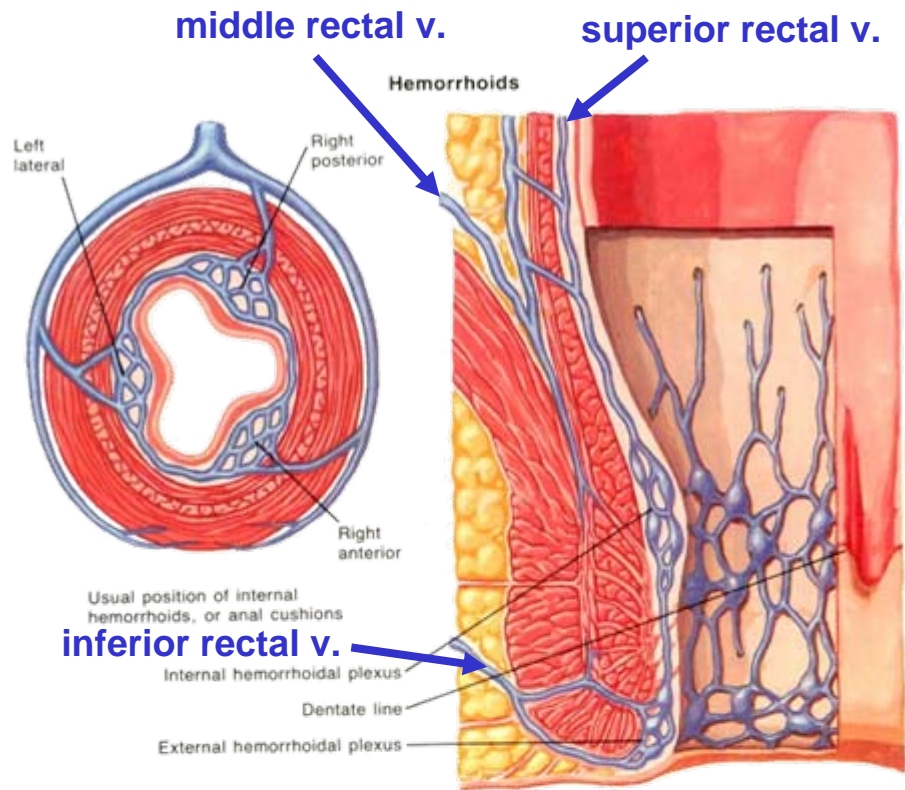


lymphatics



# Hemorrhoids

- **Anal cushions:** 3 consistently placed submucosal vascular plexuses formed by anastomosis of rectal veins within anal columns
- Anal cushions are normal—their varicosity and prolapse is not
- **Internal hemorrhoids**
  - Above dentate line
  - Generally painless
- **External hemorrhoids**
  - Below dentate line
  - Generally painful



From Fry & Kodner (1985) CIBA



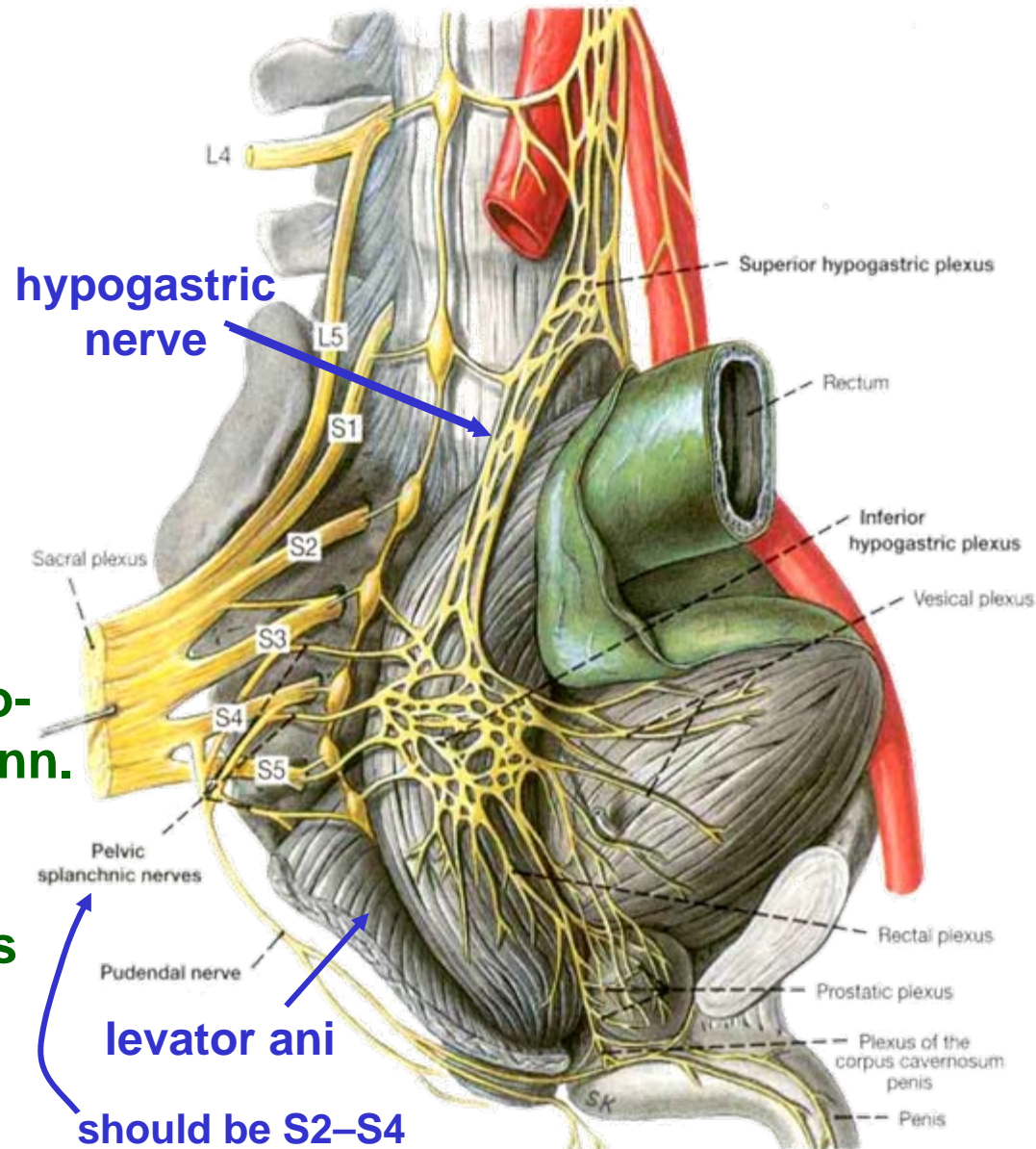
# Nerve Supply to the Anorectal Region

## Somatic innervation

- **Pudendal nerve** (S2–S4)
  - **Inferior rectal n.:** sensory & motor to muscles & mucosa below dentate line
  - **Perineal n.:** sensory & motor to perineal region

## Autonomic innervation

- Sympathetics from thoracolumbar segments via **sup. hypogastric plexus** & **hypogastric nn.**
- Parasympathetics from S2–S4 (**nervi erigentes**)
- Unite in **inf. hypogastric plexus**
- Distributed to pelvic viscera & sexual organs

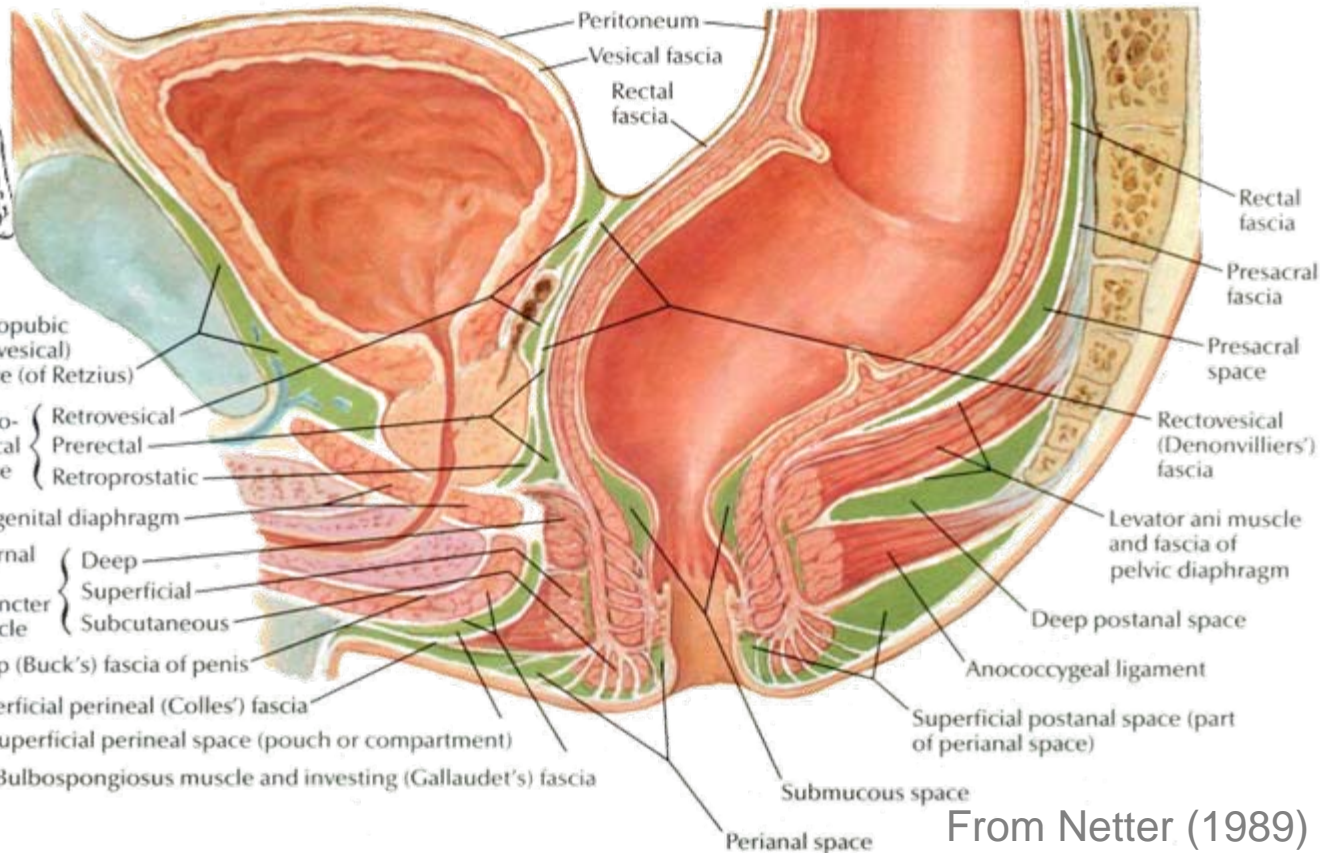
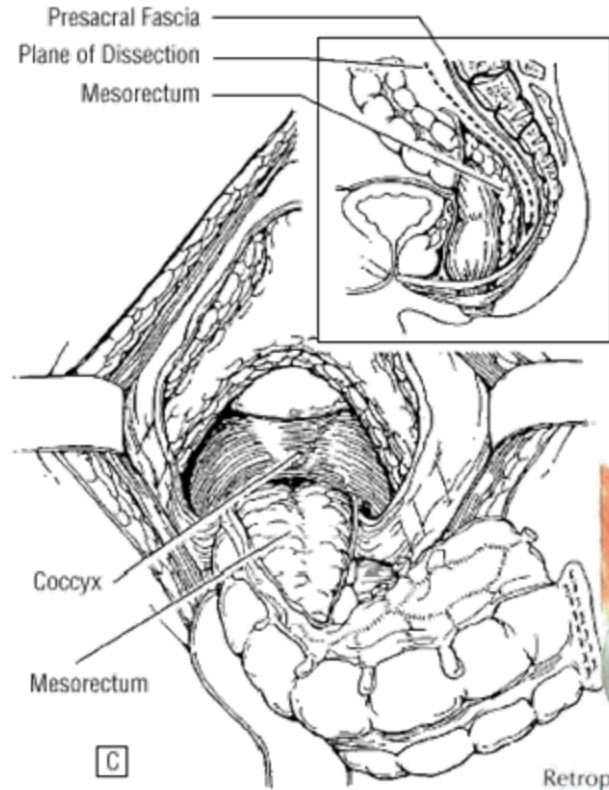


From Clemente (1997)

# Planes, Fasciae, and Spaces

## Fasciae:

- Presacral (Waldeyer's) fascia
- Rectovesical (-vaginal; Denonvillier's) fascia: middle rectal vessels
- Lateral ligg. (stalks): acc. middle rectal vessels
- Rectal fascia proper: rectum & mesorectum



From Read & Kodner  
(1999) *Arch. Surg.*

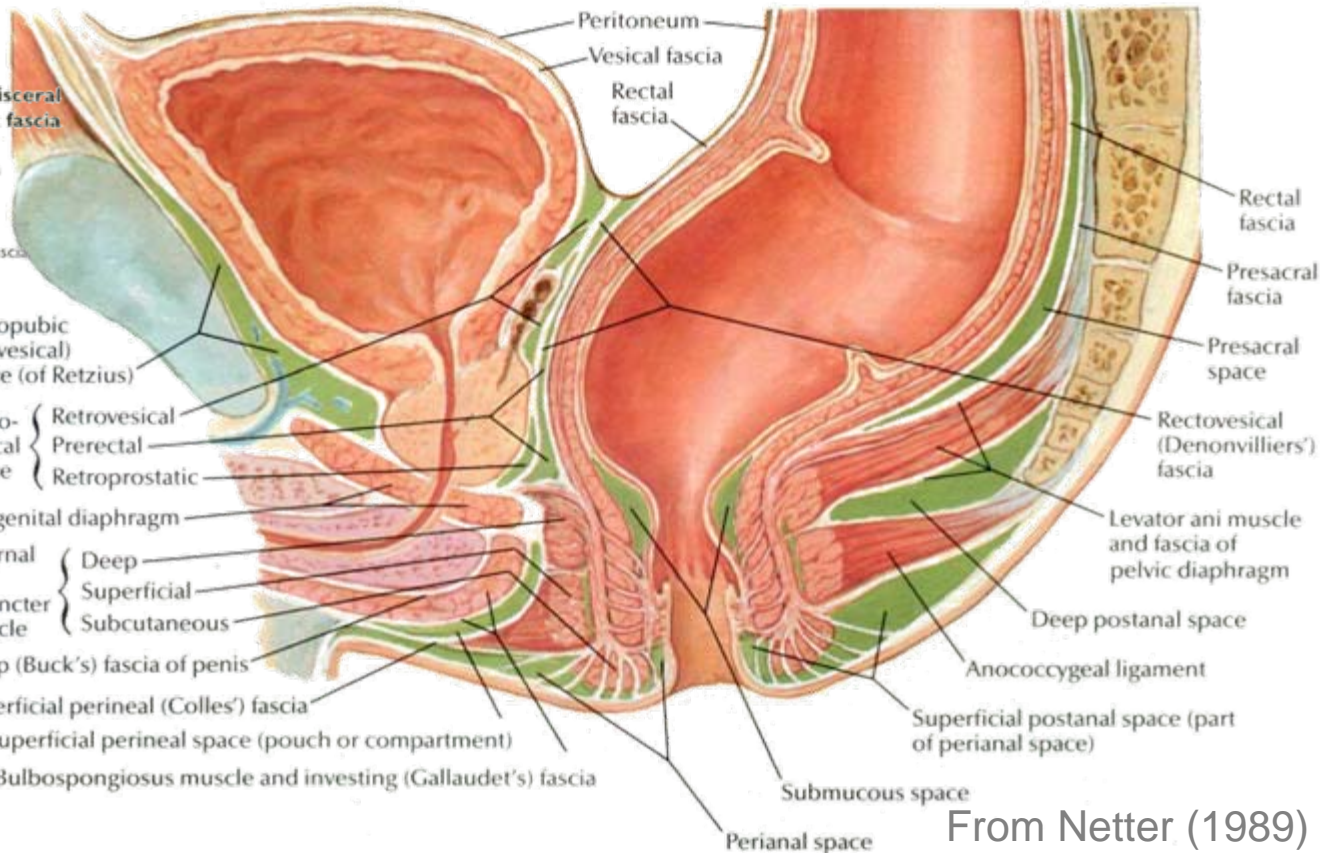
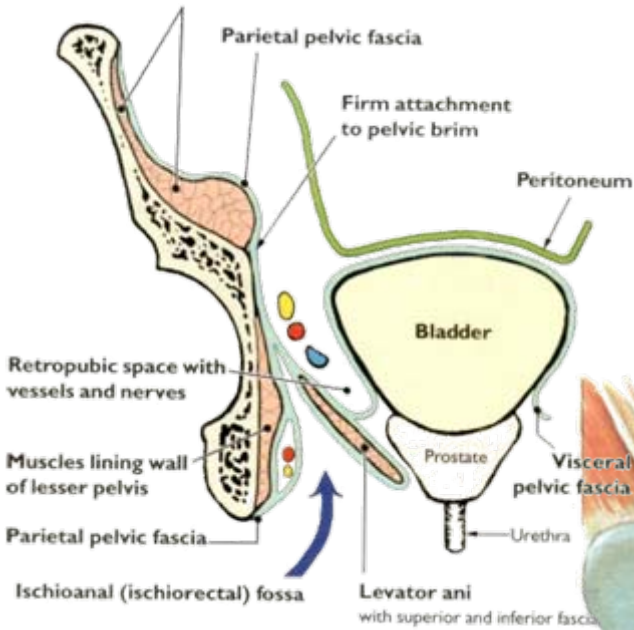
From Netter (1989)



# Planes, Fasciae, and Spaces

## Spaces:

- Perianal space
- Intersphincteric space
- Ischioanal space
- Deep postanal space
- Suprlevator space
- Presacral space
- Submucous space
- Rectovesical space



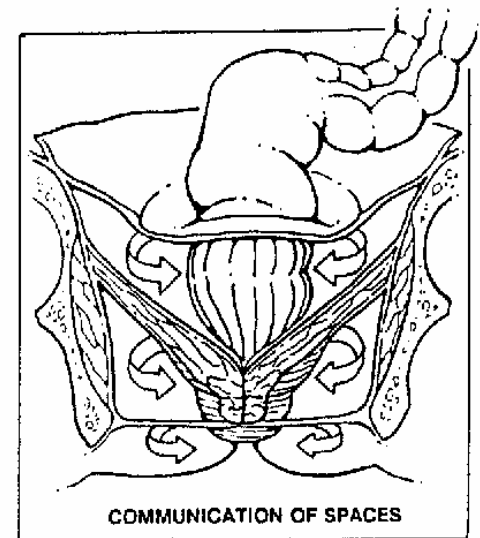
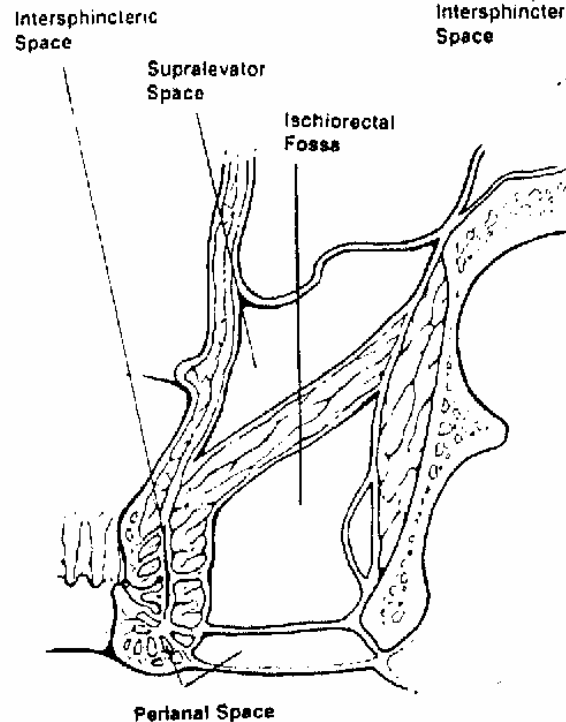
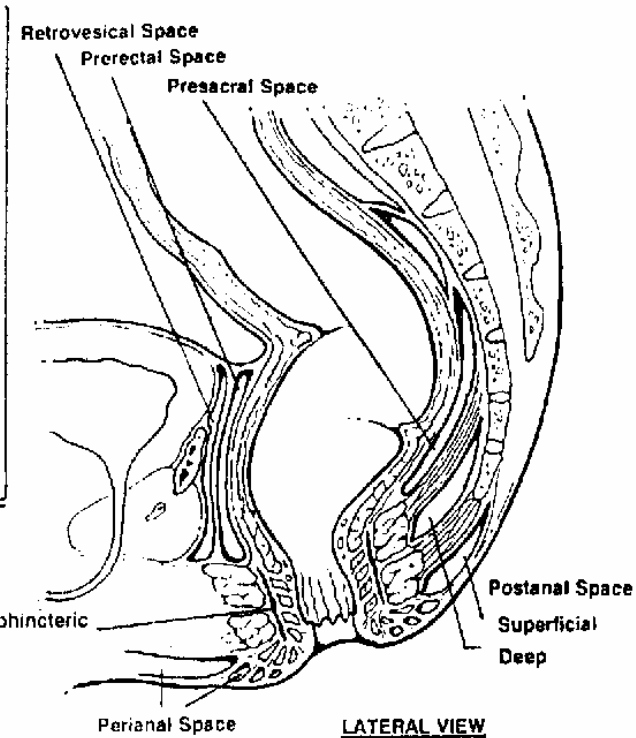
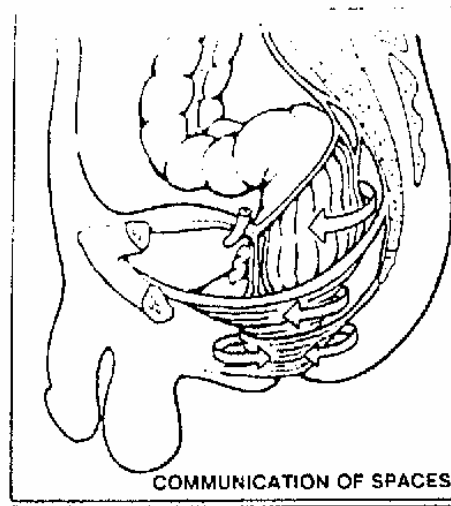
From Sauerland (1999)

From Netter (1989)



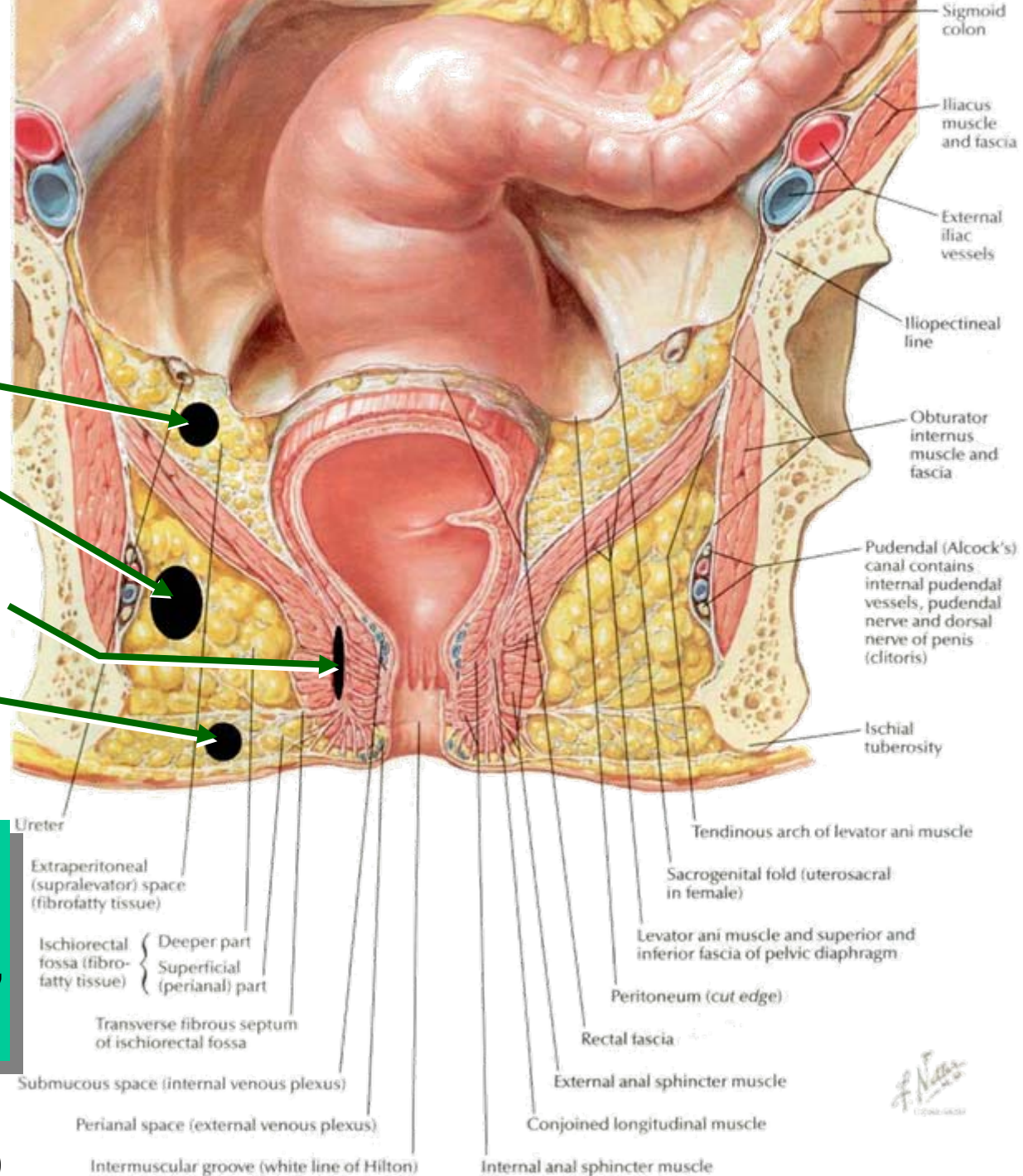
# Communication of Spaces

- Perianal space: around anus below transverse septum
- Ischioanal space: posteriorly around anorectal region via deep postanal space
- Supralelevator space: posteriorly around rectum via pre-sacral space



# Sites of Anorectal Abscess

- supralelevator
- ischiorectal
- intersphincteric
- perianal



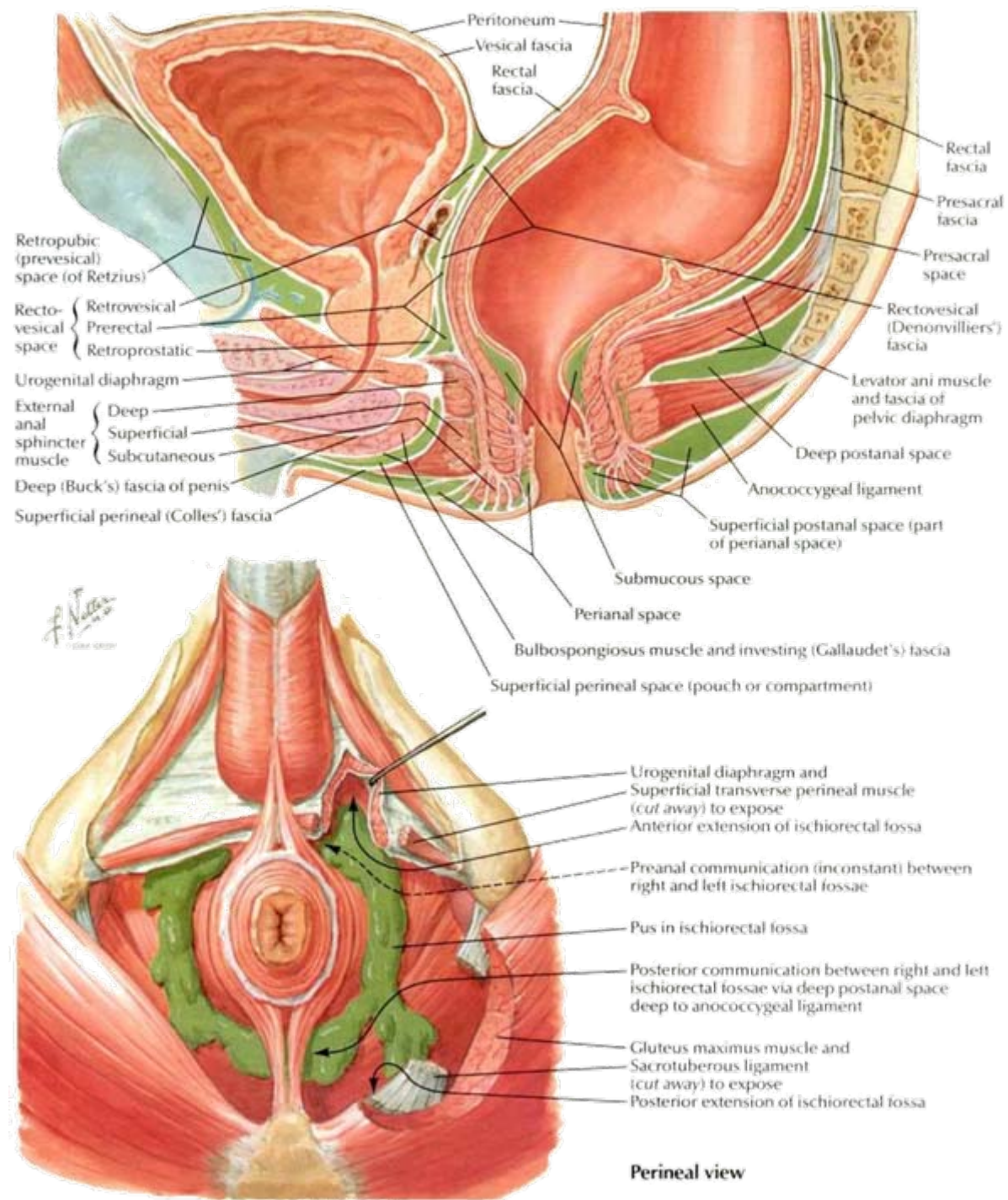
Perianal abscess is most common, followed by ischiorectal, intersphincteric, & supralelevator abscesses

From Netter (1989)

*F. Netter*  
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# Ischiorectal Abscess



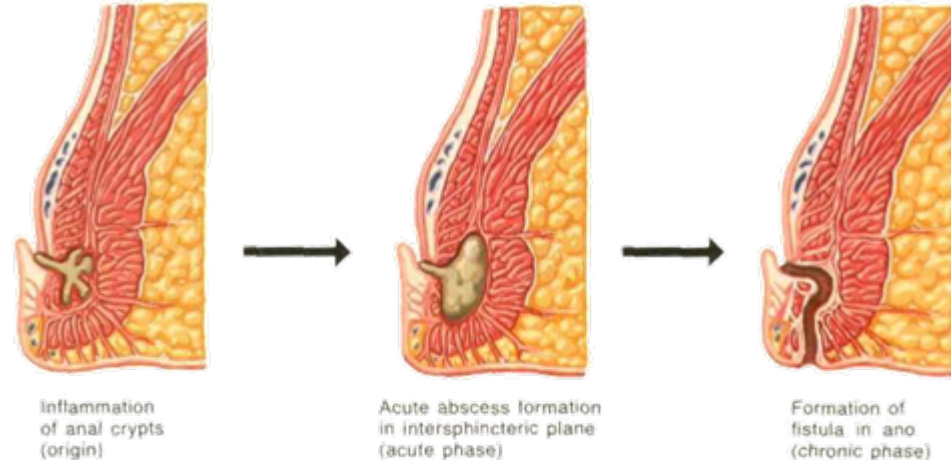
Contralateral communication  
via deep postanal space



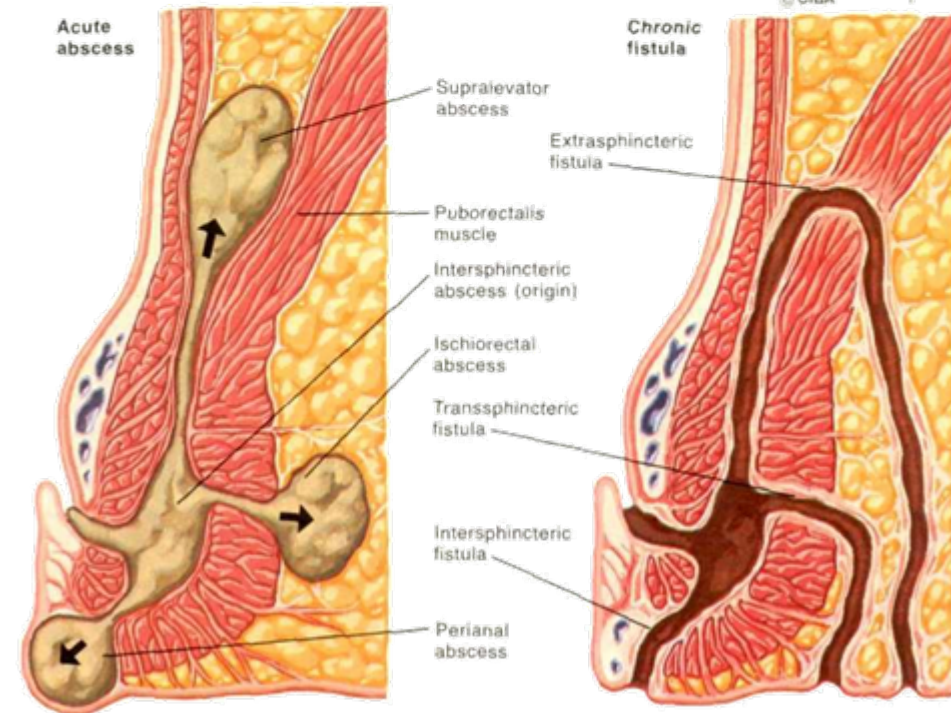
# Abscess & Fistula

- 95% results from a cryptoglandular source
- Originate as intersphincteric abscess
- Can spread to other spaces
- Abscess in acute phase, fistula in chronic phase
- Fistula in ano: fistula with external opening in perianal skin & internal opening at dentate line

Anorectal Abscess and Fistula in Ano  
Cryptoglandular Origin Theory



Extension of intersphincteric abscess

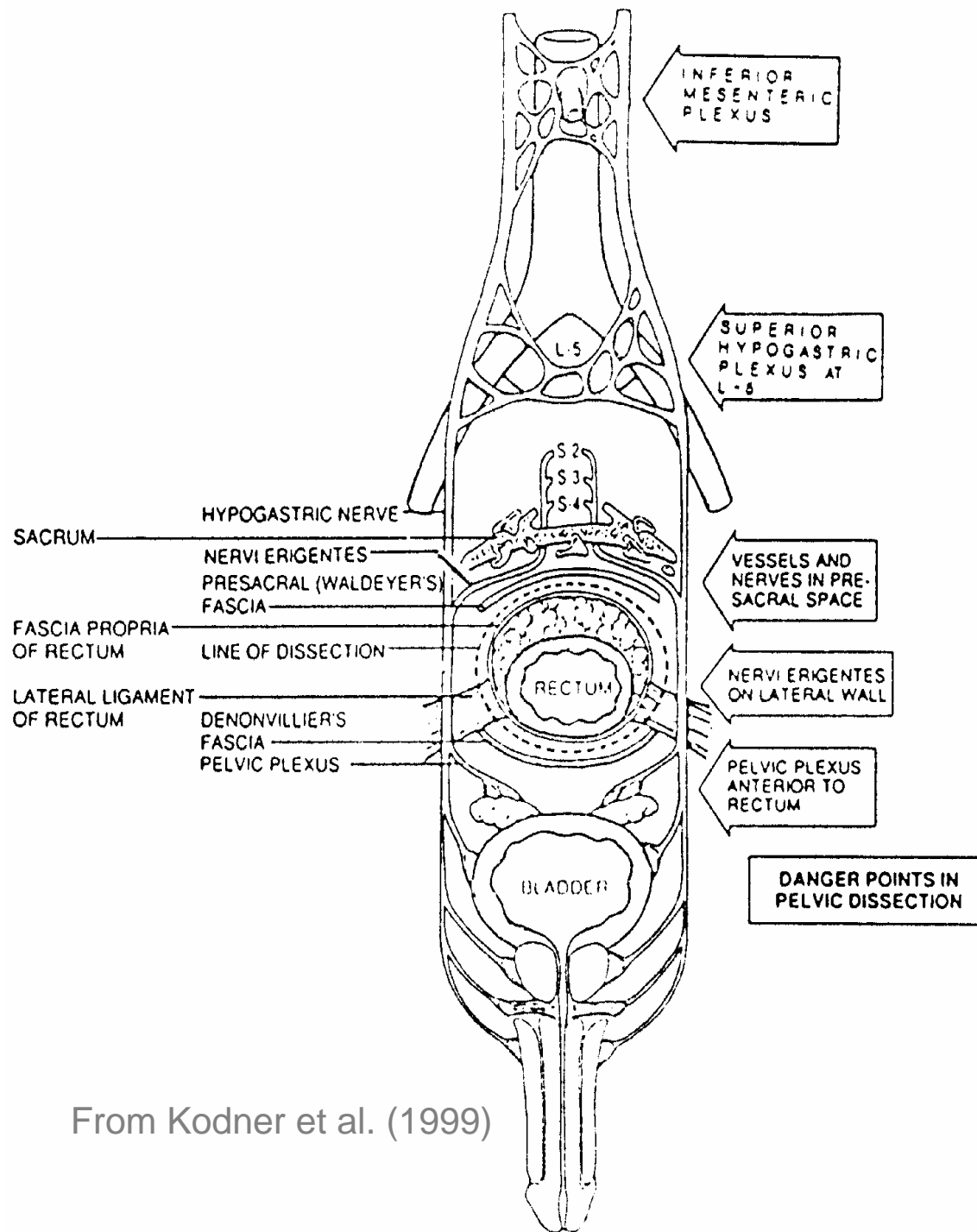


Upward extension of acute inflammation results in supralevator abscess; lateral in ischiorectal abscess; and downward in perianal abscess

Chronic inflammation results in communication of abscess sites with surface, causing fistulas

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From Kodner et al. (1999)