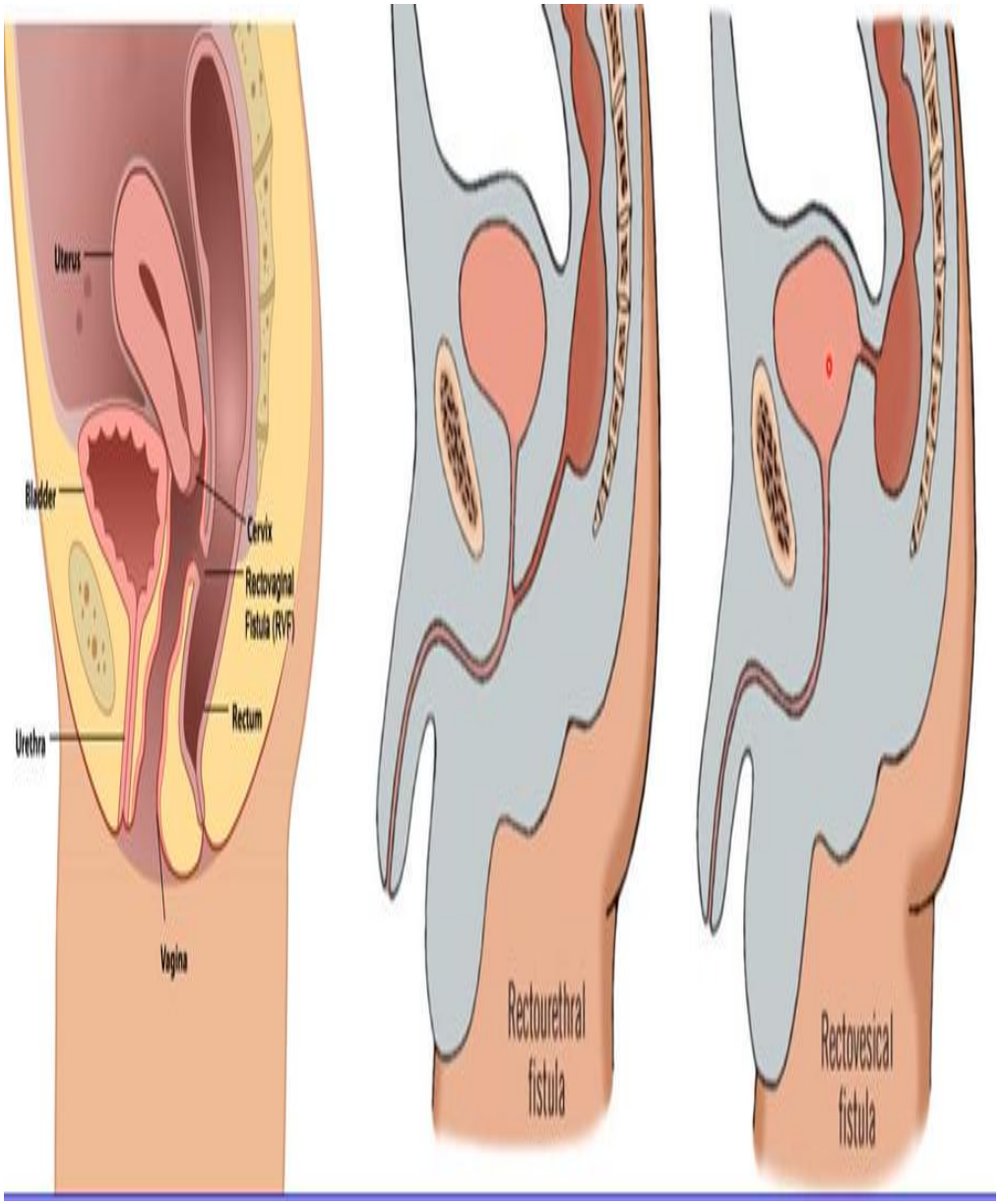
DEV. OF INT. , RECTUM & ANAL CANAL



BY

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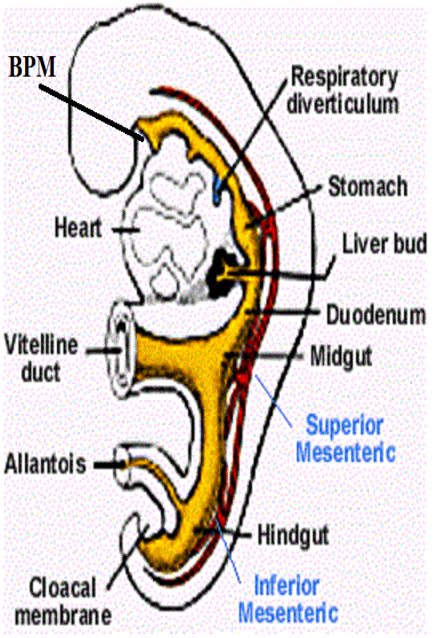
MIDGUT



Extent:

from ant. intestinal portal

(site of liver bud)

(in adult opening of CBD in duodenum)

to post. intestinal portal

(In adult junction of Rt 2/3 & Lt 1/3 of transverse colon).

it is connected with yolk sac by vitelline (vitellointestinal) duct

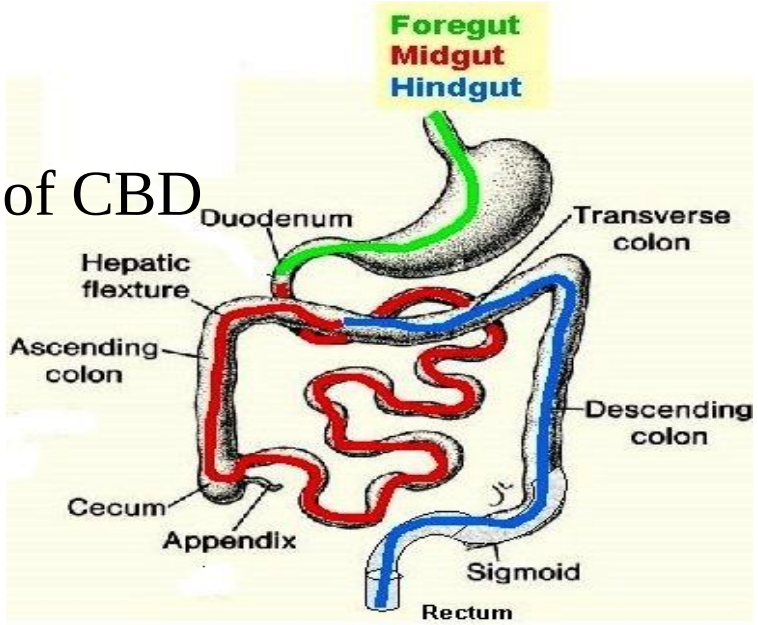
Derivatives (fate):

It gives

- lower half of duodenum caudal to opening of CBD

-jejunum , ilium , appendix , caecum ,

ascending colon & Rt 2/3 of tr. colon



MIDGUT

Development:

▯ primary midgut (intestinal) loop:

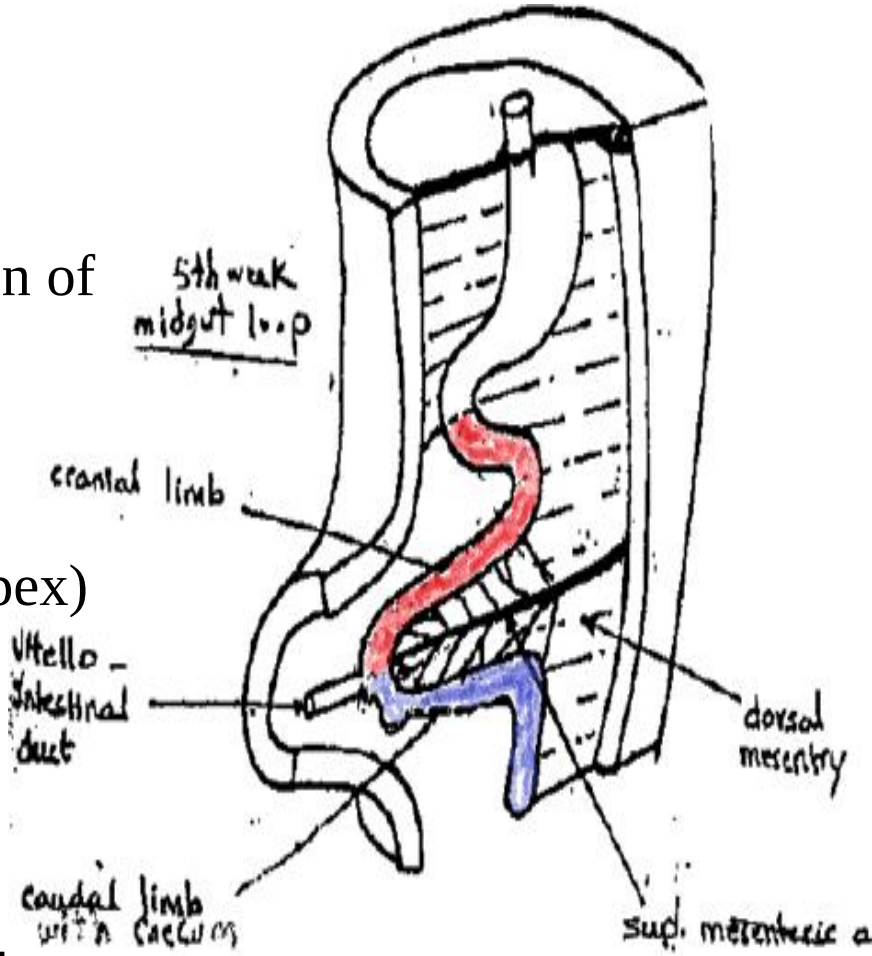
midgut grows rapidly in length ⟶ formation of U shaped loop that is formed of

1- cranial limb

2- apex connected to vitelline duct

3- caudal limb with swelling (close to the apex) that will form caecum

4- superior mesenteric art. along its axis (in its dorsal mesentery)



▯ physiological umbilical hernia:

-at 6th week of dev., the rapidly elongating loop herniate into umbilical cord through umbilical orifice

-herniation is due to inability of abd. cavity to accommodate rapidly growing mid gut due to

1-slow growth of abd. cavity

2-development of liver & kidney

MIDGUT

Development:

- **While the loop in the umbilical cord**

-The cranial limb form

the lower 1/2 of duodenum,

jejunum and greater part of ileum

-The caudal limb also form

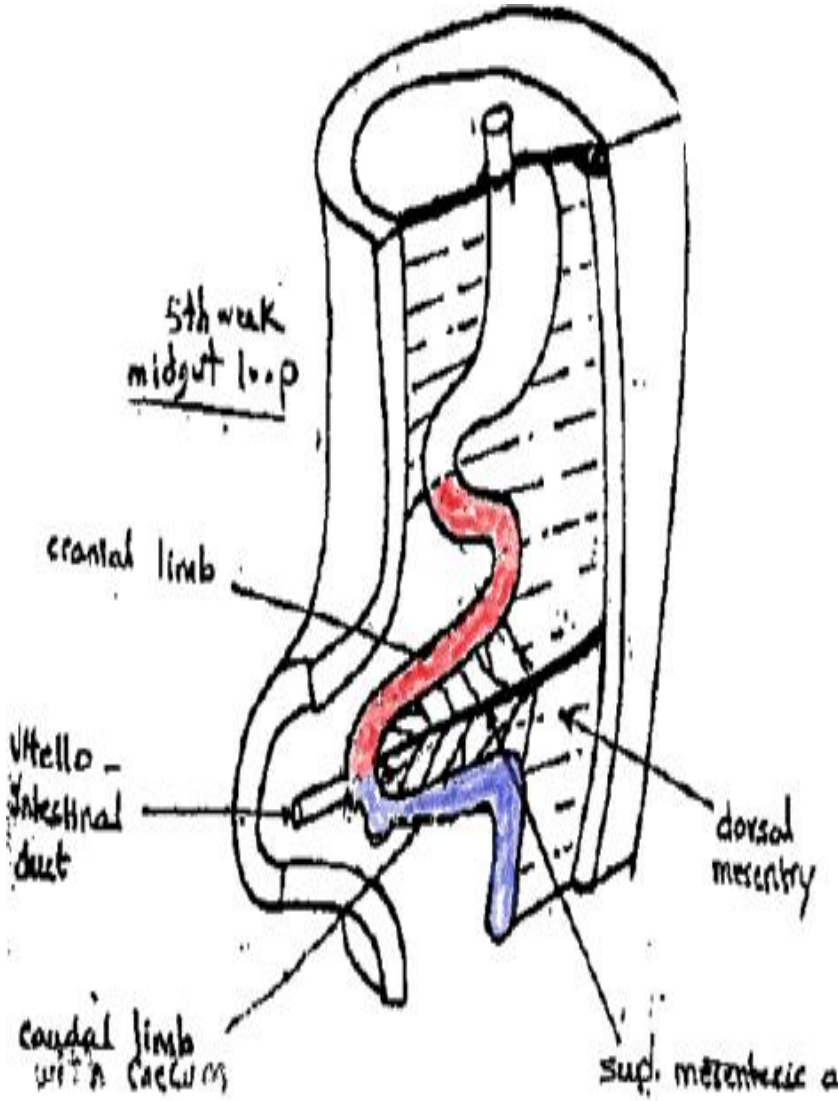
the distal part of ileum,

caecum,

appendix,

ascending colon

and Rt 2/3 of transverse colon



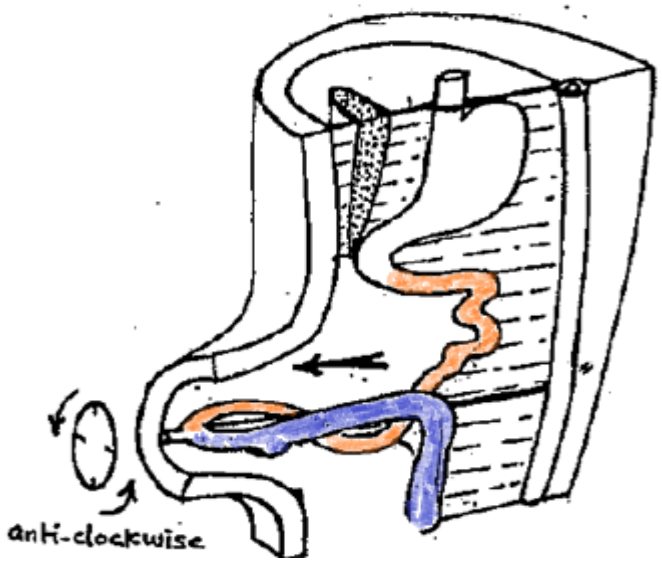
MIDGUT

Development:

□ rotation of the intestinal loop

-Due to further elongation of loop.

-Total 270 anticlockwise around its long axis formed by SMA.



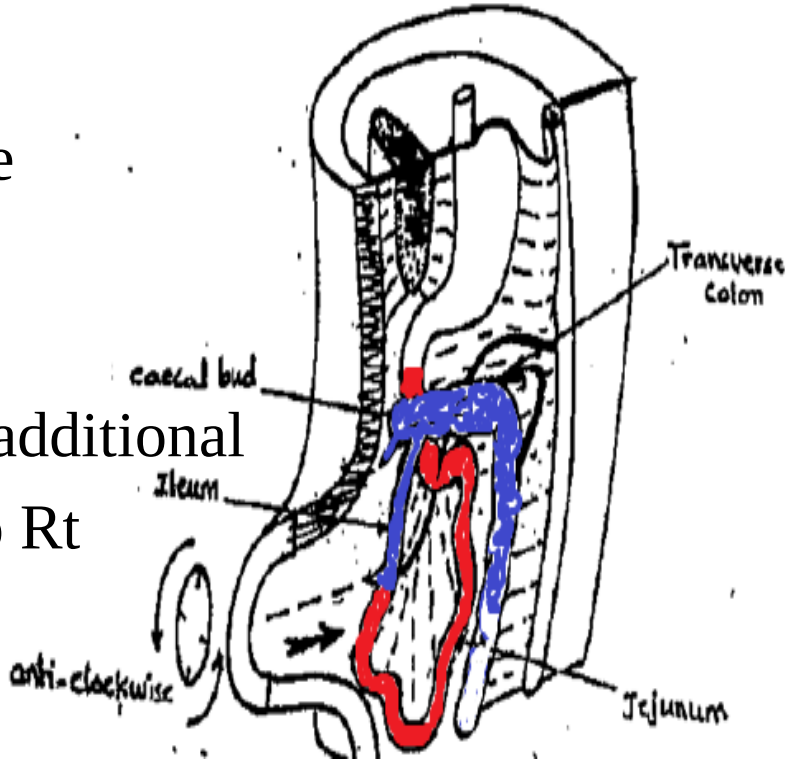
-While in umbilical cord, it rotates:

90 → caudal limb become to Lt & cranial limb become to Rt., then rotate

90 → caudal limb become cranial & cranial limb become caudal

- As the gut returns to abd cavity, it rotates additional

90 → the caudal limb (tr. Colon) become to Rt &crosses (become superficial) to the cranial limb (2nd part of duodenum)



MIDGUT

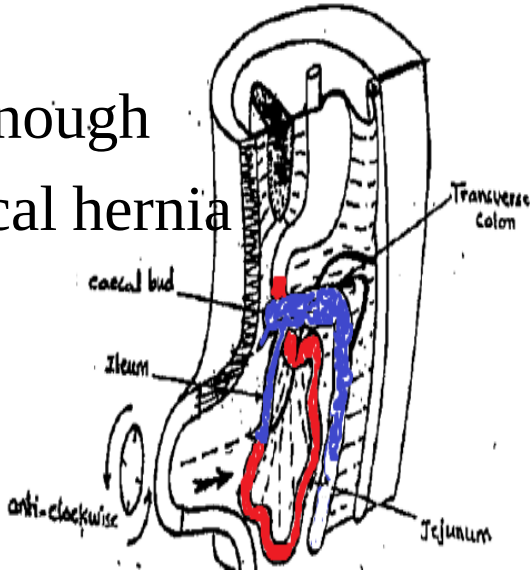
Development:

▯ return of the loop:

-at 10th week of dev., the abd. cavity become wide enough to accommodate the intestine → return of physiological hernia

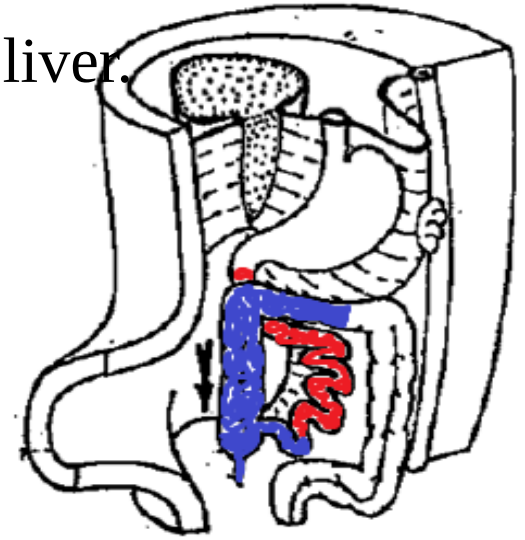
-jejunum is the 1st part to return into abd cavity &lies on the Lt side

-caecum is the last part to return into abd cavity & lies with the appendix on the Rt side , below and in contact with Rt lobe of liver.



▯ caecum and appendix descend

to Rt iliac fossa due to elongation of the segment ( ) caecum & tr. Colon to form Rt colic flexure and ascending colon



MIDGUT

Development

- **change the site of opening of appendix**

from apex of caecum to

its posteromedial wall

by differential growth

- **Fixation of intestine:**

-The mesentery of duodenum,

ascending colon and descending colon

fuse with peritoneum of post. abd wall &

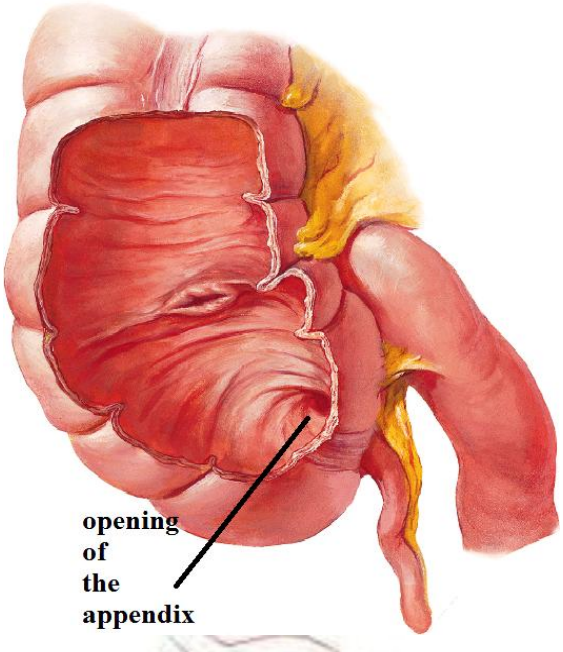
these organs become retroperitoneal

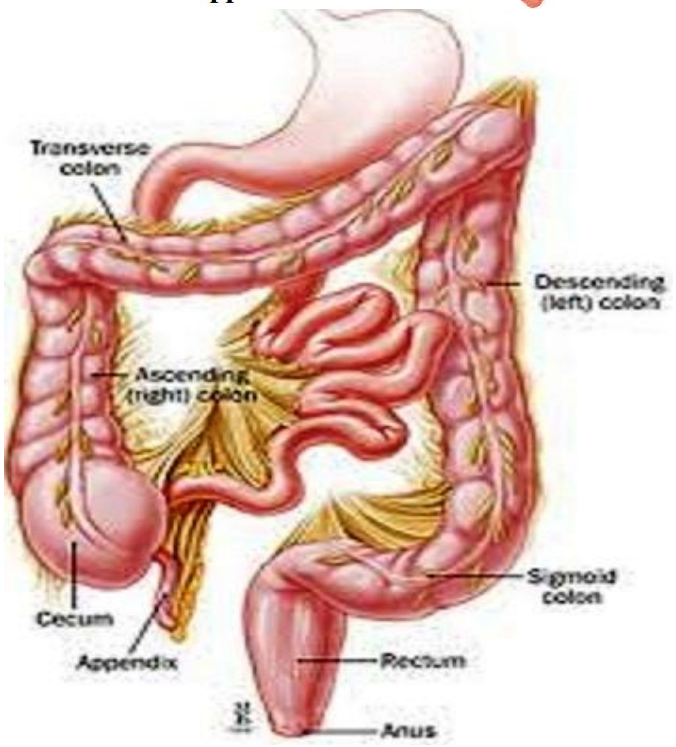
-The other mesenteries persist as

- **At 2nd month** the vitelline duct

is obliterated ,

fibrosed and degenerate





MIDGUT

Congenital Anomalies:

of intestine:

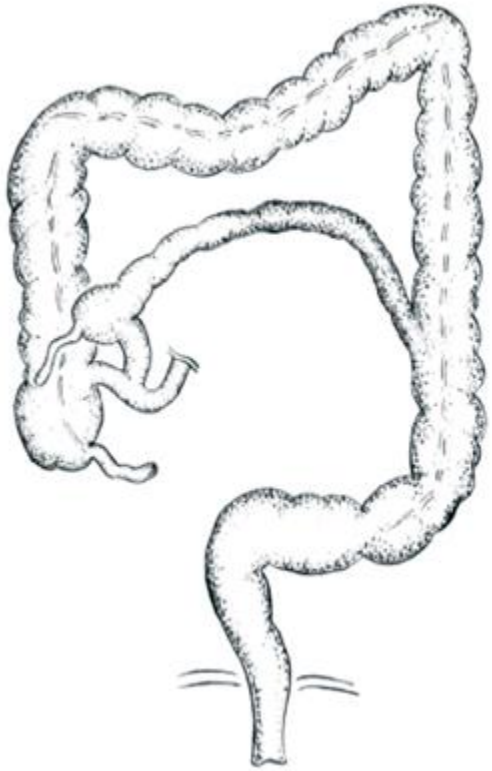
A-of intestinal loop

1- atresia (due to failure of recanalization)

2-stenosis (due to defect in recanalization)

3-Diverticulosus:- due to week wall

4-Duplication is common in **ileum**



B- congenital umbilical hernia (omphalocele)

-herniation of intestinal loop into umbilical cord

-due to failure of return of

physiological umbilical hernia

or wide umbilical orifice

MIDGUT

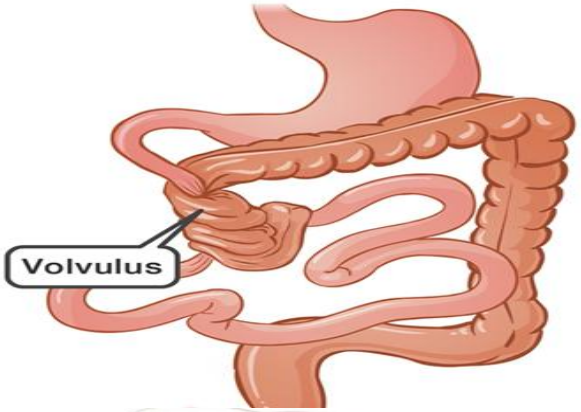
Congenital Anomalies:

of intestine:

C- of rotation:

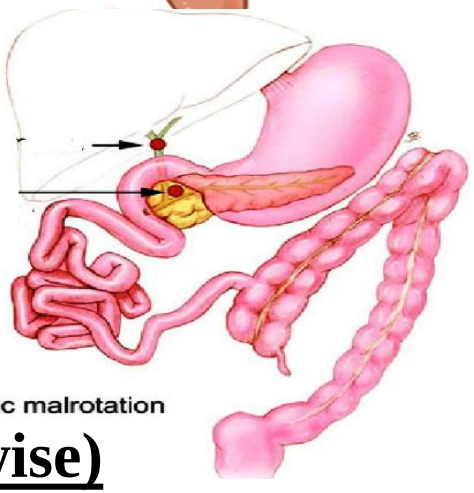
1- excessive rotation more than 270

leads to congenital volvulus



2-incomplete rotation 90 anticlockwise only:

caecum & colon become in Lt side of abdomen while duodenum , jejunum and ileum become in Rt side



3-reversed rotation, 90 in reverse direction (clockwise)

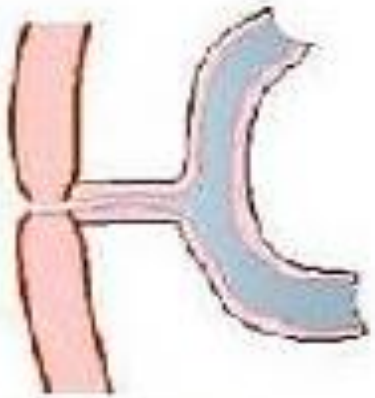
duodenum lies in front transverse colon

MIDGUT

Congenital Anomalies:

of intestine:

D- of vitelline duct

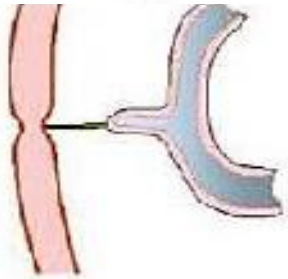


Vitelline fistula

1- vitelline (umbilical faecal) fistula:

-due to persistence of vitelline duct

- with faecal discharge at the umbilicus



Meckel's diverticulum

2- Meckel's diverticulum:

-due to persistence of the proximal part of vitelline duct

-it has the following features:

- in 2% of people , 2 inches (5 Cm) long ,2 feet from ileocaecal valve
- Attach to ant mesenteric border of ileum
- Attached to umbilicus by a fibrous cord
- May contain ectopic gastric or pancreatic tissue
- May cause pain confused with the pain from appendicitis

MIDGUT

Congenital Anomalies:

of intestine:

D- of vitelline duct

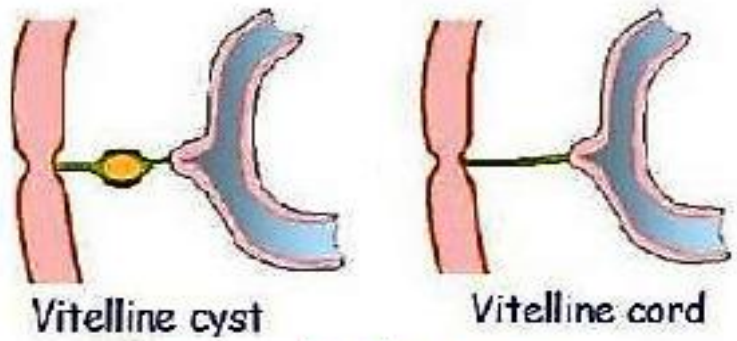
3-vitelline sinus: due to persistence of distal part of vitelline duct

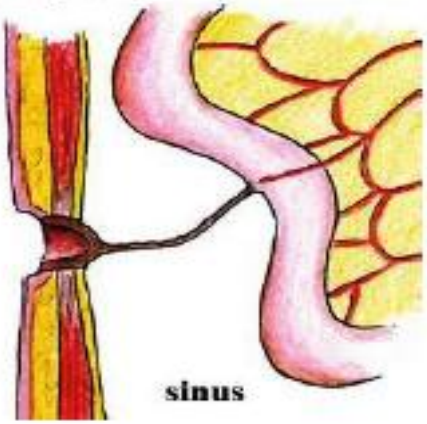
4-vitelline cyst: due to persistence of middle part of vitelline duct

5-fibrous cord:

-due to failure of degeneration of
the obliterated, fibrosed vitelline duct

-a loop of intestine may become wrapped
around it causing intestinal obstruction





MIDGUT

Congenital Anomalies:

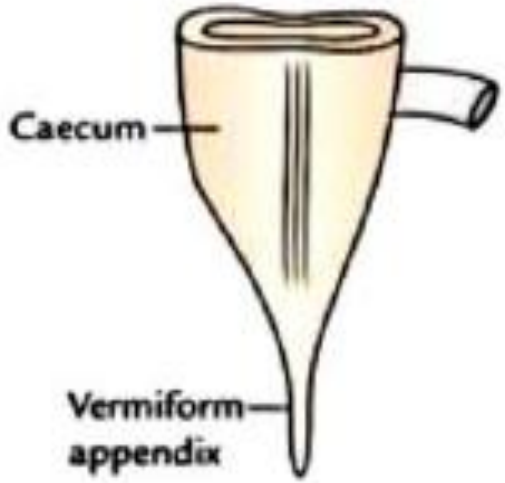
of caecum and appendix:

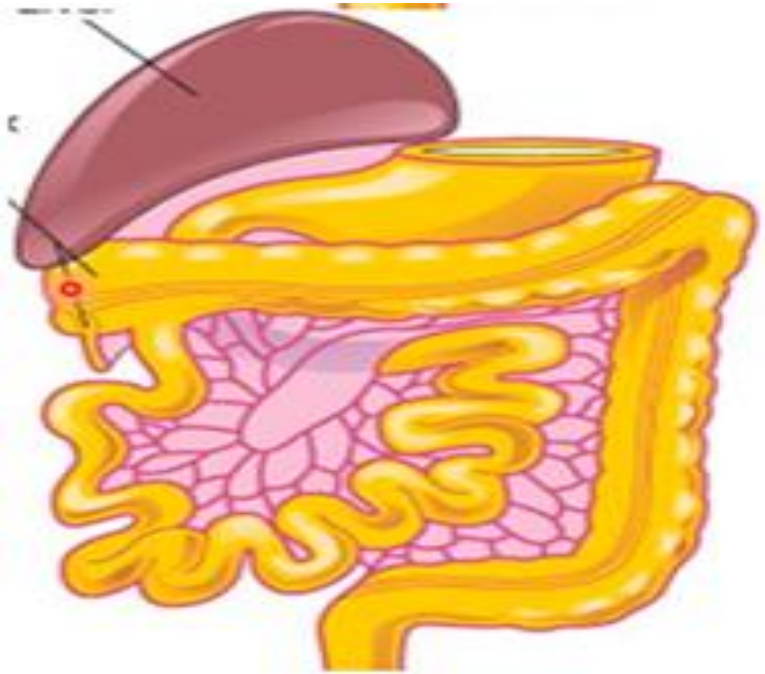
1- Abnormal position:

e.g. sub hepatic, or Rt lumbar caecum and appendix:

Due to failure of descend or arrest during descend

2- Retention of fetal shape with apical appendix.





HINDGUT

DEF.:-

the part of the primitive gut which
is enclosed in the tail fold of the embryo.

Extent:

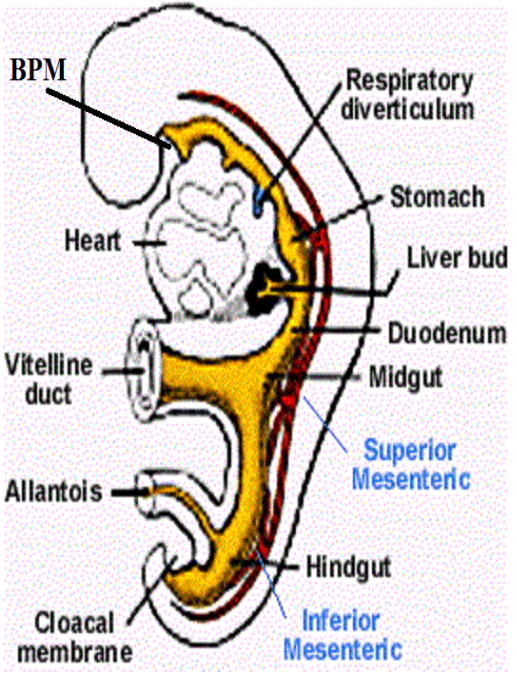
It extends from the posterior intestinal portal until the cloacal membrane.

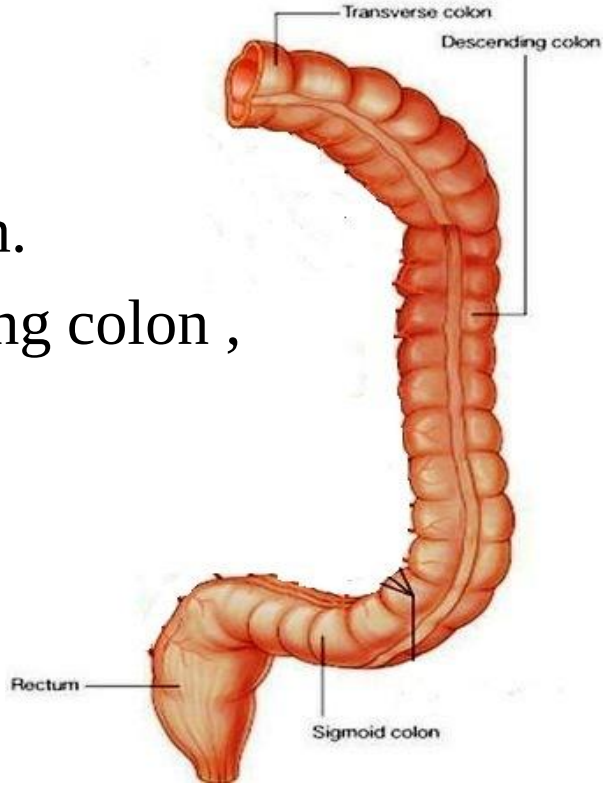
Fate(derivatives):

-left 1/ 3 of transverse colon.

-left colic flexure, descending colon , sigmoid colon, rectum.

-upper 1 /2 of anal canal.





RECTUM

Development source:

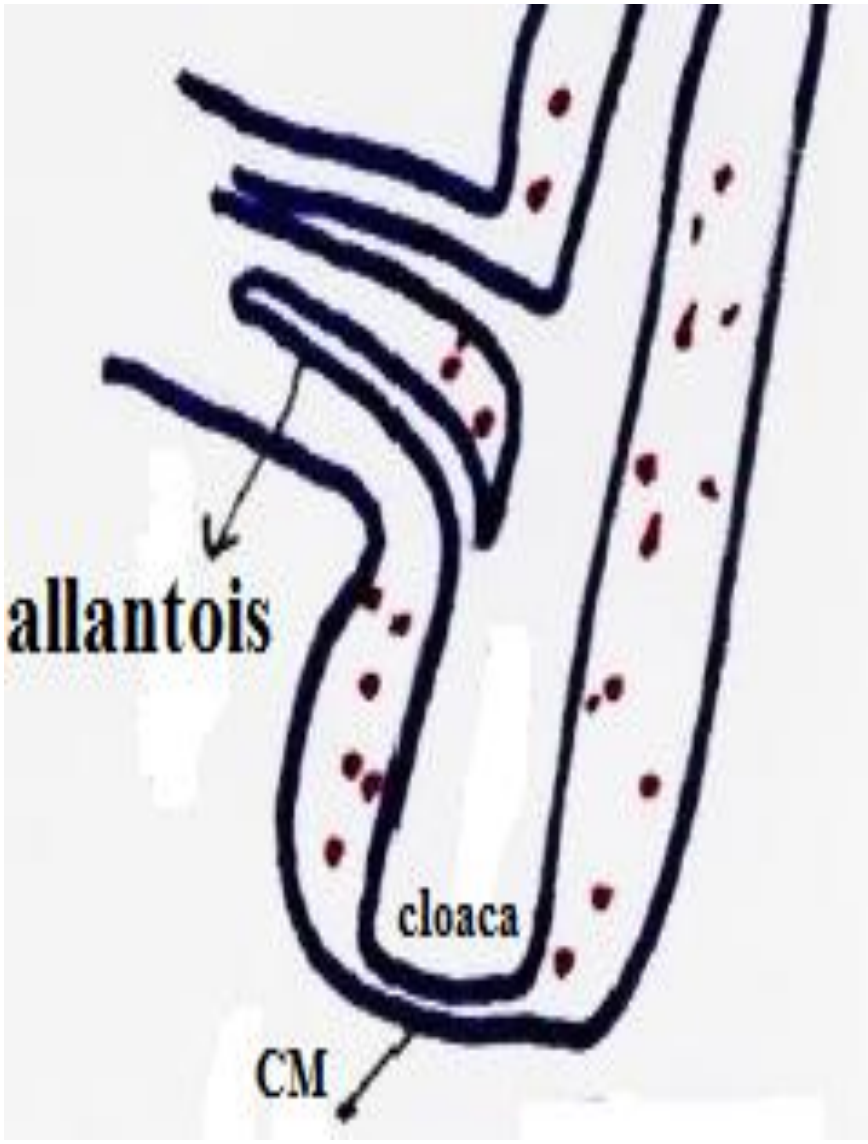
endodermal cloaca of hindgut.

allantois:

diverticulum projecting ventrally from hindgut into umbilical cord

endodermal cloaca:

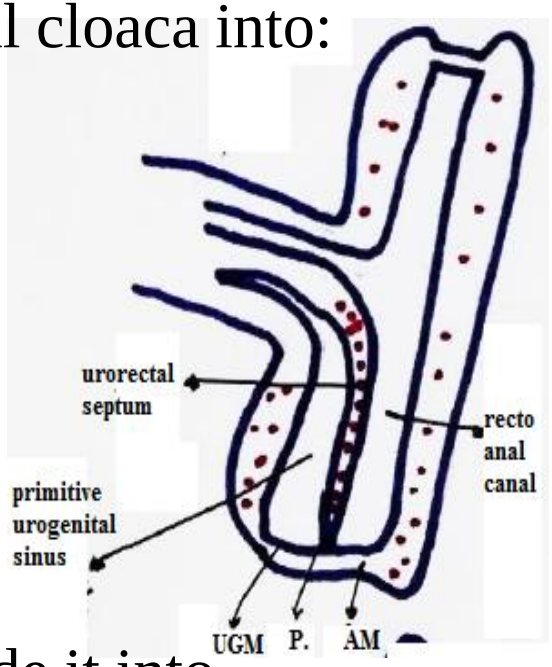
dilatation in hindgut just distal to origin of allantois, closed caudally by cloacal membrane (that separate the cavity of hind gut from the surface)



RECTUM

Development:

 the mesoderm at the angle ( ) hindgut and allantois proliferate and invaginate the endoderm forming urorectal septum that grows inferiorly in a coronal plane dividing the endodermal cloaca into:



-primitive recto anal canal (dorsal)

Form rectum

upper part of anal canal.

-primitive urogenital sinus (ventral)

Form urinary bladder & urethra

vagina.

 when septum fuse with cloacal membrane, it divide it into

-anal membrane (dorsal) -urogenital membrane (ventral)

primitive perineum (at site of fusion)

 the muscle of rectum develop from surrounding mesoderm

ANAL CANAL

Development:

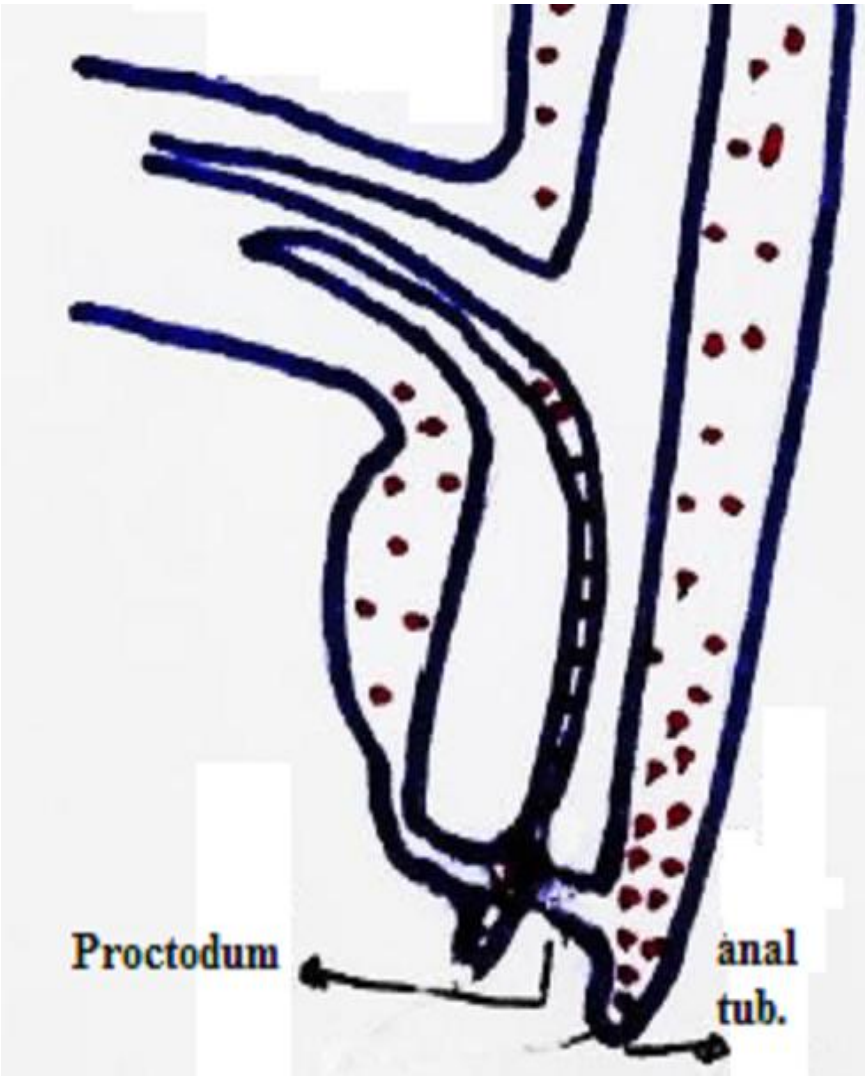
- **upper half:** from rectoanal canal (endodermal)

This part of anal canal is lined by a mucous membrane.

- **lower half:** from proctodeum (ectodermal) as follows:

mesoderm around anal membrane proliferate to form anal tubercles, and by the 9th week of development, the anal membrane comes to lie at the bottom of a depression called the proctodeum.

This part of anal canal is lined by stratified squamous epithelium (skin).



ANAL CANAL

Development:

- **rupture of anal membrane**

results in continuity( )upper & lower 1/2s

N.B: remnants of anal membrane

are represented in adult by

anal valves &pectinate line

The two parts of anal canal differs

in A.S. , N. S.& V.D. , L.D..

- **muscles of anal canal**

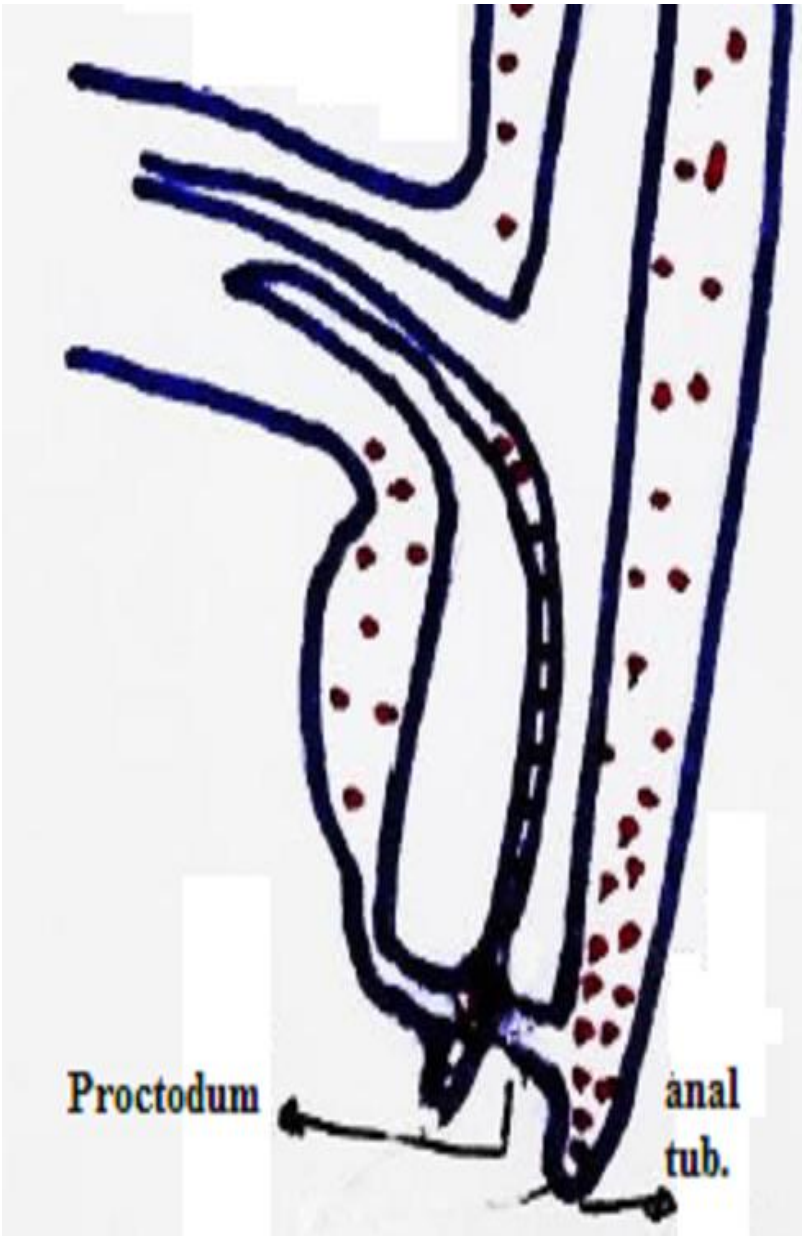
develop from surrounding mesoderm.

In the upper part form

int. anal sphincter (involuntary) , while

In the lower part form

ext. anal sphincter (voluntary)



ANAL CANAL

Congenital anomalies of rectum and anal canal:

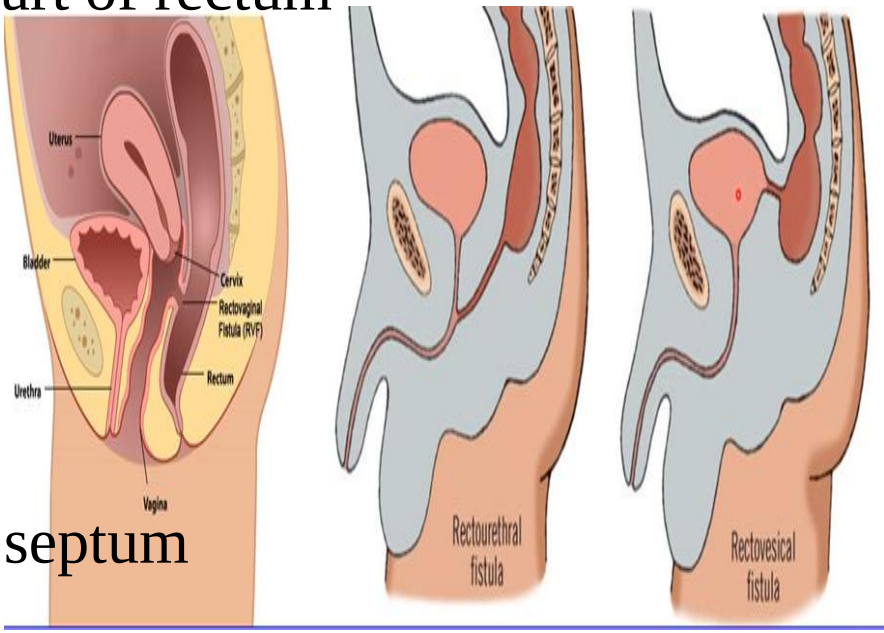
1-rectal atresia: obliteration of lower part of rectum

2-rectal fistulae: recto vesical,

recto urethral,

recto vaginal fistulae

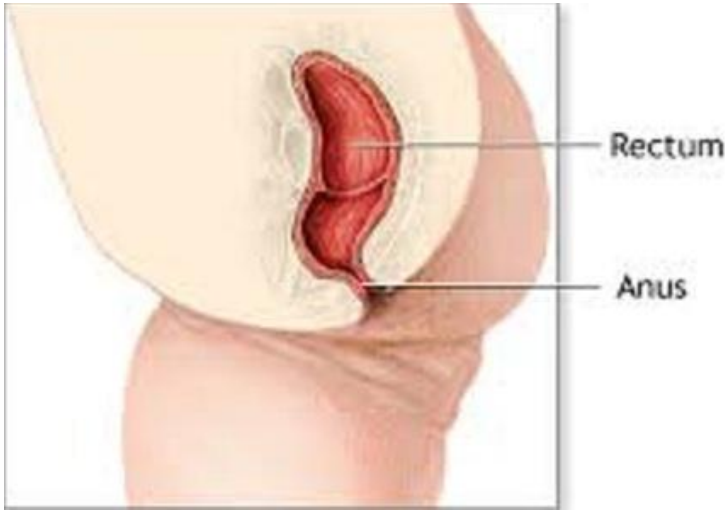
- communication ( ) rectum and either the urinary bladder, urethra or vagina
- due to incomplete growth of urorectal septum



3-imperforate anus:

anal membrane fails to rupture

and persist as a diaphragm stretching across the anal canal at level of anal valves



ANAL CANAL

Congenital anomalies of rectum and anal canal:

4-primary megacolon

(Hirchsprung's disease, aganglionic colon)

-in the 1st few days after birth ,

the child fails to pass meconium

and the abdomen become distended

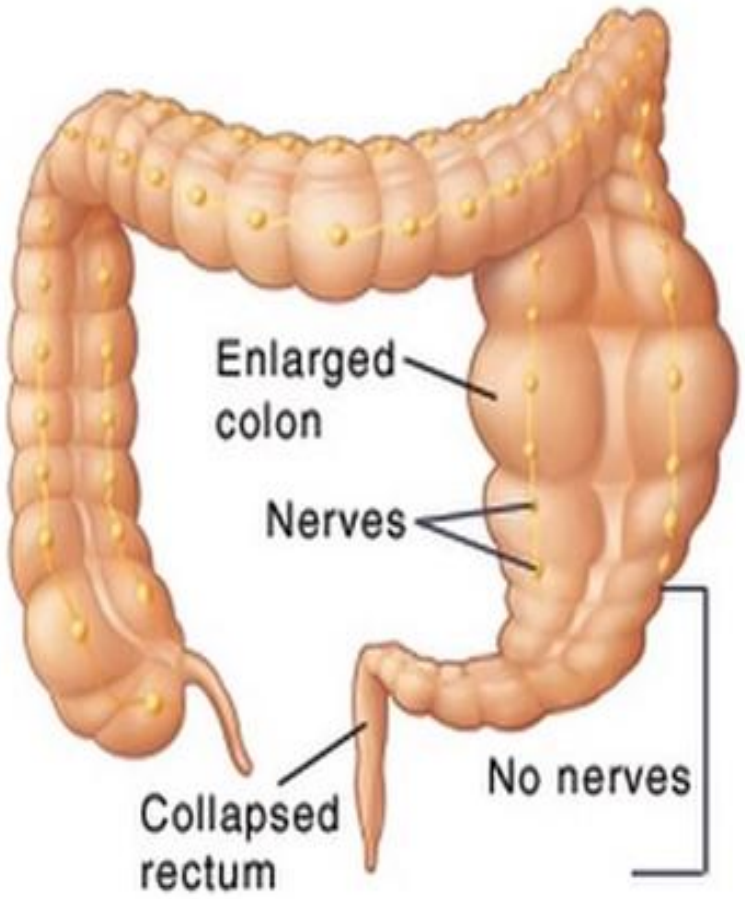
- Rectum & anal canal are constricted
- &sigmoid colon is greatly distended

-Due to failure of migration of

neural crest cells from neural folds

to form parasympathetic ganglia

in wall of bowel



THANQ