

SURGERY X RAYS

firstranker.com

TABLE OF CONTENT

<i>SERIAL NO.</i>	<i>HEADING</i>	<i>PAGE NO.</i>
<i>1</i>	<i>FREE GAS UNDER DIAPHRAGM</i>	<i>2</i>
<i>2</i>	<i>T TUBE CHOLANGIOGRAM</i>	<i>7</i>
<i>3</i>	<i>INTESTINAL OBSTRUCTION</i>	<i>9</i>
<i>4</i>	<i>-DO-</i>	<i>13</i>
<i>5</i>	<i>SIGMOID VOLVULUS</i>	<i>14</i>
<i>6</i>	<i>IVU</i>	<i>19</i>

SURGICAL IMAGING 1



Description:

It is a straight X-Ray of chest and abdomen showing free gas under both domes of diaphragm.

What does it suggest?

Hollow viscus perforation.

What are the organs commonly perforated to produce such an appearance?

1. Peptic ulcer perforation: Gastric/ duodenal
2. Small gut perforation: Typhoid ulcer/ tubercular ulcer/ Crohn's disease
3. Traumatic/ penetrating/ stab/ bullet injury
4. Appendicular perforation
5. Diverticular perforation
6. Following laparoscopic procedure/ abdominal operation.

Peptic perforation

How a patient of peptic perforation presents to the emergency?

Points	Findings
<i>History</i>	<ul style="list-style-type: none"> • Acute onset of pain abdomen which starts in the epigastric/RUQ region and later becomes generalized • There may be vomiting at the onset • Fever • There may be abdominal distension later on.
<i>General survey</i>	Features of shock: <ul style="list-style-type: none"> ✓ Hypotension ✓ Tachycardia ✓ Dehydration.
	<i>Abdominal examination</i>
<i>Palpation</i>	<ul style="list-style-type: none"> • Restriction of movement of abdomen with respiration • Muscle guard/ rigidity all over the abdomen • In late stages, there may be abdominal distension • Tenderness over all quadrants of abdomen with <i>maximum tenderness over RUQ region.</i>
<i>Percussion</i>	<ul style="list-style-type: none"> • Liver dullness may be obliterated • Evidence of free fluid in abdomen.
<i>Auscultation</i>	Bowel sounds may be absent.

What is the line of treatment?

1. Exploratory laparotomy
2. Confirmation of diagnosis of peptic ulcer perforation
3. Simple closure of perforation with an omental patch (Graham's patch) by interrupted polyglactin sutures
4. Thorough peritoneal lavage
5. Biopsy taking from ulcer margin to exclude malignancy.

Small gut perforation

What are the methods used for diagnosis of typhoid in different period of illness?

Period of illness	Method of choice
1 st week	Blood culture
2 nd week	Widal test
3 rd week	Stool culture
4 th week	Urine culture

What is the most common site of typhoid perforation?

Distal ileum.

What is the surgical treatment of choice in typhoid perforation?

As typhoid ulcers typically involves Peyer's patches (which are numerous in ileum), typhoid fever is notorious for causing multiple perforation and the recurrence rate is very high. So, the surgical treatment of choice is:

- If a single area of bowel is involved: Wedge excision of ulcer
- If extensive area of bowel is involved: Segmental resection of bowel.

What is the most common site of tubercular ulcer perforation (Koch's perforation)?

Ileo-caecal junction.

Appendicular perforation

Why free gas under diaphragm is less commonly found in appendicular perforation?

Usually obstructive type of appendicitis leads to perforation.

The lumen of appendix contains very little amount of gas.

- So, usually there is no free gas under diaphragm in case of appendicular perforation.

Note: If the perforation involves *base of the appendix*, then there may be free gas under diaphragm.

Mention the symptoms of acute appendicitis.

- Pain
- Vomiting
- Fever
 - Together comprises "Murphy's triad".

Other features:

- Constipation
- Urinary frequency.

Signs of acute appendicitis

Blumberg's sign/ Release sign: Tenderness and rebound tenderness at McBurney's point in right iliac fossa.

Rovsing's sign: On pressing over the left iliac fossa, pain occurs in right iliac fossa which is due to shift of bowel loops which irritates the parietal peritoneum.

Cope's psoas test: Hyperextension of right hip causes pain in right iliac fossa due to irritation of psoas muscle. It is positive in case of retrocaecal appendix only.

Obturator test: Internal rotation of right hip causes pain in right iliac fossa due to irritation of obturator internus muscle.

Baldwing's test: When legs are lifted off the bed with knee extended, the patient complains of pain while pressing over the flanks. It is positive in case of retrocaecal appendix only.

Describe the pain in acute appendicitis?

Peri-umbilical region pain (due to distension of appendix)

RIF fossa pain (irritation of parietal peritoneum due to inflamed appendix)

Pain eventually becomes *severe and diffuse* (spread of infection into general peritoneal cavity)

Traumatic perforation

What is the commonest site of perforation caused by blunt trauma?

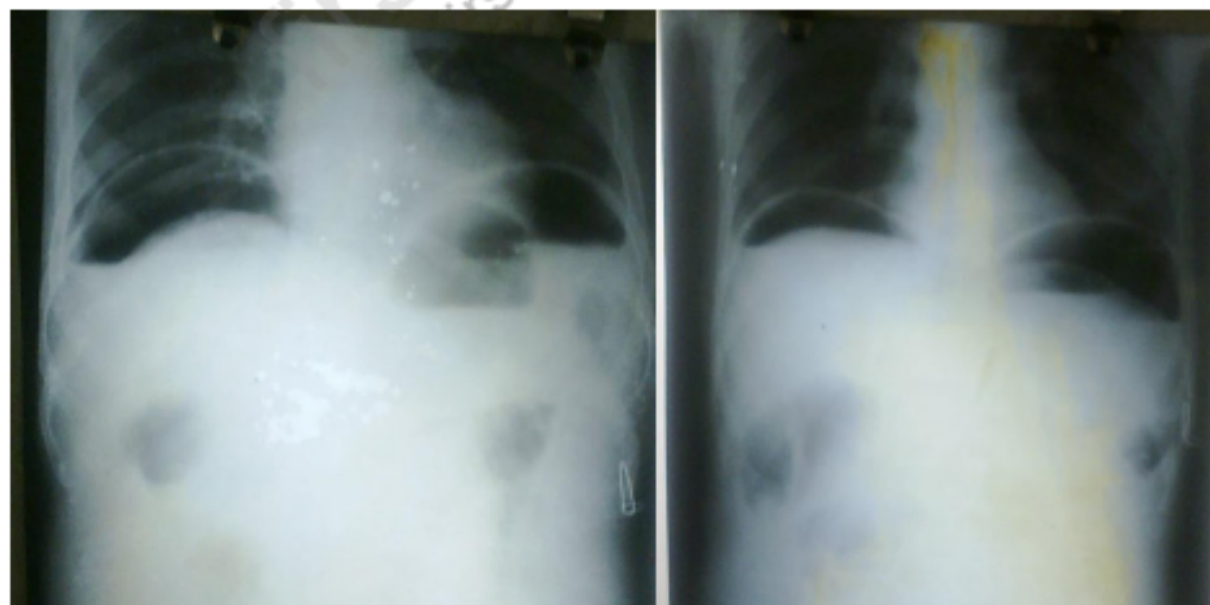
1. Duodeno-jejunal junction (commonest)
2. Recto-sigmoid junction.

Diverticular perforation

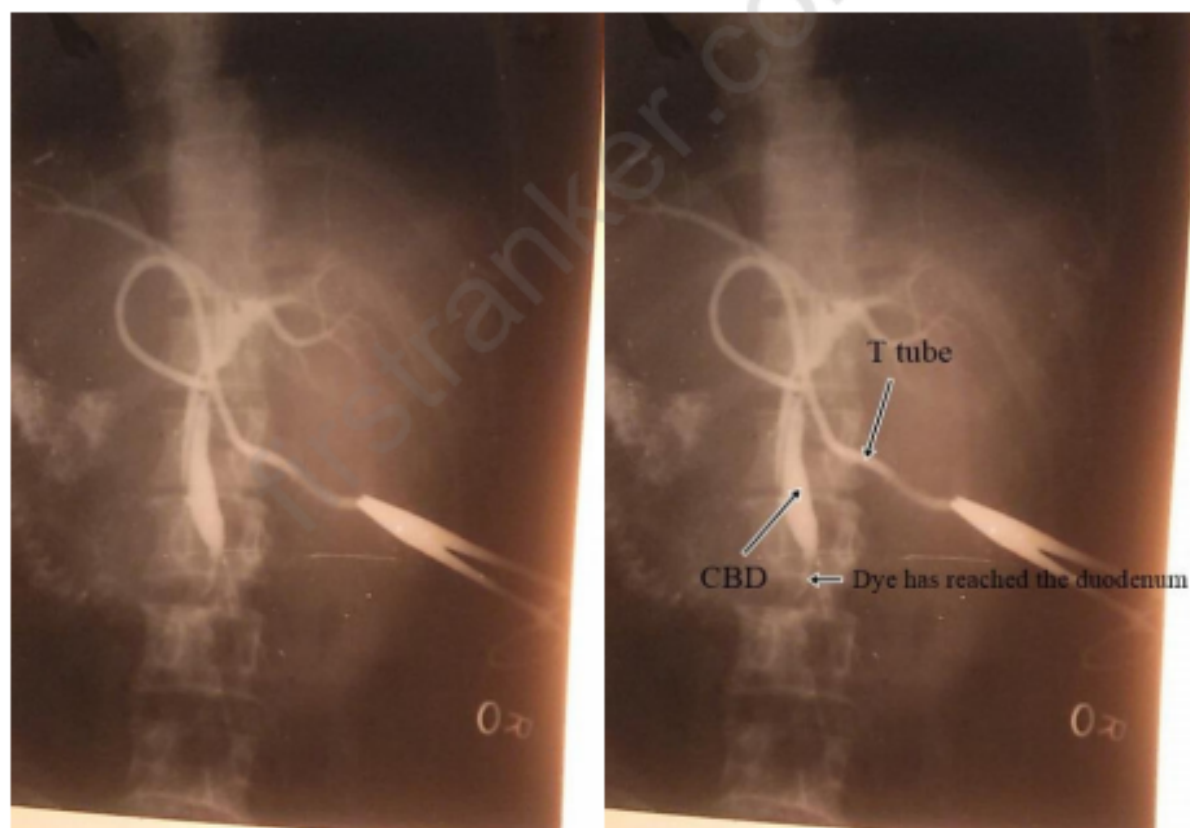
What history you may get in case of a diverticular perforation?

NSAID intake (it is a consistent risk factor of diverticular perforation).

Try yourself



SURGICAL IMAGING 2



Description:

This is one of the skiagram taken from a T-tube cholangiogram series showing patency of the tube. There is no filling defect in the lumen of bile duct. The dye has reached the duodenum, suggesting no obstruction in the terminal bile duct.



How a stone appears in a T-tube cholangiogram?

Radio-opaque shadow.

Some commonly asked questions about T-tube cholangiogram

Timing: 8 th -10 th postoperative day.
Contrast material: Urograffin (60%)
Amount of contrast injected: <ul style="list-style-type: none">• 2-3 mL: Before 1st X-Ray is taken• 4-5 mL: Before 2nd X-Ray is taken.
Indications: <ul style="list-style-type: none">• Patient's with possibility of residual small gallstones after cholecystectomy• Obstructive jaundice• Bile duct stricture• Surgeon unable to explore bile duct during cholecystectomy surgery.
Contraindications: <ul style="list-style-type: none">• Contrast/ iodine allergy• Pregnancy• Barium study within last 3 days.

Name some methods to remove retained CBD stones?

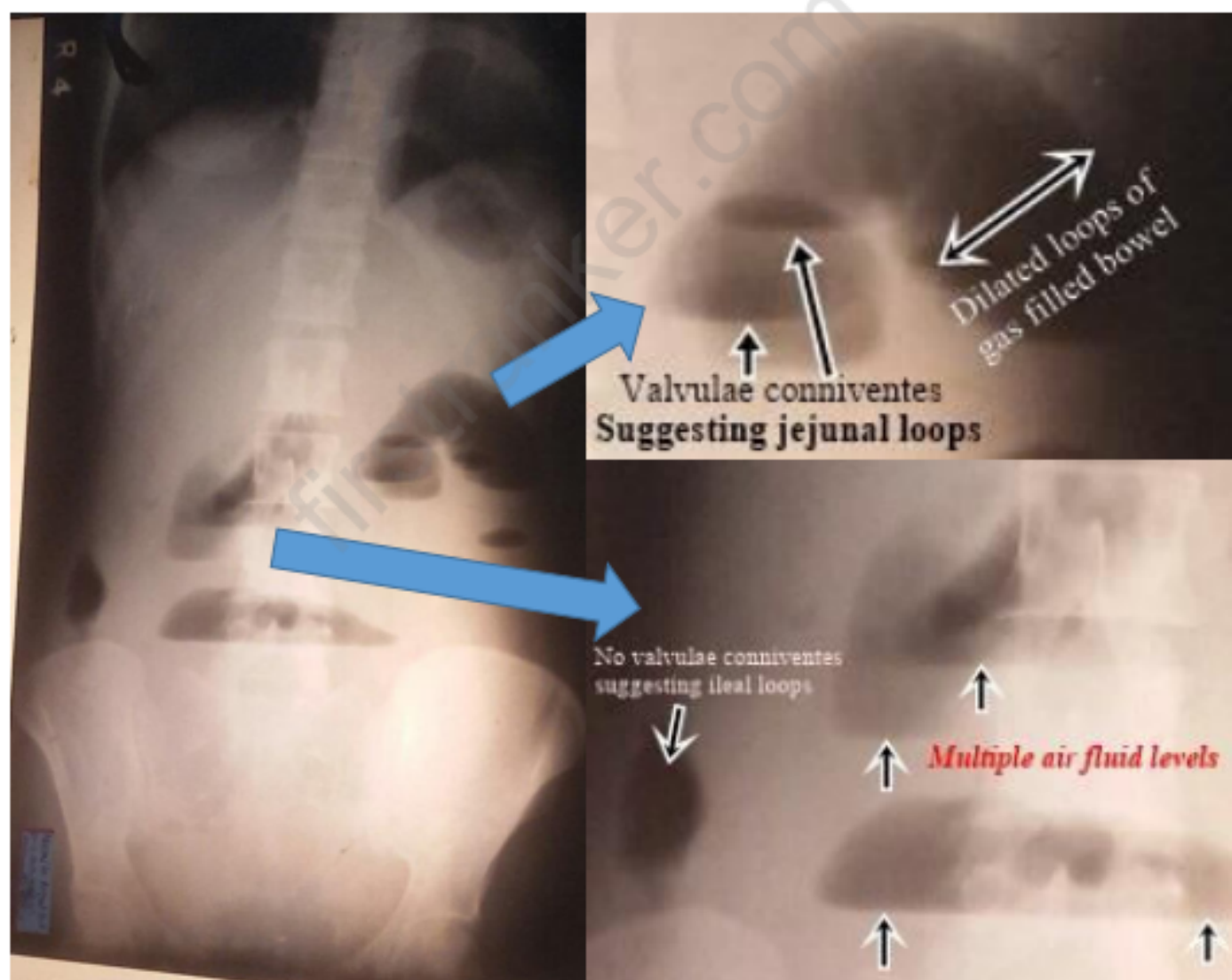
1. **ERCP** and stone removal in 3 weeks
2. **Flushing** of heparinized saline/ bile acid through the T-tube
3. **Burhenne technique:** After 6 weeks once T-tube track gets matured; using Dormia basket/ choledochoscope, stone is removed through T-tube track under fluoroscopic guidance.
4. **ESWL** with endoscopic sphincterotomy/extraction/ lavage/stenting
5. Through **percutaneous transhepatic route**, cholangioscope is passed and CBD is visualised, stone is identified and removed using Dormia basket.

If the retained stone is detected after removal of T tube, how will you manage the patient?

Endoscopic sphincterotomy and stone extraction by a Dormia basket catheter introduced through the endoscope.

For more questions, please see description of the instrument 'Kehr's T tube'.

SURGICAL IMAGING 3



Description:

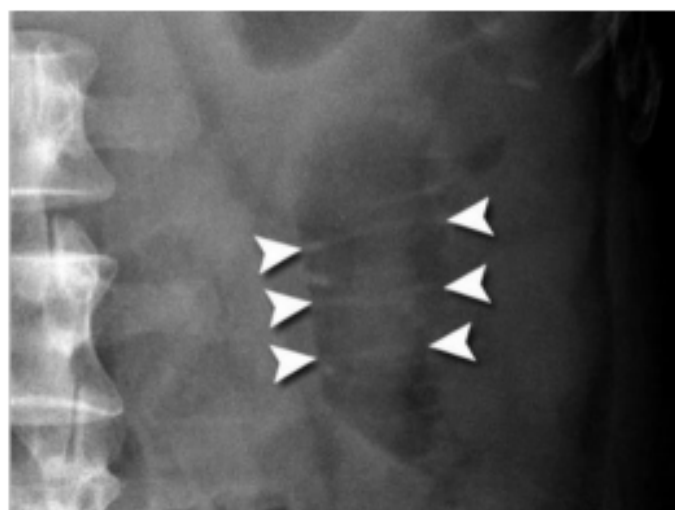
- This is a straight X-Ray of abdomen with lower part of chest and majority of the pelvis taken in erect posture showing multiple air-fluid levels.
- The left lumbar region is showing dilated bowel loops with prominent valvulae conniventes (white lines between bowel loops); suggesting these to be jejunal loops.
- The right iliac fossa region is showing bowel loops with no valvulae conniventes; suggesting these to be ileal loops.

How can you differentiate among a jejunal, ileal and a colonic gas shadow?

- Jejunal gas shadow: Numerous and prominent valvulae conniventes
- Ileal gas shadow: Sparse and less prominent valvulae conniventes
- Colonic gas shadow: Presence of haustrations.

Note that:

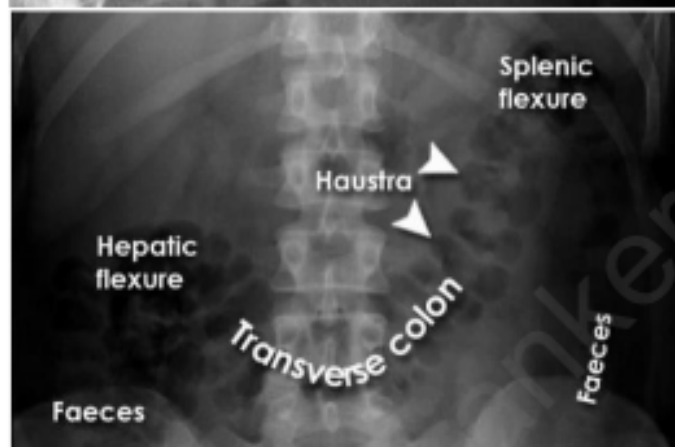
- **Valvulae conniventes:** White line between bowel loops (as seen in X-Ray). These are thin, circular, folds of mucosa, some of which are circumferential and are seen on an X-ray to pass across the full width of the lumen.
- **Haustrations:** The longitudinal muscles (taenia coli) and circular muscles of the colon form sacculations called haustra, which have characteristic radiographic appearance.



Normal small bowel

Identified by -

- ◆ Central position in the abdomen
- ◆ Valvulae conniventes - mucosal folds that cross the full width of the bowel (arrowheads)



Normal large bowel

Normal large bowel may be identified by -

- ◆ Peripheral position in the abdomen (the transverse and sigmoid colon occupy very variable positions)
- ◆ Haustra (arrowheads)
- ◆ Contains faeces

What features will the patient present with?

1. Colicky abdominal pain
2. Vomiting
3. Absolute constipation
4. Abdominal distension.

How will you manage this patient?

- Perform an emergency laparotomy
- Diagnose the cause of obstruction
- Decompress the distended bowel loop
- Assess the viability of gut
- If gangrenous bowel: perform resection and anastomosis.

What is the commonest cause of small bowel obstruction?



Postoperative adhesions and bands formation.

What are the other causes of small bowel obstruction?

▪ **Causes in the wall of intestine:**

Stricture caused by:

- ✓ Benign: IBD, TB, Trauma, Ischemia, Radiation, Intussusception etc.
- ✓ Malignant: Tumors in the intestine.

▪ **Causes in the lumen of intestine:**

- ✓ Gall stones
- ✓ Foreign body
- ✓ Worm.

▪ **Causes outside the wall of intestine:**

- ✓ Postoperative adhesions and bands
- ✓ Hernia
- ✓ Volvulus
- ✓ Intussusception
- ✓ Infiltration by a tumor.

Some basic concepts

Dynamic intestinal obstruction:

When there is mechanical obstruction of a segment of gut, the proximal segment tries to overcome the obstruction by *vigorous peristalsis*.

Adynamic intestinal obstruction (Paralytic ileus):

In this case, *peristalsis is absent*; resulting in non-propulsion of gut contents.

Strangulated obstruction:

Intestinal obstruction with *compromise in blood supply* to the gut results in strangulating obstruction.

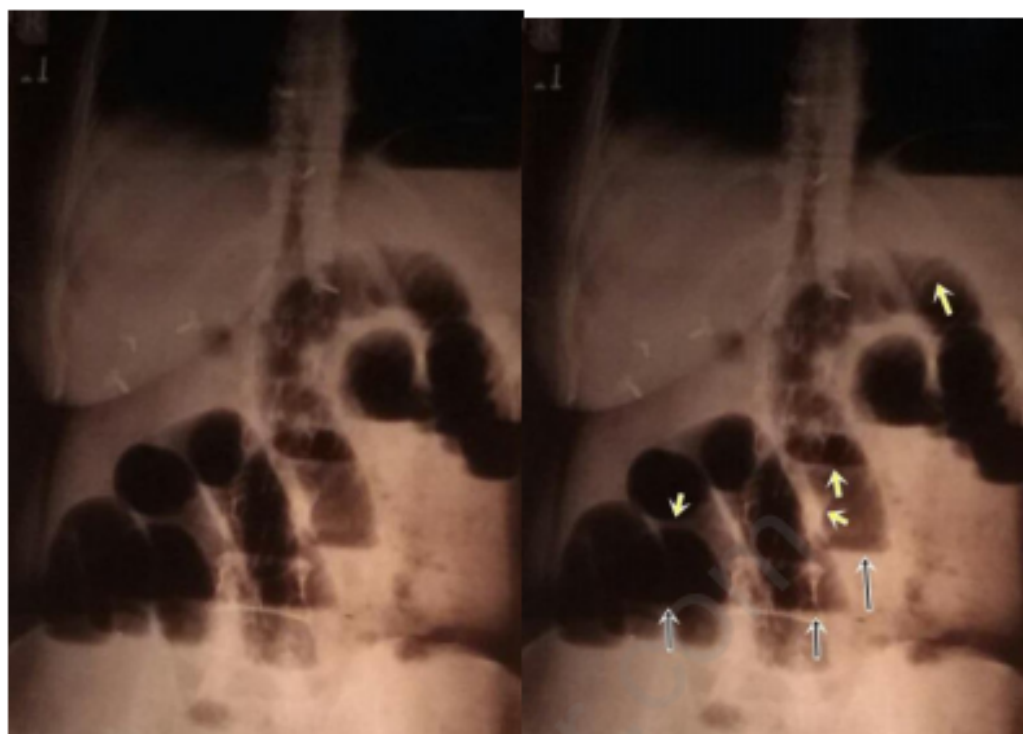
While doing exploratory laparotomy, how will you differentiate between a viable and a non-viable bowel segment?

- The segment of confusion is covered with a hot moist pack.
- Anaesthetist is asked to give the patient 100% oxygen for 10 minutes.



- The gut is reviewed.
- If the color of the segment becomes pink, peristalsis and arterial pulsation returns, then the segment is viable.

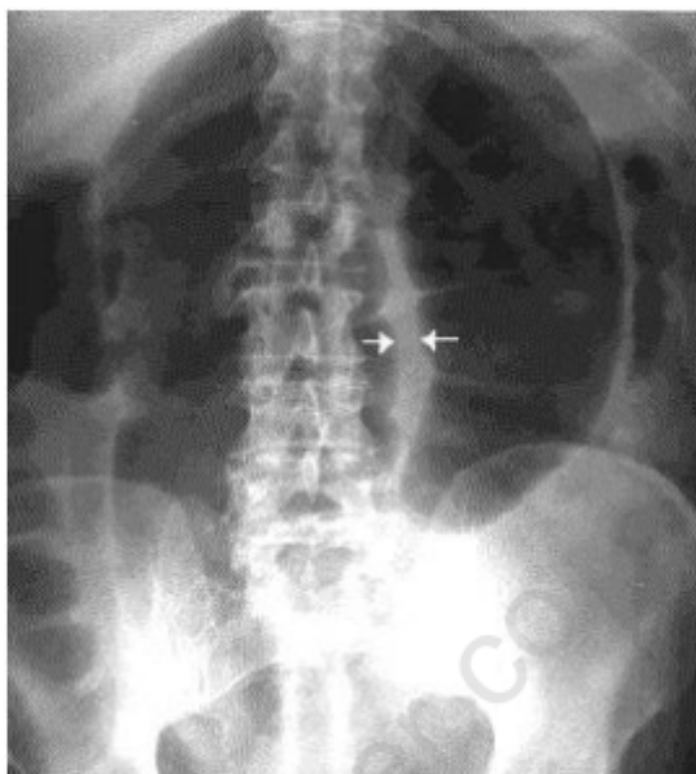
SURGICAL IMAGING 4



Description:

- This is a straight X-Ray showing lower part of chest, abdomen and upper part of pelvis.
- There are multiple air-fluid levels (white arrows), suggesting bowel obstruction.
- There are prominent valvulae conniventes (yellow arrows), suggesting that the bowel loops involved are probably jejunum.
- However, in right iliac fossa, valvulae conniventes are sparse, suggesting that this part is showing ileal loops.

SURGICAL IMAGING 5



Description:

- This is a straight X-Ray abdomen along with a part of pelvis taken in erect posture.
- There is a distended loop.
- The right sided compartment of the loop is showing prominent haustrations.
- But the left sided part of the compartment is not showing any haustrations.
- Left sided compartment of the loop is distended hugely and has extended from pelvis to RUQ region.
 - This is called 'omega sign appearance'.
- There is a central double wall (arrows) between the right and left compartments. A single wall forms the outer margin of the compartments.
 - This is called 'coffee bean appearance'.

This appearance is suggestive of large bowel obstruction due to sigmoid volvulus.

What is volvulus?

Volvulus is an abnormal rotation of a segment of bowel around its narrow mesentery.

What is danger of a volvulus?

It may lead to strangulation/ gangrene of the involved bowel segment.

How much rotation is required for luminal obstruction and vascular compromise?

180° and 360°, respectively.

Do you know the direction of rotation?

Yes, rotation always occurs in *anti-clockwise* direction.

What are the common sites of volvulus?

1. Sigmoid colon (commonest site)
2. Cecum
3. Transverse colon
4. Small intestine
5. Stomach.

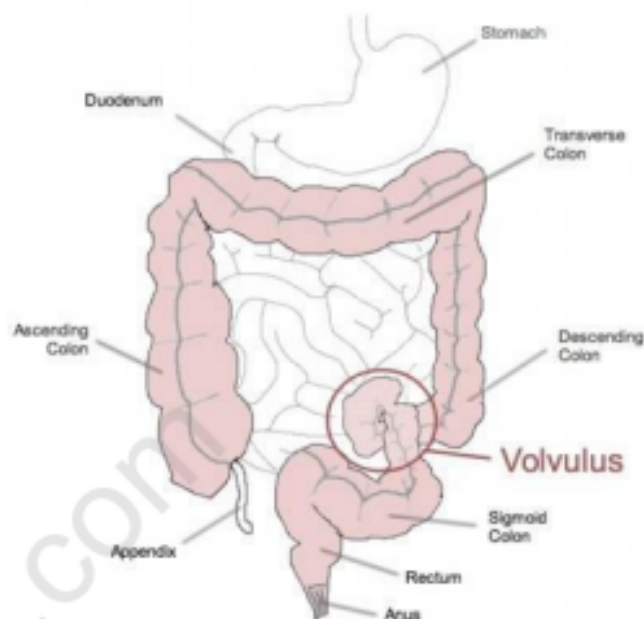
What will be the presentation of the patient?


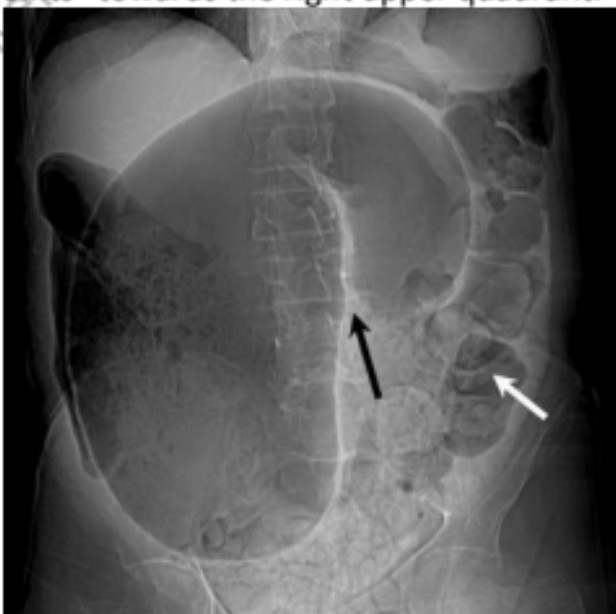
- ✓ Abdominal pain
- ✓ Abdominal distension
- ✓ Absolute constipation (also called obstipation).

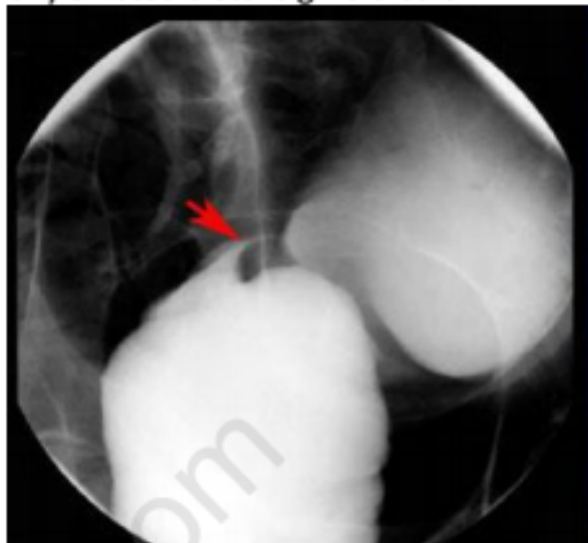
What are the risk factors for development of a sigmoid volvulus?

- ✓ Adhesions
- ✓ Peridiverticulitis
- ✓ Overloaded redundant pelvic colon
- ✓ Long pelvic mesocolon
- ✓ Narrow attachment of sigmoid mesocolon.

Mention the characteristics radiological signs of a sigmoid volvulus.



Diagnostic modality	Radiological sign	Description
Plain X ray	Omega (Ω) sign	Single, grossly distended loop of colon arising out of the pelvis and extending towards the diaphragm. 
	Coffee-bean sign	Dilated loop of sigmoid colon has a "coffee-bean" shape and the wall between the two volvulated loops of sigmoid (black arrow) "points" towards the right upper quadrant.  There is a considerable amount of stool (white arrow) in the colon from chronic constipation.

Barium study	Birds beak sign	Upper end of barium column tapers into the spirally twisted distal sigmoid colon.
		

How will you manage this patient?

Do resuscitate the patient at the very beginning. Then continue as follows:

Patient without any sign of strangulation

Non-operative decompression by pushing any of the following beyond the point of volvulus may be tried:

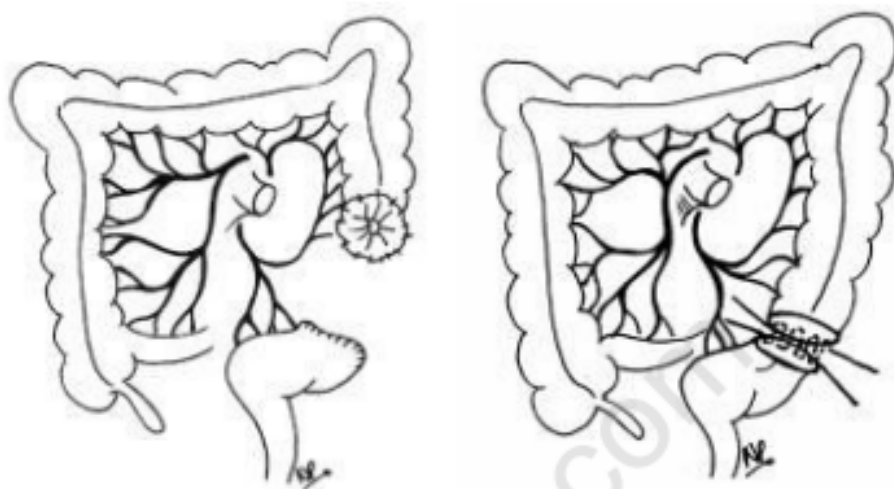
- I. Rigid sigmoidoscope
- II. Flexible sigmoidoscope
- III. Soft rubber catheter.

Patient with sign(s) of strangulation [features of shock and peritonitis]

- The management of choice is emergency laparotomy and derotation of volvulus.
- Procedures of choice:
 - ✓ Sigmoid colectomy and primary anastomosis
 - ✓ Hartmann's procedure
 - ✓ Paul-Mikulicz Operation.

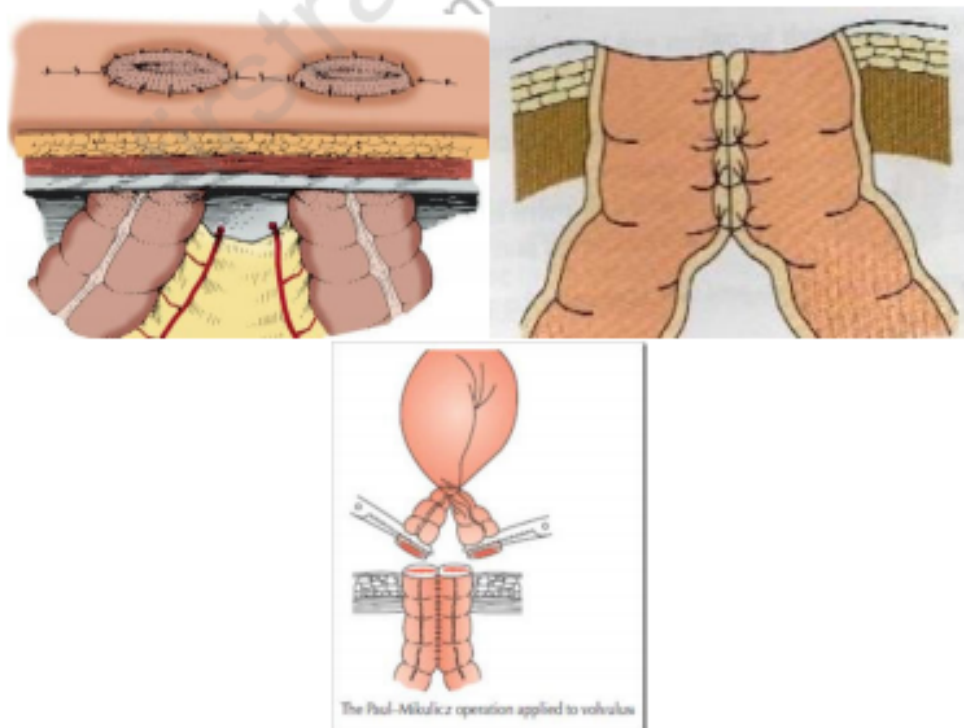
Hartmann's procedure

Resection of the gangrenous sigmoid done; proximal cut is brought out as end-colostomy: distal end closed (which is re-anastomosed at a later date).



Paul-Mikulicz Operation

Resection of the gangrenous sigmoid done; proximal cut is brought out as end colostomy: distal end is brought out as mucus fistula, from the rectum (which is re-anastomosed at a later date).



SURGICAL IMAGING 6



Description:

This is one of the skiagram from intravenous urography (IVU) series after injection of dye.

On left, there is normal excretion of the contrast. The left kidney outline and pelvi-calyceal system seems to be normal. Left ureter is outlined normally.

On right, there is no excretion of contrast. There is a large calculus (yellow arrow) obstructing the right pelvi-ureteric junction (PUJ). Right ureter is not seen.

- So, it is a staghorn calculus obstructing the right PUJ.

Name some contrast agents commonly used for IVU?

- Ionic agent: Urograffin (Sodium diatrizoate)-> 76%
- Non-ionic agent: Omnipaque.

What is hydronephrosis?

It is a condition characterized by aseptic dilation of collecting system of kidney due to partial/ intermittent complete obstruction.

Do you know the grading of hydronephrosis?

Grade	Description
1	Minimal dilation with slight blunting of calyceal fornices
2	Enlargement and obvious blunting of calyceal fornices; but intruding shadow of papillae seen

3	Rounding of the calyces with <i>obliteration of the papilla shadow</i>
4	<i>Extreme ballooning of calyces</i>

How will you manage a case of hydronephrosis due to PUJ obstruction?

If there is adequate renal function and reasonable thickness of functional renal parenchyma, I will do Anderson-Hynes pyeloplasty.

Procedure in short:

- Kidney is exposed through a standard lumbar incision
- The upper 1/3rd of ureter and pelvis is dissected
- The redundant renal pelvis and PUJ are excised
- A new pelvis is created and the cut end of pelvis is anastomosed to the ureter in the dependent position.

