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Department of surgical diseases No. 2

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COMPLICATIONS OF ACUTE APPENDICITIS

Textbook for students of the 4th year

of the Faculty of Dentistry in the discipline "Surgical Diseases"

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This teaching guide covers main issues about etiology, pathogenesis, clinical features, laboratory and instrumental diagnostics and complications of Complications of Acute appendicitis.

Teaching guide “Complications of Acute appendicitis” is made for “Surgical Diseases” discipline in accordance with requirements of FSES HE, and is intended for students from medical universities and faculties, studying for specialty 31.05.03 Dentistry.

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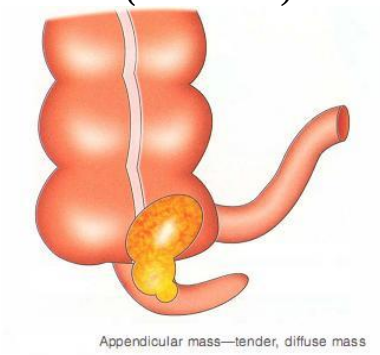
CONTENTS

COMPLICATIONS OF ACUTE APPENDICITIS

1. Rupture of appendix causes generalised peritonitis with10-20mortality rate. The treatment involves emergency laparotomy, appendicectomy and peritoneal wash followed by drainage of peritoneal cavity.
2. **Appendicular mass** (Fig.1)

- Following an attack of acute appendicitis, infection is sealed off by greater omentum, caecum, terminal ileum,etc. which results in a tender, soft to firm mass in the right iliac fossa.
- Presence of a mass is a contraindication for appendi-cectomy because it is very difficult to remove appendix from such a mass. An attempt to remove it may result in a faecal fistula.
- It is treated by Ochsner and Sherren regime. Aspiration with Ryle's tube to give rest to the gut. Bowel care-purgatives should not be used (may cause perforation).

- Charts-temperature, pulse, respiration, diameter of the mass. Swinging temperature, and increase in size of mass indicates an appendicular abscess.
- Drugs to cover all the organisms-gram-positive, gram-negative and anaerobic organisms.
- Exploratory laparotomy should not be done. However, when the condition of the patient is not improving, there is a suspicion of an abscess (Fig. 2) and when doubtful of the diagnosis, exploration ts indicated.
- Fluids *(see* Table)



(Fig.1)

Patient is kept nil orally for a few days. During this time, intravenous fluids are given to correct dehydration.

Wisdom/mistakes/surprises for surgeon while conducting appendicectomy

Observes straw-coloured fluid	Observes bile-coloured fluid	Observes 'foul' fluid	Observes haemorrhagic fluid
Completes appendicectomy Closes the wound Realises 3 days later, it was acute pancreatitis **How could it have been avoided?** Serum amylase, lipase were not sent. A preoperative ultrasound was not done. **Surgical wisdom:** If these investigations were done before surgery, they could have helped the surgeon. Luckily, the patient recovered from this unnecessary, avoidable surgery.	Completes appendicectomy Puts a drain Closes the wound Postoperative biliary fistula Asks for contrast CT, **realises duodenal ulcer perforation**, explores, sutures the perforation He had not done a simple chest X-ray or plain X-ray abdomen erect preoperatively in this case	Completes appendicectomy Postoperative faecal fistula Re-explores by midline incision Perforated Meckel's diverticulum Resection, anastomosis **Surgical wisdom:** Surgeon had not examined the terminal 2 feet ileum during appendicectomy	Completes appendicectomy Ignores fluid Patient continues to have pain OBG consultation given Twisted ovarian cyst Laparotomy and ovariectomy **Surgical wisdom:** Surgeon had not done ultrasound and gynaecological consultation was not requested before surgery.

- After 3-4 days, the abdomen becomes soft, tenderness decreases and once stools are passed, Ryle's tube is removed. Clear oral fluids followed by soft diet is given.

By one week, the patient is back to normal. After 6-8 weeks, patient is advised elective appendicectomy.

3. Perforated appendicitis

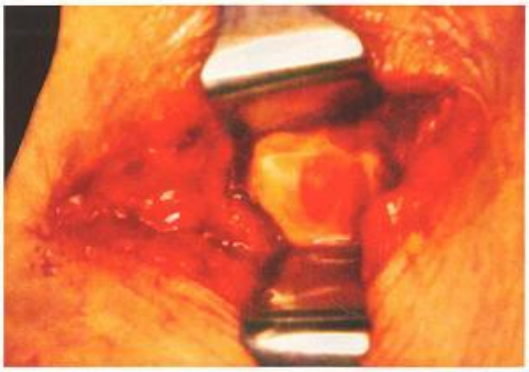
- Incidence is about 8-10%.
- More common in children and elderly patients.
- Delay in seeking medical treatment is the main factor.
- Other factors which precipitate perforation are diabetes mellitus, AIDS, faecolith.
- The pain usually localises to the right lower quadrant if the perforation has been walled off by surrounding intra- abdominal structures including the omenturn.
- Diffuse pain in cases of generalised peritonitis.
- Rigors and chills with fever of 38.9°C or above.
- As a complication of perforation peritonitis, portal pyaemia (pylephlebitis) can develop, it can be very dangerous.

4. Appendicular abscess: If the infection is not controlled properly following an attack of appendicitis, an abscess can occur in relation to the appendix. They are (A) retrocaecal, (B) postileal and preileal, (C) pelvic,(D) subcaecal abscesses. Clinically, it presents with high- grade fever with chills and rigors and a tender boggy swelling in the right iliac fossa or in the right lumbar region. Pelvic abscess presents with diarrhoea. Diagnosis is by late presentation to the hospital (3-4 days) and high-grade fever with chills and rigors.

APPENDICULAR ABSCESS

- Ultrasound/CT scan is done to assess the size and location of abscess
- Abscess greater than 4–6 cm in size needs to be drained by guided percutaneous aspiration or drainage through rectum or vagina
- Ongoing inflammation may force a surgeon to do appendicectomy open/laparoscopic at the same admission
- Those who improve require appendicectomy after 6 weeks

A. Retrocaecal abscess is drained by extraperitoneal approach. An incision of 5 to 6 cm is made in the right iliac fossa and all muscles are divided. However, peritoneum is not opened. It is swept medially and pus is drained outside. Appendicectomy is done at a later date (Fig. 7).



Appendicular abscess is drained by extraperitoneal route

(Fig. 7)

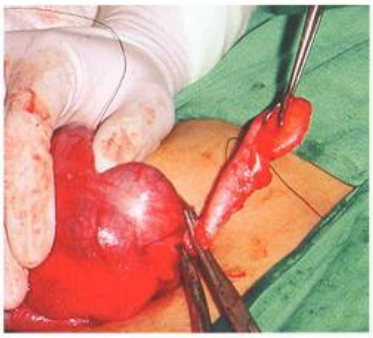
B. Preileal and postileal abscesses are drained by a laparotomy.
C. Pelvic abscess is drained *via* the rectum
D. Lumbar abscess (perinephric abscess) is drained through a loin incision.

Preoperative resuscitation

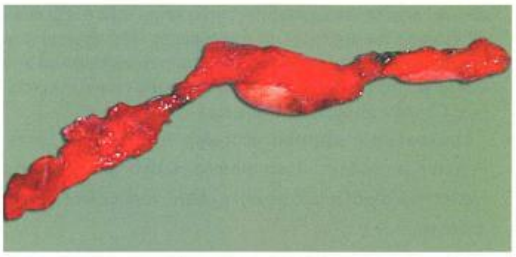
- Once diagnosis of acute appendicitis is suspected, the patient is admitted to the hospital.
- IV fluids-isotonic saline or Ringer lactate is given.
- Electrolytes are corrected especially in late cases of acute appendicitis/perforation peritonitis, etc.
- Ryle's tube is not necessary in simple appendicitis but is definitely required in complicated cases (peritonitis).
- Second generation cephalosporins along with metronidazole is given.
- Informed consent is taken.

Treatment

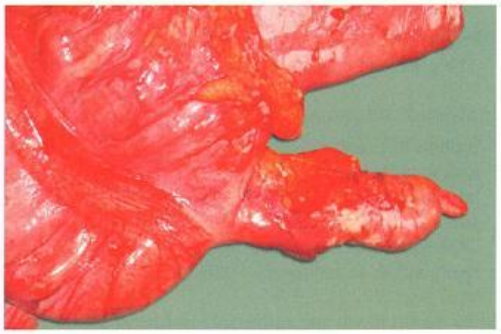
- Emergency appendicectomy: Emergency appendicectomy is offered when patient comes within 24 to 48 hours of abdominal pain. It is very impo1tant to rule out or detect a mass, especially if a decision is made to operate around 2nd or 3rd day. If a mass is palpable, it is better not to operate at that time (please refer to operative surgery, appendicectomy). A few important steps are given here (Fig 8).



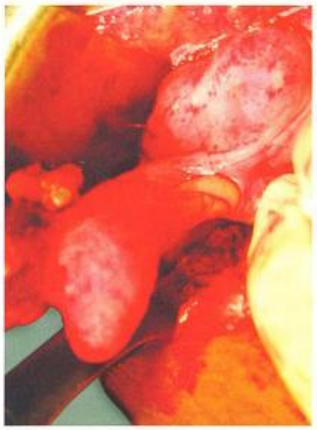
Emergency appendicectomy—base is crushed



Large faecolith resulting in acute appendicitis

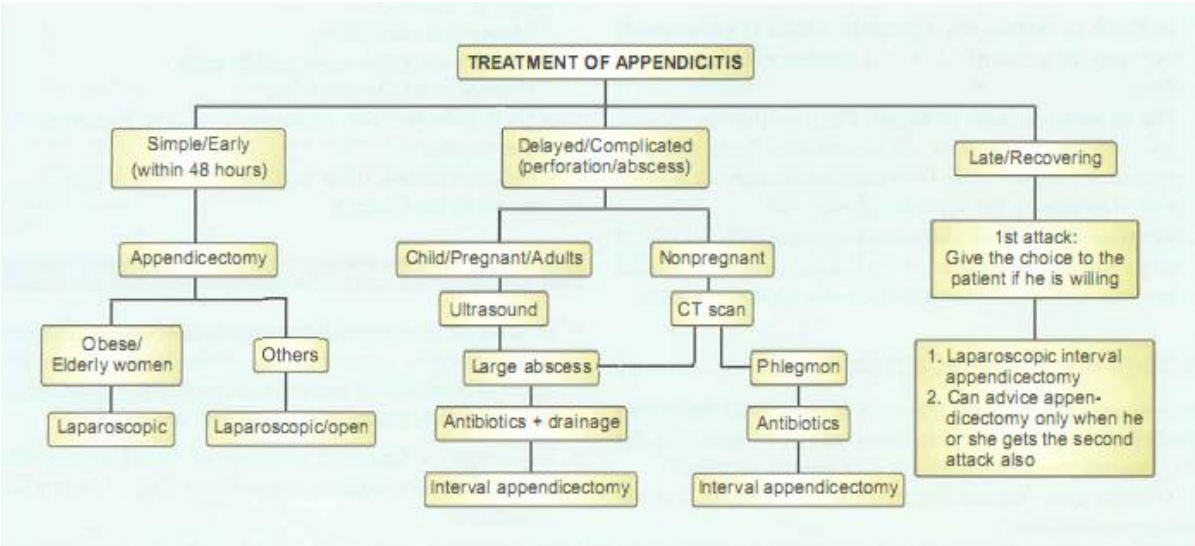


Inflamed appendix at surgery (*Courtesy:* Dr Prasad, S. Professor of Surgery, KMC, Manipal)



Appendicular perforation with abscess—appendicectomy could be done (*Courtesy:* Dr Annappa Kudva, Professor of Surgery, KMC, Manipal)

(Fig. 8)



- The appendix is identified by tracing *Taenia coli* which converges onto the base of the appendix. Mesoappendix is divided in between ligatures. Apursestring suture is applied all around the appendix in the caecum. The appendix is divided in between ligatures, the stump is invaginated and the purse string is tightened. The abdomen is closed in layers.
- Laparoscopic appendicectomy has become more popular nowadays. Less postoperative pain, speedy recovery. Benefit is maximum in obese, women and elderly patients.

Problems encountered during appendicectomy

1. The incision is small: Location is higher up-never hesitate to close the incision and a midline incision is given and do appendicectomy. An attempt to remove the appendix with traction and limited exposure through McBurney incision may result in faecal fistula.
2. Normal appendix is found: Remove the appendix. Other-wise it may cause confusion to the next surgeon when this patient presents with abdominal pain. However, look for Meckel 's diverticulitis, intestinal obstruction, stricture, etc.
3. Gangrenous appendix involving base: Problem one can face here is that the purse string can be applied but invagination of the stump is not possible. Risk of faecal fistula is also present. Appendicectomy, wash and a drain is kept.
4. Difficult to isolate the appendix which is gangrenous but pus is present: Limited ileocecectomy can be done.
5. The appendix cannot be found: First mobilise the caecum and look for subcaecal or retrocaecal sites. Look also into preileal or postileal sites. Then mobilise the ascending colon also. Agenesis of the appendix is very rare.
6. Surprise findings of carcinoma caecum (Fig. 33.25): If suspicion of a carcinoma is high, hemicolectomy should be done. Otherwise take a biopsy-do appendicectomy.

INCIDENTAL APPENDICECTOMY

It means removal of normal appendix at laparotomy for another condition. Examples: Laparotomy and ilea! resection for stricture and anastomosis (can we do appendicectomy?).

Ovarian cyst: Torsion (right) ovary is removed. Can we add appendicectomy? Since benefits of appendicitis/appendicectomy is more in young patients, if patient is under 30 years, it may be justifiable to do incidental appendicectomy provided it can be removed through same incision, without much difficulty.

The patient should be stable to tolerate the procedure.

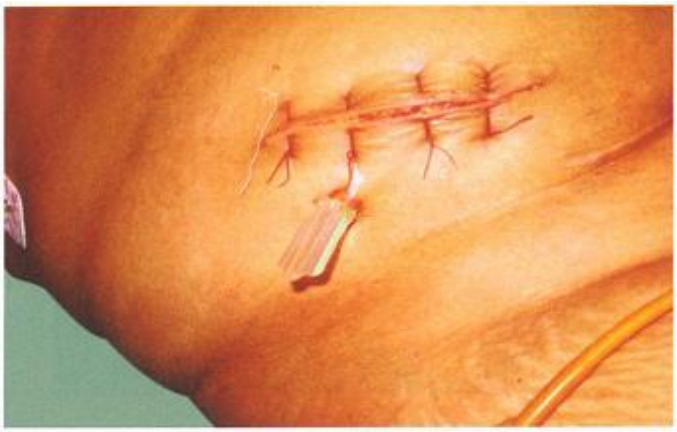
What to do if normal appendix is found at surgery?

- Nonnal white appendix is called Lily-white appendix.
- It is removed because the 'scar' should not add confusion later to a doctor whether appendix was removed or not.
- However, examine:
  - Meckel's diverticulum
  - Mesenteric lymph node enlargement
  - Ovaries and fallopian tubes
  - Gall bladder for cholecystitis and pancreas for pancreatitis.

- Rule out duodenal ulcer perforation.
- Document the findings

POST-APPENDICECTOMY FAECAL FISTULA

- It can occur after appendicectomy especially when gangrene of the appendix extends to base of the caecum. It can also occur if purse-string suture is not properly applied, injury to the terminal ileum or caecum, etc. occurs.
- Discharge of faeculent contents or faecal matter after appendicectomy suggests faecal fistula (Fig. 9 and Key Box 33.8).



This patient had faecal fistula which healed after two weeks of conservative management

(Fig. 9)

FAECAL FISTULA—CAN OCCUR

- After drainage of appendicular abscess
- After appendicectomy—if purse string sutures are not properly applied
- If the caecum is also involved by inflammation
- If the cause of appendicitis is carcinoma
- If chronic diseases develop or are present—tuberculosis, Crohn's or actinomycosis
- If appendicitis is associated with carcinoma caecum

- Usually discharge stops after a few days provided there is no distal obstruction.

NEOPLASM OF THE APPENDIX

1. Carcinoid tumour

- It is the most common neoplasm of the appendix, less aggressive, majority are benign and cured with simple appendicectomy *(see* Chapter 28 for more details).
- Goblet cell carcinoid tumour it is more aggressive, requires right hemicolectomy if the tumour is more than 2 cm, has more than 2 mitosis per high power field and lymphovascular invasion, adenocarcinoma of the appendix.

2. Carcinoma

- It is very rare.
- Often it is colonic type. Other type is mucinous adeno-carcmoma.

- Can present as acute appendicitis due to obstruction caused by the tumour.
- Mucinous variety has better prognosis.
- Colonic variety should be treated by right hemicolec-tomy.

3. Cystic neoplasm of the appendix

- Rare occurrence
- Simple cyst (non-neoplastic mucocoele) and mucinous cystadenoma (like pancreatic).
- Can attain large size.
- Diagnosis is by ultrasound/CT scan.
- Appendicectomy is the treatment of choice.
- It can rupture into peritoneal cavity resulting in pseudo-myxoma peritonei.

1. Palpation of left iliac region of abdomen produces pain in the right iliac region in appendicitis because of:

A. Sympathetic reaction
B. Displacement of colonic gas and small bowel coils
C. Sigmoid colon is also affected
D. Ileocolic reflex

2. Cope's psoas test is positive in:

A. Retrocaecal appendicitis
B. Pelvic appendicitis
C. Preileal appendicitis
D. Subcaecal appendicitis

3. Rebound tenderness in acute appendicitis is called:

A. McBurney's sign
B. Blumberg's sign
C. Rovsing's sign
D. Sherren's sign

4. The most common cause of nonobstetric emergency with abdominal pain in pregnancy is due to:

A. Acute appendicitis
B. Acute cholecystitis
C. Acute gastritis
D. Acute hepatitis

5. Contraindications for incidental appendectomy include all of the following except:

A. Crohn's of caecum
B. Radiation treatment of the rectum
C. Immunocompetent individuals
D. Previous vascular reconstruction in the abdomen

6. The following statement is TRUE about appendicular abscess:

A. Abscess greater than 4-6 cm in size needs to be drained by laparotomy
B. Appendicectomy must be done along with laparotomy or appendicular abscess
C. Can present with diarrhoea
D. Conservative management is advised till inflammation settles down.

7. Most common aerobic bacteria involved in acute appendicitis is:

A. Salmonella typhi
B. Streptococcus
C. Escherichia coli
B. Clostridium perfringens

8. The following statement is FALSE about occurrence of faecal fistula following appendicectomy:

A. Faecal fistula can occur if the cause of appendicitis is carcinoma caecum
B. Faecal fistula can occur if chronic diseases such as tuberculosis is present
C. Faecal fistula can occur if purse string sutures are not applied properly
D. It is always due to actinomycosis

9. The most reliable symptom of acute appendicitis is:

A. Fever
B. Migratory pain
C. Right iliac fossa pain
D. Vomiting

10. Appendicular perforation is common because of the following reasons except:

A. Appendix is a cul-de-sac
B. It has blood supply with profuse collaterals
C. It has a narrow lumen
D. The muscle coat of appendix is thin

ANSWERS
1-B. 2-A. 3-B. 4-A. 5-C. 6-C. 7-C. 8-D. 9-B. 10-B.

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