ACUTE APPENDICITIS
Introduction

• Vestigeal organ
• Surgical importance: Propensity for inflammation
• Most important cause of “Acute Abdomen” in young adults
Anatomy

• Position: constant ➔ at the confluence of the 03 taenia coli of caecum

• Mesoappendix : Arises from the lower surface of the mesentery of terminal ileum

• Appendicular Artery: Branch of Ileo-colic artery – End Artery

• 04-06 Lymphatic channels traverse Mesoappendix ---------→ Ileo-caecal LNs
<table>
<thead>
<tr>
<th>Anatomical Positions</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETROCAECAL</td>
<td>74%</td>
</tr>
<tr>
<td>PELVIC</td>
<td>21%</td>
</tr>
<tr>
<td>PARACAECAEL</td>
<td>2%</td>
</tr>
<tr>
<td>SUBCAECAL</td>
<td>1.5%</td>
</tr>
<tr>
<td>PREILEAL</td>
<td>1%</td>
</tr>
<tr>
<td>POSTILEAL</td>
<td>0.5%</td>
</tr>
</tbody>
</table>
Anatomical positions
Etiology

• Low dietary fibre
• Age; 2\textsuperscript{nd} and 3\textsuperscript{rd} decays
• Faecoliths
• Worm infestations: Oxyuris vermicularis
• Neoplasms: Ca caecum, carcinoids
• Viral
Pathology

- Lymphatic hyperplasia
- Luminal obstruction
- Increased intra-luminal pressure
- Edema, mucosal ulceration
- Bacterial translocation to submucosa
Pathology

Resolution  
Venous obstruction

Ischaemia of appendix wall

Invasion of muscularis propria, submucosa
Pathology

Acute Appendicitis → Lump/mucocele
Gangrenous appendicitis

Peritonitis
# Bacteriology of perforated appendicitis

<table>
<thead>
<tr>
<th>TYPE OF BACTERIA</th>
<th>PATIENTS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANAEROBIC</strong></td>
<td></td>
</tr>
<tr>
<td>B. fragilis</td>
<td>80</td>
</tr>
<tr>
<td>B. thetiaotaomicron</td>
<td>61</td>
</tr>
<tr>
<td>Bilophila wadsworthia</td>
<td>55</td>
</tr>
<tr>
<td>Peptostreptococcus spp</td>
<td>46</td>
</tr>
<tr>
<td><strong>AEROBIC</strong></td>
<td></td>
</tr>
<tr>
<td>E.coli</td>
<td>77</td>
</tr>
<tr>
<td>S.viridans</td>
<td>43</td>
</tr>
<tr>
<td>Group D streptococcus</td>
<td>27</td>
</tr>
<tr>
<td>P.aeruginosa</td>
<td>18</td>
</tr>
</tbody>
</table>
Clinical features

• Symptoms:
  1. Periumbilical pain 50% cases
  2. Pain shifts to RIF
  3. Anorexia
  4. Nausea/vomiting
Clinical features

• Signs:
  1. Pyrexia
  2. Localized tenderness in RIF
  3. Muscle guarding
  4. Rebound tenderness
  5. Rovsing’s sign
  6. Dumphy sign
  7. Psoas sign
  8. Obturator sign
Clinical features

• Risk factors for perforation:
  1. Extremes of age
  2. Immunosuppression
  3. Diabetes mellitus
  4. Pelvic appendix
  5. Previous abdominal surgery
Special clinical scenarios

• According to position:
  1. Retro-caecal
    - Silent appendix
    - Quadratus lumborum rigidity
    - Psoas sign
    - Loin tenderness
Special clinical scenarios

2. Pelvic
   - Early diarrhoea
   - Increased urinary frequency
   - Deep tenderness over symphysis pubis
   - DRE: Rectovesical pouch/POD tenderness
   - Obturator/Psoas sign +ve
Special clinical scenarios

3. Post-ileal
   - Diarrhoea
   - Marked retching
   - Ill defined tenderness to rt of umbilicus
Special clinical scenarios

• As per age:

1. Infants
   - Uncommon <36 mths
   - Difficult to diagnose
   - Diffuse peritonitis common
   - High incidence of perforation
Special clinical scenarios

2. Children
   - Vomiting
   - Marked anorexia

3. Elderly
   - High incidence of gangrene & perforation
   - Features of SAIO

4. Obese
   - Diminished signs/ delayed diagnosis
   - Midline/ Laparoscopic approach
Special clinical scenarios

5. Pregnancy
   - Most common extra-uterine cause of acute abdomen
   - Delayed presentation
   - Fetal loss
     • 3-5%
     • Upto 20% : Perforation
Differential Diagnosis

1. Children
   - Gastroenteritis
   - Mesenteric adenitis
   - Meckel’s diverticulitis
   - Intussusception
   - HS purpura
   - Lobar pneumonia
Differential Diagnosis

2. Adults
   - Regional enteritis
   - Ureteric colic
   - Perforated peptic ulcer
   - Torsion of testis
   - Pancreatitits
Differential Diagnosis

3. Adult female
   - Mittelschmerz
   - PID
   - Pyelonephritis
   - Ectopic pregnancy
   - Torsion/ rupture of ovarian cyst
   - Endometriosis
Differential Diagnosis

4. Elderly
   - Diverticulitis
   - Intestinal obstruction
   - Ca colon
   - Mesenteric infarction
Investigations

• Diagnosis is essentially clinical
• Clinical diagnosis alone
  - 15-30% negative appendicectomy
• Use of
  - Clinical scoring systems
  - Imaging modalities
  - Diagnostic Laparoscopy
  - Routine laboratory examinations
# ALVORADO Score

<table>
<thead>
<tr>
<th>Category</th>
<th>Symptom/Sign</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Migratory RIF pain</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Anorexia</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Nausea &amp; vomiting</td>
<td>1</td>
</tr>
<tr>
<td>Signs</td>
<td>RIF tenderness</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Rebound tenderness</td>
<td>1</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Elevated temperature</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Leucocytosis</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Shift to left</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>
ALVORADO Score

- < 4: Excludes diagnosis
- 5-6: Equivocal
- >7 : Strongly s/o appendicitis

**Modified Alvorado Score:**
- 9 points
- Differential count not done

**PAS:**
- Total : 10
- Rebound tenderness excluded
- Cough/percussion/hopping tenderness = 2
- Leucocytosis > 10,000 → 1
Computed Tomography

• Classical findings:
  - Distended appendix > 7mm diameter
  - **Halo/ Target sign**
  - Periappendiceal fat stranding
  - Edema
  - Peritoneal fluid
  - Phlegmon
  - Periappendiceal abscess
Computed Tomography

• Rational use:
  - Elderly
  - Atypical presentations
  - Neoplasms
  - Acute diverticulitis
  - Intestinal obstruction

• MRI: ??
US Scans

- Sensitivity = 85%  Operator based
- Specificity > 90%
- AP dia appendix > 7mm
- CROSS SECTIONAL VIEW:
  - Thick walled
  - Non compressible luminal structure : Target Lesion
- Periappendiceal fluid/ Mass
Plain Abdominal X-Rays

• Low sensitivity
• Appendicoliths picked up in only 10-15% cases
• Can be combined with Barium enema
• Failure of appendix to “Fill up”
• Low specificity → 20% of normal Appendices do not fill up
Laboratory Examinations

• WBC’s elevated
• Normal in 10% cases
• TLC > 20,000 s/o PERFORATION
• Polymorphs > 75%
• Minimal pyuria Common
• Microscopic haematuria
Diagnostic algorithm

Surgical consultation for acute abdomen

Clinical probability of Ac appendicitis

High
Operate

Intermediate
CT/USG & reassess

Low
Elderly/unreliable/far
Local/reliable
Diagnostic algorithm

+ ve  Uncertain  - ve

Operate  DL/admit  Disc/alt
Diagnostic algorithm

Elderly/unreliable/far
CT re-examine
+ ve Operate

Reliable & local
Discharge/ follow up < 24h
-ve Discharge/follow up < 24h
Treatment

- Adult/Non-pregnant
  - CT Scan
  - Simple appendicitis
- Child/Pregnant adult
  - Ultrasound
  - Large abscess
  - Phlegmon/small abscess
**Treatment**

* Antibiotics + Drainage

- **Antibiotics**
  - **No improvement**
    - Open appendicectomy
  - Improvement
    - Colonoscopy (adults)

- **Antibiotics + Drainage**
  - Laparoscopic interval appendicectomy
Management of Appendicular abscess/Lump

- Late presentation
- Clinically mass & fever
- Subject to imaging studies to ascertain:
  - Presence
  - Size
- > 4-6cms → Antibiotics+Drainage
- < 4 cms → Conservative mgt(Oschner Sherren’s Regime)
Problems Intra-operatively

2. Appendix not found:
   - Mobilise caecum
   - Taenia coli to be traced to their confluence

3. Appendicular tumour:
   - <2cms: Appendicectomy
   - >2cms: Rt hemicolecotomy
Complications

1. Wound infection
2. Intra-abdominal abscess
3. Ileus
4. Portal pyaemia (pyelephlebitis)
5. Adhesive intestinal obstruction
Discussion

• TAC test in a peripheral set-up???