Endoscopic management of Perforations & Leaks

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Outline

- Physiologic consequences of perforation
- Current practices and limitations
- Emerging technologies
- Clinical algorithm
Physiologic consequences

- Immediate – air leak ➔ tension pneumothorax or pneumoperitoneum ➔ hemodynamic crisis

- TO DO:
  - CLOSE hole
  - Decompress tension

Raju, GS GIE 2005
Physiologic consequences

- Minutes later – fluid leak ➔ mediastinitis or peritonitis

- TO DO:
  - CLOSE hole
  - Drainage
Current Practice

- **Diagnosis**
  - High index of suspicion critical
  - Plain and upright x-ray films; Gastrografin followed by barium if neg.; barium alone if risk of aspiration
  - CT scan
  - Consider endoscopy
Current Practice

• **Surgical Management**
  ~**Goal**: prevent further contamination, restore integrity of organ, eliminate infection, provide nutritional support
  ~**General anesthesia**
  ~**Thoracotomy/Laparotomy**
  ~**Locate perforation (dissection)**
  ~**Repair or divert**
  ~**Drainage**
  ~**Recovery**
• Endoscopic Management

~**Goal**: prevent further contamination, restore integrity of organ, eliminate infection, provide nutritional support

~General anesthesia

~Thoracotomy/Laparotomy

~Locate perforation (dissection)

~Repair or divert

~Drainage

~Recovery
Current Practice (Endoscopic)

- Contain the leakage (repair)
  - Suturing
    - Endocinch – challenging Adler GIE 2001
    - Plicator – no longer available
    - Esophyx – not applicable
  - Clipping
    - Endoclip or Quickclip (Olympus)
    - Triclip, Instinct [new] (Cook)
    - Resolution Clip (Boston Scientific)
Current Practice (Endoscopic)

- Contain the leakage (repair) con’t

  ~Glue or Grafts

  - Fibrin glue
    - Tisseel (Baxter)
    - Hemaseel (Hemacure)

  - Cyanoacrylates
    - Histoacryl (B Braun)
    - Glubran (GEM)
    - Dermabond (Ethicon)
    - Indermil (US Surgical)

  - Tissue grafts
    - Surgisis (Cook)
Current Practice (Endoscopic)

- Diversion and exclusion
  - Self-expandable Metal Stents
    - Z-stent (Cook)
    - Evolution [new] (Cook)
    - Wallstent (Boston Scientific)
    - Ultraflex stent (Boston Scientific)
    - Wallflex stent (Boston Scientific)
  - Self-expandable Plastic Stents
    - Polyflex Stent (Boston Scientific)
**Current Practice** (Endoscopic)

- Clearance of infection
  - Drainage
    - Endoscopic transluminal drainage
    - Percutaneous drainage
  - Broad spectrum intravenous antibiotics
Components of Endoscopic Closure

- Approximation
- Fixation
- Seal
Approximation

Small Linear

Long Linear

Gaping

Hole
Types of Fixation

- Parallel
- Everted
- Inverted
• Fixation

- Mucosa to mucosa
- Serosa to serosa
• Fibrin Glue
  ~ Tisseel (Baxter)
  ~ Hemaseel (Hemacure)

• Cyanoacrylate Glue
  ~ Histoacryl (B Braun)
  ~ Glubran (GEM)
  ~ Dermabond (Ethicon)
  ~ Indermil (US Surgical)

• Grafts
  ~ Surgisis (Cook)
  ~ Vicryl plug (Ethicon)
Diversion
Drainage & Diversion
Outline

• Physiologic consequences of perforation
• Current practices and limitations
• Emerging technologies
• Clinical algorithms
Apollo Over-stitch

- Double Channel scope
Ovesco
Over-the-scope clip (OTSC)

- cap device
- requires straight angle of approach
Ovesco
Over-the-scope clip (OTSC)
Clinical Algorithm

- Prevent Perforation
- Recognition of Perforation
- Immediate endoscopic management
- Post-endoscopy management

Raju, GS Am J Gastro 2009
Clinical Algorithm

• Prevent Perforation – use caution:
  ~ cervical spondylosis or stiff neck
  ~ small rectum on retroflexion
  ~ scope insertion force in fixed colon
  ~ avoid therapy in dirty lumen
  ~ dry the endoscopic field
  ~ saline lift prior to flat polypectomy or EMR
  ~ cold snare technique
  ~ use CO₂
Clinical Algorithm

• Recognition of Perforation
  ~ Sudden pain or restlessness
  ~ Change in vital signs including $O_2$ sat
  ~ Abdominal distention
  ~ Subcutaneous emphysema
  ~ Endoscopic findings:
    • “target sign”
    • “trees moving outside window”
Target Sign = MP

Mirror Target Sign
Target Sign = MP
“Tree moving outside window”
Endoscopic Therapy of Esophageal Leaks

**INDICATIONS**
1. Patient too sick for surgery
2. Operative closure not possible - delay in diagnosis
3. Esophageal cancer perforation
4. Anastomotic leak
5. Perforation recognized during endoscopy

**Nature of perforation / fistula & co-existing pathology**

- **Small**
  - 1-2 cm
  - no cancer
  - no stricture → CLIP
  - stricture → STENT

- **Large**
  - >2 cm
  - no cancer
  - no stricture → STENT
  - stricture → STENT

- **Cancer**
  - STENT

- **Postoperative Leak**
  - Small → CLIP
  - Large → STENT

Raju et al. GIE 2005
Clinical Algorithm

- Post endoscopic management
  - NG or rectal tube suction
  - Surgical consultation
  - CT
  - Antibiotics 2-3 days
  - PPI
  - Serial exams/x-rays
  - NPO x 2 days, then contrast study prior to resuming feeds
Endoscopic Closure of Gastrointestinal Leaks

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