Small bowel obstruction and intestinal ischemia

Long Island College Hospital

Sylvia S. Kim, MD
Case Presentation

- female patient presented with one day history abdominal pain, nausea and vomiting
  - Vague, crampy pain
  - Nonbilious vomiting
  - Last bowel movement and flatus earlier that day

- Denied any other symptoms
Case Presentation

• Past history
  – Multiple prior gynecologic surgeries: myomectomies, hysterectomy
Case Presentation

• T=99.3  HR=100  BP=130/70
• Labs

\[
\begin{array}{c|c|c|c}
& 12 & 189 & 140 & 105 & 15 & 122 \\
6.6 & 36 & & 3.9 & 24 & 0.8 & \\
\end{array}
\]
Case Presentation

• Physical exam
  – No acute distress
  – Lower midline abdominal and Pfannensteil incisions
  – Abdomen soft, distended, mild diffuse tenderness; no rebound or guarding
AXR

- Few distended loops small bowel
- Air-fluid levels
- Air and feces in colon
- Possible ileus vs. obstruction
CT

- Ascites
- Dilated small bowel
- High grade partial small bowel obstruction
CT

- Ascites
- Dilated small bowel
- High grade partial small bowel obstruction
CT

- Ascites
- Dilated small bowel
- High grade partial small bowel obstruction
Case Presentation

• Admitted for high grade small bowel obstruction
• NGT decompression
• IVF resuscitation
• Serial abdominal exams
Case Presentation

• Hospital Day #1
  – Patient still without bowel movement or flatus
  – No change in reported symptoms or pain
  – Decision made to bring patient for operative exploration later that day
  – Patient receiving Demerol 75mg IVP q4hrs
Case Presentation

• Hospital Day #1
  – Patient found unresponsive
  – ACLS protocol initiated with return of vital signs
  – Transferred to ICU
  – Pressors started
Case Presentation

• Hospital Day #1
  – Clinical course continued to deteriorate
  – Coagulopathic and acidotic
  – Coded several times

• Hospital Day #2
  – Expired
Autopsy

- Small bowel obstruction
- Infarcted segment of small bowel with torsion upon mesentery secondary to adhesive band in pelvis
Small bowel obstruction andintestinal ischemia
SBO: Historical Perspective

• Praxagoras 4th century B.C.
  – First surgery for obstruction from strangulating hernia

• Sydenham 17th century
  – Nonoperative management
  – Bleed bad humors, laudanum

• 18-19th centuries
  – Feed patient mercury or other heavy metal, lead
SBO: Etiology

- Adhesions  50-80%
- Malignancy  20%
- Hernia  10%
- IBD  5%
- Volvulus  3%
- Miscellaneous  2%
SBO: Etiology

- **Adhesions**
  - Medicare alone $3.2 billion/year for treatment of adhesion-related complications

- **Time after surgery**
  - Within first month 20%
  - Within first year 30%
  - Within 1-5 years 25%
  - Within 5-25 years 25%
SBO: Pathophysiology

- Initial proximal distention and distal peristalsis
- Progressive obstruction:
  - Lymphatics
  - Venous
  - Arterial
- Bowel ischemia and necrosis
- Perforation, peritonitis and death
SBO: Presentation

• History and physical
  – Prior surgery
  – Hernias
  – Abdominal distention
  – Peritoneal signs

• Symptoms
  – Abdominal pain
  – Nausea and vomiting
  – Obstipation
AXR

- Supine abdominal film
- Massive dilatation small bowel
- Visible *plica circulares*
AXR

• Upright abdominal films
• Air-fluid levels
• Paucity of gas in colon and rectum suggestive complete bowel obstruction
CT

- Dilated loops
- Collapsed distal bowel/colon
- Transition zone
SBO: Management

• Resuscitation
• Tube decompression
  – Nasogastric vs. long tube
• Controversy: When to operate?
SBO: Management

• Controversy: When to operate?
  – Strangulation associated with significantly increased morbidity and mortality
  – Difficult to assess strangulation preoperatively
SBO: Management

“Never let the sun rise or set on small bowel obstruction.”
## SBO: Management

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>% Surgery</th>
<th>% Strangulated</th>
<th>% Mortality</th>
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<tbody>
<tr>
<td>1952</td>
<td>412</td>
<td>72</td>
<td>22</td>
<td>12</td>
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<tr>
<td>1962</td>
<td>480</td>
<td>66</td>
<td>23</td>
<td>11</td>
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<tr>
<td>1978</td>
<td>238</td>
<td>47</td>
<td>11</td>
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<tr>
<td>1981</td>
<td>405</td>
<td>66</td>
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<td>7</td>
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<tr>
<td>1981</td>
<td>52</td>
<td>60</td>
<td>8</td>
<td>2</td>
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<tr>
<td>1985</td>
<td>127</td>
<td>38</td>
<td>12</td>
<td>2</td>
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<tr>
<td>1987</td>
<td>311</td>
<td>53</td>
<td>9</td>
<td>8</td>
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<tr>
<td>1987</td>
<td>75</td>
<td>49</td>
<td>7</td>
<td>1</td>
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<tr>
<td>1987</td>
<td>321</td>
<td>80</td>
<td>14</td>
<td>1</td>
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<tr>
<td>1987</td>
<td>105</td>
<td>55</td>
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<td>4</td>
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<tr>
<td>1993</td>
<td>297</td>
<td>27</td>
<td>11</td>
<td>2</td>
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</tbody>
</table>

*How conservatively can postoperative small bowel obstruction be treated?*  
SBO: Management

• Controversy: When to operate?
  – Most now advocate initial non-operative trial from 2 days to 5 days for partial SBO
  – 70-80% success rate
  – >85% resolve within first 48 hours
  – Complete SBO: 12-24 hours for resuscitation

Current management of small bowel obstruction
Diagnosing strangulation

• Early recognition of strangulation has always been controversial

• “Classic signs” of strangulation lack sensitivity and specificity
  – Continuous (vs. colicky) abdominal pain
  – Fever
  – Tachycardia
  – Peritoneal signs
  – Leukocytosis
Diagnosing strangulation

- Prospective study at Johns Hopkins
- 51 patients operated on for complete SBO
- 97 proposed discriminant parameters
  - Including “classic symptoms” which in retrospective reviews proved unreliable
- “Experienced clinical judgement”

Preoperative recognition of intestinal strangulation obstruction: Prospective evaluation of diagnostic capability

Diagnosing strangulation

• Defining strangulation intraoperatively
  – Discoloration
  – Nonpulsatile blood flow
  – Subserosal hemorrhage
  – Gross infarction

• Results
  – 42% (n=21) had evidence strangulation

Preoperative recognition of intestinal strangulation obstruction: Prospective evaluation of diagnostic capability

### DX strangulation: parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sens</th>
<th>Spec</th>
<th>NPV</th>
<th>PPV</th>
<th>Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous pain</td>
<td>27</td>
<td>91</td>
<td>65</td>
<td>67</td>
<td>65 (24/37)</td>
</tr>
<tr>
<td>Fever</td>
<td>24</td>
<td>70</td>
<td>57</td>
<td>36</td>
<td>51 (26/51)</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>52</td>
<td>43</td>
<td>57</td>
<td>39</td>
<td>47 (24/51)</td>
</tr>
<tr>
<td>Peritoneal signs</td>
<td>29</td>
<td>97</td>
<td>65</td>
<td>86</td>
<td>67 (33/49)</td>
</tr>
<tr>
<td>Leukocytosis</td>
<td>81</td>
<td>37</td>
<td>73</td>
<td>47</td>
<td>55 (28/51)</td>
</tr>
</tbody>
</table>

- Continuous pain seen in 2/22 without strangulation vs. 4/15 with strangulation
- Peritoneal signs seen in 1/29 without strangulation vs. 6/21 with strangulation

*Preoperative recognition of intestinal strangulation obstruction: Prospective evaluation of diagnostic capability*

“Experienced clinical judgement” preop detection of strangulation no better than chance alone

Of the 10 patients detected preop, 9 had advanced irreversible infarction

Of the 6 patients with reversible ischemia, only one patient recognized preop as having intestinal strangulation

Preoperative recognition of intestinal strangulation obstruction: Prospective evaluation of diagnostic capability

Diagnosing strangulation

• By the time clinical signs of strangulation developed to degree sufficient for preop recognition of ischemia, the process has already progressed to an irreversible stage

• Early recognition of intestinal strangulation does not appear to be feasible on conventional clinical grounds

Preoperative recognition of intestinal strangulation obstruction: Prospective evaluation of diagnostic capability

Role of CT scan

- 100 patients with suspected SBO
- CT criteria for strangulation
  - Bowel wall thickening
  - Target or halo sign
  - *Pneumatosis intestinalis*
  - Lack of enhancement of bowel wall
  - Blurring/haziness of mesentery

*Intestinal ischemia in patients in whom small bowel obstruction is suspected: Evaluation of accuracy, limitations, and clinical implications of CT in diagnosis*

Intestinal ischemia in patients in whom small bowel obstruction is suspected: Evaluation of accuracy, limitations, and clinical implications of CT in diagnosis

Role of CT scan

- Sensitivity: 83%
- Specificity: 93%
- Accuracy: 91%
- PPV: 79%
- NPV: 95%

Intestinal ischemia in patients in whom small bowel obstruction is suspected: Evaluation of accuracy, limitations, and clinical implications of CT in diagnosis

Role of CT scan

• Prospective study to evaluate value of CT in diagnosing ischemia

• Clinical or radiologic evidence suggestive of acute high grade SBO ➔
  Helical CT scan with IV contrast only

• 142 patients
  – 73 surgery
  – 71 treated conservatively

*Helical CT signs in the diagnosis of intestinal ischemia in small bowel obstruction*

Role of CT scan

• Signs
  – Reduced enhancement bowel wall
  – Mural thickening
  – Mesenteric fluid/ascites
  – Congestion of mesenteric veins

• Diagnosis of ischemia
  – Reduced enhancement of bowel wall
    or at least two other signs

*Helical CT signs in the diagnosis of intestinal ischemia in small bowel obstruction*

Role of CT scan

- CT diagnosis correct in 23 out of 24 patients with ischemia confirmed at surgery
  - 14 required bowel resection
  - One patient with negative CT findings: obese with artifact and noncontrast study

*Helical CT signs in the diagnosis of intestinal ischemia in small bowel obstruction*

# Role of CT scan

- **Sensitivity**: 96% (23/24)
- **Specificity**: 93% (111/120)
- **PPV**: 72% (23/32)
- **NPV**: 99% (111/112)

*Helical CT signs in the diagnosis of intestinal ischemia in small bowel obstruction*

## Role of CT scan

<table>
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<tr>
<th>CT sign</th>
<th>Ischemia (n=24)</th>
<th>Non-ischemia (n=120)</th>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
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<tr>
<td>Reduced enhancement bowel wall *</td>
<td>10</td>
<td>48</td>
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<td>Thickening bowel wall</td>
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<td>38</td>
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* IV contrast n=21

*Helical CT signs in the diagnosis of intestinal ischemia in small bowel obstruction*

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<td>26 22 %</td>
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<td>21 88 %</td>
<td>12 10 %</td>
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## Role of CT scan

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**Helical CT signs in the diagnosis of intestinal ischemia in small bowel obstruction**

*Zalcman et al. American Journal Radiology 2000*
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Zalcman et al. *American Journal Radiology 2000*
Analgesia and the acute abdomen

“If morphine be given, it is possible for a patient to die happy in the belief that he is on the road to recovery, and in some cases the medical attendant may for a time be induced to share the elusive hope.”

Early Diagnosis of the Acute Abdomen
Cope, 1979
Analgesia and the acute abdomen

• 288 randomized patients placebo vs. buprenorphine
• Evaluated by surgeon before and after narcotic

Analgesia and the acute abdomen

• Substantial placebo effect pain relief
  – 56% patients who received narcotic
  – 48% spontaneous relief

• Change in physical signs
  – No change in working diagnosis
  – 13% with narcotic
  – 14% with placebo

• No clear conclusions

*Analgesia in the acute abdomen.*

Analgesia and the acute abdomen

- 49 patients with “acute abdomen”
  - Acute abdominal pain by history
  - Peritoneal signs on examination
- Surgical consultation and plan formulated prior to enrollment in study
- Randomized to placebo, low-dose or high-dose morphine
- Serial abdominal exams

The use of analgesics in patients with acute abdominal pain.
Analgesia and the acute abdomen

- Significant change in patient’s subjective rating of pain
- No placebo effect

*The use of analgesics in patients with acute abdominal pain.*

# Analgesia and the acute abdomen

<table>
<thead>
<tr>
<th></th>
<th>Physical exam</th>
</tr>
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<tr>
<td></td>
<td>No change</td>
</tr>
<tr>
<td>High dose</td>
<td>(n=19)</td>
</tr>
<tr>
<td>Low dose</td>
<td>(n=13)</td>
</tr>
<tr>
<td>Placebo</td>
<td>(n=16)</td>
</tr>
</tbody>
</table>

- Half had significant alteration in physical exam: decreased tenderness or loss of rebound tenderness
- “No morbidity or delay in patient care”

*The use of analgesics in patients with acute abdominal pain.*

Analgesia and the acute abdomen

- No trial addresses safety of giving analgesia without surgeon’s direct/suspected knowledge
- Judicious use with surgeon’s direct knowledge is likely safe

Critically reappraising the literature-driven practice of analgesia administration for acute abdominal pain in the emergency room prior to surgical evaluation