Current management of an acute abdomen, risk scores, contraindications to intervention, benefits of intervention and postoperative care

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Learning Outcomes for Today

• Appreciate the impact of a laparotomy on a patient

• Changes in surgical management of the acute abdomen

• Understand the role of scoring systems to predict surgical outcome
Overview

• The Stress of Surgery

• Current Situation in UK

• Experience in Oxford

• What are scoring systems and how do we use them

• Impact of Frailty

• Surgery and surgical conditions in patients with end-of-life conditions

The changing face of surgery
The changing face of surgery

• Improved anaesthetic techniques

• Improved medical care

• Ageing population

• Improved surgical techniques

• Patient Expectation

The Stress of Surgery

Stress response to surgery

Post-operative sequelae
Stress Response to Surgery / Sepsis / Trauma

• Stress response is an evolutionary protective mechanism in the response to trauma and to mobilize stored body fuels

• Local mediators trigger endocrine and acute phase responses and activate the sympathetic nervous system

• Cytokine production reflects degree of tissue trauma

Acute Phase Response

• Stimulated by cytokines

• Fever
• Granulocytosis
• Increased production of acute phase proteins

• Act as inflammatory mediators and are essential in tissue repair
Endocrine Response

• Increase glucose metabolism and production with central utilization

• Protein Breakdown in particular skeletal muscle

• Increase in water and salt reabsorption

The Stress of Surgery
Reducing the Stress Response to surgery

Opioid use can limited endocrine response

Regional Technique: Can prevent endocrine and metabolic response
Reduce Thromboembolic complications
Improve pulmonary function
Possibly improve gut function

Reducing the Stress Response to surgery

What do you mean "left leg"?
Minimally invasive surgery

- Proven benefit in reducing
  - Post-operative pain
  - Length of stay
  - Morbidity and Mortality

- Faster return to normal function

- Role is limited in emergency setting
Post-operative sequelae

- Basal Atelectasis
- Chest Infection
- Thrombo-embolic event (20-50%)
- Delirium
- CVA (15%)
- Nausea and Vomiting (50%)
- Arrhythmia
- MI (7%)
- Acute Kidney Injury
- UTI
- Urinary Retention (10%)
- Anastomotic leak (2-10%)
- Ileus (25%)
- Wound Infection (10-20%)

**Enhanced Recovery**

- Early mobilization
- Judicious use of IV fluids
- Early return to normal diet
- Decreased use of opioid medication with greater use of wound infusion
- Reduction in length of stay and quicker return to normal activity
How does this impact on patient outcomes?

- The National Emergency Laparotomy Audit was started in 2013
- Studies showed this is one of the most risky types of emergency operation
- Lives could be saved and quality of life for survivors enhanced by measuring and improving the care delivered.
5th NELA report; 24,328 patients

- NELA Database now 160,000 patients in total
- 5th Report published December 2019

National Emergency Laparotomy Audit

- 24,328 patients were entered into the audit, from 179 hospitals in England and Wales
- 45.5% assessed as high-risk with a NELA predicted mortality risk of ≥5%
- 51% Female, 49% Male
- 49% required surgery within six hours
- 94% have emergency laparotomy after an emergency admission to hospital
- Over 70: 45% ≥70 years, median age 67
Experience in Oxford

• SEU made up of 6 consultants with UGI/HPB and LGI special interests

• Supported by Elective colleagues

• Based at John Radcliffe

• Tertiary referral centre for the region

• Major trauma centre

Experience in Oxford

• 9034 Attendances to SEU with 2934 admissions

• 1253 patients over 65 years

• In 2018 - 276 laparotomies with a mean LOS of 13 days
Mortality: National

Report findings at a glance

- 19.2 days hospital stay as compared to 16 days in 2018.
- 77% of patients had a preoperative assessment of risk.
- 95% of high-risk patients had a consultant surgical input before surgery.
- 88.5% of patients received a preoperative CT scan.
- 61% of these patients had the scan reviewed by a consultant radiologist.
- 84% of patients with sepsis received antibiotics within one hour.
- 94% of patients had a formal assessment of their frailty.
- 55% over 65.
- 301 people with learning disabilities or autism had an emergency laparotomy and their 30-day mortality was 10.3%. They were more likely to receive consultant care and access to critical care.

Graph showing 30-day mortality rate from 2013 to 2018 with peak in 2016 at 18.5%.

NELA
National Emergency Laparotomy Audit

90-day mortality: 13%
Scoring systems

• Predict mortality and morbidity

• Categorise risk to tailor post-operative care
• Inform decision making with patient and family
• Guiding decision on surgery

• Don’t predict recovery and level of function

Scoring systems

• ASA
• APACHE II
• P-POSSUM
• NELA Risk Tool
ASA

1. Healthy Patient
2. Mild systemic disease
3. Severe systemic disease
4. Severe systemic disease that is a constant threat to life
5. Moribund

E - denotes emergency

APACHE II

Good predictor of mortality
score of 0-21 mean of 5 in survivors Vs. 15-38, mean of 23 in patients who died
Table 1 – APACHE II scoring system for outcome in emergency general surgery or laparotomy.

<table>
<thead>
<tr>
<th>Year</th>
<th>Patient Category</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>Perforated peptic ulcer</td>
<td>APACHE II scoring system accurately identified patients according to risk [26]</td>
</tr>
<tr>
<td>1997</td>
<td>Perforated and strangulated enterocolitis</td>
<td>Combination of the APACHE II and the SAP provides the best scoring system [28]</td>
</tr>
<tr>
<td>2007</td>
<td>Perforated enterocolitis due to bowel ischemia or perforation</td>
<td>APACHE II scoring system can be used to assess group outcomes in patients with perforation due to bowel ischemia [27]</td>
</tr>
<tr>
<td>2007</td>
<td>General surgical patients</td>
<td>M-PENNSIM is more accurate than POSSUM and APACHE II in predicting postoperative morbidity and mortality [28]</td>
</tr>
<tr>
<td>2007</td>
<td>Perforated peptic ulcer</td>
<td>Compared to the APACHE II &amp; III and the simplified acute physiology score II, the mortality probability model (MPM) II predicted mortality at admission better [29]</td>
</tr>
<tr>
<td>2010</td>
<td>Patients with perforation</td>
<td>APACHE II is accurate in predicting mortality but has a lower advantage and is therefore more useful [30]</td>
</tr>
<tr>
<td>2010</td>
<td>Generalized secondary peritonitis</td>
<td>Independent mortality predictors were APACHE II &gt; 16 [31]</td>
</tr>
<tr>
<td>2011</td>
<td>Obstructing colon cancer</td>
<td>APACHE II score ≥ 15 was a prognostic factor for poor outcome [32]</td>
</tr>
<tr>
<td>2011</td>
<td>Perforation peritonitis</td>
<td>APACHE II is superior in prediction of the outcome as compared to SAP II, TIPS score, MOD, TISS-28 and MBI [30]</td>
</tr>
<tr>
<td>2011</td>
<td>Afflicted patients that have ongoing infection and would need reintervention</td>
<td>All weighted scoring systems (APACHE-II score, SAP-II, M-MRS, POSSUM score, and the acute part of the APACHE-II score) were unreliable predictors of the outcome, some predicted need for laparotomy [34]</td>
</tr>
<tr>
<td>2012</td>
<td>Secondary peritonitis or colorectal surgery in patients laparotomy</td>
<td>APACHE II scores might be helpful in predicting the need for reoperation [35]</td>
</tr>
<tr>
<td>2013</td>
<td>Perforated peptic ulcer</td>
<td>APACHE II has been shown to predict outcome well also for IPV patients [36]</td>
</tr>
<tr>
<td>2014</td>
<td>Patients of aneuarterial region and treated with planned laparotomy</td>
<td>APACHE II scoring system is reliable for prediction of mortality [37]</td>
</tr>
<tr>
<td>2015</td>
<td>Obstetric injury performance</td>
<td>Both POSSUM and APACHE II scores were superior to ASA score in risk prediction [38]</td>
</tr>
</tbody>
</table>

Nag D, Biomedicine. 2015: 5(4); 7-16

P-POSSUM

<table>
<thead>
<tr>
<th>POSSUM score</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiological parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>&lt;60</td>
<td>61-70</td>
<td>≥71</td>
<td></td>
</tr>
<tr>
<td>Cardiac signs</td>
<td>Normal</td>
<td>Cardiac dysrythmias</td>
<td>Edema/Varicomegaly</td>
<td>Respiratory Cardiomyopathy</td>
</tr>
<tr>
<td>C5R</td>
<td>Normal</td>
<td>Normal TK</td>
<td>Normal SOB rest</td>
<td>Raised JVP Cardiomegaly</td>
</tr>
<tr>
<td>Respiratory signs</td>
<td>Normal</td>
<td>SOB ; ced</td>
<td>SOB ; sighs</td>
<td>SOB</td>
</tr>
<tr>
<td>CXR</td>
<td>Normal</td>
<td>Pulmonary edema</td>
<td>Respiratory edema</td>
<td>Any other signs</td>
</tr>
<tr>
<td>Syncope BP (mmHg)</td>
<td>110-130</td>
<td>100-109</td>
<td>90-99</td>
<td>&lt;90</td>
</tr>
<tr>
<td>Pulse rate</td>
<td>80-90</td>
<td>81-100</td>
<td>91-120</td>
<td>&gt;120</td>
</tr>
<tr>
<td>GCS</td>
<td>15</td>
<td>14-15</td>
<td>13-14</td>
<td>&lt;13</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td>13-16</td>
<td>11.5-12.9</td>
<td>10-11.4</td>
<td>≥10.4</td>
</tr>
<tr>
<td>WBC x 10^3/l</td>
<td>4-10</td>
<td>10-20</td>
<td>≥20.1</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Urea</td>
<td>≤7.5</td>
<td>7.5-10</td>
<td>10-15</td>
<td>&gt;15</td>
</tr>
<tr>
<td>K+</td>
<td>≤3.5</td>
<td>3.5-3.8</td>
<td>3.8-4.2</td>
<td>&gt;4.2</td>
</tr>
<tr>
<td>ECG abnormality</td>
<td>Normal</td>
<td>AF (100-400)</td>
<td>Any other sign</td>
<td></td>
</tr>
<tr>
<td>Operative parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operative margin</td>
<td>Minor</td>
<td>Intermediate</td>
<td>Major</td>
<td>Major+</td>
</tr>
<tr>
<td>No. of operations within 30 days</td>
<td>1</td>
<td>2</td>
<td>&gt;2</td>
<td></td>
</tr>
<tr>
<td>Blood loss per operation (ml)</td>
<td>&lt;100</td>
<td>100-500</td>
<td>500-999</td>
<td>&gt;1000</td>
</tr>
<tr>
<td>Peritoneal contamination</td>
<td>No</td>
<td>Serosal</td>
<td>Local pus</td>
<td>Free bowel contents, pus or blood</td>
</tr>
<tr>
<td>Presence of malignancy</td>
<td>No</td>
<td>Primary cancer only</td>
<td>Nodal metastases</td>
<td>Distant metastases</td>
</tr>
<tr>
<td>Timing of operation</td>
<td>Elective</td>
<td>Emergency resection possible operation &lt;2 h</td>
<td>Emergency, immediate operation &gt;2 h</td>
<td></td>
</tr>
</tbody>
</table>
Limitation to the P-Possum

- Patient with a strangulated hernia
- P-Possum mortality of 3.6%

- However he had alcoholic liver disease
- Child-Pugh C
  - Surgical mortality of 81%
  - 1-3 year life expectancy
Ideal scoring system

• Easy to calculate
• Accurate in its prediction
• Reproducible across geographical locations
• Allow surgical audit and assess change of quality improvement

Indications for Emergency Laparotomy

![Graph showing indications for emergency laparotomy by NELA year]
Indications for Emergency Laparotomy

Antibiotics in Suspected Sepsis

- 10,947 (45%) of patients undergoing emergency laparotomy had signs of sepsis, approximately half of which had generalised peritonitis.
- 31% of patients with sepsis are not cared for in a critical care environment following surgery.

Only 19% of patients with suspected sepsis received antibiotics in the internationally recommended first hour. This has not improved over time, and is a key area of improvement that must be addressed.

Median time to antibiotics = 3.5 hours in patients with suspected sepsis on admission

80% patients with sepsis required immediate or urgent surgery; 84% of these arrived in theatres in appropriate time frame
Damage Control Surgery

Strategy
Originally described in the context of exsanguinating abdominal trauma

The completeness of operative repair is sacrificed in order to limit physiological deterioration

More likely to die from physiological failure rather than failure to complete the definitive operation

Damage Control Surgery
The Lethal Triad

ACIDOSIS

DEATH

HYPOTHERMIA

COAGULOPATHY

4 Stages of Damage Control Surgery

1. Decision to perform DCS
2. The Operation
3. ICU Resuscitation
4. Retook +/- definitive surgery
Outcomes following DCS

• Reduced mortality compared to definitive surgery
• Possible reduced stoma formation
• Not without its complications

- Fasciae Dehiscence 9-25%
- Enteric Fistula 2-25%
- Abdominal Compartment Syndrome 10-40%
- Intra-abdominal Abscesses 83%

Elderly patients and frailty - National

Table 8.1 Proportion of patients by age assessed by a geriatrician

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Total number of patients in age group [n]</th>
<th>Proportion of patients assessed by a geriatrician</th>
</tr>
</thead>
<tbody>
<tr>
<td>70–79</td>
<td>6,162</td>
<td>19.1%</td>
</tr>
<tr>
<td>80–89</td>
<td>4,200</td>
<td>26%</td>
</tr>
<tr>
<td>≥90</td>
<td>516</td>
<td>33.9%</td>
</tr>
<tr>
<td>Overall</td>
<td>10,878</td>
<td>22.5%</td>
</tr>
</tbody>
</table>
Mortality and LoS – National (patients over 65)

Figure 8.3. Comparison of 30-day mortality in two groups of patients over time: patients over the age of 65 years and patients under the age of 65 years.

Mortality and LoS – National (patients over 65)

Figure 8.2. Postoperative length of stay in patients surviving to hospital discharge, by patient age.
19% of patients over the age of 65 underwent a frailty assessment, and 50.8% of patients who had a frailty assessment met the criteria for frailty syndrome.

Frailty was associated with increased mortality, regardless of patients age.

If found to be frail and aged over 70 years, 30-day mortality was 23.4% compared to 14.5% if not frail.

### Table 8.3 Year 5 data to describe the proportion of patients over the age of 70 years who had a frailty assessment and risk adjusted mortality

<table>
<thead>
<tr>
<th>Frailty assessment result</th>
<th>Number of patients in total</th>
<th>30-day mortality</th>
<th>90-day mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not frail</td>
<td>1,790</td>
<td>5.1%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Frail</td>
<td>1,476</td>
<td>27.7%</td>
<td>28.1%</td>
</tr>
<tr>
<td>Unknown/missing</td>
<td>186</td>
<td>13.3%</td>
<td>22%</td>
</tr>
</tbody>
</table>

What does NHS England mean by frailty?

- **A long-term condition characterised by lost biological reserves across multiple systems and vulnerability to decompensation after a stressor event**
Assessment of Frailty

- Frailty Phenotype
- Deficit Accumulation Model
- Assessment is difficult

Timed Up and Go Test (TUGT)

Greater than 10 seconds to complete TUGT suggests frailty

www.england.nhs.uk
Electronic Frailty Index

The electronic frailty index (eFI) uses the existing information within the electronic primary health care record to identify populations of people aged 65 and over who may be living with varying degrees of frailty.


eFI Risk Prediction

The eFI is presented as a score (e.g. if 9 deficits are present out of a possible total of 36 the FI score = 0.25)

Higher scores indicate increasing frailty and greater risk of adverse outcomes

<table>
<thead>
<tr>
<th>1 year outcome</th>
<th>Mild (0.13 – 0.24)</th>
<th>Moderate (0.25 – 0.36)</th>
<th>Severe (&gt;0.36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>1.92</td>
<td>3.1</td>
<td>4.52</td>
</tr>
<tr>
<td>Hospitalisation</td>
<td>1.93</td>
<td>3.04</td>
<td>4.73</td>
</tr>
<tr>
<td>Nursing Home admission</td>
<td>1.89</td>
<td>3.19</td>
<td>4.76</td>
</tr>
</tbody>
</table>
Rockwood Clinical Frailty Score

Box 1: The CSHA Clinical Frailty Scale

1. Very fit — robust, active, energetic, well motivated and fit; these people commonly exercise regularly and are in the most fit group for their age
2. Well — without active disease, but less fit than people in category 1
3. Well with treated comorbid disease — disease symptoms are well controlled compared with those in category 4
4. Apparently vulnerable — although not frailly dependent, these people commonly complain of being “slowed up” or have disease symptoms
5. Mildly frail — with limited dependence on others for instrumental activities of daily living
6. Moderately frail — help is needed with both instrumental and non-instrumental activities of daily living
7. Severely frail — completely dependent on others for the activities of daily living, or terminally ill

Note: CSHA = Canadian Study of Health and Aging.


In Hospital Risk Prediction

- Severe frailty adversely impacts mortality in acute care

- Severe frailty, acute illness, delirium and dementia all lead to longer LOS

Age and Ageing. 2018; 47: 242-248
BMC Geriatrics. 2017; 17:2
BMC Geriatrics. 2016. 16:117
Clinical frailty adds to acute illness severity in predicting mortality in hospitalized older adults: An observational study

Roman Romero-Ortuno, Stephen Wallis, Richard Bram, Victoria Keevil

Department of Medicine for the Elderly, Addenbrooke's Hospital, Cambridge, United Kingdom
Clinical Genomics Unit, Department of Public Health and Primary Care, University of Cambridge, United Kingdom

Fig. 1: Hazard function for patterns 1–4

CFS categories:
- Mild
- Moderate
- Severe
- Very severe

LOS (days)

Cum. Hazard

0.0 0.1 0.2 0.3 0.4 0.5 0.6

03/03/2020

27
Assessment before Emergency Surgery

- Patients over 65 undergoing an emergency laparotomy
- Multicentred and recruited 934 patients
Surgical Management of Malignant Bowel Obstruction

- Up to 15% of cancer patients globally effected by MBO \(^{(1)}\)
  - 50% in ovarian cancer, 29% in colorectal cancer \(^{(1, 2)}\)
- Median survival after surgery 7 months \(^{(1)}\); 30 day mortality 6-32% \(^{(3)}\)
  - Greater survival from resection and primary anastomosis (7.2 months) vs. defunctioning stoma (3.4 months) and enteral bypass (2.7 months) \(^{(4)}\)
- QoL outcomes following surgery from a meta-analysis \(^{(3)}\):
  - 45-75% able to resume oral intake
  - 34-75% able to be discharged
  - Recurrent obstruction 6-47%
  - Readmission 38-74%
  - Remaining life consumed by surgical recovery e.g. long-term hospitalisation 11-61%
- Spontaneous resolution occurs in 30% within 8 days of diagnosis without any intervention \(^{(1)}\)
Surgical Management of Malignant Bowel Obstruction

- Poor prognostic factors
  - Age: mortality OR 1.85 for each 10 year interval after 65 years (1)
  - Deficient nutritional status and hypoalbuminaemia: mortality is 3 fold (1)
  - Advanced disease (1, 2)
  - General decline e.g. reduced performance status (1, 2)
  - Persistent ascites (1, 2, 5)

- The aim always has to be to improve the QUALITY of life

Surgical Management of Malignant Bowel Obstruction

REFERENCES:


Assessment of Patient for Emergency laparotomy

Predict need for increased level of care after surgery

Risk stratification

Predicted outcome of disease and its treatment

Decision made in best interest of patient

Conclusion

• Laparotomy is a significant stress on the body

• Good anaesthetic and surgical care can improve outcomes

• The right patient selection is key and frailty scoring may assist in this

• Surgical pathology may be an end of life event and surgery may not be the answer
Why is this important?
PRISMA - 7

• **PRISMA 7 Self-completed questionnaire**
  • 1. Are you more than 85 years?
  • 2. Male?
  • 3. In general do you have any health problems that require you to limit your activities?
  • 4. Do you need someone to help you on a regular basis?
  • 5. In general do you have any health problems that require you to stay at home?
  • 6. In case of need can you count on someone close to you?
  • 7. Do you regularly use a stick, walker or wheelchair to get about?

• **3 or more YES answers suggests frailty requiring further assessment**