BURST ABDOMEN

B SINGH
KING EDWARD VIII HOSPITAL
PRETORIA CONTROVERSIES MEETING
4th October 2013
BURST ABDOMEN

Partial or complete separation of an abdominal wound with protrusion (evisceration) of abdominal contents

- Wound dehiscence & incisional hernia are part of the same wound failure process
- Distinguished by timing and healing of overlying skin

“PARTIAL’ - separation of fascial edges without evisceration
  - loose fascial sutures
  - occasionally, fibrin covered intestinal loops

“COMPLETE” - full separation of fascia & skin
  - intestinal loops (if not glued by fibrin) eviscerated

BURST ABDOMEN = ABDOMINAL DEHISCENCE
BURST ABDOMEN

Major complication despite significant advances in pre-operative and operative care in 21st century

Incidence largely unchanged since 1940’s*

- before 1940’s: 0.4% (0.24 – 3%): >71,000 incisions
- 1950 -1984: 0.59% (0.24 – 5.8%): >320,000 incisions
- 1985: 1.2% - 18,333 incisions
- 1990 – 1992: 2% - 599 incisions #

Current documented incidence = 0.2 – 6% with mortality 10 – 40%

- more complex surgeries
- ageing populations

Clinical manifestations

- Evident day 7 – 14
- May develop without warning, following straining or removal of sutures
- May be preceded by a sero-sanguineous discharge

“Commonly, dehiscence of the abdomen represents a spontaneous decompression of infra-abdominal hypertension and thus could be defined as a ‘beneficial’ complication”

Schein’s Common Sense Emergency Abdominal Surgery. Springer 2005; Ch 47:Pg 414
**Pre-operative risk factors**

- Sex - M:F = 2:1
- Age - <45 = 1.3% vs > 45 = 5.4%
- Emergency surgery – maybe related to haemodynamic instability
- Obesity - not a significant association!
- Diabetes – well controlled not at risk!
- Renal failure – probably due to uraemia induced malnutrition
- Jaundice - probably due to malnutrition associated to biliary obstruction
- Anaemia – not a consistent factor!
- Malnutrition – protein, Vit C & zinc deficiency
- Corticosterioids – topical or systemic

- Van Ramshorst et al World J Surg 2010
- Afzal S, Bashir MM. Annals 2008; 14: 110 -115
Operative risk factors

- Incision type
  - midline at greater risk than transverse

- Closure
  - mass closure equivalent or better than layered
  - interrupted vs continuous no difference!
  - variants of interrupted do not improve outcome
    (Figure of 8, “far-near-near-far”)
  - peritoneal closure not necessary

- Suture material
  - no difference between slowly absorbable and non-absorbable suture
  - monofilament non-absorbable advocated in at risk patient

- Suture technique
Post operative risk factors

- Elevated intra-abdominal pressure
  - coughing
  - vomiting
  - ileus
  - urinary retention
- Intra abdominal sepsis
- Wound infection
- Radiation therapy
- Anti-neoplastic therapy

References:
- Van Ramshorst el al World J Surg 2010
- Afzal S, Bashir MM. Annal 2008; 14: 110
Webster Risk Index (point values)

- CVA with no residual deficit 4
- history of COPD 4
- current pneumonia 4
- emergency procedure 6
- operative time greater than 2.5 hr 2
- PGY 4 level resident as surgeon 3
- clean wound classification -3
- superficial, or deep wound infection 5→17
- failure to wean from the ventilator 6
- one or more complications other than dehiscence 7
- return to OR during admission -11

# Scores of 11-14 are predictive of 5% risk
# Scores of >14 predict 10% risk

Webster C et al. Prognostic models of abdominal wound dehiscence after laparotomy. 

CRITICIZED FOR LACK OF VALIDATION

- Identify independent risk factors for AWD & to develop a risk model to recognize high-risk
- 20 year study period - 363 AWD analyzed
- Major independent risk factors defined

### Risk Score for AWD

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>RISK SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGE CATEGORY</strong></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>0.4</td>
</tr>
<tr>
<td>50-59</td>
<td>0.9</td>
</tr>
<tr>
<td>60-69</td>
<td>0.9</td>
</tr>
<tr>
<td>&gt;70</td>
<td><strong>1.1</strong></td>
</tr>
<tr>
<td><strong>Male Gender</strong></td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Chronic Pulmonary Disease</strong></td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Ascites</strong></td>
<td><strong>1.5</strong></td>
</tr>
<tr>
<td><strong>Jaundice</strong></td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Anaemia</strong></td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Emergency Surgery</strong></td>
<td>0.6</td>
</tr>
<tr>
<td><strong>TYPES OF SURGERY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Biliary</strong></td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Oesophagus</strong></td>
<td><strong>1.5</strong></td>
</tr>
<tr>
<td><strong>Gastroduodenal</strong></td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Small Bowel</strong></td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Large Bowel</strong></td>
<td><strong>1.4</strong></td>
</tr>
<tr>
<td><strong>Vascular</strong></td>
<td><strong>1.3</strong></td>
</tr>
<tr>
<td><strong>Coughing</strong></td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Wound Infection</strong></td>
<td>1.9</td>
</tr>
</tbody>
</table>

### RISK SCORE vs. PROBABILITY (%)

<table>
<thead>
<tr>
<th>RISK SCORE</th>
<th>PROBABILITY (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2</td>
<td>0.1</td>
</tr>
<tr>
<td>2 - 4</td>
<td>0.7</td>
</tr>
<tr>
<td>4 – 6</td>
<td>5.5</td>
</tr>
<tr>
<td>6 – 8</td>
<td>26.2</td>
</tr>
<tr>
<td>&gt; 8</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Risk scores for AWD Score 0 - 10.6

**VALIDATED RISK MODEL SHOWED HIGH PREDICTIVE VALUE FOR AWD**
• Value of risk scoring systems – POSSUM, APACHE etc

• Evaluation of surgical competence
  ▪ risk judgement
  ▪ intra-operative decision making
  ▪ situation awareness
  ▪ judgemental ability

• HIV/AIDS?
Data regarding surgical morbidity and mortality largely predates availability of HAART

Few prospective studies

*In the HAART era, generally good outcomes have been reported

- Most important risk factor for post-op complications is ASA class (measure general health status)
- HIV (+) not independent risk factor


“AIDS patients with more advanced disease, low CD4 (<100) or poor performance status are at increased risk for poor wound healing”

Horberg MA et al. Surgical outcomes in human immunodeficiency virus-infected patients in the era of highly active antiretroviral therapy. Arch Surg 2006;141(12):1238-45
WOUND HEALING IN HIV POSITIVE

RISK FACTORS

- ASA risk classification
- CD4 <100 cell/mm³
- CD4 percentage of lymphocyte population <18
- Pre to post-operative change in percent CD4 of 3 is independent risk factor *
- Viral load > than 10 000 copies/ml

“Fascial dehiscence” (FD) after trauma laparotomy is associated with technical failure, wound sepsis, IAI
- The majority of trauma patients with FD have IAI
- The association of IAI with FD is inadequately evaluated
- Confirming IAI is essential to guide clinical diagnosis and management
- FD should be viewed as a sign of possible underlying IAI
- Imaging or direct visualization of the entire abdominal cavity mandatory before managing the dehisced fascia
With IAI, the fatal factor leading to high mortality is not the dehiscence itself but an inappropriate emergency procedure to correct it.

**INTRA-ABDOMINAL HYPERTENSION**

**ADVERSE EFFECT ON CVS, RESPIRATORY, RENAL AND INTESTINAL FUNCTION**

**MULTIORGAN DYSFUNCTION SYNDROME**

**RATIONALE FOR TEMPORARY ABDOMINAL CLOSURE**
“Forewarned, forearmed; to be prepared is half the victory”

Miguel de Cervantes

*Don Quixote* - cited as arguably the "best literary work ever written"
Preventive strategies - Finding the Best Abdominal Closure

“…an optimal technique involves mass closure, incorporating all of the layers of the abdominal wall (except skin) as 1 structure, in a simple running technique, using #1 or #2 absorbable monofilament suture material with a suture length to wound length ratio of 4 to 1”

Finding the Best Abdominal Closure: An Evidence-based Review of the Literature

Adil Ceydeli, James Rucinski, and Leslie Wise

CURRENT SURGERY 2005; 62: 220-225
Several preventive strategies

- Smead-Jones technique (1941)
- "May/Mary closure"
- Retention sutures
- “Interrupted X-suture”
- TI, TIE and TIES incisions
- Far-and-near double horizontal mattress

............. and more!

Practice driven by institutional bias & tradition, prompted by anecdotes
BURST ABDOMEN

Retention sutures

Far-and-near double horizontal mattress

3L Bag – ‘planned hernia’
BURST ABDOMEN: MANAGEMENT

Preventive & responding strategies

Interrupted Smead-Jones sutures with non-absorbable suture material for closure of linea alba combined with mass closure in high risk laparotomies

- 36 patients: 20 (55.55%) intra-abdominal sepsis
  - 8 (22.22%) trauma
  - 7 (19.44%) cancer
  - 1 (2.77%) vascular aetiology
- 1 (2.77%) had “partial” wound dehiscence
- 1 (2.77%) developed incisional hernia
- Wound infection was noted in 12 (33.33%) cases
- 4 (11.11%) experienced pain over the subcutaneous palpable knots
- 3 (8.33%) developed sinus due to the knots
- Average follow-up period was 12.47+7.17 months

Prophylactic retention sutures in midline laparotomy in high-risk patients for wound dehiscence: a randomized controlled trial.

Khorgami Z et al.
J Surg Res 2013 Apr;180(2):238-43

302 high-risk patients with at least 2 risk factors for dehiscence

- Prophylactic retention sutures reduce the occurrence of WD
- No ‘remarkable postoperative complications’
Conservative management options
- saline-soaked gauze dressings
- negative pressure wound therapy

Operative management options – a farrago
- temporary closure options (open abdomen treatment)
- primary closure with various suture techniques
- closure with application of relaxing incisions
- synthetic (non-absorbable and absorbable) & biological meshes
- tissue flaps

“Randomized controlled clinical trials needed to provide a greater level of evidence for the optimal treatment strategy” *

Outcome to re-suture of burst abdomen

- 78 patients re-sutures – followed for 1 year
- Comparison of 5 different surgical techniques for closure of burst abdomen and later development of incisional hernia
- Over 40% incisional hernias
- No significant differences in the incidence of incisional hernias when continuous and interrupted techniques compared
- Retention sutures do not reduce the incidence of incisional hernias

Gislason H, Viste A. Closure of burst abdomen after major gastrointestinal operations – comparison of different surgical techniques and later development of incisional hernia.


- No comment on role of temporary closure options
- Distinction between “complete” and “partial” dehiscence not made
27 studies identified, reporting at least one surgical outcome in at least 10 patients with burst abdomen

Relevant surgical outcome include

- recurrence
- incisional hernia
- mortality

No prospective studies

Range of conservative and operative therapies

Treatment associated with “unsatisfactory” surgical outcome

“Randomized controlled clinical trials needed to provide a greater level of evidence for the optimal treatment strategy”

van Ramshorst GH et al. Therapeutic alternatives for burst abdomen
Surg Technol Int 2010; 10: 111-9

Management prompted by institutional bias, tradition & anecdotes
BURST ABDOMEN: SUGGESTED ALGORITHM

PATIENT AT RISK

NON-SEPTIC

SEPTIC

OPEN ABDOMEN

RETENTION SUTURES

BURST ABDOMEN

‘COMPLETE’
evisceration
IAS*

‘PARTIAL’
fascial separation
technical factors
superficial sepsis

CONSERVATIVE

? RE-SUTURE

* intra-abdominal sepsis
With the widespread understanding of IAP and its management, the issue of burst abdomen may well be relegated to the surgical archives!

A REQUIEM FOR THE BURST ABDOMEN?
A systematic outcome analysis associated with different surgical techniques is absent

Management is based on institutional, sometimes individual experiences, rather than on scientific evidence

In “open abdomen’ era incidence may be decreased

“A PLANNED HERNIA IS MUCH BETTER TOLERATED THAN FASCIAL DEHISCENCE!”
Schein’s Common Sense Emergency Abdominal Surgery. Springer 2005:Pg 559

BUTS BRINGS ALONG OTHER CHALLENGES

SURGICAL NOUS, INSIGHT, EXPERIENCE PARAMOUNT