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

** Carlson MA. Acute wound failure. Surg Clin North America 1997; 77:667-636*

 # Gislason H el. Burst abdomen and incisional hernia after major gastrointestinal operations—comparison of three closure techniques. Eur J Surg 1995 May;161(5):349-54.

BURST ABDOMEN

Clinical manifestations

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

RISKS FACTORS

Pre-operative
Operative
Post-operative

"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

BURST ABDOMEN

❖ 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 defiency
- Corticosterioids – topical or systemic

- *Van Ramshorst el al World J Surg 2010*
- *Makela et al Am J Surg 1995; 170: 387-90*
- *Afzal S, Bashir MM. Annals 2008; 14: 110 -115*

BURST ABDOMEN

❖ 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

BURST ABDOMEN

❖Post operative risk factors

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

- *Van Ramshorst el al World J Surg 2010*
- *Makela et al Am J Surg 1995; 170: 387-90*
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BURST ABDOMEN: PROGNOSTIC MODELS FOR DEHISCENCE

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. J Surg Res 2003 Feb;109(2):130-7

CRITICIZED FOR LACK OF VALIDATION

VARIABLE	RISK SCORE
AGE CATEGORY	
40-49	0.4
50-59	0.9
60-69	0.9
>70	**1.1**
Male Gender	0.7
Chronic Pulmonary Disease	0.7
Ascites	**1.5**
Jaundice	0.5
Anaemia	0.7
Emergency Surgery	0.6
TYPES OF SURGERY	
Biliary	0.7
Oesophagus	**1.5**
Gastroduodenal	1.4
Small Bowel	0.9
Large Bowel	**1.4**
Vascular	**1.3**
Coughing	**1.4**
Wound Infection	**1.9**

Risk scores for AWD Score 0 - 10.6

Van Ramshorst GH, Nieuwenhuizen J et al. Abdominal wound dehiscence in adults: development and validation of a risk model. *World J Surg 2010 Jan;34(1):20-7*

- 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	PROBABILITY (%)
0 – 2	**0.1**
2 - 4	0.7
4 – 6	5.5
6 – 8	26.2
> 8	**66.5**

VALIDATED RISK MODEL SHOWED HIGH PREDICTIVE VALUE FOR AWD

BURST ABDOMEN

- Value of risk scoring systems – POSSUM, APACHE *etc*
- Evaluation of surgical competence
  - risk judgement
  - intra-operative decision making
  - situation awareness
  - judgemental ability
- HIV/AIDS?

WOUND HEALING IN HIV POSITIVE & 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

*Jones S et al. Is HIV infection a risk factor for complications of surgery? Mt Sinai J Med 2002 Oct;69(5):329-33

"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 <100cell/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

* **Tran HS et al. Predictors of operative outcome in patients with human immunodeficiency virus infection and acquired immunodeficiency syndrome. Am J Surg 2000;180(3):228-33**

BURST ABDOMEN

Intra abdominal abscess (IAI) & burst abdomen*

- "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

* *Tillou A et al. Fascial dehiscence after trauma laparotomy: a sign of intra-abdominal sepsis. Am Surg 2003 Nov;69(11):927-9*

BURST ABDOMEN

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

BURST ABDOMEN

"Forewarned, forearmed; to be prepared is half the victory"

Miguel de Cervantes

Don Quixote - cited as arguably the "best literary work ever written"

BURST ABDOMEN:MANAGEMENT

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

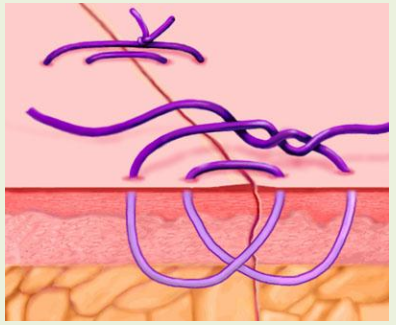
CURRENT SURGERY 2005; 62: 220-225

BURST ABDOMEN:MANAGEMENT

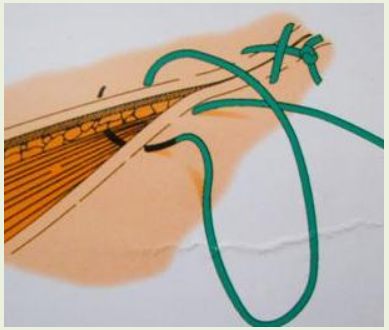
Several preventive strategies

- 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!



Smead-Jones

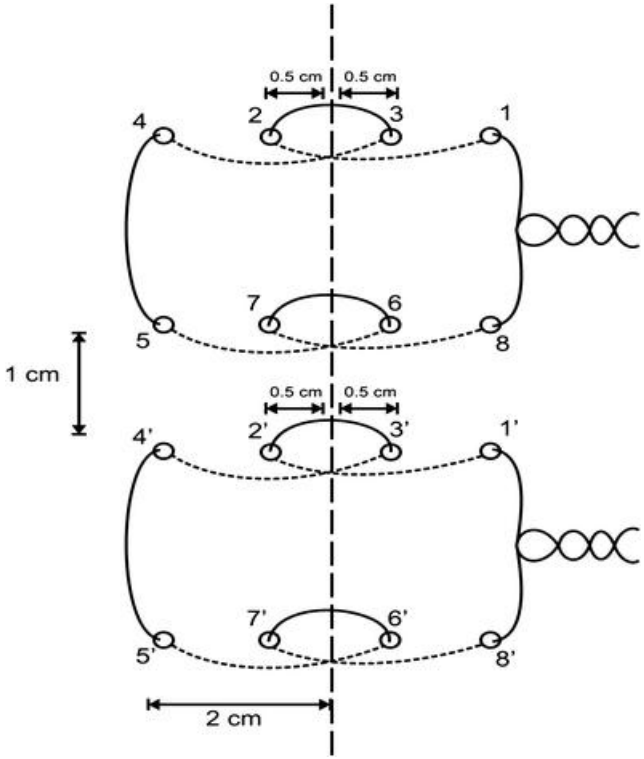


Interrupted X suture

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

Murtaza B et al. Modified midline abdominal wound closure technique in complicated/high risk laparotomies. J Coll Physicians Surg Pak 2010;20(1):37-41

BURST ABDOMEN:MANAGEMENT

Preventive & responding strategies

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”

BURST ABDOMEN: MANAGEMENT

- 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" **

*van Ramshorst GH el. Therapeutic alternatives for burst abdomen. Surg Technol Int 2010;19: 111-19

BURST ABDOMEN:MANAGEMENT

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.

Eur J Surg 1999;165(10):958-61

- **No comment on role of temporary closure options**
- **Distinction between "complete" and "partial" dehiscence not made**

BURST ABDOMEN:MANAGEMENT

Outcome to re-suture of burst abdomen

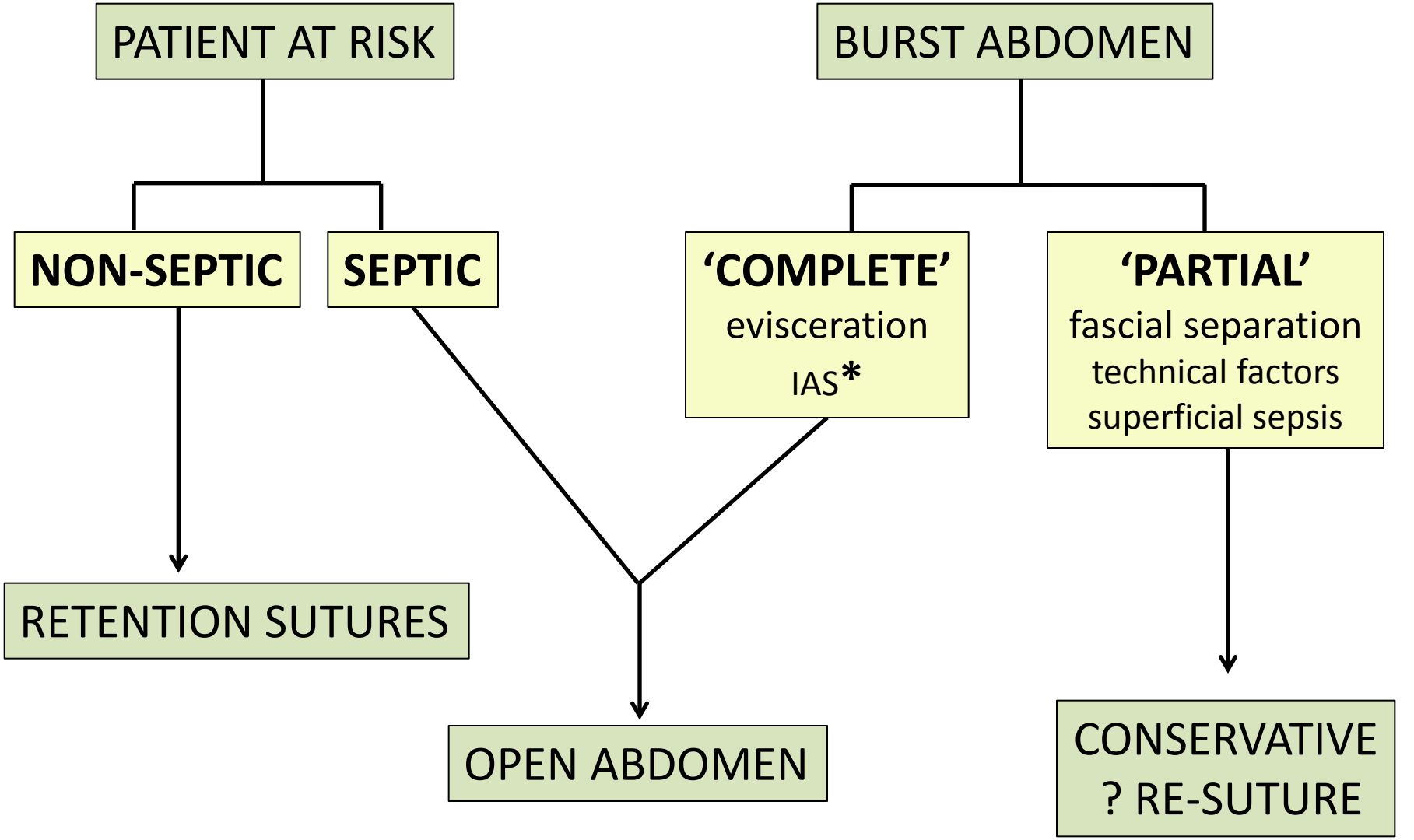
- 27 studies identified, reporting at least one **surgical outcome** in at least 10 patients with burst abdomen
- Relevant **surgical outcome** include
  - recurrence
  - incisional hernia
  - mortality
- No prospective studies
- Range of conservative and operative therapies
- Treatment associated with “unsatisfactory” surgical outcome

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

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

Management prompted by institutional bias, tradition & anecdotes

BURST ABDOMEN: SUGGESTED ALGORITHM



*intra-abdominal sepsis

BURST ABDOMEN

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?

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