



## Laparotomy for organ evisceration from abdominal stab wounds: A South African experience

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### ABSTRACT

**Introduction:** Organ evisceration following abdominal stab wound (SW) is currently considered as an absolute indication for mandatory laparotomy due to the high incidence of associated intra-abdominal injuries, but literature describing the spectrum of organ injury encountered is limited.

**Materials and methods:** We reviewed our experience of 301 consecutive patients who were subjected to mandatory laparotomy over an eight-year period at a major trauma centre in South Africa.

**Results:** Of the 301 patients with organ evisceration, 92% were male (mean age: 28 years). Ninety per cent (270/301) of the laparotomies were positive (85% (229/270) therapeutic, 15% (41/270) non-therapeutic). The frequencies of eviscerated organs were small bowel (70%), large bowel (26%), and stomach 3%. Three (1%) patients had combined evisceration of more than one of the above organs. The most commonly injured organs were small bowel and large bowel. The mean length of hospital stay was nine days. Seven patients required intensive care admission. The morbidity rate was 21% and mortality was 2%.

**Conclusions:** The spectrum of injury associated with abdominal SW with organ evisceration is similar to smaller published series. Multiple organ injuries are common. The most commonly eviscerated organs were small bowel, large bowel and stomach, while the most commonly injured organs were small bowel and large bowel.

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### Introduction

Organ evisceration following an abdominal stab wound (SW) is an absolute indication for surgical exploration as the eviscerated organs require cleaning, reeducation and repair, which can only be achieved under general anaesthesia at formal laparotomy [1,2]. Despite the dramatic nature of the presentation, the literature on the topic is limited and there are very few large, published series on this particular injury. In addition, in most western European centres, this condition is relatively rare and most of the experience with this injury emanates from developing countries such as South Africa which have a high burden of penetrating trauma. Historically, the lack of any formal registries in most South African trauma centres has hampered the ongoing temporal collection of data. The introduction of a Hybrid Electronic Medical Registry (HEMR) in our trauma centre has allowed accumulation of a large

trauma data set over extended periods of time. This has allowed us to focus on reviewing our experience in specific types of injury. In light of this, we set out to review our contemporary experience with patients who presented with an organ evisceration following abdominal SW to the anterior abdomen. Our aim was to describe the spectrum of injury encountered, to review the outcomes, and to establish whether mandatory laparotomy remains the standard of care in this specific group of patients.

### Materials and methods

#### Clinical setting

The study was based at the Pietermaritzburg Metropolitan Trauma Service (PMTS), Pietermaritzburg, South Africa. The PMTS provides definitive trauma care to the city of Pietermaritzburg, the capital of KwaZulu-Natal (KZN) province. PMTS is the largest academic trauma centre in western KZN and is the tertiary trauma referral centre covering a total catchment population of over three million people. Each year, approximately 4000 trauma cases are admitted to the PMTS with 50% of these due to penetrating trauma.

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This is reflective of the high incidence of interpersonal violence and criminal activities throughout the province. The proportion of penetrating trauma is relatively high in comparison to many centres in western Europe and the volume managed is comparable to centres of similar size in the United States [3,4].

## Management

All patients presenting with organ evisceration following an abdominal SW were resuscitated according to Advanced Trauma Life Support (ATLS) principles. The eviscerated organ was wrapped in sterile, transparent, non-adhesive plastic dressing and patients were then expedited to the operating room (OR). They were then subjected to a midline laparotomy at which the eviscerated organs are cleaned, inspected and reduced. Where possible, all injuries were repaired and the eviscerated organs were placed in an anatomically appropriate position in the abdominal cavity. All other concurrent injuries were sought and managed accordingly.

## The study

The PMTS maintains a formal, regional trauma registry known as the Hybrid Electronic Medical Registry (HEMR). All patients who present to our trauma centre are prospectively entered into the database, and the information entered includes details regarding injury mechanism, operative intervention, patient progress and clinical outcomes. Ethics approval for the maintenance of this registry for both clinical care and research has been formally endorsed by the Biomedical Research Ethics Committee (BREC) of the University of KwaZulu-Natal (UKZN). The number is BCA 221/13. Where applicable, formal consent from patients for the use of clinical photographs pertaining to this study was obtained.

This was a retrospective review of a prospectively maintained database. All patients who presented with abdominal SW with concurrent organ evisceration over the eight years from January 2010 to January 2018 were identified from the database and reviewed. At our institution, all patients who present with organ evisceration (e.g. small bowel) following a SW to the abdomen are subjected to mandatory laparotomy regardless of physical signs or haemodynamic status. Fig. 1 demonstrates a typical example of small bowel evisceration following a SW to the anterior abdomen. Fig. 2 is an example of colonic evisceration following an abdominal SW. Patients with isolated omental evisceration are managed by a selective non-operative approach (SNOM) as for any other patient

with abdominal SW after the omentum is ligated and amputated in the resuscitation room. These patients were excluded.

## Definitions

The following definitions are used in this paper:

- A *positive laparotomy* was one at which an organ injury was identified.
- A *negative laparotomy* was one where no injuries were identified.
- A *positive 'therapeutic' laparotomy* was defined as one at which an organ injury mandating repair was identified.
- A *positive 'non-therapeutic' laparotomy* was defined as a laparotomy which identified an injury which did not require operative repair and which, if undetected, would have been unlikely to result in significant morbidity. Examples include minor splenic or liver lacerations, non-bleeding serosal or mesenteric injuries.
- The spectrum of injuries was classified according to the frequency of the injury, the individual organ involved, and the operative procedure performed.
- *Primary repair* denotes simple closure of a defect. *Organ-sparing procedures* involve either simple packing or application of haemostatic agents.

## Statistical analysis

All relevant data were extracted and initially summarised onto an EXCEL<sup>®</sup> spreadsheet for review. Non-parametric (asymmetrical) data were descriptively described. All statistical analysis was performed using SPSS version 19 (IBM Corp. Released 2010. IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp.).

## Results

### Demographics

During the eight-year period, a total of 301 patients underwent mandatory laparotomy after presenting with organ evisceration following a SW to the anterior abdomen. Ninety-two per cent (278/301) were male and the mean age was 28 years (IQR: 22–33). The mean physiological parameters on admission were: heart rate: 95/min, systolic pressure: 110/min, temperature: 37°C.



Fig. 1. Isolated small bowel evisceration following abdominal SW.



Fig. 2. Isolated colonic evisceration following abdominal SW.

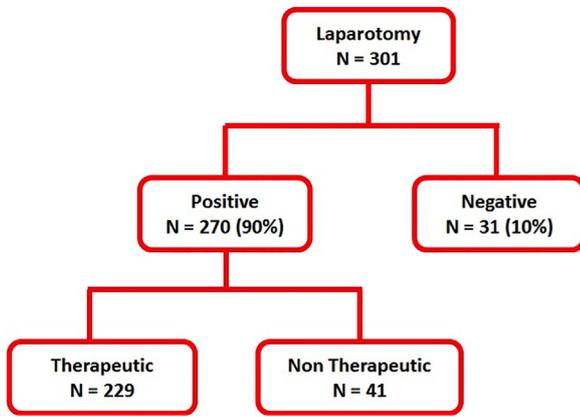


Fig. 3. Laparotomy findings in 301 patients.

*Laparotomy findings*

Of the 301 patients who underwent laparotomy, 90% (270/301) were positive and 10% (31/301) were negative. Of the 270 positive laparotomies, 85% (229/270) were therapeutic and the remaining 15% (41/270) were non-therapeutic. The laparotomy findings of the 301 patients are summarised in Fig. 3. The operative procedures performed for all organ injuries are tabulated in Table 1.

*Spectrum of organ injuries*

Of the 301 laparotomies performed, 70% (210/301) were for eviscerated small bowel, 26% (72/201) were for eviscerated colon and 3% (10/301) were for eviscerated stomach. Three (1%) patients had combined eviscerations of the above.

A total of 428 injuries were identified. The spectrum of organ injured is summarised in Fig. 4.

*Morbidity and mortality*

The overall morbidity was 21%. Forty patients developed wound sepsis, 17 developed pneumonia, eight developed renal failure and two developed other complications, seven per cent (9/301) required intensive care unit admission. The mean length of

**Table 1**  
Operative procedures performed for all organ injuries.

Organ	N = 428	Procedures	N = 428
Small Bowel	157	Primary Repair	120
		Resection	34
		Exteriorisation	3
Large Bowel	75	Primary Repair	59
		Resection	11
		Exteriorisation	5
Mesentery	52	Primary Repair	47
		Ligation	5
Stomach	34	Primary Repair	34
Liver	32	Drainage	30
		Packing	2
Diaphragm	16	Primary Repair	16
Pancreas	12	Drainage	7
		Distal Pancreatectomy	5
		Organ-Sparing Procedure	9
Kidney	12	Nephrectomy	3
		Splenectomy	5
		Organ-Sparing Procedure	6
Duodenum	8	Primary Repair	8
Gallbladder	6	Cholecystectomy	6
Ureter	5	Primary Repair	5
Vascular	5	Ligation	3
		Primary Repair	2
Bladder	3	Primary Repair	3

hospital stay was nine days. Six of the 301 (2%) patients died: One had associated intra-abdominal vascular injury and exsanguinated in the OR prior to vascular control being obtained. Two died from Adult Respiratory Distress Syndrome (ARDS). Two died from Multi-Organ Failure (MOF). One had a cardiac arrest post-operatively and autopsy confirmed a massive pulmonary embolism.

**Discussion**

The management of a patient presenting with an organ evisceration following an abdominal SW is complex. Although their presentation is often dramatic, resuscitation must follow ATLS principles. Mandatory laparotomy is indicated and the patient should be expedited to the operating room without delay. The eviscerated organ requires protection whilst the patient is being transferred to the operating room. If the eviscerated organ is left

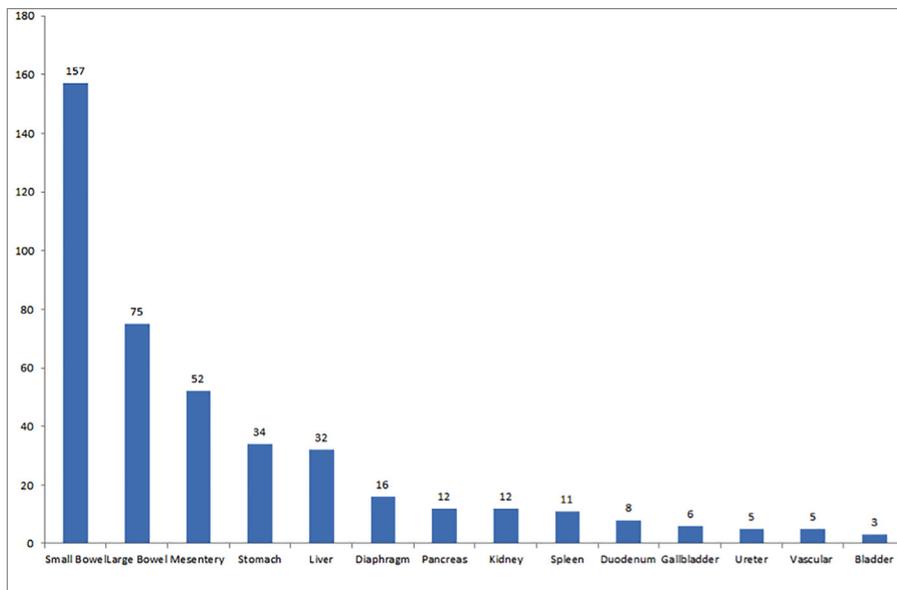


Fig. 4. The spectrum of organ injuries identified in 301 patients.

hanging at a sharp angle, blood supply may be compromised and the exposed viscera may potentially become ischaemic. If necessary, the wound through which the organ has eviscerated may be widened slightly to prevent blood supply and drainage of the eviscerated organ becoming constricted. This is especially important as there will be swelling of the structures caught in the defect and, if unnoticed, this may lead to dramatic constriction of the blood supply. The viscera must, however, not be returned to the abdominal cavity in the emergency department as this will exacerbate intra-abdominal contamination. Exposed viscera must be protected and not allowed to desiccate, especially if there is a prolonged delay in reaching the operating room. In our experience, wrapping the exposed viscera in non-adhesive plastic (e.g. cling film) provides a safe and effective means of achieving this.

Although selective non-operative management of abdominal SWs is now widely accepted, [5–7,12] organ evisceration following an abdominal SW has remained an indication for mandatory laparotomy [5,8–12]. Riley from our parent institution at King Edward VIII Hospital in Durban published the first South African series in 1987 [12]. Our results are similar. Our current study continues to support mandatory laparotomy, as there was a 90% positive laparotomy rate in this cohort. Of these positive laparotomies, 85% were therapeutic. Even in the small group of non-therapeutic procedures, the eviscerated organs require reduction back into the abdominal cavity in order to be placed in an anatomically appropriate position. This is almost impossible to achieve without the full exposure provided by a formal midline laparotomy under general anaesthesia. To our knowledge, our current study is the largest published series to date on this specific injury.

The technological developments of the last thirty years include imaging techniques such as [Focussed Assessment with Sonography for Trauma](#) (FAST), Computed Tomography (CT) and laparoscopy. None of these modalities appear to offer much to this cohort of patients and imaging of the abdomen is by and large superfluous [11]. Laparoscopy is especially difficult to justify as the viscera would need to be returned to the abdominal cavity first, and the abdominal defect closed prior to inducing a pneumo-peritoneum. In our opinion, this is completely inappropriate and has no place in the management of this type of injury. Our data support the continued use of our traditional management algorithm that is largely based on clinical assessment for this group of patients. Operative exploration must be methodical and one must not be distracted by the dramatic nature of evisceration. Furthermore, operative strategy should be directed at identifying other concurrent injuries and these may be subtle.

## Conflict of interest

No authors have any conflict of interest or funding to declare. Victor Kong, Damian Clarke, John Bruce and Grant Laing are all current ATLS instructors.

## Conclusions

Organ evisceration following abdominal SW remains an absolute indication for mandatory laparotomy. Our current study continues to support this approach, as significant intra-abdominal injuries were identified in the vast majority of cases. The most commonly eviscerated organs were stomach, small bowel and large bowel. Multiple organ injuries were often encountered and the most commonly injured organs were small bowel and large bowel.

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