

CASE REPORT

Suprapubic penetrating abdominal trauma - defining peritoneal breach and choices in operative intervention

Michael J. Papanikolas*, Anik Sarkar, Shivanthi Kandiah, and Navin Niles

Department of Surgery, Liverpool Hospital, Elizabeth Street, Liverpool, NSW, Australia

* Correspondence address. Department of Surgery, Liverpool Hospital, Corner of Elizabeth and Goulburn St, Liverpool 2170, NSW, Australia.

Tel: +61-417-002-327; Fax No: +61 2 87386318. E-mail: mj_pap@hotmail.com

Abstract

Penetrating abdominal trauma is an uncommon cause of presentation to emergency departments in Australia and is frequently associated with the clinical need for emergent operative intervention. Advances in imaging modalities, improved laparoscopic techniques and structured approaches to resuscitation in trauma have now allowed potential minimally invasive management of such injuries, avoiding laparotomy and therefore defining peritoneal breach; the major determinant of intra-abdominal organ injury in this setting is critical. We present the case of a self-inflicted stab injury to the suprapubic region in an otherwise healthy man and describe the combination of imaging and operative modalities used to define peritoneal breach in this case which successfully reduced the patient's morbidity by avoiding non-therapeutic laparotomy.

INTRODUCTION

Defining peritoneal breach in patients with penetrating abdominal trauma can be difficult as reliance on clinical examination and imaging alone may not be sufficient in all cases, and progressing directly to laparotomy is associated with a high risk of non-therapeutic intervention. We present the case of a self-inflicted stab wound to the suprapubic region, using a combination of imaging and operative techniques to define the breach and avoid non-therapeutic laparotomy.

CASE REPORT

A 67-year-old male presented to the emergency department with an alleged self-inflicted stab wound to his suprapubic region, having been found alone in a public toilet by a passer-by surrounded by an unknown volume of blood. Past medical history

included a coronary artery bypass graft on aspirin, depression and benign prostatic hypertrophy. He described stabbing himself with a knife as a method of alleviating protracted rectal pain.

He was managed according to Emergency Management of Severe Trauma (EMST) guidelines, with initial treatment based on resuscitation from expected blood loss. His haemodynamic measurements were within the normal range throughout his transfer and resuscitation. Physical examination revealed a patient in acute pain and a knife, directed in an infero-posterior direction in the midline of the abdomen, 1–2 cm inferior to the intertubercular plane [1], surrounded by a clot and an expanding haematoma of the mons pubis (Fig. 1). Despite being generally blood-soaked, no blood was expressible from the urethral meatus. No other penetrating injuries were identified. Biochemistry revealed lactate of 4.7 mmol/l, normal pH and creatinine, a white cell count $9.9 \times 10^9/l$ and haemoglobin

All authors are in agreement with the content of the manuscript.

Consent for the report has been granted by the patient.

The manuscript has not been published previously and is not under consideration elsewhere.

Received: July 29, 2019. Accepted: October 13, 2019

Published by Oxford University Press and JSCR Publishing Ltd. All rights reserved. © The Author(s) 2019.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com



Figure 1: Photograph of the stab wound displaying the infero-posteriorly directed knife and surrounding haematoma of the mons pubis. Bruising can be seen extending to the penis.

140 g/l. An extended focussed ultrasound in trauma (eFAST) was performed, which showed no abdominal free fluid. The knife was left in situ and stabilised with a bolster of combine dressings and tape.

After discussion with urology, a 14Fr indwelling catheter was inserted, which drained yellow urine. A computed tomography (CT) mesenteric angiogram demonstrated penetrating injury to the suprapubic region with haematoma and two foci of arterial extravasation with radiological evidence of peritoneal breach, and the metallic foreign body in situ (Figs 2 and 3). Importantly, the tip of the knife appeared to end at the base of the penis at the expected confluence of the dorsal vein.

He underwent an urgent exploratory laparoscopy which showed no evidence of peritoneal defect and no intra-abdominal blood. The knife was removed and placed in a sealed bag at police request. The wound was extended transversely and explored, defining a cavity extending to the pubic symphysis with active bleeding from rectus muscle controlled with diathermy. The cavity was debrided and irrigated, and FLOSEAL was applied. The wound was closed primarily. He had a postoperative haemoglobin of 124 g/l, and an uncomplicated admission, and he was referred to Psychiatry for ongoing management.

DISCUSSION

Penetrating abdominal injuries are an uncommon cause of trauma presentation in New South Wales, representing 1.1% of all-cause trauma admissions with self-harm representing 3.4% of all mechanisms, with a high associated case fatality rate for those severely injured (8.2% of trauma-related deaths) [2]. The management of penetrating abdominal injuries



Figure 2: Suprapubic stab wound: sagittal section: CT mesenteric angiogram showing knife directed in infero-posterior direction abutting but not traversing the peritoneum. Active arterial contrast extravasation can be seen. The tip of the knife abuts the root of the penis.



Figure 3: Suprapubic stab wound: coronal section: CT mesenteric angiogram showing mons pubis haematoma with active arterial extravasation.

with radiological evidence of intra-abdominal free fluid and haemodynamic instability has been well defined in the EMST guidelines; however, there is a subset of false-negative eFAST scans, who may also have a negative CT but still have an intra-abdominal injury or peritoneal breach. A recent retrospective review of haemodynamically stable patients with penetrating abdominal trauma found that 25% had intra-operative findings despite a negative CT scan [3]. CT tractography may define peritoneal breach better than conventional CT; however, its high rate of false negatives limits its use [4]. Evidence in this cohort is therefore lacking, and local protocols exist, which direct

towards non-operative management, wound exploration alone, laparoscopy, laparotomy or a combination of these methods.

In our trauma referral hospital, in patients with negative imaging and the absence of haemodynamic instability, our preferred method is a diagnostic laparoscopy to first define the presence of intra-abdominal injury and peritoneal breach. This reflects recent literature suggesting that diagnostic laparoscopy may be considered a tool to evaluate for peritoneal injury and reducing non-therapeutic laparotomies in haemodynamically stable patients [5–8]. Rates of non-therapeutic laparotomy as high as 25% have been described [9]. Progression to laparotomy would then be both injury severity and surgeon dependent, as the operation may be completed successfully via laparoscopy. A recent Australian review highlighted that peritoneal breach alone as an indicator for laparotomy is associated with a moderate incidence of non-therapeutic laparotomy [10]. Our approach intends to reduce the rate of non-therapeutic laparotomy, which increases patient morbidity in both the short- and long-term through postoperative pain, ileus, wound infection, bowel injury, small bowel obstruction and hernia risk.

CONCLUSION

We have described a case of self-inflicted penetrating lower abdominal injury that despite being extra-peritoneal, has highlighted the importance of a protocolled approach to trauma patients to objectively define their injury and to tailor their operative intervention thereby reducing their iatrogenic morbidity.

CONFLICT OF INTEREST

There are no conflicts of interest to declare.

REFERENCES

1. RMH MM. *Last's Anatomy: Regional and Applied*, 9th Edition—Revised Reprint. Australia: Churchill Livingstone, 2003.
2. NSW Agency for Clinical Innovation. *Major Trauma in NSW: 2016–17*. Sydney: ACI, 2018.
3. Patel S, Balabyeki M, Koto ZM. The correlation of CT scan in the management of penetrating abdominal injuries. *S Afr J Surg* 2017;**55**:81–2.
4. Sarici IS, Kalayci MU. Is computed tomography tractography reliable in patients with anterior abdominal stab wounds? *Am J Emerg Med* 2018;**36**:1405–9.
5. Como JJ, Bokhari F, Chiu WC, Duane TM, Holevar MR, Tandoh MA, et al. Practice management guidelines for selective non-operative management of penetrating abdominal trauma. *J Trauma* 2010;**68**:721–33.
6. Siddharth BR, Keerthi MSS, Naidu SB, Venkanna M. Penetrating injuries to the abdomen: a single institutional experience with review of literature. *Indian J Surg* 2017;**79**:196–200.
7. Koto MZ, Matsevych OY, Aldous C. Diagnostic laparoscopy for trauma: how not to miss injuries. *J Laparoendosc Adv Surg Tech A* 2018;**28**:506–13.
8. Bain K, Meytes V, Chang GC, Timoney MF. Laparoscopy in penetrating abdominal trauma is safe and effective alternative to laparotomy. *Surg Endosc* 2019;**33**:1618–25.
9. Schmelzer TM, Mostafa G, Gunter OL Jr, Norton HJ, Sing RF. Evaluation of selective treatment of penetrating abdominal trauma. *J Surg Educ* 2008;**65**:340–5.
10. Cocco AM, Bhagvan S, Bouffler C, Hsu J. Diagnostic laparoscopy in penetrating abdominal trauma. *ANZ J Surg* 2019;**89**:353–6.