

# A case of selective non-operative management of penetrating gunshot wound injury of the liver and kidney in a pregnant patient

Y Squires, G L Laing, J L Bruce, G V Oosthuizen, D L Clarke

Pietermaritzburg Metropolitan Trauma Service, Department of Surgery, Nelson R Mandela School of Medicine, University of KwaZulu-Natal

*Corresponding author:* DL Clarke ([damianclar@gmail.com](mailto:damianclar@gmail.com))

This case report focuses on the application of selective non operative management (SNOM) of penetrating abdominal trauma in a complex patient who was also pregnant at the time of injury. It goes on to contextualize SNOM in terms of its historical evolution as a strategy in South Africa and its appropriate safe application in the pregnant patient.

S Afr J Surg 2015;53(3&4)

Although the selective non-operative management (SNOM) of penetrating abdominal trauma (PAT) is widely accepted as a management strategy, it is usually reserved for stab wounds (SWs).<sup>1</sup> Muckart was the first to report on the application of SNOM to abdominal gunshot wounds (GSWs).<sup>2</sup> This report describes the successful SNOM of a pregnant woman who sustained an abdominal GSW. A twenty-five year-old lady, who was twenty-seven weeks pregnant presented to our institution six hours after sustaining a single thoraco-abdominal GSW. She complained of abdominal pain and had not felt any fetal movements since the event. Clinical examination revealed an entry and exit wound: the former overlying the right hemithorax in the plane of the anterior axillary line at the level of the 5th intercostal space, and the latter in the left paraspinal region at the level of the ninth thoracic vertebra. The patient was normotensive but tachycardic. A right intercostal drain (ICD) had been inserted at the referring hospital and 700 ml of blood had drained. Clinical examination of the abdomen elicited focal right upper quadrant (RUQ) tenderness. Her symphysis-fundal height (SFH) was in keeping with the aforementioned gestational age. Frank hematuria was noted draining from her transurethral catheter. Obstetric examination excluded the presence of vaginal bleeding and the cervical os was closed. There was no audible fetal heartbeat. In light of her clinical condition she underwent a thoracic and abdominal computed tomography (CT) scan, which demonstrated a missile tract through the lung, an American Association for the Surgery of Trauma (AAST) grade IV liver injury and an AAST grade III right renal injury. A sonogram confirmed the absence of a fetal heartbeat.

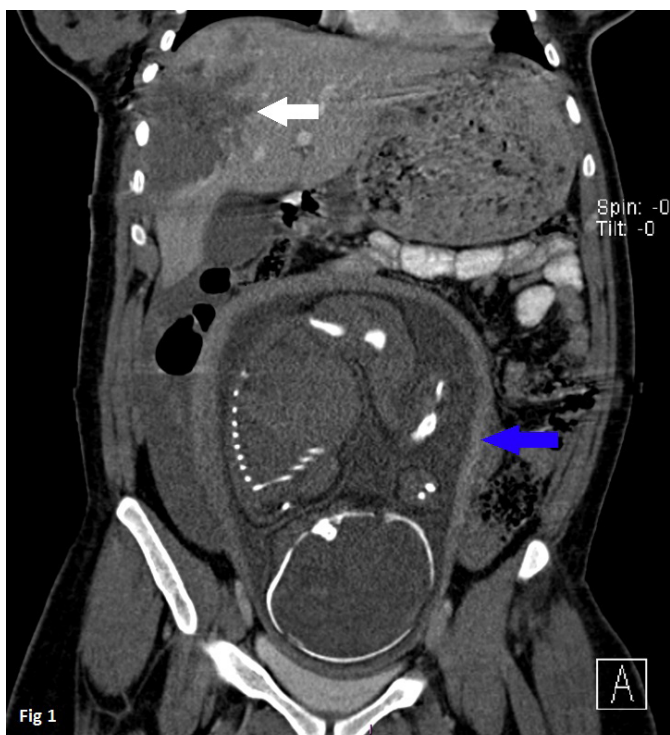
Considering the absence of a clinical or radiographic indication for emergency laparotomy, the patient was selected for a trial of SNOM. She was admitted to the intensive care unit (ICU) for dynamic monitoring, analgesia and 4 hourly

abdominal examinations. The haemo-pneumothorax resolved with intercostal drainage. A low-volume fistula developed at the site of the exit-wound. Laboratory analysis confirmed that this fluid was urine. This fistula resolved spontaneously within 5 days. Feeds were commenced 48 hours following admission to ICU. Five days following her admission the patient went into spontaneous labor and delivered a 1.9 kg stillbirth. Follow up abdominal ultrasound (US) scans were performed on day two and day eight and showed resolving liver and kidney lacerations with no intra-abdominal fluid collections. She was discharged after twelve days and was well on follow up three months later.

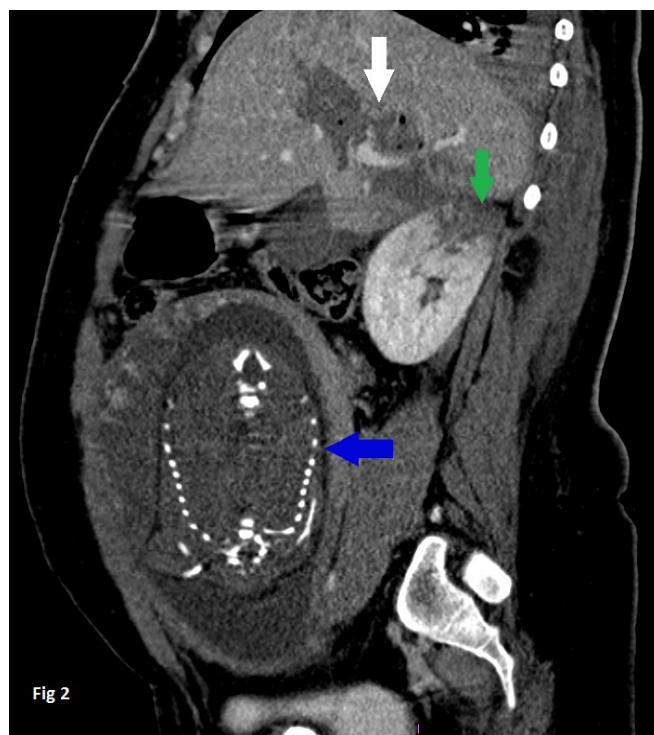
## Discussion

The management of the pregnant trauma patient poses unique diagnostic and treatment challenges as the physiological and anatomical changes associated with pregnancy and the need to preserve fetal well-being result in a number of nuances in the standard resuscitation algorithms. The dictum of aggressive resuscitation of the mother is the best way to resuscitate the fetus is a good one and the management of penetrating abdominal trauma in pregnancy must follow the principles of management that have been established in non-pregnant patients.

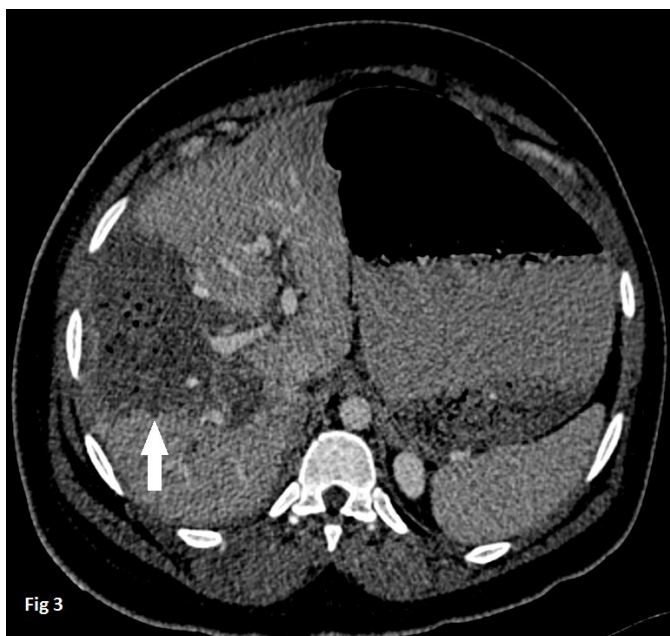
Muckart was the first to publish on the SNOM of abdominal GSWs. At the time CT scan was not widely available, yet he had good results with a policy based on thorough clinical examination.<sup>2</sup> Of a total cohort of 111 patients, 22 (20%) were managed conservatively, and none required delayed laparotomy. Since this time there have been several reports from both South African and American trauma centers on the successful application of the SNOM of abdominal GSWs.<sup>3-8</sup>



*Fig. 1. Coronal CT image.  
White Arrow: AAST Grade 4 liver injury.  
Blue Arrow: foetal corpse within uterus.*



*Fig. 2. Sagittal CT image.  
White Arrow: AAST 4 liver injury with entrained air and branch of portal vein associated with tract.  
Green Arrow: AAST 3 renal injury.  
Blue Arrow: foetal corpse within uterus.*



*Fig. 3. Axial CT image. White Arrow: AAST grade 4 hepatic injury, with entrained air and branch of portal vein associated with tract.*

A number of recent articles have focused specifically on the selective non operative management of penetrating renal and liver injuries. CT scan has now become an essential component of the management of these patients.<sup>5-8</sup> CT scan defines the injury accurately, identifies the presence of free air and other signs of hollow visceral injury as well as signs of significant arterial injury, which may result in a secondary bleed. Once a CT scan has been obtained ongoing clinical observation is essential to detect signs of deterioration, which would imply failed non-operative management and mandate operative exploration. The use of follow up US in this patient was dictated by pragmatic reasons and as the patient continued to make a steady clinical improvement we were satisfied that US was adequate in this particular patient.

This case supports the safety of SNOM of abdominal GSWs. Appropriate patient selection in combination with good clinical assessment by experienced staff and use of suitable diagnostic tools and investigation enables successful outcomes with conservative management.

#### REFERENCES

1. Muckart DJ, Abdool-Carrim AT, King B. Selective conservative management of abdominal gunshot wounds: a prospective study. *Br J Surg.* 1990 Jun;77(6):652-5.
2. Clarke DL, Thomson SR, Madiba TE, Muckart DJ. Selective conservatism in trauma management: a South African contribution. *World J Surg* 2005;29:962-5.

3. Demetriades D, Charalambides D, Lakhoo M, Pantanowitz D. Gunshot wound of the abdomen: role of selective conservative management. *Br J Surg.* 1991 Feb;78(2):220-2.
4. Renz BM, Feliciano DV. Gunshot wounds to the right thoracoabdomen: a prospective study of non-operative management. *J Trauma.* 1994 Nov;37(5):737-44.
5. Moolman C, Navsaria PH, Lazarus J, Pontin A, Nicol AJ. Non-Operative management of penetrating kidney injuries: a prospective audit. *J Urol.* 2012 Jul;188(1):169-73. doi: 10.1016/j.juro.2012.03.009. Epub 2012 May 15.
6. Navsaria PH, Nicol AJ, Krige JE, Edu S. Selective nonoperative management of liver gunshot injuries. *Ann Surg.* 2009 Apr;249(4):653-6. Doi10.1097/SLA.0b013e31819ed98d.
7. Navsaria PH, Nicol AJ. Selective nonoperative management of kidney gunshot injuries. *World J Surg.* 2009 Mar;33(3):553-7. doi: 10.1007/s00268-008-9888-y.
8. Velmahos GC, Constantinou C, Tillou A, Brown CV, Salim A, Demetriades D. Abdominal Computed Tomographic Scan for Patients with Gunshot Wounds to the Abdomen Selected for Nonoperative Management. *Journal of Trauma-Injury Infection & Critical Care*:Nov 2005; vol 59 (5) - pp 1155-1161