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CASE REPORT

Complex Multiorgan Penetrating Abdominal Trauma During Gaza conflict – A Case Report

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Abstract

Penetrating abdominal trauma can be a complex challenge for clinicians and requires concurrent resuscitation and urgent decision-making, particularly in war settings with limited medical resources. We report the case of a 32-year-old female who sustained a penetrating abdominal injury during the Gaza conflict, resulting in severe intra-abdominal injuries, including a grade I liver capsular injury, near-complete gastric transection, Grade V splenic injury, left renal cortical laceration with active bleeding, and multiple large bowel injuries with complete laceration of the duodenojejunal junction. She arrived hemodynamically unstable with signs of peritonitis, necessitating an emergent laparotomy. A retained 6 cm tank machine gun bullet was identified behind the liver. Due to resource limitations, ICU admission and full damage control protocols were not feasible. Postoperative complications included delayed renal hemorrhage requiring embolization, which could not be performed due to lack of interventional radiology. Despite these challenges, the patient was stabilized and discharged. This case highlights the challenges of managing complex abdominal trauma in war zones, emphasizing the need for adaptability when standard trauma protocols cannot be applied.

Keywords: Penetrating abdominal trauma, Multiorgan injury, Gaza conflict, Splenic rupture, Stomach transection, Jejunal laceration, Kidney cortical injury.

INTRODUCTION

In war, approximately 20% of penetrating abdominal injuries occur among battlefield casualties. Around 50% of these casualties die almost immediately from bleeding [2]. Moreover, penetrating abdominal trauma poses serious challenges for the healthcare team and necessitates simultaneous decision-making and resuscitation [1].

Abdominal penetrating injury patients must be transferred to a major trauma setting as soon as possible. As evidence shows, the centralization of trauma services plays a crucial role in decreasing morbidity and

mortality rates [1].

All patients must be managed using the <C> ABCD approach, intravenous antibiotics, and analgesia and be kept nil by mouth if surgery is indicated. The management of penetrating abdominal injuries can be divided into damage control surgery (DCS), definitive surgical management (DSM), and selective non-operative management (SNOM) [1].

We report a case of a 32-year-old hemodynamically unstable female who presented with penetrating abdominal injuries with a 6 cm tank machine gun bullet during the recent Gaza conflict, resulting in massive intra-abdominal injuries including grade 1liver capsular injury, near-complete gastric transection, grade V splenic injury, left renal cortical laceration with active bleeding, and multiple large bowel injuries and complete laceration of the Doudenojejunal junction. The case was managed under extremely challenging conditions due to severe limitations in medical resources, including lack of medical instruments, medications, sterile environments, healthcare personnel, and ICU capacity. Additionally, the medical team faced significant challenges in making critical, life-saving decisions under immense pressure. Despite these obstacles, the patient's condition was stabilized, and the necessary surgical interventions were successfully performed.

Case presentation

On March 3, 2024, at 5:00 AM, a 32-year-old female patient presented with a penetrating abdominal injury. The entrance wound was located in the left flank, with no exit wound. According to the patient's sister, she was asleep in her tent in the Mawasi Khan Younis area when an Israeli tank began firing indiscriminately at the tents. On arrival, the patient was hemodynamically unstable, with a heart rate of 130 bpm, blood pressure of 84/40 mmHg, and a temperature of 35°C. Abdominal examination revealed peritonitis. Given her condition, she was immediately taken to the operating room for an emergency laparotomy. Upon entry, a significant hemoperitoneum was identified, prompting immediate four-quadrant packing while anesthesia initiated with active resuscitation and blood transfusion. The only available blood product was packed RBCs, as platelet and fresh frozen plasma (FFP) transfusions were unavailable. Once hemodynamic stabilization was achieved, the packing was carefully removed to assess the extent of the injuries. Initial exploration of the right lower quadrant and pelvis revealed no injuries. However, in the right upper quadrant, a grade 1 liver capsular injury was noted, and a bullet was found posterior to the liver, measuring 6 cm in length, likely from a tank-mounted machine gun.

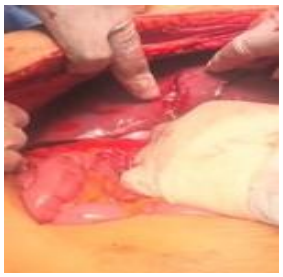
Large bullet shot by a quadcopter Israeli drone

Further assessment of the left upper quadrant, the primary source of hemorrhage, revealed the following injuries:

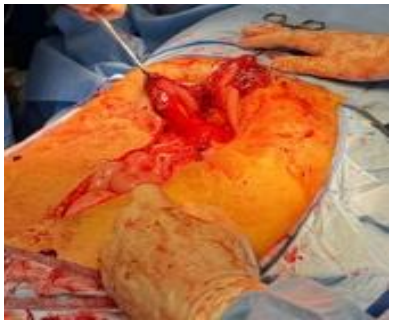
- Stomach: Near-complete transection at the mid-body, with only a 1 cm connection at the lesser curve; lesser omentum remained intact.
- Spleen: Grade 5 injury, completely shattered.
- Left Kidney: Cortical injury with active bleeding, but no involvement of the hilum.
- Duodenojejunal Junction & Proximal Jejunum: Multiple large lacerations.
- Splenic Flexure of the Colon: Multiple large lacerations.

Primary anastomosis (resection) of the stomach

Left kidney injury



Liver capsular tear



Further photos to clarify the depth and location of the injuries

The patient's injuries were managed in a stepwise approach as follows:

1. Grade I Liver Capsular Injury: Managed with packing and observation.
2. Grade V Splenic Injury (Completely Shattered Spleen): A trauma splenectomy was performed. The spleen was fully mobilized from its attachments, and the hilum was controlled using a vascular stapler.
3. Multiple Large Lacerations of the Splenic Flexure of the Colon: The splenic flexure was rapidly mobilized, and the injured segments were resected (Figure 1). Initially, the colon was left in discontinuity to provide better exposure

to the left kidney and duodenojejunal injury. Eventually, a side-to-side, functional end-to-end stapled anastomosis was performed using a two-stapler technique.

4. Multiple Large Lacerations at the Duodenojejunal Junction, Including the Proximal Jejunum (figure 2):
   - The ligament of Treitz was mobilized to identify an intact segment of the fourth part of the duodenum.
   - Proximal control was achieved using a stapler just to the left of the superior mesenteric artery (SMA).
   - The proximal jejunum was transected distally, and the mesentery was secured using a bipolar device.
   - A side-to-side, functional end-to-end anastomosis was then performed using a surgical stapler, and the enterotomy was closed in two layers with running 3.0 Vicryl sutures. The final anastomosis was positioned to the left of the SMA.
5. Left Kidney Cortical Injury with Active Bleeding (No Hilum Involvement):
   - Initial packing with hemostatic agents and abdominal gauze was attempted. As bleeding persisted, electrocautery was used, but bleeding continued.
   - Eventually, the injury was then packed with hemostatic agents, including Surgicel and Gelfoam, and approximated using 2.0 nylon pledgeted sutures, successfully controlling the bleeding.
6. Near-Complete Transection of the Stomach at the Mid-Body:
   - Only a 1 cm bridge at the lesser curvature remained intact, with the lesser omentum preserved (Figure 3).
   - The defect was managed with end-to-end gastro-gastric anastomosis in two layers: The outer layer was closed with running 3.0 nylon sutures, and the inner layer with running 3.0 Vicryl sutures

Figure (1)

Figure (2)

Figure (3)

At the conclusion of the procedure, the patient exhibited signs of hypothermia and hemodynamic instability, and no ICU beds were available. Therefore, the decision was made to keep her in the operating room for

active warming and resuscitation. This process lasted about two hours, during which her temperature nearly returned to normal and her hemodynamic status improved. Once stabilized, the patient was extubated in the operating room and transferred to the regular floor due to the lack of ICU availability. The family was advised to monitor her closely, as nursing care was suboptimal given the large number of casualties and the shortage of medical staff. Her sister, a nurse, assisted with her postoperative care.

On postoperative day five, the patient developed tachycardia, hypotension, a hemoglobin drop to 6 g/dL, and gross hematuria. Computed tomography of the abdomen and pelvis demonstrated active bleeding from the left renal injury into the urinary bladder. As interventional radiology was unavailable, the patient was managed conservatively, and the hematuria resolved spontaneously.

Her diet was gradually advanced to a full fluid diet, and she was discharged home after approximately 12 days in the hospital.

DISCUSSION

This case highlights the challenges of managing complex penetrating abdominal trauma in a war setting. The patient sustained multiple life-threatening injuries involving the liver, stomach, spleen, kidney, and intestines — each requiring urgent surgical attention.

Although the patient sustained multiple life-threatening abdominal injuries, she was managed using a classical one-stage definitive surgical approach. The inability to apply formal damage control resuscitation and surgery protocols—including staged laparotomy, delayed anastomosis, and prolonged ventilatory support—was due to the unavailability of ICU care, blood components such as FFP and platelets, and interventional radiology.

The renal injury, which later caused delayed hemorrhage, would typically be managed with embolization in a well-equipped setting. However, the absence of this option led to a reliance on transfusion and conservative measures, which fortunately succeeded. This situation reflects findings from war surgery literature, where non-operative or delayed intervention becomes a necessity due to logistical constraints [2].

Finally, this case reinforces the value of adaptability, surgical judgment, and teamwork under pressure. It also underlines the need for improved humanitarian access and infrastructure to support advanced trauma care in conflict zones.

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إصابة بطنية مخترقة معقدة متعددة الأعضاء في سياق صراع غزة

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الملخص

الخلفية والأهداف : تُعد إصابات البطن النافذة من التحديات المعقدة التي تواجه الأطباء، وتتطلب الإنعاش الفوري واتخاذ قرارات عاجلة، خاصةً في ظروف الحروب التي تتسم بندرة الموارد الطبية.

منهجية الدراسة : نُبلغ في هذا التقرير عن حالة لامرأة تبلغ من العمر 32 عامًا تعرضت لإصابة نافذة في البطن خلال العدوان على غزة، أدت إلى إصابات داخلية شديدة شملت: إصابة من الدرجة الأولى بكبسولة الكبد، تمزق شبه كامل في المعدة، إصابة من الدرجة الخامسة في الطحال، تمزق في قشرة الكلية اليسرى مع نزيف نشط، وعدة إصابات في الأمعاء الغليظة مع تمزق كامل في الوصلة بين الإثني عشر والصائم. وصلت المريضة بحالة غير مستقرة ديناميكيًا مع علامات التهاب بريتواني، مما استدعى إجراء فتح بطن عاجل.

النتائج : تم العثور على رصاصة دبابة عيار 6 سم خلف الكبد. ونظرًا لنقص الموارد، لم يكن من الممكن إدخال المريضة إلى العناية الحثيثة أو تطبيق بروتوكولات السيطرة على الضرر الكاملة. من المضاعفات بعد العملية حدوث نزيف كلوي متأخر تطلب إجراء قسطرة تداخلية، إلا أن ذلك لم يكن متاحًا بسبب غياب خدمات الأشعة التداخلية. رغم هذه التحديات، تم تثبيت حالة المريضة وخروجها من المستشفى.

الاستنتاجات : تُبرز هذه الحالة التحديات المتعلقة بتدبير الإصابات البطنية المعقدة في مناطق النزاع، وتؤكد على أهمية التكيف عند عدم توفر البروتوكولات القياسية لمعالجة الإصابات.

الكلمات الدالة: إصابة بطنيّة نافذة، إصابة متعددة الأعضاء، العدوان على غزة، تمزق الطحال، تمزق المعدة، تمزق الصائم، إصابة قشرية في الكلية