



Case report

Transection of the appendix and omentum following a seat belt injury; case report and literature review



Loay M. AlJaberi^{a,*}, Alaa Eddin K. Salameh^a, Raha M. Almarzooqi^b, Mohammed F. Emar^c, Rafiq Salhab^c

^a Al-Quds University School of Medicine, East Jerusalem, Palestine

^b Cleveland Clinic, Ohio, USA

^c Al-Ahli Hospital, Hebron, Palestine

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ABSTRACT

Introduction: Appendiceal injuries following a blunt abdominal trauma are rare. Upon literature review, several cases have been reported to develop appendicitis following blunt abdominal trauma, but total transection of the appendix is extremely rare.

Case presentation: Our case involves a 24-year-old male restrained driver who was involved in a motor vehicle accident. He had bruising corresponding to the pattern of the seatbelt, the 'seatbelt sign', on admission. On his second day of admission, he was found to have a rigid abdomen. On exploratory laparotomy, the patient had a completely transected appendix with a 10 × 10 cm piece of transected omentum lying in the pelvic cavity.

Discussion: Literature suggests that seat belts may play a role in the mechanism of injury leading to transection. **Conclusion:** Since the introduction of seatbelt in the 1970s, fatalities from road traffic accidents have fallen by up to 60%. However, the seat belt itself is associated with a unique injury profile, including intestinal tears, perforations, and transections, collectively termed "the seatbelt syndrome". Seat belt syndrome injuries may sometimes have a delayed presentation, thus repeated abdominal examination is recommended even if the patient is initially stable. Appendiceal transection is rare but may occur. A thorough inspection of the abdominal soft tissue to look for accompanying injuries is important if case an exploratory laparotomy is warranted.

1. Introduction

Seatbelt compression and blunt abdominal trauma (BAT) were reported in literature as causes of appendicitis; however, appendiceal transection is extremely rare. BAT accounts for the majority of abdominal injuries seen in the Emergency Department, and is responsible for substantial morbidity and mortality. The majority of BAT cases are related to motor vehicle accidents or auto versus pedestrian accidents. The presence of abdominal wall ecchymosis, the 'seatbelt sign', increases the chance of intra-abdominal injuries by 8 folds. In 3 out of 7 reported cases of appendiceal transection, seat belts have shown to be associated with the transection of appendix. Interestingly, it was noticeable that the patients developed a delayed presentation of peritoneal irritation that indicated surgical exploration. This case report has been reported in line with the SCARE criteria [1].

2. Case presentation

A 24-year-old male was brought to the Emergency Department by ambulance 30 minutes after a motor vehicle collision. On initial evaluation, the patient complained of a headache and right flank pain. He was hemodynamically stable and alert with a Glasgow Coma Scale of 15/15. He had no significant past medical, surgical, or family history. On physical examination of the abdomen, he was noted to have a 'seatbelt sign' on the right lower quadrant, a pattern of bruising corresponding to the position of the seat belt strap. It was associated with minimal tenderness on palpation with no peritoneal signs. Abdominal CT scan showed minimal free fluid and he was admitted for observation.

On the second day of admission, he started complaining of increasing abdominal pain. On repeat abdominal examination, he had signs of peritoneal irritation. The general surgery team was consulted. Repeat CT scan showed minimal free fluid and a degree of inflammation

* Corresponding author. Correspond author. Department of Surgery, Al-Ahli Hospital, Hebron, Palestinian Territories. Affiliated with (Al-Quds University School of Medicine, East Jerusalem, P.O. Box 89, Al-Quds University School of Medicine, Palestine.

E-mail address: Loayaljaberi@gmail.com (L.M. AlJaberi).

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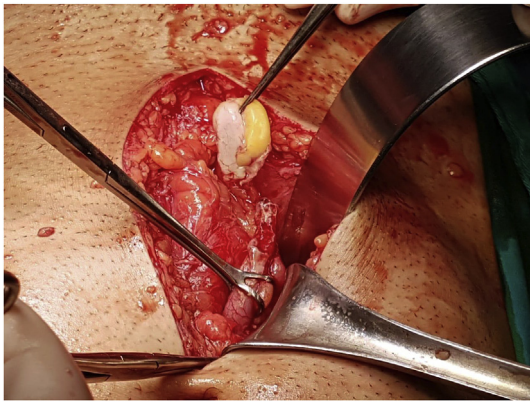


Fig. 1. Demonstrates the transected appendix.

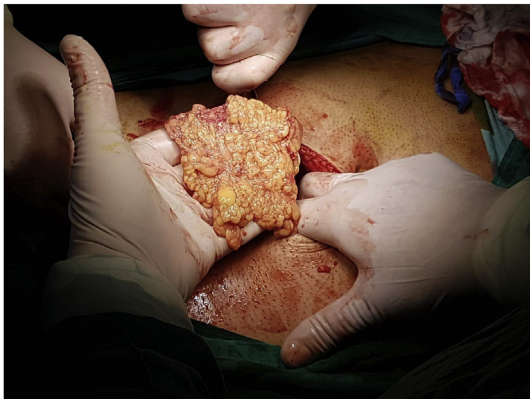


Fig. 2. Demonstrates the transected omentum.

of the appendix that warranted a lower midline exploratory laparotomy. Exploration of the abdomen revealed free fluid in the abdomen, a completely transected appendix (Fig. 1), and a 10 × 10 cm of omentum (Fig. 2) lying in the pelvic cavity. Appendectomy of the remaining appendix portion was performed and the omentum piece was removed. The patient had an uneventful postoperative course and was discharged from the hospital in a stable condition.

3. Discussion

The normal appendix is rarely affected by direct trauma owing to its high mobility and small dimensions, which are protective factors. However, the appendix isn't immune to injury. Anatomically, factors increasing susceptibility include a narrow lumen, a lack of a mesentery to help absorb congestion, and an end arterial blood supply. The mechanisms of appendiceal injury in patients wearing seat belt is likely related to the sudden increase in intraluminal pressure with displacement of feces and gas into the appendix and mucosal injury, or to the displacement of mobile viscera with traction at fixed points, or due to direct traumatic injury [2]. Retrocecal appendix is probably the most common position for appendiceal injuries since the intervening small gut generally protects other anatomical positions.

Upon review of literature on appendiceal transection after abdominal trauma, only a few cases were reported, summarized in (Table 1). Appendiceal transection was first reported in 1938 after a two-week history of pneumatic drill use while resting on the right iliac fossa [3]. The patient felt a sudden onset, severe pain in the right lower quadrant while drilling; however, it initially improved, but returned the next day with increasing severity, eventually leading to a rigid abdomen. During an exploratory laparotomy, the appendix tip was found to be amputated.

Gatewood and Russum reported the first case of appendiceal transection following a blunt abdominal trauma due to a motor vehicle accident in 1956 [4]. It is unknown whether the patient was wearing a seatbelt. It was 3 h after the trauma that the patient started complaining of mild pain. The abdomen was rigid on examination and she was taken to the operating room. During surgery, the distal three-fourths of the appendix with its mesentery was found to be floating free in blood and fecal material, with a 1.5 cm stump remaining.

In 1977, Pillay and Baker reported a case of a blunt abdominal trauma due to a car door handle compressing the right lower quadrant of the abdomen of the patient during a motor vehicle accident [5]. Two days later, abdominal examination revealed marked tenderness, guarding, and rebound tenderness. During surgery, the distal three-quarters of the appendix was avulsed and attached to its mesentery.

In 1992, Statter and Coran reported the first known case of appendiceal transection in a patient with a 'seatbelt sign' present on abdominal inspection during initial examination [6]. In 1999, Edward et al. reported the second case [7] and in 2016, Seung et al. reported the third case [8]. In all three cases, the BAT was due to a motor vehicle accident. All patients similarly had a delayed presentation of abdominal rigidity. Exploratory laparotomy eventually revealed total transection of the appendix in all patients.

In 2013, Moselmi et al. reported a case of appendiceal transection following a bicycle handlebar injury to the abdomen [9]. On abdominal examination, mild ecchymosis of the periumbilical area and left flank was present. Within 6 hours, the patients developed diffuse abdominal pain and examination was significant for generalized abdominal tenderness and rigidity. Findings in the operating room revealed transection of the appendix from its distal half.

In our case, the patient presented after a motor vehicle accident and was hemodynamically stable. He did have a seatbelt sign on the right lower quadrant, which raised the suspicion for bowel injury. As the patient was stable, he underwent a CT that showed minimal fluid. The decision was made to admit him for observation. As all cases above, the patient had a delayed presentation and only started having abdominal pain and peritoneal signs on day two of admission. He underwent an exploratory laparotomy that showed a completely transected appendix, and, interestingly, an accompanying 10 × 10 cm of transected omentum lying in the pelvic cavity.

It is important to note that none of these patients, including our patient, presented with hemodynamic instability or peritoneal signs from the onset of injury. Studies have shown that solid organ injury is more common in patients presenting with hemodynamic instability from onset, whereas bowel injury is more common in patients with delayed clinical signs [10]. As Dr. Stewart mentioned in the manual of *Early Care of Soft Tissue Injuries* [11], "It is notable that in certain instances of blunt trauma to the abdomen, serious visceral lesions may result with but little early indication of their presence. In some cases, the small intestine may be completely transected, with little or no hemorrhage, so that the individual appears to be free of trouble until spreading peritoneal contamination results." Therefore, high suspicion and appropriate observation with repeated abdominal examinations should be considered for all patients with seat belt signs.

4. Conclusion

Seat belts provide significant protection in Motor vehicle collisions and should always be worn while driving. Rarely, seat belts may cause a specific type of injury to abdominal tissue. Appendicitis and appendiceal transection are potential injuries from seat belt compression. A seat belt ecchymosis pattern must raise the suspicion for such injuries. The normal appendix is rarely affected by blunt abdominal trauma due to its small size and mobility; however, deceleration forces being transmitted to fixed points of mobile viscera may increase the risk of injury. Due to the raising evidence that soft abdominal tissue injury tends to be of delayed presentation, it is important to emphasize the importance of

Table 1

Demonstrates all reported cases of appendiceal transection.

Author	Sex	Patient Age	Symptoms	Time after Trauma	Seat belt
Burgess, 1938 [4]	Male	46 years	Abdominal pain	1 day	No. Pneumatic-drill resting on the RLQ.
Gatewood and Russum, 1956 [5]	Female	39 years	Abdominal pain	3 hours	Not recorded
Pillay and Baker, 1977 [6]	Male	30 years	Abdominal pain	4 days	Not worn. Door-handle trauma.
Statter and Coran, 1992 [7]	Female	5 years	Abdominal pain	8 hours.	YES
Edwards et al., 1999 [8]	Male	41 years	Abdominal pain	Not recorded	YES
Moslemi et al., 2013 [10]	Male	13 years	Left flank pain followed by abdominal pain	6 hours.	No. Bicycle-handlebar trauma.
Seung et al., 2016 [9]	male	23 years	Abdominal pain	8 hours.	YES

repeated clinical examination. It is also important that suspicion for accompanying injuries to the bowel or omentum be present, surgeons should carefully inspect the abdominal tissue when a laparotomy is warranted.

Provenance and peer review

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Ethical approval

This case report is exempt from ethical approval in my institution.

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Author contribution

L. Aljaberi, A. Salameh, R. Almarzooqi: wrote first draft, revised manuscript.

M. Emar, R. Salhab – revised manuscript, added/removed paragraphs, edited draft.

Conflicts of interest

The authors have no conflicts to declare.

Registration of research studies

This is not a human study research, its only a case report.

Guarantor

Dr. Rafiq Salhab

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.amsu.2018.08.019>.

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