

# A case of seatbelt-induced mesenteric injury and delayed colon ischemia after a car accident

✉ Burak Çelik, ✉ Safa Toprak, ✉ Mesut Yeşilsoy, ✉ İbrahim Halil Özata

Department of General Surgery, Koc University School of Medicine, İstanbul-Türkiye

## ABSTRACT

Trauma is the sixth leading cause of death globally and the leading cause of morbidity and mortality in young patients. Blunt bowel and mesenteric injuries are rare, occurring in only 1-5% of blunt abdominal traumas, and are associated with high morbidity and mortality. In this report, we present a case of a patient with sigmoid colon perforation due to ischemia caused by mesenteric injury, who was admitted to the hospital with abdominal pain two days after a car accident. A twenty-one-year-old man was admitted to the emergency department with abdominal pain and vomiting, having been involved in a car accident as a driver two days prior. Computed tomography revealed free air in the abdomen, originating from the perforation of the sigmoid colon wall, and free fluid in the pelvic area. The patient underwent immediate laparotomy. Exploration revealed a rupture in the sigmoid mesocolon, causing ischemia and perforation. Additionally, there was a rupture in the mesentery of the terminal ileum close to the ileocecal valve, but without ischemia. Partial sigmoid colon and ileal resections were performed, followed by colocolic anastomosis and double-barrel ileostomy. He was discharged in good health after a 20-day hospital stay. Thorough clinical examination and radiological evaluation can aid in detecting visceral injuries in trauma patients. Early recognition and repair of intestinal damage can prevent severe complications.

**Keywords:** Mesenteric injury; car accident; blunt trauma; perforation; seat belt.

## INTRODUCTION

Trauma is the sixth leading cause of death globally and the leading cause of morbidity and mortality in young patients.<sup>[1]</sup> Blunt injuries due to traffic accidents are the most common cause of trauma-related injuries. Intestinal and mesenteric injuries resulting from blunt abdominal trauma account for approximately 1-5% of these cases, with high morbidity and mortality, and perforation may occur in only about 0.3% of these patients.<sup>[2,3]</sup> To decrease mortality after accidents, the seatbelt (SB) became standard in 1964, leading to a 50% decrease in fatal injuries from automobile collisions.<sup>[4]</sup> However, SB can also cause damage due to the transmission of force to the driver or passenger, leading to skin abrasions, intra-abdominal injuries, and bone fractures.<sup>[4]</sup> This report presents the case of a patient with intra-abdominal perforation due to sigmoid colon ischemia who was admitted to the hospital with abdominal pain two days after a car accident.

## CASE REPORT

A twenty-one-year-old male presented to the emergency department with symptoms of abdominal pain, nausea, and vomiting. With no underlying health conditions or surgical history, the patient recounted a vehicular accident occurring two days prior as the driver, wherein his vehicle collided with a tree and caught fire. Remarkably surviving the traumatic incident, the patient sustained severe burns on his right upper and lower extremities and a right talus fracture, as diagnosed at another medical facility. Despite no thoracic or abdominal abnormalities in physical examination and computed tomography (CT) scans, the patient had been discharged from the initial hospital following 24 hours of observation. Noteworthy vital signs at admission included a blood pressure of 100/60 mmHg, heart rate of 112 beats per minute, respiratory rate of 19 breaths per minute, oxygen saturation (SpO<sub>2</sub>) of 99%,

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Address for correspondence: Burak Çelik

Department of General Surgery, Koc University School of Medicine, İstanbul, Türkiye

E-mail: bcelik@kuh.ku.edu.tr

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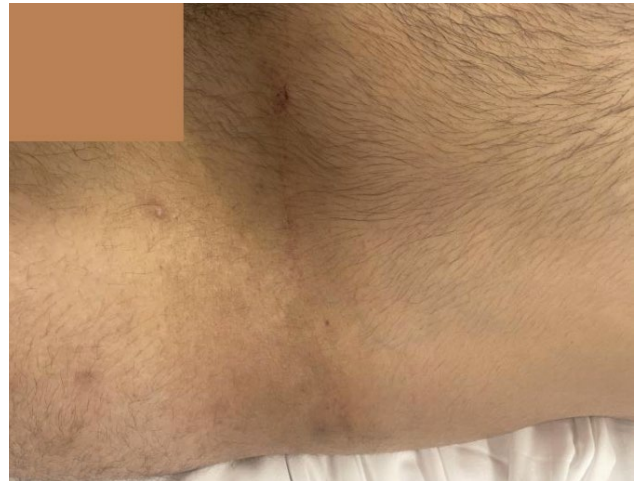
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**Figure 1.** Ecchymosis and abrasions on both anterior superior iliac crests resulting from the tightening of the seatbelt (Right).



**Figure 2.** Ecchymosis and abrasions on both anterior superior iliac crests resulting from the tightening of the seatbelt (Left).

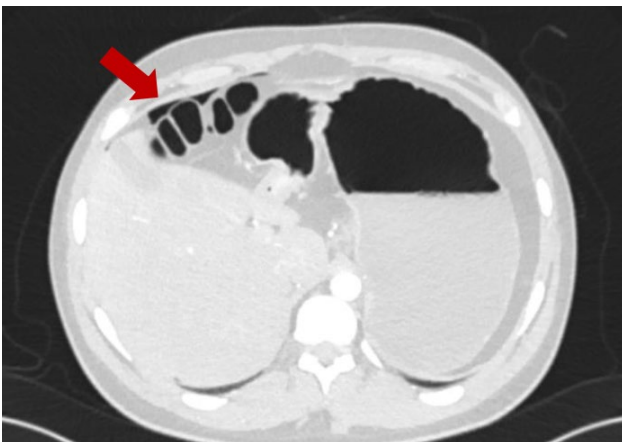
and a temperature of 38.0 degrees Celsius. Notable findings on abdominal examination included ecchymosis at both anterior superior iliac crest levels, attributed to seatbelt-induced trauma (Figures 1 and 2). Palpation revealed widespread tenderness, guarding, and rebound tenderness. Subsequent CT imaging disclosed free air in the abdomen resulting from sigmoid colon wall perforation and free fluid accumulation in the pelvic region (Figures 3 and 4). Hematological analysis yielded values within the following ranges: hemoglobin (Hb) 16.8 g/dL, hematocrit (Hct) 48%, white blood cell count (WBC) 24.86 k/uL, platelet count (Plt) 358 k/ $\mu$ L, C-reactive protein (CRP) 441 mg/L, blood urea nitrogen (BUN) 15 mg/dL, and creatinine (Cre) 1 mg/dL. Following a comprehensive consultation with the patient and his family, a diagnostic laparotomy was performed. This revealed a ruptured sigmoid mesocolon with approximately 10 cm of the sigmoid colon ischemic and perforated. Additionally, a rupture in the mesentery occurred 20 cm proximal to the ileocecal valve in the terminal ileum (Fig. 5). Surgical interventions included sigmoid resection, colocolic anastomosis, resection of 10 cm of the terminal ileum,

and a double-barrel ileostomy to mitigate the risk of colorectal anastomotic leakage. After a two-day stay in the intensive care unit, the patient was discharged 20 days post-operation with appropriate antibiotics and medical treatment. The stoma was successfully closed after a two-month period.

## DISCUSSION

Howland first defined an unstable spine fracture, termed a chance fracture, resulting from a seatbelt in a car collision in 1965. Subsequently, the term "seat belt injury" has become standard terminology for injuries involving a combination of spinal, visceral, and vascular damage.<sup>[5]</sup> Seat belt syndrome is frequently linked to injuries such as intestinal perforation, mesenteric tears, damage to the aorta, and burst fractures of the thoracolumbar vertebrae.<sup>[5]</sup>

The mesentery is a fold of tissue and peritoneum that includes blood vessels and nerve innervation. It attaches the colon and intestines to the back wall of the abdominal cavity. Injuries to the mesentery can occur due to both blunt and



**Figure 3.** Presence of free air in the abdomen.



**Figure 4.** Perforation of the sigmoid colon wall with surrounding air balloons.



**Figure 5.** Injury to the mesentery of the terminal ileum.

penetrating trauma. The severity of mesenteric injuries can vary depending on the extent of the trauma. In minor cases, the injury may cause minimal damage, and the mesentery may heal independently with proper care and rest. However, in more severe cases, the injury may lead to significant tearing or rupture of the mesentery, resulting in serious complications such as internal bleeding, infection, ischemia, or even death. ‘The fixed-point theory’, proposed by Counseller and McCormack in 1935, states that most intestinal injuries occur in the proximal jejunum or distal ileum. According to this theory, the anatomical fixation of these tissues to the retroperitoneum explains their susceptibility to damage.<sup>[6]</sup>

In 2020, Yamamoto et al. reported 64 major abdominal blunt injuries in 25 patients requiring surgical intervention. This included 34 bowel injuries with 20 perforations and 30 mesenteric injuries. There were significantly more bowel perforations in the small intestine than in the large intestine. Similarly, more mesenteric injuries were found in the small intestine than in the large intestine.<sup>[7]</sup>

Diagnosing isolated mesenteric injury in patients with blunt abdominal trauma can be challenging, as it may not present with obvious symptoms and signs of peritonitis caused by perforation until a significant amount of time has elapsed. This delay in symptom onset can delay the diagnosis of the injury. Moreover, the symptoms of mesenteric injury can be similar to those of other abdominal injuries, such as bowel perforation, which can further complicate the diagnosis. The mesentery is a delicate structure that supports and suspends the intestines and contains numerous blood vessels. Injury to these vessels can lead to severe bleeding that may not be immediately evident.<sup>[8,9,10]</sup>

In the approach to a patient with multiple traumas, contrast-

enhanced CT should be the first imaging choice for hemodynamically stable patients. Even if no pathology is detected on initial imaging, the patient should be closely monitored for at least 24 hours. A decrease in hemoglobin levels, unexplained elevation in leukocytes or lactate, and persistent abdominal pain should always be considered as potential indicators of mesenteric injury. In the case presented, the absence of any pathology on the initial CT scan at the time of admission, combined with the development of persistent abdominal pain, signs of ileus, and the observation of a seatbelt injury during the physical examination, indicated the need for immediate secondary imaging. Due to the presence of free air, surgical intervention became inevitable, and the patient subsequently underwent surgery.

## CONCLUSION

A thorough clinical examination, complemented by radiological evaluations, can aid in detecting visceral injuries in trauma cases. Early recognition and repair of intestinal damage can prevent severe complications.

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## OLGU SUNUMU - ÖZ

### Trafik kazası sonrası emniyet kemeri nedeniyle meydana gelen mezenter yaralanması ve gecikmiş kolon iskemisi

**Burak Çelik, Safa Toprak, Mesut Yeşilsoy, İbrahim Halil Özata**

Koç Üniversitesi Tıp Fakültesi, Genel Cerrahi Ana Bilim Dalı, İstanbul, Türkiye

Travma, küresel olarak ölümlerin altıncı sebebi olup, genç hastalarda morbidite ve mortalitenin en önemli nedenidir. Bağırsak ve mezenterin künt yaralanması karın travmalarının sadece %1-5'ini oluşturmakla birlikte yüksek morbidite ve mortaliteye sahiptir. Bu olgu sunumunda, trafik kazası sonrası emniyet kemeri nedeniyle mezokolon yaralanması gelişen ve sigmoid kolon iskemisi sonucu perforasyon gelişen bir hasta sunuldu. Yirmi bir yaşındaki erkek hasta 2 gün önce geçirdiği trafik kazası sonrası acil servise karın ağrısı ve kusma şikayetiyle başvurdu. Yapılan bilgisayarlı tomografide sigmoid kolon perforasyonundan kaynaklanan karın boşluğunda serbest hava ve pelvik bölgedeki serbest sıvı görüldü. Hasta tanınal laparotomi yapılmak üzere acil ameliyata alındı. Yapılan inceleme sonucu sigmoid kolon mezosunun yırtıldığı, iskemi ve perforasyona neden olduğunu görüldü. Ayrıca, iskemi olmadan ileoçekal valfe yakın terminal ileum mezenterinde bir yırtık daha saptandı. Kısmi sigmoid kolon ve ileal rezeksiyonlar, sırasıyla kolokolik anastomoz ve çift namlulu ileostomi ile gerçekleştirildi. Travma hastalarında detaylı klinik muayene ve radyolojik değerlendirme, visseral organ yaralanmalarının erken tanısında önemli rol oynamaktadır. Künt karın travmalı hastalarda izole mezenter yaralanmasını erken teşhis etmek peritonit bulguları geç ortaya çıkabileceği için zor olabilmektedir. Özellikle emniyet kemeri takan hastalarda, karın cildindeki kemer pozisyonuna uyan ekimoz bulguları emniyet kemeri yaralanması açısından uyarıcı olabilmektedir. İntestinal hasarın erken tanınması ve onarımı ciddi komplikasyonları önleyebilir.

**Anahtar sözcükler:** Emniyet kemeri; künt travma; mezenter yaralanması; perforasyon; trafik kazası.

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