

# Case series: isolated small bowel perforations, secondary to blunt abdominal traumas



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## Case series: isolated small bowel perforations, secondary to blunt abdominal traumas

*Isolated small bowel trauma after blunt abdominal trauma is rare and diagnosis may be difficult. The method used in the diagnostic is computed tomography so there is no consensus on this issue. Difficulty in diagnosis and delay in treatment can cause increased morbidity and mortality. We present the diagnosis and treatment modalities of interesting three cases, admitted to the Emergency Service with the complaint of blunt abdominal trauma and were found to have isolated small bowel perforations. Isolated small bowel perforation is secondly seen in cases with blunt abdominal trauma. To this end, a careful examination and the way of the trauma that occurs are crucial for diagnosis. Of note, we postulate that a physician should remain vigilant whether taking the decision of immediate operation to be able to attenuate the morbidity and mortality for a blunt trauma phenomenon.*

KEY WORDS: Trauma, Blunt trauma; Small bowel perforation; Emergency

### Introduction

Trauma, a part of life with the history of humanity, maintains its importance today in changing forms. Recent technologic developments and continuous research, on the other hand, have revealed new types of trauma, that may lead to fatal traumas.

While 1000/1 million people in the States are exposed to major trauma that requires treatment in trauma centers within a year, nowadays, trauma has become the most common reason for the death of the young population worldwide <sup>1</sup>. Head trauma, heart, and great vessel injuries are the most significant causes of mortality.

Moreover, abdominal trauma accounts for 10% of the deaths due to trauma <sup>2</sup>. Blunt abdominal trauma might cause both solid and hollow organ injuries, which can be observed in various ways <sup>3</sup>.

While solid organ injuries usually lead to the symptoms of intraabdominal bleedings in the early period, isolated hollow organ injuries may not show any symptoms in that interval, revealing themselves with peritonitis and sepsis in the late period <sup>3,4</sup>.

Isolated small bowel perforation following blunt abdominal trauma is less frequent than a penetrating one. In this context, clinical symptoms are rare at the beginning and have a relatively higher rate of morbidity and mortality <sup>5,6</sup>. Small bowel injuries are the most common type among hollow organ injuries and are seen in 10-15% of blunt traumas. Picardi proclaimed every effort should be being performed in order for avoiding life-threatening traumas for the different vital organs <sup>7</sup>. In a high volume multicenter study, hollow organ injury was detected in 3,1%, while hollow organ perforation was 1,3% of all the cases with blunt abdominal trauma. Moreover, some authors reported the gastrointestinal injury after blunt trauma as 0,7-26,5%. The increase in the use of abdominal computerized tomography (CT) non-operative treatment of blunt trauma might bring about the risk of delay in the diagnosis the hollow organ perfora-

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tion. Undetermined or lately determined hollow organ perforations clinically result in sepsis, multiple organ failure, and death (5). The following three cases describe the clinical features, treatment modalities, and responses of the adults who presented with blunt trauma and isolated small bowel perforation.

## Case Series

### CASE N. 1

A 63-year-old previously healthy Turkish male with a driver weaving the seat belt presented to the Emergency Department due to the traffic accident. On review of systems, he reported the disseminated ecchymosis from the umbilicus to the pelvis with a generalized abdominal tenderness was detected. The laboratory results included a white blood count (WBC) of  $12.9 \times 10^3/\mu\text{L}$  (4.9-10.8). The contrast-enhanced abdominal CT illustrated the generalized subcutaneous emphysema at the level of the umbilicus, hematoma in the subcutaneous tissue, starting from the right lateral of the umbilicus to the right iliac area and perihepatic-perisplenic areas, generalized free fluid between the bowel loops in the lower quadrant and the pelvis, free air particles of 4-5 millimeters in lengths at the level of the umbilicus in the midline.

The constellation of findings was suspicious for blunt trauma with bowel perforation. He underwent the surgery under emergency situations and on the laparotomy, full-thickness injury in approximately 60 cm distal to the ileocecal valve and bleeding from the intestinal mesentery were explored. Segmenter small bowel resection with end-to-end anastomosis was performed. He experienced a near resolution of symptoms and normalization of vital signs within one was discharged. The patient demonstrated improved symptoms and discharged home on hospital day five on a given medical prescription.

### CASE N. 2

A 19-year-old previously healthy Turkish female, sitting in the right front seat weaving the seat belt, admitted to the Emergency Department with an in-vehicle traffic accident. On examination, the patient had normal vital signs and abdominal tenderness. The laboratory results included a WBC of  $22.5 \times 10^3/\mu\text{L}$  (4.9-10.8). The contrast-enhanced abdominal CT revealed a condensed free fluid between the bowels loops in the perihepatic-perisplenic areas and pelvis, with several free air images. In addition, a slight height loss in the anterior corpus of vertebra L3 and L4 (compression fracture), the fracture line in the vertebra L4 and vertebra L3 were observed.. She underwent the surgery under emergency

conditions with the pre-diagnosis of perforation. On the laparotomy, full-thickness injury in three different small bowel segments with 30, 90, and 100 cm distance from the ileocecal valve and bleeding from the bowel mesentery were explored. Segmenter small bowel resection with an end-to-end anastomosis was applied for two different localizations.

She experienced a near resolution of symptoms and normalization of vital signs within one was discharged. The patient demonstrated improved symptoms and discharged home on hospital day five on a given medical prescription.

### CASE N. 3

A 57-year-old previously healthy Turkish male presented to the Emergency Department with a complaint of the iron body falling bluntly to his abdomen about 12 hours ago. On the physical examination, a widespread tenderness with the rebound was recognized. The rest of his physical exam was unremarkable. The laboratory results included a WBC of  $7.9 \times 10^3/\mu\text{L}$  (4.9-10.8).

Contrast-enhanced abdominal CT of the abdomen demonstrated: free fluid among the bowel loops and in the pelvic area. An application of a laparoscopy procedure was decided. During the laparoscopy, intestinal ingredients were determined intraabdominally.

Thereupon, he underwent a laparotomy. On the exploration, approximately the 2 cm perforation was determined in the 70 cm proximal to the ileocecal valve, and the perforation was repaired primarily. He experienced a near resolution of symptoms and normalization of vital signs within one was discharged. The patient demonstrated improved symptoms and discharged home on hospital day six on a given medical prescription.

## Discussion

Isolated small bowel perforation accounts for less than 1% after the blunt trauma. Motor vehicle accidents are responsible for 75% of that <sup>4</sup>. It is indicated that fastening seat belts in traffic accidents can lead to small bowel perforation <sup>8</sup>. Therefore, if a patient, applies to the hospital after the accident, harboring ecchymosis related to the seat belt, that case should follow up closely in regards to perforation. If any force compresses a bowel segment over a fixed point, particularly the vertebra, intraluminal pressure can raise suddenly and perforation can occur from the antimesenteric side.

Seat belt syndrome (ecchymosis in the abdominal wall with small bowel injury and lumbar spine injury or Chance fracture) abides this kind of injury. Especially in elderly patients, clinical symptoms might be soft at the beginning. However, ischemia and perforation can develop during the late period. In such cases, the patient

should be kept under surveillance and the physical examination and imaging methods should be repeated closely and periodically in order to manage these cases. Two patients in the report wore seat belts and one had a generalized ecchymosis on the anterior abdominal wall.

Several parameters should be evaluated together in small bowel perforation. The way of trauma, tenderness detected during the physical examination, accompanying rebound, leukocytosis, and amylase elevation in the laboratory might be significant.

Posteroanterior chest radiography, standing direct abdomen radiography, FAST (Focused Abdominal Sonography for Trauma), CT, and DPL (Diagnostic Peritoneal Lavage) can be helpful for the diagnosis. Nowadays, ultrasonography (US) and CT compose the most important step in trauma patients thanks to the ease of access to the imaging methods. The US has the convenience of applying at the bedside and is especially preferred for patients who are not hemodynamically stable. CT provides more definite results (92% sensitivity, 94% specificity) in terms of determining free air and liquid. Furthermore, it provides an opportunity to exclude other possible reasons for intraabdominal free fluid and to evaluate the solid organs. We preferred the abdomen CT for our three patients who were hemodynamically stable.

The diagnostic algorithm has not been well defined in small bowel injury that is owing to blunt trauma due to its rarity and lack of specific indicators. Early diagnosis is greatly crucial in order to reduce morbidity and mortality. Watts et al.<sup>9</sup>, reported that the mortality was 16% in the case of unnoticed diagnosis of perforation and the 24 hours delay for the operation. Similarly, in the case of delayed surgery, morbidities such as sepsis, intraabdominal abscess, and wound separation increase two times<sup>8</sup>.

Relying only on imaging findings may impede the diagnosis since the rate of false-negative might be as high as 15% by using CT alone. Hence, an intermittent physical examination is recommended<sup>8,10</sup>. The diagnosis of the present cases were established together with the physical examination and CT findings in the early period and the diagnosis negative consequences due to delay in diagnosis was prevented.

Small bowel injuries are ranked first among hollow organ injuries due to blunt trauma. Frick et al<sup>11</sup>, reported the most frequently injured segments were found to be the jejunum, ileum, and duodenum. Injuries can occur simultaneously in more than one segment. We have determined isolated small bowel perforation in three patients, one of which was multiple. The way of repair of perforation depends on the localization and the degree of the injury. In small bowel perforations, the primary closure of small defects, resection of large defects, and ischemic segments, with a primary anastomosis can be performed smoothly even in delayed cases<sup>12</sup>. We have preferred to apply the segmenter resection with end-to-

end anastomosis in two cases and primary closure for the third one. Notwithstanding, emergency surgery remains its severity in the era of emergency, prevalently<sup>13-17</sup>.

## Conclusion

Isolated small bowel perforation is observed rarely in patients with blunt abdominal trauma. As such, careful examination of the patient and the right information about the type of trauma is crucial for the diagnosis. Last but not least, it is critical emergency physicians remaining vigilant for the growing spectrum of clinical presentation for blunt trauma phenomenon to ensure appropriate clinical care to minimize disease-related morbidity and mortality.

## Riassunto

Il trauma intestinale isolato dopo un trauma addominale contusivo è raro e la diagnosi può essere difficile. Non c'è consenso nell'individuare la tomografia computerizzata come metodo diagnostico.

La difficoltà nella diagnosi e il ritardo nel trattamento possono causare un aumento della morbilità e della mortalità. Presentiamo la diagnosi e le modalità di trattamento di tre casi interessanti, ricoverati al Pronto Soccorso con trauma addominale contusivo nell'anamnesi e riscontrati poi con perforazioni intestinali isolate del tenue. La perforazione isolata dell'intestino tenue nei casi con trauma addominale contusivo è osservata secondariamente. Pertanto un attento esame clinico e le caratteristiche del meccanismo traumatico sono fondamentali per la diagnosi. In conclusione sollecitiamo il medico a rimanere attento nel prendere la decisione di un intervento immediato per essere in grado di attenuare la morbilità e la mortalità in caso di trauma addominale contusivo.

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