Introduction

Abdominal injuries caused by blunt trauma are in the 3rd place, right after head and chest traumas, blunt abdominal traumas (BAT) being the leading cause of mortality and morbidity in all age groups. Isolated injuries of the small intestine and mesentery, as a part of BATs, are rare and occur in about 1–5% of cases, and high morbidity and mortality is often due to late diagnosis [1, 2].

Intestinal injuries in BAT may be caused by various forms of blunt traumas, but the main causes of BAT are direct traumas, motor vehicle accidents, and falls from height [3]. The authors present a case of a 58-year-old male with traumatic jejunal perforation caused by an accidental hammer blow to the abdomen.

Case Report

A 58-year-old man was admitted to the Department of General Surgery of the General Hospital Novi Pazar, Serbia, due to abdominal pain caused by an accidental self-injury to the abdomen with a hammer blow. The patient had a history of a previous surgery of a duodenal ulcer.

Initially, a laboratory test (all biochemical parameters were in reference range), abdominal and chest x-ray (no signs of pneumoperitoneum), abdominal ultrasound (no free fluid in the abdomen and pelvis) were performed. A muscle hematoma measuring 14 x 6 mm was observed in the suprapubic area on the left side of the abdominal wall. There were no visible signs of injury on the skin surface.

Summary

Introduction. Trauma is among the leading causes of death. Undetected and untreated adequately and on time, traumatic small bowel injuries can be lethal. Case Report. We present a case of a small bowel perforation after a blunt abdominal injury, caused by an accidental self-inflicted hammer blow to the abdomen. The initial abdominal and chest x-rays and abdominal ultrasound did not indicate an injury to the abdominal organs. Due to the impaired clinical picture and the fact that the patient was hemodynamically stable, multi-detector computed tomography of the abdomen and small pelvis was performed, showing intraperitoneal free fluid and pneumoperitoneum, not seen by other imaging methods. A decision for surgical treatment was made. The intraoperative finding confirmed a small bowel perforation. Conclusion. Due to the possible false-negative imaging findings, clinical follow-up of patients with abdominal trauma is mandatory when making the decision for surgical treatment.

Key words: Intestinal Perforation; Wounds, Nonpenetrating; Abdominal Injuries; Household Articles; Accidental Injuries; Pneumoperitoneum; Signs and Symptoms; Diagnosis; Tomography, X-Ray Computed; Treatment Outcome

Sažetak

Uvod. Trauma je među vodećim uzrocima smrti. Neprimećene i nelečene na odgovarajući način i na vreme, traumatske povrede tankog creva mogu biti smrtonosne. Prikaz slučaja. Predstavljamo slučaj perforacije tankog creva nakon tupe traume trbuka, uzrokovane slučajnim samopovredavanjim u trbuhi, udarcem čekićem. Prvobitni rendgenski snimci grudnog koša i abdomena, kao i ultrazvuk abdomena, nisu ukazivali na povredu trbušnih organa. Zbog pogojašanja kliničke slike, a zbog činjenice da je pacijent bio hemodinamički stabilan, urađena je kompjuterizovana tomografija abdomena i male karlice koja je pokazala slobodnu tečnost i pneumoperitoneum, što nije vido drugim imidžing metodama. Postavljena je indikacija za operativno lečenje. Intraoperativni nalaz – perforacija tankog creva. Zaključak. Zbog mogućih negativnih nalaza radiološke dijagnostike, kliničko praćenje bolesnika s trbušnom traumom obavezno je prilikom postavljanja indikacije za operativno lečenje.

Ključne reči: perforacija tankog creva; nepenetrirajuće rane; abdominalne povrede; kućni alati; slučajne povrede; pneumoperitoneum; znaci i simptomi; dijagnoza; et; ishod lečenja

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Since the radiological and ultrasound diagnostics did not indicate injuries of internal abdominal organs, and the patient was in good overall condition, hemodynamically stable, conservative treatment was initiated. Eight hours after admission, the general condition of the patient got worse with an increase in abdominal pain. The abdomen was distended with diffuse tenderness and guarding over the lower quadrants of the abdomen. The laboratory test showed the following results: C-reactive protein 103.9 mg/L, white blood cells 11.6 x 10^9/L, red blood cells 4.64 x 10^12/L, hemoglobin 143 g/L, hematocrit 0.395 L/L, while the rest biochemical parameters were within the reference range. The patient was hemodynamically stable. The computed tomography (CT) of the abdomen and pelvis showed fluid around the liver and lower abdomen, whereas apparent solid organ injuries (Figures 1 and 2) were not found by other imaging methods. A decision for surgical treatment was made.

A median laparotomy was performed and approximately 800 cc of free fluid and intestinal contents was evacuated, and a portion of the contents was sent for microbiological analysis. Intraoperatively, a large number of small bowel adhesions to the anterior abdominal wall as well as to the small bowel were identified, probably as a result of the previous surgery. The small intestine was partially covered with fibrin deposits. Adhesiolysis was performed and the abdomen was explored. The small bowel was examined completely up to the ileocecal valve. A perforation of the small intestine was found about 70 cm from the Treitz ligament, on the antimesenteric side, with no other signs of injury (Figure 3). Abundant lavage of the abdominal cavity with a large amount of saline was done, after which the suture of the perforation site was made, in two layers, using absorption thread with a diameter 3/0. The first two postoperative days the patient was in intensive care after which he was transferred to the general surgery department, hemodynamically stable, afebrile with no signs of sepsis. Klebsiella spp. was isolated from the intra-abdominal fluid specimen sent for analysis. The treatment was continued with conservative therapy (crystalloids, analgesics, antibiotics (ceftriaxone, amikacin, metronidazole) and other supportive therapy). The postoperative recovery was satisfactory. There was no significant abdominal postoperative pain. The patient was discharged on the 12th postoperative day.

**Discussion**

Blunt abdominal trauma can cause injury to both the solid organs and intestines. Solid organ injuries usually involve liver and spleen injuries and they are manifested by internal bleeding. Enteric injuries usually do not have such a dramatic clinical picture initially and manifest with sepsis and peritonitis [4, 5]. Clinical assessment of the patient’s condition and adequate diagnosis are crucial for the timely diagnosis of small bowel perforation (SBP) and surgical treatment. Delayed surgical management leads to an increase in morbidity and mortality. Because imaging methods have a degree of false-negative results, relying solely on them may delay surgery and endanger the patient [1, 6]. Different investigations reported low accuracy (16–45%) of clinical findings and unreliability in defining the need for laparotomy in BAT patients [7]. Due to the charac-

**Abbreviations**

BAT – blunt abdominal trauma  
CT – computed tomography  
SBP – small bowel perforation  
US – ultrasonography

![Figure 1. Abdominal CT scan A](image1)  
*Figure 1. Abdominal CT scan A*

*Figure 2. Abdominal CT scan B*

*Figure 2. Kompjuterizovana tomografija abdomena - slika A*

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The diagnosis of blunt abdominal trauma is CT [10]. The CT allows detection of both parenchymal and hollow organ injury. If there are no CT signs of solid organ injuries, but there are pneumoperitoneum, free abdominal fluid, contrast extravasation in the abdomen, small bowel thickening and dilatation, there is a high suspicion of a bowel injury [3]. This finding has been reported in several studies [3, 11, 12]. The CT diagnosis of SBP has a sensitivity of 92–97.7% and a specificity of 94–98.5%, making it the gold standard for the diagnosis of SBP [2, 3]. Although some authors found CT findings to be unreliable for assessing the injury severity, they recommended mandatory laparotomy for patients with isolated free fluid on CT scans [13]. Surgical treatment of patients may be either open or laparoscopic surgery. The laparoscopic approach can be applied in hemodynamically stable patients with BAT, taking into account the patient’s condition, surgical team experience, and equipment. Complications of laparoscopic surgery should also be considered, especially in patients who have previously had open abdominal surgical procedures, procedures which may complicate the laparoscopic exploration and a degree of conversion which can go up to 50% [1, 14]. Our patient was previously operated on for duodenal ulcer perforation. With all of the above in mind, the surgical team opted for an open surgical procedure. There were no postoperative complications and the outcome was successful.

### Conclusion

Diagnosis of an isolated perforation of the small intestine in the context of blunt abdominal trauma can sometimes be difficult and can lead to delayed diagnosis, which increases morbidity and mortality. Due to the possible false-negative imaging findings, clinical monitoring of patients with abdominal trauma is mandatory when making the decision for surgical treatment. Due to the high sensitivity, computed tomography is necessary in the early diagnosis of minor blunt abdominal injuries.

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