

## Pancreatic injury revealed in abdominal ultrasound: a case report

Karın ultrasonografisiyle gösterilen pankreatik yaralanma: Olgu sunumu

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Pancreatic laceration due to blunt trauma is relatively uncommon and it is less likely to accompany injury of a retroperitoneal organ. While renal injuries are easily detectable in both clinical and radiographic imaging examination, pancreatic injuries are difficult to diagnose clinically and in several cases remain occult. Although ultrasonography is not generally recommended for initial assessment of the trauma patient and its role is limited in the follow-up of contained intra- or perihepatic bilomas that are treated conservatively, it was demonstrated to be capable for exploration of pancreatic injuries as well. We present a case of a 23-year-old male with pancreatic injury found in ultrasonography.

**Key Words:** Abdominal ultrasound; pancreatic injury.

Künt travmaya bağlı pankreatik laserasyon nadirdir ve retroperitoneal organ yaralanmasıyla birlikteliği enderdir. Renal yaralanmalar klinik ve radyografik görüntüleme incelemesinde kolaylıkla saptanabilirken, pankreatik yaralanmalara klinik olarak tanı koymak zordur ve bazı durumlarda da pankreatik yaralanmalar tanı konulmadan kalmaktadır. Her ne kadar ultrasonografi travma hastalarının ilk değerlendirilmesinde önerilmese ve intra veya perihepatik biliomaların takibinde yeri sınırlı da olsa, pankreas yaralanmalarının araştırılmasında yetkin bir tetkik olduğu gösterilmiştir. Bu yazıda, ultrasonografiyle saptanan pankreatik yaralanması olan 23 yaşındaki bir erkek olgu sunuldu.

**Anahtar Sözcükler:** Karın ultrasonografisi; pankreatik yaralanma.

Blunt abdominal trauma may result in a variety of abdominal injuries. In most cases, those injuries involve the liver, spleen and kidney.<sup>[1]</sup> Pancreatic laceration due to blunt trauma is relatively uncommon, and it is less likely to accompany injury of a retroperitoneal organ.<sup>[2]</sup> While renal injuries are easily detectable in radiographic imaging, injuries of the pancreas, gallbladder, and bile ducts are more subtle.<sup>[3,4]</sup> Since those injuries are associated with high morbidity and mortality -especially if diagnosis is delayed- accurate and early diagnosis is imperative. Repeated imaging evaluation plays a key role in detection. Findings suggesting pancreatic or duodenal trauma in plain abdominal radiography are: obliteration of the psoas muscle, spine scoliosis, and

retroperitoneal and subdiaphragmatic air. There are no specific findings in the ultrasound examination. Computed tomography (CT) usually reveals pancreatic swelling, pancreatic lacerations and fluid collections, while Gerota's fascia thickening is not always clearly evident.

### CASE REPORT

A 23-year-old immigrant was admitted to our hospital after a motor vehicle accident. The patient was hemodynamically stable and did not have externally obvious lesions. The initial laboratory and radiological examinations (radiography of thorax and abdomen and serum biochemical tests) were normal. Initial abdominal ultrasound revealed only a limited

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fluid collection around the left kidney without evidence of renal laceration. The patient remained in the hospital for follow-up. Even though he remained hemodynamically stable, he presented sudden intense abdominal pain and an increase in amylase of urine and blood 22 hours later. Repetition of radiological examination of thorax remained negative, while radiography of the abdomen revealed a small degree of psoas muscle obliteration, strengthening the suspicion of the presence of retroperitoneal air. Ultrasound examination revealed enlargement of the pancreatic head (Fig. 1), a nonhomogeneous depiction of its echotexture and obliteration of the pancreatic fat (Fig. 2), as far as the obliteration of the duodenum wall. The presence of mild echogenic content into the gallbladder led to high suspicion of hemobilia (Fig. 3). CT and magnetic resonance imaging (MRI) clearly depicted the presence of retroperitoneal air but no signs of extravasations were observed in the CT scan. The diagnosis of pancreatic and duodenal injury was finally established, and the patient was treated conservatively.

### DISCUSSION

Pancreatic injury is relatively uncommon; less than 10% of all instances of abdominal trauma include pancreatic contusions. Only 25% of them result from blunt abdominal trauma.<sup>[5]</sup> The pancreas is vulnerable to crushing injury in blunt trauma due to impact against the adjacent vertebral column. Two-thirds of pancreatic injuries occur in the pancreatic body, and the remainder occur equally in the head, neck, and tail.<sup>[5]</sup> The majority (over 90% of cases) are associated with adjacent organ injuries,

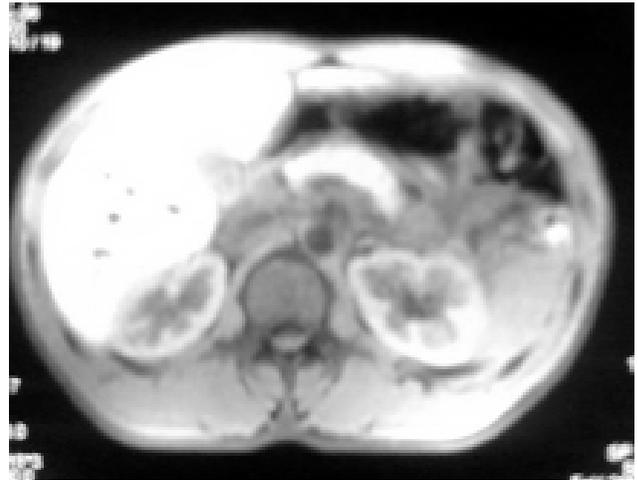


Fig. 1. Enlargement of the pancreatic head.

especially of the liver, gallbladder, stomach and duodenum.<sup>[4]</sup> Isolated pancreatic-duodenal injury is less likely to accompany injury of the kidney.<sup>[6]</sup> Renal injuries accompanying injury of the pancreas resulting from blunt abdominal trauma are rare and have been estimated to occur in only 2.25% of the cases. While renal injuries are easily detectable in both clinical and radiographic imaging examination, pancreatic injuries are difficult to diagnose clinically and in several cases remain occult.<sup>[7]</sup> Symptoms and clinical signs are often non-specific and unreliable, while laboratory examination may be falsely negative. Indeed, amylase and lipase levels in diagnostic peritoneal lavage samples are often negative,<sup>[8]</sup> while the classic triad of fever, leukocytosis and elevation of serum amylase levels is rarely encountered.<sup>[9]</sup> Occasionally, the pancreas may have almost normal

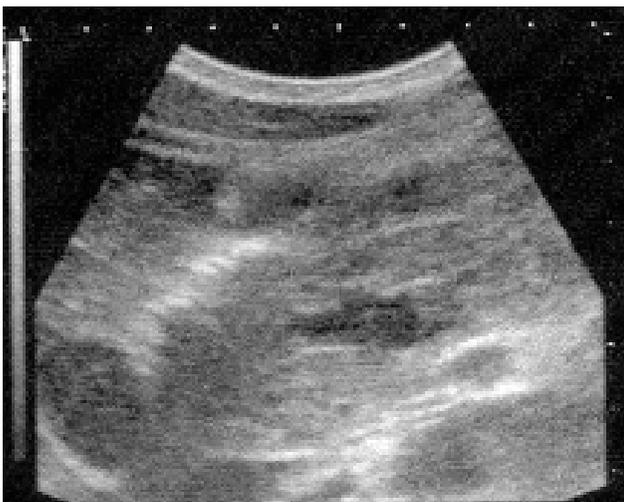


Fig. 2. Nonhomogeneous depiction of pancreatic echotexture - obliteration of the pancreatic fat.

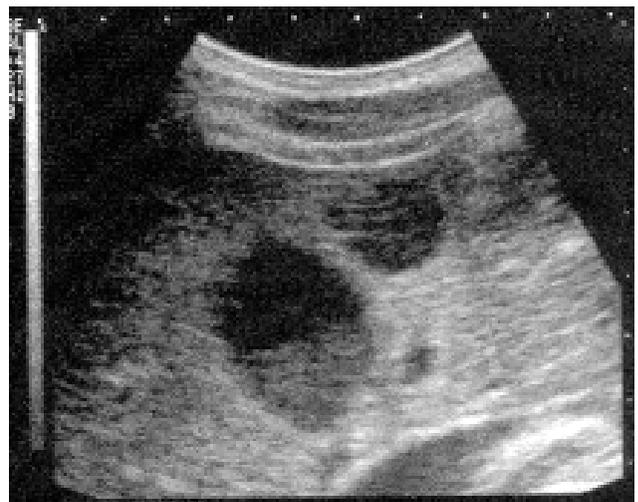


Fig. 3. Hemobilia (mild echogenic content into the gallbladder).

morphologic features on CT despite the presence of duct disruption,<sup>[9]</sup> while in most cases, patients with pancreatic injury usually do not exhibit the whole spectrum of radiologic findings.<sup>[3]</sup> Moreover, findings on radiologic examination are not specific and usually depend on the degree of parenchymal fracture.<sup>[2]</sup> Since early elevation of serum amylase levels may only be seen in up to 73% of cases,<sup>[4]</sup> a rising serum amylase indicating injury to the pancreas requires radiologic re-evaluation. Early diagnosis is crucial, since delayed complications such as fistula, abscess, sepsis, and hemorrhage may lead to significant mortality, occurring in up to 20% of cases.<sup>[2]</sup> Most deaths occur within the first 48 hours following the traumatic event, usually due to acute hemorrhage from injury to the portal vein, splenic vein, or inferior vena cava.<sup>[10]</sup>

Although ultrasonography is not generally recommended for initial assessment of the trauma patient and its role is limited in the follow-up of contained intra- or perihepatic bilomas that are treated conservatively,<sup>[4]</sup> it was demonstrated to be capable for the exploration of solid-organ injuries as well.<sup>[11]</sup> A skilled operator can evaluate gallbladder wall thickness, investigate the presence of intraluminal hemorrhage, and reveal asymmetry and nonhomogeneity of pancreatic parenchyma echotexture and obliteration of the pancreatic fat and of the duodenum wall as well.

In conclusion, in the case of an occult pancreatic injury, such as that reported here, serial laboratory and repeated ultrasound examinations may be determinant in the diagnosis and grading of pancreatic injury if non-operative management is to be undertaken. It would be of interest to keep in mind that the initial CT scan will sometimes miss or underestimate pancreatic injuries; therefore, repetition of radiolog-

ic investigation in patients suspected as having pancreatic injury is crucial. Since the incidence of pancreatic injury is low, the experience of any single institution and radiologist should be increased with systematic examination of the pancreas in everyday ultrasound practice.

## REFERENCES

1. Gibson DE, Canfield CM, Levy PD. Selective nonoperative management of blunt abdominal trauma. *J Emerg Med* 2006;31:215-21.
2. Ilahi O, Bochicchio GV, Scalea TM. Efficacy of computed tomography in the diagnosis of pancreatic injury in adult blunt trauma patients: a single-institutional study. *Am Surg* 2002;68:704-8.
3. Gay SB, Siström CL. Computed tomographic evaluation of blunt abdominal trauma. *Radiol Clin North Am* 1992;30:367-88.
4. Gupta A, Stuhlfaut JW, Fleming KW, Lucey BC, Soto JA. Blunt trauma of the pancreas and biliary tract: a multimodality imaging approach to diagnosis. *Radiographics* 2004;24:1381-95.
5. Akhrass R, Yaffe MB, Brandt CP, Reigle M, Fallon WF Jr, Malangoni MA. Pancreatic trauma: a ten-year multi-institutional experience. *Am Surg* 1997;63:598-604.
6. Ivatury RR, Nallathambi M, Rao P, Stahl WM. Penetrating pancreatic injuries. Analysis of 103 consecutive cases. *Am Surg* 1990;56:90-5.
7. Wilson RH, Moorehead RJ. Current management of trauma to the pancreas. *Br J Surg* 1991;78:1196-202.
8. Carrel T, Lerut J, Niederhauser U, Schweizer W, Blumgart LH. Diagnosis and treatment of traumatic injuries of the duodenum and pancreas: 21 cases. *J Chir (Paris)* 1990;127:438-44.
9. Wong YC, Wang LJ, Lin BC, Chen CJ, Lim KE, Chen RJ. CT grading of blunt pancreatic injuries: prediction of ductal disruption and surgical correlation. *J Comput Assist Tomogr* 1997;21:246-50.
10. Madiba TE, Mokoena TR. Favourable prognosis after surgical drainage of gunshot, stab or blunt trauma of the pancreas. *Br J Surg* 1995;82:1236-9.
11. Sato M, Yoshii H. Reevaluation of ultrasonography for solid-organ injury in blunt abdominal trauma. *J Ultrasound Med* 2004;23:1583-96.