



Delayed retroperitoneal bleeding causing acute abdominal compartment syndrome: case report

Akut abdominal kompartman sendromuna yol açan gecikmiş retroperitoneal kanama: Olgu sunumu

Fikri M. ABU-ZIDAN,¹ Ali JAWAS,¹ Mustafa BORAIE,² Misbah U. AHMED³

Delayed acute abdominal compartment syndrome (ACS) due to retroperitoneal bleeding is rare. Herein, we report the clinical management of such a rare case. A 46-year-old male who fell from a height of 12 meters was admitted to Al-Ain Hospital. He was hemodynamically stable. His abdomen was soft and not distended. Abdominal computed tomography (CT) was normal on admission. On day 7, the patient tolerated enteral feeding. On day 15, he became suddenly hypotensive. CT of the abdomen showed a large retroperitoneal hematoma compressing the inferior vena cava (IVC) associated with contrast blush indicating active bleeding. The abdomen became distended and tense. The patient developed respiratory failure and severe acidosis, increased airway pressure and reduced urine output. A clinical diagnosis of ACS was made. There was dramatic improvement in the hemodynamic and respiratory function directly after laparotomy. Exploration of the retroperitoneal hematoma showed an actively bleeding ligated ileocolic vessel. The abdomen was temporarily closed using saline IV bags sandwiched between two layers of Steri-Drape. The abdomen was closed primarily on day 6. The patient was discharged home on day 50. Life-threatening delayed retroperitoneal bleeding may occur suddenly two weeks after trauma causing ACS.

Key Words: Abdominal compartment syndrome; bleeding; retroperitoneal.

Retroperitoneal kanamaya bağlı gecikmiş akut abdominal kompartman sendromu (AKS) nadir görülür. Burada, böyle nadir bir olgunun klinik tedavisi sunuldu. 12 metre yükseklikten düşen 46 yaşındaki bir erkek, Al-Ain Hastanesine yatırıldı. Hasta hemodinamik olarak stabildi. Fiziksel incelemesinde, karın yumuşaktı, şişkin değildi. Yatırılma sırasında gerçekleştirilen karın bilgisayarlı tomografisi (BT) bulguları normaldi, 7. günde hasta, enteral beslemeyi tolere etti, 15. günde hasta aniden hipotansif hale geldi. BT'sinde aktif kanamayı gösteren kontrast renkle birlikte inferior vena kavaya bası yapan büyük bir retroperitoneal hematoma belirlendi. Karnı, şişkin ve gergindi. Hastada respiratuvar yetersizlik ve ciddi asidoz gelişmiş, havayolu basıncı artmış ve idrar çıkışı azalmıştı. AKS tanısı konuldu. Laparotomiden hemen sonra, hemodinamik ve respiratuvar fonksiyonda dramatik düzelme oldu. Retroperitoneal hematoma ilişkin araştırma, aktif olarak kanayan bağlanmış ileokolik bir damar olduğunu gösterdi. Karın, iki katmanlı Steri-Drape arasına yerleştirilen IV serum fizyolojik torbaları kullanılarak geçici olarak kapatıldı. Karın, 6. günde primer olarak kapatıldı. Hasta, 50. günde evine taburcu edildi. Yaşamı tehdit edici retroperitoneal kanama, AKS'ye yol açan travmadan iki hafta sonra aniden oluşabilir.

Anahtar Sözcükler: Abdominal kompartman sendromu; kanama; retroperitoneal.

Acute abdominal compartment syndrome (ACS) is being recognized more by the treating trauma surgeons. Associated increased intra-abdominal pressure (IAP) causes high airway pressure, reduced cardiac output and oliguria.^[1] Causes of ACS are usually multi-facto-

rial. Retroperitoneal hemorrhage is a well-recognized cause of ACS.^[2] Nevertheless, delayed acute ACS due to retroperitoneal bleeding is rare and may represent a diagnostic dilemma. Herein, we report the clinical management of such a rare case.

¹Trauma Group, Faculty of Medicine, UAE University;
²Department of Critical Care, ³Radiology, Al-Ain Hospital,
Al-Ain, United Arab Emirates.

¹Birleşik Arap Emirlikleri Tıp Fakültesi, Travma Grubu, Al-Ain;
Al-Ain Hastanesi ²Acil Tıp Kliniği, ³Radyoloji Bölümü,
Al-Ain, Birleşik Arap Emirlikleri.

CASE REPORT

A 46-year-old male builder fell from a height of 12 meters on his head. He sustained severe head injury with depressed right frontoparietal bone and comminuted fracture of the left tibia. The patient was hemodynamically stable. His abdomen was soft and not distended. Computed tomography (CT) of the chest and abdomen were normal on admission. The patient was taken to the operating theater on the first

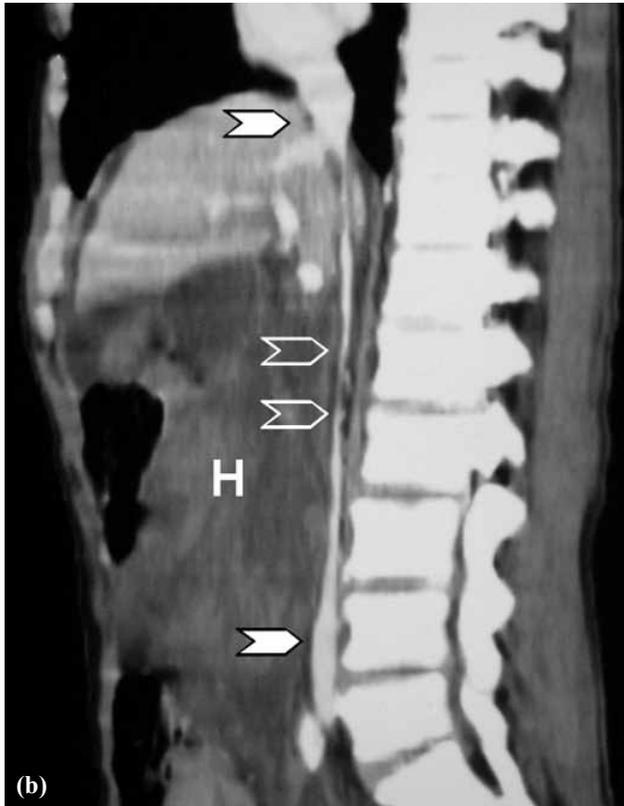
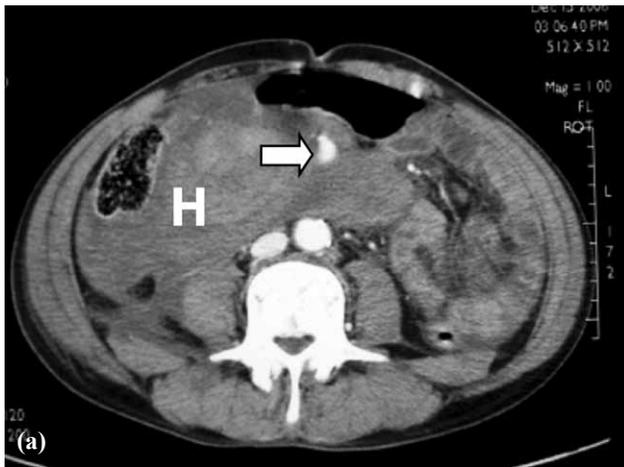


Fig 1. Abdominal CT with intravenous contrast **(a)** showing a large retroperitoneal hematoma (H) compressing the IVC associated with contrast blush (arrow). Sagittal reconstruction **(b)** shows a hematoma (H) compressing the IVC (open arrows). Both the distal and suprahepatic IVC were dilated (closed arrows).

day and underwent decompression of the depressed skull fracture. On day 7, the patient tolerated enteral feeding well. On day 12, he underwent open reduction and internal fixation of the tibia fracture. On day 15, the patient became suddenly hypotensive with blood pressure of 70/40 mmHg and pulse rate of 120 beats per minute. His hemoglobin dropped from 9.6 g/dl to 3.9 g/dl. The patient was actively resuscitated till his blood pressure stabilized. Urgent CT of the abdomen showed a large retroperitoneal hematoma compressing the inferior vena cava (IVC) with a radiological blush indicating active bleeding (Fig. 1a, b). Diagnostic peritoneal lavage was negative. Despite the fact that blood pressure was 160/90 mmHg, the abdomen became more distended and tense and the patient experienced respiratory failure and severe acidosis (pH of 3.72), SpO₂ of 70%, and airway pressure of 35 cm water. Urine output was reduced to 20 ml/hour. A clinical diagnosis of acute ACS was made. Urgent midline laparotomy showed a contained huge central retroperitoneal hematoma without intraperitoneal bleeding (Fig. 2). There was dramatic improvement in the hemodynamic and respiratory function as soon as the abdomen was opened. Exploration of the retroperitoneal hematoma showed a bleeding ileocolic vessel that was partially and tangentially injured. The bleeder was suture ligated. The cecum was viable. The abdomen was closed temporarily using saline IV bags sandwiched between two layers of Steri-Drape with the adhesive surface adherent to the IV bags. The Drape was spread under the abdominal sheath on both sides and then covered with abdominal towels (Fig. 3). Postoperative IAP was 15 mmHg, and had reduced to 10 mmHg on day 4. The patient was taken to the operating theater three times to change the dressing. The abdomen was closed primarily on day 6. The patient was discharged home on day 50 eating a normal diet and without any neurological deficit.



Fig 2. Huge central retroperitoneal hematoma without intraperitoneal bleeding.



Fig 3. Temporary closure of the abdomen using saline IV bags sandwiched between two layers of Steri-Drape with the adhesive surface adherent to the IV bags. The Drape was spread under the abdominal sheath on both sides and then covered with abdominal towels.

DISCUSSION

An international consensus has defined ACS as sustained IAP of 20 mmHg that is associated with new organ dysfunction.^[3] ACS with its high IAP will cause direct compression on the IVC, reduced venous return, increased peak airway pressure, and compression on the renal veins causing oliguria.^[4]

We did not measure the IAP before surgery in our patient because the clinical diagnosis was clear and the decision was made for laparotomy. The dramatic improvement in the hemodynamic and respiratory function as soon as the abdomen was opened confirmed the diagnosis of ACS. Nevertheless, IAP immediately after surgery was still high (15 mmHg, Grade I intra-abdominal hypertension)^[3] and then dropped to normal values at day 4. Measuring IAP routinely could have led to earlier surgery in our patient before he reached the described critical condition.

The acceleration/deceleration injury of this patient is unique as the mesocolon was stretched, causing a partial ileocolic vessel injury. The repeat mobilization of the patient possibly dislodged a clot of the injured vessel on day 15, as evidenced by the dramatic deterioration of the clinical picture and the active bleeding on CT scan. The sagittal reconstruction of the abdominal CT scan was highly informative. It demonstrated the pressure on the central IVC while the suprahepatic

and distal parts were dilated. Although hypovolemia may have contributed to the narrowing of the IVC, the distended portion of the IVC below the level of compression is a radiological sign of ACS.^[5] Furthermore, narrowing of upper abdominal IVC can also be encountered in some patients with increased IAP.^[6]

The advantages of leaving the abdomen open should be weighed against side effects, which are usually late.^[4,7] The open abdomen has an associated mortality of 25%.^[7] The morbid condition of our patient before surgery was the immediate threat. We decided to leave the abdomen open so as to improve the physiological status of the patient. The technique we used to temporarily close the abdomen is inexpensive, non-adherent, minimizes fluid and heat loss, facilitates re-exploration of the abdomen, and decreases mortality.^[7] Nevertheless, the abdominal domain may be lost and there is a risk of evisceration if the abdominal closure is delayed.^[4,7] We were able to close the abdomen in our patient before reaching that stage.

In summary, the mechanism of injury, the delayed acute presentation of ACS, the abdominal CT scan findings, and the dramatic response to surgery were unusual in our patient.

REFERENCES

1. Moore AF, Hargest R, Martin M, Delicata RJ. Intra-abdominal hypertension and the abdominal compartment syndrome. *Br J Surg* 2004;91:1102-10.
2. Sugrue M. Abdominal compartment syndrome. *Curr Opin Crit Care* 2005;11:333-8.
3. Malbrain ML, Cheatham ML, Kirkpatrick A, Sugrue M, Parr M, De Waele J, et al. Results from the International Conference of Experts on Intra-abdominal Hypertension and Abdominal Compartment Syndrome. I. Definitions. *Intensive Care Med* 2006;32:1722-32.
4. Rutherford EJ, Skeete DA, Brasel KJ. Management of the patient with an open abdomen: techniques in temporary and definitive closure. *Curr Probl Surg* 2004;41:815-76.
5. Pickhardt PJ, Shimony JS, Heiken JP, Buchman TG, Fisher AJ. The abdominal compartment syndrome: CT findings. *AJR Am J Roentgenol* 1999;173:575-9.
6. Wachsberg RH, Sebastiano LL, Levine CD. Narrowing of the upper abdominal inferior vena cava in patients with elevated intraabdominal pressure. *Abdom Imaging* 1998;23:99-102.
7. Swan MC, Banwell PE. The open abdomen: aetiology, classification and current management strategies. *J Wound Care* 2005;14:7-11.