Adrenal gland injury after blunt abdominal trauma: Two case series and review of the literature

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ABSTRACT

INTRODUCTION: Adrenal gland injury (AGI) is a rare form of trauma that is often misdiagnosed, especially if isolated.

PRESENTATION OF CASE: Herein we describe two rare cases of adrenal hematoma (AH) and adrenal contusion due to blunt abdominal trauma. A 33-year-old Caucasian male who was transported to the emergency department after a low-speed motorbike accident and a 69-year-old Caucasian female who fell from 50 cm height. Both where complaining of intense pain in the right flank. Neither were under anti-coagulant or anti-platelet therapy. In both patients thoracoabdominal CE-CT revealed the injury.

DISCUSSION: AGI is an uncommon finding in blunt trauma and isolated adrenal injuries usually result from low force accidents. Treatment is most commonly conservative, but depends on patient’s status. In Greece, to our knowledge, these are the first such cases reported in adults.

CONCLUSION: Diagnosis needs high level of clinical suspicion.

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1. Introduction

Adrenal gland injury (AGI) is a rarely described condition, able to happen in both high and low blunt thoracoabdominal trauma. It is usually presented in the form of isolated adrenal hematoma (AH), a very rare entity [1]. Herein we report two cases of isolated AGI due to blunt abdominal trauma. Those entities are described rarely in literature. In Greece, to our knowledge, they are the first such cases reported in adults. The work has been reported in line with the SCARE criteria [2].

1.1. Case 1

A 33-year-old Caucasian male was transported to the emergency department after a low-speed motorbike accident. He had a free medical record with occasional tobacco use. On presentation, the patient had normal vital signs: Blood pressure: 133/91 mmHg, heart rate: 72bpm, peripheral oxygen saturation (SpO2): 100%, Temperature 36.8 °C. He complained of deep right upper quadrant and right flank at rest and right upper limb pain, without evidence of ecchymosis or lacerations on his chest or abdomen. Some superficial abrasions were visible on his right elbow and his right lower quadrant. Physical examination revealed mild tenderness to deep palpation in his right upper quadrant and right flank.

There were no abnormal signs on his blood analysis, metabolic or coagulation panel. Urinalysis revealed mild microscopic hematuria (20–26 erythrocytes per field vision). Chest, spine and pelvis plain radiography was negative for fractures or any other abnormal findings. A focused assessment sonography for trauma (FAST) performed by a clinical radiologist in the Emergency Department revealed no evidence of trauma. An abdominal contrast-enhanced computed tomography scan (CE-CT) was performed due to persistence of pain and high clinical suspicion. The CT revealed round enlargement of the right adrenal (4.2 × 2.7 cm) with increased density (60-70HU), periaxial fat stranding and right diaphragmatic crus thickening without extravasation of the intravascular contrast. No injuries from other organs were spotted and the diagnosis of an isolated right adrenal hematoma (AH) was made (Fig. 1). As a result, he was admitted to the clinic for preservative treatment and further monitoring. He had stable vitals and body temperature throughout his hospitalization period and gradually improving pain after intravenous analgesia. He was discharged with oral antibiotics and analgesia for 6 days. A follow-up MRI scheduled in 7 days, showed no size reduction and acute AH characters with signs of possible active hemorrhage (Fig. 2), whereas, close affiliation of the structures posterior to the injured adrenal gland shows compression...
and chance of shape of the adrenal between the liver and the vertebrae (Fig. 3). The patient was free of symptoms and his urinalysis, metabolic panel and adrenocorticotropic hormone (ACTH) stimulation test performed were normal. New follow-up with abdominal MRI scheduled after 60 days revealed partial resolution of the AH, while the lesion that remained had elements of a chronic hematoma (Fig. 4).

1.2. Case 2

A 69-year old Caucasian female was admitted to the emergency department due to fall from 50 cm height and she was complaining of intense pain in her right flank around the impact area. The examination revealed pain in the lower right thoracic area and right upper quadrant in superficial and deep palpation with no sign of abrasions or ecchymosis. Her vital signs, on presentation, were slightly abnormal (Blood pressure: 150/83 mmHg, Heart rate: 84 bpm, SpO2: 97 %, Body Temperature: 36.7 °C). The patient’s medical history consisted of hypertension under medication and chronic obstructive pulmonary disease (COPD) due to smoking. She did not mention anti-coagulant or anti-platelet use. Chest radiograph showed minor right pleural effusion without rib fractures and FAST did not reveal any evidence of trauma. There were no abnormal findings from her blood analysis, metabolic/coagulation panel, and urinalysis. The patient constantly complained about pain in her right upper quadrant and right flank even after the administration of analgesics. A thoracoabdominal CE-CT was performed to evaluate the origin of pleural effusion and abdominal pain. The CT confirmed the pleural fluid diagnosis as well as mentioned a small round lesion of variable attenuation with a very small focal hyperdense area on the right adrenal, with no active extravasation (Fig. 5). No other traumatic injuries from the chest or abdomen were described. The patient was admitted to the clinic for monitoring. She remained hemodynamically stable but complained of pain and difficulty in deep breath even with IV analgesia. Therefore, a thoracoabdominal CT scan was scheduled. The right adrenal lesion appeared as a more well-defined hypodense oval mass, possibly adenoma, while the rest of the gland was slightly enlarged and hyperdense (Fig. 6). The possibility of mild adrenal contusion was discussed. The pleural effusion remained unchanged and treated conservatively. No other evidence of trauma was concluded from the rest of the radiographic examination. Hyponatremia and hypokalemia remained even after
fluid and electrolyte administration but otherwise she had normal lab values. The patient’s pain improved after three days and was discharged after a 5-day hospitalization with oral antibiotic and pain medication. Unfortunately, the patient was lost on scheduled follow-up.

2. Discussion

Adrenals are small retroperitoneal glands directly below the diaphragm attached to kidneys. They are attached to the crura of the diaphragm by the renal fascia. The right adrenal, is more posteriorly than the left, has the shape of a pyramid and is related anteriorly to the right lobe of the liver and the inferior vena cava (IVC) [3].

The left adrenal is crescent in shape and surrounded by the stomach and the spleen. It is located further from the spine than the right.

The right adrenal vein medially with the spinal column, whereas the left adrenal vein joins the left renal vein. As a result the right adrenal vein is more susceptible to contusions and edema [3]. In most cases described in literature the right adrenal is more likely to undergo AGI [4,5]. In both our patients the trauma was inflicted on the right adrenal.

Force application in a lateral manner provoking minimal damage seems to be the cause of AGI [1]. The first patient underwent a low-speed motorbike accident, whereas the second fall from 50 cm height. Similar reports for children patients have revealed that some part of the adrenal gland was intact [1,6].

Adrenal trauma diagnosis is made solely by imaging tools because of the lack of indicative examinations. Clinical appearance includes vague back pain and physical or laboratory examination might reveal hyper- or hypo-tension, leukocytosis, microscopic hematuria and mild electrolyte disorders [7]. FAST is the most fre-
is most commonly conservative, but depends on patient’s status. Diagnosis needs high level of clinical suspicion.

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**Ethical approval**

The study has been approved by the Ethics committee of St. Andrew’s General Hospital, Patras, Greece, approval number 41541.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Author contribution**

All authors have contributed in study concept and design, data collection, data analysis and interpretation.

**Registration of research studies**

None.

**Guarantor**

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**Declaration of Competing Interest**

The authors declare that they have no competing interests.

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