

Bilateral Post-Traumatic Adrenal Hematoma: A Rare Etiology Not to be Overlooked

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Abstract

The adrenal glands are paired retroperitoneal endocrine organs responsible for the secretion of catecholamines, mineralocorticoids, glucocorticoids, and androgens. Adrenal trauma is uncommon on CT (1 - 2% of blunt trauma cases) but is more frequently identified at autopsy, suggesting underdiagnosis. Post-traumatic adrenal hemorrhage is the most common adrenal injury and usually occurs unilaterally, predominantly on the right side, whereas bilateral hemorrhage is rare but potentially life-threatening because of acute adrenal insufficiency. CT is the imaging modality of choice, typically demonstrating hyperdense adrenal hematomas (50 - 80 HU), adrenal enlargement, lacerations, and surrounding fat stranding. Adrenal injuries are frequently associated with other thoracoabdominal and skeletal traumatic lesions. Diagnosis of adrenal insufficiency relies on clinical suspicion, biochemical abnormalities (hyponatremia, hyperkalemia, hypoglycemia), and hormonal assessment. Prompt corticosteroid replacement with hydrocortisone, correction of electrolyte disturbances, and supportive care are essential. Most adrenal hematomas are managed conservatively with serial CT follow-up, while embolization or adrenalectomy is reserved for ongoing hemorrhage. Bilateral hemorrhage may resolve completely or progress to adrenal atrophy requiring lifelong hormone replacement. In our patient, bilateral adrenal hematomas associated with right adrenal laceration were successfully treated with hydrocortisone and supportive management, resulting in a favorable outcome.

Keywords: *Bilateral Adrenal Hematoma; Abdominal trauma; Computed Tomography (CT Scan); Acute Adrenal Insufficiency; Emergency Management*

Abbreviations

CM: Contrast Agent; CT: CT Scan; IVC: Inferior Vena Cava; MRI: Magnetic Resonance Imaging; ACTH: Adrenocorticotrophic Hormone

Introduction

Bilateral post-traumatic adrenal hematoma is rare, but the problem is that it is underdiagnosed. CT scan allows for early diagnosis as well as an assessment of associated injuries. The main risk is acute adrenal insufficiency, which can be fatal without adequate management. We report a case of bilateral adrenal hematoma following severe trauma, diagnosed by CT scan.

Case Report

A 68-year-old patient with no significant past medical history presented to the emergency department following a fall from the fourth floor. He complained of lumbar pain without any other associated symptoms. The clinical examination revealed that the patient was stable neurologically, respiratory-wise, and hemodynamically. He exhibited a dorso-lumbar ecchymosis, a soft abdomen, and tenderness upon palpation of the lumbar vertebral spinous processes, with a positive percussion sign. Biology: No significant abnormalities were noted, particularly no anemia or signs of adrenal insufficiency. An emergency non-contrast thoraco-abdomino-pelvic CT scan was performed, revealing the following: At the thoracic level: Bilateral basal ground-glass opacities with septal thickening consistent with pulmonary contusions. At the abdomino-pelvic level:

- Bilateral adrenal lesions with a spontaneous hematogenous density (57 HU), the right lesion is located at the body measuring 25 x 20 mm, the left lesion is at the external limb measuring 20 x 12 mm.
- Infiltration of both limbs of the right adrenal gland, suggestive of lacerations.
- Infiltration of the adjacent adrenal fat.
- Left retroperitoneal hematoma measuring 35 x 28 mm.
- Edematous thickening of the left psoas muscle and quadratus lumborum with low-volume retroperitoneal hemorrhage.
- Fracture of the left transverse processes of L2, L3, and L4. Preventive hydrocortisone treatment was administered to the patient. The patient progressively improved without developing long-term adrenal insufficiency. pendant 36 seconds.

Patient aged 68 years with no significant past medical history, who presented to the emergency department following a fall from the 4th floor, he presents with lumbar pain without any other associated symptoms.

The clinical examination found a patient stable neurologically, respiratory-wise, and hemodynamically.

Dorso-lumbar ecchymosis, soft abdomen, tenderness on palpation of the lumbar vertebral spinous processes with a positive percussion sign.

Laboratory tests: No significant abnormalities, particularly no anemia, no signs of adrenal insufficiency.

An emergency thoraco-abdomino-pelvic CT scan without contrast injection was performed, revealing:

- At the thoracic level: Bilateral basal ground-glass opacities with septal thickening consistent with pulmonary contusions.
- At the abdomino-pelvic level: Bilateral adrenal lesions with a spontaneous hematogenous density (57 HU), the right lesion is located in the adrenal body measuring 25 x 20 mm, the left lesion is in the lateral limb measuring 20 x 12 mm.
- Infiltration of both limbs of the right adrenal gland, consistent with lacerations.
- Infiltration of the fat adjacent to the adrenals.
- Left retroperitoneal hematoma measuring 35 x 28 mm.
- Edematous thickening of the left psoas muscle and quadratus lumborum with low-volume retroperitoneal hemorrhage.
- Fracture of the left transverse processes of L2, L3, and L4.
- Preventive treatment with hydrocortisone was administered to the patient, and the patient evolved well without long-term adrenal insufficiency.

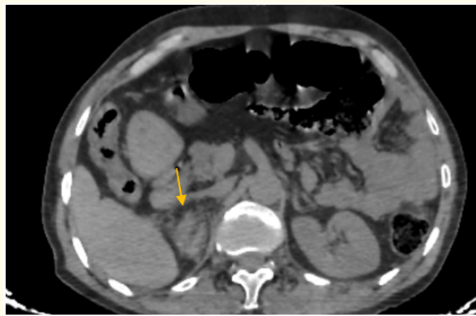


Figure 1: Axial slices of an abdominal CT scan without contrast injection showing edematous thickening of the right adrenal limbs with infiltration of the adjacent fat.

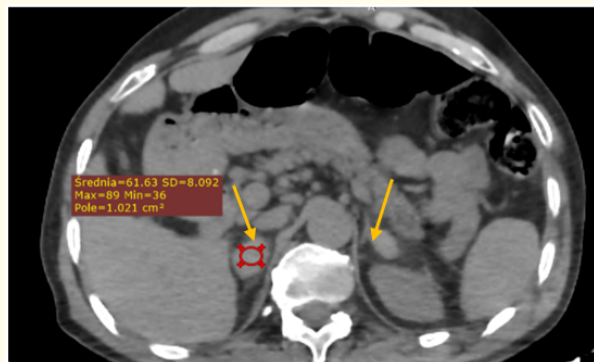


Figure 2: Axial slices of an abdominal CT scan without contrast injection showing two adrenal hematomas.

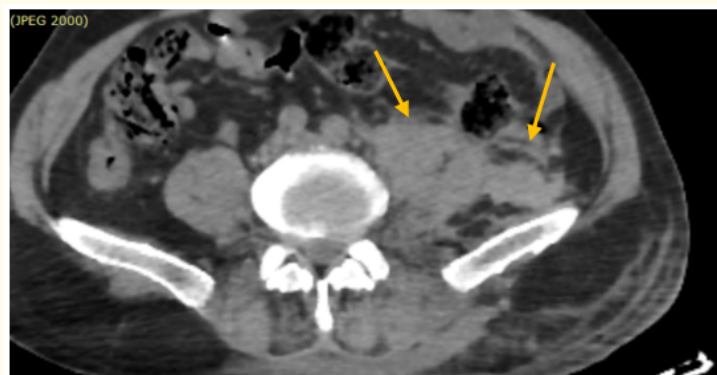


Figure 3: Axial section of an abdominal CT scan showing a hematoma of the left psoas muscle with a retroperitoneal hemorrhage.

Discussion and Conclusion

The adrenal glands are paired retroperitoneal endocrine glands, located at the upper pole of the kidneys, and play an important role in the body's metabolism.

The adrenal gland is composed of the medulla, which secretes catecholamines, and the cortex, which has three layers: the glomerular zone secreting aldosterone, the fascicular zone secreting cortisol, and the reticular zone secreting androgens [1].

The arterial supply is provided by the inferior phrenic artery, the middle adrenal artery directly from the aorta, and the inferior adrenal branch from the lower renal artery [2].

On ultrasound, the adrenal glands are normally not visible in adults.

On CT, the adrenal glands appear either as a Y-shape or an inverted V-shape. The body measures 8 mm in thickness, while the inner and outer limbs measure between 5 and 7 mm. Without contrast injection, they have a tissue density similar to that of the liver or spleen. After contrast injection, they enhance moderately and homogeneously with rapid wash-out.

On MRI, they are isosignal on T1 and T2 compared to the liver, with moderate enhancement.

Adrenal trauma occurs in 1 to 2% of blunt trauma cases on CT scans [3], while in an autopsy series, adrenal injuries were found in 27% of cases [4]. This suggests that adrenal trauma may be underdiagnosed. Adrenal hemorrhage is the most common post-traumatic injury, either due to direct compression or increased venous pressure from compression of the inferior vena cava [5]. It seems that the severity of the shock is not always the determining factor; other factors may contribute to the occurrence of adrenal hemorrhage: stress, hemostasis disorders, whether primary or iatrogenic, and pre-existing adrenal gland lesions [6]. Isolated adrenal trauma is rare and is often associated with other post-traumatic injuries. A complete evaluation is necessary for optimal management [7].

Associated injuries can include pulmonary contusions, pneumothorax, and/or pneumomediastinum, splenic, liver, and/or adrenal lacerations, rib, pelvic, or spinal fractures, as well as brain injuries. Adrenal hemorrhage can also present with hemorrhage in the posterior para-renal space, psoas hematoma, inferior vena cava compression, and thickening of the diaphragm pillars [8].

Our patient had pulmonary lacerations, transverse process fractures, a psoas hematoma, and a retroperitoneal hematoma.

In imaging: adrenal hematomas appear on CT as well-defined adrenal masses at the body or limbs of the adrenal gland, with hemogenous densities ranging from 50 to 80 HU [7]. Lacerations appear as irregular hypertrophy of the adrenal limbs [7]. Infiltration of the peri-renal fat is often present. MRI is rarely used in emergency settings, and hemorrhage appears isosignal on T1 compared to the liver with hyper-signal on T2 [3].

Our patient had bilateral adrenal hematomas, a laceration of the right adrenal limbs with bilateral infiltration of the adjacent fat.

Post-traumatic adrenal hemorrhage is often unilateral, most often on the right, due to potential compression from the liver or spine or increased pressure from direct compression of the inferior vena cava. Bilateral adrenal hemorrhage can be fatal due to acute adrenal insufficiency. Clinical signs of acute adrenal insufficiency are non-specific, especially in the context of polytrauma. Biologically, hyponatremia, hyperkalemia, and hypoglycemia may be found [9]. A low morning cortisol level with normal or elevated ACTH can confirm the diagnosis [9].

Treatment consists of urgent administration of hydrocortisone hemisuccinate or dexamethasone, combined with correction of hydro-electrolytic imbalances. The patient's prognosis depends on the speed of intervention. Most cases of adrenal hemorrhage are managed

conservatively, but transcatheter angiographic embolization and surgical adrenalectomy are potential treatment options for severe or persistent hemorrhage [10]. Follow-up involves iterative CT scans; adrenal hematomas liquefy within four to six weeks. Healing is more or less fibrous without sequelae in the case of unilateral hemorrhage [11].

In the case of bilateral hemorrhage, the lesions may resolve without sequelae, or bilateral atrophy with chronic adrenal insufficiency may occur, in which case lifelong replacement therapy must continue [11].

Follow-up CT scans also help rule out pre-existing masses [11]. In our patient, emergency treatment with hydrocortisone hemisuccinate, combined with hydration, led to favorable clinical progression.

Conflict of Interest

No conflict of interest to declare.

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