Unilateral Adrenal Hemorrhage After Total Knee Arthroplasty

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Abstract

Adrenal hemorrhage (AH) is a rare but serious condition that is often diagnosed at autopsy. Unilateral adrenal hemorrhage (UAH) in adults is extremely rare and is often due to trauma or anticoagulation or is associated with systemic illness. The case of a 73-year-old man who was diagnosed with UAH several days after an elective total knee replacement is presented. The patient had an uncomplicated procedure and he was treated postoperatively with a prophylactic dose of subcutaneous low-molecular-weight heparin and compression sleeves. On postoperative day 8, he reported sustained epigastric and midback pain at the lower thoracic level. He had a temperature of 38.5°C. On clinical examination, the patient expressed only mild tenderness at the lumbar area. Abdominal ultrasound and computed tomography (CT) scan were inconclusive. On postoperative day 13, the patient experienced no pain but remained febrile. An abdominal CT scan revealed a high-density mass on the left adrenal gland suggestive of hemorrhage. The subcutaneous heparin as well as the antimicrobial therapy was discontinued and a serum cortisol examination was done. Serum levels were within normal values in the evening and the morning. On postoperative day 16, all laboratory values returned to normal and the patient was discharged in excellent condition. Patients who have abdominal pain, hypotension, or both soon after initiation of anticoagulation or patients who experience abdominal pain, fever, nausea, or confusion postoperatively should be screened for AH.
Adrenal hemorrhage (AH) is a rare but serious condition that is often diagnosed at autopsy. Classically, it is associated with meningococcal septicemia and disseminated intravascular coagulation (Waterhouse-Friderichsen syndrome), but it is also associated with trauma, hypotension, tumors, complications of pregnancy, antiphospholipid-antibody syndrome, thromboembolic diathesis, shock, and adrenocorticotropic hormone (ACTH) administration.¹

Unilateral adrenal hemorrhage (UAH) in adults is often due to trauma or anticoagulation or it is associated with systemic illness.² The authors report a 73-year-old man who was diagnosed with UAH 13 days after elective total knee replacement.

**CASE REPORT**

A 73-year-old man was admitted to the hospital for elective total knee arthroplasty. His medical history was remarkable for arterial hypertension. The patient had an uncomplicated procedure, and he was treated postoperatively with a prophylactic dose of subcutaneous low-molecular-weight heparin at 40 mg/0.4 mL daily and pneumatic compression sleeves.

On postoperative day 8, he reported sustained epigastric and midback pain at the lower thoracic level. Vital signs were a pulse rate of 75 beats per minute, respiration rate of 20 breaths per minute, blood pressure of 110/65 mm Hg, and temperature of 38.5°C. On clinical examination, the patient expressed only mild tenderness at the lumbar area.

Laboratory findings were remarkable for leukocytosis (white blood cells=16.8×10⁹/µL) with neutrophil predominance (N=81.4%), a slight decrease in hemoglobin level (from 10.2 to 9.1 gm/dL), a notable elevation in alkaline phosphatase (392 units per liter), a notable increase in glutamyl transferase (226 units per liter), and a mild elevation of total serum bilirubin (2.1 mg/dL). No electrolyte disturbances were observed. Radiography of the chest was normal.

Cholangitis was suspected, so an abdominal ultrasound and computed tomography (CT) scan were performed. No obstruction in the biliary tract was noted, but renal calculi were found (Figure 1).

Microscopy of urine showed pyuria, so the patient was treated for a presumed acute pyelonephritis. He started taking ciprofloxacin 600 mg every 12 hours.

On postoperative day 13, the patient experienced no pain but remained febrile. Blood and urine cultures were subsequently negative, so a new abdominal CT scan was performed to evaluate for a possible occult source of infection. A high-density mass on the left adrenal gland suggestive of hemorrhage was revealed (Figure 1).

The subcutaneous heparin and the ciprofloxacin were discontinued, and a serum cortisol examination was done. Serum cortisol level was 16 ng/dL in the evening and 15 ng/dL in the morning (normal values: evening, 4.3-22.4 ng/dL; morning, 3.09-16.66 ng/dL).

On postoperative day 16, laboratory values returned to normal and the patient was discharged in excellent condition.

**DISCUSSION**

Severe acute adrenal hemorrhage is often diagnosed at autopsy due to the patient’s rapid deterioration and vague clinical presentation. Clinical manifestations, such as fever, tachycardia, hypotension, lethargy, and electrolyte disturbances, commonly occur in postoperative patients as well.

Adrenal hemorrhage is a rare complication after joint arthroplasty, most often reported after knee arthroplasty. Of the cases of bilateral adrenal hemorrhage after knee arthroplasty reported in the literature, 3-8 2 cases were diagnosed postmortem. 5,8 The patients all received prophylactic anticoagulation therapy and the symptoms usually developed after postoperative day 6. The most common symptoms and signs were flank pain, fever, nausea, vomiting, weakness, fatigue, confusion, and hypotension. In terms of laboratory tests, hyponatremia, hyperkalemia, and a decrease in hematocrit were noted in the majority of the cases. The nonspecific nature of clinical presentation may lead to a false diagnosis, so in most of the cases patients were treated as having sepsis. 3-8

Unilateral adrenal hemorrhage in adults is rare. A case of UAH in a 45-year-old woman was reported by Friedrichs et al. ⁹ Her medical history was unremarkable. She reported right flank pain, and a CT scan revealed an adrenal tumor. Adrenalectomy was performed and pathology testing showed hemorrhage of adrenal gland. ⁹

Ten cases of spontaneous UAH were reported by Hoeffel et al. ¹⁰ Five patients had a medical history remarkable for arterial hypertension. An association between
Figure 2: Computed tomography scans taken on postoperative day 13 showing a high-density mass measuring 4 cm on the left adrenal gland, suggestive of hemorrhage.

Hematomas and a benign tumor was noted in the other cases. Six patients reported flank pain, whereas the finding of hematoma in CT scan was incidental (incidentaloma) in the other patients.\textsuperscript{10}

Hoeffel et al\textsuperscript{2} also presented the clinical histories and the CT and magnetic resonance imaging findings for 8 patients with UAH. Four patients were asymptomatic, 3 had acute abdominal pain, and 1 had chronic lumbar pain. Three patients had a history of hypertension. Adrenal function was normal in 6 patients.\textsuperscript{2}

Kobayashi et al\textsuperscript{11} reported a 64-year-old woman who presented with a giant mass in the upper left quadrant of the abdomen. She had been treated previously for hypertension. She had never received anticoagulants and denied any trauma. Adrenalectomy was performed and the pathology test was positive for hemato-ma.\textsuperscript{11}

Gavrilova-Jordan et al\textsuperscript{12} reported a case of symptomatic UAH in the third trimester of pregnancy in a young woman. She reported flank pain and fever. The diagnosis was made using magnetic resonance imaging. She had slightly decreased adrenal function. She was successfully managed conservatively.\textsuperscript{12}

Vella et al\textsuperscript{13} summarized 141 cases of adrenal hemorrhage in patients older than 15 years using data from the Mayo Clinic over a 25-year period; of them, 63 were unilateral. Of the UAH cases, 14 were spontaneous, meaning spontaneous hemorrhage of the adrenal gland occurred with acute abdominal pain in the absence of trauma or anticoagulation. Of the cases of UAH, 8% developed systolic hypotension, 22% developed a fever, and 38% had abdominal findings on examination.\textsuperscript{13}

Steensrud et al\textsuperscript{1} reported a case of UAH that worsened or was initiated by systemic thrombolytic therapy given for a suspected myocardial infarction. The patient was admitted in a circulatory unstable condition. The diagnosis was made using CT scan, and the patient underwent a successful adrenalectomy.\textsuperscript{1}

No reports of UAH following surgery are found in the literature. Most cases are associated with trauma, anticoagulation, hypertension, sepsis, pregnancy, and benign tumors. In the majority of cases, the symptoms of flank pain and fever are attributed to other medical conditions because they are nonspecific and adrenal hemorrhage is rarely suspected.

The current patient had 2 of those risk factors: hypertension and anticoagulation therapy. The patient’s symptoms, including fever and flank pain, in combination with the laboratory findings, led to the possible diagnosis of acute pyelonephritis.

Usually, acute adrenal insufficiency is caused by bilateral adrenal hemorrhage, although cases of adrenal insufficiency caused by unilateral adrenal hemorrhage have been reported. In an autopsy series by Knight\textsuperscript{14} where fatal unilateral hemorrhage was observed, the author concluded that the opposite adrenal gland was exhausted with reduced or absent cortical lipid. In the autopsy series by Xarlil et al,\textsuperscript{15} 5 of 22 patients had massive unilateral hemorrhage with a varying degree of contralateral involvement.

The current patient developed fever and flank pain without any sign of acute adrenal insufficiency, which was confirmed by examination of the blood cortisol levels.

Abdominal CT is the most reliable and widely available method for detecting AH. Of note, normal findings on abdominal CT early in the clinical course do not rule out the presence of hemorrhage. Therefore, repeated scans are needed if clinical suspicion is high. In the current patient, the second abdomen CT taken 5 days after the onset of pain was indicative of UAH. The possibility of adrenal tumor was extremely low because the mass was not present 5 days previously.

**CONCLUSION**

Adrenal hemorrhage is a heterogeneous clinical entity that occurs in various situations. The clinical picture may be subtle and symptoms may easily be attributed to other causes, causing the diagnosis to be delayed or missed. Therefore, patients who have abdominal pain, hypertension, or both soon after the initiation of anticoagulation and patients who experience postoperative abdominal pain, fever, nausea, or confusion should be screened for AH.

In cases of UAH, especially in the case of incidentaloma, CT, magnetic resonance imaging, or both can be useful for suggesting the nature of tumor, but care is needed for differentiating this rare entity from an unknown adrenal tumor.

**REFERENCES**

2. Hoeffel C, Legmann P, Luton JP, Chapuis Y, Fayet-Bonnin P. Spontaneous unilateral adre-


