Renal trauma in a single-kidney patient: an open clinical case


ABSTRACT

Traumatic injury is the most common type of kidney lesion. Blunt injuries are caused by automobile accidents, falls, and injuries sustained in fistfights. Penetrating trauma is produced by gunshot or stab wounds. Renal injury is staged according to the American Association for the Surgery of Trauma scale. Evaluation of the patient with penetrating trauma should focus on rapid identification and care of life-threatening injury. Traumatism rarely causes death, except in the case of renal avulsion or important renal vein or renal artery injury.

The case of a 19-year-old man with left nephrectomy due to kidney injury five years before is presented. He was attacked again, resulting in a stab wound in the right thoracolumbar region. Upon hospital admittance, he presented with hypovolemic shock with 100% right hemothorax and contained perirenal hematoma. Evidence of contrast medium leakage was seen in the arterial phase of a computed tomography scan. An intrapleural catheter was placed, obtaining 1030 cc of bright red blood. Right posterolateral thoracotomy was performed, obtaining 1600 cc of blood with no sign of injury in the pulmonary parenchyma or diaphragm. Intercostal artery injury and seventh costal arch fracture were identified. The patient presented with hemodynamic instability twenty-four hours later; exploratory laparotomy was carried out that revealed a hemoperitoneum with 2000 cc and partial amputation of the upper pole at the pole superior in cara posterior del riñón derecho con

RESUMEN

Las lesiones renales más comunes son las ocasionadas por trauma. Las contusas son causadas por accidentes automovilísticos, caídas y lesiones por riñas. El trauma penetrante se produce por armas de fuego o punzocortantes. Las lesiones renales se estadifican según la escala de la Asociación Americana de Cirugía de Trauma. La valoración del paciente con trauma penetrante debe enfocarse en la rápida identificación y atención de lesiones, que pongan en riesgo la vida. Excepto en avulsión renal o lesión importante de la arteria o vena renal, los traumatismos rara vez causan la muerte.

Se presenta el caso de paciente masculino de 19 años de edad, con nefrectomía izquierda por trauma renal hace cinco años. Es agredido nuevamente, produciendo lesión en región toracolumbar derecha con arma punzocortante. A su ingreso presentó choque hipovolémico con presencia de hemothórax derecho del 100%, hemotórax perirrenal contenido y evidencia de fuga de medio de contraste, en la fase arterial de tomografía computada. Se colocó sondabdomopleural, obteniéndose 1 030 cc de sangre de color rojo rutilante. Se realizó toracotomía posterolateral derecha, extrayéndose 1 600 cc de sangre, sin evidenciar lesión en parénquima pulmonar ni diafragma, se identificó lesión en arteria intercostal y fractura de séptimo arco costal. Veinticuatro horas después presentó inestabilidad hemodinámica, se practicó laparotomía exploradora, encontrando 2 000 cc de hemoperitoneo y amputación parcial de polo superior en cara posterior del riñón derecho con
posterior surface of the right kidney with active bleeding from the anterior apical artery. The apical artery was tied and the upper pole was sutured. The postoperative progression of the patient was satisfactory.

**Keywords:** Penetrating renal trauma, single kidney, American Association for the Surgery of Trauma, Mexico.

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**INTRODUCTION**

Of all the lesions of the genitourinary tract, renal injury due to external trauma is the most common. It is essential to obtain all the details related to the trauma mechanism since diagnostic and therapeutic approach is different, depending on the type of injury (blunt or penetrating). Blunt renal injury is often caused by automobile accidents, falls, and injuries sustained in fistfights. The majority of cases of penetrating renal injury are secondary to injury caused by gunshot or stab wounds.1

Clinical signs of renal injury include ecchymosis, flank or abdominal pain or rigidity, fracture of the ribs or vertebrae adjacent to the kidney, gross hematuria, injury associated with the abdominal organs, and shock. In penetrating trauma, these clinical characteristics present in a variety of forms and kidney involvement should be suspected in all cases in which the injury is located near the kidney.2 More than 90% of patients will have some other associated injury and the majority are intra-abdominal. It is worth noting that in more than 50% of penetrating kidney trauma cases, no hematuria is observed.3

Renal injury is staged according the severity scale of organ injury from grades I-V established by the American Association for the Surgery of Trauma (Figure 1) (Table 1).4

Initial evaluation of the patient with penetrating trauma in the urinary tract should be focused on rapid identification and care of life-threatening injuries. Except in cases of kidney avulsion or important main renal artery or renal vein injury, genitourinary traumatism rarely causes death.

Whenever possible, information should be gotten as to the injury mechanism, type of weapon used (size, caliber), number and location of wounds, past history of diseases or previous injury to the genitourinary tract, whether the patient is taking medication, and patient allergies.

During the secondary evaluation, special attention should be paid to physical examination of the abdomen, pelvis, and external genitals to identify any sign of genitourinary injury.5

Computed tomography (CT) scan with intravenous contrast medium is the imaging diagnostic method of choice for staging penetrating renal trauma in the hemodynamically stable patient. Initial CT scans usually miss some injuries of the kidney pelvis and ureter and therefore late images 10 minutes after intravenous contrast agent administration should be taken in order to evaluate contrast medium extravasation when an injury of this type is suspected.6

Definitive treatment will depend on kidney injury grade and the hemodynamic status of the patient.

The objective of this paper is to present a clinical case of renal trauma in a single-kidney patient.

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**CASE PRESENTATION**

The patient is a 19-year-old man with a past medical history of left nephrectomy due to grade IV kidney trauma caused by a stab wound in February 2006. The patient’s present condition began 5 hours prior to hospital admittance after being stabbed by a third party in the right thoracolumbar region. He came to the emergency room presenting with tender fascia, poorly hydrated oral mucosa, pallid skin and teguments, lethargy, and time disorientation. Vital signs on admittance were: blood pressure of 70/50 mmHg, heart rate of 110 beats per minute, respiratory rate of 26 breaths per minute, and body temperature of 36° C.

Physical examination showed a wound of approximately 2 cm in length in the right posterolateral surface of the thorax at the level of the 7th costal arch, no bladder murmur, diminished vocal vibration, dullness upon right hemithorax percussion, and no alterations in the left hemithorax; abdominal scar at the supra-infraumbilical midline from previous exploratory laparotomy, the abdomen was flat, there was voluntary muscle rigidity and pain upon mid and deep palpation in the right hypochondrium and flank, diminished peristalsis, and no alterations in the thoracic or pelvic members. Laboratory tests upon admittance reported: Hb 13.9 g/dL, Htc 42.2%, leukocytes 9.9 x 10³, platelets 162,000, glucose 133 mg/dL, creatinine 1.3 mg/dL, BUN 10.5 mg/dL; Urinalysis blood ++++, erythrocytes: 3502. Chest X-ray: hazy right hemithorax. CT scan: perirenal hematoma with contrast agent (Figure 2). Right intrapleural catheter was placed, draining 1030 cc of bright red blood at the moment of placement.

Right posterolateral thoracotomy was carried out obtaining 1600 cc of blood from hemithorax and showing no evidence of injury in the pulmonary parenchyma or the diaphragm. Intercostal artery injury and fracture of the 7th costal arch were identified. The bleeding vessel was tied. The patient was taken to the Intensive Care Unit and 24 hours after surgery he became hemodynamically unstable, presenting with the following vital signs: blood pressure of 70/40 mmHg, heart rate of 120 beats per minute, respiratory frequency of 27 breaths per minute, body temperature of 35°C. Control laboratory tests reported: Hb 8.7 g/dL, Hct 25.7%, platelets 45,000, glucose 87 mg/dL, creatinine 2.49 mg/dL, and BUN 20.1 mg/dL. Because the patient did not improve, exploratory laparotomy was performed revealing a hemoperitoneum of 2000 cc and hematoma in zones I and II of the retroperitoneum. Vascular control of the renal artery and renal vein was carried out and partial amputation of the upper pole at the posterior surface of the right kidney with active bleeding from the anterior apical artery was identified (Figure 3). The apical artery and kidney upper pole raphe were sutured with separate mattress stitches and an omentum patch (Figure 4). Intestinal segment distention and intra-abdominal hypertension risk were managed with open abdomen with Bogotá bag placement. The patient had adequate postoperative progression and was released from the hospital 18 days after surgery.

**Discussion**

In upper urinary tract injury, urologic evaluation is an immediate management priority. In cases of important vascular injury of the main renal artery or renal vein, renal angiography with selective embolization can be both a diagnostic and therapeutic resource, but it requires more time and specialized equipment and is not available in many hospital centers. 7

The need for surgical management in renal trauma depends on injury severity classified by the American Association for the Surgery of Trauma scale and on the hemodynamic state of the patient. A patient that is hemodynamically stable with a correctly staged injury by means of CT scan can usually be managed expectantly without the need for surgery. Even in grade IV and V injuries, surgery can be avoided in well-selected patients. Patients with high grade injury (grades III-V) that have been selected for conservative management should

<table>
<thead>
<tr>
<th>GRADE</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>I</td>
<td>CONTUSION</td>
<td>Micro or gross hematuria, normal imaging studies</td>
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<tr>
<td></td>
<td>HEMATOMA</td>
<td>Non-expanding subcapsular hematoma with no laceration of the parenchyma</td>
</tr>
<tr>
<td>II</td>
<td>HEMATOMA</td>
<td>Non-expanding hematoma confined to the retroperitoneum</td>
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<tr>
<td></td>
<td>LACERATION</td>
<td>&lt;1 cm of depth in the renal cortex without urinary extravasation</td>
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<tr>
<td>III</td>
<td>LACERATION</td>
<td>&gt;1 cm of depth in the renal cortex without rupture of the collecting system or urinary extravasation</td>
</tr>
<tr>
<td>IV</td>
<td>LACERATION</td>
<td>Laceration of the parenchyma that extends through the cortex, medulla, and collecting system</td>
</tr>
<tr>
<td>V</td>
<td>VASCULAR</td>
<td>Main renal artery or vein injury with contained hemorrhage</td>
</tr>
<tr>
<td></td>
<td>VASCULAR</td>
<td>Renal hilum avulsion, devascularized kidney</td>
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</table>

The American Association for the Surgery of Trauma
be kept under close surveillance with hematocrit measurement and control CT. Patients with grade IV injury (parenchymal laceration greater than 1 cm involving the collecting system or main renal artery injury) that present with contained hematoma and that are stable, can be managed with strict surveillance. If contrast agent extravasation is identified serial CT should be carried out, and if it persists for more than 48 hours, a ureteral catheter should be placed for the purpose of reducing perirenal urinoma formation risk.1

Surgical exploration indications in patients with renal trauma can be classified as absolute and relative. Absolute indication includes: evidence of persistent kidney bleeding, expanding perirenal hematoma, pulsatile hematoma, and hemodynamic instability. Relative indications include: urinary extravasation, non-viable tissue, late diagnosis of arterial injury, and segmental arterial injury.1

Renal trauma patient progression can have complications of urinoma, perirenal abscess formation, and even kidney unit loss. Some patients can develop hypertension secondary to perirenal hematoma that causes parenchymal compression, developing an entity known as Page kidney.8

- CONCLUSIONS

The identification of injuries, adequate patient evaluation, and correct treatment of associated injuries are the cornerstones of penetrating renal trauma management. With the exception of cases of renal avulsion and main renal artery and vein injury with significant hemorrhage, penetrating renal trauma is rarely a cause of death.

REFERENCIAS