Conservative management of synchronous bilateral blunt renal injuries

Bruce L. Jacobs, MD, Marc C. Smaldone, MD, Kartik Prabhakaran, BS, Stephen V. Jackman, MD

Department of Urology, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania

JACOBS BL, SMALDONE MC, PRABHAKARAN K, JACKMAN SV. Conservative management of synchronous bilateral blunt renal injuries. The Canadian Journal of Urology. 2008;15(3):4115-4117.

The kidney is the most commonly injured urologic organ, with most injuries occurring unilaterally. We report a rare case of synchronous bilateral renal hematomas in an 87-year-old restrained driver involved in a motor vehicle accident and briefly review the management of renal trauma, including the indications for operative intervention. This case demonstrates that in select cases bilateral renal injuries can be managed conservatively.

Key Words: bilateral renal trauma, arterial embolization, renal hematoma

Introduction

Injury to the renal parenchyma and vessels is well documented following blunt traumatic injury. However, synchronous bilateral renal hematomas constitute a rare manifestation of traumatic blunt injury, having only been reported once previously in the literature. For isolated unilateral blunt renal injuries, in the absence of life-threatening hemorrhage, nonoperative conservative management is the preferred treatment modality.[1] We present a case of conservative management of synchronous bilateral blunt renal injuries in an 87-year-old male with multiple comorbidities involved in a motor vehicle accident. Delayed hemodynamic instability prompted angiographic evaluation and unilateral embolization and operative intervention was avoided.

Accepted for publication April 2008

Address correspondence to Dr. Bruce L. Jacobs, Department of Urology, University of Pittsburgh School of Medicine, 3471 5th Avenue, Suite 700, Pittsburgh, PA 15213-3232 USA

Case

An 87-year-old male presented as a Level II trauma after having been involved in a head-on collision with another motor vehicle as a restrained driver. Upon presentation, the patient's Glascow Coma Scale score was 14, but he was intubated in the trauma bay due to concern for aspiration. A non-contrast computed tomography (CT) scan of the chest, abdomen, and pelvis revealed multiple rib fractures, a C7 vertebral body fracture, a right renal subcapsular hematoma (grade I) with compression of the right kidney and a left subcapsular and perinephric hematoma (grade II), Figure 1a. In addition, perihepatic, perisplenic and right adrenal hematomas were noted. The patient's past medical history was significant for mild chronic renal insufficiency (baseline creatinine (Cr) of 1.5 mg/dl), hypertension, diabetes, and a right ureteral stricture following abdominal aortic aneurysm repair managed with chronic ureteral stent changes.

In the trauma bay the patient was normotensive, and initial laboratory evaluation revealed a hematocrit

of 38% and a Cr of 1.5 mg/dl. A foley catheter was placed with return of clear urine, and his urine culture grew > 100,000 colonies/ml of *Pseudomonas aeruginosa*. Although this was thought to represent urinary tract colonization from his chronic stent, broad spectrum antibiotic therapy (pipericillin/tazobactam) was initiated to cover both aspiration pneumonia and the urinary tract. Twenty-four hours after admission, the patient became tachycardic and hypotensive and his hematocrit dropped to 18%. He was transfused five units of packed red blood cells and a repeat non-contrast CT was obtained which demonstrated an increase in the right renal subcapsular hematoma, Figure 1b. The patient was emergently transferred to the interventional radiology suite where a selective renal arteriogram was performed. This demonstrated active extravasation of contrast from small branches off both the right upper and lower segmental renal artery branches, Figure 2a. Endovascular coils were placed and repeat imaging demonstrated no active hemorrhage, Figure 2b. A left renal arteriogram did not reveal any areas of active hemorrhage.

Despite successful embolization and stabilization of renal function, hemodialysis was initiated over the next 72 hours due to severe volume overload. The patient developed respiratory failure requiring re-intubation and multi-system organ failure as a result of worsening sepsis from a presumed pulmonary source. On post-trauma day 21 the patient was changed to comfort measures only and he expired shortly thereafter.

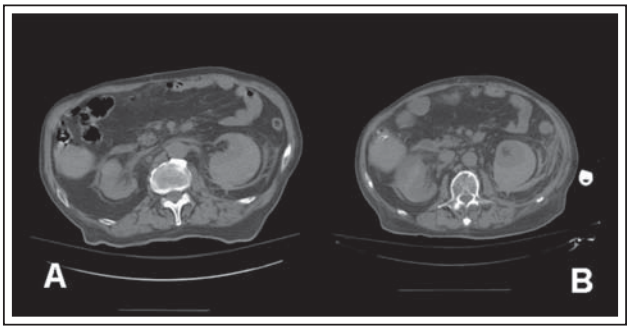

Figure 1. A) Non-contrast computed tomography scan of the abdomen obtained on admission, revealing a right subcapsular (grade I) and a left perinephric (grade II) renal hematoma. Contrast administration was avoided due to the patient's underlying renal insufficiency. B) Repeat non-contrast CT of the abdomen taken 24 hours after admission revealing an interval increase in the size of the right subcapsular hematoma.

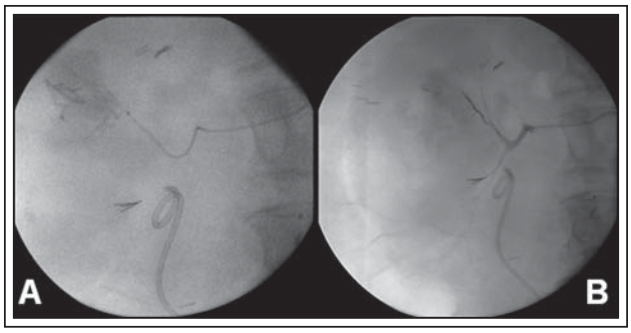

Figure 2. Twenty-four hours after presentation the patient became hemodynamically unstable with a significant drop in his hematocrit. A) Selective right upper pole renal angiogram performed after lower pole coil placement revealed persistent extravasation of contrast. B) Post-embolization films demonstrated no further evidence of hemorrhage.

Discussion

Renal injury occurs in up to 5% of abdominal trauma cases, with 90% of such renal injuries occurring secondary to blunt trauma to the abdomen or flank.[1] The American Association for Surgical Trauma classification scheme grades renal injuries from I–V, with contusion or non-expanding subcapsular hematoma characterized as a grade I injury and non-expanding perirenal hematoma or laceration < 1 cm without urinary extravasation as a grade II injury. Subcapsular hematomas are uncommon and usually manifest as a high-density fluid collection between the renal parenchyma and capsule. They carry the risk of compressing renal parenchyma, causing decreased perfusion leading to hypertension or renal insufficiency. In contrast, non-expanding perinephric hematomas are more common and carry a smaller risk of renal parenchyma compression.[2]

Our patient presented with a right renal subcapsular hematoma (grade I) and a left subcapsular and perinephric hematoma on CT scan (grade II) after blunt trauma with rapid deceleration. Since the patient was intubated shortly after arrival to the trauma bay, he was unable to be evaluated for typical symptoms of kidney injury such as abdominal or flank tenderness. On exam, he did not have a flank hematoma or gross hematuria, although he did have multiple rib fractures on CT. His initial urine analysis had 52 RBC's and 170 WBC's, which most likely reflected colonization from his chronic stent or possibly a urine infection. However, his microhematuria, defined as > 5 RBC's per high power field, could have also been a result of his kidney trauma.

Blunt trauma with gross hematuria, with microhematuria and shock (systolic blood pressure less than 90 mmHg), or with a significant mechanism of injury such as a rapid deceleration are indications for imaging.[3] The best modality for diagnosing renal injury is CT.[4,5] Intravenous pyelogram (IVP), which used to be the most common modality for imaging renal trauma, is less effective than CT but still has a limited role in the intra-operative setting; a one-shot IVP can be done 10 minutes after IV infusion of 2 mg/kg of contrast material in order to assess the function of the contralateral kidney and to stage the injured side.[6] MRI, although as good as CT for assessing renal injury, is only selectively used due to increased cost and imaging time.[6]

Most renal injuries are minor lacerations (grade I and II) and may be observed conservatively with bedrest, frequent physical examinations, and serial hematocrits. Patients should remain on bedrest until gross hematuria clears. Patients with major renal lacerations (grade III-V) may be selected carefully for nonoperative management. The only absolute indication for renal exploration is life-threatening hemorrhage relating to renal injury in which case patients usually present in severe shock and rarely have had imaging before emergency laparatomy.[7] Relative indications for repair include devitalized renal fragments, significant vascular injury, urinary extravasation, and an incompletely staged renal injury.[8] Oftentimes, the decision to explore a renal injury is dependent on the management of concomitant injuries.[6] In select cases, the success of nonoperative management may be enhanced by the use of angiographic embolization.[1] Given our patient's age, chronic renal insufficiency, grade I and II injuries to the right and left kidneys, respectively, and hypotension that was responsive to resuscitation, we thought embolization would provide the best chance of hemorrhage control and preservation of as much kidney function as possible. Furthermore, in this case renal exploration would be complicated by the possible need to explore both kidneys.

Both bilateral renal artery thrombosis[9,10] and ureteropelvic junction disruption[11] have previously been described. However, synchronous bilateral perirenal hematomas resulting from blunt injury is a rare occurrence that has been reported only once previously. Lin et al described a 46 year-old restrained back-seat passenger involved in a motor vehicle accident with a CT scan revealing bilateral renal subcapsular hematomas without evidence of other injuries that was attributed to seatbelt compression.[12] Conservatively managed, a CT scan at 12 months showed near-complete resolution and there was no negative effect on renal function.

Although unclear, retroperitoneal tethering of the urinary tract following abdominal aortic aneurysm repair likely contributed to the bilateral nature of our patient's injury. Initially managed with supportive measures, angiography was performed after acute onset of hemodynamic instability secondary to delayed right renal hemorrhage. Following embolization, the patient's hematocrit remained stable throughout the remainder of his hospitalization and repeat radiographic evaluation showed no evidence of continued hemorrhage.

Management of bilateral renal injury requires a careful balance between operative and non-operative modalities to minimize the risk of renal insufficiency. This patient already had mild chronic renal failure and a chronic ureteral stricture. Despite his poor outcome due to advanced age and multi-system organ failure, this case demonstrates that selected bilateral renal injuries can be managed conservatively. □

References

1. Santucci RA, Wessells H, Bartsch G et al. Evaluation and management of renal injuries: consensus statement of the renal trauma subcommittee. *BJU Int* 2004;93(7):937-954.
2. Smith JK, Kenney PJ. Imaging of renal trauma. *Radiol Clin North Am* 2003;41(5):1019-1035.
3. Miller KS, McAninch JW. Radiographic assessment of renal trauma: our 15-year experience. *J Urol* 1995;154(2 Pt 1):352-355.
4. Federle MP, Brown TR, McAninch JW. Penetrating renal trauma: CT evaluation. *J Comp Assist Tomogr* 1987;11(6):1026-1030.
5. Bretan PN Jr, McAninch JW, Federle MP et al. Computerized tomographic staging of renal trauma: 85 consecutive cases. *J Urol* 1986;136(3):561-565.
6. Alsikafi NF, Rosenstein DI. Staging, evaluation, and nonoperative management of renal injuries. *Urol Clin North Am* 2006;33(1)13-19.
7. Master VA, McAninch JW. Operative management of renal injuries: parenchymal and vascular. *Urol Clin North Am* 2006;33(1):21-31.
8. Lynch TH, Martinez-Pineiro L, Plas E et al. EAU guidelines on urological trauma. *Eur Urol* 2005;47(1):1-15.
9. Frassinelli P, Pasquale MD, Reckard C et al. Bilateral renal artery thrombosis secondary to blunt trauma: case report and review of the literature. *J Trauma* 1997;42(2):330-332.
10. Van der Wal MA, Wisselink W, Rauwerda JA. Traumatic bilateral renal artery thrombosis: case report and review of the literature. *Cardiovasc Surg* 2003;11(6):527-529.
11. White MA, Kepros JP, Zuckerman LJ. Bilateral partial ureteropelvic junction disruption after blunt trauma treated with indwelling ureteral stents. *Urology* 2007;69(2):384.e15-17.
12. Lin PH, Bush RL, Lumsden AB. Bilateral renal subcapsular hematoma subsequent to seat belt compression. *J Trauma* 2004;57(1):198.