

Management of Blunt Renal Trauma: a Profile of 65 Patients

N. Iqbal (Department of Urology and Renal Transplantation, Allama Iqbal Medical College, Jinnah Hospital, Lahore.)

M.N. Chughtai (Department of Urology and Renal Transplantation, Allama Iqbal Medical College, Jinnah Hospital, Lahore.)

Abstract

Objective: To outline the pattern and trends in the management of patients of renal trauma at the Department of Urology and Renal Transplantation, Jinnah Hospital, Lahore, from January 1998 to June 2003.

Methods: We retrospectively reviewed 65 patients identified with blunt renal trauma.

Results: Of 65 patients of renal trauma, injuries were graded I to V in 18 (27%), 9 (14%), 13 (20%), 16 (24%) and 9 (14%) respectively. Nephrectomy was done in all patients of Grade V and in 3 patients of Grade IV injury. Two patients in each group of grade IV and V died of associated injury. Rest of the patients were treated conservatively with blood transfusion, parenteral fluid, antibiotics, analgesics and bed rest. Of 53 patients treated conservatively two (4%) developed fever and eight (15%) hypertension. Two (4%) patients of grade III underwent delayed exploration for perinephric collection.

Conclusion: Conservative management of blunt renal trauma without associated abdominal injury is feasible in patients who are hemodynamically stable at presentation (JPMA 54:516;2004).

Introduction

Renal trauma accounts for more than 50% of all genitourinary trauma cases, nearly 90% of them corresponding to blunt trauma.¹ Incidence is higher in male with male to female ratio of 3:1. It is more frequent in between the second and third decades.² Based on severity, renal injuries were divided in five grades using the classification of the organic injuries survey committee from the American Association of Surgery in Trauma (AAST).³ Staging begins with excretory urography as soon as the intravenous lines are established for resuscitation. CT scan has proved to be an effective means of staging renal trauma.⁴ Abdominal sonography has not been shown to add information during initial evaluation of severe abdominal trauma. Most renal trauma (75% to 85%) are classified as minor (Grade I to III). Majority of them is treated conservatively. The remaining 15% of cases represent major injuries (Grades IV to V), 5% are grade V. Surgery is limited to patients with grade V pedicle avulsion and in patients hemodynamically unstable despite aggressive resuscitation.⁵ The relative indications for renal exploration can be nonviable tissue, urinary extravasation, incomplete staging, and arterial thrombosis. These injuries may coexist with bleeding, and it is this combination that lead to

renal exploration.⁶ Transcatheter embolization is an effective alternate to surgical intervention for the management of traumatic bleeding sites.⁷ There is little controversy about the proper management of renal trauma.⁸ We evaluated 65 of our cases of blunt renal trauma and share our experience here.

Patients and Methods

We retrospectively analyzed data of all patients who presented in Jinnah Hospital Emergency after blunt renal trauma from 1998 to 2003. Patient's data was obtained from trauma register, chart review and radiological trauma films. Patient's age, sex, injury mechanism, degree of hematuria, resuscitation measures, treatment options, operative findings, duration of hospitalization and complications were recorded. Hemodynamically unstable patients at presentation were resuscitated and stabilized before imaging. The renal injuries were graded according to AAST.⁸ (Table 1) Conservative management consisted of continuous hemodynamic monitoring, parenteral fluid therapy with crystalloid, colloid or blood transfusion, hematocrit determination, prophylactic antibiotics and bed rest until gross hematuria settled. Early complications were assessed during hospital stay and late complications from patient's record when they returned to hospital.

Statistical Analysis

Descriptive statistics were used to analyze the data with SPSS version 10.6

Results

The mean age of the 65 patients was 29+12.1 ranging 18 to 65 years. There were 59 (90%) males (Figure). Forty five (69%) were involved in motor vehicle accident, 13 (20%) were pedestrians struck by an automobile and rest of the patients 7 (11%) had history of

Table 1. Organ injury scale for kidney.

Minor	
1	Parenchymal contusion Subcapsular hematoma
2	Parenchymal laceration less than 1cm deep Perirenal hematoma confined to renal retro peritoneum
3	Parenchymal laceration greater than 1cm. deep without collecting system involvement
Major	
4	Parenchymal laceration into collecting system
5	Parenchyma shattered Hilar avulsion with renal devascularization

fall on blunt objects. Of 65 patients 40 (61%) had gross hematuria, while 13 (20%) had microscopic hematuria. Four patients underwent emergency surgical operation before urinalysis. No hematuria was present in 8 (12%) patients. Renal injuries were graded I to V, 18 (27%), 09(14%), 13(20%), 16 (24%) and 9 (14%) cases respectively (Table 2). All patients of grade V and three patients of grade IV underwent nephrectomy. Of 9 patients of grade V, 6 had shattered kidneys and 3 were with pedicle avulsion. Two patients in each group of grade IV and V died of associated injury. All other patients were treated conservatively. No death was observed in non-operative group.

Table 2. Patient's distribution according to grade of blunt renal trauma (n=65).

Grade	No.	Percentage
I	18	27
II	9	14
III	13	20
IV	16	24
V	09	14
Total	65	

Discussion

Blunt renal trauma is the most common mechanism accounting for 80 to 85% of all renal injury. Blunt renal trauma may be classified as minor or major.³ Blunt trauma due to motor vehicle is the most common mechanism of renal injury.¹ Motor vehicle accident was also the major cause of blunt renal trauma (89%) in our study. All the patients with grade IV and V injuries in our study were involved in motor vehicle accidents. It seems that a large impact force is required to cause major injury.¹ Rest of the patients 7(11%) had history of fall on blunt objects. The mean age of the 65 patients was 29+12.1 years ranging from 18 to 65 years. Renal trauma tends to be more in young than in elders.⁹

The presence of gross hematuria (60%), microscopic hematuria (13%) and absence of hematuria (12%) indicates that evaluation of patient of renal trauma should be based on both clinical judgment and the presence of hematuria.⁵ Hai et al. had reported absence hematuria in 2.8% cases of major injuries.¹⁰

Sixty two percent renal injuries were graded minor (Grade I, II, III) and 38% as major (Grade IV and V). There is general consensus on conservative treatment for renal contusion & surgical management for shattered kidney and major renal pedicle injury.⁷ The literature is both in favor and against conservative management of major renal trauma.¹¹⁻¹³

Complete exposure of the kidney is required to identify all injuries.¹⁴ A midline trans abdominal approach is preferred for exploration of both renal and associated abdominal injuries. The retroperitoneal incision over the aorta just above the inferior mesenteric artery makes the vascular control significantly better. Incising the retro peritoneum lateral to colon makes the kidney approaches easy.¹⁵

All viable tissue should be preserved. Bleeding should be controlled. Renal capsule preservation makes later reconstruction possible. Repair of the collecting system should be water tight to prevent urinary extravasation.⁵ The renal parenchymal injury is repaired with absorbable suture through capsule for strength. The absorbable gelatin sponge may be used to add strength. The renal parenchymal defect can be covered with pedicle flap of omentum.¹⁶ In case of blunt trauma and arterial thrombosis, after 12 hours of ischemia, the chance of salvage is remote.¹⁷

In our study all patients of grade V and three patients of grade IV underwent nephrectomy. Indication of laparotomy was hypotension (not responding to resuscitation) and acute abdomen. Two patients in each group of grade IV and V died of associated injury. The blunt renal trauma contributes to associated injuries of pancreas, liver, spleen and intestine and need for surgical exploration. The large impact force may be the cause of parenchymal injury to other intra-abdominal organs.^{1,18} Tso et al reported associated injury of spleen and liver 12% each, in children.¹⁹

All other patients were treated conservatively. No death was observed in non-operative group. The concept of conservative treatment of blunt renal trauma is not new. All patients of Grade, II, III and 81% of Grade IV in our study were treated conservatively. Indication of exploration was hypotension and acute abdomen. Hemodynamic

stability was the indication for conservative management. This data supports the conservative approach of Clarisa C et al showing the nephrectomy rate for Grade IV 0%.⁵ In future, use of argon laser to facilitate the welding of the edge of injured renal parenchyma will further decrease the rate of nephrectomy.²⁰

Conservative approach is not without complications. Robert et al in his study showed pyelonephritis (9%), residual perinephric fluid collection (36%) and ureteral stenting for urinary extravasation in 36% cases.²¹ Open drainage for perirenal infection was 7% of the patients treated conservatively. Due to poor follow up and short number of patients in our study exact incidence of complications cannot be explained. Of 52 patients treated conservatively 2 (4%) developed fever and 8 (15%) developed hypertension. Two (4%) patients of grade III underwent delayed exploration for perinephric collection.

References

1. Ataman AL, Haas C, Kurt H, Dinchman KH, et al. Selective non-operative management of blunt grade 5 renal injury. *J Urol* 2000;164:27-31.
2. Carmona-Campos EC, Prieto CR, Regueiro-lopez JC, et al. Evaluation and treatment of closed renal trauma. *Acta Urol* 1998; 22:23-8.
3. Moore EE, Shackford SR, Pachter HL, et al. Organ injury scaling: spleen, liver and kidney. *J Trauma* 1989; 29:1664-6.
4. Eastham JA, Wilson TG, Ahlering TE. Radiological assessment of blunt renal trauma. *J Trauma* 1991;31:1527.
5. Hammer CC, Santucci RA Effect of institutional policy of non-operative treatment of grade I to VI renal injury. *J Urol* 2003;169:1751-3.
6. McAninch JW, Carroll PR. Renal exploration after trauma. Indication and reconstructive techniques. *Urol Clin North Am* 1989,16:203-11.
7. Larsen DW, Pentecost MJ: Embolotherapy in renal trauma. *Semin Interv Radiol* 1992;9:13.
8. Carroll PR, McAninch JW. Operative indication in penetrating renal traumas. *J Trauma* 1985;8:1071-81.
9. Abou-Jaoude WA, Sugarman JM, Fallat ME, et al. Indication of genitourinary tract injury or anomaly in cases of pediatric blunt trauma. *J Pediatr Surg* 1996;31:86-9.
10. Hai MA, Pontes JE, Pierce JM , Jr. Surgical management of major renal trauma: a review of 102 cases treated by conservative surgery. *J Urol* 1977;118:7.
11. Cass AS, Luxenberg M, Gleich P, et al. Long term result of conservative and surgical management of blunt renal lacerations. *J Urol* 1987;59:17-20.
12. Santucci RA, McAninh JW, Safir M, et al. Validation of the American Association for the surgery of trauma organ injury severity scale for the kidney. *J Trauma* 2001;50:196.
13. Mathews LA, Smith EM, Spirnak JP. Non-operative treatment of major blunt renal laceration with urinary extravasation. *J Urol* 1997;157:2056.
14. Moudouni SM, Hadj Slimen M , Manunta A , et al. Management of major blunt renal lacerations: is a non-operative approach indicated? *Eur Urol* 2001;50:409-14.
15. McAninch JW, Carroll PR. Renal trauma: kidney preservation through improved vascular control - a refined approach. *J Trauma* 1982;22:285-9.
16. Mounzer AM, McAninch JW, Schmidt RA. Poly glycolic acid mesh in repair of renal injury. *Urology* 1986;28:127-30.
17. Cass AS, Luxenberg M. Conservative or immediate surgical management of blunt renal injuries. *J Urol* 1983;130:11-16.
18. Knudson MM., MacAninch JW, Gomez R, et al. Hematuria as a predictor of abdominal injury after blunt trauma. *Ann Surg* 1992;164: 485-6.
19. Tso EL, Beaver BL, Haller JA, Jr. Abdominal injuries in restrained pediatric passengers. *J Pediatr Surg* 1993; 28:915.
20. Hussain M Hamid R. Pattern and management of genitourinary trauma in a tertiary care center in Pakistan: analysis of 450 cases. *J Nephrol Urol Transplant* 2002;3:6-10.
21. Robert M, Drianno N, Muir G, et al. Management of major blunt renal lacerations: surgical or non-operative approach? *Eur Urol* 1996,30:335.