

Conservative Management of Renal Trauma: Ten Years Experience

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Objective: To evaluate the feasibility of conservative approach for renal injury patients and its impact on nephrectomy rate.

Setting: Salmaniya Medical Complex, Division of Urology, Department of Surgery.

Design: Retrospective study.

Method: A review of renal trauma patients from 1995 to 2005 was done. Data were collected from the records of these patients.

Result: Thirty-eight cases of renal trauma were reviewed; 29 were males and 9 were females. Most patients had renal injury due to blunt abdominal trauma (37 patients) and one patient had penetrating injury due to stabbing. On presentation, 24 patients had gross hematuria and 14 patients had microscopic hematuria. Renal injury Grading were: grade 1 (24 patients), grade 2 (4 patients), grade 3 (2 patients), grade 4 (6 patients), and grade 5 (2 patients). Associated injuries were: rib fracture (3 patients), spleen injury (3 patients), liver injury (2 patients), pelvic fracture (1 patient), head injury (1 patient) and femur fracture (1 patient). Most patients had CT scan or ultrasound on initial imaging for staging of renal trauma. Only five patients were admitted in the intensive care unit and nine patients received blood transfusions. Nephrectomy rate in this study was 5.2% (2 patients) and both had grade 4 blunt renal injury.

Conclusion: Conservative management in renal injury patients with hemodynamic stability is a feasible option and can maintain a low nephrectomy rate.

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Renal injury occurs in almost 1-5% of abdominal traumas since the kidney is the most susceptible genitourinary organ¹. The majority of renal injuries are due to blunt trauma². The American Association of Surgery of Trauma had classified the renal injuries into grades which reflect the expected morbidity and mortality from the trauma³. The injury severity and injury scaling along with hemodynamic instability are predictors of nephrectomy after blunt and penetrating renal injury⁴. The classification of renal injury was proposed in 1989 and validated in 2001 by a retrospective study of 2,847 patients; Grade 1 injury is a contusion or subcapsular hematoma, Grade 2 is a cortical laceration less than 1cm without urinary extravasation, Grade 3 is cortical laceration more than 1cm, Grade 4 is a laceration through corticomedullary junction or segmental artery or vein injury, and Grade 5 is a shattered kidney or renal pedicle injury³.

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The recent trend for the management of renal trauma is expectant or conservative therapy. From the middle of the last century, non-operative management was proposed and has become the standard of care for most blunt renal injuries⁵. The criteria for renal exploration have been narrowed to absolute and relative indications which were supported by several studies, which were peer-reviewed by WHO and Societe International D'Urologie. The absolute indications for operative intervention include: life-threatening hemorrhage from renal injury, renal pedicle avulsion (Grade 5 injury), and expanding, pulsatile retroperitoneal hematoma. The relative indications are large laceration of the renal pelvis or pelviureteric junction, co-existing pancreatic or bowel injuries, persistent urinary leakage or urinoma after failed percutaneous or endoscopic treatment, abnormal intraoperative one-shot IVP, devitalized parenchymal segment with urinary leak, complete renal artery thrombosis of both kidneys or a solitary kidney, renal vascular injuries after failed angiographic management and renovascular hypertension⁶.

By adopting a policy of selective non-operative management of renal injuries, the nephrectomy rate can be reduced along with the morbidity of renal exploration without an increase in complications^{7,8}. In blunt trauma, most injuries may be managed non-operatively even in settings of urinary extravasation and non-viable tissue. Bluntly injured kidneys seem to heal well; this observation was seen in a series of over 2900 blunt renal traumas from San Francisco General Hospital, only 2.6% of patients were managed operatively with less than 0.7% nephrectomy rate⁹.

This previous policy was been adopted in the Salmaniya Medical Complex, Bahrain. The aim of this study is to review the renal trauma patients in the last ten years. The outcome of the conservative management was assessed to justify its use as the standard of care for most renal trauma patients.

METHOD

This is a retrospective study of renal injuries between 1st January 1995 and 31st December 2005. The files of these patients were reviewed for personal characteristics, grade of renal injury, presentation to the emergency, mechanism of injury, hemodynamic status, imaging modality used for assessment, associated injuries and operative intervention if any.

RESULT

Thirty-eight cases of renal injury were seen during the last ten years; twenty-nine patients were male and nine were female. The average age was 24.3 years (7 months to 66 years). The most common mechanism of injury was blunt trauma sustained from a road traffic accident (37 patients). Only one penetrating injury due to stabbing was seen.

Left sided renal traumas were 20 patients and right-sided were 17 patients, one patient had bilateral renal trauma. The majority of patients presented with gross hematuria (24 patients) and fourteen cases had microscopic hematuria. Four patients (10.5%) were hemodynamically unstable, one patient had grade one renal injury, another had grade two injury and two had grade four injury.

The grades of renal injury were as follows: 24 patients had grade 1 injury, 4 patients had grade 2 injury, 2 patients had grade 3 injury, 6 patients had grade 4 injury and 2 patients had grade 5 injury. Other injuries included rib fractures in 3 patients (7.9%), spleen injury in 3 (7.9%), liver injury in 3 (7.9%), pelvic fracture in one (2.6%), head injury in one (2.6%), and fractured femur in one (2.6%).

Patients were initially imaged with either CT scan (17 patients) or ultrasound (14 patients). Five patients had both ultrasound and CT scan on the day of presentation. Two patients had intravenous urography. Only five patients were admitted to the intensive care unit for monitoring.

Blood transfusions were required for nine patients (23.7%); two patients had grade 5 injury, four had grade 4 injury, two had grade 2 injury and one had grade 1 injury. The average number of packed red cells units given were 3 (1-6).

Two patients (5.2%) underwent nephrectomy and both patients had a grade 4 renal injury with hemodynamic instability. The nephrectomies were done after failure of conservative therapy. The average hospital stay for most patients was 11.5 days (1-60 days). Other injuries were the cause of long hospitalization.

Ten patients (26.3%) were followed up with radiological assessment in the outpatient clinic. Seven patients had ultrasound and three patients had CT scan to evaluate renal function and resolution of the renal injury.

DISCUSSION

Renal trauma management was steered towards conservative approach in the last century. Literature reviews and studies validate the approach and several urological associations have published evidence-based recommendations according to the outcomes reviewed^{5,6,10}. This approach had reduced nephrectomy rate and unnecessary operative intervention once seen in renal traumas⁵.

In blunt trauma, most renal injuries can be managed non-operatively even in the settings of urinary extravasation and non-viable tissue. In this study, most patients (97.3%) had blunt renal trauma which is the most common mechanism of injury accounting for 90-95%^{1,11,12}. Renal trauma mainly affects the young; the mean age of large retrospective series is 20-30 years, which correlates to our population with a mean age of 24.3 years⁶. Most studies found that more males sustain renal trauma than females⁶. This observation was attributed to male participation in high-risk activities, such as, high-speed motor vehicle crashes, contact sports or violent crime^{2,13,14}. In this study, most of the patients presented with renal injury were male (76.3%) and only nine patients were female.

On presentation, urine analysis is essential when suspecting a renal injury. However, there is no correlation between the degree of hematuria (gross or microscopic) and the

severity of renal injury^{5,6,10,15}. In high grade renal injuries (grade 4 and 5), hematuria is absent in almost 18% and microscopic in 27%^{6,16}. All patients in this study had hematuria, 24 patients (63.3%) had gross hematuria and 14 (37%) had microscopic hematuria. There was no relationship between the grade of injury and the amount of hematuria.

The objectives of initial imaging in renal trauma is to accurately stage the injury, identify other pre-existing problems in the kidney, document the renal function of the other kidney and identify other associated injuries^{6,17}. Recommendations by the European Association of Urology and other societies (WHO and SIU) for the radiological assessment of renal injury is that contrast-enhanced CT scan should be done when there is suspicion of renal trauma in a hemodynamically stable patient^{6,15}. Ultrasound in experienced hands is useful in giving information about the renal injury but its resolution is inferior to CT scan and does not provide information about renal function^{6,15}. Only 44.7% of patients in this study had CT scan on initial imaging; others had ultrasound and five patients had both imaging modalities. The ultrasound results did not coincide with the CT scan results when both modalities were done. One patient was staged as grade one injury by ultrasound but was found to have grade three injury on CT scan.

Most renal injuries are minor. Major renal injuries make up 4-25% of blunt traumas. In penetrating trauma, high grade renal injuries account for 27-68%^{18,19,20}. The majority of our cases (78.9%) had low grade blunt renal injury. One patient had penetrating renal injury, grade four.

Numerous centers have been using hemodynamic instability as the only absolute indicator for immediate operative intervention in both adult and pediatric population⁵. All hemodynamically stable patients in this study were managed expectantly. Four patients were unstable hemodynamically but were not solely related to the renal injury because they had other associated injuries.

The nephrectomy rate in this study was 5.2% (2 patients), both had grade four blunt traumas with hemodynamic instability. Nephrectomy rate differs in each institution due to the policies they follow. However, the largest series from San Francisco General Hospital over 26 years had a rate of 11% in high grade renal injury compared to Ohio series, which had 0% nephrectomy rate^{9,21}.

Follow-up imaging of the kidney is essential to evaluate the renal function after renal trauma and to evaluate any complications, such as, urinoma or delayed hemorrhage. Grade 1-3 injuries with hemodynamic stability and no devitalized tissue, no further imaging is needed. It is advisable to repeat CT scan after 36-72 hours in grade 4 lacerations⁶. Patients with grade 4 and 5 renal injuries should be evaluated after the trauma with documentation of renal function by quantitative assessment with radionuclide scintigraphy, regardless of the method of treatment¹⁶. In this study, the follow-up of patients was unsatisfactory since only 10 patients (26.3%) had radiological assessment after the trauma. None of the high grade renal injuries had radionuclide scan

to assess renal function and no follow-up was done for complications such as arteriovenous fistula or renovascular hypertension.

CONCLUSION

Conservative management is a feasible option even in high grade blunt renal injuries as long as patient is hemodynamically stable. This method of treatment can reduce the nephrectomy rate and salvage the kidney in an emergency setting.

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