Management of Blunt Renal Trauma in Srinagarind Hospital: 10-Year Experience

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Background: *Renal trauma is the most common injury in the urogenital system. In the last decade the management has been shifted from a mandatory exploration to conservative treatment. So, the present study was conducted to evaluate the result of renal trauma patients.*

Material and Method: *The data of renal trauma patients treated at Srinagarind Hospital since 1 January 1998 to 31 December 2007 was collected. Clinical data and trauma score were obtained via medical record review.*

Results: *Sixty-nine patients were included; 59 were male (82%). Mean age was 29.8 years (1-68 years). Forty-nine patients (80%) were injured by traffic accident. Eighteen percents of patients also had splenic injury. Fifty-five patients (80%) of blunt renal injury patients were treated by Non-Operative Management (NOM). In this group, most patients had grade I injury (39%). Mean injury severity score (ISS), revised trauma score (RTS), trauma and injury severity score (TRISS) were 20, 7.3, and 0.93, respectively. Successful rate of non-operative management was 87.2%. Mean hospital stay was 11.8 days and urinary tract infection was the most frequent complication (10%).*

Fourteen patients (20%) underwent surgery. Mean ISS, RTS, TRISS were 20.8, 5.5, and 0.72, respectively. In the operative group, 71% were grade 5 injury and almost all were treated by nephrectomy. Mean hospital stay was 19 days.

Conclusion: *Blunt injury is the major cause of renal trauma and the main mechanism is traffic accident. The success rate of Non-Operative Management in Srinagarind Hospital was high. However, operative management is still the standard treatment in unstable patients.*

Keywords: *Renal trauma, KUB trauma, Abdominal trauma*

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Urogenital system injury is a rare condition with devastating outcome leading to permanent renal dysfunction. Kidney injuries are seen in 8-10% of abdominal trauma patients[1] and mostly in patients with multiple trauma and severe trauma of lower parts of abdomen or pelvis. Blunt trauma is the major cause of kidney injury.

The management of renal injuries relies on the assessment of the hemodynamically stable patient using computed tomography (CT) and unstable patients using laparotomy and intra-operative one-shot intravenous urography. Grading of renal injuries is performed using the American Association for the Surgery of Trauma organ injury severity scale[2].

Most kidney injuries can be managed by Non-Operative Management (NOM)[3-5]. Intervention or surgical procedure still must be reserved for hemodynamically unstable patient due to renal bleeding or renovascular injuries[6-8]. The absolute indications for renal exploration continue to be life-threatening hemorrhage from a renal source with associated instability, pulsatile perirenal hematoma (which is suggestive of a grade V vascular injury), and active extravasation of intravenous contrast[9-11]. The relative reasons for operative exploration include associated intra-abdominal injury of the colon or pancreas, a devitalized segment with urinary extravasation, and persistent urinoma with a failed ureteral stent or percutaneous management[12-14]. Urinary extravasation is the most common complication associated with renal trauma. Most patients with extravasation will improve spontaneously (74% to 87%)[15,16]. For persistent cases, the use of a retrograde stent or percutaneous nephrostomy typically result in resolution[17].

Srinagarind Hospital is one of the tertiary cares in northeastern Thailand. Non-Operative Management of renal injuries has gained much support.

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But there as yet are no reports concerning the result of such management. The objective of this research is to study the outcome of management of renal injury in the Srinagarind Hospital.

This project was approved by the Khon Kaen University Ethics committee (The Helsinki Declaration: HE521112).

Material and Method

Medical records of the patients who were diagnosed blunt renal trauma injury at Srinagarind Hospital between 1 January 1999 and 31 December 2008 were reviewed. Patient characteristics, mechanism of injury, grading of renal injury and associated injury were recorded. Management strategy was classified into 2 groups: Non-Operative Management (NOM) group and Operative management group. Outcome of each methods were analyzed. Additionally, mean hospital stay, mean ICU stay and blood transfusion were recorded.

Results

During 1 January 1999-31 December 2008, 80 patients were diagnosed with renal injury in Srinagarind Hospital. Six patients were excluded due to missing data (3 patients) and iatrogenic injury (3 patients). Seventy-four renal trauma patients were included in the present study. Sixty-nine patients (93%) were blunt injury and 5 patients (7%) were from penetration injury (Fig. 1).

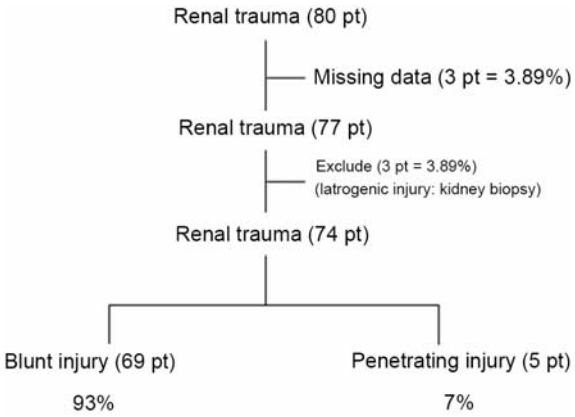

Fig. 1 Population study and mechanism of injury.
pt = number of patients

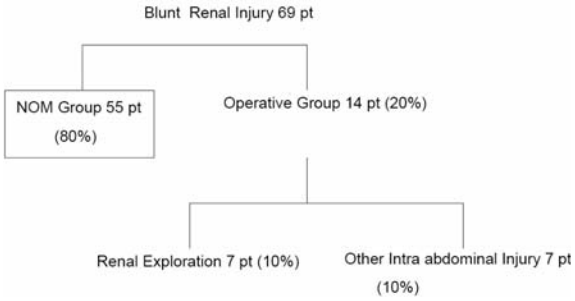

Fig. 2 Management strategy of blunt renal trauma patients.
pt = number of patients

Sixty-nine blunt renal trauma patients were included in the present study; 59 were male (82%). Mean age was 29.8 years (1-68 years). Fifty-five patients (80%) had no underlying disease. Mechanism of blunt renal trauma patients were traffic accidents, 49 patients (42%), falling injury 10 patients (14%), blunt object 5 patients (7%) and body assault 4 patients (6%) and sporting injury 1 patients (1%). Associated injuries can be classified into extra-abdominal and intra-abdominal associated injury. The most common extra-abdominal associated injury was head injury; spleen was the most common intra-abdominal injury.

Fifty-five renal trauma patients (80%) were managed by NOM. Fourteen renal trauma patients (20%) were managed by Operative procedure (Fig. 2).

In NOM group, mean ISS, RTS, TRISS was 20, 7.3 and 93, respectively. Most common grading of renal injury in this group was grade 1 (39%). Grade 2-5 injury was 22%, 13%, 24% and 2%, respectively. In operative group, mean ISS, RTS, TRISS was 20.8, 5.5, and 72.2, respectively. In this group only 2 degrees of severity were found. Grade 5 injury was 71% and grade 4 injury was 29%.

Successful rate in NOM group was 87.2% (48 of 55 patients). Three patients had died due to associated injury, 2 patients had severe head injury and 1 patient developed massive hemothorax. Four patients failed in NOM: one patient developed peritonitis that needed surgical intervention and 3 patients had serious complication during treatment. One patient developed pseudoaneurysm that needed exploratory laparotomy (EL) with nephrectomy. One patient developed infected urinoma; percutaneous drainage was performed but did not result in adequate drainage. One patient developed delayed bleeding; embolization was performed but bleeding could not be stopped. Finally, EL with partial nephrectomy was performed in both patients (Table 1).

In operative group, 7 of 14 patients were operated due to renal injury cause. The most common procedure was nephrectomy (6 in 7 patients). Exploratory Laparotomy with ureteropyeloplasty was

performed in 1 patient. In this group, 1 patient was died due to severe head injury, 1 patient developed abdominal compartmental syndrome that needed EL with temporary abdominal closure.

In NOM group, mean hospital stay was 11.8 days (1-54 days), mean ICU stay was 0.5 days (0-9 days), mean packed red cell (PRC) was 1.6 units (0-16 units). In operating group, mean hospital stay was 19 days (1-74 days), mean ICU stay was 5.14 days (0-23 days), mean PRC was 5.14 units (0-9 units) (Table 2).

Penetrating renal injury was founded in 5 renal injury patients. The entire patient population was male. Mean age was 31 years (19-40 years). Two patients were injured by knife. Three patients were injured by gun shot.

Mean ISS, RTS, TRISS was 20.8 (13-26), 6.8 (6-7.8) and 93.7 (86-98), respectively. Mean severity grading of renal injury was 2.4 (1-4). Associated injuries were found in all patients. Hemothorax was founded in 3 patients. Splenic injury, pancreatic injury and colon injury was found in 2 patients. Diaphragm injury, liver injury and duodenal injury was found in 1 patient.

In penetrating injury patients, all of the patients were sent to operative management. Only 3 patients were operated due to renal injury cause. Repair lower pole of the left kidney was performed in 2 patients and right nephrectomy was performed in another one.

Mean hospital stay was 24.6 days (7-70 days). Mean ICU stay was 6.6 days (0-17 days). Mean PRC was 5.8 units (0-8 units). All patients in this group survived treatment.

Complication of renal injury in the operating group was found in 2 patients. One patient developed abdominal compartmental syndrome that needed temporary abdominal closure. One patient developed pneumonia after the operation.

Discussion

According to the obtained results from the present study, renal injury developed in a small portion of abdominal traumatic patients (4.37%). However, these injuries may lead to mortality, urogenital dysfunction, neglecting them could cause serious sequelae. Patient mean age was 20-30 years and may be because of a traumatic pattern which mostly affects the youth. Regarding gender, Males were enrolled 4.5 times more than females in the present study. More than 90% of patients were from blunt injury. The most common mechanism was traffic accident. Non-Operative Management (NOM) was the treatment of choice in stable patients. Most of patients could be managed conservatively. Successful rate of NOM at our institute was 87.2% when compared to 87.1%[9] and 90%[17] in previous studies. In failed NOM patients,

Table 1. Management outcome in NOM group

Non-operative Group (55Pt)		
Successful NOM	Death	Failed NOM
48/55 pt (87.2%)	3/55 pt (5.5%) Severe head injury: 2 pt Massive hemothorax: 1 pt	4/55 pt (7.3%) Peritonitis: 1 pt - Avulsion of upper pole of kidney Complication: 3 pt - Pseudoaneurysm : 1 pt - Infected urinoma : 1 pt - Delayed bleeding : 1 pt

pt = number of patients

Table 2. Mean hospital stay, mean ICU stay and mean PRC used in NOM group and Operative group

	Non-operative group (55 pt)	Operative group (7 pt)
Mean hospital stay	11.8 days (1-54)	19.00 days (1-74)
Mean ICU stay	0.5 days (0-9)	5.14 days (0-23)
Mean PRC used	1.6 units (0-16)	5.14 units (0-9)

pt = number of patients

the authors was found that 3 patients died due to serious associated injury, 1 patient failed due to immediate sequale complication (developed peritonitis) and 2 patients failed due to late sequale complications (infected urinoma, delayed bleeding) and unsuccessful radiological intervention. In operating group, the most common surgical procedure was exploratory laparotomy with nephrectomy.

The authors found that the mortality rate in operative group was higher than the NOM group (5% vs. 36%). The cause of all deaths did not come from renal injury. Mean trauma score and renal injury grading in the operating group were higher than the NOM group.

Conclusion

Blunt injury was the major cause of renal trauma and the main mechanism was from a traffic accident. The success rate of Non-Operative Management in Srinagarind Hospital was high and should be the management of choice in most renal trauma patients who are hemodynamically stable. Although delayed intervention may be required, complications can often be treated with retrograde stent or percutaneous methods. However, operative management is still the standard treatment in unstable patients.

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Potential conflicts of interest

None.

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การรักษาผู้ป่วยที่ได้รับบาดเจ็บที่ไตจากการกระแทกในโรงพยาบาลศรีนครินทร์

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วัตถุประสงค์: การบาดเจ็บของไตเป็นการบาดเจ็บที่พบได้มากที่สุดในระบบทางเดินปัสสาวะและระบบสืบพันธุ์ ส่วนมากเป็นการบาดเจ็บจากการกระแทก ซึ่งการรักษาในปัจจุบันนั้นมีทั้งการรักษาโดยการผ่าตัดและการรักษาโดยการไม่ผ่าตัด การศึกษานี้มีวัตถุประสงค์เพื่อรวบรวมข้อมูลต่าง ๆ ของผู้ป่วยในกลุ่มนี้ที่เข้ารับการรักษาที่โรงพยาบาลศรีนครินทร์

วัสดุและวิธีการ: รวบรวมข้อมูลย้อนหลังของผู้ป่วยที่ได้รับบาดเจ็บของไตที่เข้ารับการรักษาในโรงพยาบาลศรีนครินทร์ ตั้งแต่ 1 มกราคม พ.ศ. 2541-31 ธันวาคม พ.ศ. 2550

ผลการศึกษา: มีผู้ป่วยที่ได้รับบาดเจ็บของไตจากการกระแทกทั้งหมด 69 คน เพศชาย 56 คน (ร้อยละ 82) อายุเฉลี่ย 29.8 ปี (1-68 ปี) ผู้ป่วย 49 คน (ร้อยละ 72) ได้รับบาดเจ็บจากอุบัติเหตุจราจร การบาดเจ็บในช่องท้องที่พบร่วมมากที่สุดคือการบาดเจ็บของม้าม (ร้อยละ 18) ผู้ป่วย 55 คน (ร้อยละ 80) ได้รับการรักษาโดยการไม่ผ่าตัด ค่าเฉลี่ย ISS 20 RTS 7.3 TRISS 93 ระดับความรุนแรงของการบาดเจ็บที่พบมากที่สุดคือ grade 1 (ร้อยละ 39) อัตราความสำเร็จของการรักษาแบบไม่ผ่าตัดเท่ากับ ร้อยละ 87.2 ระยะเวลานอนโรงพยาบาลเฉลี่ย 11.8 วัน ภาวะแทรกซ้อนที่พบร่วมบ่อยที่สุดคือการติดเชื้อในระบบทางเดินปัสสาวะ (ร้อยละ 10)

ผู้ป่วย 14 คน (ร้อยละ 20) ได้รับการรักษาโดยการผ่าตัดโดยมีผู้ป่วย 7 คน (ร้อยละ 10) ที่ต้องผ่าตัดเนื่องจากการบาดเจ็บของไตค่าเฉลี่ย ISS 20.8 RTS 5.5 TRISS 0.72 ระดับความรุนแรงของการบาดเจ็บที่พบมากที่สุดคือ grade 5 (ร้อยละ 71) หัตถการในการผ่าตัดที่ใช้มากที่สุดคือการทำ Nephrectomy ระยะเวลานอนโรงพยาบาลเฉลี่ย 19 วัน

สรุป: การบาดเจ็บของไตส่วนมากเป็นการบาดเจ็บจากการกระแทก ซึ่งส่วนใหญ่เกิดจากอุบัติเหตุจราจร อัตราความสำเร็จในการรักษาแบบไม่ผ่าตัดในโรงพยาบาลศรีนครินทร์ค่อนข้างสูงและควรใช้เป็นวิธีการรักษา ในผู้ที่มีการบาดเจ็บของไตซึ่งมีสัญญาณชีพอยู่ในเกณฑ์ปกติ แต่การรักษาโดยการผ่าตัดก็ยังคงเป็นวิธีการรักษาหลักในผู้ป่วยที่สัญญาณชีพไม่คงที่และมีข้อบ่งชี้ในการผ่าตัด