Research Article

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Management of Kidney Trauma in Saiful Anwar General Hospital Malang Indonesia

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ABSTRACT

Aims and Objectives: *Kidney is the most commonly injured genitourinary organ. This study was performed to describe and analyze the characteristics of hospitalized kidney trauma patients in Saiful Anwar General Hospital Malang, Indonesia.*

Materials and Method: *From January 2005 to December 2016, 63 data of kidney trauma patients in Saiful Anwar general hospital were retrospectively collected. They were described and analyzed based on demographic characteristic, chief complaint, mechanism of injury, hemodynamic stability state, grade of trauma, location of trauma and management. The associations of hemodynamic state, type of management, anemic condition, grade of kidney trauma to patient's outcome were analyzed using statistical software (SPSS).*

Results: *Kidney trauma occurred mostly in male patients (47/74.6%). Pediatric involves in (22/34.9%) of total patients. Motor vehicle injury was the most common mechanism of injury (49/77.8%). Most of the patients came with flank pain as a chief complain (42/66.7%). Trauma were occurred mostly due to blunt trauma (61/96.8%), more frequent cases involved right kidney (33/52.4%). Grade I kidney trauma occurred in (40/63.5%), grade II in (10/15.9%), grade III in (9/14.3%) cases, grade IV in (1/1.6%) cases and grade V in (3/4.8%) cases. Patients who came to the emergency department mostly in stable hemodynamic state (50/79.4%). Kidney trauma patients were mostly treated with non-operative management (60/95.2%) and no significant difference of length of hospitalization was noted between conservative and operative treatment ($p=0.625$). It was also found that there was significant association between hemodynamic state and treatment options ($p=0.047$). However, no association was noted between the type of management and patients' outcome ($p=0.436$). Severe grade of trauma revealed increasing nephrectomy rate (OR: 174, 95% CI: 8.62-315.174; $p<0.01$).*

Conclusion: *Most of kidney trauma patients in Saiful Anwar Hospital were uneventfully treated by conservative treatment. Severe grade of trauma increased the risk of nephrectomy.*

Keywords

Kidney Trauma, Conservative Treatment, Nephrectomy.

Introduction

Indonesia has high incidence of physical trauma due to motor vehicle accident. About 1 accident every 9 minutes was reported [1]. Kidney is the most common injured genitourinary organ, about 65% of all genitourinary traumas involving kidney. Kidney trauma occurs in approximately 1-5% of all trauma cases [2]. The incidence of kidney trauma in Europe is about 4.9 per 100000 [3], but in Indonesia it has not been defined yet. The present study was performed to describe and analyze the characteristics of hospitalized kidney trauma patients in Saiful Anwar General Hospital Malang, Indonesia.

Methods

All of kidney trauma patient's data who were admitted between January 2005 and December 2016 in Saiful Anwar General Hospital were retrospectively collected. Kidney trauma is graded based on Computed Tomographic (CT) Scan with contrast and according to the American Association for the Surgery of Trauma (AAST) organ injury scale. Patients were then described and analyzed based on demographic characteristic, chief complaint, mechanism of injury, hemodynamic stability state, and grade of trauma, location of trauma and management of the patients. The association between initial hemodynamic state and grade of kidney trauma to management option was analyzed using statistical software (SPSS).

Results

Kidney trauma in Saiful Anwar General Hospital afflicts predominantly adult males. From 63 patients, 41 patients (65%) are adult and 22 patients (35%) are pediatric age. There are (74.6%) male and only (25.4%) female. Most of the patient is male in both age groups. Pediatric's male population account for 15 patients (23.8%). Adult population also dominated by male (32 patients/50.8%). The mean age of kidney trauma patient in Saiful Anwar General Hospital is 26.22 years old. Mean age for male patient is 27 year old (5-70, ± 16.2); and 22 year old (5-64 ± 16) for female patients (p= 0.31).

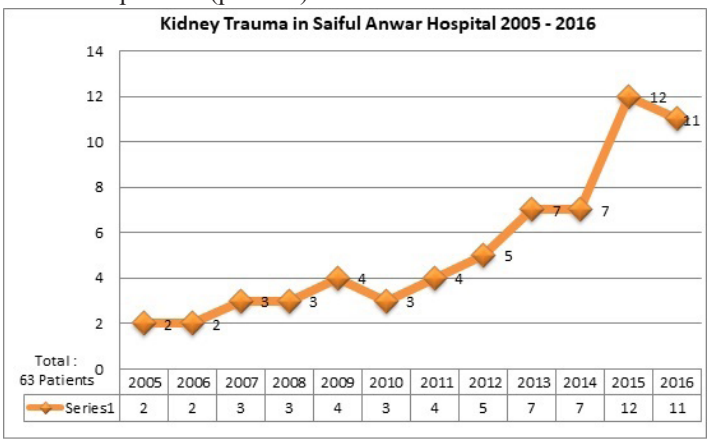

Figure 1: Kidney Trauma case in Saiful Anwar Hospital (2005-2016).

Total Patient		63 Patients		
Age		Mean		
Male		27 year old (5-70 ± 16.2)		p=0.31
Female		22 year old (5-64 ± 16)		
	Pediatric	Adult		Total
Gender	Male	15 (23.8%)	32 (50.8%)	47 (74.6%)
	Female	7 (11.1%)	9 (14.3%)	16 (25.4%)
Symptom	Flank pain	11 (17.5%)	31 (49.2%)	42 (66.7%)
	Abdominal pain	6 (9.5%)	5 (8%)	11 (17.5%)
	Hematuria	3 (4.7%)	4 (6.3%)	7 (11%)
	Decrease of Conciousness	2 (3.2%)	1 (1.6%)	3 (4.8%)
Mechanism	Blunt Trauma:	22 (34.9%)	39 (61.9%)	61 (96.8%)
	Penetrating Trauma	0 (0%)	2 (3.2%)	2 (3.2%)
Type of Blunt Trauma	Motor vehicle Injury	18 (28.6%)	31 (49.2%)	49 (77.8%)
	Fall	4 (6.3%)	8 (12.7%)	12 (19%)
Grade of kidney Trauma	Grade 1	14 (22.2%)	26 (41.3%)	40 (63.5%)
	Grade 2	3 (4.8%)	7 (11.1%)	10 (15.9%)
	Grade 3	4 (6.3%)	5 (7.9%)	9 (14.2%)
	Grade 4	1 (1.6%)	0 (0%)	1 (1.6%)
	Grade 5	0 (0%)	3 (4.8%)	3 (4.8%)
Hemodynamic	Stable	15 (23.8%)	35(55.6%)	50 (79.4%)
	Unstable	7 (11.1%)	6 (9.5%)	13 (20.6%)
Treatment	Non operative	22 (34.9%)	38 (60.3%)	60 (95.2%)
	Operative	0 (0%)	3 (7%)	3 (4.8%)

Table 1: Kidney Trauma in Saiful Anwar Hospital Malang Indonesia.

The number of blunt trauma (96.8%) is 20 times higher than penetrating trauma (3.2%). Kidney trauma is caused mostly by motor vehicle accident (77.8%), followed by fall from height (19%), penetrating injury 2 patients (3.2%). In pediatric kidney trauma population, motor vehicle accident accounts for 81.8% cases and 18.2% due to fall from high. In adult population, motor vehicle accident also dominated the cases (75.6%) followed by fall from high (19.5%). Penetrating trauma is observed in two cases (4.9%).

	Management		Hemodynamic	
Grade Of Kidney Trauma	Conservative	Operative	Stable	Unstable
Grade 1	40 (63.5%)	0 (0%)	35 (55.6%)	5 (8%)
Grade 2	9 (14.3%)	1 (1.6%)	9 (14.3%)	1 (1.6%)
Grade 3	9 (14.3%)	0 (0%)	7 (11.1%)	2 (3.2%)
Grade 4	1 (1.6%)	0 (0%)	0 (0%)	1 (1.6%)
Grade 5	1 (1.6%)	2 (3.2%)	1 (1.6%)	2 (3.2%)
Mechanism				
Blunt Trauma	59 (93.6%)	2 (3.2%)	51 (80.9%)	10 (15.9%)
Penetrating	1 (1.6%)	1 (1.6%)	1 (1.6%)	1 (1.6%)
Type of Blunt Trauma				
Motor Vehicle	47 (74.6%)	2 (3.2%)	40 (63.5%)	9 (14.3%)
Fall	12 (19%)	0 (0%)	11 (17.5%)	1 (1.6%)

Table 2: Management of Kidney Trauma in Saiful Anwar Hospital.

Most of kidney trauma patients in Saiful Anwar General Hospital initially seek medical attention due to flank pain (66.7%). Abdominal pain was found in 17.5% cases, 11% came due to hematuria and only three patients (4.8%) were admitted with decrease of consciousness. Flank pain was observed in 75.6% adult cases, followed by abdominal pain (12.2%), macroscopic hematuria (9.8%) and decrease of consciousness (2.4%). Similar trends was also observed in pediatric patients which is half of pediatric patients came with chief complain of flank pain (11 patient/50%) when admitted to hospital, followed by abdominal pain (6 patients/27.3%), hematuria (3 patients/13.6%) and decrease of consciousness (2 patients/9.1%).

Right kidney was affected in 33 (52.4%) of patients and left kidney was affected 30 (47.6%) of patients. Most cases presents in low grade kidney trauma (Grade 1-3). Most of pediatric patients came with grade 1 trauma (14 patient /63.6% of pediatric patient). No grade 5 pediatric patient is noted. Similar in adult was dominated by grade 1 trauma (26/63.4%). However grade 5 renal trauma was observed in three patients.

Most kidney trauma patients (50 patients/79.4%) in Saiful Anwar Hospital Malang were admitted with stable initial hemodynamic status (hemodynamic condition before resuscitation) and only small number of unstable initial hemodynamic status (18.5%). In pediatric population, the number of unstable initial hemodynamic patients which admitted to Saiful Anwar General Hospital is relatively high (7 patients/31.8% of pediatric population) compare to adult population (6 patients/9.8% of adult population). Blunt trauma patients who admitted to Saiful Anwar Hospital with unstable initial hemodynamic was in 10 patients (16.4%), we noted that nine patients caused by motor vehicle injury and one patient caused by fall from high. Blunt trauma patients that were admitted in Saiful Anwar General Hospital with stable hemodynamic status was observed in 51 patients (83.6%), 78% due to motor vehicle injury and 22% due to fall from high. Only two patients with penetrating injury were admitted to Saiful Anwar Hospital.

Most of kidney trauma patients were treated with non-operative management (95.2%) and only 3 patients (4.8%) underwent operative management. There are no pediatric population underwent operative management. Three patients that were performed exploration were adult. There were two (3.2%) patients with blunt trauma underwent operative management. One patient with penetrating trauma that underwent operative management. There were 52 stable hemodynamic patients and only one patient (1.9%) underwent operative management, but from 11 patients in unstable initial hemodynamic state, there are two patients (18.2%) underwent operative management. There were 3 patients that underwent operative management, one were in grade 2 kidney trauma and the other two were grade 5 kidney trauma.

There was a significant association between hemodynamic instability and management of kidney trauma in our data ($p=0.047$). Severe grade of kidney trauma was associated with increase nephrectomy rate (OR: 174.95%, CI: 8.62-315.174, $p<0.01$). However, no association was noted between the type of management and patients' outcome ($p=0.436$) and no significant difference between length of hospitalization and management option ($p=0.625$).

Discussion

Kidney is the most common injured organ in genitourinary tract. It occurs in approximately 1-5% of all injury [2]. Kidney trauma occurs in approximately 8-10% of blunt or penetrating abdominal trauma [4]. In Saiful Anwar Hospital, kidney trauma patients afflicts predominantly in adult male patients (50.8%) with mean age 26 year old. According to literature, the proportion of kidney trauma based on sex (male vs female) is 3:1 [5]. Review of 15 articles that analyzed total of 10,935 patients, 72% are male with a mean age of 30.8 years [6]. Pediatric kidney trauma in Indonesia (1:2 compare to adult) is related to high number of motor vehicle incidence in Indonesia, unsafety riding, or under age motorcycle rider [7].

Blunt kidney trauma is more common than penetrating kidney trauma [2], which is caused primarily by motor vehicle collision, followed by fall from height, sport contact and pedestrian accident. Number of blunt kidney trauma patient in Saiful Anwar General Hospital is higher than penetrating kidney trauma (20 times higher). Penetrating kidney trauma is quite rare, but it is associated with more severe injury [2].

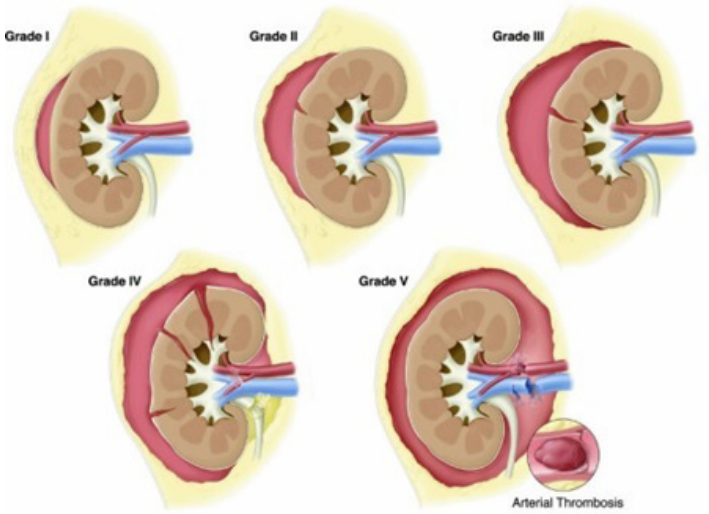

Figure 2: Classification of Kidney Trauma based on American Association for the Surgery of Trauma (AAST) organ injury scale [4].

American Association for Surgery of Trauma Renal Injury Scale		
Grade	**Type**	**Description**
I	Contusion	Microscopic or gross haematuria. Urological studies normal
	Haematoma	Subscapsular, non expanding without parenchymal laceration
II	Haematoma	Non-expanding peri renal haematoma confined to renal retroperitoneum
	Laceration	<1.0cm parenchymal depth of renal cortex with no urinary extravasation
III	Laceration	>1.0cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation
IV	Laceration	Parenchymal laceration extending through renal cortex, medulla & collecting system
	Vascular	Main renal artery or vein injury with contained haemorrhage
V	Laceration	Complete shattered kidney
	Vascular	Avulsion or renal hilum that devascularies kidney

Table 3: American Association for Surgery of Trauma Renal Injury Scale [7].

Both kidneys have equal probability to be injured [5]. In Saiful

Anwar Hospital, both kidneys have almost similar proportion (52.4 % right kidney compares to 47.6 % in left kidney). Even though hematuria was not the main chief complaint that patient had when admitted to Saiful Anwar Hospital, it is still present almost in every patient (90%). This finding similar to a review that conclude hematuria that present in 80-94% of cases. Hematuria will determine further radiographic evaluation [8].

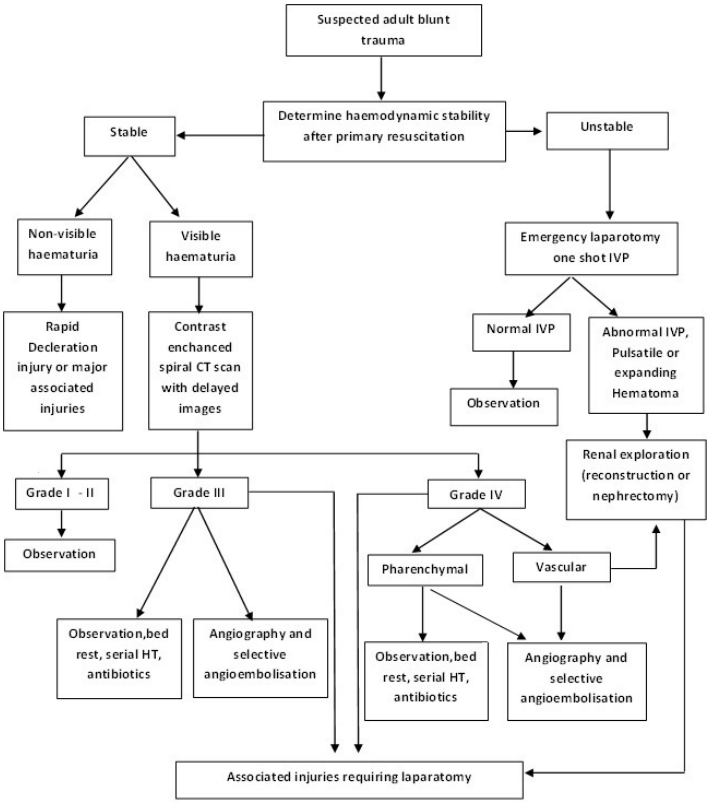

Figure 3: Management of Kidney Trauma [3].

Minor grade of kidney trauma is more common, with grade I injuries are the most common type of renal injury (75-85% of cases) [6]. Similar to other review, minor grade of kidney trauma is the most common presentation with grade 1 kidney injury occurred in 63.5% cases. Kidney is located lying high in the retroperitoneum with the renal pedicle and uretero pelvic junctions are the only major attachment points, makes them relatively well protected. This protective mechanism will be the reason why only major forces applied will end in significant renal injury, which also account for the high incidence of other intra-abdominal injuries in association with renal trauma [2].

Nonoperative management of kidney trauma has become the standard in most cases [2]. Increasing number of kidney trauma patient, event those with high grade injuries, are now managed with conservative management [9]. Conservative management consists of regular monitoring of vital sign, physical examination, laboratory analysis (hemoglobin, hematocrit). Bed rest is proposed until stable clinical sign achieved and hematuria has resolved [4]. For AAST Grade 1 or 2 kidney trauma, conservative management is preferred (Grade B, AUA and EAU). Conservative management is also recommended for grade 3 or 4 trauma (Grade B, AUA). For grade 5 trauma, EAU recommends renal exploration if there are vascular trauma. However, conservative management is still prefered for hemodynamically stable patients regardless of AAST grade (Grade B, AUA) [8].

Success rate of conservative management of kidney trauma in Saiful Anwar Hospital was quite high (80%). This finding agree, in general, with the existing evidence in the literature, consisting typically of limited case series, often with disparate results. Buckley and Mcanninch reported succesfull non operative management of one third of patients with grade IV blunt and penetrating renal injury, none of them required a delayed nephrectomy. Shariat et al succesfully managed nonoperatively 41 of 51 patients with with grade IV blunt renal trauma (80%). In a systematic review by Umbreit et al that examined 95 children with grade IV Blunt renal trauma, no intervention was needed for 86 of the 95 children (72%) and partial renal preservation was possible for 90 of the 95 children (95%) [10]. A recently published series from Australia showed successful observation of all grade I and II injuries with a 94.9, 90.7 and 35.1 % conservative success rate in grade III, IV and V of blunt renal trauma [11].

Immediate intervention is absolute for unstable patient (Grade B, AUA, SIU and EAU) [8]. Another absolute indication for renal exploration are life threatening hemmorhage, renal pedicle avulsion, or pulsatile/expanding retroperitoneal hematoma at the time of laparotomy [5]. In our study there are 11 patients with stable initial hemodynamic but only two patients who underwent operative procedure. This is due to 9 of 11 patients improved to stable hemodynamic after initial resuscitation, hence no intervention required. There is one patient with stable hemodynamic patient who underwent operative procedure due to injury of other organ. However, no long term outcome data of patient who underwent conservative management due to loss of follow up. Better medical recording and follow up need to be performed to get better conclusion regarding long term complication of kidney trauma patient in Saiful Anwar Hospital Malang Indonesia.

Conclusion

Most of kidney trauma patients in Saiful Anwar Hospital were uneventfully treated by conservative treatment. Severe grade of trauma and unstable hemodyamic increased the risk of nephrectomy.

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