

Characteristic of Ureteral Trauma in Tertiary Hospital from January 2005 until December 2016

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Received: 08 February 2018; Accepted: 01 March 2018

Citation: Besut Daryanto, Thede Surya Putra, Paksi Satyagraha. Characteristic of Ureteral Trauma in Tertiary Hospital from January 2005 until December 2016. Med - Clin Res & Rev. 2018; 2(2): 1-4.

ABSTRACT

Introduction and Objective: Ureteral trauma is rare among urogenital trauma, about 1% of all urogenital trauma. This research is conducted to determine the characteristic and management of ureteral trauma in Saiful Anwar Malang Hospital as Tertiary Hospital.

Method: Twenty two data of ureteral trauma patients was collected retrospectively since January 2005 until December 2016. Data were then described by etiology, location, initial presentation and management.

Result: Mean age of the patient is 40 years old ($SD \pm 8.12$), with 91% of the patient is female. The most common etiology of ureteral trauma was iatrogenic (82%) gynecologic surgery (82%). Other etiology was due to abdominal blunt trauma (14%) and abdominal penetrating trauma (4%). Right side of ureter was the most common location (50%), followed by left (28%) and both side (22%). Seventy-two percent of ureteral trauma are total trauma and consulted on going operation due to Iatrogenic (61%). Initial presentation of ureteral trauma was back pain (68%), anuria (18%), hematuria (9%), and ureterocutaneous fistule (4%). End to end anastomotic of ureter with DJ stent insertion was the most common procedure (55%) with good result. No complication was noted post operatively.

Conclusion: Gynecologic iatrogenic operation was the most common etiology of ureteral trauma. Most of ureteral trauma are total rupture (grade 5), with distal part of ureter as the most common location. Ureteral repair and DJ stent insertion have good outcome to most patient.

Keywords

Ureteral trauma, Iatrogenic, Ureteral repair.

Introduction

Trauma is the sixth most common cause of death around the world, causing an estimated 10% of mortality. In the United States alone, more than 2.8 million patients are being treated in the hospital due to trauma cause every year, with an estimated cost of 406 billion every year for medical expenses related to trauma, causing a significant loss in productivity. Trauma incidents have a major effect on the young adult population, causing more loss in job every year than cancer or heart related disease.

In Europe, blunt abdominal trauma is highly related to urogenital

organ trauma, in which motorcycle accidents are the major cause of this trauma. Data from 1996 until 2011 revealed the incidence of urogenital trauma in Europe to be approximately 0.46% cases (199 from 43.056 cases). Urogenital trauma presented in 10-20% of all major trauma patients. Most cases of urogenital trauma are non-life threatening. Nonetheless failure in recognition could lead to significant morbidity, and possibly death.

Ureteral trauma is seldom present in most emergency setting; it comprises only 1% of all urogenital tract traumas. Ureter trauma could be caused by iatrogenic injury (75%), blunt injury (15%), lacerating injury (7%), and gunshot injury (3%) [1-4]. Gynecology operation (55%), pelvic operation (8%), endourology operation such as: ureteroscopy or laparoscopy, and vascular operation

within the abdominal region (5%) are the major cause of iatrogenic ureter injury. [1-4]. The diagnosis of iatrogenic ureter trauma is often missed in 70% of cases whereas the end result of ureter trauma treatment is related to time of initial diagnosis. Retrograde ureterography (RPG) is the most accurate diagnostic test, nonetheless CT or IVU are comparable diagnostic options [1,2].

Ureteral trauma are often asymptomatic, it usually does not manifest any early sign or symptoms. Fifteen - 55% patients present with no hematuria or normal urine analysis upon hospital admission [5-7]. Ureter trauma is commonly found during laparotomy exploration indicated for patients with intraabdominal organ trauma, unstable hemodynamics, and major blood loss [5,8,9]. Conditions directing to possible ureter trauma includes accumulation fluid within operating field, hematuria, anuria or oliguria if affecting both ureter.

Termino-terminal anastomosis (uretero-ureterostomy), ureter debridement and repair, JJ stents insertion, and reimplantation (ureteroneocystostomy) are the mainstay therapy for most ureter trauma [5,10,11]. In cases of rare ureter trauma caused by extensive ureter disruption, a Transureteroureterostomy, ileum interposition, and auto-transplantation could be considered. Patient undiagnosed or inappropriately treated are at risk of severe morbidity including urinoma, fever, septicemia, fistula formation, and in advance cases could lead to ureter stricture and permanent kidney injury. The aim of this retrospective study is to report the incidence of ureter trauma and our experience in managing ureter trauma.

Method

This is a retrospective study. Samples included all ureter trauma patients who presented to emergency department at Saiful Anwar General Hospital Malang during January 2005 until December 2016. Data was collected from medical records, electronic medical records of the Urology Trainy program, Urology and Gynecology operation room report.

Result

From 2005 until 2016 a number of 22 patients were treated for ureter trauma, where 20 (91%) were female and 2 (9%) were male. The average age was 40 years old with the youngest being 19 years old and oldest being 54 years old.

Sex	Number of patients	Percentage
Male	2	9%
Female	20	91%

Table 1: Distribution of ureter trauma patients based on sex.

Based on the cause of trauma, 18 patients had ureter trauma due to iatrogenic cause (82%), 3 patients (14%) caused by blunt injury, and 1 patient (4%) caused by abdominal lacerating injury.

Most cases of iatrogenic ureter trauma was caused by a discontinued ureter accounting for 11 patients (61%), 4 (22%) due to banded ureter, 1 (6%) patient due to false route during uretereroscopy and

2 (11%) patients presented with no identifiable cause.

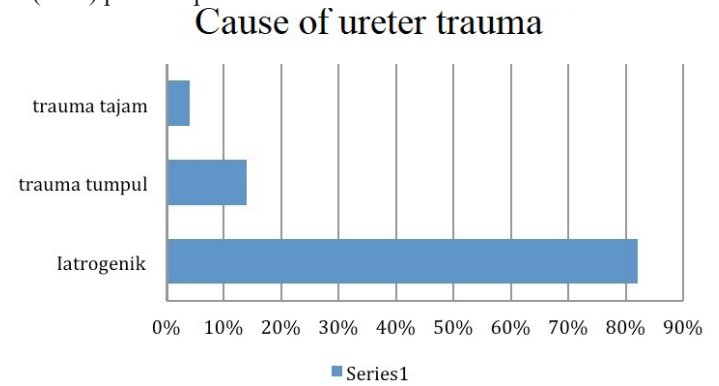


Figure 1: Distribution of patients based on ureter trauma cause.

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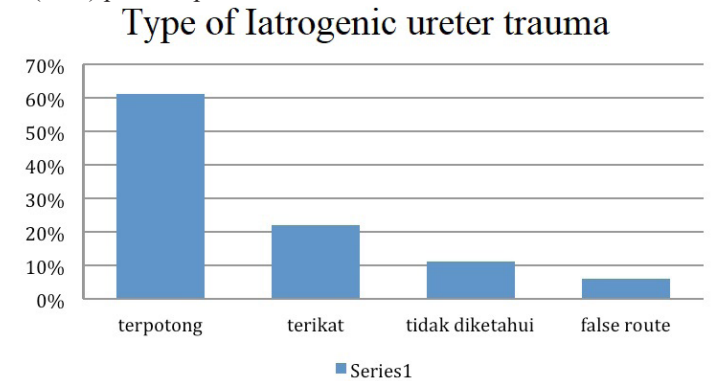


Figure 2: Distribution of patients based on iatrogenic cause.

The most common operation causing iatrogenic ureter trauma in our study was gynecology operation which included 15 patients (83%), 2 (11%) patients were due to digestive surgery and 1 (6%) patient had ureter trauma due to operation in urology field.

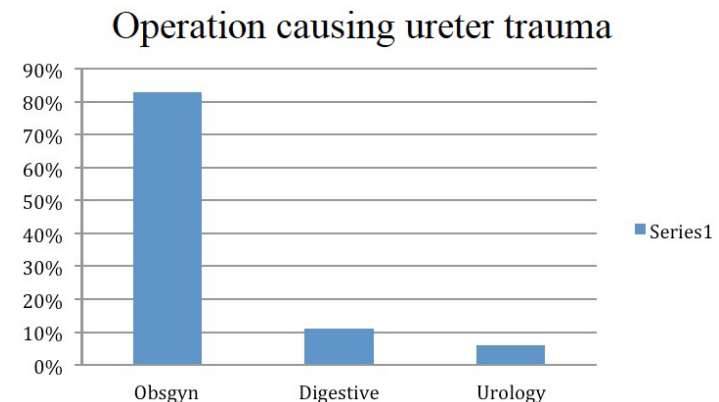


Figure 3: Distribution of patients based on operation causing ureter trauma.

Most patients presented with total ureter trauma which included 13 (72%) patients, and 5 (28%) patients presented with partial ureter trauma.

Ureter trauma degree	Number of patients	Percentage
Partial (grade 1, 2)	5	28%
Total (grade 3, 4, 5)	13	72%

Table 2: Distribution of patients based on degree of ureter trauma.

Unilateral Iatrogenic ureter trauma occurred in 14 patients, where most patients presented with disruption on the right side, as much as 10 (50%) patients were within this group. Four (28%) patients had disruption on left side of ureter. Meanwhile 4 (22%) patients had bilateral ureter trauma.

Side of ureter disruption

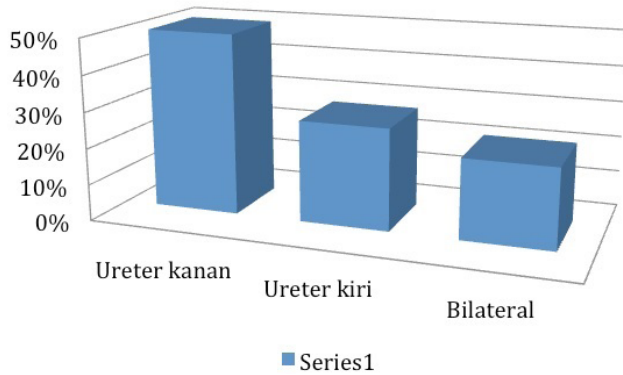


Figure 4: Distribution of patients based on side of ureter inflicted.

Based on the location of trauma, most occurred in the distal ureter which included 16 (73%) patients, meanwhile only 6 (27%) patients had trauma within proximal ureter.

Location of ureter trauma

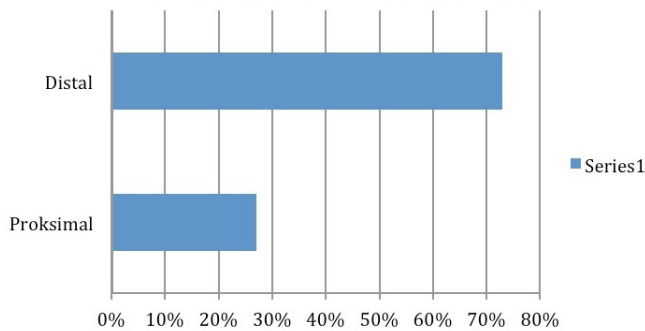


Figure 5: Distribution of patients based on ureter trauma location.

Operator of ureter trauma

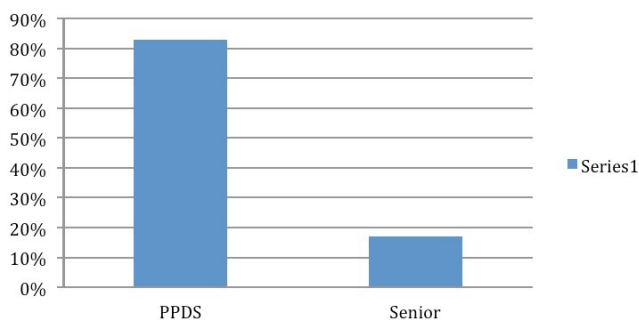


Figure 6: Distribution of patients based on operator of ureter trauma.

Most of ureter trauma 15 (83%) patients occurred because of instrumentation that performed by residency medical students (PPDS), and 4 (17%) patients performed by senior.

Some of clinical manifestation that complained by patients after ureter trauma occurred are flank pain in 15 (68%) patients, 4 (18%) patients anuria, hematuria occurred in 2 (9%) patients, and 1 (4%) patients with ureterocutaneous fistule.

Clinical manifestation	Number of patients	Percentage
Flank pain	15	68%
Anuria	4	18%
Hematuria	2	9%
Fistule	1	4%

Table 3: Distribution of ureter trauma patients based on clinical manifestation.

Management of ureter trauma patients are determined based on locations, severity of trauma, and time of diagnosis. In partial ureter trauma cases (grade I), no intervention needed (5%). Up to 12 (55%) patients operated by end to end anastomoses and DJ stent, ureteroneocystostomy (neointplantation) performed in 5 (22%) patients due to distal ureter were cut off that diagnosed during operation, and stitches released in 4 (18%) patients.

Management	Number of patients	Percentage
End to End Anastomose + DJ stent	12	55%
Neoimplantasi	5	22%
Release jahitan	4	18%
Konservatif	1	5%

Table 4: Distribution of patients based on management of ureter trauma.

Three months post-surgery, all patients recovered without any complications.

Discussion

Ureter is organ that properly protected by their surrounding structures and ureter also mobile, therefore trauma to this organ rarely occurred. Ureter trauma represents 1% of all kind of trauma in urinary tract and related to penetrating injury [3,9,10]. Ureter avulsion that caused by blunt trauma rarely happened and usually occurred in ureteropelvic junction, which mostly occur in children. Ureter trauma due to blunt trauma, mostly detected by intravenous urography (IVU) [12,13]. Ureter trauma frequently undiagnosed when patients come, the problems usually detected thereafter, due to another trauma that related to ureter trauma.

Ureter trauma is classified based on AAST (The American Association for the Surgery of Trauma) [1-3]. Grade I: Ureter hematoma, Grade II: laceration occurred less than 50% of ureter's diameter, Grade III: laceration occurred more than 50% of ureter's diameter, Grade IV: being cut off less than 2 cm, Grade V: being cut off more than 2 cm.

The results from retrospective study found that ureter trauma

occurred in women 20 (91%) with average age 40 years old. Most of the cases were caused of iatrogenic during operation 18 (82%), particularly related to obstetric operations 15 (83%), in distal ureter 16 (73%). This finding similar to study by Dobrowolski that suggested most of ureter trauma caused by iatrogenic trauma (75%), particularly related to obstetric surgery (73%) in distal ureter (74%) [13].

One side ureter trauma was found in 14 (78%) patients, which most complained clinical manifestation is flank pain, 15 (68%) patients. Anuria problems (4 (18%) patients) occurred in patients with ureter trauma on both sides (22%). Most of the patients had total ureter trauma 13 (72%) patients, and 5 (28%) patients had partial ureter trauma, where most of it 11 (61%) patients of ureter trauma caused by being cut off.

Up until now the decisions are still controversial whether using preoperative IVU or intraoperative IVU in evaluating ureter trauma on penetration trauma cases. Few studies observed IVU examination having false negative more than 30% [12,13]. Retrograde pyelography is an imaging modality that having highest sensitivity to diagnose ureter trauma. This modality evaluates and detects contrasts extravasation, ureter fistule, and ureter injury that cannot be detected by IVU examination [13]. Ureter trauma cases in RSUD Dr. Saiful Anwar that diagnosed during open surgery found in 8 (44%) patients, which exhibit clear injury location that will be managed without any additional examinations. Whereas, in patients with uncertain/unclear injury location (56%), retrograde pyelography is a mandatory examination that should be done before definitive treatment, or by another examinations that could help. EAU guideline 2016 suggested that retrograde pyelography as a "gold standard" to assess ureter trauma [1,13].

Basic principal of surgery management in ureter trauma include adequate debridement in ureter tissues that have been damaged, ureter anastomoses spatulation, adequate drainage, and ureter stent application [15,16]. Most of the ureter trauma patients in RSUD Dr. Saiful Anwar operated by using end to end anastomoses an DJ stent application (12 (55%) patients), 5 (22%) patients are done by neoimplantation, 4 (18%) patients are stitches released, and 1 (5%) patient without intervention in partial ureter trauma (Grade I).

Similar to EAU guideline 2016, management of ureter trauma depend on the situation when the ureter trauma diagnosed, patients overall condition, location and severity of ureter lesions [1]. Application of DJ stent recommended in all ureter trauma cases to enable canalization and stabilization area around damaged ureter, therefore reducing the risk of stricture formation [9,10].

Evaluation in three months after surgery reported all ureter trauma patients recovered without any complications. This suggested that proper and quick management of ureter trauma indicate good outcome.

Conclusion

Iatrogenic ureteral trauma due to obstetric surgery represents the most common causes of ureter trauma, particularly in distal of ureter. Retrograde pyelography examination help to detect location ureter trauma that still uncertain, and DJ stent insertion to all of the patients suggested good outcome.

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