

# CHARACTERISTICS OF IATROGENIC URETERAL TRAUMA IN TERTIARY HOSPITAL IN WEST JAVA FROM JANUARY 2019 - DECEMBER 2023

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## ABSTRACT

**Objective:** This study aims to identify the characteristics of iatrogenic ureteral trauma in patients at Dr. Hasan Sadikin General Hospital, Bandung, during the period from January 2019 to December 2023. **Material& Methods:** This study used a retrospective descriptive study method by collecting secondary data from the medical records of inpatients, outpatients, and emergency room installations at Dr. Hasan Sadikin General Hospital, Bandung. The characteristics of iatrogenic ureteral trauma data were manually processed and presented in the form of frequency distribution tables for analysis. **Results:** This study involved 58 cases of ureteral trauma over the past 5 years. The respondents were predominantly over 40 years old (55.1%) and mostly female (94.8%). The main cause of ureteral trauma was gynecological surgery (94.8%). The most common site of injury was the right ureter (58.6%), with right distal ureter injuries accounting for 34.4% of the cases. Based on the provided data, bladder involvement in ureteral trauma occurred on both the right side (13.7%) and the left side (10.27%). Early diagnosis (75.8%) is crucial to reduce the risk of serious complications, while selecting the appropriate management method is essential for the success of the intervention and patient recovery. In this study, ureteral re-implantation had the highest rate of success at 50%. **Conclusion:** Most cases of iatrogenic ureteral trauma are experienced by women, predominantly caused by gynecological procedures.

**Keywords:** Iatrogenic ureteral trauma, characteristic, ureteral re-implantation.

## ABSTRAK

**Tujuan:** Penelitian ini bertujuan untuk mengidentifikasi karakteristik trauma ureter iatrogenik pada pasien di Rumah Sakit Umum Dr. Hasan Sadikin, Bandung, selama periode Januari 2019 hingga Desember 2023. **Bahan & Cara:** Penelitian ini menggunakan metode studi deskriptif retrospektif dengan mengumpulkan data sekunder dari rekam medis pasien rawat inap, rawat jalan, dan unit gawat darurat di Rumah Sakit Umum Dr. Hasan Sadikin, Bandung. Karakteristik data trauma ureter iatrogenik diolah secara manual dan disajikan dalam bentuk tabel distribusi frekuensi untuk analisis. **Hasil:** Studi ini melibatkan 58 kasus trauma ureter selama 5 tahun terakhir. Responden sebagian besar berusia di atas 40 tahun (55,1%) dan sebagian besar perempuan (94,8%). Penyebab utama trauma ureter adalah operasi ginekologi (94,8%). Lokasi cedera yang paling umum adalah ureter kanan (58,6%), dengan cedera ureter distal kanan menyumbang 34,4% dari kasus. Berdasarkan data yang diberikan, keterlibatan kandung kemih pada trauma ureter terjadi di sisi kanan (13,7%) dan sisi kiri (10,27%). Diagnosis dini (75,8%) sangat penting untuk mengurangi risiko komplikasi serius, sementara pemilihan metode penanganan yang tepat sangat penting untuk keberhasilan intervensi dan pemulihan pasien. Dalam studi ini, reimplantasi ureter memiliki tingkat keberhasilan tertinggi sebesar 50%. **Simpulan:** Sebagian besar kasus trauma ureter iatrogenik dialami oleh wanita, terutama disebabkan oleh prosedur ginekologi.

**Kata kunci:** Trauma ureter iatrogenik, karakteristik, reimplantasi ureter.

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## INTRODUCTION

Iatrogenic ureteral trauma accounts for approximately 75% of all ureteral stricture cases requiring urological reconstruction.<sup>1-2</sup> If left untreated, this trauma can lead to serious short- and long-term complications.<sup>3</sup> Gynecological

procedures contribute to the majority of ureteral trauma cases, approximately 64%-82%, followed by colorectal, pelvic vascular, and urological surgeries, which account for about 15%, 26%, and 11%-30%, respectively. The anatomical location and unique proximity of the ureter to other pelvic and abdominal organs make it particularly susceptible to iatrogenic

trauma.<sup>4-5</sup> Common mechanisms of trauma include direct injury (transection, ligation with sutures, crush injury, and coagulation) or indirect injury caused by relative ischemia due to large-caliber instruments, devascularization, and thermal injury.<sup>6</sup>

The management of ureteral trauma and stricture currently includes various therapeutic options, ranging from endoscopic management to complex reconstruction, depending on the trauma's location. The distal third of the ureter is the most frequently affected area (91%).<sup>7</sup> Ideally, ureteral trauma should be treated and corrected at the time of occurrence. If not, the primary therapeutic goal is to restore urinary drainage to prevent complications such as secondary retroperitoneal fibrosis, sepsis, and renal failure. Delayed diagnosis can significantly impact patient outcomes, increasing hospital stay duration and necessitating more complex management. Therefore, iatrogenic ureteral injuries should ideally be recognized intraoperatively, allowing for immediate repair.<sup>7</sup>

Currently, there is limited research on iatrogenic ureteral trauma globally and in Indonesia. However, iatrogenic ureteral trauma cases have varied etiology and management, with high morbidity due to delayed diagnosis.

## OBJECTIVE

Based on the background provided, this study aims to investigate the characteristics of iatrogenic ureteral trauma in patients at Dr. Hasan Sadikin General Hospital, Bandung, from January 2019 to December 2023.

## MATERIAL & METHODS

This study employs a retrospective descriptive research method to characterize iatrogenic ureteral trauma in patients at Dr. Hasan Sadikin General Hospital (RSUP), Bandung. The data source is secondary data obtained directly from inpatient, outpatient, and emergency department medical records at RSUP Dr. Hasan Sadikin, Bandung, from January 2019 to December 2023.

The inclusion criteria for this study were secondary data of patients diagnosed with iatrogenic ureteral trauma at Dr. Hasan Sadikin General Hospital, Bandung, from January 2019 to December 2023. The exclusion criteria included patients with

incomplete medical record data and patients with missing medical records.

Data were collected using a total sampling method, encompassing all patients diagnosed with iatrogenic ureteral trauma at Dr. Hasan Sadikin General Hospital, Bandung, from January 1, 2019, to December 30, 2023. Patient data were gathered from medical records, including information on age, gender, etiology, type of consultant, time of reconstruction, management, and outcomes. The data were processed manually and presented in frequency distribution tables to draw conclusions.

## RESULTS

Table 1 shows the characteristics of iatrogenic ureteral trauma at Dr. Hasan Sadikin General Hospital (RSHS) from January 2019 to December 2023. The data includes information on age, gender, etiology, type of diagnosis, injury location, and management of ureteral trauma cases. The table illustrates the distribution of age, gender, type of diagnosis, and the types and number of management cases handled at the hospital.

The data in Table 1 indicate that patients with iatrogenic ureteral trauma at RSHS are predominantly over 40 years old (55.1%) compared to those under 40 (44.8%). Females are more frequently affected (94.8%) than males (5.1%). The primary etiology of this trauma is gynecological surgery, accounting for 94.8% of cases, followed by digestive surgery at 3.45%. There were no cases due to urological, oncological, or vascular surgery.

In terms of diagnosis, most cases were detected early (75.8%), while delayed and missed diagnoses accounted for 3.45% and 20.69% of cases, respectively. Ureteral injuries more frequently occurred on the right side (58.6%) compared to the left side (36.2%), with bilateral injuries observed in 5.17% of patients. Detailed injury locations on the right ureter show that the distal right ureter was most commonly affected (34.4%), followed by the proximal right ureter (6.9%), with some cases involving the bladder. Injuries on the left ureter most commonly occurred at the distal left ureter (15.5%).

Management of iatrogenic ureteral trauma was most often conducted through ureteral re-implantation (50% of cases), followed by uretero-ureterostomy (20.64%), repair ureter (20.69%), and DJ stent use (1.7%). No cases required nephrectomy.

**Table 1.** Characteristics of Iatrogenic Ureteral Trauma at RSHS (January 2019–December 2023).

| Variable                    | N  | %      |
|-----------------------------|----|--------|
| <b>Age</b>                  |    |        |
| • < 40 Years                | 26 | 44.80% |
| • > 40 Years                | 32 | 55.10% |
| <b>Gender</b>               |    |        |
| • Male                      | 3  | 5.10%  |
| • Female                    | 55 | 94.80% |
| <b>Etiology</b>             |    |        |
| • Gynecological Surgery     | 55 | 94.80% |
| • Digestive Surgery         | 2  | 3.45%  |
| • Urological Surgery        | -  | -      |
| • Oncological Surgery       | -  | -      |
| • Vascular Surgery          | 1  | 1.70%  |
| <b>Diagnosis Type</b>       |    |        |
| • Early                     | 44 | 75.80% |
| • Delay                     | 2  | 3.45%  |
| • Missed                    | 12 | 20.69% |
| <b>Injury Location</b>      |    |        |
| • Bilateral                 | 3  | 5.17%  |
| • Right (Dekstra)           | 34 | 58.60% |
| ○ Right Proximal            | 4  | 6.90%  |
| ○ Right Proximal + Bladder  | 1  | 1.70%  |
| ○ Right Distal              | 20 | 34.40% |
| ○ Right Distal + Bladder    | 7  | 12%    |
| ○ Right Proximal Distal     | 2  | 3.40%  |
| • <b>Left (Sinistra)</b>    | 21 | 36.20% |
| ○ Left Proximal             | 1  | 1.70%  |
| ○ Left Proximal + Bladder   | 1  | 1.70%  |
| ○ Left Middle               | 4  | 6.90%  |
| ○ Left Middle + Bladder     | 2  | 3.40%  |
| ○ Left Proximal Middle      | 1  | 1.70%  |
| ○ Left Distal               | 9  | 15.50% |
| ○ Left Distal + Bladder     | 3  | 5.17%  |
| <b>Management</b>           |    |        |
| • Uretero-ureterostomy      | 12 | 20.64% |
| • Transuretero-ureterostomy | 4  | 6.90%  |
| • Repair Ureter             | 12 | 20.69% |
| • Ureteral Re-implantation  | 29 | 50%    |
| • DJ Stent Only             | 1  | 1.70%  |

## DISCUSSION

This study indicates that the respondents' ages are divided into two groups: under 40 years old (26 cases, 44.8%) and over 40 years old (32 cases,

55.1%). Older age, particularly above 40, can be a risk factor for iatrogenic ureteral trauma. As age increases, so does the risk of ureteral trauma. Older patients tend to have more complex health conditions and may have undergone more medical procedures that pose a risk of ureteral trauma.<sup>8-9</sup>

The respondents' gender was predominantly female (55 cases) compared to male (3 cases), largely due to gynecological procedures being the main cause of iatrogenic ureteral trauma, accounting for between 64%-82% of cases. A previous study conducted at Dr. Hasan Sadikin Hospital from 2013 to 2017 also found that most ureteral trauma cases occurred in females.<sup>8</sup> This is because most ureteral trauma is iatrogenic and often results from gynecological procedures. According to previous studies, gynecological procedures are the most common cause of iatrogenic ureteral injuries, and women are more likely to undergo these procedures than men. Consequently, the higher frequency of ureteral trauma in women can be attributed to the large number of gynecological procedures that pose a risk to the ureter. Gynecological surgeries, such as hysterectomy, endometriosis excision, and oophorectomy, are procedures that increase the risk of ureteral trauma in women.<sup>7,10</sup>

Iatrogenic ureteral trauma is more commonly caused by gynecological surgeries compared to digestive surgeries for several reasons. Previous research indicates that gynecological surgeries account for 64%-82% of ureteral trauma cases. Gynecological surgeries often lead to ureteral trauma due to the ureter's close proximity to female reproductive organs such as the uterus and ovaries. Surgical procedures on these organs increase the risk of ureteral damage due to the complex interactions between them. Additionally, gynecological procedures often involve detailed and intricate manipulation of surrounding tissues, which can affect the ureter and increase the likelihood of trauma. Therefore, due to the frequency and nature of gynecological procedures and the unique location of the ureter, gynecological surgeries are more frequently associated with iatrogenic ureteral trauma than digestive and urological surgeries.<sup>10</sup>

Iatrogenic ureteral and bladder trauma refers to injuries occurring to the ureter or bladder as a result of medical procedures or interventions. Iatrogenic ureteral trauma often occurs during open surgery, laparoscopy, or endoscopic procedures, which can include suturing of the ureter, sharp

incisions, transection, avulsion, and devascularization. Meanwhile, iatrogenic bladder injuries can occur during gynecological surgeries, kidney surgeries, or other urological interventions, potentially leading to serious complications if not promptly identified and managed. Both types of trauma can have serious consequences, including urinoma, abscess, ureteral stricture, and even kidney damage or death.<sup>11</sup>

Ureteral trauma can be diagnosed in various ways, including direct (early), delayed, and missed diagnosis. In this study, ureteral trauma diagnoses were categorized as direct (early), delayed, and missed, with proportions of 75.8%, 3.4%, and 20.7%, respectively. The higher occurrence of direct (early) diagnosis may be due to several factors. Early diagnosis is more common in ureteral trauma compared to missed and delayed diagnoses because the characteristic signs of ureteral injury can be clearly observed through appropriate medical examinations and diagnostic procedures. As mentioned in the study results, extravasation of contrast material on CT is a key indicator of ureteral injury, though other signs such as hydronephrosis, ascites, urinoma, or mild ureteral dilation can also be observed. In unclear cases, retrograde or antegrade urography is typically used for further confirmation. This allows for early diagnosis of ureteral injuries so they can be promptly addressed, reducing the risk of serious complications for the patient. Additionally, early diagnosis is crucial to prevent serious complications such as urinoma, abscess, ureteral stricture, and ipsilateral kidney damage that can occur with delayed diagnosis. Therefore, it is important to identify and diagnose ureteral trauma as early as possible to enable appropriate management and minimize complications. Factors such as high suspicion index, challenging specific symptoms, and the importance of early detection to prevent complications are the main reasons for the higher incidence of direct (early) diagnosis in ureteral trauma cases.<sup>12-15</sup>

Management of iatrogenic ureteral trauma can be achieved through various methods such as uretero-ureterostomy, transuretero-ureterostomy, ureteral re-implantation, and the use of DJ stents only. Choosing the appropriate management method according to the location and severity of the ureteral injury is crucial for ensuring successful intervention and patient recovery.<sup>8,10</sup>

## CONCLUSION

Based on the study of the characteristics of iatrogenic ureteral trauma in patients at Dr. Hasan Sadikin General Hospital, Bandung, it can be concluded that iatrogenic ureteral trauma is primarily caused by gynecological procedures, occurs more frequently in patients over 40 years old, and is more common in female patients. The management of ureteral trauma involves various methods, including uretero-ureterostomy, transuretero-ureterostomy, and ureteral re-implantation, with outcomes varying in each case. Additionally, early detection is crucial in the management of ureteral trauma, as failure to recognize or mismanage these injuries can lead to serious complications. Older age, specifically above 40 years, is a risk factor for iatrogenic ureteral trauma, as the likelihood of trauma increases with age. The main cause of iatrogenic ureteral trauma is gynecological procedures, which predominantly affect women due to the high incidence of iatrogenic trauma from these procedures.

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