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INDICATIONS AND INSERTION METHODS OF DOUBLE J URETERAL STENTING IN Dr. SOETOMO HOSPITAL, SURABAYA Retrospective-Descriptive Study, Periode 2012-2015

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ABSTRACT

Double J ureteral stents (DJ stents) have become one of the most basic and valuable tools in urological practice. Insertion of DJ stent provides direct drainage from the kidney to the bladder without the need for external diversion. The indications for insertion of stents into the urinary tract has expanded significantly for oncology also non-oncology case. This study was designed to observe the indication and insertion metode of DJ ureteral stenting in the Department of Urology, Medical Faculty of Airlangga University – dr. Soetomo Hospital, Surabaya, from January 2012 to December 2015. The purpose of this study was to determine the characteristics of patients with perirenal abscess and their management. The majority of the patients 829 (99,2%) were adults between 17 to 81 years with a mean ageof 47 years old with a male to female ratio of 1:1,3. Majority of insertion methods was with endourology 748 (89 %) and open surgical 88 (11 %), The most common indication for DJ ureteral stenting was urinary tract stone disease (kidney: 130, ureter: 315, kidney and ureter: 80) total 525 patients (63 %), and followed by oncology case 254 patients (30 %), stenosis (ureter: 19, UVJ: 3, UPJ: 16) total 38 patients (5 %) dan neglected DJ stent 19 patients(2 %). The most common cause of DJ ureteral stenting for males was urinarytract stone disease in 201 patients (38,2 %), and the most common cause of DJ ureteral stenting for females was oncology cases in 37 patients (93,4 %). The majority of the patients that performed DJ ureteral stenting 829 (99,2%) were adultswith a male to female ratio. 1:1,3. The majority of insertion methods of DJ stents were with endourology. The most common indication for DJ ureteral stenting was urinary tract stone disease and followed by oncology cases.

Keyword : COVID-19, postoperative, surgery, telemedicine

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1. INTRODUCTION

Currently, the ureteric stent is widely usedin urology practices. The practice of ureteral stents in the management of upper urinary obstruction has been proven useful.[1] The use of stents ureter in surgery has begun since thebeginning of the 19th century. The first endoscopic ureteral stent insertion was found in 1967 by Zimskind. After that, in 1978 Finney andHepperlen developed a double-J or double pigtailstent with a self-retaining mechanism.[2] The idealstent must be radio-opaque and free from bacterial colonization. Ureteral stents areavailable in a variety of shapes and materials, which consist of polymer and metal mesh. Polymer is made of polyurethane and silicon.Metal mesh is made of metal alloys, nickel-cobalt,or stainless steel. The stent is made based on itsfunctions and composition. The most frequently used design is the DJ stent or double-J stent.[1] This stent has the ability to maintain its position because the double coil design is sited at the proximal end and the distal end that functions asan anchored in the upper urinary tract (renalpelvis or superior calyx) and lower urinary tract (bladder). This mechanism prevents the DJ stentmigration to the proximal or distal although thereis the flow of urine, the patient's movements, andperistaltic of the ureter.[3] The aim of fitting the DJ stent, in general, is to overcome the ureteral obstruction that needs urine drainage. [2]

A ureteric stent is a tube that is placed in the lumen of the ureter, either retrograde or antegrade. This tube is useful for maintaining thepatency of the hole or maintaining ananastomose graft.[3,4.] The indication of placing a DJ stent can be divided into two indications: urgent and relative. Placing DJ stent in urgent indication comprising in the cases pyelonephritisobstructive and in intolerable acute renal colic. The save indication of inserting DJ stent after endoscopy execution, for example, can be observed in following cases: edema ureter or ureter perforation, steinstrasse, history of renal failure, and a single kidney or a kidney transplant.The relative indication of inserting a DJ stent canbe observed in the following cases: such as a 2 centimeters stones that will be treated byextracorporal shockwave lithotripsy (ESWL), pregnancy, long impacted stones, a history of urinary tract infection or sepsis, the passiveusage of DJ stent to dilate the ureter and orificium ureter, the long duration of surgery (more than 45 minutes), and for the patients who needs additional procedures such as second look ureteroscopy.[3] The stent utilization can be done temporarily until definitive treatment is done, or itcan be done permanently if the definitive insertionis impossible to be done or the patient refuses todo so.[2]

The insertion of a ureteral stent in patientswith stone and hydronephrosis/obstruction can reduce colic ureteric and infection.[1] Nowadays, the practice of urinary tract stones is mostly done by using endourology techniques such as ESWL,percutaneous nephrolithotomy (PCNL), and ureterorenoscopy (URS).[5] The need for ureteral stent insertion after ESWL and URS is still questionable and debatable until now.[1] Ureteral stenting is recommended in a >15 mm diameter stone case to prevent steinstrasse before ESWLis done.[6] The routine use of ureteral stents after URS is still debatable. Three meta-analyses stated that the routine use of ureteral stent does not have any advantage in stone-free rate or ureteral structure formation.[7] The purpose of stent insertion can be a therapeutic or prophylactic action. Prophylaxis ureteral stenting does not prevent ureteral injury but it can help detect the ureter to avoid trauma during surgery.

There are two options that can beprepared for urgent decompression in a case of obstruction of an upper urinary tract. They are ureteral stenting and nephrostomy.[8] Ureteral stenting as a treatment can be used for the following cases: pyelonephritis due to stone obstruction, kidney failure due to bilateral stone obstruction or unilateral solitary kidney, renal colic refractory, or to handle severe longstandinghydronephrosis. Ureteral stent inserting had been regarded as a routine practice after ureteroscopy(URS). The stents are expected to prevent ureteral obstruction due to ureteral edema and healing of ureteral mucosal lesions after URS accomplishment. Indications of inserting a DJstent after URS can be observed if the following

happened: ureteral perforation, ureteritis, oredema because of the stone embedded in the lumen or because there is a residual stone fragment. This may cause the possibility of ureteral obstruction after the surgery procedure. The remaining stone at the time of URS can be overcome by inserting a stent because a passivedilatation will occur so that later the stone can come out spontaneously, and if it is necessary, the next URS will be easier to handle.[9]

A retrospective study is carried out by Jeong H, C SE Kwak, and Lee from April 2000 till January 2001. The sample in this study is 45 patients who have ureteral stones without a history of surgery and ESWL. However, URS- lithotripsy is previously conducted, in which the patients were randomly divided into two groups. The first group is inserted with a DJ stent and theother group didn't. the purpose of this treatmentis to compare the pain and the symptoms after surgery. This study concluded that ureteroscopy lithotripsy that is executed to new complications/comorbidities of ureter patients is safer without using a ureteral stent.[10]

Routine ureteral stenting after URS-lithotripsy is commonly done. It is because the ureteral stones may affect mucosal inflammation.If the stent is not inserted it may potentially causeureteral stricture, the ureteral stent prevents the formation of the ureteral stricture with a ureteral dilatation mechanism.[11] One should consider theadvantages and the disadvantages of using regular stents after URS. It is better ureteric stentto be inserted if the following cases happened: ifthere are any complications; there are waste rockfragments or edema of the ureter where the stoneis attached (stone bed); the damage or perforation of the ureter wall; and the long duration of surgery because it is afraid of the disruption and edema ureteral peristalsis emergencies. In a meta-analysis study, of the 10previous studies that involved 891 renal units, it is found that there are no significant differences in the final result in the patient's post-URS between the stone-free numbers and the incidence of complication. It means that the finalresult is the same for those who have no complications and for those without inserting thestent.[12]

Other literature mentioned that inserting stents will further enhance the complaints related to the stent (stent-related symptoms), 78% of patients experienced dysuria, hematuria, and even incontinence. More than 80% of patients experienced pain during their daily activities, and32% of them had sexual dysfunction.[13] If there isany infection and ureteral obstruction of the urinary tract obstruction, it requires antibioticsand drainage.[14] Insertion of the ureteral stent is only intended for the patient who is stable and has no complex anatomy. Whereas, for patients who have bad conditions, it is recommended to do a nephrostomy.[14] The advantages of insertinga ureteral stent are we don't utilize external drainage to the patient and the risk of injury in thekidneys and other organs is smaller as well as thebleeding. The disadvantages of inserting a ureteral stent are: if the patient's condition isimpossible for him/her to do the surgery and anesthesia, patients with impacted stone that affixed to the ureter so that the guidewire is not able to bypass the blockage, patients with a largeprostate growth so that it covers the mouth of theureter, and it highly depends on the skill of the operator in undertaking urology action.[5]

A prospective study conducted by Ofer Yet.al. on 92 ureteral obstruction patients (61% intrinsic and 39% extrinsic) turned out that the success of the patient who is treated with inserting ureteral stent therapy is 94% intrinsic patients and 73% extrinsic ureteral obstruction patient. This study concluded that inserting aureteral stent into a patient with an external ureteral obstruction and with severe hydronephrosis and distal obstruction tends to get failure. Therefore, it is suggested to undertake percutaneous nephrostomy (PNS).[15]

Another retrospective study is conducted by Anjali MG and Kevin RL. In this study, they inserted a ureteric stent in a patient who gets ureteral obstruction. The data is collected from the patient who visited the hospital in the period of time from January 1st, 1990 till January 1st, 2004. Anjali et.al. found that out of 157 patients with ureteral obstruction, 56 patients got a failureto be inserted the ureter stent due to external compression of malignancy. This failure rate is approximately 35.7% (56 of 157).[16] In a study of prophylactic ureteric stenting before gynecologic

surgery, it is noted that the insertion of the ureterdoes not prevent the occurrence of iatrogenic ureteral trauma during gynecological surgery, and even it increases the fee charged to patients due to additional time staying in the hospital's surgery room, such as the cost of equipment and materials, as well as costs and expenses forurologist and anesthesiologist.[17]

Ureteral stenting is also an integral part of endopyelotomy and endoureterotomy procedures. These procedures are some a choice on ureteropyelo-junction (UPJ) stenosis and stricture ureter due to the high morbidity of ureter incision. A study states that a complete cure of mucosal ureter after full-thickness incision will be reached within 6 weeks after the surgical procedure.[5,18]

The kidneys and ureters trauma can occur because of an external blunt or sharp trauma, however, it can also happen because of iatrogenic. The principle of ureteral trauma surgery is debridement and spatulate, followed by tension-free suturing and ureteral stenting up to the need for complete healing time. The insertion of a ureteral stent is indicated if there ispersistent extravasation urine or if it is repeated after trauma. A study reports that ureteral stentingcan reduce the incidence of ureteral stricture after trauma ureter.5,19 Extravasation after PNL is recommended to utilize an antegrade ureteralstent and maintain nephrostomy and urethral catheter. All ureteral injuries should be inserted ureter stent in order to maximize urinary diversion, and it is inserted for 4-6 weeks.[20]

An institution in Egypt, that has transplanted 118 kidneys from living donors in a year, mentioned that there are only two patients who encounter leaked urine and none of them get ureteral stricture. However, that figures are not significantly different than those without inserting stents. A frequent complication that always occurs in patients who use stents is hematuria butit has no significant difference. A significant difference is found in post-transplant urinary tract infections. There are 19 patients who use stents who experienced an infection, whereas 9 others, not use a stent, have no infection. The most common bacteria that emerge are Klebsiella pneumonia, Escherichia coli, Pseudomonas aeruginosa, Enterobacter spp, and Proteus Mirabilis. The complications in relation to ureteralstents have occurred in 2 patients. One patient with stent migration and the other with malposition stent. So, this study concluded that routine stenting in kidney transplantation has no benefit, even if it causes more complications and infections for the patient.[21]

Due to the least amount of data concerning the application of DJ stents in Indonesia, it encourages us to conduct a study ondescriptive retrospective to find out the indicationand the method of inserting DJ stents to the patient at dr. Soetomo General Hospital started inJanuary 2012 until December 2015.

2. METHOD

This study is a retrospective descriptive study, all the data obtained from the field of study will be displayed and analyzed in the form of graphs and descriptive narration. This study is conducted at Dr. Soetomo Hospitalstarting from August until October 2016, approximately 3 months. The sample in this studyis all of the patients who are treated and insertedby DJ stent. They are the patients who visited Dr.Soetomo Hospital during the period of January 2012 until December 2015. The data in this studyis collected by examining the operation book listsat GBPT Dr. Soetomo Hospital. The registration number of the patients that are inserted by the DJstent is pursued. This study also considers gender, age, and etiology. The span of the time of this study is from January 2012 until December2015.

3. RESULTS

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All of the patients undergoing insertion of DJ stent, as many as 836 patients, are the main data in this study. They are the patients who entered the hospital in the period of January 2012 until December 2015. The majority of ureteral stenting based on surgical procedures are endourology 748 patients (89%) and open surgical 88 patients (11%) (Fig. 1)The number of male patients is 366 (44%), which is divided into 318 patients (38%) undergoing ureteral stenting by endoscopy and 48 patients (6%) ureteral undergoing stenting byopen surgery. While the number of female patients is 470 patients (56%), which is divided into 430 patients (51%) undergoing ureteral stenting by endoscopy and 40 patients (5%) undergoing ureteral stenting by open surgery (Fig. 2). Total male to female ratio of ureteral stenting procedure was 1: 1.3.

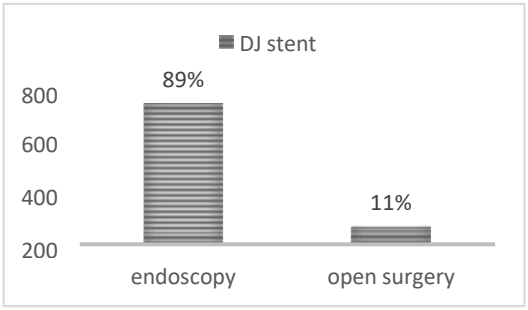

Figure 1. Distribution Of ureteral Stenting based on surgical procedures

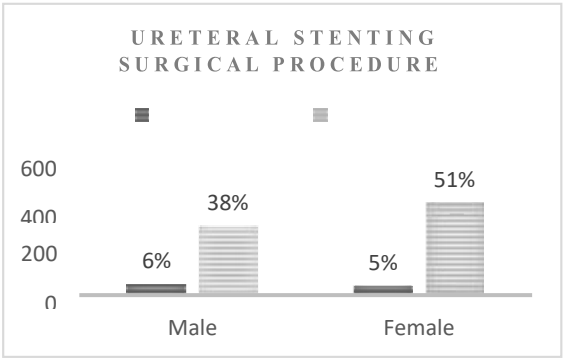

Figure 2. Distribution of Ureteral stenting surgical procedures by gender

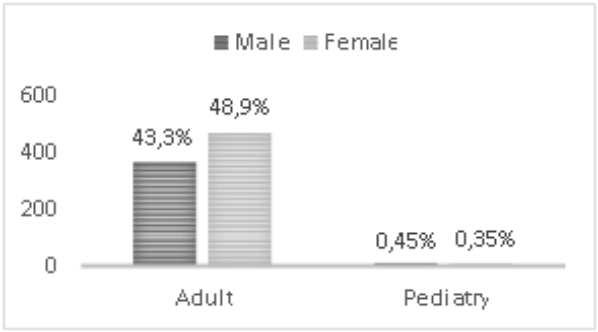

Figure 3. Adult to Paediatric gendercomparison of DJ Stent Insertion

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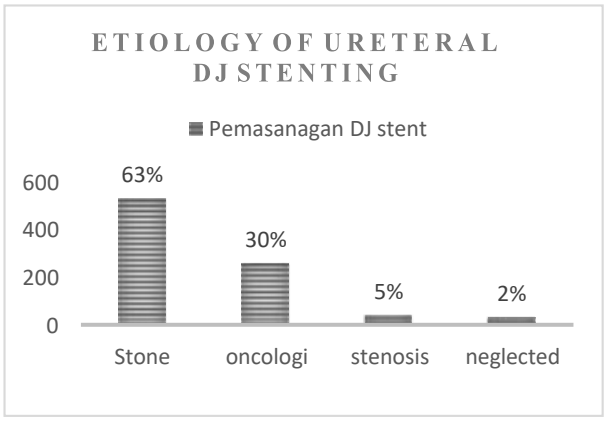


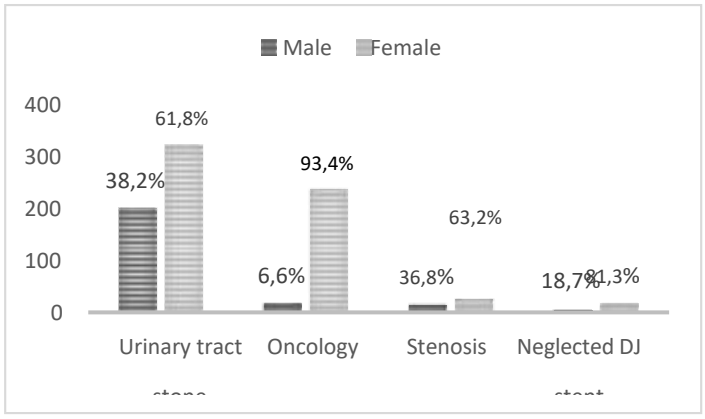
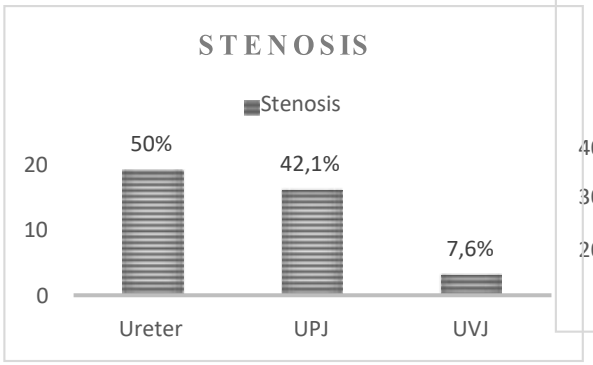


Figure 4. Etiology inserting Dj stent

Figure 5. Insertion of DJ stent based onetiology



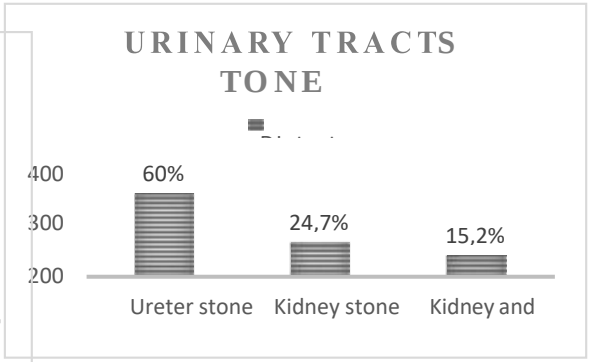


Figure 6. Distribution of Stenosis LocationAmong DJ Stent-Inserted Patients

Figuran 7. Distribution Of Urinary

The total number of patients undergoing insertion of a DJ stent is 836. The number of adults is 829 patients (99.2%) and the rest are pediatric7 patients (0.8%). The average age of the adult patient is 47 years. The youngest of them is 17 years old and the oldest is 81 years old. Total of adult patients 829 patients (99.2%), 362 patients (43,3%) are male and the remaining467 patients (48,9%) are female. There are 7 pediatric patients who undertook DJ stent insertion. The average age of them is 12 years old. The youngest patient is 10 years old and theoldest one is 16 years old. From 7 (0.8%) paediatric patients, 4 patients (0,45%) are boys and the remaining 3 patients (0,35%) are girls (Fig. 3). The most common DJ stent insertion thepatients is urinary tract stones with a total numberof patients are 525 patients (63%). Then followedby oncology DJ stent insertion with a total numberof patients of 254 (30%).

The most common DJ stent insertion for male patients is urinary tract stones, there are 201 patients (38.2%). Next is stenosis, there are
14 patients (36.8%). Whereas, neglected DJ stent case, there are 3 patients (18,7%), and oncology case, there are 17 patients (6.6%). While for female patients, the most common cause of DJ stent insertion is oncology. There are237 patients in this case (93,4 %). Then followedby neglected DJ stent in 16 patients (81.3%), stenosis in 24 patients (63.2%), and urinary tractstones

in 324 patients (61.8%) (Fig. 5).

There are 38 stenosis patients using DJ stents. Among them were 19 patients (50%) of ureteral stenosis type, 16 patients (42,1%) of UPJstenosis type, and 3 patients (7,6%) of stenosis UVJ type (Fig. 6). The total number of DJ stent insertions with the urinary tract stones patients are 525 patients, divided into ureter stone 315 patients (60%), kidney stone 130 patients (24,7%), and both kidney and ureter stone 80 patients (15,2%) (Fig. 7).

4. Discussions

Ureteral stent insertion is very important in urological procedures. Among them are ESWLand URS. Pansota MS, Memon NA, and Richter S et. al described that obstructive uropathy is themost common cause of inserting a DJ stent.[22,23,24]. The urinary obstructive becomes theone that causes chronic kidney failure.[25,26.] The systematic analysis of this is done by Mills et al. The population of their study is patients all aroundthe world. The result of their study in 2010 showed that the total number of adult patients with chronic renal failure is 225.7 million males and 271.8 million females mature. This suggeststhat renal failure becomes a challenge in the fieldof human health.[27]

In this study, it is found that the data of thepatients undergoing stent DJ insertion are 836 patients. The time period is from January 2012 toDecember 2015. The total number of male patients is 366 (44%), while the total number of female patients is 470 (56%). The ratio of men and women is 1: 1.3. The majority of DJ stent insertion undertaken is endourology operative action, as many as 748 (89%). While open surgical action as many as 88 actions (11%). Meanwhile, the same study conducted by Pansota MS et.al. found that the sex ratio of males and females is 2.6: 1. In this study, the number of patients undertaking endourology action is 5 patients (27.8%) and open surgery action is 13 patients (72.2%).[24]

The majority of patients who are inserted with DJ stents in this study are 829 patients (99.2%). They are adult patients with an averageage of 47 years old. The youngest age is 17 years old and the oldest one is 81 years old. Out of the829 adult patients, 362 patients or 44% are male and the remaining 467 patients or 56% are female. The 7 pediatric patients who undertook DJ stent insertion have an average age of 12 years old. The youngest patient is 10 years old and the oldest one is 16 years old. Of 7 pediatricpatients, 4 patients or 57% are boys, and the remaining 3 patients or 43% are girls. In relationto this study, Pansota MS et. al conducted a study on the patients who is inserted DJ stents that ranged from 20-80 years with an average age of 43.[24]

Overall, the common cause of ureteral stenting in this study is urinary tract stones with a total number of patients are 525 (63%). They arethe patient with kidney 130, ureter 315, and both kidney and ureter 80 patients. The next commoncause is oncology. There are 254 patients (30%) in this case. After that, the stenosis consists of ureter 19 patients, UVJ 3 patients, and UPJ 16patients. So, the total number of patients in stenosis cases is 38 (5%). Whereas the neglected DJ stent case consists of 19 patients (2%). The research conducted by Pansota MS et.al, shows that the most common cause of installing DJ stents is urinary tract stones. The number of kidney patients is 20, ureter patients are 30, and both kidney and ureter patients are
10. So the total number of patients, in this case, is 60 (75%). The second common cause is oncology. There are 10 oncology patients (12.5%).

The most common cause of DJ stent insertion for men is urinary tract stones. There are 201 patients (38.2%) in this case. The next one isstenosis. There are 14 patients (36.8%) in this case. Then there are 3 patients (18.7%) with neglected DJ stents and the rest of 17 patients (6.6%) on oncology. As for female patients, the most common cause of DJ stent insertion is oncology. There are 237 oncology patients (93.4%). After that is neglected DJ stent. There are 16 patients (81.3%) with this problem. The next one is stenosis which has 24 patients (63.2%),

and the last one is urinary tract stones. There are 324 (61.8%) patients in this case.

Women with a history of abdominal and gynecological surgery should be considered to beat risk for various kinds of ureteral injuries when they undergo further pelvic surgery. In this respect Daly and Higgins reported 16 ureteral injuries occurring during 1093 (1.5%) extensive procedures: of these 16, eight occurred in womenwho had undergone hysterectomy. The injuries involved were transaction (nine patients), ligation(six patients), and fulguration in one patient. Dalyand Higgins stated that previous open surgical procedures in the pelvis, endometriosis, ovarian neoplasms, pelvic adhesions, and distortedanatomical features of the pelvis should be considered as risk factors for surgical ureteral injuries.[28]

Surgical ureteral injuries occur in 0.5–1%of all pelvic operations.[29] It is estimated that about 50% of these, or even more, are related to gynecological surgical procedures.[30,31]

Ureteral injuries are reported to occur in 10–30% of all radical hysterectomies and 1.5–2.5% of all gynecological procedures, as described by Dowling et al.13 An early series reported ureteral fistula rates in radical hysterectomies as being 8–20%.[32]

Bigongiari et al. published data obtained with the conservative management of nonmalignant ureteral strictures diagnosed in 14renal units among nine patients. Of 14 strictures, eight (57%) were successfully stented and three were converted to indwelling ureteral stents, yielding a 78% success rate using only ureteral stenting, without significant complications. [33]

Zadra et al. reported on 98 patients (57 women and 41 men), who were referred with bilateral malignant ureteral obstruction. The mostcommon origin of the disease was the cervix (28%), followed by the prostate (17%), bladder (16%), and ovary (10%).[34]

Mata et al. reported their experience in themanagement of 105 obstructed renal units between 1983 and 1986, 30 (28%) of which wereMUO. The majority of these were secondary to carcinoma of the cervix, many after previous radiation therapy and most before planned nephrotoxic chemotherapy. Of 30 obstructed ureters, 24 (80%) were successfully stented internally—a very high rate of success in relationto the insertibility procedure and the impact on patient management. [35]

Iatrogenic ureteral injuries may occur during surgical or laparoscopic procedures performed in the retroperitoneal space or pelvis (urological, general, gynecological, and vascular surgery), as well as during ureteroscopic procedures. [36,37]
Ureteroscopy accounts for most ureteral injuries, occurring in 9% (range 0–28%) of all procedures, including perforation (7%), avulsion (0.4%), and postoperative strictures(1.4–11%).[37,38,39]

Although the upper ureter has a thinner mucosal lining and less muscle support than the lower part, most injuries occur in the distal third, where the majority of procedures are performed. Abdominal perineal resection is the colorectalsurgical procedure most frequently associatedwith ureteral injury (0.3–5.7%), with thepredominance of the left ureter due to its close proximity to the mesocolon. [40,41]

The overall rate of ureteral injuries due togynecological procedures is 0.5%–1.5%.[42,43] Two-thirds occur during abdominal procedures and one-third during vaginal surgery.35 The incidence of ureteral injury following a radical hysterectomy may vary from 5 to 30%, 2.5% after hysterectomy for benign disease, and 0.1% aftercesarean section. [45,46,47]

The three most common sites of ureteral injury during gynecological surgery are (a) at the pelvic brim (the ureter is close to the ovarian vessels); (b) at the level of the infundibulopelvic ligament (the ureter is under the uterine artery), and (c) at the ureterovesical junction. [48]

Blasco and Saladie reviewed 154 patients with ureteral obstruction following vascular surgery, and observed that ureteric fistula occurred in 19 patients (12%).[49] Turner et al. proposed that retrograde endoscopic placement of an indwelling double stent to bridge the damaged area should be attempted whenever possible. In case of failure, decompression of the obstructed

kidney by percutaneous nephrostomytube insertion is mandatory in order to preserve renal function, relieve flank pain, overcome urinary tract infection, and divert urine from the injured site of the ureter. [50]

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