# The use of JJ stent in the management of deep pelvic malignancies, does it prevent the ureteric injury?

Elshoieby MH[1], Sayed MM[2], Reda A[3], Aboeleuon E[1]

[1] Department of Surgical Oncology, South Egypt Cancer Institute, Assiut University, Assiut, Egypt.
[2] Department of Radiation Oncology, South Egypt Cancer Institute, Assiut University, Assiut, Egypt.
[3] Department of Urology, Faulty of Medicine, Assiut University, Assiut, Egypt.

## Abstract

**Objectives**: With the increasing number of pelvic malignancies like cervical or rectal cancer in the last decade, many difficulties and risk of complications increase, especially ureteric injuries during dissection due to local malignant spread or adhesions. We describe our work and experience using prophylactic JJ stents, in patients had open for such malignancies, with regard to prevention and
Management of ureteral injuries.
**Design:** Descriptive comparative retrospective analysis between January 2015 and December 2017.
**Setting:** Department of Urology and Surgical oncology, University Hospital, Assiut, Egypt.
**Population and methods:** Cases of patients who underwent open surgery for pelvic malignancies and who had JJ stents in their management and who didn't have been recorded. Open surgery was performed in collaboration between Department of urology and Surgical oncology Department at Assiut University Hospitals, Egypt.
**Main outcome measures:** To evaluate the benefits of JJ stent in the prevention and management of ureteral injuries during deep pelvic malignancy surgery.
**Results:** A total of 54 patients, 26 females and 28 males, had surgery for deep pelvic malignancies. 28 (51, 9 %) patients had prophylactic preoperative JJ stents, while 26 (48, 1 %) had not.
We noted ureteral injuries in total 15 cases (27.8%), 10 in cases with preoperative JJ stents and 5 in cases without. We noticed that JJ stent presence didn't prevent the ureteric injury but facilitated both dissection and repair of the injury.
**Conclusions:** Ureteral injuries couldn't be prevented by prophylactic preoperative JJ stents during open surgery for deep pelvic malignancies but stents could facilitate identification, dissection and repair of ureteric injuries.

**Keywords**: JJ stent, pelvic malignancy, ureteral injury

## Introduction:

Deep pelvic malignancies are characterized by compression or infiltration of the lower ureters which causes obstruction of one or both kidneys that causes rising of the renal functions and deterioration of the general condition. Compression or invasion of the ureters makes the surgery more difficult and ureteric identification is not easy, subsequently, ureteric injury could happen easily and the repair is more difficult that may cause serious complications such as urine leakage or postoperative ureteric strictures and kidney obstruction.

Most cases are incidentally discovered with renal obstruction unilateral or even bilateral due to compression by the tumor, during preoperative investigations1.About 30% of cases presented by ureterohydronephrosis secondary to ureteral compression or invasion that may cause loss of the affected kidney. [1]

Compression or invasion of the ureters by tumors makes identification is very difficult, moreover ureteric injury occurs easily that makes the repair is very difficult due to distorted anatomy and friable tissues. Sometimes, long segment of the ureter could be lost, that requires boari flap with or without psoas hitch for repair. [2]

Moreover, most of the ureteral injuries are discovered postoperatively and, in more than 2/3 of cases, open surgery to repair the injury is the favorite choice which causes more morbidity. [2] [3]

Ureteral identification interaoperativly might prevent most of the injuries or at least facilitate the repair if occurred. Preoperative insertion of a ureteric stent could help in identification of the ureters and prevent iatrogenic injuries during dissection.

We report here our experience in those patients undergoing laparotomy for deep pelvic malignancies such as cervical, ovarian or rectal cancers. Preoperative insertion of ureteric stents such as JJ tube or ureteric catheter is performed endoscopically by use of Cystoscope. This is done by a urologist before surgery in a separate session or immediate preoperatively in the same session.

The aim of this study was to demonstrate the benefit of the ureteric stent in identification of the ureters, prevention of ureteric injuries during surgery for deep

pelvic malignancies, also the role of such stents in facilitating the repair in iatrogenic injuries of the ureters. [4] [5]

## Patients and Methods:

A descriptive retrospective study was performed to identify patients who had open surgery for deep pelvic malignancies such as cervical, ovarian or rectal masses. The study is performed during the period from January 2015 and December 2017 at the Department of Urology and Surgical oncology, Assiut university Hospitals, Assiut, Egypt.

A preoperative ureteric stents such as JJ tube or ureteric catheter are inserted endoscopically by cystoscope in a separate pre-operative session or immediately preoperative in the same session under the guidance of C-arm to ensure that the stents are in place inside the pelvicalyceal system. An ascending uretero-pyelogram is done before stent placement to ensure patency of the ureters.

All Basic data were acquired through a review of hospital data records with a specially designed data collection form.

The preoperative diagnosis of deep pelvic masses or malignancies, pre-operative investigations and imaging are reviewed by our board to ensure the diagnosis and decision of surgery.

Preoperative imaging was done when necessary (Intravenous pyelogram (IVP), magnetic resonance

Imaging, computed tomography uroscan) either alone or in combination, if needed. A preformed discussion and detailed consent were obtained from the patients.

The procedures were done by two experienced surgical oncology surgeons. Follow up is performed at 4 weeks, 3 months and 12 months after surgery, sometimes, it is detailed according the case requirements and prognosis and could be extended if required.

Interaoperative consultation of urologist if needed during difficult dissection over the ureters or to repair any iatrogenic injury. In all cases, histopathologic diagnosis of tumor type is done postoperatively.

Endoscopic removal of the ureteric stents is detailed according to each case post operatively after confirmation of patient cure.

Ultrasound follow up post operatively for the kidneys is done 1 week, first month after the stents removal.

## Results:

In our study period, 54 patients underwent open surgery for deep pelvic malignancies. Among them, 26 (48.1%) females and 28 males (51.9%). Among them 28 cases (51.9%) needed preoperative prophylactic ureteric stents and 26 cases (48.1%) didn't had stents. The median age was 51 years (range 25 – 76).

The localization of the lesions were cervix uteri in 21 cases, sigmoid colon in 20 cases, rectal mass in 8 cases and 5 cases with advanced uterine masses (all summarized in table 1).

Table 1: Baseline Characteristics of the studied Cohort

| Variable | Category | n = 54 |
|---|---|---|
| **Age /year** | • Mean ± SD | 51.54 ± 13.1 |
| | • Median (Range) | 51 (25 – 76) |
| **Sex** | • Male | 28 (51.9%) |
| | • Female | 26 (48.1%) |
| **BMI** | • Mean ± SD | 30.9 ± 5.9 |
| | • Normal Weight | 9 (16.7%) |
| | • Overweight/Obese | 45 (83.3%) |
| **Lesion Site** | • Cervix Uteri | 21 (38.9%) |
| | • Sigmoid Colon | 20 (37%) |
| | • Rectal Carcinoma | 8 (14.8%) |
| | • Uterine Mass | 5 (9.3%) |
| **Histopathology** | • Adenocarcinoma | 29 (53.7%) |
| | • Squamous Cell Carcinoma | 15 (27.8%) |
| | • Mucinous Adenocarcinoma | 9 (16.7%) |
| | • Lipomyoma | 1 (1.9%) |
| **Final Diagnosis** | • Cancer Sigmoid | 20 (37%) |
| | • Mass | 9 (16.7%) |
| | • Stump Carcinoma | 9 (16.7%) |
| | • Cancer Rectum | 8 (14.8%) |
| | • Cancer Cervix | 7 (13%) |
| | • Cervical Leucoplakia | 1 (1.9%) |
| **History of Chronic Illness** | • DM | 13 (24.1%) |
| | • HTN | 12 (22.2%) |

All Ureteric stents were inserted by urologists preoperatively in all 28 cases either in a separate session or in the same session.

All the stents were bilaterally inserted. Indications assumed for preoperative ureteral JJ stents were as follows:

- Obstruction of one or both kidneys.
- Ureteral distortion at preoperative imaging studies.
- Large or advanced mass.

Stents were removed were tailored according to each case postoperatively between 4 and 8 weeks after the operation.

Post-removal check test was done to all patients after removal of the stents by renal ultra sound.

We noted 15 intraoperative ureteric injuries, 10 in cases with stents (35.7%), 3 in cases without stents (19.2%); all were unilateral injuries, 8 on the left side and 7 on the right side. table 2

All the ureteral injuries in case with prophylactic stents were repaired immediately by simple interrupted 4-0 vicryl sutures. Three cases without JJ stents were repaired by 4-0 vicryl interrupted sutures and 2 cases with transected ureters at lower third were treated by direct reimplantation in the urinary bladder, ureteroneocystostomy. Double J stents were inserted interaoperativly for the 5 cases operated without prophylactic JJ stents. Ureteric injury repair was noted to be easier in cases with prophylactic stents, despite the mean operative time didn't differ (237 min. in cases without stents, 241 min. in cases with stents).

Table 2: Factors associated with JJ Stinting among the studied Cohort

| Parameter | No (n=26) | Yes (n=28) | P-value |
|---|---|---|---|
| **Age/years** | 50.23 ± 12.9 | 52.75 ± 13.3 | 0.485* |
| **Sex (M/F)** | 11/15 | 17/11 | 0.140** |
| **BMI** | 31.22 ± 6.8 | 30.60 ± 5.0 | 0.705* |
| **Chronic Illness (DM/HTN)** | 10 (38.5%) | 15 (53.6%) | 0.046** |
| **Lesion Site** | | | |
| • **Cervix Uteri** | 13 (50%) | 8 (28.6%) | 0.156** |
| • **Recto-Sigmoid** | 11 (42.3%) | 17 (60.7%) | |
| • **Uterine** | 2 (7.7%) | 3 (10.7%) | |
| **Histopathology** | | | |
| • **Adenocarcinoma** | 12 (48%) | 17 (60.7%) | |
| • **Mucinous Adenocarcinoma** | 2 (8%) | 7 (25%) | 0.034** |
| • **Squamous Cell Carcinoma** | 11 (44%) | 4 (14.3%) | |
| **Final Diagnosis** | | | |
| • **Cancer Cervix** | 7 (26.9%) | 1 (3.6%) | |
| • **Cancer Rectum/Sigmoid** | 11 (42.3%) | 17 (60.7%) | 0.039** |
| • **Mass/Stump Carcinoma** | 8 (30.8%) | 10 (35.7%) | |
| **Operative Type** | | | |
| • **Pan hysterectomy** | 7 (26.9%) | 1 (3.6%) | 0.042** |
| • **Sigmoidectomy** | 11 (42.3%) | 15 (53.6%) | |
| • **Resection/Excision/others** | 8 (30.8%) | 12 (42.9%) | |
| **Operative Time/min.** | 237.27 ± 56.3 | 241.75 ± 55.3 | 0.769* |
| **Blood Loss/ml** | 12232.08 ± 96.8 | 823.21 ± 107.1 | 0.002*** |
| **PO Hospital Stay/days** | 9.73 ± 3.3 | 10.64 ± 3.2 | 0.275*** |
| **Positive LN** | 5 (19.2%) | 1 (3.6%) | 0.080** |
| **Operative Injury** | 5 (19.2%) | 10 (35.7%) | 0.044** |
| **Adjuvant Therapy** | 7 (26.9%) | 1 (3.6%) | 0.019** |
| **Neoadjuvant Therapy** | 6 (23.1%) | 6 (21.4%) | 0.884** |
| **PO Complications** | 8 (30.8%) | 10 (35.7%) | 0.462** |

*Independent t-test test was used to compare the mean difference between groups

**Chi-square test was used to compare proportions between groups

***Mann Whitney U test was used to compare the mean difference between groups

In the 10 cases with prophylactic stents, the ureters were identified prior to the injury on 8 cases, but injuries occurred due to difficult dissection and massive adhesions. Repair was easy due to the presence of the stents with preserved continuity of the ureter. In the cases without stents, 4 injuries occurred without identification of the ureters, one injury occurred with suspicious of periureteric adhesions. Repair of the 5 ureteric injuries and interaopertive stents insertion were much more difficult than cases with preoperative prophylactic stents.

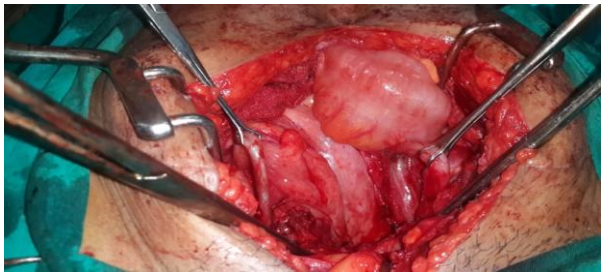

Figure 1, stinted ureters identified intraoperatively during cervical stump carcinoma resection

## Discussion:

Unilateral or bilateral ureteric compression or even invasion by deep pelvic malignancy is not a rare event.

Management with preoperative prophylactic ureteric catheter or JJ stent is still controversial [6] such strategy still unproven regarding decrease in the rate of ureteral injury.

Ureteric stents is proven to increase the rigidity of the ureter and allow easier identification and ureterolysis. On the other hand, this strategy adds more costs and time. In our series, preoperative prophylactic stents insertion usually takes more or less 15 minutes extra time for the procedure. [6]

The use of prophylactic ureteric stent allows early and easily identification of the ureters helps, also facilitate ureterolysis and is supposed to decrease the rate of injury, moreover, it should facilitate more rapid and anatomical repair of ureteral injuries in such cases. [6]

In all the cases of ureteral injuries occurred, immediate repair was performed by simple repair, only 2 reimplantation of the ureter.

In our series, all the cases were diagnosed interaoperativly; no postoperative incidents concerning any ureteric injuries were reported. While in the literatures, about 70 % of the cases were reported postoperatively which would necessitate the need for an appropriate method to prevent injuries or identify the ureter interaoperativly. Prophylactic preoperative ureteric stenting is considered a necessary step to prevent such injuries. In our

Practice, we recommend prophylactic preoperative ureteric stenting.

The approach in management of our serious cases was by open surgery, 15 intraoperative ureteric injuries, 10 in cases with stents (35.7%), 5 in cases without stents (19.2%), all were unilateral injuries, 8 on the left side and 7 on the right side.

Our series confirms, as in the literature, that the prophylactic preoperative ureteric stenting offers better identification of the ureters, facilitate the dissection, although it seems that it didn't prevent the injuries, but facilitated the anatomical repair and prevented the post-operative renal obstruction by ureteric edema. [7]

In our series, only 2 cases had complete ureteric transaction that needed reimplantation (ureteroneocystotomy). Both cases didn't have a prophylactic preoperative ureteric stenting. Reimplantation was done with interavesical tunnel and JJ stent.

Regarding the indications for the preoperative stenting like in other series, usually are: obstruction of one or both kidneys, ureteral distortion at preoperative imaging studies, large or advanced mass. [1]

In the literatures, some ureteric injuries in cases without prophylactic stents were major to the extent that needed major intervention for repair like Boari-flap or even ileal loop replacement [8]. In our series as mentioned all the 10 cases with prophylactic stenting hade simple injuries that needed only simple repair. Only 2 injuries needed reimplantation with antireflux technique in cases without preoperative stenting [8].

In our series, we found that the repair of a ureter definitely requires a JJ stent. The stent allows accurate identification of both ends of the injured ureter; facilitate coaptation and watertight repair of the injury. Mild cystitis could be noted postoperatively due to the presence of the stents and managed safely by anti-cholinergic drugs till removal of the stents [9].

The first systematic review and meta-analysis to investigate the role of prophylactic ureteric stent insertion during colorectal surgery revealed that the benefit of prophylactic ureteric stenting remains uncertain, given the retrospective nature of the identified studies, and thus the non-random allocation of the intervention. Importantly, prophylactic ureteric stenting was not associated with increased patient morbidity with respect to the studied outcomes. Operating time was significantly longer in the intervention group, which may have significant cost implications [10].

## Conclusion:

Deep pelvic malignancies increase the risk of ureteric injuries during dissection. The use of preoperative prophylactic ureteric stenting has many benefits concerning identification of the ureters, dissection and repair in case of ureteric injuries. In our series, the presence of preoperative ureteric stents facilitated the identification of the ureters interpretatively, although it didn't decrease the rate of injury in advanced cases, but it facilitated the anatomical repair of the ureteric injury and prevented the postoperative renal obstruction or urine leakage.

## References:

1. Luks VL, Merola J, Arnold BN, et al., Prophylactic Ureteral Stenting in Laparoscopic Colectomy: Revisiting Traditional Practice. J Surg Res. 2019 Feb;234:161-166.
2. Yellinek S, Krizzuk D, Nogueras JJ, et al., Ureteral Injury During Colorectal Surgery: Two Case Reports and a Literature Review. J Anus Rectum Colon. 2018 Jul 30;2(3):71-76.
3. Terzibachian JJ, Gay C, Bertrand V, et al., Value of ureteral catheterization in laparoscopy. Gynecol Obstet Fertil. 2001 Jun;29(6):427-32.
4. Douissard J, Ris F, Morel P, et al., Current Strategies to Prevent Iatrogenic Ureteral Injury During Colorectal Surgery. Surg Technol Int. 2018 Jun 1;32:119-124.
5. Rafique M, Arif MH, Management of iatrogenic ureteric injuries associated with gynecological surgery. Int Urol Nephrol. 2002;34(1):31-5.
6. Assimos DG, Patterson LC, Taylor CL, Changing incidence and etiology of iatrogenic ureteral injuries. J Urol. 1994 Dec;152(6 Pt 2):2240-6.
7. Saidi MH, Sadler RK, Vancaillie TG, et al., Diagnosis and management of serious urinary complications after major operative laparoscopy. Obstet Gynecol. 1996 Feb;87(2):272-6.
8. Puntambekar S, Palep RJ, Gurjar AM, et al., Laparoscopic ureteroneocystostomy with psoas hitch. J Minim Invasive Gynecol. 2006 Jul-Aug;13(4):302-5.
9. Maldonado-Avila M, Garduno-Arteaga L, Jungfermann-Guzman R, et al., Efficacy of Tamsulosin, Oxybutynin, and their combination in the control of double-j stent-related lower urinary tract symptoms. Int Braz J Urol. 2016 May-Jun;42(3):487-93.
10. Hird AE, Nica A, Coburn NG, et al., Does Prophylactic Ureteric Stenting at the Time of Colorectal Surgery Reduce the Risk of Ureteric Injury? A Systematic Review and Meta-analysis. Colorectal Dis. 2020 Dec 19.