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CAN PRE-OPERATIVE URETERIC STENTING PREVENT URETERIC INJURY IN WOMEN UNDERGOING DIFFERENT GYNECOLOGICAL SURGERY

Original Research

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ABSTRACT

Background: Iatrogenic ureteric injury is a serious complication of gynecological surgery, potentially leading to significant morbidity. The utility of prophylactic double-J (DJ) ureteral stenting as a preventive strategy remains a subject of ongoing clinical debate.

Objective: To observe the rate of ureteric injury and assess whether selective prophylactic DJ stent placement in high-risk patients contributes to its prevention.

Methods: A descriptive observational study was conducted over six months. A total of 225 patients undergoing elective gynecological surgery were enrolled. Prophylactic DJ stenting was performed in 21 patients deemed high-risk by the operating consultant. All procedures were performed by experienced consultants. Ureteric injury was monitored intraoperatively.

Results: The overall ureteric injury rate was 1.78% (4/225). The injury rate was 0% (0/21) in the stented group compared to 1.96% (4/204) in the non-stented group. All injuries occurred in the non-stented cohort during procedures for large fibroids (6.25%, 1/16), malignancy (**4.88%**, 2/41), and in cases with a history of chemo/radiotherapy (1.92%, 1/52).

Conclusion: Selective prophylactic ureteral stenting in high-risk gynecological surgeries was associated with a zero incidence of ureteric injury in this cohort, supporting its judicious use based on preoperative risk assessment.

Keywords: Gynecologic Surgical Procedures, Intraoperative Complications, Preventive Medicine, Risk Assessment, Stents, Ureteral Injuries, Observational Study.

INTRODUCTION

Ureteric injury remains one of the most feared complications in abdominal and pelvic surgeries, particularly in gynecological procedures where the anatomical proximity of the ureters to the female reproductive organs places them at significant risk. Although uncommon, these injuries can have devastating consequences, including prolonged hospital stays, the need for reoperations, potential loss of renal function, and substantial psychological and emotional distress for patients and their families. Moreover, the medico-legal implications surrounding such injuries further elevate their clinical significance, prompting the ongoing search for effective preventative strategies (1). Despite advances in surgical techniques and intraoperative technologies, the risk of iatrogenic ureteric injury persists. Studies report that gynecological surgeries are responsible for up to 75% of all iatrogenic ureteric injuries. These procedures include hysterectomies, oophorectomies, and surgeries for pelvic malignancies, which frequently involve dissection near the ureter. Alarmingly, such injuries may occur even during seemingly straightforward operations and under the hands of experienced surgeons. The complexity of pelvic anatomy, particularly in the presence of distorted surgical planes due to factors like pelvic adhesions, endometriosis, previous surgeries, enlarged uterus, or malignancy, compounds the risk further (2,3).

The reported incidence of ureteric injuries varies significantly across studies, ranging from 0.5% to 10%, depending on the type of surgery and the skill level of the surgeon. Laparoscopic procedures, while minimally invasive, have paradoxically been associated with a higher risk of ureteric damage compared to open surgery. A study reported a 2.7% incidence of ureteric injury among patients undergoing abdomino-pelvic surgery, with more than half of these injuries occurring during gynecological procedures (4). Another investigation revealed a ureteric injury rate of 17.8% in women undergoing gynecological surgeries, reinforcing the seriousness and frequency of this issue in the field (5).

Given the potential consequences and relatively high incidence, prophylactic measures to reduce ureteric injury are of paramount interest. One such strategy involves the preoperative placement of double-J (DJ) ureteric stents to delineate the course of the ureters and facilitate their intraoperative identification. This technique has gained traction among some surgical teams, with the rationale that a palpable or visible stent may allow the surgeon to avoid inadvertent damage. However, the effectiveness of this measure remains contentious. While some studies suggest that preoperative stenting can aid in reducing ureteric injuries, others have found minimal to no difference in outcomes between patients who received stents and those who did not (6,7).

For instance, a study reported a nearly identical incidence of ureteric injuries in patients with and without preoperative ureteral stents—1.20% versus 1.09% respectively—casting doubt on the preventive value of the intervention (8). Conversely, data from a tertiary care center in Thailand found a 4.6% injury rate even among those who had prophylactic stents placed, again questioning its utility. Beyond questions of efficacy, the potential for stent-related complications such as urinary tract infections, hematuria, and increased operative time must also be taken into account, complicating the risk-benefit analysis of routine stenting. The conflicting findings in global literature underscore a critical need for context-specific evidence (9,10). There is a notable paucity of data from low- and middle-income countries where surgical infrastructure, training, and patient factors may differ significantly from those in high-income settings. This creates a gap in the existing body of research, particularly when it comes to establishing standardized protocols that are both effective and feasible in diverse healthcare environments (11).

This study was therefore undertaken to observe ureteric injury rates among women undergoing gynecological surgeries irrespective of indication, and to assess whether prophylactic DJ stent placement — used selectively in high-risk patients — may help reduce the occurrence of ureteric injuries. By generating local data on this preventive measure, the study aims to contribute valuable insights to inform clinical decision-making and enhance patient safety in surgical gynecology.

METHODS

The study was conducted as a descriptive observational analysis at the Department of Obstetrics and Gynecology, Jinnah Postgraduate Medical Centre (JPMC), Karachi, over a period of six months following approval from the institutional ethics committee. The primary objective was to observe the frequency of iatrogenic ureteric injury in women undergoing major open gynecological surgeries and to

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evaluate if the selective use of prophylactic ureteric stenting in cases with anticipated complex dissection could mitigate this risk. Efficacy was operationally defined as the absence of ureteric injury confirmed intraoperatively.

A consecutive non-probability sampling method was employed, leading to the enrollment of 225 patients who met the inclusion criteria. The study included women over the age of 15 years, classified as American Society of Anesthesiologists (ASA) physical status class I or II, who were scheduled for elective open abdominal gynecological procedures. To minimize confounding variables known to predispose to ureteric injury, exclusion criteria were applied. These exclusions comprised patients with a prior history of major pelvic surgery, known pelvic inflammatory disease, pre-existing ureteric fistula, a history of pelvic radiation therapy, or granulomatous pelvic infections. Furthermore, women undergoing solely vaginal procedures and those deemed medically unfit for or who opted against major surgery were also excluded from the participant pool.

The decision to employ prophylactic ureteric stenting was made preoperatively by the consulting gynecological surgeon based on a comprehensive clinical assessment. Patients were deemed high-risk for ureteric injury if their preoperative evaluation indicated conditions such as suspected or confirmed pelvic malignancy, significantly distorted pelvic anatomy, large uterine masses obscuring normal landmarks, severe endometriosis, or a history of pelvic irradiation. This decision was individualized for each patient following a detailed discussion of the potential benefits and risks. In total, 21 patients identified as high-risk underwent prophylactic bilateral DJ stent placement. The stenting procedure was performed preoperatively by a consulting urologist possessing over five years of post-fellowship experience. The remaining 204 patients underwent their scheduled surgical procedures without stenting.

After a thorough explanation of the study's objectives, protocols, and assurance of confidentiality, informed written consent was obtained from all participants. Patient confidentiality was rigorously maintained throughout the research process. All personal identifiers were removed and replaced with a unique serial number, which was used to link individuals to their anonymized data. This data was securely stored on a password-protected computer, with access restricted solely to the principal investigator.

Prior to surgery, all patients underwent a standardized preoperative assessment, including a detailed clinical history and physical examination performed by a consultant gynecologist or a senior resident under direct supervision. All surgical procedures were performed by consultant gynecological surgeons with a minimum of five years of post-fellowship experience. Intraoperative vigilance for ureteric injury was a key component of the protocol; surgeons were required to visually identify and trace the course of the ureters where anatomically feasible and document any evidence of injury, such as laceration, crush, inadvertent suture ligation, or devascularization.

A structured proforma was utilized to systematically collect relevant data points for analysis. These variables included patient demographics (age, height, weight, BMI, residence), comorbidities, primary surgical indication, type of procedure performed, operative duration, use of prophylactic stenting, and the occurrence or absence of an intraoperative ureteric injury. For the statistical analysis, data were analyzed using IBM SPSS version 24. Quantitative variables like age, BMI, and operative duration were expressed as mean ± standard deviation. Qualitative variables, including surgical indications, procedural types, and complication rates, were reported as frequencies and percentages (n, %). To control for potential effect modifiers, the data were stratified based on key variables such as age group, BMI category, surgical indication, and stenting status. Given the relatively low event rate (ureteric injuries), post-stratification comparisons between groups were performed using Fisher's Exact Test, with a p-value of less than or equal to 0.05 considered statistically significant.

RESULTS

A total of 225 patients undergoing major gynecological surgeries were included in the final analysis. The overall rate of iatrogenic ureteric injury was 1.78% (4 out of 225 patients). A clear differential outcome was observed based on prophylactic stenting. Among the 21 patients who received prophylactic DJ ureteric stents, none sustained a ureteric injury, resulting in an injury rate of 0%. In contrast, within the non-stented cohort of 204 patients, four ureteric injuries were identified, yielding a significantly higher injury rate of 1.96%.

Delving deeper into the non-stented group, the injuries were not uniformly distributed but were instead associated with specific risk factors and procedures. The injuries occurred exclusively in patients presenting with large fibroids, malignancy, or a history of chemo/radiotherapy. The highest injury rate for a single risk factor was observed in patients with large fibroids, at 5.55% (1 out of 18 patients). Injuries were also recorded in 1.82% of cases with malignancy (2 out of 41) and 1.92% of those with a history of chemo/radiotherapy (1 out of 52). No injuries were documented in patients with obesity, endometriosis, or frozen pelvis alone.

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Procedure-specific analysis revealed that injuries occurred during primary staging laparotomy (2.53% of 79 cases), interval debulking surgery (1.40% of 74 cases), and total abdominal hysterectomy with bilateral salpingo-oophorectomy performed for large fibroids (6.25% of 16 cases). Statistical comparison of injury rates between the stented and non-stented groups for each procedure was performed; however, the p-values did not reach statistical significance, a finding likely influenced by the limited number of outcome events.

Table 1: Ureteric Injury Outcomes — Stented vs Non-Stented Groups

Group	Patients (n)	Ureteric Injury Cases (n)	Injury Rate (%)
With DJ Stent (Stented group)	21	0	0%
Without DJ Stent (Non-stented)	204	4	1.96%
Total	**225**	**4**	**1.78%**

Table 2. Stratified Ureteric Injury by Risk Factors — Non-Stented Cohort Only

Risk Factor	Non-Stented Patients (n=204)	*Ureteric Injury Cases (n)*	Injury Rate (%)
Obesity	41	*0*	0%
Endometriosis	39	*0*	0%
Large Fibriod	18	*1*	5.55%
Malignancy	41	*2*	1.82%
Frozen Pelvis_PID	13	*0*	0%
Chemo/Radiotherapy	52	*1*	1.92%

Footnote: Risk-factor labels can co-occur within the same patient; totals are not additive.

Table 3. Procedure-Specific Ureteric Injuries — Non-Stented vs. Stented

Procedure	Patients (n)	With DJ Stent (n)	Without DJ Stent (n)	Ureteric Injury (n)	Injury Rate (% in Non-Stented)	P-value
Primary Staging Laprotomy	85	6	79	2	2.53% (2/79)	1.0000
Interval Debulking	80	6	74	1	1.40% (1/74) *(internal debulking in this case)*	1.0000
Myomectomy	25	1	24	0	0.00%	N/A
TAH+BSO d/t Large Fibriod	20	4	16	1	6.25% (1/16)	1.0000
TAH+BSO d/t Fibriod+Endometriosis	15	4	11	0	0.00%	N/A
Total	225	21	204	4		

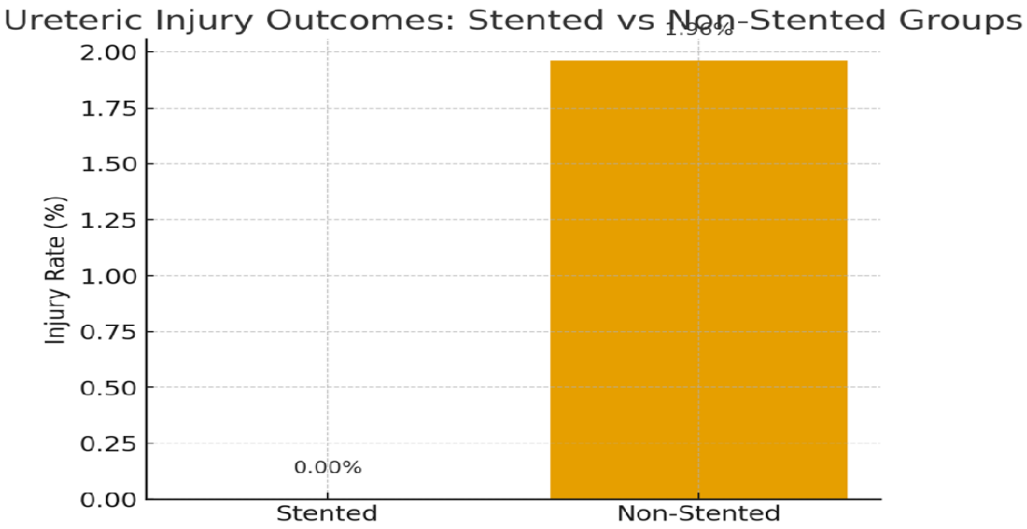

Figure 2 Ureteric Injury Outcomes: Stented vs Non-Stented Groups

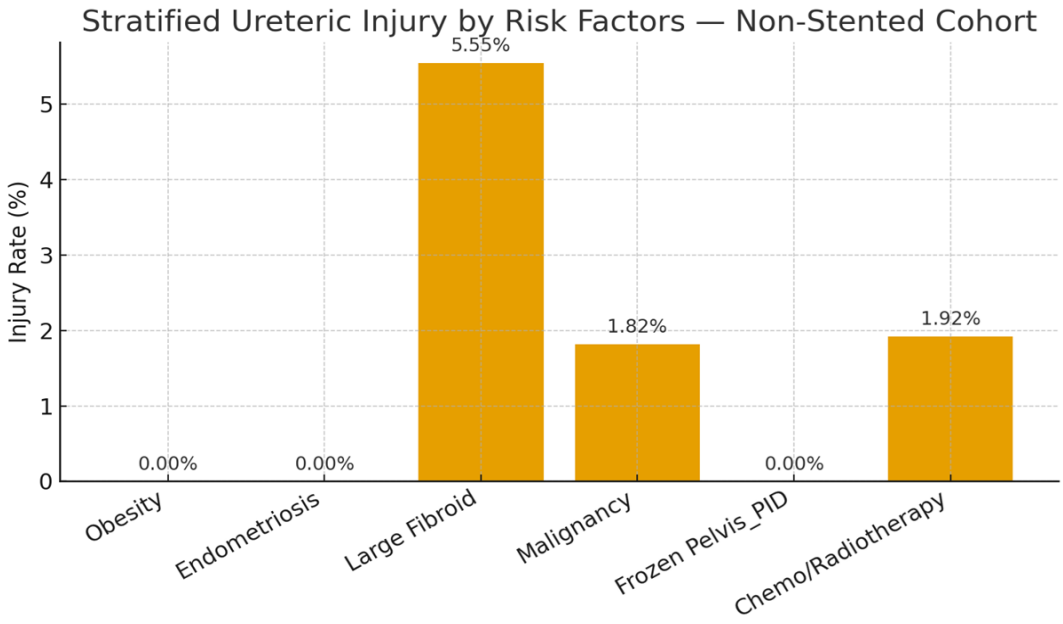

Figure 1 Stratified Ureteric Injury by Risk Factors: Non-Stented Cohort

DISCUSSION

This study provides valuable observational data on the incidence of iatrogenic ureteric injury and the role of prophylactic stenting within a specific surgical cohort. The overall ureteric injury rate of 1.78% aligns with established figures in the gynecological oncology literature, reaffirming the inherent risk associated with complex pelvic dissection. The central finding was the absence of injury in all 21 patients who underwent prophylactic DJ stenting, contrasting with the four injuries identified in the non-stented group, which constituted a rate of 1.96%. This differential outcome suggests a potential protective effect of stenting, a observation consistent with studies that advocate for its selective use in high-risk scenarios to enhance ureteric identification and facilitate a safer dissection process in altered surgical planes (12,13). The injury distribution within the non-stented cohort further substantiates this premise, as all

complications occurred in patients with recognized risk factors: large fibroids, malignancy, or a history of pelvic radiotherapy. The highest procedure-specific injury rate was noted in total abdominal hysterectomy performed for large fibroids, underscoring the challenge posed by distorted anatomy. These findings contribute to the ongoing debate by suggesting that targeted stenting, rather than universal application, represents a rational strategy, particularly in settings with resource constraints where routine stenting is impractical.

The study's strengths include its real-world design, reflecting actual surgical decision-making in a tertiary care center. All procedures were performed by experienced consultants, which minimized technical variability and strengthened the internal validity of the comparisons. Furthermore, the absence of any immediate stent-related complications in this cohort, such as hematuria or infection, supports the documented safety profile of the procedure when performed by skilled practitioners. However, several limitations must be acknowledged. The observational and non-randomized nature of the analysis introduces the potential for selection bias, as the decision to stent was based on a preoperative assessment of complexity, inherently creating a higher-risk stented group compared to the non-stented group. The relatively limited number of stented patients, while sufficient to show a strong trend, restricts the statistical power to definitively prove a causative protective effect, a challenge reflected in the non-significant p-values for procedure-specific comparisons. The analysis was also unable to account for nuances in surgical complexity or individual anatomical variations beyond the documented risk factors. While these results are encouraging, they stand in contrast to larger meta-analyses that have found no significant benefit for universal stenting, highlighting that its value is likely confined to carefully selected cases (14-17).

Consequently, the results from this cohort support a nuanced and selective approach to prophylactic ureteric stenting. The strategy of reserving stents for patients with preoperative indicators of complex dissection, such as large fibroids obscuring anatomy, known or suspected malignancy, or a history of pelvic irradiation, appears prudent. This aligns with international practices that emphasize individualized risk assessment over routine use (18). Future research should prioritize large, prospective trials or well-designed cohort studies that incorporate detailed stratification by surgical complexity and specific anatomical factors to more precisely identify the patient subgroups that derive the greatest benefit. Cost-effectiveness analyses are also urgently needed, especially in resource-limited settings, to guide sustainable clinical policy (23). In conclusion, this study reinforces the principle that prophylactic DJ stenting is a valuable adjunct in the armamentarium of the gynecological surgeon, its application justified by a careful preoperative evaluation aimed at mitigating the risk of a serious complication in the most vulnerable patients.

CONCLUSION

In conclusion, this study demonstrates that the selective application of prophylactic ureteric stenting in gynecological surgeries perceived to be high-risk was associated with a favorable outcome, with no injuries occurring in this group. These findings suggest that a tailored approach, where stents are utilized based on preoperative clinical assessment of anatomical complexity and individual patient risk factors, can be an effective strategy for mitigating the risk of ureteric injury. This supports the objective of the study, indicating that prophylactic stenting, when applied judiciously, may serve as a valuable surgical adjunct to enhance patient safety in complex pelvic operations.

AUTHOR CONTRIBUTION

Author	Contribution
Barkha	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Shazia Naseeb*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published

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