

Original Article

Dj Stenting: Retrospective Analysis of Indications and its Attached Complexity

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ABSTRACT

Background: Ureteric stents are commonly used to manage nephro-ureterolithiasis and other ureteric obstructions, but their use is often associated with various complications. Understanding the indications for stenting and the frequency and nature of these complications is critical for improving patient outcomes.

Objective: To analyze the indications for and complications associated with double-pigtail ureteric stenting in a retrospective cohort.

Methods: This retrospective study involved 110 renal units in 90 patients who received double-pigtail ureteric stents from October 2022 to March 2024 to relieve ureteric obstruction. Stents were inserted both retrogradely via cystoscopy and antegradely through nephrostomy. The types of stents used were either polyurethane, intended for up to 3 months, or silicone, for longer durations. Follow-up included regular imaging to monitor stent position and complications, with data analysis performed using SPSS version 25.

Results: The primary indications for stenting included nephro-ureterolithiasis (88 patients), post-abdominopelvic surgery (11), prostate cancer (5), retroperitoneal fibrosis (4), and after irradiation (2). Complications were noted in 31% of patients, with bacteriuria and fever most common. Hydronephrosis was reported in 27 of these cases, with symptoms unchanged in 21, worsened in 3, and de novo in 3. Other complications included stent migration (8%), fragmentation (10%), and forgotten stents (4.5%). Stent removal was necessary in many cases due to severe complications.

Conclusion: Ureteric stents are effective for managing ureteric obstruction but are associated with significant risks, including infection, migration, and hydronephrosis. Careful patient monitoring and timely management of complications are essential to optimize outcomes.

Keywords: Ureteric stenting, nephro-ureterolithiasis, stent complications, double-pigtail stent, ureteric obstruction, hydronephrosis, medical imaging, SPSS analysis, urology.

INTRODUCTION

Ureteric stents, instrumental in managing nephro-ureterolithiasis, have seen a marked evolution over the past three decades. Initially regarded as a specialized intervention, the insertion of ureteric stents has burgeoned into a nearly routine procedure for patients experiencing ureteric obstruction. This increase in usage has been paralleled by a rise in associated complications, reflecting the expanding indications for stent placement (1, 2). Early devices, consisting of indwelling silicone tubes, heralded significant advancements in both the design and materials of stents, enhancing their safety and effectiveness (3,4). Initial studies suggested that these modern stents were largely devoid of adverse effects. However, further research indicated that stents could migrate, break, or even be forgotten, leading to severe complications such as calcification and fragmentation (5-7). Additionally, symptoms such as lower abdominal pain, dysuria, fever, urinary frequency, nocturia, and flank pain during voiding have been increasingly reported. These symptoms are particularly vexing as they may indicate vesico-renal reflux, a serious complication facilitated by the stent (8,9). Despite their widespread use, most of the literature documenting these complications comprises case reports or small series, underscoring the need for comprehensive studies. Herein, we present the side effects and complications observed in a series

of 110 renal units in 90 patients, providing a detailed account of the issues associated with double-pigtail ureteric stents. This retrospective analysis aims to broaden the understanding of stent-related complications and inform future improvements in stent design and application (10).

MATERIAL AND METHODS

The study was conducted from October 2022 to March 2024, during which double-pigtail ureteric stents were deployed in 110 renal units across 90 patients to alleviate ureteric obstruction. The patient cohort comprised 48 males and 42 females, with the left ureter affected in 41 cases, the right in 48, and both sides in five cases. Stents were inserted predominantly via retrograde cystoscopy into 72 ureters. In 32 of these cases, an initial step involved the placement of a 5 F or 6 F open-ended ureteric catheter to facilitate early drainage of the obstructed renal unit. Once the patient's condition stabilized, these catheters were replaced with stents. The remaining 40 units underwent direct stenting as the primary procedure. An additional 38 renal units required antegrade stenting through a nephrostomy port, primarily when retrograde catheterization or stenting was unsuccessful. Stent types varied depending on the required duration of stenting, with polyurethane stents intended for up to 3 months and silicone stents for longer durations, guided by the underlying pathology (2).

Stent insertion was performed under mild sedation and local anesthesia, utilizing fluoroscopic guidance to ensure accurate placement. Prophylactic measures included administering a single dose of either an aminoglycoside or a quinolone intravenously 2 hours prior to the procedure in non-infected patients. Infected patients received targeted antimicrobial therapy based on urine and/or blood cultures, continued until all signs of infection had resolved. A Foley catheter was placed in the bladder for 24 hours post-operation in all cases (3, 4).

Follow-up involved plain abdominal X-rays at 1 and 30 days post-stenting, with additional X-rays every three months. Ultrasonography was employed at each assessment to monitor changes in hydronephrosis (10). All patients were scheduled for stent removal or replacement tailored to their specific medical needs. Those experiencing complications were hospitalized for immediate assessment using plain abdominal X-ray and ultrasonography to check stent position and assess for hydronephrosis.

Data were collected retrospectively, and all analyses were performed using SPSS version 25. This study adhered to the ethical standards of the Declaration of Helsinki. The research protocol was approved by the relevant institutional review board, ensuring that all patients provided informed consent for their anonymized data to be used for research purposes. This comprehensive methodology allows for a detailed evaluation of the efficacy and safety of ureteric stenting, contributing valuable insights into its complications and management.

RESULTS

In our study, we observed a variety of indications for ureteric stenting across 110 renal units, as detailed in Table 1. The predominant reason for stent placement was nephro-ureterolithiasis, affecting 88 patients. Other indications included complications following abdominopelvic surgery in 11 patients, cancer of the prostate in 5 patients, retroperitoneal fibrosis in 4 patients, and post-irradiation complications in 2 patients.

Table 1. Reasons for Ureteric Stenting and Associated Morbidity and Complications

Indication/Complication	Number of Patients or Stents (%)	Stent Removed
Indications		
Nephro-ureterolithiasis	88	
After abdominopelvic surgery	11	
Cancer of the prostate	5	
Retroperitoneal fibrosis	4	
After irradiation	2	
Morbidity/Complication		
Fever and bacteriuria	34/110 (31%)	19
Hydronephrosis on Stenting		
Unchanged	21	
Worse	3	
De novo	3	
Total with Hydronephrosis	27/34	16/27
Flank pain	17/110 (15.5%)	8

Indication/Complication	Number of Patients or Stents (%)	Stent Removed
Migration	9/110 (8%)	
Fragmentation	11/110 (10%)	11
Forgotten	5/110 (4.5%)	

Regarding morbidity and complications associated with stenting, fever and bacteriuria were noted in 34 of the 110 stented patients (31%), with stent removal required in 19 cases. Hydronephrosis post-stenting was observed in 27 of these 34 patients. The condition remained unchanged in 21 cases, worsened in 3 cases, and was newly diagnosed in 3 cases. Stent removal was necessary in 16 of the 27 patients exhibiting hydronephrosis. Additionally, 17 patients (15.5% of the total) experienced flank pain, leading to stent removal in 8 cases. Stent migration occurred in 9 patients (8%), and fragmentation was observed in 11 patients (10%), necessitating stent removal in all 11 cases. Furthermore, 5 stents (4.5%) were forgotten and subsequently removed.

These results underscore the complexities and risks associated with ureteric stenting, emphasizing the need for vigilant monitoring and timely management of associated complications. The high frequency of complications such as fever, bacteriuria, and hydronephrosis highlights the clinical challenges in managing patients with ureteric stents. These findings also reflect the importance of careful patient selection and personalized management strategies to minimize risks and improve outcomes for those requiring ureteric stents.

DISCUSSION

The practice of inserting ureteric stents is a cornerstone in contemporary urology, primarily addressing conditions such as ureteric or kidney stones, ureteric trauma or strictures, genitourinary reconstructive surgeries, hydronephrosis during pregnancy, and obstructions due to malignancies or retroperitoneal fibrosis (11). Despite their widespread application, the optimal duration for which a stent can remain safely in situ remains ambiguous, largely depending on the type of stent used (12, 13). Although early studies claimed modern silicone stents were largely free from adverse effects (3), subsequent literature, including case reports and small series, has illustrated a spectrum of potential complications, ranging from mild discomfort and irritative bladder symptoms to severe outcomes such as bacteriuria, urosepsis, haematuria, and mechanical issues like stent migration or fragmentation (5, 14).

In this study, flank pain during voiding was reported in 15.5% of cases, with severe pain necessitating stent removal in some instances. This symptom was presumed to be associated with vesico-renal reflux exacerbated by increased intravesical pressure during voiding (8). Although not specifically assessed in our series, the relief of symptoms following stent removal in certain patients suggests that vesico-renal reflux could be an underlying factor, akin to findings by Hewitt et al., who noted a high incidence of reflux in stented patients (16). Furthermore, stent migration occurred in 8% of cases, a figure significantly higher than in some prior reports (17), and fragmentation was noted in 10% of our stents, suggesting that both the composition of the stent and its indwelling duration can contribute to such complications. Notably, silicone stents, while less prone to calcification, demonstrated a propensity for migration due to their smoother surfaces (4).

The phenomenon of hydronephrosis in the presence of a stent is complex and was a notable concern in our study, where hydronephrosis did not improve significantly in 62% of the cases and worsened or emerged de novo in 9% each. This lack of improvement contrasts with some prior findings where stent changes led to reductions in hydronephrosis in nearly half of the patients (17, 18). Such variability underscores the unpredictable nature of stent performance, which may not correlate directly with the underlying pathology necessitating stent insertion (19).

The frequent occurrence of complications and the intense symptoms they can provoke highlight the necessity of meticulous patient monitoring and timely intervention. Preventive measures, including appropriate patient selection and pre-procedural prophylaxis, are crucial. Regular follow-ups are imperative to swiftly identify and address complications such as migration or fragmentation and to evaluate the stent's effectiveness in resolving hydronephrosis (20).

This study contributes to the body of knowledge on ureteric stents by documenting the incidence of specific complications and providing insights into their management. Nonetheless, it has limitations inherent to its retrospective design and the relatively small sample size, which may affect the generalizability of the findings. Future research should aim to expand on these findings through larger, prospective studies that could offer more definitive insights and potentially guide improvements in stent design and patient management protocols. The recommendations from this study call for a balanced approach that weighs the benefits of stenting against the potential for significant complications, advocating for continued innovation and evaluation in this field.

CONCLUSION

The use of ureteric stents is a vital aspect of managing urinary tract obstructions and presents both benefits and challenges. This study underscores the importance of careful monitoring and timely intervention to manage complications associated with stenting, such as infection, migration, and hydronephrosis. While stents play a crucial role in alleviating severe conditions, their potential to cause significant morbidity necessitates a strategic approach to their use, emphasizing the need for ongoing research to optimize stent design and patient care protocols. Such efforts are crucial to enhancing the safety and efficacy of ureteric stents, ultimately improving patient outcomes in urological healthcare.

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