SCIENTIFIC ARTICLE

The effect of routine ureteral stent placement on post-ureteroscopy complications: A prospective study from a resource limited setting.

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Abstract

Background

Rigid ureterorenoscopy (URS) stands as a highly successful treatment for ureteral stones. The current guidelines from the European Association of Urology (EAU) recommends selective double J (DJ) stent placement post-URS to mitigate major complications. However, in resource-limited hospital setups, executing selective stent placement poses substantial risks in preventing complications and reducing readmission rates. This study aims to unveil the ramifications of our routine stent replacement approach after ureteric stone surgery on surgical outcomes in a resource-constrained setting.

Materials and Methods

This prospective study was conducted at a urological unit within a tertiary care center in Sri Lanka, over a one-year period, involving 112 diagnosed patients. Patients underwent routine DJ stenting following rigid URS for ureteral stone management, without additional intervention. Data collected from clinical records encompassed demographics, stone characteristics, and complications. Postoperative complications linked to routine DJ stenting were assessed using the Clavien-Dindo classification system. Descriptive statistics were employed for data summary using SPSS version 23.0.

Results

The mean age of patients was 47.3±14.9 years (range: 13-76 years), with 67.9% being males. The mean stone size was 15.35±6.58 mm (range: 4.5-35 mm), distributed across right (48.2%), left (44.6%), and bilateral (7.1%) ureters, of which 52.7% were proximal, 30.4% distal, and 17% mid ureteric stones. Postoperative evaluation revealed 26.8% of patients experiencing Clavien-Dindo grade I complications (e.g., dysuria, haematuria, loin pain, and lower urinary tract symptoms), managed conservatively. Moreover, 4.5% encountered Clavien-Dindo grade II complications, predominantly postoperative fever, necessitating hospital readmission specifically for intravenous antibiotic administration.

Conclusion

Despite guidelines advocating selective stent placement, this study underscores the safety and efficacy of routine DJ stent implementation after the URS laser procedure. The findings showcase a notable reduction in postoperative complications alongside decreased hospital readmission rates in resource-limited environments. Embracing routine DJ stenting post-URS in such settings could serve as a pragmatic approach, potentially enhancing patient outcomes and minimizing healthcare burdens.

Introduction

Rigid ureterorenoscopy (URS) is the most common treatment modality with a high success rate in managing ureteral stones. It is commonly performed as a minimally invasive procedure in urological practice. URS involves the use of a rigid URS to visualize and manage stones located in the ureter or kidney [1]. According to the current European Association of Urology (EAU) guidelines, selective placement of a double-J (DJ) stent after URS is recommended to prevent major complications [2]. Although URS is highly effective, occasionally it leads to potential complications, including ureteral injury, ureteral stricture and postoperative urosepsis. The reported range for complications is 9 to 25%. The major complications of rigid URS are ureteric perforation (2-4%) and ureteric avulsion (0.5-2%) [3].

The routine placement of a DJ stent after URS has been considered by many urologists based on surgeons' techniques and experience to prevent or reduce major complications to mitigate these risks [4]. However, the necessity and benefits of routine DJ stenting after URS remain a subject of debate,

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due to disturbing stent-related symptoms such as dysuria, haematuria, storage urinary symptoms and loin pain and need for second procedure under local anesthesia for stent removal [5,6,7].

The infrastructure setting includes human resource and operating theatre facility play a crucial role in the surgical management of urolithiasis. Limited resource settings often encounter challenges such as restricted access to emergency healthcare facilities, financial constraints, and scarcity of medical resources. In such settings, where resources need to be allocated wisely, it becomes crucial to determine necessity and potential benefits of routine DJ stenting after rigid URS. This evaluation is essential to enhance patient safety by reducing major complications such as post-operative obstructed infected kidney with urosepsis which can lead to significant morbidity and mortality.

Routine DJ stenting after the URS procedure is the most reasonable approach and is typically placed for 3 to 6 weeks. This practice can potentially reduce the likelihood of unplanned emergency healthcare encounters and hospitalization while also enhancing patient satisfaction with the healthcare system and overall quality of life. In most cases, complications in post-URS patients with stent can be managed with minimal pharmacological management such as anticholinergics and analgesics rather than resorting to surgical intervention like emergency DJ stenting and percutaneous nephrostomy. The aim of the study was to investigate whether routine DJ stenting following ureteric stone surgery improve surgical outcome in a limited resource setting.

Materials and method

This prospective study was conducted in a limited resource setting, in a urological unit of a tertiary care center, in Sri Lanka for one-year period. This study included 112 diagnosed patients, who underwent routine DJ stenting following rigid URS for the management of ureteral stones without any other intervention. All new patients with a ureteric stone confirmed through a non-contrast computerized tomography (NCCT) KUB and meeting the criteria outlined in the EAU guidelines were included in this study using a convenience sample technique and pre-stented patients were excluded from the study. A 5/6 Fr, 24/26 cm DJ ureteral stent was placed in each patient for 3-6 weeks. Patients were discharged from the hospital within 24-48 hours after the URS procedure.

Approval for the study was obtained from the Institutional Ethical Review Committee. Informed written consent was obtained from all the study participants before enrollment. Data collection was performed prospectively using a validated data collection form which included patient demographics, stone characteristics, and postoperative complications. Postoperative complications with routine DJ stenting were evaluated for 3 months based on the Clavien-Dindo classification system [8]. Pain perception was assessed by Visual Analogue Scale (VAS) after the procedure.

Collected data were summarized using descriptive statistics. Continuous variables were presented as either mean ± standard deviation or median (interquartile range) based on their distribution. Categorical variables were presented as frequencies and percentages. The study aimed to observe and report the safety outcomes associated with routine DJ stenting following a rigid URS procedure.

Table 1: Patients Characteristics

No of patients	112	100%
Age		47.30±14.97 (13-76 years)
Gender		
Male	76	67.9%
Female	36	32.1%
Stone size		15.35±6.58 (4.5-35mm)
Stone location		
Right	54	48.2%
Left	50	44.6%
Bilateral	08	7.1%
Stone site		
Proximal ureter	59	52.7%
Mid ureter	19	17%
Distal ureter	34	30.3%
Hospitalization		1.38±0.5 (1-2) days
Readmission hospital stay	5	3.78±1.12 (3-5) days

Results

Among the 112 patients, 67.9% were males and 32.1% were females, with a male-to-female ratio of 2.38:1. The mean age was 47.30±14.97 years (range, 13-76 years). The mean size of the stone was 15.35± 6.58 mm (range, 4.5- 35 mm). Stones were located in the right (48.2%), left (44.6%) and bilateral (7.1%) ureter, in which 52.7% were proximal, 30.3% were distal and 17% were mid ureteric stones.

All patients were discharged from the hospital within 24-48 hours and only 4.5% of patients were readmitted due to fever. The mean hospital stay during re-admission was 3.78±1.12 (3-5) days.

In post-operative analysis, 26.8 % of patients had stent-related Clavien-Dindo grade I complications such as dysuria, haematuria, loin pain, and lower urinary tract symptoms. Loin pain was a common symptom seen in 10.7% (12) patients whiles 7.1% (8), 6.3% (7) and 5.4% (6) of patients experienced haematuria, dysuria and LUTS respectively. Moreover, 4.5% of patients experienced Clavien-Dindo grade II complications, mainly post-operative fever which was successfully treated with intravenous antibiotics. There were no Clavien-Dindo III, IV, and V complications were noted during the follow-up period. When assessing pain perception in patients with a DJ stent, those who had a DJ stent experienced significantly lower pain scores, with a median VAS score of 2.68 (SD±0.90).

Discussion

Selective placement of DJ stent after the URS procedure is a common practice in urology and stents are typically retained for 3-6 weeks. Stents facilitate the direct drainage of urine from the kidney to the bladder [5,9]. This study aimed to investigate whether routine DJ stenting following ureteric stone surgery improve surgical outcome in a limited resource setting. The current study revealed that postoperative complications were not uncommon following rigid URS and routine DJ stenting. However, the most frequently reported complication was Clavien-Dindo 1 stent-related symptoms. According to a global survey, patients with renal stones (80%) and ureteral stones (60%) were more likely to receive a post-operative DJ stent which has demonstrated a substantial decrease in readmissions and hospital stays [5]. Another study reported that, although stent placement was associated with a 1.25 higher odds of emergency department visits (p=0.043), it did not result in hospitalization (p=0.12) [10]. This study also revealed that DJ stent placement had reduced both hospitalization (1.38±0.5 days) and readmission (3.78±1.12 days), when compare to the standard figures of complications given in most of the other studies including metanalysis of Makarov et al [20].

Stent placement promotes ureteric healing and prevents complications by maintaining the integrity of the ureteric wall, reducing inflammation and urine extravasation, and directing epithelial regrowth. It is also used as a method of drainage in acute presentation [11]. Thus, post-operative stent placement is recommended after URS in higher-risk cases such as solitary kidney, impacted stone, older age and higher stone burden, to reduce complications and facilitate the passage of residual stone fragments [5]. In the present study, DJ stenting was performed on all the patients who underwent elective URS and laser lithotripsy. Although minor complications were reported due to the DJ stent, it showed a decrease in both hospitalization and readmission.

Table 2: Complications associated for URS with laser lithotripsy and DJ stent

Postoperative complication	No	%
Clavien Dindo 1	33	26.8%
Dysuria	7	6.3%
Haematuria	8	7.1%
Loin pain	12	10.7%
LUTS	6	5.4%
Clavien Dindo 2		
Fever	5	4.5%
VAS Score		2.68 ±0.90

A recent meta-analysis revealed that pain, dysuria, hematuria, irritative urinary symptoms, and urinary tract infections (UTI) were significantly more common in patients with postoperative DJ stent placement. But, the risk of unplanned readmissions was significantly higher in the unstented group ($p < 0.01$) compared to the stented group according to Wang et al [12]. Joshi et al demonstrated nearly 80% of the patients experienced stent-related urinary symptoms [13]. However, the current study revealed that only 26.79 % of patients had stent-related symptoms such as dysuria, haematuria, loin pain, and lower urinary tract symptoms which were comparatively lower than the studies conducted in the developed countries.

A European study revealed a mean visual analogue score (VAS) of 3.21±2.32 [14]. However, the mean VAS in our cohort was 2.68±0.9. This difference may be attributed to potentially better pain tolerance in our South Asian population and other explanation may be those with higher standards of living tend to complain more regarding minor issues .

Some studies have reported major complications such as ureteric avulsion, perforation, ureteric edema, urosepsis during and after rigid URS, and as well as ureteric stricture on follow-up. [15,16]. However, there were no major complications reported in the per-operative or follow-up period in this study. This may be due to single consultant doing all the procedures with better technique and routine stenting of all cases.

In a setting with limited resources, which includes lack of human resources and logistical deficiencies, such as insufficient theatre space and equipment, shortage of medical facilities for antibiotics and anesthetic supplies, and a lack of specialist consultant surgeons and medical officers, patient outcomes may be affected. As a result, the patients may experience complications and readmissions. Despite the popular belief that stent symptoms may have psychological, social, and economic impacts, the present study demonstrated improved patients' safety with fewer stent-related symptoms [2].

In a limited resource setting, managing unplanned visits, emergency hospital admissions and hospital stays following URS procedures can be challenging. In USA, around 20% of unplanned visits or hospital readmissions were identified after the stone procedure [17,18]. However, in this study, interestingly only 4.5% of patients required hospital admission due to post-operative fever which was managed successfully with intravenous antibiotics, and no other major complications were reported. However, further studies are necessary to determine the long-term complication associated with stent placement.

Conclusion

In conclusion, the placement of routine DJ stenting post-Rigid URS for stone management showed reduced occurrence of major complications in comparison previous studies. This has significantly reduced major complications and heightened patient safety within our resource-limited setting. Patients exhibited good tolerance toward minor stent-related issues. Therefore, we suggest that routine application of DJ stenting following Rigid URS in similar settings, emphasizing its potential to enhance patient safety and substantially diminish major complications compared to adhering solely to selective stent placement guidelines

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