Predictive Factors for Ureteral Double-J-Stent Related Symptoms

Thesis

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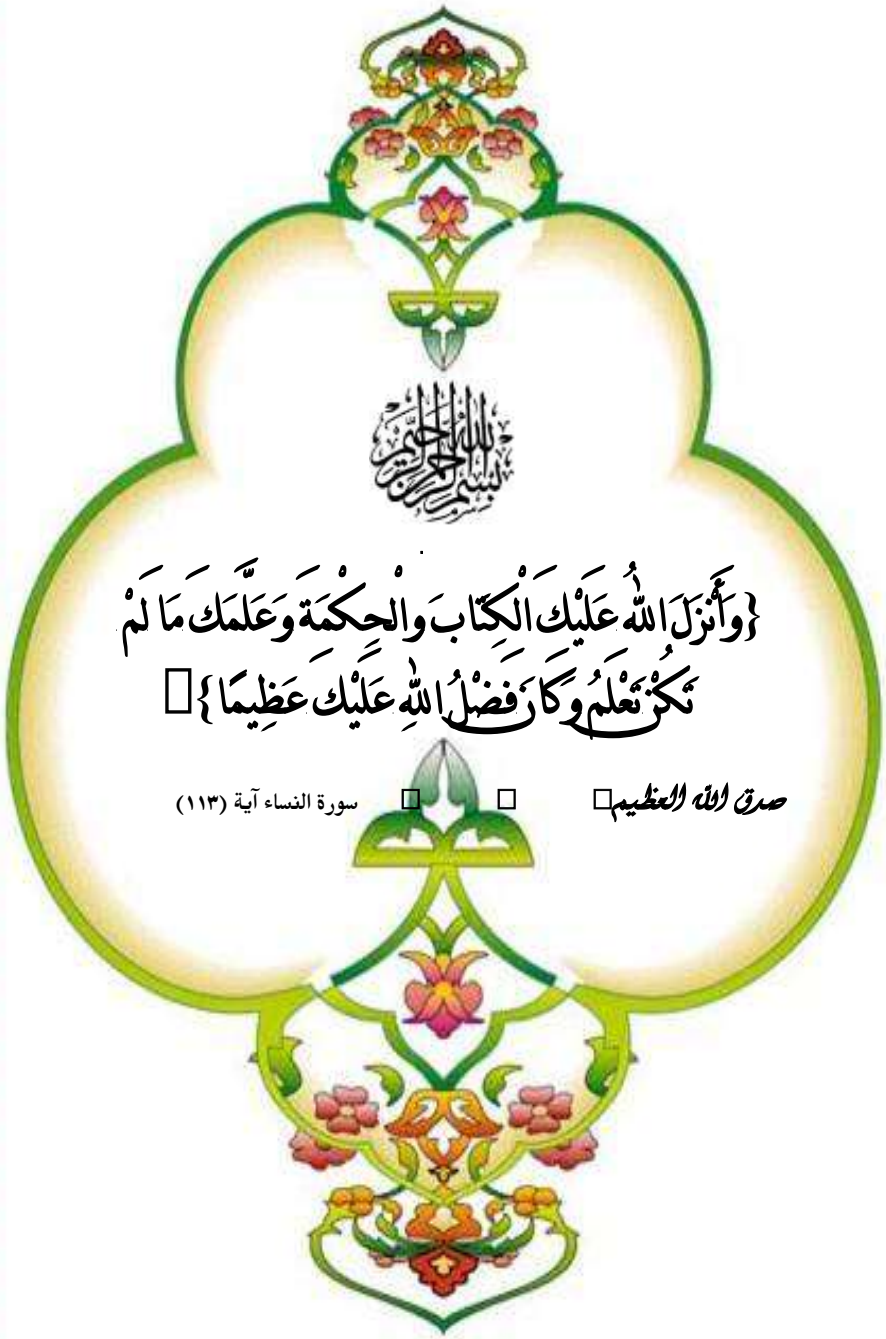

بسم الله الرحمن الرحيم

{وَأَنزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا}

صدق الله العظيم

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Ahmed Sameer Abdul-Jabbar

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List of Abbreviations

Abbrv.	Full-term
ESWL	: Extra corporeal shock wave lithotripsy
PCNL	: Per-cutaneous nephrolithotomy
USSQ	: Ureteral stent symptom questionnaire
IPSS	**:** International Prostate Symptom Score
PLGA	**:** Poly-L-lactide-co-glyclide
TUDS	**:** Temporary ureteral drainage stents
LUTS	**:** Lower Urinary Tract Symptoms
QOL	**:** Quality of life
BFLUTS	**:** BRISTOL Female Lower Urinary Tract Symptoms questionnaire
OAB	**:** Overactive bladder

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Abstract

Background/Purpose: Whether the length of stent affects stent-related symptoms after urological procedures remains controversial. We aimed to evaluate the predictive factors for stent-related urinary tract symptoms after uncomplicated ureteroscopy.

Methods: We prospectively assessed a total of 50 patients who underwent double -j- stent and 6-Fr double-J ureteral stent placement. the demographic and perioperative data and stent characteristics, including the length (26 or 28cm), position of proximal end (upper calyx or pelvis), position of distal end (crossing midline or not), and configurations of both ends (complete or incomplete curl) were recorded. All patients completed a ureteral stent symptoms questionnaire to evaluate the double -j- stent-related urinary symptoms and pain 1 week and 1 month after the procedure. All variables were analyzed to assess the symptoms and their severity and to determine the factors that were significantly associated with stent-related symptoms.

Results: Twenty-three (46%) male and 27 (54%) female patients were enrolled in this study. In multivariate analysis, we found that percentage of patients with urge incontinence increased significantly after 1 month in comparison with first week after double -j- placement and the length of stent (28cm) aggravated the urgency, urge incontinence and dysuria and we noted that patients with position of proximal end of the stent in renal pelvis had significantly urgency. Crossing the midline of the distal end was significantly associated with urge incontinence.

Conclusion: The length of stent and crossing the midline of the distal end were significantly associated with stent-related symptoms after URS. Selection of the proper length of double-J stent is the most important factor in minimizing stent-related symptoms.

Key Words: stent-related symptoms, double -j- stent, ureteroscopy

Introduction

The double-J ureteral stent has become an indispensable part of the urologist's routine practice. Traditionally, ureteral stents are placed to relieve the ureteric obstruction as an adjunct to treatment of urinary stone disease after surgery or shock wave lithotripsy. With advances in stent manufacturing, various designs using different materials with or without different coatings have been produced, resulting in an expansion in the use of stents in clinical work despite the absence of strong evidence on patient morbidity and cost-effectiveness [1].

Early era was plagued with frequent stent migration and expulsion, Development of the Double J (DJ) and pigtail stents by Finney and Hepperlen (1978) solved these problems, making ureteral stenting a routine urological procedure, it is employed for relief of ureteral obstruction and ureteral injury and as a ureteral splint in various open, laparoscopic, and endourological procedures [2].

The double-J ureteral stent is widely used to relieve or prevent ureteral obstruction after following various procedures, such as ureteroscopy, percutaneous nephro-lithotomy, ureterolithotomy, and ureteral end-to-end anastomosis procedures. Although insertion of a ureteral stent maintains ureteral patency and ensures drainage, some

patients encounter some discomfort such as irritative bladder symptoms, hematuria, bladder pain, and flank pain; all of which have a negative impact on the quality of life [3].

The exact pathophysiology of stent-related symptoms remains unknown. Bladder symptoms are thought to be a result of mucosal irritation of the nerve located in the submucosa in the bladder trigone. Flank pain is thought to be due to reflux of urine from the bladder to the kidney, especially during micturition. The relationship between stent characteristics such as diameter, length, material, softness, position, and curl completeness and the stent-related symptoms have been investigated by several researchers [4,5].

The double j stents are available in many shapes, sizes, and biomaterials and are composed of synthetic polymeric biomaterials that must remain stable in the unstable chemical environment within the urinary tract. Additionally, the design must follow certain basic principles that provide the parameters for optimal stent function [6].

Aim of the Work

This study aims to evaluate the predictive factors for double -j stent-related pain & urinary tract symptoms.

Ureteral Stents

I. History of the Ureteric Stent

The widely used double 'J' stent was first introduced by Finney in 1978. However, different types of ureteric stents have been described prior to this, with some dating back to the 1800s. Dr. Gustav Simon is credited with performing the first ureteric stenting during open bladder surgery [7].

The early stents dating back to the 1900s were made from fabric coated in lacquer varnish, it was in 1967 that endoscopic insertion was introduced by Dr. Paul Zimkind who placed a straight silicone prosthesis as a ureteric splint. McCullough devised the 'shepherd's crook' stent in 1974 with the aim of ensuring that the stent remained in a better position within the urinary tract [7]. Recently, modifications have focused on composition, patients' comfort and the longevity of the stents.

II. Stent Function and Physiology

The ideal ureteric stent should relieve intra/ extra-luminal obstruction, be easily inserted, be radiopaque, resist encrustation or infection, avoid migration, be affordable and cause minimal discomfort to the patient, hollow ureteric stents are intended to allow drainage of urine through and around the stent [8].

The normal flow rate of urine in an unobstructed ureter is 0.5 ml/min, although it may be as high as 4 ml/ min in patients with diabetes insipidus, the presence of a stent reduces the urine flow rate by inhibiting ureteric peristalsis which results in a paralytic effect [9].

This loss of active propulsion also results in impaired transit of stones or stone fragments, thus any movement within the ureter predominantly occurs due to a combination of ureteric dilatation and the effect of gravity [10].

This is highlighted by a study comparing the effects of stenting on the stone free rate after extracorporeal shock-wave lithotripsy (ESWL) for ureteric stones. In this particular study, the authors concluded that there was a significantly higher stone free rate in patients without a stent compared to those with a stent (89.9 % versus 81.3 %) [11].

Whilst some investigators have shown no difference in urine flow rates, with urine outputs of up to 100 ml/h achieved between commercially available stents, the composition of the stent does appear to be important [12], a softer stent is easily kinked resulting in a slower flow and high pressures within the ureter regardless of the stent diameter. A harder stent has better drainage with less risk of kinking, but is found to be more uncomfortable for the patient and has the additional risk of ureteric ischemia and erosion [13].

Stoller et al. reported an in vitro study proposing that urine flow and stone propulsion is greater with the use of a helically ridged stent when compared to a smooth stent. As most fragments of a stone pass in the space between the stent and the ureteric wall, a spirally ridged stent not only optimizes this but also allows most of the urine to travel around the stent. In instances of external compression, the helical stent is not as easily compressed and also allows urine to flow through the lumen [10].

It is important to remember that the rate of urine flow is also affected by additional patient related factors other than those mentioned above. These include the intrarenal pressure, intravesical pressure and urine density amongst others [7].

III- Indications of Ureteral Stenting

1- In stone disease:

(i) Ureteral stones:

1. Acute ureteral obstruction:

This is usually due to impacted ureteral calculi and can be temporarily relieved by ureteral stent [14].

2. Stent before extracorporeal shock wave lithotripsy (ESWL):

"ESWL" is first line treatment for most patients with stones 1 cm or less in the upper ureter. ESWL and ureteroscopy are both acceptable treatment choices for stones 1 cm and less in the distal ureter [15].