

# *Comparative study on postoperative complications and medical intervention after double J tube implantation*

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**Keywords:** D-J tube; Complications; Bladder irritation; Hematuria; Ureteral reflux; Medical intervention

**Abstract:** Ureteral stent implantation has become a common drainage method in urology, but there are also some concurrent occurrences during treatment. Therefore, it is of great significance to study the occurrence and treatment of these complications. We collected 572 cases of D-J tube implantation in Hiser urology department from June 2017 to March 2022, and analyzed the three most common complications after catheterization by different methods, including bladder irritation, hematuria and ureteral reflux. The study found that the experimental group and the control group had significant statistical significance in bladder irritation and ureteral reflux. Therefore, the cure rate of bladder irritation and ureteral reflux in postoperative complications of D-J tube implantation was significantly improved after medical intervention. However, medical intervention in hematuria patients is of little significance.

## 1. Introduction

With the development of minimally invasive urology and the innovation of ureteral stents, external drainage has been gradually replaced by internal ureteral drainage. Epidemiological investigation has shown that ureteral stent (D-J) placement has become a common drainage method in urology <sup>[1]</sup>. Indications for indwelling D-J tubes include open urinary tract surgery, ureteral surgery <sup>[2]</sup>, percutaneous nephroscopic surgery, advanced tumor hydroneurosis <sup>[3]</sup> inflammatory stenosis <sup>[4]</sup>, ureteral injury, external compression, various postrenal diseases <sup>[5]</sup> etc. Catheterization methods include open catheterization, cystoscope catheterization, ureteroscope catheterization, etc. The duration of catheterization varies according to different diseases <sup>[6]</sup>. Therefore, ureteral stents have become an indispensable therapeutic tool in most urological surgeries. D-J tubes play an important role in postoperative drainage and support, and play an important role in disease recovery. However, as a kind of foreign body placed in the body, it will inevitably cause many complications

[7], such as short-term complications, such as urinary tract irritation symptoms, reflux symptoms, etc., and long-term symptoms, such as hematuria, infection, foreign body sensation, stones, etc., since most patients can tolerate these complications, they have not attracted enough attention from experts and scholars. By sorting out, studying, analyzing and intervening the clinical application effect of the most common complications of D-J tubes, this study can alleviate the pain of patients, benefit many patients and significantly improve their symptoms. Therefore, this study is of great significance.

## 2. Materials and methods

572 patients with complications during ureteral stenting in our hospital from June 2017 to March 2022 were collected, and the complications were summarized and classified. There were 190 cases of bladder irritation. There were 284 cases of microscopic hematuria and gross hematuria. 98 cases of ureteral reflux. Among them, 357 were males and 215 were females; Left side catheterization in 287 cases; There were 268 cases of right catheterization and 17 cases of bilateral catheterization. There were 343 ureteroscopic catheterization, 42 percutaneous nephroscopic catheterization, 66 ureteral open operation catheterization, and 121 cystoscopic catheterization.

This study was a comparative study of complications and medical intervention after double J tube implantation. Clinical patients were collected and grouped according to the types of complications. The most common clinical complications were divided into groups, and medical intervention was carried out in the experimental group, so as to conduct a comparative study.

The most common complications of D-J tubes were divided into groups, and each group was randomly divided into two groups (placebo group and experimental group). The placebo group was given starch tablets and the experimental group was given alpha-blockers. The hematuria placebo group was given more water and oral starch tablets, while the experimental group was given more water and oral quinolone antibiotics for 3 days. The ureteral reflux group was given more water, and the experimental group was instructed to drink more water and reduce bladder pressure during urination. Effective rate = (number of cases before treatment - number of cases after treatment) / number of cases before treatment \* 100%. The  $\chi^2$  test showed that  $P < 0.05$  was statistically significant.

## 3. Results

In this group of 572 patients with complications, urinary tract irritation symptoms accounted for 33.2 % (190/572), control group patients cured accounted for 20% (19/95), the cure rate of the experimental group 85.3% (81/95),  $P < 0.05$ , there was significant statistical significance; The proportion of patients with hematuria was 49.7% (284/572), the cure rate of patients in control group was 39.4% (56/142), and the cure rate of patients in experimental group was 47.2% (67/142),  $P > 0.05$ , without statistical significance. Patients with ureteral reflux accounted for 17.1% (98/572), patients cured in the control group accounted for 22.4% (11/98), and the cure rate in the experimental group was 75.5% (37/98),  $P < 0.05$ , showing significant statistical significance. The classification of D-J tube complications and the comparative study data between the experimental group and the control group are shown in Table 1. The comparison of box figures between the experimental group and the control group is shown in Figure 1.

## 4. Discussion and conclusion

With the development of minimally invasive technology in urology, ureteral stent implantation has become a routine operation in urology. Ureteral stents are more and more widely used in

diseases of the urinary system, which has the advantages of good tissue compatibility, safe use and less trauma. D-J tube plays an important role in postoperative drainage and support, and plays an important role in disease recovery. At present, for the clinical application of D-J tube, Zhao Yi proposed<sup>[1]</sup> that after ureter operation, mucosal edema occurs, and urine production in the kidney is not smooth, followed by increased intrapelvic pressure and increased renal membrane tension. Sun Xizhao<sup>[8]</sup> proposed that the main mechanism of renal colic was as follows: first, rapid movement or sudden incarceration of stones in the renal pelvis and ureter led to acute obstruction of the upper urinary tract. Due to the increased tension of the inner wall of the lumen, pain receptors in these parts were pulled to cause severe pain. Second, edema of the ureter or calyceal wall and smooth muscle ischemia increase inflammatory transmitters and activate more pain receptors, further aggravating the pain sensation. In addition, the pathogenesis of acute and chronic obstruction is also different<sup>[9]</sup>. In the acute upper urinary tract obstruction model, both renal pelvis pressure and renal blood flow increase in the first 1.5h, while renal pelvis pressure remains high but renal blood flow declines in the following 4h. After this time, renal pelvis pressure and renal blood flow begin to decline. The initial increase in renal blood flow is mediated by prostaglandins, which also cause diuresis, increased intrapelvic pressure, and a redistribution of renal plasma flow in the cortex and medulla. The further decrease in blood flow also affected glomerular filtration rate (GFR), renal blood flow, and renal oxidative metabolism. These physiological and biochemical parameters decreased within hours and reached their lowest values after 2 hours of unilateral ureter occlusion. At 3 days of obstruction, GFR dropped to 25% of its original level, 15% after 2 weeks, and almost zero after 8 weeks.

The clinical practice shows that: (1) D-J tube drainage is an ideal method for the treatment of hydronephrosis caused by upper urinary tract obstruction. It has the advantages of simple method, short hospital stay and low postoperative infection rate. (2) The incidence of postoperative urinary complications was significantly reduced by D-J tube drainage. (3) For patients with ureteral calculi, due to long-term stimulation of calculi, ureteral mucosa often has varying degrees of inflammatory hyperplasia and even polyp formation, and complications such as continuous urine leakage, urine cyst and stenosis formation are prone to occur after incision and lithotomy. After placement of D-J tube, due to the dual role of internal drainage and internal stent, urine leakage can be prevented or shortened, and the formation of stenosis can be prevented. (4) D-J tube has good supporting effect and unobstructed closed drainage, which can avoid the shortcomings of nephrostomy or external ureteral stent infection, and can be placed routinely. (5) Provide ureteral localization markers to facilitate ESWL or lithotomy. PCNL intraoperative ureteral catheter can be injected with contrast agent, the formation of artificial water and can prevent the formation of postoperative "stone street". It can not only be used for diagnosis of diseases, but also for clinical treatment. With the maturity of the technology, ureteral stents show a good application prospect. Placing double J tubes can not only improve renal function, but also reduce the incidence of complications such as renal pelvis or ureter stenosis and kidney infection, with obvious advantages, but also potential complications<sup>[10]</sup>. In this study, the most common complication after D-J tube implantation was hematuria, which was mainly caused by surgical operation and stimulation of foreign body in ureteral stent, resulting in congestion and edema of ureteral and bladder mucosa, thus leading to hematuria. After lying in bed and drinking more water, most patients disappeared in about 3 days without special treatment. And bladder irritation symptoms to patients with frequent urination, urgent urination, accompanied by Li and other symptoms. Urethral irritation symptoms and the D-J tube bladder end is too long, or the D-J end is located in the trigone, thereby stimulating the trigone of the bladder or the posterior urethra bladder irritation symptoms. The trigone region is the initiating region of bladder urination, and there are  $\alpha$  receptors in the posterior urethra. After oral spasmolysis, the symptoms of most patients were relieved. At the same time, our department carried

out traditional Chinese medicine collapse stain, microwave treatment, urinary tract irritation significantly improved. The main traditional Chinese medicine<sup>[11]</sup> (corydalis, corydalis, thistle, wormwood leaf, frankincense, myrrh) was ground and treated with paste to the umbilical cord. At the same time, the symptoms of bladder irritation were significantly improved. After the D-J tube is used, the anti-reflux mechanism of the vesicoureter disappears, and the urine in the bladder regurgitates with the pressure difference between the bladder and the ureter. Therefore, continuous catheterization should be carried out for about 5-7 days after catheterization, so that the bladder is in an empty state of low pressure, to prevent early postoperative infection and urine leakage. After removal of the catheter, the patient should avoid coughing forcefully, do not exert pressure during urination, and do not hold urine. Antispasmodic drugs can be used to reduce vesicoureteral reflux as much as possible. In addition, there are double J tube displacement, the main catheter, guide wire removal, strict control of the tail, or percutaneous renal surgery or open surgery catheterization must see reflux meilan or iodophor, at the same time as far as possible downward indwelling, the upper end can generally avoid. When choosing the D-J tube, doctors can choose the appropriate tube according to the patient's height, which has been beneficial to reduce the incidence of postoperative complications. Peritubular and lumen calculi were more common in patients with indwelling time for more than 3 months. At present, the imported double J tube can be left in place for half a year. When replacing the double J tube, it is recommended to replace it under endoscopy. After surgery, strengthen anti-infection, alkalize urine and drink more water, which can prevent the formation of stones.

Defects in clinical use of D-J tubes existing some insurmountable defects<sup>[12]</sup> in application: (1) They must be removed by invasive operation, that is, by cystoscopy. Although this kind of cystoscopy operation is not a major operation, patients will suffer greatly, and more seriously, the extubation will cause varying degrees of damage to the urinary tract tissue. Cause infection and edema, often require emergency treatment. (2) Due to various reasons, many patients will forget extubation or delay extubation, non-absorbable stents in the body for a long time to form ureteral stones, cannot be extracted through the cavity, have to take open surgery to remove, which undoubtedly seriously increased the pain and economic burden of patients. (3) D-J tubes often caused some complications. With the extension of stent indwelling time, these materials began to affect the urothelium and urine composition, leading to the formation of coating around the stent tubes. Literature review shows that medical intervention of D-J tube complications, as a brand new academic proposition, still has a lot of room for optimization: first, advance psychological intervention and timely postoperative treatment for patients who need to indent D-J tubes. At the same time, it is urgent to develop the D-J tube quantitative evaluation scale for complication intervention<sup>[13]</sup> to deeply analyze the quantitative problems of complications. Second, on the basis of theoretical construction, we should pay attention to practical exploration experience and think from the standpoint of patients. Third, with the emergence of new materials<sup>[14]</sup>, D-J tubes will be more compatible, or make a self-soluble D-J, so that patients do not suffer from complications.

In conclusion: With the development of minimally invasive technology in urology, ureteral stent implantation has become a routine operation in urology. D-J tube plays an important role in postoperative drainage and support, which plays an important role in the recovery of the disease. However, we medical staff should pay more attention to the treatment of complications. The results of this study showed that medical intervention in advance and correct education had a good effect on the occurrence of postoperative complications and the alleviation of symptoms, alleviating the pain of patients and improving the quality of life of patients. We believe that there will still be many other complications in clinical operation, for our clinical doctors still need to continue to work hard to find solutions. It is also believed that the improvement of D-J materials, the improvement of doctors' diagnosis and treatment level, and the progress of surgical operation will certainly reduce

the occurrence of postoperative complications, relieve patients' pain, and reduce medical conflicts in the future.

Table 1: D-J tube complications classification and comparative study between experimental group and control group n (%)

Complication	n		n	Cured	Uncured	Effective rate (%)	p
Bladder irritation	190(33.2)	Control group	95(16.6)	19(7.1)	76(25.2)	20	<0.05
		Experimental group	95(16.6)	81(29.9)	14(4.7)	85.3	
Hematuria	284(49.7)	Control group	142(24.8)	56(20.7)	86(28.6)	39.4	>0.05
		Experimental group	142(24.8)	67(24.7)	75(24.9)	47.2	
Ureteral reflux	98(17.1)	Control group	49(8.6)	11(4.1)	38(12.6)	22.4	<0.05
		Experimental group	49(8.6)	37(13.7)	12(3.9)	75.5	

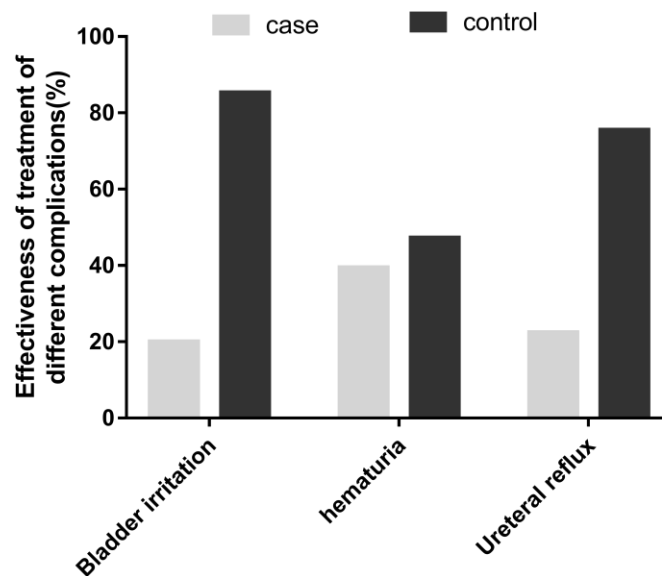


Figure 1: Comparison between experimental group and control group

## Acknowledgements

I am very grateful to each author and thank Mr. Lu xuechao for his guidance to me.

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