

## Research Article

# New Double – Pigtail Ureteral Stent for Laparoscopic Use: Initial Experience

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- Urethral stent placement
- Double-pigtail
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**Abstract**

**Purpose:** We evaluated the ease of placement of a new double-pigtail Ureteral stent via a transperitoneal or retroperitoneal laparoscopic ureterotomy.

**Materials and Methods:** We describe the technical characteristics and placement of a double-pigtail Ureteral stent for laparoscopic use. The stent was placed in 27 patients: 24 during laparoscopic procedures (21 retroperitoneal, 3 transperitoneal) and 3 during open procedures.

**Results:** Stent placement was successful in 26 patients, with a mean placement time of 7 min.

**Conclusions:** Ureteral stent placement was fast and easy. This meets the need for a Ureteral stent that is easy to place during laparoscopic procedures, thereby avoiding the need for pre- or postoperative placement.

## INTRODUCTION

The double-pigtail Ureteral stent is used to achieve flow of urine from the kidney to the bladder when the ureter is obstructed by a stone or by other conditions such as malformations, ureteropelvic stenosis, or intraluminal tumor. Although placement of a double-pigtail stent through the Ureteral meatus is easy, placement through a middle or lower ureterotomy during a laparoscopic procedure is not so easy, because the surgical field is very small.

Saussine [1] described the following procedures to facilitate laparoscopic placement of currently available double-pigtail stents: 1) introduction of the stent (with the guide wire) into the incision in the ureter, 2) removal of the guide wire, 3) reinsertion of the guide wire towards the opposite tip of the stent, and 4) creation of a loop to introduce the stent into the other part of the ureter. Depending on the position of the stone, the surgeon initially introduces the stent and guide wire into the part of the ureter that will use the longest length of stent. The guide wire is then removed from the part of the stent that has been placed, and is reinserted through one of the holes in the stent and directed towards the opposite tip. This opposite tip is then introduced through the ureterotomy towards the other part of the ureter, initially creating a loop in the stent. The stent must be inserted until this loop disappears completely. It is important for the assistant to prevent the first portion of the stent from slipping out of place while the surgeon is placing the second portion. The

guide wire is removed when the stent is correctly positioned in ureter.

In some cases, the double-pigtail stent cannot be placed through a ureterotomy, and must be placed at the end of the procedure in the standard way using an endoscope. The procedure described above highlights the difficulty of placing a stent via a laparoscopic ureterotomy.

We present here a new double-pigtail ureteric stent that is easy to place via a transperitoneal or retroperitoneal laparoscopic ureterotomy.

## MATERIALS AND METHODS

During 2010, we investigated the reasons why laparoscopic ureteric stent placement was so difficult. We used a pelvi trainer to place double-pigtail stents into tubes with openings at various levels that simulated ureterotomies. We considered that the placement difficulties were caused by the guide wires being too stiff and too long (145 cm) to manipulate easily in the small surgical field. After several modifications, we developed a new double-pigtail Ureteral stent and guide wire for use in laparoscopic surgery. The stent is closed at both ends so that the semi-rigid guide wire does not extend past the tips. The guide wire inlet holes are placed in a line and are large enough to allow easy passage of the guide wire. The stents are marked with three colored lines: red (2 cm from one curl), yellow (in the middle of the stent), and green (8 cm from the opposite curl), indicating

the positions of the guide wire entry holes for high, middle, or low ureterotomies, respectively. The remaining holes allow adjustment of the entry position of the guide wire according to the level of the ureterotomy (Figure 1). The guide wire is very flexible in the middle, but is semi-rigid at the ends to achieve uncurling of the pigtails during stent placement, which lengthens the stent by more than 2 cm.

### Placement technique

First, the stent is assembled by introducing the guide wire through the holes according to the level of the ureterotomy and forming a handle with the redundant wire. The stent is then introduced into the surgical field through a trocar. The flexible part of the guide wire allows the stent to curl up within the small surgical field. The colored lines help the surgeon to correctly orientate the stent. The red line is oriented upwards (towards the renal pelvis) and the green line is oriented downwards (towards the lower ureter). The colors are arranged as in a traffic light, with red at the top, yellow in the middle, and green at the bottom starting at the end (Figure 2). The stent is introduced through an incision in the ureter (Figure 3), of the longest segment. When the first portion of the stent has been placed, the guide wire is withdrawn from that segment, and the assistant places a clamp on the stent to avoid accidental dislodgment from the ureter (Figure 4). The surgeon then places the other tip of the stent in the ureterotomy, directing it towards the opposite end of the ureter, and forming a loop in the stent (Figure 5). The stent is advanced in the ureter until the looped part is straightened. The stent placement is secured with a clamp, and the guide wire is removed (Figure 6). The small portion of stent still outside the ureter is then twisted 180° to allow full insertion (Figure 7).

The final version of this stent was developed 20 months ago,

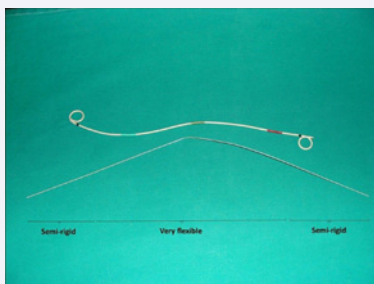


Figure 1 Double- Pigtail Ureteral stent for laparoscopic use.

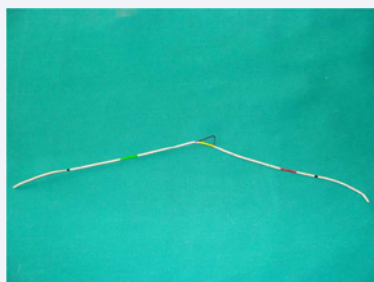


Figure 2 Stent assembled.

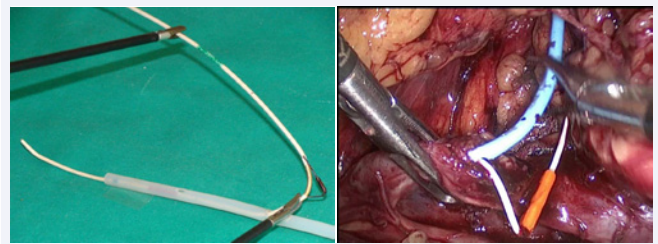


Figure 3 First portion of the stent is introduced in the urethra.

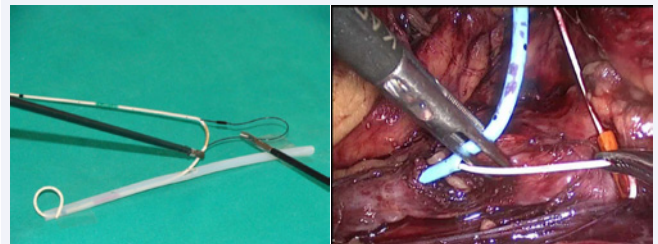


Figure 4 The guide wire is withdrawn from the segment introduced.

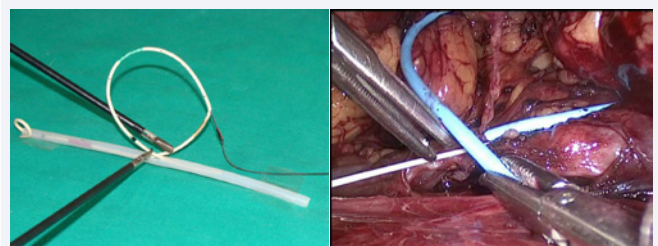


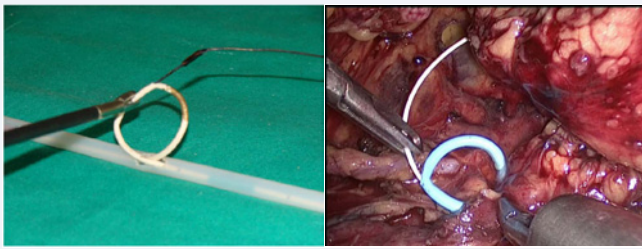
Figure 5 Placing the other tip of the stent in the ureterotomy forming a loop.

and has been used in 27 patients since then, including 11 with ureteropelvic stenosis, 14 with Ureteral lithiasis (7 in the upper ureter, 4 in the mid-ureter, and 2 in the lower ureter), 1 with complete transection of the lower ureter during laparoscopic hemicolectomy, and 1 undergoing vesicoureteral reimplantation.

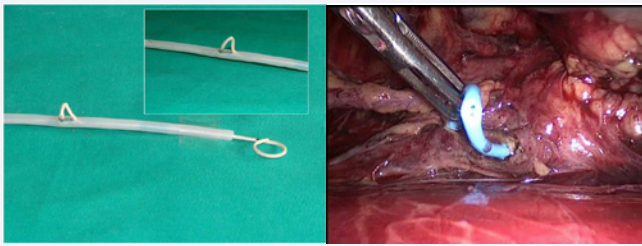
Stent placement was during a laparoscopic procedure in 24 patients: retroperitoneal in 21 patients and transperitoneal in 3 patients (1 with Ureteral lithiasis, 1 with a Ureteral injury, and 1 undergoing vesicoureteral reimplantation). Stent placement was during an open procedure in three patients with Ureteral lithiasis.

### RESULTS AND DISCUSSION

Stent placement was successful in 23 of the 24 patients who underwent laparoscopic placement. In the remaining patient, who had Urolithiasis, the lower end of the stent did not enter the bladder to allow the pigtail to curl, and urine was observed in the drain. In this patient, we performed cystoscopy to reposition the tip of the stent. We determined that it is important to have intraoperative radiological confirmation of correct stent placement. In the three patients who underwent stent placement during an open procedure, placement was very easy. The average placement time was 7 min.



**Figure 6** The guide wire is removed.



**Figure 7** Small portion of stent still outside the ureter.

## CONCLUSION

Placement of double-pigtail Ureteral stents during transperitoneal or retroperitoneal

Laparoscopic procedures are very challenging. Our new stent is fast and easy to place by both experienced and inexperienced surgeons, and avoids the previous difficulties associated with intraoperative ureteric stenting.

Although this stent was developed for use during laparoscopic procedures, it is also fast and easy to place during open procedures. This stent could therefore be used by urologists, general surgeons, and gynecologists who need to place ureteric stents during open procedures.

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1. Saussine C. Laparoscopic management of urolithiasis. *Web Surg Com.* 2004; 4.

### Cite this article

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