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## **Double-J stent placement during laparoscopic ureterolithotomy: the “seagull” technique**

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### **Introduction**

Laparoscopic ureterolithotomy (LUL) may be advocated as the primary treatment for a very large proximal ureteral stone or as one of the treatment options in case of refractory calculi from either failed ureteroscopy or ESWL [1]. Although some debate exists over the necessity of ureteral stenting after LUL, placing a double J stent (DJ) represents an effective internal drainage method that maintains the patency of the urinary tract, prevents prolonged urinary leakage and allows for a better healing, thus preventing the narrowing of the ureteral lumen [2].

However, the ideal method for the DJ placement in laparoscopy is still controversial. Two main methods of stenting after LUL have been described: 1) retrograde, via the bladder route that may be pre- or postoperative [3,4] and 2) antegrade (intracorporeal) [2,5]. These methods, together with other that have been described [6,7] could require of extra cystoscopic or ureteroscopic instrumentation (with their use being familiar only to the urologists), changing of the patient position, modification of the DJ or of the guidewire or further dissection and incision of the upper ureter.

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## **Aim**

To present a new technique of double-J stent (DJ) placement during transperitoneal LUL.

## **Description of the technique**

Patients were placed in a lateral decubitus kidney position. Following the medialization of the colon, the ureter was identified and followed-up to the stone. Ureterotomy was performed with a n° 11 scalpel blade on a laparoscopic needle holder. The stone was then extracted and placed in an endobag.

A traditional open end 6Fr DJ stent and two nitinol hydrophilic straight tip guidewires are used. In appropriate images of the preoperative abdominal CT scan, the distances (lengths) from the middle part of the stone to the ureteropelvic and ureterovesical junction were measured (Figure 1). The two guidewires are then inserted into the sideholes relative to the previously measured distance (Figure 2a-b), leaving about 5cm of each wire protruding from the proximal and distal ends of the stent and resembling the wings of a flying seagull (Figure 3a-b). This allows to straighten the terminal curls of the stent and provides for a safe navigation of the ureteric lumen. The residual proximal parts of both guidewires are left inside each guidewire dispenser.

The two ends of the stent are grasped together in a U-fashion and the DJ stent is inserted in the abdomen through a 10mm port. Once in the abdomen, the longer segment of the stent and its guidewire held together with a needle holder, are inserted and pushed into the ureterotomy until the target site (bladder or renal pelvis) is reached. The guidewire is then removed. The same procedure is repeated for the other end of the stent. After the removal of the second guidewire the central segment of the DJ is carefully adjusted.

The ureterotomy is sutured in a running fashion with a monocril 4-0. A slice of equine fibrin-adhesive-coated collagen fleece is placed on the suture line that forms a dense tissue-like sealant at the surface of the ureterotomy and acts as an anti-adhesive to other structures situated around the site. The ureterotomy is finally extraperitonealized by synthesis of the Gerota's fascia on Hemolock clips or stitches.

## **Results**

No perioperative complications were observed; mean time for stent preparation with the relative guidewires was 180sec (120-230) and mean time for intraoperative stent placement was 5 minutes (4-6). The postoperative KUB demonstrated the correct placement of the DJ and patients were discharged in the 11<sup>th</sup> postoperative day in almost all cases. Outcomes are summarized in Table 1.

## Discussion

The ideal method of DJ placement after LUL is still controversial.

Some authors place the DJ stent preoperatively in a retrograde fashion [3]. However, the preoperative stenting in the presence of a large obstructing and impacted stone may be difficult or unsuccessful. The preoperative (cystoscopic) placement of a ureteral catheter at the distal portion of the stone has been proposed, to insert a guidewire and DJ stent soon after the stone removal. Both techniques need a change of the patient positioning from dorsal lithotomy to a lateral decubitus kidney position and additional instrumentation, thus increasing operative time and cost of the procedure.

Post-operative cystoscope or ureteroscope-assisted DJ placement has been also described [4], again with the need for changing position and additional instrumentation. Moreover, the use of saline irrigation during the ureteroscope-assisted procedure may tear the ureteric suture line with the risks of dehiscence and urinary leakage.

The intracorporeal antegrade placement of DJ could be the ideal method for upper urinary tract incision, such as in case of laparoscopic pyeloplasty. In case of treatment of a lower ureteral stone, some Authors proposed a further incision of the upper ureter to insert the stent [5].

In a more recent manuscript, Das JK et al [2] describe the antegrade placement of a guidewire inside the ureter through a small-bore antral puncture needle; the whole stent is pushed distally leaving only the upper end in the ureterotomy area. Then, the guidewire is removed and the upper end is (blindly) pushed up into the renal pelvis [2].

Further techniques that require the use of modified (cut) guidewires inserted through lateral slits in closed-tip DJ have been also proposed [6].

Kim JY et al described a technique for DJ placement on a two guidewires [7]. In their series, the ureter was catheterized using a standard 6F double-J stent with both long and short guidewires inserted through two separate side holes of the stent that were closed at both ends. Then, the prepared stent was inserted in a bidirectional manner through the ureterotomy site, and the two guidewires were extracted.

The main techniques of DJ placement following LUL as well as their drawbacks are summarized in Table 2.

With our technique, the stent was correctly placed in all cases in less than 6 minutes without any difficulty. Only standard laparoscopic equipment is used while there is no need for patient replacement and for extra cystoscopic or ureteroscopic procedure. Once each segment of the DJ has been placed, the relative guidewire is removed; the sequential removal of the guidewires avoids the application of opposite direction forces that might enlarge or tear the ureterotomy; in our technique any force is applied only unidirectionally and according to the axis of the ureter.

The described technique could be also used as a method of DJ placement in case of iatrogenic lesion of the ureter as may occur during procedures of other surgical branches (general surgery, gynecology etc). In

these cases, the technique allows for a quick DJ placement by the operating surgeon, allowing to complete the planned surgery in laparoscopy; thus, there is no additional need of cystoscopic procedures and the relative instrumentation avoiding the intraoperative presence of the consultant Urologist.

### Conclusions

The «seagull» technique is time-saving and safe. It confers no risk to enlarge or tear the ureterotomy. There is no need for patient replacement, extra cystoscopic or ureteroscopic procedures, modified guidewires or closed-tip stents.

**Conflicts of interest:** None

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**Accompanying video:** <https://www.dropbox.com/s/bxrrs4piab2iel9/video%20dt%20versione%2013-06.mp4?dl=0>

## Figure Legends

**Figure 1a.** UPJ, right ureteropelvic junction. As indicated by the white arrow, it corresponds to the position 132.5mm.

**Figure 1b.** \*, middle part of a 4 cm lumbar ureteral stone, position 182.5mm, i.e. 50mm (182.5-132.5mm) caudal to the right UPJ.

**Figure 1c.** \*, right ureterovesical junction, position 333.75mm, i.e.  $333.75-182.5=151.75$ mm (15cm) caudal to the middle part of the aforementioned ureteral stone.

**Figure 2a.** Right urinary tract. P=pelvis, UPJ=uretero-Pelvic junction, UVJ=ureterovesical Junction, S=stone.

The distances between the middle part of the stone and the UPJ/UVJ respectively, have been calculated on the preoperative CT scan; this allows for the appropriate side holes of the DJ to be identified and prepared with the relative guidewires as shown in Figure 2b.

**Figure 2b.** Identification of the correct sideholes for the guidewire insertion on the DJ.

**Figure 3a.** 6Fr DJ stent and two nitinol hydrophilic straight tip guidewires inserted through adequately identified lateral sideholes. The residual proximal parts of both guidewires are left inside each guidewire dispenser.

**Figure 3b.** L1 : Distal segment; L2: Proximal segment; d1: 5 cm of protruding guideline

The lengths L1 and L2 are calculated as shown in Figure 1.

**Figure 3c.** Insertion of the DJ (already carried on the two guidewires) in the abdomen through a 10mm trocar.

**Figure 3d.** The first segment of the stent (L1) is inserted in the ureterotomy and advanced till the target site. When all the relative length has been inserted, the guidewire (g1) is removed.

**Figure 3e and 3f.** With an atraumatic grasper keeping in place the inserted portion of the stent, the other segment (L2) of it is inserted in the same manner and when completely advanced, the relative guidewire (g2) is also removed.

Patients, n	21
Side	14 right, 7 left
Sex	15 males, 6 females
Mean stone size	32 mm (29-60mm)
Mean operative time	100 min (86-180)
Mean time for stent preparation with the 2 guidewires	180sec (120-230)
Mean time for intraoperative stent placement	5 min (4-6)
Postoperative KUB	100% correct DJ placement

Stone free rate	100%
Complications	0%
Mean length of hospital stay	2.2 days (2-4)

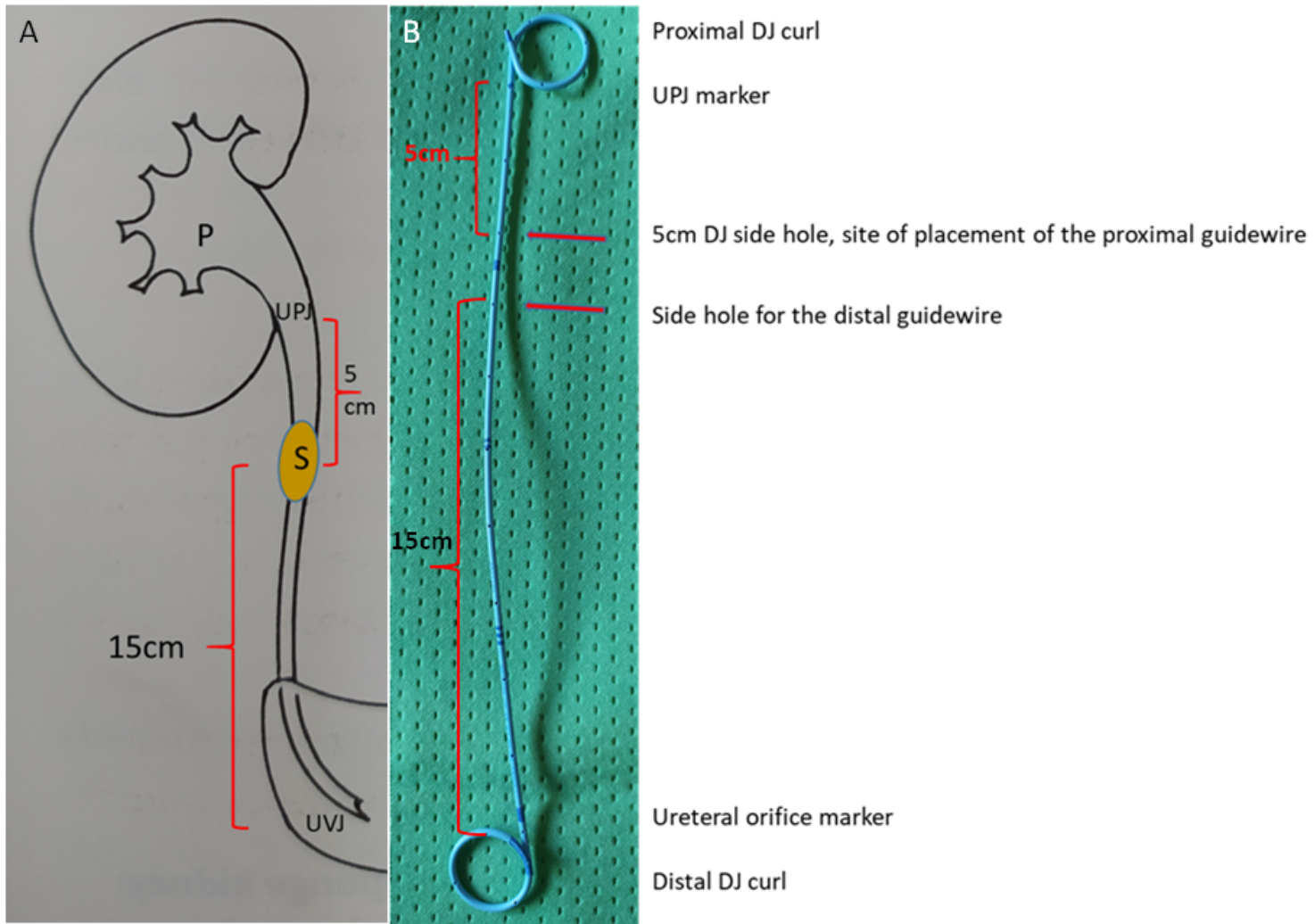
Table 1. Main baseline and perioperative outcomes.

Technique	Disadvantages
1) Cystoscopic preoperative retrograde stenting	Additional position changes Extra instrumentation-Costs Difficult or unsuccessful in the presence of an obstructing stone
2) Cystoscopic postoperative retrograde stenting	See 1) + risks due to advancing the suture site without direct visualization.
3) Ureteroscopic postoperative placement	See 1) + the saline irrigation may tear the ureteral suture line
4) Antegrade laparoscopic placement	Not adequate for distal ureterotomies-further incision (and consequently dissection) of the proximal ureter is required
5) Laparoscopic antegrade placement on guidewire inserted through slit of the stent	A slit on the lateral surface of the stent is required → when pulling the guidewire the split may become wider increasing the risk of stent fracture
6) Placement on double guidewire inserted through the stent side holes	Closed-tip DJ is required Use of modified (cut) guidewires The introduction of the two ends of the folded stent through the ureterotomy in opposite directions might tear and enlarge the ureterotomy

Table 2. Main techniques for DJ placement following LUL and their principal drawbacks.

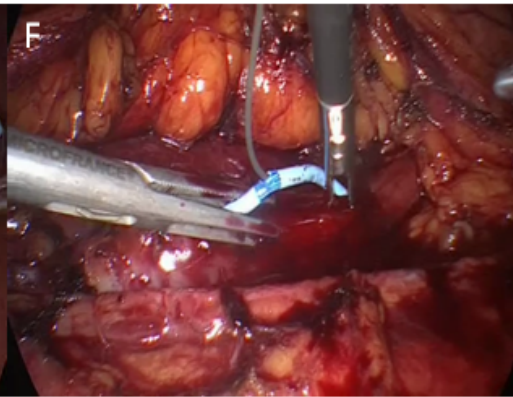
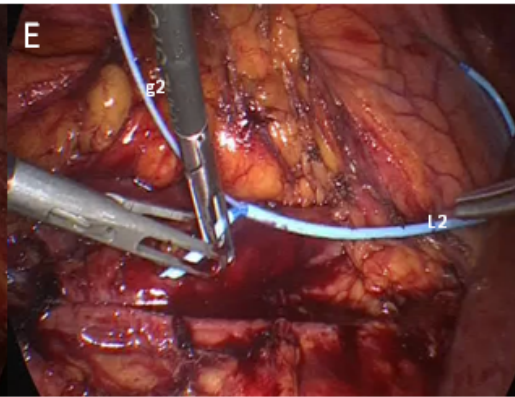
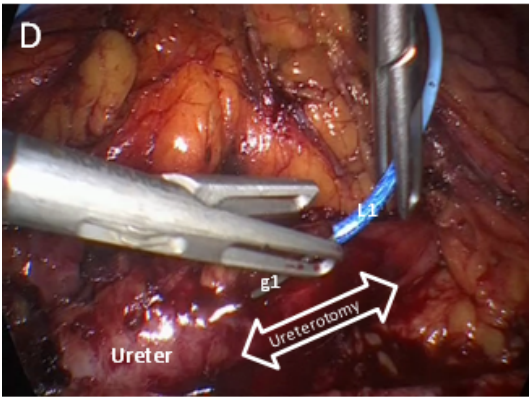
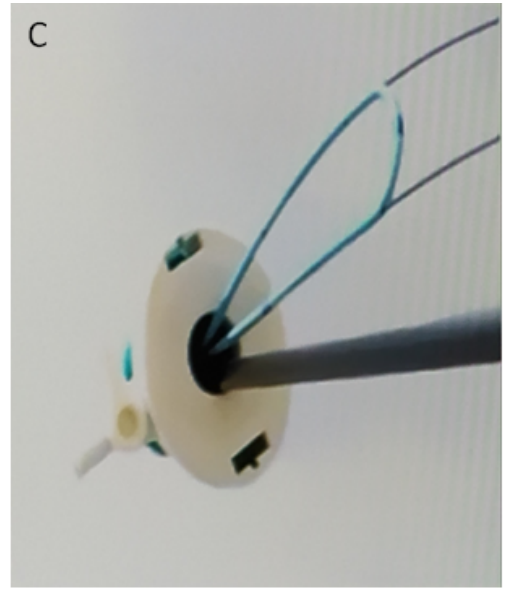
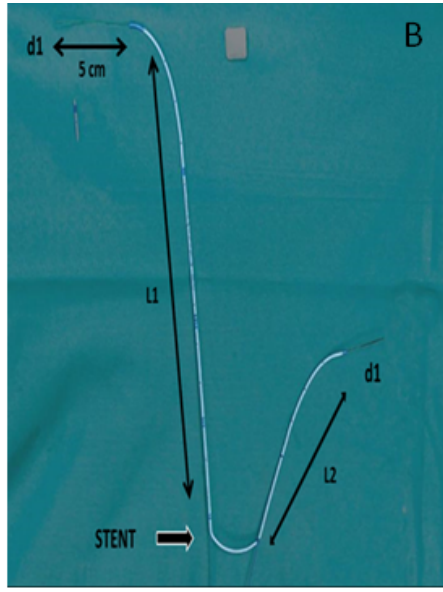
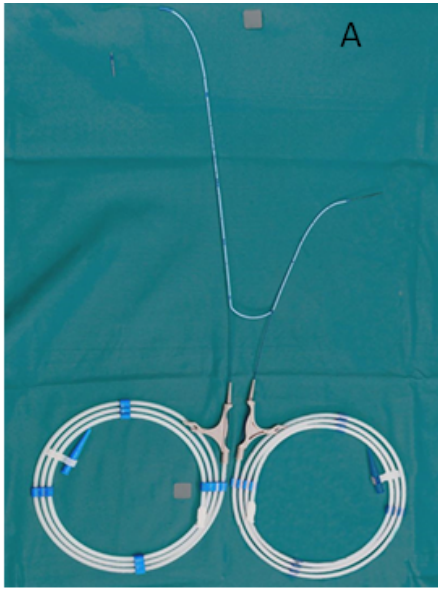


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