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DISMEMBERED LAPAROSCOPIC PYELOPLASTY WITH ANTEGRADE PLACEMENT OF URETERAL STENT: SIMPLIFICATION OF THE TECHNIQUE

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ABSTRACT

Laparoscopic pyeloplasty is an effective treatment option for ureteropelvic junction obstruction, with success rates superior to other minimally invasive approaches. We describe our technique of laparoscopic pyeloplasty with antegrade placement of ureteral stent with a laparoscopic-guided abdominal puncture. This technique decreases the use of fluoroscopy and also facilitates renal pelvis dissection and ureteropelvic anastomosis.

Key words: laparoscopy; kidney; ureter; ureteral obstruction Int Braz J Urol. 2002; 28: 439-45

INTRODUCTION

In recent years many treatment modalities have been developed to manage ureteropelvic junction obstruction (UPJO), such as antegrade or retrograde endopyelotomy, the Acucise cutting balloon, and ureteral dilation. Despite they are all minimally invasive alternatives, the success rates of these procedures is low (70-80% in well-selected patients) when compared to the traditional open pyeloplasty, with success rates around 90% (1,2).

In 1993 Schuessler et al. (3) performed the first laparoscopic pyeloplasty and since then many papers have shown that this technique is a safe and effective treatment for UPJO (4,5). One of the most difficult steps in laparoscopic pyeloplasty is the ureteropelvic anastomosis when the classic dismembered technique (Anderson-Hynes) is performed. Beyond the complexity imposed by the intracorporeal suturing, the presence of an ureteral stent (previously placed by cystoscopy) in front of the anastomotic site makes the suture even more difficult and time-consuming. We developed an alternative technique for placing the ureteral stent in an antegrade fashion, through a laparoscopic guided percutaneous puncture. This technique decreases the use of radiation, and facilitates the ureteropelvic junction (UPJ) dissection and the ureteropelvic anastomosis.

SURGICAL TECHNIQUE

Preoperative Evaluation

All patients undergo an intravenous pyelogram with furosemide and a renal scan preoperatively. If the surgeon intends to perform a retrograde pyelogram prior to the surgery, this can be done just before the laparoscopic access, or preoperatively in a separate procedure, as no preoperative stent is placed.

Patient Preparation

All patients are admitted to the Hospital the day before surgery, and begin oral bowel preparation with sodium phosphate, and intravenous antibiotic



Figure 1 - Patient position for laparoscopic pyeloplasty. The patient in a slight flank position, with the side to be operated rotated up to 45°.

prophylaxis with cefazolin 1 hour before the surgical procedure.

Bladder Catheterization

In the operating room, bladder catheterization is performed with an 18F 3-way Foley catheter. The irrigation path of the Foley catheter is connected to a 500cc bottle of 0.9% saline solution mixed with methylene blue.

Patient Positioning

The patient is positioned in a slight flank position with the side to be operated rotated up to 45° with a role (Figure-1). The pressure points are protected with pads, and the patient is fixed to the table with cloth tape, allowing the table to be rotated during the surgery. The surgeon and the camera are placed in the contralateral side with the TV monitor in front of them.



Figure 2 - Trocar placement for left laparoscopic pyeloplasty. For right pyeloplasty all trocars are placed in the midline.

Port Placement

We routinely use transperitoneal approach to access the UPJ. After the creation of pneumoperitoneum with a Veress needle (with abdominal pressure of 12mmHg), we place the three 10-12mm ports in a linear configuration at the midline for right pyeloplasty. For the left side, we place the right-hand trocar just lateral to the lateral border of the rectus muscle (Figure-2). The middle trocar is positioned in the umbilicus for both right and left sides. A fourth 5mm trocar may be placed, if necessary, in the subcostal region at the level of the anterior axillary line, and may be used to retract adjacent organs.

Colon Mobilization and Ureter and Renal Pelvis Identification

The parietocolic and renocolic ligaments are divided, allowing the colon be moved medially, thus providing exposure of the retroperitoneum (Figure-3). At this point, the dilated renal pelvis can be seen posteriorly to the colon. The administration of 20mg of furosemide intravenously helps to dilate the renal pelvis (as it is not previously catheterized), and facilitates its dissection. The ureter is identified and isolated just below the inferior pole of the kidney, and carefully dissected cranially up to UPJ, in order not to compromise its blood supply. The anterior and posterior aspects of the renal pelvis and UPJ are dissected with a gauze, creating as much space as possible to perform a tension-free anastomosis.



Figure 3 - The parietocolic ligament is divided allowing exposure of the retroperitoneal space and access to the UPJ.



Figure 4 - The renal pelvis and ureter are identified after the division of renocolic ligaments, and medial retraction of the colon. After dissection of the renal pelvis and UPJ, a stitch is passed with a straight needle in the most dependent portion of the inferior border of the renal pelvis. This stitch exits through the abdominal wall, allowing the renal pelvis to be pulled up from outside.

Renal Pelvis Repair

After wide dissection of the renal pelvis and UPJ, we pass a stitch through the anterior wall of the renal pelvis in order to make its retraction possible from outside the peritoneal cavity, avoiding the need of another trocar. For this purpose, a 3-0 nylon with a straight needle is introduced through the abdominal wall, about 1cm lateral to the most cranial port. As it is seen on the monitor, the needle is taken by the laparoscopic needleholder, passed through the inferior border of the renal pelvis on its most dependent portion, and then through the abdominal wall again, from inside to outside, as close as possible to its entrance site (Figure-4). The two ends of the suture are grasped with a hemostat, allowing the assistant to retract the anterior wall of the renal pelvis by simply pulling up the hemostat and thus opening the UPJ.

UPJ Resection and Ureteropelvic Anastomosis

The obstructed UPJ is resected together with the redundant renal pelvis when necessary (Figure-5). When the UPJ is resected, care should be taken not to cut the nylon stitch previously placed. The ureter is then spatulated on its lateral aspect (facing the medial aspect of the kidney) (Figure-6). We routinely perform interrupted suture with 5-0 polygalactin. The first stitch is passed in the medial



Figure 5 - The obstructed UPJ is resected leaving a margin of normal tissue to perform the anastomosis. Note that the renal pelvis is opened as close as possible to the nylon stitch.





angle of the anastomosis outside-in on the renal pelvis, and then inside-out on the ureter (Figure-7). The other sutures are placed in the posterior wall in the same fashion, in order to locate all the knots in the extraluminally. At this point, it is crucial to keep the nylon stitch pulled, maintaining the renal pelvis opened, and thus facilitating the sutures placement. The absence of a previously placed ureteral stent in the surgical field at this point makes posterior wall anastomosis easier to perform.



Figure 7 - The first stitch is passed in the lateral angle of the anastomosis. The stitches are passed outside-in on the renal pelvis, and inside-out on the ureter, in order to place the knots outside the ureteral lumen.

Percutaneous Stent Placement

After completing the anastomosis of the posterior wall, a 7F ureteral stent (double-J) will be inserted in an antegrade fashion. An abdominal puncture is made with a 18G needle used for peripheral venous access. The needle is placed cephalad to the anastomotic site, towards the ureteral axis. A 0.035" hydrophilic guidewire is inserted through the needle that, after entering the peritoneal cavity, is inserted in the ureter with a laparoscopic



Figure 8 - Insertion of the guidewire in the ureter. The guidewire is inserted in the abdominal cavity from outside through a puncture with an 18G needle. Note that at this point the posterior wall of the anastomosis is completed.

forceps (Figure-8). The presumed length of guidewire necessary to reach the bladder is inserted. The abdominal wall is dilated using dilators from a nephrostomy set until number 8F, permitting the passage of the double-J. The dilators can also be used to facilitate the introduction of the guidewire in the ureter, when the indroduction with the grasper is difficult. The double-J stent is then introduced through the guidewire in the abdominal cavity and penetrates the ureteral orifice with the aid of the positioner (Figure-9). Before introducing the entire stent, the bladder is filled with the saline solution mixed with methylene blue, previously connected to the Foley catheter. As the stent reaches the bladder, one may observe the exit of methylene blue through the anastomotic site, confirming the adequate placement of the stent and avoiding the need of radiologic control. After that, the guidewire is removed and only the proximal end of the stent will be outside the anastomosis (Figure-10). With a grasper, this part of the stent is introduced in the renal pelvis under direct vision (Figure-11). The anterior wall of the anastomosis is then completed with interrupted sutures (Figure-12), in a similar fashion of what was made for the posterior wall, and a suction drain is placed near the UPJ. If there is minimal output from the retroperitoneal drain, the bladder catheter is

removed on postoperative day 2. The retroperitoneal drain is removed shortly thereafter if there is no increase in output. The ureteral stent is generally removed in 6 weeks.

Follow-up

An intravenous pyelogram with furosemide is performed 2 months after stent removal if the patient is without any symptoms. A renal scan is performed annually thereafter, if the patient is still symptomfree.

COMMENTS

Laparoscopic pyeloplasty is a safe and effective procedure to treat UPJO. There is a clear advantage over other minimally invasive approaches and open procedures in respect to results and morbidity, respectively (4).

We believe that the placement of the stent through an antegrade fashion may decrease radiation exposure and maintain the renal pelvis dilated, facilitating its dissection and, consequently, the anastomosis.



Figure 9 – After placing the guidewire, a 7F double-J stent is passed from outside the abdominal cavity using the guidewire to enter the ureter. The observation of methylene blue through the stent confirms its adequate position in the bladder.



Figure 10 - The guidewire is removed and only the proximal portion of the stent is seen outside the ureter.



Figure 11 - The proximal portion of the double-J is iserted in the renal pelvis with a grasper.



Figure 12 - The anterior wall is closed with interrupted suture, completing the anastomosis.

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EDITORIAL COMMENT

The authors are to be congratulated for developing a technique for placing and confirming ureteral stent placement during laparoscopic pyeloplasty. Over the last 12 years, laparoscopic urology has evolved from primarily a diagnostic modality to become a radical, extirpative procedure. The field continues to grow to encompass reconstructive procedures such as laparoscopic pyeloplasty, as well as vesical-urethral anastomosis during laparoscopic prostatectomy.

Reconstructive laparoscopic procedures can be performed using either the Endostitch or free hand laparoscopic suturing using a needle driver. Robotic suturing may also prove to bridge the gap in laparoscopic training to allow urologists to perform complex laparoscopic procedures. As the surgeon places their hands at a remote console and moves handles located beneath a console, a robotic arm duplicates their hand movements with precision. Robotic instruments such as electrocautery, needle drivers, graspers, and scissors can then be used to perform complex laparoscopic procedures. The robotic articulated needle driver allows a larger range of motion compared to standard laparoscopic needle drivers which have fixed insertion sites at the trocar level, a limited range of motion, and limited angles. A three dimensional viewing screen also increases the depth of perception which may also aid the surgical perspective. The limitations of robotics include cost as well as lack of haptic, or force feedback. Currently, only visual clues are employed in order to determine the force being applied. This will be the next technological hurdle to overcome.

The use of methylene blue in this manuscript avoids the need for fluoroscopy, as well as the need for cystoscopy and placement of a ureteral stent at the beginning of the procedure. The only caveat in performing the procedure this manner is that the distal ureter and ureteropelvic junction anatomy is not evaluated by retrograde pyelogram prior to the procedure, unless an intravenous pyelogram adequately delineates this anatomy.

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