INTRAVESICAL SEALING OF THE DISTAL URETER IN NEPHROURETERECTOMY

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Summary.- OBJECTIVES: To study the effectiveness and reliability of a new minimally invasive technique for the treatment of the terminal ureter in nephroureterectomy due to transitional cell carcinoma, both in open and laparoscopic procedures.

METHODS: Observational retrospective study of 14 patients that underwent intravesical sealing and endoscopic excision of terminal ureter, before ureterectomy (11 laparoscopic, 3 open), due to an upper urinary tract tumor, between July 2003 and November 2007. This procedure was performed on 11 males and 3 females, average age 59.5 years, (range: 35-70). The tumor settled on the renal pelvis in 12 cases and on the proximal ureter in 2. Stage was Ta – T1 in 10 patients, T2 in 3, and T3 in 1. Tumor grade was G3 in 9 cases and G2 in 5.

Excision was carried out with a Collins knife. In order to avoid contact between the urine and retroperitoneal space, the meatus was quickly sealed with a clip introduced by means of a transvesical trocar.

RESULTS: Total surgical time of nephroureterectomy was 231.15 minutes (range 200-340). Global complication rate for the procedure was 28.4%, but the rate for the cases associated with this technique (meatus sealing and disinsertion) was 14.2%.

All patients were discharged after removing bladder catheter. Mean hospital stay was 10.14 days (range: 6-22).

After an average follow-up of 25.3 months (range: 12-64), no retroperitoneal recurrence has been reported. One of the patients had bladder recurrence and another one developed metastasis to the suprarenal gland that was treated satisfactorily.

CONCLUSIONS: Quick sealing of distal ureter by transvesical application of a clip before its endoscopic excision in nephroureterectomy is a sound technique from an oncological point of view, with an acceptable complication rate that avoids a second open time to manage distal ureter.

Keywords: Nephroureterectomy. Endoscopic ureteral disinsertion. Intravesical ureteral sealing.

Resumen.- OBJETIVO: Estudiar la eficacia y fiabilidad de una nueva técnica mínimamente invasora para el tratamiento del uréter terminal en la nefroureterectomía por tumor urotelial, tanto abierta como laparoscópica.
INTRODUCTION

Tumors in the upper urinary tract need radical surgery that involves the excision of both the kidney and the ureter, due to the high probability (19-43%) of ipsilateral relapse when the ureterectomy is incomplete (1). Traditionally, nephroureterectomy required two surgical incisions to approach the retroperitoneum on its upper and pelvic levels. In 1952, with the purpose of reducing morbidity, McDonald (2) described the endoscopic disinsertion of the ureter, by resecting the meatus and the inner section of the ureter, thus avoiding the lower abdominal incision. A year later, a new method that involved performing a vesical intussusception on the ureter after nephrectomy for its subsequent transureteral resection was published (3). In spite of their apparent simplicity and technical swiftness, these procedures failed to obtain widespread acceptance among the urological community.

The development of laparoscopic nephroureterectomy, as described by Clayman (4) and, nowadays, the more ample practice of laparoscopy by urologists has renewed interest in these techni-
ques, in order to apply minimally invasive solutions to distal ureter excision. In recent years, several methods to manage this procedure have been described (5-9), although consensus as to which one is the most appropriate has not yet been reached. In this paper, we present a new method to manage distal ureter in nephroureterectomy, following the oncologic guidelines of this surgery to assure urinary tract watertightness, by sealing the ureteral meatus with a clip before proceeding to its endoscopic disinsertion.

MATERIAL AND METHODS

Between July 2003 and November 2007, we used the intravesical seal technique of distal ureter before its endoscopic disinsertion in 14 nephroureterectomies (11 laparoscopies and 3 open surgeries) to tackle tumors in the upper urothelium. The patients were 11 males and 3 females, mean age 59.5 years old (range: 35-70); the tumor was settled in the renal pelvis in 12 cases and in the proximal ureter in 2. The stages were classified as Ta – T1 in 10 cases, T2 in 3 cases and T3 in 1. The tumor grade was G3 in 9 cases and G2 in 5.

TECHNIQUE

With the patient in lithotomy position, under general anesthesia, we started the procedure performing a cystoscopy in order to disregard vesical tumors. After locating the meatus, we initiated disinsertion performing an incision around it, with a resector assembled to a Collings knife. We interrupted the incision as soon as we managed to release a short
section of the distal ureter (aprox 1cm) in the density of the detrusor, and always before reaching the perivesical fat, thus avoiding a urine leak from the bladder.

We then substituted the resector by a cystoscope, with which we controlled the transvesical access of a 10mm laparoscopic trocar introduced at about 3cm over the pubic symphysis. A hemo-lock clamp was then introduced through the trocar and directed towards the area of the detached ureter. To make the sealing easier, we clasped the meatus with cystoscopic tweezers and tensed the released ureteral end towards the vesical neck. Once the ureteral end was sealed, we emptied the bladder from its potentially dangerous contents, introduced the resector once again, and continued with the circumferential disinsertion inwards until we reached the perivesical fat.

RESULTS

Total surgical time of procedure was 231.15±70.86 minutes (range: 200-340). In most of the cases, during both open and laparoscopic procedures, we observed moderate overflowing of the irrigation liquid to the pelvis. In 2 of the cases, the overflowing expanded widely around the retroperitoneum. However, none of the cases presented hyponatremy due to post-operative reabsorption, and renoureteral ablation was not particularly difficult.

Two of the laparoscopic procedures had to be resolved through open surgery. One of them due to the impossibility to release a section of the pelvic ureter that had not been sufficiently disinserted, and the other one due to a lesion to the external iliac ar-
tery, while performing the ureteral dissection that required a prosthetic by-pass.

In the post-operative stage, one of the patients from the laparoscopy group had to undergo a second procedure due to bleeding in the pelvic area where ureteral disinsertion had taken place. In the open surgery group there was a case of suture dehiscence. All of the patients were discharged without a vesical catheter. Average hospital stay was 10.14 days (range: 6–22 days).

After an average follow-up of 22.21 months (range: 4–54 months), so far, we have not encountered any local retroperitoneal relapse. There was 1 case of vesical relapse, and 1 patient developed a metastasis to the suprarenal gland that was treated successfully.

DISCUSSION

Upper urinary tract tumor surgery involves full excision of the urinary tract up to the ureteral meatus, since the risk of tumor recurrence in the ureteral stump is high (1,2). In order to carry out the procedure with oncologic rigor, it is essential to avoid any contact between the urine in the urinary tract and the surgical bed.

In 1952, McDonald describes the endoscopic resection of the ureteral orifice, using a “pluck” technique, with the objective of avoiding the second incision traditionally required by nephroureterectomy (2). However, in spite of its simplicity and swiftness—which several authors emphasize (11,12)—, this technique has failed to obtain widespread support due to its drawbacks, i.e., failure to produce a complete specimen and potential contamination of the periureteral vicinity by urine carrying tumor cells. Several authors have reported cases of tumor cell spread, when using this technique (13, 14).

Intussusception and stripping of the ureter on a ureteral catheter through the urethra (3, 15) is another method that has failed to arouse much interest because it requires ample transurethral manipulation and does not guarantee the total excision of the inner ureter with a blind avulse maneuver (16).

The development of laparoscopic nephroureterectomy (4) and, later, its widespread acceptance and use (17-19) have brought about renewed interest in techniques that manage ureteral disinsertion, according to the minimally invasive principles that guide the practice of laparoscopic procedures. In this context, several “pluck” techniques have been proposed.

For instance, the Washington University technique (5) suggests to initiate disinsertion by performing the incision with the aid of a dilation balloon, inflated in the inner section of the ureter, once the ureteral end has been released. The catheter balloon is
then substituted by a ureteral occlusion catheter that is subsequently fixed at the pyeloureteral joint. Parallel to the catheter balloon, a system to drain the kidney is set up. According to the authors, this procedure requires a fluoroscope and takes 50 min.

Using a Collings knife, Wong performs the disinsertion of the distal ureter, guided by hand-assisted laparoscopy (7).

The surgeon’s hand controls the tension of the ureter, helping in its excision, while, at the same time, the intestine contents and the iliac vessels are protected, as the incision is performed. However, the same as the techniques mentioned previously, an important drawback of this procedure is that, until the ureter is sealed, there is high probability of contact between the urine in the tract and the surgical bed and, therefore, risk of spreading tumor cells in the area, as commented before (16).

In theory, sealing of the vesical horn with an Endo-Gia™ (Autosuture, Norwalk, CT) (19) is an interesting method, not only from a technical point of view, as it allows full excision through laparoscopy, but also from an oncologic one, as it avoids urine leak from the urinary tract. Notwithstanding, as other authors have also pointed out, handling the stapler in such a reduced space as the pelvis of certain patients is not always feasible (16). It has also been reported that the metal clamps used in this technique can cause lithiasis (5.7% of cases), after a year and a half of follow-up (20).

A similar procedure on 13 nephrectec- mies was performed by Tsivian (8), except, instead of using the stapler, he used the sealing tweezers LigaSure Atlas, which seem to prevent lithiasis. So far, he has not reported any local relapse, although the average follow-up has been less than a year. From an oncologic point of view, both techniques have their weak points, as it is difficult to know whether or not the sealing includes the ureteral meatus and, on the other hand, the probability of lesion to the contralateral meatus when manipulating the trigon is also present. A study carried out by the Cleveland Clinic compares the former technique with the one that involves detachment and laparoscopic transvesical ligation and their results show that tumor recurrence is significantly greater when using the stapler technique, which is why its oncologic effectiveness is questioned (21).

The method of laparoscopic transvesical disinsertion proposed by this group of authors allows an oncologic management of the distal ureter, occluding the meatus with and “endo-loop”, after a transvesical instrumental dissection of the inner section of the distal ureter. However, as the authors themselves point out, this dissection is not only complex due to the difficulty of performing in such a small cavity, but also extremely arduous and time-consuming (90 min), even for so largely experienced hands (6).

The technique we describe allows us to achieve the same oncologic goal: to avoid any contact between the urine potentially contaminated with tumor cells and the retroperitoneum, as the sealing of the ureter is done in the density of the detrusor, before its full disinsertion and, subsequently to the emptying of the potentially dangerous urine in the bladder, completing the detachment before reaching the perivesical fat. Our method is simple and faster, as it only requires a transvesical trocar and it is very reliable thanks to the perfect sealing that the Hem-o-lock® provides.

A minor drawback of our technique, similar to the one described by the Cleveland Clinic authors (6) is the overflowing of the irrigation liquid around the transvesical port and through the vesical opening during disinsertion. In two of our first cases, overflowing, although alarming during the laparoscopic approach, did not call for any special measures. Taking further precautions, such as working with low intravesical pressure and reducing laparoscopy time, as the short learning curve progresses, reduces this drawback significantly.

The rate of complications may seem high for this first series of patients that have undergone this novel procedure: 14% intraoperative conversion and 7% post-operative reintervention. These rates refer not only to the technique itself, but also to the procedure as a whole, taking into account that, according to recent revision studies, as a rule, nephroureterectomies can reach up to 40.9% global complications (22), examining the procedure from beginning to end.

CONCLUSION

Transurethral ureteral disinsertion (11) is an effective technique to complete nephroureterectomies, but its application should be restricted to treat tumors in the lower section of the ureter, especially in the inner ureter, as other authors also conclude, in order to obtain the best outcome possible.
REFERENCES AND RECOMMENDED READINGS
(*of special interest, **of outstanding interest)


