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Management of distal ureter in laparoscopic nephroureterectomy

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ABSTRACT

Introduction: Nephroureterectomy is one of the procedures for which a laparoscopic approach is more clearly indicated. However, despite the long experience available, management of the distal ureter is still difficult.

Materials and methods: Thirty-two laparoscopic nephroureterectomies were performed from November 2004 to December 2008. The procedure used was endoscopic resection of distal ureter and earlier ligation of the ureter in the laparoscopic time in 13 patients, a laparoscopic bladder cuff in 13 patients, and an open bladder cuff in 3 patients.

Results: Mean operating time was 221.53 min (125-315 min), and mean postoperative stay of 27 patients was 4.6 days. Conversion to open surgery and discontinuation of the procedure for local tumor progression were required in one patient each. Mean patient follow-up was 17.8 months. No local relapse or metastasis occurred in the ports.

Conclusion: The most common procedures continue to be endoscopic resection and the open bladder cuff depending on indication. Any laparoscopic approach to upper urothelial tumors must strictly comply with oncological principles. The reported procedure is in our experience the fastest, most simple, and most effective for this purpose. In our opinion, the therapeutic algorithm provided is adequate for management of the distal ureter in laparoscopic nephroureterectomy.

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Abordaje del uréter distal en la nefroureterectomía laparoscópica

RESUMEN

Introducción: la nefroureterectomía laparoscópica constituye una de las indicaciones más claras para el abordaje laparoscópico, pero a pesar de la larga experiencia acumulada sigue presentando dificultades en lo concerniente al abordaje del uréter distal.

Material y métodos: desde noviembre de 2004 hasta diciembre de 2008 hemos realizado un total de 32 nefroureterectomías laparoscópicas. En 13 casos lo hemos hecho mediante desinserción endoscópica previa y clipaje precoz del uréter en el tiempo laparoscópico,

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en otros 13 con rodete vesical laparoscópico y en tres casos con rodete vesical por vía abierta.

Resultados: el tiempo quirúrgico medio ha sido de 221,53 minutos (125-315 minutos) y la estancia postoperatoria media ha sido de 4,6 días sobre 27 casos. Hemos tenido un único caso de reconversión a cirugía abierta, así como un único caso de suspensión del procedimiento por progresión local del tumor. El seguimiento medio de los pacientes ha sido de 17,8 meses. No hemos tenido ningún caso de recidiva local ni de metástasis en los puertos.

Conclusión: los procedimientos más comunes siguen siendo la desinserción endoscópica y el rodete vesical abierto según las indicaciones. Cualquier abordaje laparoscópico de los tumores de urotelio superior ha de ser exquisito en el cumplimiento de los criterios oncológicos. La técnica que hemos descrito constituye en nuestra experiencia la más rápida, sencilla y eficaz para este fin. Consideramos que el algoritmo terapéutico que presentamos es adecuado para el manejo del uréter distal en la nefroureterectomía laparoscópica.

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Introduction

In the last decade, laparoscopic surgery has become prevalent in almost all areas of Urology. However, doubts remain in certain procedures, despite the now routine application of such surgery in the different centers. Laparoscopic nephroureterectomy is one of the clearest indications for the laparoscopic surgical approach, since its initial description by Clayman in 1991¹. However, despite the extensive experience gained, difficulties remain in relation to management of the distal ureter.

En bloc removal of the nephroureterectomy piece remains the procedure of choice for treating upper urinary tract tumors, since its description by Albarran in 1909. This procedure poses a challenge when considering the laparoscopic approach, and is also a source of concern in terms of oncological safety, since urothelial tumors show a high risk of local relapse or metastatic spread in the laparoscopy ports, as indicated by a number of communications - though to date only 11 cases of port metastasis have been reported, and in all of them the oncological safety principles in relation to the extraction bag were not met²⁻⁴. Publications on oncological safety are currently available involving up to 7 years of follow-up, and these studies confirm the prevalence of laparoscopy over the open surgical approach also in upper urothelial tumors⁵⁻⁷.

The principal objective of this article is to report our experience and approach to the management of laparoscopic nephroureterectomy.

Material and methods

From November 2004 to December 2008, we performed a total of 32 laparoscopic nephroureterectomies. The mean patient age was 68.9 years (range 48-89), and males predominated (26:6). Prior endoscopic deinsertion and early ureteral clipping in the laparoscopic step was performed in 13 cases,

while a laparoscopic bladder cuff was used in another 13 patients, and an open bladder cuff in three patients. We also included three patients jointly subjected to laparoscopic radical cystectomy.

The laparoscopic step was carried out using four trocars for left kidneys and 4-5 trocars for right kidneys, according to whether liver deflection proved necessary or not. The surgical piece was indistinctly removed through a small and muscle-preserving ilioinguinal incision starting from the lowest-positioned port. In the case of the patients subjected to an open bladder cuff, the piece was removed through either a Gibson incision or an infraumbilical laparotomy. In the purely laparoscopic bladder cuffs, the patient was shifted to the forced Trendelenburg position, and one or two additional trocars were placed in a way similar to the procedure used in pelvic laparoscopic surgery in general. An example of this step is shown in Figure 1, corresponding to a patient with a history of gastric surgery and partial ureterectomy who developed ureteral tumor relapse at the iliac crossing. All the patients were discharged with a bladder catheter and drainage bag for a period of 7-10 days.

Results

The mean surgical time was 221.53 minutes (range 125-315), with a mean postoperative stay of 8.06 days (range 2-40). The mean stay in the case of laparoscopic nephroureterectomy was 4.6 days (range 2-12) in reference to 27 cases, since we excluded three patients subjected to laparoscopic radical cystectomy performed in the same intervention, as well as another two subjects in which the stay exceeded 25 days as a result of medical complications. Two patients developed paralytic ileus, while another two developed renal failure that prolonged the postoperative stay. Likewise, one patient with a bladder cuff performed in lateral decubitus showed a prolonged stay due to hematuria and urine leakage. The



Figure 1 – Patient placement and distribution of trocars for laparoscopic bladder cuff.

surgical times were documented from the operating room nursing reports (Table 1). Intraoperative and postoperative blood transfusion proved necessary in one and 5 patients, respectively, representing a global transfusion rate of 19.35% (including 3 patients subjected to radical cystectomy and one patient with postoperative hematuria), though intraoperative bleeding was of scant relevance in most of the patients.

Conversion to open surgery was documented in only one case, and suspension of the procedure likewise proved necessary in only one case, due to local tumor progression (3.03%). In turn, hand-assisted maneuvering proved necessary in only one case, corresponding to the early period of our patient series.

The mean duration of follow-up was 17.8 months (range 4-43). As regards the histopathological findings, we documented only one case in stage pTa (3.57%), with 15 in stage pT1 (53.57%), 2 in stage pT2 (7.14%) and 10 in stage pT3 (35.7%) (Table 2). There were no deaths either during surgery or in the immediate postoperative period. However, two patients died in the course of follow-up as a result of

progression of the disease (in both cases within the first 12 months), while a third patient died after three years of follow-up due to decompensated background heart failure. To date there have been no local relapses or metastases in the laparoscopy ports. It should be noted that three patients have developed bladder relapses (2 cases of *in situ* carcinoma and 2 stage T1G3 lesions).

Discussion

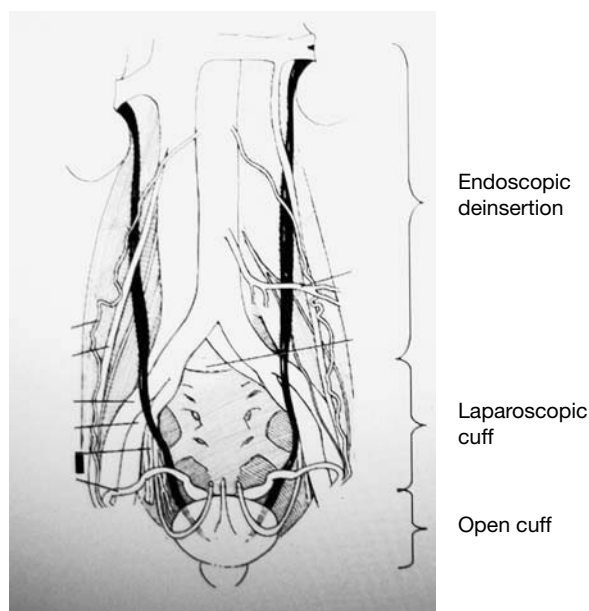
For the past decade, management of the distal ureter in laparoscopic nephroureterectomy has been a recurrent issue in the literature. The most common procedures remain endoscopic deinsertion and the performance of an open bladder cuff, depending on the indications. In any case, many studies have aimed to perform the entire procedure via the laparoscopic route. As early as 1999, Gill et al. described transvesical ligation of the distal ureter. Similar procedures have subsequently been reported, as well as a number of

Table 1 – Perioperative characteristics of the different surgical approaches

	Deinsertion	Laparoscopic cuff lateral decubitus	Laparoscopic cuff Trendelenburg	Open cuff
N = 29	13	9	4	3
Conversion	1	0	0	0
Surgical time (min)	182.5 (180-275)	186.1 (125-280)	243.75 (165-315)	256.6 (210-300)
Mean stay (days)	4.3 (2-9)	4.6 (3-8)	5.75 (3-12)	Not evaluable due to n=3 (3-40)

Table 2 – TNM staging of the laparoscopic nephroureterectomy series

Approach	Deinsertion	Lateral decubitus cuff	Trendelenburg cuff	Open cuff	Total
TNM					
pTa	0	1	0	0	1
pT1	8	4	3	0	15
pT2	0	2	0	0	2
pT3	4	2	1	3	10

**Figure 2 – Schematic representation of the management of the distal ureter in laparoscopic nephroureterectomy.**

endourological techniques, and ligation of the bladder cuff using an endo-GIA. In turn, we have described a purely laparoscopic bladder cuff technique similar to the procedure used in open surgery⁸⁻¹². None of the described techniques have prevailed over the rest, however, due to technical difficulties (Gill), or because of no single technique has been shown to be superior to the rest in terms of surgical time or postoperative stay.

In a way similar to our usual practice in open surgery, in all cases of upper urothelial tumors located above the iliac crossing, we have performed endoscopic deinsertion followed by placing of the patient in lateral decubitus and the performance of laparoscopic nephroureterectomy – in all cases with early ureteral clipping. In those patients with urothelial tumors below the iliac crossing, we performed laparoscopic nephroureterectomy with a bladder cuff. In this patient group we distinguish between an open or laparoscopic bladder cuff depending on its location. Thus, in those cases where the urothelial tumor is located in the juxtavesical and/or intramural ureter, we always perform an open bladder cuff, since it is not possible to perform ureteral clipping below the tumor, and thus avoid the risk of tumor cell spread during

laparoscopic surgery. However, in those tumors located below the iliac crossing but with a sufficient distance to ureteral entry to the bladder to allow ureteral clipping and thus safely seal off the urinary tract, we perform a laparoscopic bladder cuff (Fig. 2). We consider that this approach offers the maximum advantages of laparoscopy and also the maximum oncological guarantees, considering the oncological course of our patients in terms of local and/or distant disease relapse.

The laparoscopic bladder cuff can be performed with the patient in lateral decubitus, and even in 45-degree decubitus, redistributing our instruments with the available trocars. In our experience, ureteral dissection with a bladder cuff and posterior bladder closure in lateral decubitus can prove cumbersome and may give rise to subsequent problems. However, it is true that the procedure can be carried out this way in many patients with a favorable phenotype (wide pelvis and thin body constitution), as seen from our series (Table 1). We have found that changing the position of the patient to supine decubitus in the forced Trendelenburg position offers increased convenience in performing such dissection, which in some cases may prove complex due to local disease involvement or previous endourological maneuvers, and in performing laparoscopic cystorrhaphy after identifying the ureteral meatus to be removed. In most patients this procedure in the Trendelenburg position does not exceed 30 minutes, though the surgical time can be prolonged considerably when the technique is performed in lateral decubitus.

As we have seen in this article, there are different options for management of the distal ureter in laparoscopic nephroureterectomy. On comparing the different groups, it can be affirmed that in our series there have been no important differences in terms of the surgical times or duration of postoperative stay – though given the limited number of cases involved, no statistical conclusions can be drawn (Table 1). Likewise, no important differences are observed between our series and the most relevant publications on the laparoscopic approach to upper urothelial tumors in terms of surgical time, hospital stay or complications²⁻⁷.

Whenever possible, we should avoid performing an incision to dissect the distal ureter, and the consequent need to use retractors, which may affect the postoperative analgesia requirements. Any laparoscopic approach to upper urothelial tumors must be strictly compliant with the established oncological principles. Consequently, in the case of doubt regarding such compliance, or in the presence of added difficulties such as local disease progression, etc., an open bladder cuff is advised. For this reason, tumor stage and grade may also influence the surgical approach used.

Examples are the contraindication of deinsertion in high-grade tumors according to some authors, or the convenience of performing an open bladder cuff in locally advanced ureteral tumors.

Conclusions

The best approach to the distal ureter in laparoscopic nephroureterectomy has not been established. In centers with the greatest experience in laparoscopic surgery, where the aim is to secure the maximum benefits of this technique, a laparoscopic bladder cuff is to be performed whenever indicated and technically feasible. In our experience, the technique we have described is the fastest, simplest and most effective option for this purpose¹². We consider that the presented therapeutic algorithm is adequate for management of the distal ureter in laparoscopic nephroureterectomy, since it offers the benefits of laparoscopic surgery and guarantees compliance with the oncological principles (Fig. 2). In our opinion, the open approach is probably the safest option for performing a bladder cuff, and whenever laparoscopic surgery raises doubts about oncological safety, we recommend conventional surgery for managing the distal ureter.

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