**RETROPERITONEAL LAPAROSCOPIC SURGERY. EXPERIENCE AT LA PAZ UNIVERSITY HOSPITAL**

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**Summary.-** OBJECTIVES: With the popularisation of laparoscopic radical prostatectomy, the above technique has once again taken on an important role in the work of urology departments. Our extensive experience in laparoscopy means that we are performing increasingly more interventions using this approach. In the context of minimally invasive surgical procedures, this is probably bringing clearer benefits to retroperitoneal surgery than to prostatic surgery. In this article, we describe our series over nearly 4 years.

METHODS: The period analysed covers June 2004 to March 2008, during which time 288 retroperitoneal operations were performed (184 nephrectomies, 113 other procedures). In the majority of cases, the route of approach was transperitoneal.

RESULTS: The mean hospital stay was 3.6 days for the nephrectomies and 3 days for the other procedures. The transfusion rate for the nephrectomies was 5% and there was a conversion rate of in 2%. In the other types of surgery, the transfusion rate was 6% and there were no conversions.

CONCLUSIONS: The expansion of laparoscopy in Urology has to be accompanied good patient selection and the progressive acquiring of experience on the part of the surgeon. Certain interventions should only be tackled in cases where there is extensive experience.

**Keywords:** Renal surgery. Laparoscopy. Retroperitoneal. Living donor.

**Resumen.-** OBJETIVO: Con la popularización de la prostatectomía radical laparoscópica, dicha técnica vuelve a tomar un papel importante en el funcionamiento de los servicios de urología. Nuestra mayor experiencia en laparoscopia hace que cada vez realicemos más intervenciones mediante este abordaje. En este sentido, la cirugía retroperitoneal probablemente se beneficie más claramente que la prostática de la cirugía mínimamente invasiva. En este artículo describimos nuestra serie de casi 4 años.


RESULTADOS: La estancia hospitalaria media fue de 3,6 días para las nefrectomías y 3 días para los otros
INTRODUCTION

Laparoscopy in Urology was mainly developed in the 1990s with the performing of the first nephrectomies (simple, radical, nephroureterectomy, living donor) (1-3). The experience progressively gained in this new technique and the development of laparoscopic instruments means that increasingly more complex cases and more demanding surgery requiring laparoscopic intracorporeal suturing are possible (4).

The definitive recognition came as a result of the development and popularisation of the technique for radical prostatectomy. One of the main focus points in Oncological Urology is prostate cancer and its treatment. The fact that there is a reproducible laparoscopic technique, albeit complex, has lead to laparoscopy once more being considered in Urology, having been previously destined to remain limited to retroperitoneal techniques.

In Spain, we are living in a golden age as far as interest in laparoscopy is concerned. Initially condemned for multiple reasons, such as doubts about the oncological control involved (port-site metastases, peritoneal seeding), the technical difficulty involved in laparoscopic suturing, the initial accidents (vascular, intestinal, etc.) and probably a certain reticence to “learn how to operate all over again”. Now this resistance has been overcome and we have to be careful not to end up at the extreme opposite: “everything can be done by laparoscopy”.

With this article, we would like to describe the experience with retroperitoneal laparoscopic surgery over nearly 4 years in our centre.

MATERIAL AND METHODS

The period analysed covers June 2004 to March 2008. Transperitoneal has been the chosen approach due to its clear advantages in terms of working space and anatomical orientation (5,6). Lumboscopy involves less abdominal insufflation with less subsequent postoperative discomfort and avoids contact between the abdominal compartment and the retroperitoneum. However, we consider that the transperitoneal technique is safer and more convenient for starting a project of this type. We did perform lumboscopy on a small number of patients due to their previous surgical history, reaffirming our initial view.

Initially, due to lack of experience, we set a certain amount of contraindications for ourselves. We decided we needed to have experience before carrying out living donor extraction, adrenalectomy for pheochromocytoma, resection of large-size tumours or tumours close to the hilum. Our current contraindications are xanthogranulomatous pyelonephritis, renal tumour with vena cava thrombus, adrenal carcinoma with local invasion and partial surgery in cases of a single kidney. A previous history of abdominal surgery, initially considered as a possible cause for performing retroperitoneoscopy, has not forced us to convert any of the operations. We believe that this approach can be useful in some cases and should be known, but not used without previous experience in laparoscopy.

Seeking to maximise safety, for the first nephrectomies we decided to make use of the aid of the GelPort (Aesculap) hand-assist device, since working with a hand inside the abdomen gives a better perception of depth and obviously provides greater reassurance in the event of vascular accident. We performed a total of 10 operations with this device. We consider that dissection is more precise with scissors and forceps and having the hand inside partially limits working in this way. We now only introduce the hand at the moment of extraction in the case of living donors.

The first living donor extraction was carried out after having performed 67 retroperitoneal interventions (43 nephrectomies and 23 other procedures).

RESULTS

During this period (June 2004-March 2008), 297 retroperitoneal operations were performed (184 nephrectomies and 113 other procedures). There were 47 nephrectomies performed in the first year,
42 in the second, 58 in the third and there have been 37 so far in the fourth year. (Table I and Figure 1) Of the other interventions, 24 were performed in the first year, 36 the year after, 33 in the third year and 20 so far in the fourth.

The average age of the nephrectomy patients was 56 (22-79 years), with a BMI of 27.6 kg/m² (18-42). In 62 cases, there was a history of major abdominal surgery (39%). The mean operating time was 135 minutes (60-270), with average bleeding of 110 cc. Nine (9) patients required transfusion of red-cell concentrate (5%). Average hospital stay was 3.6 days (2-9).

For the other retroperitoneal procedures, the mean age was 45 years (19-79), with a BMI of 25.4 kg/m² (20-40). On 26 occasions there was a history of major abdominal surgery (23.8%). The mean operating time was 89 minutes (50-240), with bleeding of 110 cc and average hospital stay of 3 days (1-7). Transfusion of red cells was required on 7 occasions (6.1%).

We have had two deaths (0.6%). The first occurred during the course of a radical nephrectomy in which 2 hours into the procedure, the patient developed an uncontrollable arrhythmia. This was a 53 year-old male, BMI of 34 kg/m², heavy smoker, whose medical history included hypercholesterolaemia, cardiac history and anaesthetic risk ASA3. The second case was a 79-year-old patient diagnosed with hyperaldosteronism due to a functioning adrenal adenoma, with poorly-controlled hypertension. The Endocrinology Department considered adrenalectomy necessary and this was performed in approximately 70 minutes with bleeding of 50 cc. The patient suffered a cerebrovascular accident 24 hours post-intervention, which led to death 48 hours later.

On 6 occasions (2.4%), it was necessary to convert to open surgery; 1 case due to vascular injury (superior mesenteric artery), 2 due to bleeding (vena cava, lumbar vein), 1 patient with polycystic kidneys due to the impossibility of manoeuvring such a large piece, 2 cases due to periadrenal infiltration in an adrenalectomy (1 due to pulmonary tumour metastasis and the other due to a tumour of unknown origin).

On three occasions (1%) postoperative surgical revision was necessary due to bleeding; 1 from a perforating branch of the psoas muscle, 2 from the adrenal gland in the context of a nephrectomy.

There were 28 patients (9.7%) who developed medical complications which were resolved.

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>Nº CASES</th>
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<tbody>
<tr>
<td>Radical Nephrectomy</td>
<td>101</td>
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<tr>
<td>Simple Nephrectomy</td>
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<tr>
<td>Nephroureterectomy</td>
<td>33</td>
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<td>Living Donor</td>
<td>20</td>
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<td>Pyeloplasty</td>
<td>30</td>
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<td>Partial</td>
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<td>Adrenal</td>
<td>26</td>
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<tr>
<td>Cyst</td>
<td>8</td>
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<td>Retroperitoneal Biopsy</td>
<td>12</td>
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<tr>
<td>Lithiasis</td>
<td>6</td>
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<tr>
<td>Ureterectomy</td>
<td>1</td>
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<td>Heminephroureterectomy</td>
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**Figure**: Distribution by years.
with conservative treatment (acute gastroenteritis, dyspnoea, gastritis, mild renal failure, fever, paralytic ileus, toxicodermatia). In 1 partial nephrectomy case, a urinoma occurred which was successfully treated with percutaneous drainage. Two (2) cases developed abscesses in the surgical wound which required drainage (0.6%).

For the radical nephrectomies, the results from anatomical pathology revealed: 45 pT1 clear cell tumours, 4 pT2, 37 pT3; 11 oncocytomas; 1 multicystic nephroma and 1 angiomyolipoma. In the nephroureterectomies, we found 2 Ta, 17 T1, 1 T2, 9 T3 and 1 T4. Of the partial nephrectomies, there was 1 adenoma, 18 T1, 2 T3, 3 oncocytomas and 1 angiomyolipoma. Of the adrenalectomies performed, 4 cases were pheochromocytomas, 14 adenomas, 2 hyperplasias, 1 metastasis from 1 colon carcinoma, 2 metastasis from pulmonary tumour, 1 metastasis from 1 undifferentiated tumour, 1 myelolipoma and 1 mesothelial cyst.

DISCUSSION

As we have been acquiring more experience and the laparoscopic instruments have developed, retroperitoneal surgery has become increasingly more complex, so that we are now performing interventions which would not previously have been considered with this technique; such is the case with renal parenchyma-sparing surgery, living donor extraction and retroperitoneal lymphadenectomy.

When planning to initiate a project of this kind, one thing which must be taken into account is that this type of surgery in general entails a potential risk of serious vascular complications, since the area in which it is performed contains the body’s main vessels and their branches. Also to be borne in mind is the handling of organs such as the liver or the spleen, susceptible to rupture and bleeding, or manipulation of the intestines, always highly sensitive to nearby electrical coagulation. If we add surgical procedures which involve reconstruction, such as partial nephrectomy or pyeloplasty, we find a surgical field which is very attractive for minimally invasive surgery, but which requires very delicate handling. We believe that the approach to this field should be gradual and common sense must be used.

In terms of the route of approach (transperitoneal-retroperitoneal), both are valid and safe, although it would seem that transperitoneal is somewhat easier due to allowing more space for working and the placement of ports and better anatomical orientation since there are more visible references (7).

Concerning the pathology for which this technique can be used, we believe that this depends greatly on the surgeon’s experience. Now that initial doubts about oncological safety have been overcome, it would seem that tumours of urological origin can safely benefit from laparoscopy. These doubts arose when the technique was first being used, primarily in gynaecological or digestive tract tumours, when there was the poor practice of not using bags for the extraction of the piece or morcellation of the piece with bursting of the bag. Since the first reported case of port-site metastasis in 1978 (8), resulting from a diagnostic laparoscopy in an ovarian tumour, more cases have been described in the literature. The first urological reference was in 1994 resulting from a lymphadenectomy for high-grade bladder carcinoma in which no extraction bag was used (9). In a review of 10,912 urological laparoscopic procedures for cancer, 13 cases of tumour implants were found (0.1%); 10 of which were port-site seedings (0.09%) and 3 which were in the peritoneum (0.03%) (10). These data support the idea that urological laparoscopy is oncologically safe as long as certain guidelines are followed, such as the use of bags for the extraction of the pieces or avoiding morcellation. We probably have to be more careful with high-grade urothelial tumours in order to prevent the accidental opening of the tract.

Since it was first performed in the 1990s, and after almost 20 years of experience, laparoscopic radical nephrectomy appears to be at least as safe, oncologically, as open surgery (11-13), providing clear advantages in terms of postoperative pain and recovery. This seems clear in T1-T2 tumours, but there can be technical difficulties in renal tumours with vena cava thrombus, although some articles have made reference to a laparoscopic approach in these cases. We do not consider the presence of a thrombus beyond the renal vein to be a good surgical indication (14-16).

In the nephroureterectomies, the approach from the distal end of the ureter is the most controversial aspect. In our department we consider that in low-grade tumours above the iliac crest, endoscopic stripping can be performed, leaving management of the bladder cuff by laparoscopy for high-grade tumours or those below the iliac crest, changing the position of the patient as described in previous articles (17).

Living donor kidney nephrectomy is the only case in which we introduce the hand when extracting the piece, the objective being to keep the warm ischaemia time to an absolute minimum. The laparoscopic technique normally used is the classic transperitoneal approach with the patient in the lateral decubi-
tus position (18,19). When clamping the renal artery, we do not attach the clip to the ostium, since cases have been reported in the literature of clips slipping out (20-22). For the vein, we use two Hemolok XL, as the mechanical sutures leave less vascular length.

The indication in adrenalectomies is unquestionable; as a rule, a large incision is made for a small piece in open surgery. The only doubt might arise in pheochromocytoma, due to the possibility of releasing catecholamines during the creation of pneumoperitoneum, but this concern seems to have dissipated over the years as more experience has been acquired (23,24). In the case of adrenal carcinoma, it would seem prudent to operate by open surgery if, radiologically, there is any suspicion of invasion of neighbouring organs.

Renal parenchyma-sparing surgery is one of the techniques which probably demands the greatest preparation. It requires working with a predetermined warm ischaemia time (approximately 30 minutes) and consists of a first phase – extracting the tumour, during which oncological safety is of the greatest importance – followed by a reconstructive phase, in which a mastery of laparoscopic intracorporeal suturing is required to close the urinary tract, and the technology of haemostatic sealants is needed to guarantee haemostasis. With the added factor that the tumour is not always in the most convenient position for working, the complex nature of this surgery is evident. A fundamental step in carrying out the operation with oncological safety (negative margins) and intraoperative safety (controlled bleeding) is the correct clamping of the renal hilum. In our case, we have moved on from the selective clamping of the artery with a tourniquet, to block clamping with a laparoscopic Satinsky clamp. We consider it important to be able to excise the tumour with a bleeding-free field and the preparation of the renal hilum is therefore fundamental. The cutting of the parenchyma is done with cold forceps, since the use of coagulation could mask the tumour margin. The bed is then sutured with a running suture and we later apply a haemostatic sealant (FloSeal Baxter) with stitches for approximation of the renal parenchyma edges (25-27).

Our complication rate is very similar to that of other published series, vascular accident being the most common of the intra-operative complications. The rates for mortality, conversions to open surgery and postoperative surgical revision are also comparable with other series (28,29). The fact that the most complex surgery, partial nephrectomy, constitutes 9.8% of our series may explain the low complication and transfusion rates.

**CONCLUSIONS**

As we have been acquiring more experience and the laparoscopic instruments have developed, retroperitoneal surgery has become increasingly more complex, so that we are now performing interventions which would not previously have been considered with this technique; such is the case with renal parenchyma-sparing surgery, living donor extraction and retroperitoneal lymphadenectomy. We must be cautious about introducing a retroperitoneal laparoscopic programme; not everything which can be done by laparoscopy should be done by laparoscopy. Good patient selection is necessary and our experience in laparoscopy has to be analysed objectively before trying to take on all types of retroperitoneal surgery.

It seems evident that a great number of patients with urological retroperitoneal pathology could benefit from the laparoscopic approach; the level of safety we might be able to offer depends on our degree of expertise in this technique.

A urological retroperitoneal laparoscopy programme which tackles the most complex techniques must be undertaken in a Department where the volume of retroperitoneal surgery is at least 60 interventions a year; otherwise, the number of complex operations will be low with a greater chance of complications.

**REFERENCES AND RECOMMENDED READINGS**

("of special interest, "\* of outstanding interest")


