Brazilian Journal of Urology
Official Journal of the Brazilian Society of Urology
Vol. 28 (3): 192-196, May - June, 2002

RETROPERITONEOSCOPIC RENAL BIOPSY

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ABSTRACT

Objective: Present the advantages and difficulties to access the retroperitoneum for laparoscopic renal biopsies.

Material and Methods: We analyzed thirty patients with percutaneous biopsy contraindication (coagulopathy, anatomic alteration, and failure in the percutaneous procedure) who were submitted to laparoscopic renal biopsy. The access was made by a 10-mm incision in the extremity of the 12th rib and muscle dissection until the retroperitoneum. The modified Gaur balloon was allocated into the retroperitoneum and filled with 500 to 800 ml of saline. One or 2 additional 5-mm ports were made in order to perform the biopsy.

Results: The main difficulty in the retroperitoneoscopy was the limited working space, and sometimes it was difficult to manipulate the instruments. The conversion occurred in only one patient, due to problems to visualize the kidney. The rupture of the Gaur balloon occurred in 2 cases, without additional lesions. Peritoneum perforation occurred in 3 cases, without need of conversion. Mean surgical time was 40 minutes.

Conclusion: The retroperitoneoscopic renal biopsy is a procedure with low complication rates. The advantages are the easy access to the kidney and the adequate removal of material for analysis. The main disadvantage is the limited working space

Key words: kidney; biopsy; laparoscopy; retroperitoneal; diagnosis
Braz J Urol, 28: 192-196, 2002

INTRODUCTION

The histopathologic diagnosis of renal diseases is of ultimate importance, especially in cases of glomerulonephritis, nephrotic syndrome and renal failure of unknown origin, as it will establish the most effective therapy (1). The needle renal biopsy, preferably ultrasound-guided (USG), is the procedure of choice in most cases, with few complications (2). Some authors believe that the percutaneous technique should not be performed in exceptional cases, such as uncontrolled hypertension, coagulation disorders, uremia, and kidneys with unusual topographies (pelvic kidney) (3,4). In these cases, due to the higher probability of complications, the biopsy should be performed by the conventional surgery.

Since the 90's, some authors have been using laparoscopic techniques to perform renal biopsies as an alternative to the open surgery, in order to promote a more comfortable approach and to obtain specimens as efficiently as with the conventional technique (5,6). The present study will describe the our experience in 30 retroperitoneal renal biopsies, discuss technical aspects, results and the main advantages and disadvantages of this new approach..

MATERIAL AND METHODS

Thirty patients who underwent a retroperitoneal laparoscopic renal biopsy from 1996 to 2000 at Anchieta Hospital, ABC Medical School,

have been analyzed. A prospective protocol with the criteria described below was followed.

Indication to surgical biopsy: uncontrolled hypertension, coagulation disorder with risk of bleeding, uremia or renal ectopy, previous percutaneous renal biopsy with inadequate material.
a)- Stable clinical condition, allowing general anesthesia – criteria from the American Society of Anestesiology (ASA) I and II, once it was a diagnostic procedure (7);
b)- Besides the clinical evaluation performed by the nephrology team, a routine abdomen plain film (to visualize the floating ribs and check the distance between the 12th rib and the margin of the iliac crest – representative of the working space, and renal shadow, if possible) was performed.
c)- Ultrasonography, to verify the presence of the kidneys, their dimension and location, and also to rule out anomalies that would exclude the renal unit from the biopsy (cyst, tumors, agenesia).

The patient was hospitalized the night before the surgery to check the exams, to undergo intestinal preparation (enteroclysis) and fasting. As an alternative, the hospitalization could happen on the day of the surgery, with domiciliary preparation.

The retroperitoneum was accessed through 2 or 3 incisions. The first was always of 10 mm and the others of 5 mm.

The first incision allows the access to the retroperitoneum. First, a digital dissection is made, avoiding peritoneum lesion, so that the dilation balloon can be placed afterwards. It is important to perform a non-cutting dissection between the posterior abdomen wall and the kidney, to facilitate the dissection of the kidney lower pole by the dilation balloon. Optionally, the Gerota's fascia can be opened under vision**,** also to facilitate exposure. In the first cases, a modified balloon proposed by Gaur (8) was systematically used. It was made using the middle finger of a glove and a 16F urethral catheter. This balloon, filled with water, allows the retroperitoneal distension under low pressure, up to 500 to 800-ml of volume. When the balloon reaches this volume and the abdomen is visibly bulging, it is clamped and left in position for a period of 5 to 10 minutes, for local hemostasis.

Then, a 10-mm Hasson's trocar which allows the passage of a 0-degree optic was used. At this moment, the pneumoretroperitoneum was insufflated up to 12-15-mm Hg of pressure. This way, a retroperitoneum inspection was performed, identifying the upper muscles, the peritoneal reflexion (medially) and the kidney (by breathing oscillation). Under direct vision**,** 1 or 2 more incisions were made, to allow the passage of the clamps. As the kidney was identified by the dissection with the feeler gauge, the Gerota's fascia was opened in the lower pole to identify the parenchyma and the fragment section to be removed by laparoscopic scissors or laparoscopic biopsy clamp. After the fragment removal through the 5-mm trocar, the bloody area was cauterized with monopolar current. The eventual clots were removed by saline washing and aspiration. The pneumoretroperitoneum was disconnected, the hemostasis revised, and the clamps removed under vision. The aponeurosis of a 10-mm port was sutured with absorbable suture, being the skin sutured with intradermic absorbable sutures and covered with sterile tape.

The following evaluation criteria have been considered: number of incisions, operative time, hospital stay, postoperative analgesia, effectiveness of the obtained material for diagnosis and complications associated with the method.

RESULTS

Table-1 shows the general characteristics of the samples and the diagnosis.

Median age was 30 years, with one procedure performed in a 12-year-old child with lupus, and another in a 60-year-old patient with renal failure without apparent diagnosis.

Table-2 shows the main results.

Three incisions were performed in the first 4 cases and 2 in the subsequent ones. The latter caused a small discomfort to the surgeon, but it did not affect the operative time and the results. Mean operative time was 40 minutes, varying from 180 minutes (beginning of the experience) to 30 minutes (in the last procedures).

Table 1 - *General characteristics of 30 patients submitted to renal biopsy through retro-peritoneoscopy.*

General Characteristics	Values
Age	12 to 60 years (median = 30)
Gender	19 female (63%)
	11 male (37%)
Diagnosis	9 nephrotic syndrome
	7 nephritic syndrome
	3 lupus and hypertension
	1 Von Willebrand disease
	10 lost of renal function

Hospital stay varied from 36 hours in the beginning, to 12 hours, after the day-hospital experience. There was very little need of analgesia. Most cases (95%) needed only 2 doses of intravenous pain killer. All specimens obtained were sufficient for pathology.

As complications, we had 3 cases of peritoneal perforation during the dissection, which made the biopsy more difficult but not impossible, due to the extrinsic compression of the peritoneum over the retroperitoneal area and CO_2 escape to the abdominal cavity. However, it was not necessary to convert this procedure to an open surgery. In these eventualities, it was possible to check the peritoneal cavity through the port, not observing any lesions to other organs.

The conversion was necessary in only one case, due to a small kidney difficult to identify by retroperitoneoscopy. We did not have any similar difficulty as experience improved.

Rupture of the Gaur balloon occurred in two cases, with no intercurrence. We have not had any cases of excessive bleeding, hemodynamic instability, or necessity of blood transfusion. We have not observed any severe secondary repercussion to the carbonic gas infusion or other associated complication.

DISCUSSION

Needle renal biopsy is the procedure of choice to collect renal tissues for nephropaties diagnosis. Its clinical application is wide, being performed under local anesthesia and, preferably, guided by ultrasound. It is a safe procedure, presenting only 2% of complications (1). These are hematuria, peri-renal bleeding and, more rarely, hypovolemic shock (2). The main factors related to higher probabilities of bleeding are uncontrolled hypertension and uremia (9,10). Besides these cases, when the kidney is located in a difficult position for an effective incision or in cases of renal anomalies, an open surgical biopsy has been recommended.

The incision traditionally used to access the kidney for a biopsy is the lombotomy. The post-operative algic effects, the recovery for daily activities

Table 2 - *General results of retroperitoneoscopic renal biopsy in 30 patients.*

Number of Punctures	2 punctures: 26 cases
	3 punctures: 4 cases
Surgical Time	35-180 minutes (median = 40)
Hospitalization	12-36 hours (median = 24)
	last 10 patients = 12 hours
Postoperative Analgesia	1 dose: 26 cases (86 %)
	2 doses: 3 cases (10%)
	4 doses: 1 case (3.3%)
Effectiveness of Collected Samples	30 cases (100 %)
Complications / Conversion	3 peritoneal perforations (conversion not necessary)
	1 case = hard kidney visualization at the beginning
	last 10 patients = no complications

and the esthetical aspects are the most well-known disadvantages of this kind of incision.

In the 90s, the videolaparoscopic techniques widely applied in gynecology and general surgery started to be used in urology (11). In 1992, Squadrito et al. described successful transperitoneal renal biopsies (12). In 1992, Gaur reported retroperitoneoscopic renal biopsies with the laparoscopic advantages (fast recovery and less surgical aggression) without risks of lesions to intraperitoneal organs. The main disadvantages were the narrow working space and the visualization of a more reddish working area. These factors, however, were overcome by experience and excellent results were obtained (6). Das et al. (1993) published their successful experience using the modified Gaur balloon (13). Chen et al. (14) have recently reported 9 cases of retroperitoneoscopic biopsy in extremely obese patients. In spite of facing higher technical difficulties due to the peri-renal adiposity and the subcutaneous adipose panniculus, the procedure was feasible. We tend to agree that, in obese patients, the technical difficulty is higher (2 cases), especially to locate the kidney and to dissect the peri-renal adiposity which is usually abundant.

Like other authors, we have noticed that there is a clear learning curve, specially concerning operative time and associated complications. In relation to the technique, after adequate learning, we believe that 2-incision procedure is a slightly less comfortable than the procedure with 3 incisions; however, this fact does not affect the results significantly. Some authors perform the video-assisted needle biopsy with good results (12). Whenever necessary, the kidney is dissected with the optics stem and, after incision and fragment removal, the distal optic extremity was placed to compress the bleeding area of the kidney to promote hemostasis. We believe that in the cases with more bleeding likelihood, an incision to allow electrocautery access is essential. There are still other options to promote adequate hemostasis of the renal parenchyma that can be laparoscopically used, such as ultrasonic cautery, argon cautery or chemical hemostasis with biological glue, collagen, thrombin, and regenerate oxidate celulose. We have also chosen to remove a 0.5-cm fragment with scissors, in order to garanttee adequate pathologic evaluation. A laparoscopic clamp can be alternatively used to make the procedure faster. The optic and trocar position can vary, without compromising of the results and the technique.

The most reassuring results were associated with the operative time, hospitalization period and need of analgesia. The possibility of performing this procedure in 50 minutes or less (minimum of 30 minutes) without a significant incision is very positive. Postoperative pain is not intense and does not last long. It can be controlled with ordinary painkillers and is usually restricted to the first day after the surgery. In the last cases, we have performed the biopsies in a day-hospital basis, which is best for the patient and the institution. Thus, the higher costs of the laparoscopic surgery would be diminished by the short hospitalization period and the use of few drugs.

In terms of efficacy, adequate fragments were removed for diagnosis, as in the open surgery. There were insignificant complications with no clinical relevance and the only conversion case occurred in the beginning of the learning process. There was no macroscopic hematuria or bleeding of clinical repercussion.

We emphasize the importance of such approach as an introductory procedure to retroperitoneoscopy and to other minimally invasive procedures which have been more frequently described and performed in urology (15). The learning curve in our experience was established in the first 20 cases, observing the stabilization of a 30-minute operative time and absence of postoperative intercurrences in the last 10 cases. This was due to the familiarization with the retroperitoneal space, minimizing access complications such as difficulty to visualize the kidney, peritoneum perforation and working space limitations.

Due to our successful results, we have started to indicate the retroperitoneoscopic renal biopsy in patients who should undergo surgical biopsy.

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Received: November 1, 2001
Accepted after revision: February 15, 2002

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