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# Retroperitoneal decortication of simple renal cysts vs decortication with wadding using perirenal fat tissue: results of a prospective randomized trial

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## OBJECTIVES

To evaluate, in a pilot prospective randomized trial, the safety, effectiveness and radiological recurrence of retroperitoneal renal cyst decortication compared with retroperitoneal decortication with wadding using perirenal pedicled fat tissue.

## PATIENTS AND METHODS

From March 2004 to December 2007, 40 patients with simple renal cysts were enrolled and randomized; 22 (group A) had a simple retroperitoneal decortication (SRD) and 18 (group B) a decortication with wadding of the cyst using perirenal fat tissue

(RDCW). The following variables were recorded: age, gender, side, size on ultrasonography/computed tomography (CT), location, operative duration, blood loss, complications, pathology, presence or absence of flank pain, hypertension, urinary tract compression or urinary infection. The primary endpoint of this trial was to evaluate and compare the efficacy of both treatments. Secondary endpoints were safety and pain, hypertension and the resolution of urinary tract obstruction.

## RESULTS

In all, 40 cysts were treated; there were no bilateral cysts. The mean (SD) size on CT was 11.9 (1.84) cm in group A and 12.8 (1.25) cm in group B ( $P = 0.1$ ). All the procedures were completed laparoscopically and no conversion was necessary. There were no intraoperative complications. The mean

(range) hospital stay was 3.4 (3–6) days. There was no statistically significant difference between the groups for all variables assessed. There was a radiological recurrence in three patients (14%) in group A, but none in group B (all successful).

## CONCLUSION

To be completely successful, with maximum safety and to prevent recurrences in the treatment of renal cysts, RCDW is recommended when a retroperitoneal approach is chosen, especially if the cyst is located anteriorly. When symptom relief is considered, RCDW duplicates the results obtained with SRD.

## KEYWORDS

renal cysts, wadding, retroperitoneal, recurrence

## INTRODUCTION

The incidence of renal cysts is estimated to be ≈50% in the adult population [1]. Renal cysts are usually asymptomatic, their diagnosis is often incidental and linked to the development and increased use of imaging tools such as ultrasonography (US). However, up to 5–10% of renal cysts [2] can cause dull flank pain, hypertension, haematuria, infection or obstruction of the upper urinary tract, conditions therefore requiring treatment.

The operative management of renal cysts, when indicated, is usually by minimally

invasive procedures such as percutaneous aspiration with or without injection of sclerosing agents, endoscopic cyst opening or laparoscopic decortication. For the latter, the technique is safe, as it duplicates all the steps of the open procedure, combined with the advantages of a minimally invasive technique, making it the option of choice.

Unfortunately, the recurrence rate is to 19% after laparoscopy [3], independent of the technique chosen (transperitoneal, extraperitoneal, decortication, wadding). Thus the aim of the present prospective randomized trial

was to evaluate the effectiveness and safety of retroperitoneoscopic wadding using perirenal pedicled fat tissue (RDCW), compared to simple retroperitoneoscopic decortication (SRD).

## PATIENTS AND METHODS

Between March 2004 and December 2007, patients with simple renal cysts of >9 cm (Bosniak I), diagnosed at our institution and eligible for treatment, were enrolled in a prospective randomized trial. Cysts were localized and typified by US and/or CT. Patients with complicated renal cysts

(septations, calcifications or other internal cysts lesions, Bosniak II or III) or autosomal polycystic kidney were excluded from the study. In all, 40 patients (24 men and 16 women) matched the selection criteria and were divided into two groups using a randomization scheme; group A (22) had SRD and was considered as the control group, and group B (18) had RDCW. All the procedures were performed by one surgeon (F.P.) highly experienced in basic and advanced laparoscopic techniques.

All patients were accurately informed and written consent was provided. The indications for surgery were flank pain in 12 patients, urinary tract obstruction in 24 (10 of 24 patients had associated flank pain), hypertension in one, while the last three asymptomatic patients requested surgery after the diagnosis.

The procedure involved three trocars; a Hasson trocar, two trocars of 5 mm or one of 1 mm and one of 5 mm. Retroperitoneal fat tissue was dissected and the psoas muscle and ureter identified. After having identified the renal cyst, electrocautery scissors were used to open the exophytic wall. The cystic cavity was thoroughly examined for the presence of neoplastic changes and if no suspicious lesions were found, the liquid was aspirated and the wall resected with warm scissors up to the limit of the normal renal parenchyma edges.

The cystic wall was then submitted for formal histopathological examination to exclude malignancy. The edges were fulgurated as near as possible to the base of the cyst. In the presence of an anterior renal cyst, the kidney was mobilized and peritoneum lifted forwards for better exposure. When the wadding technique was used, pedicled perirenal fat tissue, previously mobilized, was fixed to the base of the cyst with one or two polyglactin 2-0 sutures. It is fundamental that the suture involves only the base of the cyst to avoid injuring the underlying parenchyma. At the end of the procedure, a small 21 F drainage was left *in situ* and removed on the first day after surgery.

Using a specific database, the following variables were recorded: age, gender, side, US/CT size, location (upper pole, lower pole, mesorenal, anterior, posterior), operative duration, blood loss, complications during and after surgery, pathology, presence or absence

of flank pain, hypertension, urinary tract compression or UTI.

The primary endpoint was the efficacy of the treatment; secondary endpoints were safety, pain, hypertension and the resolution of urinary tract obstruction. When considering symptoms, all patients were asked if they had pain and were evaluated using the Wong-Baker visual pain scale, administered before and 3 months after surgery. Patients with a pain score of >3, or with a residual pain rating, were categorized as having a symptomatic failure; the others were recorded as having symptomatic success.

In the presence of hypertension controlled by drugs, we evaluated if the hypertension was reduced after treatment and if drugs could be suspended. We evaluated the presence or absence of pain at 3 months and no earlier or later, because we wished to identify the pain strictly related to the presence of the cyst, to exclude a chronic back pain or other causes.

To evaluate the efficacy of the technique for pain relief, symptomatic patients were stratified in two subgroups, i.e. those with pain alone (12) and those with pain associated with urinary tract obstruction (10).

To evaluate if RCDW was more effective than SRD the follow-up evaluations were at 1, 3, 6 and 12 months, with objective assessments and US. Recurrence was defined as the presence of a perirenal anechoic area with a diameter of >4 cm.

All the variables were compared statistically between the groups using the chi-square and Fisher's exact test, with statistical significance indicated at  $P < 0.05$ .

## RESULTS

No patient was lost at follow-up; the mean (SD) follow-up was 37.2 (15.7) months. The two groups were comparable in terms of age and gender (Table 1). There were no bilateral cysts and thus 40 cysts were treated. The mean cyst size at CT was 11.9 (1.84) cm in group A and 12.8 (1.25) cm in group B ( $P = 0.10$ ).

All the procedures were completed laparoscopically and no conversion was necessary. There were no intraoperative complications. The mean (range) operative duration (from the introduction of the first

trocar to the removal of the last one) was 52.6 (35–58) min in group A and 47.8 (30–55) min in group B ( $P = 0.15$ ). The time to wad the cyst with fat tissue was 4.6 (4–7) min. All patients were mobilized on first day after surgery and oral intake started on the first or second day. The mean (range) hospital stay was 3.4 (3–6) days.

In all cases pathology showed no evidence of tumours, but only the presence of chronic inflammation of the cystic wall. There were no statistically significant differences between the groups for all the variables assessed.

Assessing the safety of the technique, there were three complications; in group A, a urine leak occurred in two patients and was treated successfully by JJ ureteric stenting. In group B, one patient developed a perirenal haematoma, requiring one unit of blood transfusion. The haematoma resolved spontaneously within 2 months.

Twelve patients in group A and 10 in group B had flank pain before surgery, with mean scores of 8.3 and 7.6, respectively, on the Wong-Baker visual pain scale. At 3 months, pain was reduced in all patients, with a mean score of 2.6 for group A and 1.2 for group B, but this difference was not statistically significant (Table 1).

When analysing data by stratifying patients on the basis of urinary tract obstruction, the pain scores before and after surgery were, respectively, 7.8 and 1.5 when urinary tract obstruction was absent, and 6.9 and 1.8 in those with obstruction (no significant difference, Table 2).

Hypertension before surgery was recorded in only one patient in group B. At the 1-month follow-up there was a slight reduction in blood pressure, and drug doses were reduced. At 3 months, unfortunately, hypertension was still present and the patient needed to resume the same therapy as before cyst treatment. Upper urinary tract obstruction was present in 24 patients before surgery but US after surgery showed no hydronephrosis.

There was a radiological recurrence in three patients (14%) in group A, at 1 month in one and at 3 months in the two others. The mean (range) anechoic perirenal area was 5.2 (4.5–7) cm. There were no further recurrences and no further changes in the diameter of the new cysts. Of these three patients, none

required further treatment of the new cyst. There were no recurrences in group B, with a successful result in all.

**DISCUSSION**

Simple renal cysts are a benign disease with a high prevalence among adults of 20% at 40 years of age to 33% at 60 years [4]. The diagnosis of renal cysts is very common and often incidental, due to the development of radiological tools like US, and its wide diffusion among medical practices.

Most cysts are asymptomatic (85–90%), but in some cases they are responsible for flank pain, hypertension, urinary tract obstruction, stone formation, vascular compression resulting in renin-mediated hypertension, and spontaneous haemorrhage. When these features are present, treatment is usually required [5].

The treatment of simple renal cysts is usually by minimally invasive techniques, as they have a high success rate, confining the open approach only to selected cases. Percutaneous US-guided aspiration has been the treatment of choice for several years. Nevertheless that technique had a high recurrence rate in series with a long follow-up [6,7]. To improve the success rates, sclerosing agents have been introduced as a single or multiple administration [8], but with fairly high recurrence rates (up to 35%) [9]. Although this technique can be administered on an outpatient basis, it can be associated with morbidity, e.g. bleeding, urine leak, extravasation of the sclerosing agent into the retroperitoneum inducing severe perirenal inflammation and consequent PUJ obstruction, inadvertent instillation of the agent into the collecting system, abscess formation, fever, pain, and cyst recurrence [10]. Another limit of the technique is that there is no histopathological evaluation, missing, in rare cases, a cystic tumour.

Another minimally invasive technique, already introduced, is ureteroscopic marsupialization; this procedure must be done under fluoroscopic exposure and to date only a few series with poor results have been reported [11,12]. Therefore this procedure has been abandoned, in favour of other techniques with higher success rates. Percutaneous marsupialization has also been described, but only limited series that included few patients have been published [13–15].

**TABLE 1** The characteristics of the patients, and the perioperative results and follow-up

Variable Mean (SD) or n	Group A (SRD)	Group B (RDCW)	P
No. of patients	22	18	
Age, years	60.2 (12.7)	57.8 (9.8)	0.20
Gender			
Men	14	10	
Women	8	8	
Side			
Left	9	7	
Right	13	11	
CT size, cm	11.9 (1.84)	12.8 (1.25)	0.10
Location			
Upper pole	15	12	
Mesorenal	4	4	
Lower pole posterior	3	2	
Anterior	13	11	
Posterior	9	7	
Patients with			
Pain	8	4	0.09
Hypertension	0	1	
Urinary tract obstruction	11	13	0.19
Urinary tract obstruction + pain	4	6	0.20
<b>Perioperative results and follow-up</b>			
Operative duration, min	52.6 (8.2)	47.8 (9.4)	0.15
Blood loss, mL	16 (9.4)	9.4 (6.6)	0.08
Complications			
During surgery	0	0	
After surgery	2 (urine leak)	1 (haematoma)	
Radiological failure at, months			
1	2 (peripelvic)	0	
3	1	0	
6	0	0	
12	0	0	
Wong-Baker visual pain score; mean (range)			
Before surgery	8.3 (6–10)	7.6 (6–10)	0.16
After surgery	2.6 (1–4)	1.2 (0–5)	0.09

Wong-Baker visual pain score	Patients with		P	<b>TABLE 2</b> Results for symptoms; patients were stratified by the presence of urinary obstruction
	Pain alone	Pain + obstruction		
No. of patients	12	10		
Before surgery	7.8	6.9	0.12	
After surgery	1.5 (0–3)	1.8 (1–5)	0.18	

Since the advent of laparoscopy in the 1990s, laparoscopic management of renal cysts has been confirmed as safe and effective, with results equalling those of open surgery [16]. Laparoscopy duplicates all the steps of the open procedure, allowing all the benefits of a minimally invasive approach, e.g. low morbidity, reduced bleeding, low postoperative pain and fast recovery.

Nevertheless, currently different laparoscopic techniques (simple decortication, marsupialization, decortication with wadding) and different approaches (transperitoneal, extraperitoneal) have been described.

The choice of a transperitoneal or a retroperitoneal approach is often determined by the location of the cyst and by surgeon's

TABLE 3 Previous reports of laparoscopic cyst decortication

Ref	No. of patients	Technique	Operative duration, min	Mean follow-up, months	Complication rate, %	Radiological success rate, %
[2]	22	R, SD	101.9	60	0	100
[3]	36	T, SD	–	67.2	0	81
[17]	18	T, SD	–	52	3.6	89
[18]	45	T, D + W	89	39	2.2	95.5
[19]	19	R, SD	70	24	0	100
[20]	24	R, D + W	95	33.6	0	91.7
[21]	20	T, SD	75	–	–	100

R, retroperitoneal; T, transperitoneal; SD, simple decortication; D + W, decortication with wadding.

preference. The transperitoneal approach requires major mobilization of the colon. In some cases, when the cyst is located anteriorly, transmesocolic access can be chosen, but these steps can make the surgery prolonged. Furthermore, in the presence of infected cyst liquid, the possibility of inducing peritonitis after opening the cyst wall is not remote. By contrast, in the retroperitoneal approach these manoeuvres are avoided, limiting the risks and duplicating accurately the principles of open surgery.

The different techniques described to date have not had homogenous results in terms of the efficacy of laparoscopic treatment. As shown by an analysis of previous reports (Table 3; [2,3,17–21]) the recurrence rate can be as high as 19% and the success rate seems to be influenced by cyst location. Peripelvic/anterior cysts, as they are close to the collecting system and kidney hilar vessels, are more challenging to be dissected and expose; the series by Hoenig *et al.* [22] had a failure rate of 75%.

Recurrence after decortication is mainly attributed to the presence of a remaining cyst wall with secretory activity. If the resection of such a wall is incomplete, it can adhere to surrounding tissues, e.g. perirenal fat tissue or the naked colonic area, promoting in consequence the development of a new cyst.

To prevent recurrences, different techniques have been reported, i.e. cyst decortication with fulguration of the cyst base, marsupialization, resection with Surgicel bolsters positioned into the base of the cyst, and wadding of the cyst [2,12,17,23]. Currently fulguration of the cyst after

decortication is not recommended because of the high risk of bleeding and urine leak due to the opening of the upper urinary tract. Marsupialization, although duplicating open surgery, requires a long time for suturing and the success rate is not satisfactory, as high radiological (up to 50%), and symptom recurrence (up to 62% of patients had pain) have been reported [24,25]. Surgicel or sealants positioned at the cyst base have not gained popularity; a series by Roberts *et al.* [23] showed a recurrence rate of 3%, with 13% complications.

The wadding procedure was described previously [17] and is frequently used in pelvic surgery for managing lymphoceles. Wadding the cyst prevents the adhesion of the cavity wall to the surrounding tissue, acting both with a mechanical function as a wick, and facilitating drainage and absorption of the liquid secreted by the cyst base. Although different procedures have been described, no comparative study of the techniques of retroperitoneal management of renal cysts has been published and especially no study analysing simple decortication and wadding.

To treat renal cysts we prefer a retroperitoneal approach because we believe that this approach adheres more to the principles of open surgery. Therefore, to determine the best technique for preventing recurrences, we assessed SRD and RDCW. For efficacy, with a mean follow-up of 37.2 months, patients in group B (RDCW) had no recurrences (all successful), while there were three recurrences (14%) in group A (SRD). Although not statistically significant, probably because there were too few patients, it is evident that RDCW was more successful.

Among the three patients with recurrences, in two there was a peripelvic anterior cyst and in one a cortical upper polar cyst. The recurrence after SRD can be explained by the position of the cyst. The peritoneal sac can lie on the base of the cyst, becoming a roof on the remaining cavity, and so creating a new cyst. Moreover, the position of the cyst makes the resection difficult and does not allow a complete decortication. This element suggests that, in the presence of an anterior peripelvic cyst, SRD is not indicated.

For the secondary endpoints there were no differences between the groups in safety; there were only three (8%) complications after surgery. In group A (SRD) two patients developed a urine leak and were treated successfully with ureteric stenting for 4 weeks. Importantly, these urine leaks could have been present before surgery, as the cysts were not fulgurated, to avoid penetrating the collecting system. In group B (RDCW) one patient developed a perirenal haematoma, that was monitored daily by US and that resolved spontaneously within 2 months. The haematoma could have been caused by a suture that was applied too deeply on the cyst base, involving the renal parenchyma. To prevent such a complication, sutures should be passed very carefully only into the base of the cyst.

For symptoms, the Wong-Baker pain score was 8.3 and 7.6 in groups A and B, respectively, at 1 month, and 2.6 and 1.2 at 3 months. The reduction in pain scores was the same in both patients with pain and no urinary tract obstruction (12) and those with associated urinary tract obstruction (10). There was no statistically significant difference among the four subgroups (Table 2). The only patient with hypertension (group B) had no change after the procedure.

In conclusion, for complete success and to prevent recurrences when treating renal cysts, using a retroperitoneal approach, RDCW is recommended, especially if the cyst is located anteriorly. The technique is safe, if suturing of the perirenal tissue on the base of the cyst is done carefully to prevent bleeding. When symptom relief is needed, RDCW is an attractive option, as it duplicates the results obtained with SRD.

#### CONFLICT OF INTEREST

None declared.

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**Abbreviations:** US, ultrasonography; SRD, simple retroperitoneoscopic decortication; RDCW, retroperitoneoscopic decortication with wadding using perirenal fat.