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# LAPAROSCOPIC MANAGEMENT OF PERIPELVIC RENAL CYSTS: UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, EXPERIENCE AND REVIEW OF LITERATURE

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## ABSTRACT

**Objectives.** To report our experience and review published reports on the laparoscopic management of peripelvic renal cysts. Peripelvic renal cysts represent a unique subset of renal cysts, as they are rare, commonly symptomatic, and more difficult to treat than simple peripheral renal cysts. Minimally invasive methods for the treatment of peripelvic renal cysts, including laparoscopic decortication, have recently become more common.

**Methods.** Four patients who presented with symptomatic peripelvic cysts underwent laparoscopic decortication at our institution. All four were men aged 47 to 65 years. One patient had undergone an unsuccessful prior cyst aspiration. All patients underwent preoperative computed tomography and retrograde pyelography. The mean number of peripelvic cysts per patient was 3.0, and the mean cyst size was 7.1 cm.

**Results.** The mean operative time was 259 minutes (range 240 to 293), and the mean estimated blood loss was 30 mL (range 10 to 50). No evidence of cystic renal cell carcinoma was found on aspiration cytology or cyst wall pathologic examination. The mean hospital stay was 1.3 days. No inadvertent collecting system injuries and no intraoperative or postoperative complications occurred. All 4 patients achieved symptomatic relief and were determined to have radiologic success as determined by the 6-month postoperative computed tomography findings.

**Conclusions.** Laparoscopic ablation of peripelvic renal cysts is more difficult than that of simple peripheral renal cysts and demands a heightened awareness of potential complications and, therefore, more advanced surgical skills. In addition to our experience, a thorough review of published reports found this procedure to be safe and effective with appropriate patient selection. UROLOGY 65: 882–887, 2005. © 2005 Elsevier Inc.

Simple renal cysts are common in the general population.<sup>1</sup> Most are found incidentally, are peripheral in location, and are generally asymptomatic. Rarely, the cysts can become large enough to cause pain and/or compression of the collecting system. Therefore, therapeutic interventions are rarely needed, and, when required, cyst aspiration (usually with sclerotherapy)<sup>2</sup> or open or laparoscopic<sup>3</sup> decortication is generally effective and safe. In contrast, cysts adjacent to the renal pelvis, also called peripelvic cysts, are rare in the general pop-

ulation.<sup>4</sup> They are usually discovered on workup for abdominal pain and more commonly require intervention, as they can compress the renal pelvis, leading to hydronephrosis and urinary obstruction.<sup>4,5</sup>

The treatment of peripelvic cysts differs from that of peripheral renal cysts. Although percutaneous aspiration can be performed, it is more dangerous because of the proximity of the cyst to renal hilar structures and is less effective than with peripheral cysts. Sclerotherapy is relatively contraindicated, because spillage of the sclerosing agent into the retroperitoneum can induce severe perirenal inflammation and secondary ureteropelvic junction obstruction.<sup>6</sup> The previous standard treatment of symptomatic peripelvic cysts has been open cyst decortication or nephrectomy.<sup>4,7</sup> Recently, the use of minimally invasive techniques has become more common to treat such cysts. A

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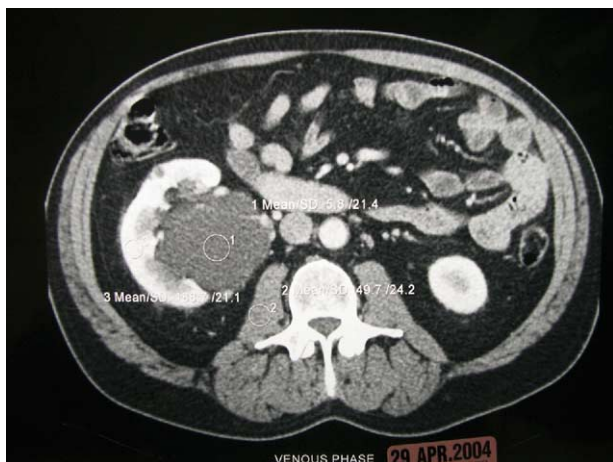


FIGURE 1. Example of peripelvic renal cyst as seen on computed tomography.

single case of a large peripelvic cyst treated by ureteroscopic marsupialization was reported in 1991,<sup>8</sup> but no cases have been reported since. Laparoscopic ablation of peripelvic renal cysts has only been reported in individual cohorts and small series, with a total of only 37 patients (38 cases) previously described.<sup>9–16</sup> We report our experience with laparoscopic ablation of peripelvic cysts and compare our experience with that in published studies.

## MATERIAL AND METHODS

We retrospectively reviewed the data from 4 consecutive patients who had undergone laparoscopic ablation of peripelvic renal cysts at our institution by one surgeon (M.L.S.). One patient had a history of cyst aspiration followed by only transient symptomatic relief. All patients presented with flank or abdominal pain and underwent computed tomography to help define the renal anatomy, number of cysts, and proximity of the cysts to the renal hilum and pelvis (Fig. 1). In addition, all patients underwent retrograde pyelography to determine whether any of the cysts communicated with the collecting system.

Our technique is approached using a transperitoneal route with a preplaced open-ended ureteral catheter for instillation of methylene blue. After reflecting the colon to expose the renal pelvis, the renal vessels are isolated, and the cyst is exposed. The fluid within the cyst should not be blue, to allow differentiation between the collecting system, which was previously injected, and the cyst fluid. The fluid from the cyst is aspirated and sent for cytologic analysis. A large window is removed from the cyst wall and sent for permanent histologic pathologic examination. The interior of the cavity is inspected to exclude additional cysts and to biopsy areas suspicious for carcinoma. Fulguration is not performed owing to the proximity of the collecting system and major renal vessels. Methylene blue is injected through the ureteral catheter to rule out an unsuspected collecting system injury. The cyst cavity is packed with perinephric fat or omentum. Finally, a Jackson-Pratt drain is left in place.

We compared symptoms based on pain using a visual analog scale preoperatively and postoperatively to determine the symptomatic success of the operation, and all patients underwent repeat computed tomography imaging 6 months after

the procedure to determine radiologic success. Symptomatic success was defined as a decrease in the pain on the visual analog scale of greater than 50%, and radiologic success was defined as no hydronephrosis or resolution of the cysts.

## RESULTS

All 4 patients were men aged 47 to 65 years (mean 55.7). The mean operative time, including cystoscopy and ureteral catheter placement, was 259 minutes (range 240 to 293). The estimated blood loss was 10 to 50 mL (mean 30), and no patient required blood transfusion. No patient had an inadvertent collecting system injury, and no evidence of urine leakage was found postoperatively. The mean length of stay was 1.3 days, and no intraoperative or postoperative complications occurred. No lesions suspicious for renal cell carcinoma were evident. All cytology and cyst wall pathologic findings revealed no evidence of malignancy. The mean convalescence period, defined as total recovery until resuming full activities as reported by the patients, was 18 days.

The average follow-up was 9 months. All 4 patients were symptomatic successes according to the preoperative and postoperative visual analog scales, and no late failures occurred as determined by the most recent follow-up examination findings. All 4 patients were radiologic successes on the basis of the 6-month computed tomography findings.

## COMMENT

Peripheral simple renal cysts are common in the general population and are usually asymptomatic. When requiring intervention, the initial first-line therapy for symptomatic simple renal cysts is often percutaneous aspiration with or without the instillation of a sclerosing agent, which is associated with a low morbidity (1.3% to 20%) and high success (75% to 97%) rate.<sup>2,17,18</sup> Other options include open cyst decortication,<sup>19</sup> which has a potentially greater morbidity and longer convalescence, laparoscopic decortication, or nephrectomy. Laparoscopic decortication of renal cysts was not only one of the first laparoscopic procedures reported for a urologic condition,<sup>3</sup> but has been shown to be an extremely safe and effective therapy.<sup>17</sup>

In contrast to the treatment of simple renal cysts, the treatment of peripelvic cysts is more difficult. This is due not only to the proximity to the renal hilar structures and renal pelvis but also to the often complex and multilobulated cysts encountered (our population had an average of 3.0 cysts per patient). Aspiration and sclerotherapy are associated with a high recurrence rate, and accidental spillage of a sclerosing agent can lead to secondary ureteropelvic junction obstruction.<sup>6,17,18</sup>

**TABLE I. Summary of preoperative parameters from nine published series on laparoscopic decortication of peripelvic renal cysts**

Investigator	Patients (n)	Male/Female (n)	Left/Right Side (n)	Age (yr)	Presenting Symptoms	Previous Cyst Aspiration (n)	Maximal Cyst Diameter (cm)	Cysts per Kidney (n)
Rubenstein <i>et al.</i> <sup>9</sup>	1	NA	NA	NA	100% pain	NA	NA	1
Hoening <i>et al.</i> <sup>10</sup>	4	1/3	NA	47.5 (35–59)	100% pain 25% infection	3	4.8 (4–6)	NA
Hemal <i>et al.</i> <sup>11</sup>	2	NA	NA	NA	100% pain	0	NA	NA
Roberts <i>et al.</i> <sup>12</sup>	11	5/6	NA	NA	91% pain 18% infection 18% hematuria	1	NA	8 with 1 2 with 2 1 with 4
Iannelli <i>et al.</i> <sup>13</sup>	5	3/2	3/2	45.2 (31–66)	100% pain	NA	7.7 (3.5–20)	4 with 1 1 with 3
Okumura <i>et al.</i> <sup>14</sup>	1*	0/1	1/1 (bilateral)	60	100% pain	0	NA	1 cyst in each kidney
Yoder and Wolf <sup>15</sup>	9	NA	NA	53.6 (32–68)	100% pain	2	6.7 (2–9.8)	4 with 1 2 with 2 1 with 3 2 with >3
Doumas <i>et al.</i> <sup>16</sup>	4	2/2	3/1	58 (44–67)	100% pain 25% infection	NA	5.5 (4.5–6.5)	NA
Current series	4	4/0	1/3	55.7 (47–65)	100% pain	1	7.1 (5–10)	2 with 1 1 with 4 1 with 6
Total	41 (42 renal units)	52% male; 48% female	53% left; 47% right	52.3	98% pain 9.5% infection 4.8% hematuria	22%	6.4	1.7

KEY: NA = not available.

Data in parentheses are ranges.

\* Laparoscopic ablation of bilateral peripelvic cysts (considered as 2 kidneys for analysis).

Kavoussi *et al.*<sup>8</sup> reported retrograde ureteroscopic marsupialization of a large peripelvic cyst in 1991. Despite the successful resolution, no further data have been published.

Although several large series have been published on the laparoscopic approach to simple peripheral renal cysts, only limited data have been published on the laparoscopic management of peripelvic cysts.<sup>9-16</sup> Rubenstein *et al.*<sup>9</sup> first reported laparoscopic ablation of a peripelvic cyst in 1993. Compared with laparoscopic decortication of simple renal cysts, laparoscopic peripelvic cyst decortication is associated with a statistically significant greater estimated blood loss and operative time and a suggested increased length of hospital stay, although a similar complication rate.<sup>12</sup> Laparoscopic decortication of peripelvic cysts requires advanced surgical skills because of the complexity of the cysts and the proximity to the renal hilar structures and collecting system, as well as because urinary tract reconstruction may be necessary in cases of inadvertent collecting system injury.<sup>9</sup> In total, only 41 patients (42 renal units) in nine series have been reported to date, including our patients, and the preoperative, intraoperative, and postoperative data available are summarized in Tables I to III.

The incidence of peripelvic cysts appears to be unrelated to sex or side (Table I). Our series of 4 patients were all men, which we relate more to chance than to scientific rationale compared with the other published reports. The most common presenting symptom was pain (98% of reviewed patients), along with urinary tract infection (9.5%) and hematuria (4.8%). These symptoms are likely a consequence of cyst enlargement and secondary compression of the collecting system.<sup>5</sup> Unlike simple renal cysts, which are rarely seen in patients younger than 40 years of age,<sup>1</sup> three of the nine series reported peripelvic cysts in patients 35 years old or younger.<sup>10,12,13</sup> The average patient age, however, was 52.3 years.

Most investigators generally use a combination of imaging modalities preoperatively. We generally perform computed tomography and retrograde pyelography, the latter can be performed at surgery, to determine the likely number and configuration of cysts and to evaluate for collecting system communication. In other cases, intravenous urography and ultrasonography were used.<sup>5</sup> Missed cysts and collecting system communication could adversely affect surgical success. In the studies cited, one third of the patients had multiple cysts, including 2 of our 4 patients, 1 of whom had six cysts.

Intraoperatively, the choice between the transperitoneal and retroperitoneal approach is dependent on surgeon comfort, experience, and cyst lo-

TABLE II. Summary of intraoperative data from nine published series on laparoscopic decortication of peripelvic renal cysts

Investigator	Transperitoneal/ Retroperitoneal (n)	Cystic Fluid Sent to Cytology	Pathologic Findings (Frozen Section)	Edge Fulguration	Perirenal Fat Pedicle Placed	Collecting System Entry (Treatment)	EBL (mL)	OT (min)
Rubenstein <i>et al.</i> <sup>9</sup>	1/0	Yes	Cyst wall sent	NA	PTFE	0/1	NA	NA
Hoenig <i>et al.</i> <sup>10</sup>	3/1	No	No	Yes in 3/4	1/4	1/4 (suture and double-J stent)	90	338
Hemal <i>et al.</i> <sup>11</sup>	0/2	Yes	No	0/2	2/2	No	200	185
Roberts <i>et al.</i> <sup>12</sup>	7/4	Yes	Suspicious areas biopsied	0/11	11/11	3/11 (suture and double-J stent)	182	233
Iannelli <i>et al.</i> <sup>13</sup>	5/0	Yes	Suspicious areas biopsied	NA	NA	NA	40	87.3
Okumura <i>et al.</i> <sup>14</sup>	1/0 (bilateral)	No	No	0/2	0/2	0/2	NA	390
Yoder and Wolf <sup>15</sup>	9/0	Yes	Suspicious areas biopsied	0/9	Yes when unable to ablate wall	NA	89	163
Doumas <i>et al.</i> <sup>16</sup>	4/0	Yes	No	4/4	0/4	0/4	<150*	155
Current series	4/0	Yes	Cyst wall sent in all	0/4	4/4	No	30	259
Group results	83%/17%	7/9 investigators		7/36 reported		9.5%	108	206

KEY: NA = information not available; PTFE = polytetrafluoroethylene; EBL = estimated blood loss; OT = operative time.  
\* Not included in analysis.

**TABLE III. Summary of postoperative data from nine published series on laparoscopic decortication of peripelvic renal cysts**

Investigator	Complications (n/patient)	Malignancy (Renal Unit)	Hospital Stay (days)	Symptomatic Success (n)	Radiologic Success (n)	Total Recovery (days)
Rubenstein <i>et al.</i> <sup>9</sup>	0/1	No	NA	1/1	1 partial	NA
Hoenig <i>et al.</i> <sup>10</sup>	0/4	No	2.75	3/4	2 complete 2 partial	22.75
Hemal <i>et al.</i> <sup>11</sup>	0/2	No	NA	2/2	2 complete	NA
Roberts <i>et al.</i> <sup>12</sup>	1/11 (urine leak)	No	2.7	11/11	11 complete	NA
Iannelli <i>et al.</i> <sup>13</sup>	0/5	No	2.2	5/5	5 complete	NA
Okumura <i>et al.</i> <sup>14</sup>	0/1 (bilateral)	No	7	2/2 (bilateral)	2 complete (bilateral)	NA
Yoder and Wolf <sup>15</sup>	0/9	No	NA	7/9	5 complete 3 partial 1 failure	NA
Doumas <i>et al.</i> <sup>16</sup>	1/4 (subcutaneous hematoma)	No	2.7	4/4	3 complete, 1 partial	14
Current series	0/4	No	1	4/4	4 complete	18
Group results	2/41 (42 renal units)	0/42	2.5	39/42	81% complete 16.6% partial 2.4% failure	18.25

KEY: NA = data not available.

cation. In our review (Table II), 83% of the cases were performed transperitoneally, including in all of our patients. Most investigators, including us, routinely place an open-ended retrograde ureteral catheter as a port for injection of methylene blue to help guide safe dissection, to help differentiate the collecting system (with blue fluid) from the cyst, and to evaluate for unsuspected collecting system injury. Some investigators have suggested the use laparoscopic ultrasonography for drainage guidance when multiple cysts are encountered or to help distinguish a blue-colored cyst dome from a major vein.<sup>12,15</sup>

We routinely send fluid for cytologic analysis and the cyst wall for permanent pathologic examination to evaluate for unsuspected cystic renal cell carcinoma, because this has been rarely seen in patients with presumed simple peripheral renal cysts.<sup>20,21</sup> The cytologic findings obtained from cyst aspiration alone appear to be insufficient because cytology has a low yield and a known false-negative rate for renal cell carcinoma.<sup>22</sup> None of our patients or any of the patients reviewed had evidence of renal cell carcinoma. To help decrease the risk of cyst recurrence, we and others commonly place perirenal fat or omentum into the cyst cavity when possible<sup>10,12,15</sup>; one investigator used a wick of polytetrafluoroethylene tacked inside the cavity.<sup>9</sup> Although others have cauterized the bed of the cyst, as performed commonly with simple renal cysts, this should be done with caution owing to the proximity to the renal hilum and infundibuli.

The reported rate of collecting system injury during laparoscopic management of perirenal cysts is 9.5% (4 of 42 renal units reviewed), with none in our group. These lacerations were all managed laparoscopically. Although complications could arise from missed injuries, early diagnosis followed by intraoperative repair should result in minimal morbidity. In the patients reported, no major blood vessel injury occurred nor were blood transfusions required.

Postoperatively (Table III), two complications have been reported. One patient had a low output urinary lead with a prolonged ileus after a repaired renal pelvis injury that was treated by stent and drain placement, and one had a subcutaneous hematoma that required no further intervention. Symptomatic success was achieved in 39 (93%) of 42 patients, including our 4. Only 3 patients were characterized as having treatment failure; 2 with immediate failure and 1 with a late recurrence 2 months postoperatively. One of the patients with immediate failure underwent nephrectomy, and the patient with late failure eventually underwent open cyst decortication. Of the 42 kidneys, 34 (83%) and 7 (16%) were considered complete and partial radiologic successes, with 1 patient considered to have radiologic failure. Two of the 7 with partial radiologic success were known to have undergone incomplete dissections. Two of the patients with partial radiologic success and the one with radiologic failure were similarly the three with symptomatic failure.

## CONCLUSIONS

The likelihood of symptomatic relief and acceptable long-term recurrence after laparoscopic ablation of peripelvic renal cysts is high. Despite the technical complexity of this procedure, the incidence of both intraoperative and postoperative complications is low if proper precautions are taken.

## REFERENCES

1. Laucks SP Jr, and McLachlan MS: Aging and simple cysts of the kidney. *Br J Radiol* 54: 12–14, 1981.
2. Holmberg G, and Hietala SO: Treatment of simple renal cysts by percutaneous puncture and instillation of bismuth-phosphate. *Scand J Urol Nephrol* 23: 207–212, 1989.
3. Stoller ML, Irby PB III, Osman M, *et al*: Laparoscopic marsupialization of a simple renal cyst. *J Urol* 150: 1486–1488, 1993.
4. Amis ES Jr, Cronan JJ, and Pfister RC: The spectrum of peripelvic cysts. *Br J Urol* 55: 150–153, 1983.
5. Barloon TJ, and Vince SW: Caliceal obstruction owing to a large parapelvic cyst: excretory urography, ultrasound and computerized tomography findings. *J Urol* 137: 270–271, 1987.
6. Camacho MF, Bondhus MJ, Carrion HM, *et al*: Ureteropelvic junction obstruction resulting from percutaneous cyst puncture and intracystic isophendylate injection: an unusual complication. *J Urol* 124: 713–714, 1980.
7. Amar AD, and Das S: Surgical management of benign renal cysts causing obstruction of renal pelvis. *Urology* 24: 429–433, 1984.
8. Kavoussi LR, Clayman RV, Mikkelsen DJ, *et al*: Ureteronephroscopic marsupialization of obstructing peripelvic renal cyst. *J Urol* 146: 411–414, 1991.
9. Rubenstein SC, Hulbert JC, Pharand D, *et al*: Laparoscopic ablation of symptomatic renal cysts. *J Urol* 150: 1103–1106, 1993.
10. Hoenig DM, McDougall EM, Shalhav AL, *et al*: Laparoscopic ablation of peripelvic renal cysts. *J Urol* 158: 1345–1348, 1997.
11. Hemal AK, Aron M, Gupta NP, *et al*: The role of retroperitoneoscopy in the management of renal and adrenal pathology. *BJU Int* 83: 929–936, 1999.
12. Roberts WW, Bluebond-Langner R, Boyle KE, *et al*: Laparoscopic ablation of symptomatic parenchymal and peripelvic renal cysts. *Urology* 58: 165–169, 2001.
13. Iannelli A, Fabiani P, Niesar E, *et al*: Long-term results of transperitoneal laparoscopic fenestration in the treatment of simple renal cysts. *J Laparoendosc Adv Surg Tech A* 13: 365–369, 2003.
14. Okumura A, Fuse H, Muraishi Y, *et al*: Laparoscopic ablation of peripelvic renal cysts. *Int Urol Nephrol* 35: 307–310, 2003.
15. Yoder BM, and Wolf JS Jr: Long-term outcome of laparoscopic decortication of peripheral and peripelvic renal and adrenal cysts. *J Urol* 171: 583–587, 2004.
16. Dumas K, Skrepetis K, and Lykourinas M: Laparoscopic ablation of symptomatic peripelvic renal cysts. *J Endourol* 18: 45–48, 2004.
17. Pearle MS, Traxer O, and Cadeddu JA: Renal cystic disease: laparoscopic management. *Urol Clin North Am* 27: 661–673, 2000.
18. Lang EK: Renal cyst puncture and aspiration: a survey of complications. *AJR Am J Roentgenol* 128: 723–727, 1977.
19. Kropp KA, Grayhack JT, Wendel RM, *et al*: Morbidity and mortality of renal exploration for cyst. *Surg Gynecol Obstet* 125: 803–806, 1967.
20. Chapple CR, Newman J, O'Brien JM, *et al*: Adenocarcinoma in the free wall of a simple renal cyst. *J R Coll Surg Edinb* 32: 320–321, 1987.
21. Meng MV, Grossfeld GD, and Stoller ML: Renal carcinoma after laparoscopic cyst decortication. *J Urol* 167: 1396, 2002.
22. Hayakawa M, Hatano T, Tsuji A, *et al*: Patients with renal cysts associated with renal cell carcinoma and the clinical implications of cyst puncture: a study of 223 cases. *Urology* 47: 643–646, 1996.