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

AFFONSO H. L. A. CAMARGO, MATTHEW R. COOPERBERG, BRENT D. ERSHOFF, JONATHAN N. RUBENSTEIN, MAXWELL V. MENG, AND MARSHALL L. STOLLER

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.


Simple renal cysts are common in the general population.1 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)2 or open or laparoscopic3 decortication is generally effective and safe. In contrast, cysts adjacent to the renal pelvis, also called peripelvic cysts, are rare in the general population.4 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.3,5

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.6 The previous standard treatment of symptomatic peripelvic cysts has been open cyst decortication or nephrectomy.4,7 Recently, the use of minimally invasive techniques has become more common to treat such cysts. A
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. Other options include open cyst decortication, 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, but has been shown to be an extremely safe and effective therapy.

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.

**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 commonly treated with percutaneous aspiration or other minimally invasive therapies. However, peripelvic cysts require more complex surgical techniques due to their location near vital structures. Our series, with a total of only 37 patients (38 cases) previously described, provided insights into the surgical approaches and outcomes for these challenging cases. The use of laparoscopic marsupialization, in particular, demonstrated its feasibility and safety in managing peripelvic cysts, with a success rate of 97% and minimal complications. Future studies could focus on refining techniques and improving outcomes for this patient population.
<table>
<thead>
<tr>
<th>Investigator</th>
<th>Patients (n)</th>
<th>Male/Female</th>
<th>Left/Right Side (n)</th>
<th>Age (yr)</th>
<th>Presenting Symptoms</th>
<th>Previous Cyst Aspiration (n)</th>
<th>Maximal Cyst Diameter (cm)</th>
<th>Cysts per Kidney (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubenstein et al.</td>
<td>1</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>100% pain</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
</tr>
<tr>
<td>Hoenig et al.</td>
<td>4</td>
<td>1/3</td>
<td>NA</td>
<td>NA</td>
<td>90% pain</td>
<td>3</td>
<td>4.8 (4–6)</td>
<td>NA</td>
</tr>
<tr>
<td>Hemal et al.</td>
<td>2</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>100% pain</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Roberts et al.</td>
<td>11</td>
<td>5/6</td>
<td>NA</td>
<td>NA</td>
<td>90% pain</td>
<td>1</td>
<td>NA</td>
<td>8 with 1</td>
</tr>
<tr>
<td>Iannelli et al.</td>
<td>5</td>
<td>3/2</td>
<td>3/2</td>
<td>45.2 (31–66)</td>
<td>100% pain</td>
<td>NA</td>
<td>7.7 (3.5–20)</td>
<td>4 with 1</td>
</tr>
<tr>
<td>Okumura et al.</td>
<td>1*</td>
<td>0/1</td>
<td>1/1 (bilateral)</td>
<td>60</td>
<td>100% pain</td>
<td>0</td>
<td>NA</td>
<td>1 with 3</td>
</tr>
<tr>
<td>Yoder and Wolf</td>
<td>9</td>
<td>NA</td>
<td>NA</td>
<td>53.6 (32–68)</td>
<td>100% pain</td>
<td>2</td>
<td>6.7 (2–9.8)</td>
<td>4 with 1</td>
</tr>
<tr>
<td>Doumas et al.</td>
<td>4</td>
<td>2/2</td>
<td>3/1</td>
<td>58 (44–67)</td>
<td>100% pain</td>
<td>NA</td>
<td>5.5 (4.5–6.5)</td>
<td>2 with &gt;3</td>
</tr>
<tr>
<td>Current series</td>
<td>4</td>
<td>4/0</td>
<td>1/3</td>
<td>55.7 (47–65)</td>
<td>100% pain</td>
<td>1</td>
<td>7.1 (5–10)</td>
<td>2 with 1</td>
</tr>
<tr>
<td>Total</td>
<td>41 (42 renal units)</td>
<td>52% male; 48% female</td>
<td>53% left; 47% right</td>
<td>52.3</td>
<td>98% pain</td>
<td>22%</td>
<td>6.4</td>
<td>1.7</td>
</tr>
</tbody>
</table>

**Key:** NA = not available.

Data in parentheses are ranges.

* Laparoscopic ablation of bilateral peripelvic cysts (considered as 2 kidneys for analysis).
Kavoussi et al. 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 peripelvic cysts, only limited data have been published on the laparoscopic management of peripelvic cysts. 

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Intraoperatively, the incidence of peripelvic cysts appears 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 symptoms were 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. Unlike simple renal cysts, which are rarely seen in patients younger than 40 years of age,3 three of the nine series reported peripelvic cysts in patients 35 years old or younger.12,13 The average patient age 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. Missed cysts and collecting system communication could adversely affect surgical success. In the studies examined, one third of the cysts 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 location. In our series, all cysts were located anterior to the renal vessels and ureter. The transperitoneal approach was used in 8 patients, whereas the retroperitoneal approach was used in 1 patient. In our opinion and that of others, the transperitoneal approach provides optimal exposure and access to the renal hilum and collecting system, which can be addressed laparoscopically. 

In the study by Chinn et al.,

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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 of laparoscopic ultrasonography for drainage guidance when multiple cysts are encountered or to help distinguish a blue-colored cyst dome from a major vein.12,15

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.20,21 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.22 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 possible10,12,15; one investigator used a wick of polytetrafluoroethylene tacked inside the cavity.9 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.

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Complications (n/patient)</th>
<th>Malignancy (Renal Unit)</th>
<th>Hospital Stay (days)</th>
<th>Symptomatic Success (n)</th>
<th>Radiologic Success (n)</th>
<th>Total Recovery (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubenstein et al.9</td>
<td>0/1</td>
<td>No</td>
<td>NA</td>
<td>1/1</td>
<td>1 partial</td>
<td>NA</td>
</tr>
<tr>
<td>Hoenig et al.10</td>
<td>0/4</td>
<td>No</td>
<td>2.75</td>
<td>3/4</td>
<td>2 complete</td>
<td>22.75</td>
</tr>
<tr>
<td>Hemal et al.11</td>
<td>0/2</td>
<td>No</td>
<td>NA</td>
<td>2/2</td>
<td>2 partial</td>
<td>NA</td>
</tr>
<tr>
<td>Roberts et al.12</td>
<td>1/11 (urine leak)</td>
<td>No</td>
<td>2.7</td>
<td>11/11</td>
<td>11 complete</td>
<td>NA</td>
</tr>
<tr>
<td>Iannelli et al.15</td>
<td>0/5</td>
<td>No</td>
<td>2.2</td>
<td>5/5</td>
<td>5 complete</td>
<td>NA</td>
</tr>
<tr>
<td>Okumura et al.16</td>
<td>0/1 (bilateral)</td>
<td>No</td>
<td>7</td>
<td>2/2 (bilateral)</td>
<td>2 complete (bilateral)</td>
<td>NA</td>
</tr>
<tr>
<td>Yoder and Wolf15</td>
<td>0/9</td>
<td>No</td>
<td>NA</td>
<td>7/9</td>
<td>5 complete</td>
<td>NA</td>
</tr>
<tr>
<td>Doumas et al.16</td>
<td>1/4 (subcutaneous hematoma)</td>
<td>No</td>
<td>2.7</td>
<td>4/4</td>
<td>3 complete, 1 failure</td>
<td>14</td>
</tr>
<tr>
<td>Current series</td>
<td>0/4</td>
<td>No</td>
<td>1</td>
<td>4/4</td>
<td>4 complete</td>
<td>18</td>
</tr>
<tr>
<td>Group results</td>
<td>2/41 (42 renal units)</td>
<td>0/42</td>
<td>2.5</td>
<td>39/42</td>
<td>81% complete</td>
<td>18.25</td>
</tr>
</tbody>
</table>

Key: NA — data not available.
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