

**Letters**

**RESEARCH LETTER**

**PACIFIC COAST SURGICAL ASSOCIATION**

**Management of Symptomatic Polycystic Liver Disease With Hepatic Resection**

Polycystic liver disease causes devastating symptoms owing to hepatomegaly. Aspiration or fenestration fails to definitively remove the cyst wall and results in the reaccumulation of cyst fluid. Preserved hepatic function generally precludes consideration of a liver transplant, leaving hepatic resection the best available treatment option for patients with impaired quality of life. This case series outlines a successful outcome using this operative strategy.

**Methods** | A retrospective, single-center medical record review approved by the Oregon Health and Science University institutional review board was performed for patients with polycystic liver disease who underwent formal liver resection (2-4 segments) by 1 surgeon during the period from June 2001 to June 2013. All patients with polycystic liver disease who had severe symptoms and normal liver and kidney function were offered this treatment. Our operative technique included formal resection of the segment or lobe with the largest cysts. The remaining unresected cysts were drained and partially resected using an endogastrointestinal vascular stapler, with marsupialization via a 3-layer staple line, oversewing any internal communication with the biliary tract (5-0 absorbable sutures) to avoid sclerosing the biliary tree, and sclerosis of the remaining cyst wall by 15 to 20 minutes of (5-0 absorbable sutures) to avoid sclerosing the biliary tree, and sclerosis of the remaining cyst wall by 15 to 20 minutes of betadine.

**Results** | Eleven patients were treated with a median duration of follow-up of 32 months (range, 6-146 months). All patients described significant improvement in their symptoms. No patients required a reoperation for symptoms. Complications included incisional hernias, postoperative ascites that resolved with medical therapy, secondary bacterial peritonitis from infected ascites, and bile leakage (Table). Four of the patients received long-acting octreotide acetate postoperatively for treatment of remaining large cysts.

**Discussion** | The primary aims of hepatic resection are to reduce liver volume by more than 50% and to remove or drain any infected or bleeding cysts. As the initial step in the operation, drainage and partial resection of the larger cysts provide better exposure to the porta hepatis and facilitate liver mobilization. Our series had excellent results with the use of the endogastrointestinal staple device instead of suture ligatures. Whereas fenestration entails creating holes in liver cysts, this marsupialization technique opened up the cyst completely, with partial resection via an endogastrointestinal anastomosis staple and sclerosis of any residual cyst wall to prevent regrowth. Because the extent of liver resection is determined at the time of operation, and owing to the necessity of adequate liver mobilization, an open approach is the preferred surgical technique for hepatic resection. Perihepatic drain placement addresses the accumulation of intra-abdominal fluid, and with its placement, we can monitor the development of biliary leaks.

Octreotide therapy has been shown to decrease the volume of liver cysts, as well as prevent the growth of new cysts; however, 15% of patients do not respond to this type of therapy. Our patients failed to develop the most common adverse effects of octreotide, mainly abdominal cramps or diarrhea. Discontinuation of octreotide therapy has resulted in the immediate recurrence in the growth of liver cysts, which suggests that continuous treatment is important for long-lasting effect.

**Table. Patient Characteristics and Extent of Operation**

<table>
<thead>
<tr>
<th>Patient No./Sex/ Age, y</th>
<th>Operations</th>
<th>Complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/F/38</td>
<td>Right hepatic lobectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts; cholecystectomy</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2/F/43</td>
<td>Segmentectomies (segments V and VI); nonanatomic subsegmentectomies (segments II, III, and IVb); drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Postoperative ascites, bile leak</td>
</tr>
<tr>
<td>3/F/45</td>
<td>Left lateral segmentectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Not applicable</td>
</tr>
<tr>
<td>4/M/51</td>
<td>Right hepatic lobectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Incisional hernia</td>
</tr>
<tr>
<td>5/M/51</td>
<td>Left lateral segmentectomy; partial resection of segment IB; drainage, partial resection, marsupialization, and sclerosis of remaining cysts; cholecystectomy</td>
<td>Not applicable</td>
</tr>
<tr>
<td>6/M/56</td>
<td>Left hepatic lobectomy; segmentectomy (segment V); drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Postoperative ascites</td>
</tr>
<tr>
<td>7/F/57</td>
<td>Left lateral segmentectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Not applicable</td>
</tr>
<tr>
<td>8/M/63</td>
<td>Left hepatic lobectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Incisional hernia</td>
</tr>
<tr>
<td>9/F/64</td>
<td>Left lateral segmentectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Not applicable</td>
</tr>
<tr>
<td>10/M/64</td>
<td>Left lateral segmentectomy; drainage, partial resection, marsupialization, and sclerosis of remaining cysts</td>
<td>Postoperative ascites, incisional hernia</td>
</tr>
<tr>
<td>11/M/65</td>
<td>Drainage, partial resection, marsupialization, and sclerosis of remaining cysts; cholecystectomy</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

**Table.** Patient Characteristics and Extent of Operation.
In conclusion, the preferred approach for patients with severely symptomatic polycystic liver disease with preserved liver and renal function is hepatic resection with drainage, partial liver resection, sclerosis, and marsupialization of the remaining cysts. This safe and feasible strategy helps patients avoid a liver transplant, experience resolution of their symptoms, and have an improved quality of life. Our series of patients experienced long-term success in eradicating symptoms after the majority of them had failed previous, less aggressive surgical options. There were no major complications, no need for reoperation, and no deaths. The use of postoperative long-acting octreotide has the potential to reduce the growth of remaining cysts and prevent new cysts from developing, and it should be considered in the management of these patients after surgery.

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Author Contributions: Drs Tseng and Orloff had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Tseng, Orloff.
Acquisition, analysis, or interpretation of data: Tseng, Orloff.
Drafting of the manuscript: Tseng.
Critical revision of the manuscript for important intellectual content: Tseng, Orloff.
Statistical analysis: Tseng.
Administrative, technical, or material support: Orloff.
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Conflict of Interest Disclosures: None reported.

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PACIFIC COAST SURGICAL ASSOCIATION
Identification of a High-Risk Subset of Patients Undergoing Infragenual Bypass Surgery

With the aging of the adult population, a significant increase in the number of procedures required to alleviate symptoms of lower extremity ischemia has occurred. The ability to predict either a major adverse limb event or a major adverse cardiac event following open infragenual revascularization may help us to select patients better served by a less invasive approach.

Methods | The American College of Surgeons National Surgical Quality Improvement Program database, encompassing an 8-year period, was analyzed. Patients undergoing infragenual revascularization by open bypass were identified. A major adverse limb event was defined as a deep incisional surgical site infection, an organ-space infection other than the incision, disruption of a surgical wound, graft failure, or a return to the operating room within 30 days, which includes amputations. A major adverse cardiac event was defined as a stroke, a myocardial infarction, cardiac arrest, or death within 30 days of operation. Preoperative risk factors and patient demographics were compared by use of χ² analysis. Those factors found to be significant were placed in a series of logistic regression models to determine their individual significance. No institutional review board approval was needed because the National Surgical Quality Improvement Program database contains de-identified data.

Results | Between 2005 and 2012, a total of 20 505 patients undergoing lower extremity bypass were identified in the National Surgical Quality Improvement Program database. The overall rates of a major adverse cardiac event and a major adverse limb event were 4.33% and 19.74%, respectively. In multivariate analysis, diabetes mellitus, a history of congestive heart failure, and steroid use were associated with a major adverse limb event (P < .05). An age of 80 years or older, dependent functional status, chronic obstructive pulmonary disease, myocardial infarction, previous coronary surgery, or a history of angina were associated with a major adverse cardiac event (P < .05). Dialysis dependence and an American Society of Anesthesiologists score of greater than 3 were associated with both events (Table 1). Patients with a dependent functional status, dialysis dependence, a history of angina, myocardial infarction, or congestive heart failure appear to be at a particularly high risk for a major adverse cardiac event or a major adverse limb event (Table 2).

Discussion | For many years, infragenual bypass grafting has been the standard of treatment for patients with lower extremity ischemia. The advent of percutaneous treatments for peripheral arterial disease has significantly increased the number of options available for treating these patients. The low peri-procedural morbidity and shortened hospital stays associated with catheter-based treatment must now be carefully weighted against the durability and proven effectiveness of lower extremity bypass. Many clinical variables must be considered in deciding the best method of treatment for those with lower extremity ischemia, including the availability of a conduit, the length and location of arterial occlusion, patient longevity, and the degree of limb ischemia, as well as peri-procedural morbidity and mortality. In addition to the adverse effect on the individual patient, the societal consequences of major adverse limb events (especially wound infection and graft failure) and major adverse cardiac events have been well documented.