Hemipelvectomy: a changing perspective for a rare procedure

Christopher R. Baliski, MD,* Norman S. Schachar, MD;† J. Gregory McKinnon, MD;‡ Gavin C. Stuart, MD;¶ Walley J. Temple, MD†

Objective: To compare the prognosis of patients undergoing a hemipelvectomy (HP) in the treatment of pelvic sarcomas and carcinomas and to review the morbidity and mortality associated with HP. Design: Retrospective chart review. Setting: The Foothills Hospital, University of Calgary, Calgary, Alberta. Patients: Thirteen patients with clinically and radiographically isolated malignancies involving the bony pelvis and adjacent structures. Interventions: Patients were treated with either an external HP (9 patients) or internal HP (4) in 1983–2001. Outcome measures: Survival and recurrence rates for patients in 2 histopathologic groups (sarcoma v. carcinoma); morbidity and mortality associated with HP. Results: Hemipelvectomy was performed for 7 sarcomas (4 primary bone and 3 soft tissue) and 6 carcinomas (5 genital tract and 1 unknown primary). Seven of the 9 external HPs involved composite resection of other pelvic structures, including other pelvic viscera (3 patients), sacrum (3) and portions of lumbar vertebrae and nerves (1). There were no additional resections among the 4 internal HPs, but 3 patients had allograft reconstruction. Length of stay averaged 30 days (range 14–70 d). At least 1 complication occurred in 10 of 13 cases. The most common complication was flap necrosis occurring in 5 patients (38%). There was 1 perioperative death (8%). The survival of patients treated for sarcomas was better than for carcinomas, which were primarily of the genital tract. Only 1 of the patients with a pelvic sarcoma died of disease (86% disease-specific survival), with a median follow-up of 12 months (range 9–108 mo). Of the 7 sarcoma patients 5 were disease-free at last follow-up. One of 6 pelvic carcinoma patients died perioperatively, with another dying of unknown causes 4 months after surgery. Of the 4 remaining patients 3 died of disease, resulting in a median survival of 9 months (range 4–20 mo). Four of 6 patients with pelvic carcinomas developed recurrent disease, none local. Conclusions: HP has considerable morbidity but is a viable and potentially curative treatment for patients with pelvic sarcomas. With pelvic carcinomas HP was not curative, but did provide short-term local disease control. Future improvements in imaging techniques and quality-of-life studies may help with patient selection. The role of HP in recurrent carcinoma remains to be determined.

From the *Division of General Surgery, Department of Surgery, St. Paul’s Hospital, University of British Columbia, Vancouver, BC, and the †Division of Surgical Oncology, Department of Surgery and the ‡Division of Gynecological Oncology, Department of Oncology, University of Calgary, Calgary, Alta.

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Correspondence to: Dr. Christopher R. Baliski, Department of Surgery, St. Paul’s Hospital room C302, 1081 Burrard St., Vancouver BC V6Z 1Y6; cbaliski@providencehealth.bc.ca

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Hémipelvectomie (HP) est un uncommon procedure performed in response to a variety of pelvic neoplasms. The most common indication is primary neoplasms of the bony pelvis, but it is used for soft-tissue sarcomas of the pelvis as well. Other less common indications for HP are advanced melanoma, squamous cell carcinoma, renal and bladder cancer, rectal cancer, and even metastatic disease that has gone into the bone.1,2

HP is usually performed in highly specialized tertiary/quaternary medical centres with a comprehensive surgical oncology team. The infrequent indications, technical challenges and attendant morbidity of HP demand this. The University of Calgary is a regional referral centre for patients being assessed for this procedure.

The primary purpose of this study was to review long-term prognosis with reference to clinical/pathologic factors, in order to help determine which patients would benefit most from HP. The morbidity and mortality associated with HP was reviewed as well.

Materials and methods

The medical records of the Foothills Hospital (University of Calgary) were reviewed for patients undergoing HP from 1983 to 2001. An HP was classified as external if the leg was amputated along with the hemipelvis, whereas an internal HP involved preservation of the leg and major neurovascular structures, with a major resection of the bony pelvis. Information obtained included symptoms; operative procedure, surgical operative time and blood loss; histopathologic examination of the tissue removed and its margins; previous and adjuvant treatment(s); and in-hospital morbidity and mortality. Follow-up data for patients were obtained from the charts of the Southern Alberta Cancer Registry (Tom Baker Cancer Centre) and referring institutions, and also from direct communication with patients. All HPs were performed with curative intent after an extensive metastatic work-up.

Results

Thirteen patients underwent HP during the study period. Their median age was 39 years (range 18–66 yr). The clinical indications for HP were highly variable. Seven patients had primary pelvic sarcomas (4 bone and 3 soft-tissue); the other 6 had carcinomas (5 genital tract and 1 metastatic) involving either the pelvis or major neurovascular structures. The symptoms patients experienced were also varied: all complained of pelvic or leg discomfort, with 10 of 13 patients having severe pain requiring narcotics to manage it. Two patients had gaiting groin masses that were not amenable to treatment with radiation. Four complained of leg weakness.

Nine patients underwent an external HP (hindquarter amputation), whereas 4 were treated with an internal hemipelvectomie (Table 1). Seven of 9 external HPs involved composite resections of other pelvic structures, including other pelvic viscera (3 patients), the sacrum (3), and portions of lumbar vertebrae and nerves (1). All internal HPs were restricted to resections of bone only, with 3 patients undergoing allograft reconstruction and 2 requiring total hip arthroplasties. Margins tested positive on pathologic examination in 5 of 13 HPs (38%), with the margins of 2 of the 3 sacrectomies exhibiting tumour. The mean length of the operative procedure was 7 hours, with a mean blood loss of 2.73 L. Median length of stay was 30 days (range, 12 to 70 d).

Ten patients (77%) experienced at least 1 postoperative complication. Five patients (38%) developed skin-flap necrosis, requiring 9 operative procedures for debridement and tissue coverage (1–3 operations per individual). Seven patients developed other in-hospital complications, including cellulitis, prolonged ileus, pneumonia, urinary retention, hip dislocation, intra-abdominal abscess and bowel obstruction. Of the 3 patients who underwent an internal HP and
pelvic allograft, the 2 with sarcomas required readmission and (external) completion HPs for chronic osteomyelitis, with 1 of the 2 also requiring repair of a bladder fistula. One patient died from complications related to bowel obstruction and intra-abdominal sepsis after a combined HP and pelvic exenteration (a perioperative mortality of 8%).

The median follow-up for all patients was 11 months. In addition to 1 perioperative death, 2 patients died of other causes at 4 months and 5 years of follow-up respectively, both free of disease. Four died of disease at a median of 8.5 months (range 4–20 mo). Two patients are alive with disease at 11 and 12 months, 1 of whom has a local recurrence. Four patients are disease-free at a median follow-up period of 60 months (range 9–108 mo; Table 1).

The prognosis for patients with sarcomas of the pelvis was superior to those with carcinomas (non-sarcomas). At a median follow-up of 12 months, only 1 patient with sarcoma had died of disease, secondary to sarcomatosis, for a disease-specific survival rate of 86%. Another died of other causes 5 years after HP. Six of 7 sarcoma patients were disease-free at last follow-up; the other is alive with locally recurrent disease after 12 months.

For the 6 patients with pelvic carcinomas, outcomes were much worse. One patient died of complications related to postoperative sepsis; another died of unknown causes 4 months after surgery. Three of the 4 other patients died of disease at a median of 9 months (range 8–20 mo). Before their deaths these 3 patients developed recurrent disease: 1 with carcinomatosis, 1 in the contralateral groin and 1 systemic. Only 1 patient with pelvic carcinoma remains alive (11 months after undergoing HP), but with disease in the contralateral groin.

Discussion

Hemipelvectomy is a procedure uncommonly performed because of infrequent indication, misconceptions about it among patients and physicians, and reported morbidity, among other possible reasons. Morbidity as a factor was confirmed in our study: 77% of our patients experienced at least 1 perioperative complication. The most common was flap necrosis, which occurred in 5 patients (38%) and required a total of 9 reoperations.

Reported morbidity rates for flap necrosis range from an already immoderate 15% in high-volume centres to as much as 80% elsewhere. Necrosis often requires operative debridement and tissue coverage, which not only consumes nursing and other surgical and hospital resources but also may delay these patients’ rehabilitation.

Two factors may have contributed

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**Table 1**

<table>
<thead>
<tr>
<th>Age, yr</th>
<th>Type of tumour</th>
<th>Previous surgical procedures</th>
<th>Type of HP</th>
<th>Other, adjuvant procedures</th>
<th>Morbidity</th>
<th>Pathology at margins</th>
<th>Disease status</th>
<th>Site(s) of recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Malignant fibrous histiocytoma</td>
<td>TAH-BSO</td>
<td>External</td>
<td>Sacrectomy (S2–S5); vaginectomy</td>
<td>Flap necrosis, ileus</td>
<td>neg</td>
<td>NED 9 mo</td>
<td>—</td>
</tr>
<tr>
<td>58</td>
<td>Chondrosarcoma</td>
<td>—</td>
<td>External</td>
<td>—</td>
<td>Cellulitis</td>
<td>neg</td>
<td>NED 11 mo</td>
<td>—</td>
</tr>
<tr>
<td>18</td>
<td>Ewing’s sarcoma</td>
<td>—</td>
<td>Internal</td>
<td>—</td>
<td>—</td>
<td>neg</td>
<td>NED 9 yr</td>
<td>—</td>
</tr>
<tr>
<td>48</td>
<td>Osteosarcoma</td>
<td>—</td>
<td>Internal, AG, THA</td>
<td>TAM flap procedure</td>
<td>Flap necrosis, hip dislocation, osteomyelitis</td>
<td>neg</td>
<td>NED 9 yr</td>
<td>—</td>
</tr>
<tr>
<td>25</td>
<td>Liposarcoma</td>
<td>—</td>
<td>Internal, AG</td>
<td>—</td>
<td>Wound infection, bladder fistula, osteomyelitis</td>
<td>neg</td>
<td>Died of other causes, 5 yr</td>
<td>—</td>
</tr>
<tr>
<td>60</td>
<td>Chondrosarcoma</td>
<td>—</td>
<td>External</td>
<td>Sacrectomy (S3–S5)</td>
<td>Flap necrosis</td>
<td>pos</td>
<td>Alive with disease, 12 mo</td>
<td>Local</td>
</tr>
<tr>
<td>30</td>
<td>Schwannoma</td>
<td>Enucleation</td>
<td>External</td>
<td>—</td>
<td>—</td>
<td>pos</td>
<td>DOD 5 mo</td>
<td>Sarcomatosis</td>
</tr>
<tr>
<td>40</td>
<td>SCC of the vulva</td>
<td>Vulvectomy; 2 groin lymph-node dissections</td>
<td>External</td>
<td>Oophorectomy</td>
<td>Flap necrosis</td>
<td>neg</td>
<td>Alive with disease, 11 mo</td>
<td>Contra-lateral groin</td>
</tr>
<tr>
<td>29</td>
<td>SCC of the cervix</td>
<td>TAH-BSO; partial sacrectomy; abdominopelvic resection</td>
<td>External</td>
<td>Colectomy; transverse process of L5; L3–S1 nerve roots</td>
<td>Pneumonia</td>
<td>pos</td>
<td>DOD 20 mo</td>
<td>Carcinomatosis, liver</td>
</tr>
<tr>
<td>39</td>
<td>SCC of the vulva</td>
<td>Vulvectomy; bilateral lymph-node dissection</td>
<td>External</td>
<td>Partial cystectomy</td>
<td>—</td>
<td>neg</td>
<td>DOD 9 mo</td>
<td>Contra-lateral groin</td>
</tr>
<tr>
<td>66</td>
<td>SCC from undetermined primary site</td>
<td>—</td>
<td>Internal, AG, THA</td>
<td>TAM flap procedure</td>
<td>Urinary retention</td>
<td>neg</td>
<td>DOD 8 mo</td>
<td>Liver &amp; spine metastasis</td>
</tr>
<tr>
<td>56</td>
<td>Adenocarcinoma of the ovary</td>
<td>TAH-BSO; resection of buttock &amp; pelvic side wall</td>
<td>External</td>
<td>Partial sacrectomy</td>
<td>Flap necrosis</td>
<td>pos</td>
<td>Died of other causes, 4 mo</td>
<td>—</td>
</tr>
<tr>
<td>37</td>
<td>SCC of the cervix</td>
<td>TAH-BSO</td>
<td>External</td>
<td>Abdominopelvic &amp; small bowel resections</td>
<td>Intra-abdominal abscess; bowel obstruction</td>
<td>pos</td>
<td>Perioperative death, 49 d</td>
<td>—</td>
</tr>
</tbody>
</table>

AG = allograft; DOD = died of disease; NED = no evidence of disease at last follow-up; neg = negative; pos = positive; SCC = squamous cell carcinoma; TAH-BSO = total abdominal hysterectomy with bilateral salpingectomy and oophorectomy; THA = total hip arthroplasty; TAM = transverse rectus abdominis myocutaneous.
to flap necrosis. First, 9 patients previously had radiation therapy, which is known to compromise skin-flap viability. Second, 3 patients had simultaneous sacral resections (all 3 developed flap necrosis). Survival of the posterior skin flap can depend on the viability of the underlying gluteus maximus muscle, which receives its medial blood supply from the sacrum. In 2 of these patients who had simultaneous posterior flap HP and sacrectomy the sacral resection may have contributed to flap necrosis. The other sacrectomy was an anterior flap HP based on the branches of the deep profunda femoral vessels. One perioperative death (8% mortality) occurred in a patient after a combined HP and pelvic exenteration, which is consistent with other reports in the literature.

The clinical indications for HP in this cohort of patients was remarkably different from those in other reports. Seven of 13 (54%) had sarcomas of the pelvis, the most common indication for HP. The other 6 HPs (46%) were performed for carcinomas (non-sarcomas) of the pelvis. Five of these were primary malignancies of the female genital tract; the other was a squamous cell carcinoma with an unknown primary source. There have been only a few reports of aggressive treatment of genital tract malignancies involving the bony pelvis. Vulvar cancer has been treated by hip disarticulation and resection of the pubic bone, with only 1 case documented of the use of HP to treat cervical cancer. Our study of HPs is unique, with its high prevalence of cancers of the genital tract.

The long-term prognosis was dependent on the clinical indication for surgery, with better survival among patients with sarcomas (86% disease specific survival, with a median follow-up of 12 months; the patient who died from sarcomatosis had a malignant schwannoma previously enucleated). Although the follow-up for our patients is heretofore limited, a favourable outcome in pelvic sarcomas is not unexpected. Kawai and colleagues reported a 5-year survival in patients with primary bony sarcomas of the pelvis of 55%; with chondrosarcoma, 55%; Ewing’s sarcoma, 52%; and osteosarcoma, 47%. Inadequate margins in combination with HP worsens the prognosis. The outcome among patients with soft-tissue sarcomas (2 in our study) requiring HP is worse, with a reported 5-year survival of only 10%.

The 6 patients who underwent HP for pelvic carcinomas did poorly, with a median survival of 9 months. The solid patient with metastatic squamous-cell carcinoma from an unknown primary died of diffuse metastatic disease 8 months after HP. The other 5 had genital-tract malignancies; 1 died in the perioperative period. Three of the patients with genital-tract malignancy had disease progression: 1 developed carcinomatosis after incomplete excision of a cervical cancer, and 2 patients with vulvar cancer had recurrences in the contralateral groin. The fifth patient died of unknown causes 4 months postoperatively.

Reports of patients undergoing resection of the bony pelvis for locally advanced genital-tract malignancies are few. King and coworkers reported on 12 patients with primary and recurrent vulvovaginal cancers that required resection of the pubic bone as part of a radical resection. In their cohort 6 patients with a primary presentation of advanced vulvar cancer survived (as of 6–18 years of follow-up), but the other 6 died after a median follow-up period of 12 months. Pathologic exams of lymph nodes for all surviving patients had negative results; for all those who died, positive. King’s group reported 1 patient with a recurrent vulvar cancer who survived, but not the length of survival.

Other groups have reported recurrence in the regional lymph nodes to be an independent factor for poor prognosis. One study found no disease-free survival, and a 2-year median survival in patients with recurrences in the regional nodal basin. The 2 such patients in our study were treated for large, fungating regional nodal recurrences, with 1 having undergone 2 previous ipsilateral groin dissections. Both had recurrences in the contralateral groin rather than locally, suggesting the presence of aggressive disease.

Only 1 article in the literature reports on a patient undergoing resection of the pelvis for cervical cancer. Wanebo and colleagues performed an external HP for recurrent cancer; their patient died of disease 14 months later. The 2 patients with cervical cancer in our study had locally advanced, recurrent disease. One required a pelvic exenteration in addition to HP; the other had resection of colon, a portion of the fifth lumbar vertebrae and surrounding nerve roots after a previous exenteration and sacral resection. Tissue margins for both patients displayed positive pathology. One died in the perioperative period, and the other died of metastatic disease.

The fifth genital-tract malignancy was a 12-cm ovarian cancer, treated with HP and partial sacrectomy after a previous wide excision of a recurrence involving the pelvic side-wall and gluteal muscles. No reports of similar cases could be found in the literature.

Performing an HP for the treatment of pelvic sarcomas is justified, given the prognosis of this disease. On the other hand, survival in patients with non-sarcoma carcinomas of the pelvis was poor, with no survivors beyond 20 months. This result is less surprising given the poor prognostic factors for each of these 6 patients. All had recurrent disease, with the 5 patients with genital-tract cancers requiring a composite resection and the 1 with an unknown primary having metastatic disease.

A major rationale for these 6 surgeries was local control of disease. Each of these patients had significant tumour burden, and all had received at least 1 previous course of external beam radiotherapy, leaving few other
reasonable options. The goal of their HPs was complete surgical resection, guided by preoperative imaging; unfortunately the margins of 3 of the 6 patients with cancer were pathologically positive. Most of these patients died of progressive disease, but none of their recurrences was local. Thus HP in this cohort of patients with highly advanced pelvic carcinomas provided good short-term local control, but was not curative.

Palliative HP has been advocated in other studies of patients with locally advanced or metastatic bone disease. Indications include intractable pain, ulceration, hemorrhage, infection and unstable pathologic fractures. In our group of patients with pelvic cancers, all 6 were having significant pain, 3 had objective leg weakness and 2 had fungating groin masses (1 of which was bleeding from the femoral vessels). Improvement in functional status and even quality of life after major amputation have been reported. Because of the retrospective nature of this study and follow-up at outside institutions, it is difficult to assess the degree of symptom control, palliation and quality of life achieved. Performing HP with a palliative intent is controversial, especially with less than a year’s expected survival. All other treatment options should therefore be exhausted before considering HP, particularly analgesia for control of pain, the most common indication for HP.

In conclusion, hemipelvectomy is a viable and potentially curative operation in patients with advanced sarcomas of the pelvis. In this small cohort of patients with locally advanced pelvic carcinomas (mostly of the genital tract), HP provided local control of disease but was not curative and prone to rapid nonlocal disease progression and death. Future improvements in imaging techniques and other treatment modalities might help in selecting patients in whom cure or long-term survival may be achieved. For patients in whom a cure is not expected, prospective quality-of-life studies are required to validate HP as a treatment option. At this time, its role in recurrent carcinoma remains to be determined.

Competing interests: None declared.

References


