Case Report

The Results of Surgical Management of Bone Metastasis Involving the Periacetabular Area: Siriraj Experience

Prasert Wangsaturaka MD*, Apichat Asavamongkolkul MD*, Saranatra Waikakul MD*, Rapin Phimolsamti MD*

*Department of Orthopedic Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University

Background: Periacetabular metastasis is a common site of bone metastasis and can cause major disability to the patients. Non-operative treatment including medication or radiation therapy is the first treatment modality. The operative treatment is indicated in patients with failed non-operative treatment or pathologic fracture.

Objective: To assess the functional results, quality of life, and complications after reconstruction of the periacetabular metastasis.

Material and Method: Fourteen patients underwent 16 intralesional excisions of tumor and cemented total hip arthroplasty reconstruction from 2002 to 2006. The primary tumors were breast carcinoma in five patients, thyroid carcinoma in three, kidney carcinoma in two, and one each of cervix carcinoma, urinary bladder carcinoma, lung carcinoma, and multiple myeloma. Type of periacetabular metastases by Harrington’s classification, age of patients, blood loss, unit of blood transfusion, and postoperative complication were reviewed. Pre- and Postoperative pain by the visual analogue scale was evaluated.

Results: The mean age of patients was 56 years with a mean follow up time of 389 days (range 30-1,275 days). The mean time from diagnosis of primary tumor to periacetabular metastatic surgery was 32.5 months (range 0-84 months). By Harrington’s classification, seven patients were classified in class I, four patients were class II, and three patients were class III. The visual analogue scale was improved from more than 8/10 preoperatively to 2/10 postoperatively. All patients could ambulate and walk independently and two patients could walk without gait support. Four patients died of disease progression and 10 patients are still alive. Two patients had complications from postoperative hip dislocation and acetabular loosening which successfully treated by closed reduction and revision of the prosthesis respectively.

Conclusion: With promising results, low rate of complication and improvement of quality of life could be achieved after total hip arthroplasty reconstruction in the appropriately selected patient with a periacetabular metastasis. Additional surgery may be required in the patient with longer survival or progression of the disease.

Keywords: Periacetabulum, Bone metastasis, Surgery

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Metastatic carcinoma is the most frequent malignant lesion of bone, and the skeleton represents the third most common site of metastatic spread after the lung and liver. Metastatic lesions are most commonly seen in axial skeleton (spine, pelvis, ribs, and skull) and, when the appendicular skeleton is involved, the lesions most frequently occur in the proximal long bones(1,2). Periacetabular metastatic disease is a cause of major disability to the patients, and may lead to loss of ambulatory function and quality of life unless the construct of the iliofemoral weight-bearing axis is restored for force-transmitting in this area.

Non-operative treatment is the first treatment modality that includes restriction of weight bearing, use of bisphosphonate, appropriate adjuvant chemotherapy, and radiation therapy. Surgical intervention
has to be considered in selected patients with progressive osteolysis from metastatic destruction in this particular area, despite the use of adjuvant treatments. The main goals of surgical intervention are pain relief, restoration, maintenance of function, and life quality. Numerous technological advances have simplified the surgery of periacetabular metastases\(^3\)\(^-\)\(^8\). The authors report the results and surgical management of patients with periacetabular metastases.

**Material and Method**

Between August 2002 and May 2006, 16 acetabular reconstructions were performed in 14 patients. Two patients underwent two operative procedures. The inclusion criteria was patients with metastatic periacetabular disease that was unresponsive to systemic chemotherapy or radiation therapy, adequate physical status for major operation and life expectancy period more than 4-6 weeks.

Prior to the operation, all patients had a complete history, physical examination, plain radiographs of chest, pelvis, hip, and femur. The entire bone was evaluated by a technetium\(^{99m}\) bone scintigraphy. Blood testing for evaluation of general condition (complete blood count, electrolyte analysis, coagulation study, and liver function test) was done. A complete pre-operative evaluation of patients was performed that included age, primary malignancy, a visual analogue pain score, and Harrington’s classification of periacetabular metastatic lesion\(^4\). Hypervascularized tumors that included thyroid, kidney, and urinary bladder carcinoma underwent embolization pre-operatively (Fig. 1). The operative procedure was intralesional excision of tumor and cemented total hip arthroplasty reconstruction. The type of reconstruction depended on Harrington’s classification. With Harrington’s class I and class II, the reconstruction was conventional cemented total hip arthroplasty with or without an anteprotrusion acetabular ring (Fig. 2). In class III, internal fixation was used for reconstruction that included plate, screws, and Steinmann pin fixation (Fig. 3).

The amount of blood loss, the number of units of blood transfusion, the postoperative complications, the visual analogue pain score 4 weeks after the operation, and the ambulatory status was reviewed. All of the patients were postoperatively treated with a radiation therapy dose of 3,000 cGy and appropriate systemic adjuvant therapy. The mean and range were used to present patients’ characteristics and the results of the operation.

**Results**

The mean age of patients at diagnosis was 56 years (range 38-74 years). The mean time from diagnosis of primary malignancy to periacetabular metastatic disease was 32.5 months (range 0-84 months). The mean follow up time was 389 days (range 30-1,275 days). All of the debilitated patients suffered from the...
disease so severely that they could not ambulate. By Harrington’s classification, seven patients were in class I, four patients in class II, three patients in class III, and none was grouped in class IV. The mean operative time was 2.3 hours (range 1.5-3.4 hours). The mean estimated blood loss was 1,614 ml (range 300-5,500 ml). The mean blood transfusion was 3 units (range 0-7 units). The patients’ data is demonstrated in Table 1.

Pre-operative pain scores in all patients were more than 8/10 and the mean postoperative pain score was 2/10 at the operative site. Four patients died from progression of the metastatic disease with a mean survival of 105.5 days after the operation. The ambulatory status was improved from bed-ridden to ambulation with walker in six patients; axillary crutches in one patient, cane in five patients, and two patients could walk without gait support.

None of the patients suffered surgical-related death in the present series. There was no neurovascular injury, deep infection, or wound problem following the operation at the time of the follow-up. There were three postoperative complications in two patients. The first was patient number 8, he had postoperative hip dislocation four days after surgery during bedside ambulation. He underwent closed reduction and skin traction for three weeks. At that time, he could walk with a cane support. Fifteen months after the operation, he developed hip pain from the acetabular loosening. A second operation was performed by an acetabular reconstruction augmented with screw-plate and Steinmann pins. At the last follow-up, he could walk without pain by using a cane for support. The second complication was acetabular loosening from tumor recurrence in patient number 11. He could walk independently without gait support after the first operation. He developed progressive pain at the hip 11 months postoperatively and could not move his hip or ambulate. A second operation was performed by intralesional tumor excision and reconstructed with a cemented acetabular reconstruction using a flanged anteprotrusio cup. Postoperatively, he could walk without pain by using axillary crutches.

Discussion

The presence of bone metastases is indicative for disseminated cancer disease and indicates a short-term survival prognosis in these cancer patients. The primary goal of treatment is palliation of symptoms, with a multidisciplinary team approach. Bone is the third most common site of cancer metastasis, behind the lung and liver(2). Bone metastasis can impair the quality of life of patients, due to pain, fracture,
spinal cord compression, hypercalcemia, and impaired ambulatory function. Almost 80% of patients with advanced cancer of the prostate or breast will develop bone metastases during their life. More than 80% of bone metastases are located in the axial skeleton, with the vertebrae, ribs, and pelvis the most frequently involved locations\(^1\,\text{2,}\,\text{9}\).

Patients with massive acetabular destruction secondary to metastatic cancer suffer from severe pain, difficulty to ambulate, and pathologic fracture. The initial treatment is appropriate systemic chemotherapy and radiation therapy. Patients unresponsive to these treatment modalities, with a reasonably long life expectancy and no contra-indication for surgery, should be considered for operative treatment.

In 1981, Harrington reported 58 periacetabular metastatic patients and classified these patients into four groups based on location of the fracture within the periacetabular bone, the extent of tumor or radiation osteolysis and the specialized technical requirements needed to accomplish a secure arthroplasty\(^4\). In class I, the lateral cortices and the superior and medial portions of the acetabulum were structurally intact. Patients with class I lesions were treated by
<table>
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<th>Preoperative Embolization</th>
<th>Operative Time (hours)</th>
<th>EBL(ml)</th>
<th>Blood Transfusions (unit)</th>
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F/U, follow-up
EBL, estimated blood loss
ML, millilites
AWD, alive with the disease
DOD, died of the disease
conventional total hip arthroplasty, frequently with placement of mesh along the medial portion of the acetabular wall for reinforcement. In class II, the medial portion of the wall was deficient. Patients with class II lesions were treated with a protrusion ring. In class III, the lateral cortices and the superior portion of the wall were deficient. Patients with class III lesions were treated with Steinmann pins directed along the medullary canal of the ilium in the acetabular prosthetic component. Patients with class IV lesions had only a solitary metastasis in the acetabular area and underwent a wide excision. In Harrington’s series, the main technique for acetabular reconstruction in class III was retrograde Steinmann pins technique. In addition, there were antegrade Steinmann pin techniques that were reported by Walker(6) and Parikh(10). In the present series, the authors used the augmentation technique with plate-screw system that could transmit the force from spine to the structural intact acetabular bone and the durability of reconstruction was acceptable (in patients number 1, 4, and 8).

The results of surgical management in periacetabular metastatic disease are rarely reported and difficult to compare, due to variability in classification as well as type of reconstruction(5-8). The most extensive results on acetabular reconstruction in patients with metastatic disease have been reported by Harrington(4). Fifty-eight patients were treated by hip replacement arthroplasty for pathological fractures and fracture dislocation of the acetabulum secondary to metastatic diseases. At 6 months, 67% had excellent or good pain relief that remained at 43% even after two years. Eighty percent were ambulatory at 6 months and 45% kept their walking ability after two years. There were two operative deaths, and five patients had loosening of the acetabular prosthetic components due to local tumor recurrence. Marco et al reported a series of 55 patients with metastatic disease of the acetabulum(11). Fifty-four of the hips were reconstructed with a protrusional cup and one patient had an endoprosthetic reconstruction of the hemipelvis. Seventy-six percent of the patients had relief from pain. Nine of 18 patients unable to walk preoperatively regained walking ability and another 14 patients regained full ambulatory status. Local progression was seen in 25% of the patients. The mean operative time was 290 ± 72 minutes, the mean estimated blood loss was 2,200 ± 1,100 ml. The outcomes of the present series in terms of pain relief and functional maintenance and improvement could be acceptable compared to other studies(4,5,11).

Periacetabular surgery is a major procedure and has a risk of complications. Many series that reported the result of this procedure had some life threatening complications and surgical related complications including fatal pulmonary emboli(12,13), dislocation(12,13), nerve palsy(6), venous thrombosis and deep infection(11). However, there were few complications. In the present series, there was no perioperative mortality and other major complications. The late failure of the implant due to progression of the disease was reported in many series with a mean time of 12 months(11). In general, the median survival of patients with bone metastasis is 6 to 12 months in melanoma, lung, urinary bladder, and thyroid cancer. Furthermore, longer survival rates were found in breast (19-25 months) and prostate cancer (12-53 months)(14). With the advances of treatment modality, the survival of these cancer patients can be prolonged further than previously. In addition, the general surgical procedure for metastatic lesion is intralesional excision of the tumor that can leave a gross tumor, although adjuvant systemic treatment and radiation therapy was used after the operation. For these reasons, a later loosening can occur in a small number of patients. Two patients with late fixation failure occurred 11 and 14 months after the first procedure and were successfully treated by revision surgery.

Conclusion
With the advent of the new strategy for the treatment of cancer, the survival of cancer patients and the number of bony metastases has increased. The quality of life of patients with periacetabular metastatic lesions that deteriorate from unresponsiveness to the non-operative treatments category can be managed with surgical acetabular reconstruction. For proper indication, a thorough oncological work-up is necessary, as well as detailed preparation of the operation in order to decrease intra- and postoperative morbidity. Independent ambulation and pain are significantly improved after surgery in the present series, indicating that acetabular reconstruction for metastasis in selected patients can improve the quality of the remaining life of patients with periacetabular metastatic disease.

References
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ผลการรักษามะเร็งกระดูกทุติยภูมิบริเวณด้านข้างของกระดูกตะโพกด้วยวิธีผ่าตัด: ประสบการณ์ของโรงพยาบาลศิริราช

ประเสริฐ วังสตุรค, อภิชาติ อัศวมงคลกุล, สารเนตร ไวคกุล, ระพินทร์ พิมลศานติ์, ภูมิหลัง

ภูมิหลัง: มะเร็งกระดูกทุติยภูมิบริเวณด้านข้างของกระดูกตะโพกพบได้บ่อยจากการแพร่กระจายมาจากมะเร็งของอวัยวะอื่น ทำให้เกิดความเจ็บปวดและไม่สามารถใช้ทางเดินได้ วิธีการรักษาส่วนใหญ่ คือการผ่าตัดรักษาในกรณีที่ผ่าตัดด้วยวิธีดังกล่าวแล้วไม่ได้ผลหรือมีการกระดูกหักผ่าน

วัตถุประสงค์: เพื่อศึกษาผลการใช้งานคุณภาพชีวิตและโรคแทรกซ้อนในผู้ป่วยที่ได้รับการผ่าตัดบูรณะกระดูกด้านข้างของกระดูกตะโพกที่มีมะเร็งกระดูกทุติยภูมิ

วัสดุและวิธีการ: ผู้ป่วย 14 รายที่มารับการรักษาที่โรงพยาบาลศิริราช โดยการผ่าตัดด้วยเนื้องอกของกระดูกและใส่ข้อตะโพกเทียมจำนวน 16 ครั้ง ตั้งแต่ปี พ.ศ. 2545 – พ.ศ. 2549 พบว่ามีมะเร็งกระจายมาจากอวัยวะต่างๆ 5 ราย มะเร็งของกระดูก 3 ราย มะเร็งที่ 2 ราย และมะเร็งกล้ามเนื้อ มะเร็งกระดูกหลังประสาท มะเร็งตับ และ multiple myeloma อย่างละ 1 ราย ผู้ศึกษาได้ออกคำแนะนำของการแพทย์ประจำการของผู้ป่วยกระดูกทุติยภูมิบริเวณด้านข้างของกระดูกโดยวิธี Harrington จะมีข้อต่อที่สั้นในการตามและหลังผ่าตัด ปริมาณเลือดที่ใช้ในผู้ป่วย โรคแทรกซ้อนที่เกิดหลังการผ่าตัด และวัดผลการลดการความเจ็บปวดโดยวิธี visual analogue scale ภายหลังผ่าตัด

ผลการศึกษา: ค่าเฉลี่ยของอายุผู้ป่วย 56 ปี และค่าเฉลี่ยของระยะเวลาที่ติดตามผู้ป่วยนาน 389 วัน (ช่วง 30-1,275 วัน) ค่าเฉลี่ยของระยะเวลาที่มีการลดปวดจากการผ่าตัดเหลือจาก 32.5 เดือน (ช่วง 0-84 เดือน) ลักษณะของการแพร่กระจายของมะเร็งกระดูกทุติยภูมิโดย Harrington พบว่าผู้ป่วย 7 ราย เป็น Class I โดย 4 รายเป็น Class II และ 3 รายเป็น Class III ค่าความเฉลี่ยของความเจ็บปวดโดยวิธี visual analogue scale ลดลงจากก่อนผ่าตัด 8/10 เป็น 2/10 รายหลังผ่าตัด ผู้ป่วยทุกรายสามารถกลับบ้านออกจากเดินได้ด้วยตนเอง และมี 2 รายที่เดินได้โดยไม่ต้องใช้ข้อตะโพกยื่นขึ้น ผู้ป่วย 4 ราย เลือดวิสัยปกติ และ 10 รายมีปัญหาผ่าตัด 2 รายมีปัญหาอาการหลังผ่าตัดจากข้อตะโพกหลุดไปตามหลังและของข้อตะโพกที่มีภาวะหลุดผู้ป่วยหลัง 2 รายได้รับการรักษาที่หลังโดยการใส่ข้อตะโพกเทียม และผ่าตัดเปลี่ยนข้อตะโพกเทียมในเต้ามข้างต่างๆ

สรุป: จากการศึกษาได้แสดงให้เห็นว่าการผ่าตัดเป็นวิธีที่มีประสิทธิภาพในการรักษาถังกระดูก สามารถลดความเจ็บปวดและทำให้คุณภาพชีวิตของผู้ป่วยดีขึ้น พบว่าการเกิดปัญหาหลังการผ่าตัดมีผลต่อการพบปัญหาดังกล่าวที่มีประสิทธิภาพและมีชีวิตยืนนานอยู่ได้พอสมควร