Reconstruction in metastatic destruction of the acetabulum

Support rings and arthroplasty in 12 patients

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In 12 patients with acetabular metastases, we reconstructed the hip with a support ring, cement, and Charnley prosthesis with a 22 mm head.

There were no immediate postoperative deaths or cardiovascular complications. Dislocations occurred in 5 patients, 1 of whom required open reduction. At follow-up, 3 patients were alive 11, 15, and 18 months after surgery. 9 patients died after 8 (2–13) months. All patients obtained relief from pain, became ambulatory and were discharged to their homes. 1 patient had rapid disease progression with pathologic fracture and cranial dislocation of the support ring. Among the remaining 11 patients, the hip has not again caused pain or limited function. There were no signs of loosening, except in the patient with fracture of the hemipelvis. Remineralization was observed in 2 breast cancer patients after chemotherapy.

Hip reconstruction can restore painless function until death in cancer patients with severe destruction of the acetabulum.

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Metastatic bone disease is common in the pelvis. Pathologic fracture of the acetabulum leads to severe pain and disability. In the few reports dealing with surgical treatment, reconstruction was achieved with pins, acrylic cement, and arthroplasty (Harrington 1981, Levy et al. 1982, Walker 1993). Harrington (1982) advocated the use of acetabular support rings to anchor the prosthesis to intact bone. There are now branched acetabular support rings which may provide better stability where medial support is lacking (Duparc et al. 1989). We report on 12 patients with painful metastatic destruction of the acetabulum treated with curettage, filling of the defect with acrylic cement reinforced with an acetabular ring, and arthroplasty.

Table 1. Clinical data of 12 patients operated for acetabular destruction

Case	Sex	Age	Primary lesion	Solitary metastasis	Pathologic fracture	Type [a]	Acetabular ring [b]	Long stem [c]	Operative time, min	Bleeding L	Complication	Survival months
1	f	55	breast	–	+	2	Müller	–	135	0.9	dislocation	dead 11
2	f	56	breast	+	+	3	BS	–	195	1.7		dead 10
3	f	51	breast	–	+	3	BS	–	195	3.5	dislocation	dead 13
4	f	75	breast	–	–	3	BS	–	165	1.2		dead 8
5	f	76	breast	–	+	3	Wolf	–	135	1.4		dead 12
6	f	52	breast	–	–	3	Wolf	+	180	2.0		alive 18
7	m	79	bladder	+	+	3	BS	–	150	0.8		dead 4
8	f	74	breast	+	+	2	Müller	–	120	0.6		dead 3
9	m	57	kidney	–	–	3	Wolf	–	180	5.8		alive 15
10	m	72	melanoma	+	–	2	Müller	–	180	2.7	dislocation	dead 2
11	m	61	prostate	–	+	2	Müller	+	300	2.3	dislocation infection	alive 11
12	m	67	prostate	–	–	2	Müller	+	165	2.0	dislocation	dead 2

[a] Harrington (1981) classification of acetabular destruction
[b] BS Burch Schneider
[c] Charnley femoral component

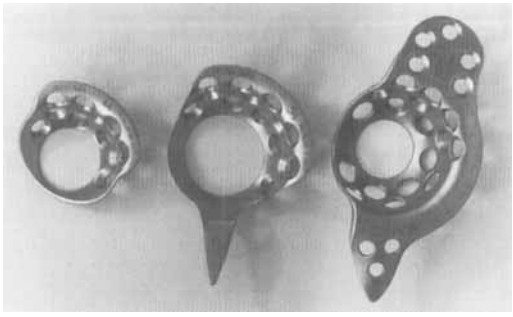

Figure 1. From left to right: Müller, Wolf, and Burch-Schneider acetabular support rings.

Patients and methods

Since 1992, 12 patients have undergone surgery (Table 1). Their median age was 65 (51–79) years. All patients suffered from pain and were more or less bedridden. Indications for surgery were pain and radiological signs of destruction of the acetabulum. No patients were refused surgery because the destruction was too large. 3 patients also had metastatic lesions in the ipsilateral femur. 3 patients had had radiotherapy for the affected hip and were operated on because of continued destruction and fracture. The remaining were given postoperative radiotherapy. Patients with breast cancer also had chemotherapy.

Surgery was performed through an extended posterior approach with the patient placed in the lateral position. Tumor tissue was removed with a curette. Depending on the size of the defect, one of the following acetabular support rings were applied: original Müller in 5 cases, Wolf in 3, and Burch-Schneider in 4 (Protek AG, Berne, Switzerland) (Figure 1). The support rings were fixed with cancellous screws and the defects were filled with cement containing gentamycin. A Charnley cup was cemented in the support ring. On the femoral side, a standard Charnley component was used when there were no femoral metastases (Figure 2). The 3 patients with femoral metastases had a long-stem Charnley prosthesis of up to 40 cm which bypassed the destruction. Postoperatively, all patients were allowed unrestricted weight bearing.

Results

The hip could be reconstructed in all cases. The median operative time was 3 (2–5) hours and the intraoperative bleeding was 2.1 (0.6–5.8) L. The largest amount of bleeding occurred in case 9 with a kidney cancer metastasis.

Figure 2. Case 6. A 52-year-old woman with breast cancer metastases.

A. Preoperative radiograph shows a lytic periacetabular joint destruction without pathologic fracture. There was also a metastasis to the greater trochanter of the ipsilateral femur.

B. Postoperative radiograph shows reconstruction with a Wolf ring, cement and a long stem Charnley prosthesis.

C. Radiograph 16 months postoperatively, after chemo- and radiotherapy, shows remineralization of the acetabulum and no signs of loosening.

Figure 3. Case 7. A 78-year-old man with solitary metastases of urinary bladder cancer. He had severe pain which was not relieved by radiotherapy or opiates.

A. Preoperative radiograph showing complete destruction of the acetabulum and cranial dislocation of the femoral head.

B. Postoperative radiograph after reconstruction with a Burch-Schneider ring, bone cement, and a Charnley hip prosthesis. The reconstruction was unsatisfactory because the cranial screws did not reach the sacroiliac joint region.

C. 1 month postoperatively, continued bone destruction, fracture of the hemipelvis, and cranial dislocation of the support ring and cement.

Complications

There were no immediate postoperative deaths or cardiovascular complications. Dislocations occurred in 5 patients; 1 (case 11) required open reduction. This patient developed an infection and was treated with antibiotics for the rest of his life. There were no other wound complications.

Survival

3 of the 12 patients were still alive 11, 15, and 18 months after surgery. 9 patients died after a median of 8 (2–13) months.

Function

All patients obtained relief from pain, became ambulatory with full weight bearing, and were discharged to their home. 8 of the 9 patients who have died remained pain-free in the affected hip. Case 7 with an initial good result showed rapid disease progression with pathologic fracture of the pelvis 1 month postoperatively (Figure 3). He became bedridden again until he died 3 months later. The 3 patients who were still alive were living at home, fully ambulatory without crutches.

Radiography

There were no signs of loosening during follow-up, except in the patient with fracture of the pelvis. Remineralization was observed in 2 breast cancer patients after chemotherapy (cases 3 and 6).

Discussion

Metastases to the pelvis are common and only a few patients are candidates for surgery; chemo- and/or radiotherapy give sufficient palliation for most patients. If oncologic treatment does not lead to improvement, surgery should be considered. If there is an intraarticular fracture or joint destruction, pain-free function can hardly be restored by means other than surgery. Criteria for selection include life-expectancy, other treatment modalities, the degree of disability and pain, and the extent of the destruction. During the period of our study, no patients were excluded only because the destruction was considered too great. The median survival time of cancer patients operated for spinal or extremity metastases was reported to be 6 months (Bauer and Wedin 1995). Patients with lung or brain metastases or primary lung cancer have a short survival whereas those with kidney or breast cancer with limited disease have a good chance of surviving one year. Patients who are bedridden for reasons other than the acetabular fracture are hardly candidates for surgery. Patients with severe pain may well benefit from hip reconstruction, even if their life expectancy is short, provided that their general condition is satisfactory. In our opinion, the indications for surgery are basically the same for a pathologic fracture of the acetabulum as for a similar fracture of the proximal femur.

Harrington (1981) classified acetabular destructions into 3 types, depending on the degree and location and recommended different types of surgical treatment based on this classification. We have employed this classification but, like Levy et al. (1982), are unsure whether it helps in choosing the type of reconstruction. We used a standard Müller ring in cases where there was sufficient support both cranially and medially. If the medial support was lacking, we used the Wolf ring which has a distal branch that places a load on the intact bone of the ischium. Finally, we used the Burch Schneider ring when the cranial defect engaged the acetabular rim (Duparc et al. 1989). We used long screws directed towards the sacroiliac joint to stabilize the support ring to intact bone. We did not use Steinman pins to create a cage to encompass and reinforce the bone cement (Harrington 1982, Walker 1993), without apparently jeopardizing stability.

The routine use of femoral long stem components has been advocated to circumvent later metastatic destruction of the femur (Harrington 1982, Walker 1993). Long stems are associated with increased risk of cardiovascular complications, especially in cancer patients (Patterson et al. 1991, Persson and Bauer 1994). We used short stems, unless preoperative radiographs showed metastatic deposits.

5 of 12 patients had postoperative dislocations. This can be explained by the general disability of the patients, the use of a 22 mm femoral head, and the extensive surgical approach. There may also be a risk that the edge of the support ring acts as a fulcrum dislocating the femoral head. Once the patients were fully mobilized and the wound was healed, the hips became stable, since none had repeat dislocations. We now use a 32 mm head to reduce the risk of dislocation.

All patients survived surgery and neither operating time nor bleeding were excessive, except in one patient with kidney cancer. Preoperative embolization may reduce bleeding in patients with hypervascular lesions (Harrington 1981). The limiting factor for surgery is the extent of the destruction. The patient who had a postoperative fracture of the hemipelvis due to tumor progression should probably not have undergone surgery. On the other hand, the finding of periprosthetic remineralization in two patients implies that effective chemotherapy can increase stability.

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