

Chapter

18

Surgical Technique for Resection and Reconstruction of Supra-acetabular Metastatic Lesions

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BACKGROUND

- For patients with metastatic periacetabular disease confined to the supra-acetabular region,³ resection and reconstruction avoids hip joint replacement.
- The goal of treatment is to alleviate pain and ensure ambulation as soon as possible after surgery, with minimal perioperative morbidity and mortality.
- Periacetabular lesions may be classified according to Harrington's classification. Supra-acetabular lesions are categorized as class I.
- Surgical options include extra-articular curettage and fixation versus intra-articular acetabular curettage and reconstruction with an acetabular prosthetic component, known as *total hip replacement*.
 - The extra-articular approach requires minimal surgical intervention (< 1 hour, with minimal blood loss), a shorter postoperative hospital stay, and lower post-hip arthroplasty risk of infection and instability.
 - The intra-articular approach, or total hip replacement, is a more expansive, definitive approach, with a mean blood loss of 1800 mL, mean operative time of 140 minutes, and average hospital stay of 14 days.^{1,3}

ANATOMY

- Metastatic bone disease usually does not invade into cartilage. Therefore, the acetabular cartilage usually is spared by periacetabular lesions. After curettage, fixation of the lesion provides ample support for the cartilage without violating the joint (analogous to curettage and cementation of giant cell tumors).
- Reconstruction should take into account the concavity of the hip cartilage.

INDICATIONS

- Metastatic periacetabular lesions may present as pain on weight bearing.
- The treatment of choice for most of these lesions is radiation therapy.
- Surgical treatment is reserved for impending pathological fractures and painful lesions resistant to radiation therapy (**FIG 1**).

- Harrington class I lesions have extensive tumor invasion without loss of structural integrity of the acetabulum. Minimal medial wall disease is present.
- Not indicated if the ipsilateral femoral head is involved with tumor.

IMAGING AND OTHER STAGING STUDIES

Imaging

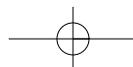
- Plain radiographs and CT scans of the pelvis and hip joint are necessary to define the extent of the lesion accurately.
- Three-dimensional CT reconstructions have been used more recently to show remaining bone stock accurately.
- MRI studies are helpful in defining the continuity of the acetabular cartilage (**FIG 2A**).
- Bone scan is needed to rule out concomitant metastatic lesions to the ipsilateral femur (**FIG 2B**).
- Angiography and embolization should be strongly considered in metastases from vascular lesions such as renal cell and thyroid carcinoma.

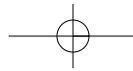
Biopsy

- For metastatic disease, biopsy is performed at the time of surgery. A frozen section typically provides adequate diagnostic information.

SURGICAL MANAGEMENT

- A CT scan is done preoperatively to access localized tumor to supra-acetabular area with minimal medial wall involvement.
- The patient is placed in the lateral decubitus position.
- The skin incision is made from the posterior third of the iliac crest to the greater trochanter (**FIG 3A**).
- The gluteus maximus is detached from the iliotibial band and retracted to expose the retrogluteal space. Care is taken not to open the hip joint.
- The sciatic nerve should be picked up as it exits below the piriformis muscle and should be tagged with a vessel loop. The sciatic notch is identified, and the nerve is protected (**FIG 3B**).
- The iliac bone superior to the acetabulum may then be exposed by retracting the gluteus medius and minimus muscles anteriorly. Care should be taken not to injure the superior and inferior gluteal vessels.





2 Part 4 ONCOLOGY • Section III SPINE AND PELVIS

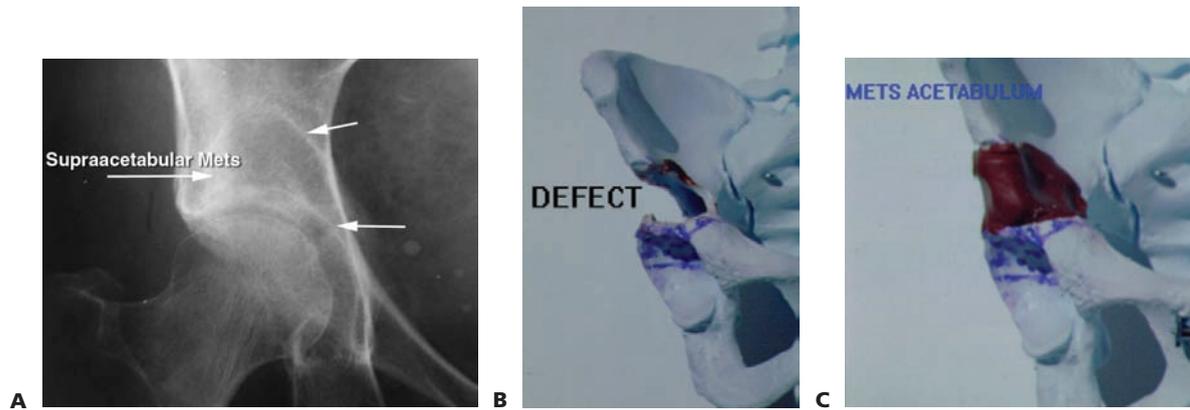


FIG 1 • A. Supra-acetabular metastatic lytic lesion. Joint contour is preserved. **B.** Supra-acetabular defect in a pelvic model. **C.** Reconstruction of the defect.

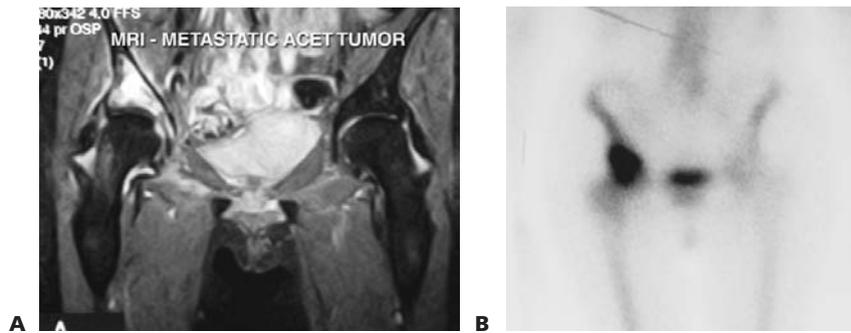


FIG 2 • A. T2-weighted MRI scan showing the preserved cartilage border of the right hip joint. **B.** Technetium Tc 99m bone scan showing uptake in the supra-acetabular region. No uptake is seen in the ipsilateral femur or medial acetabular wall.

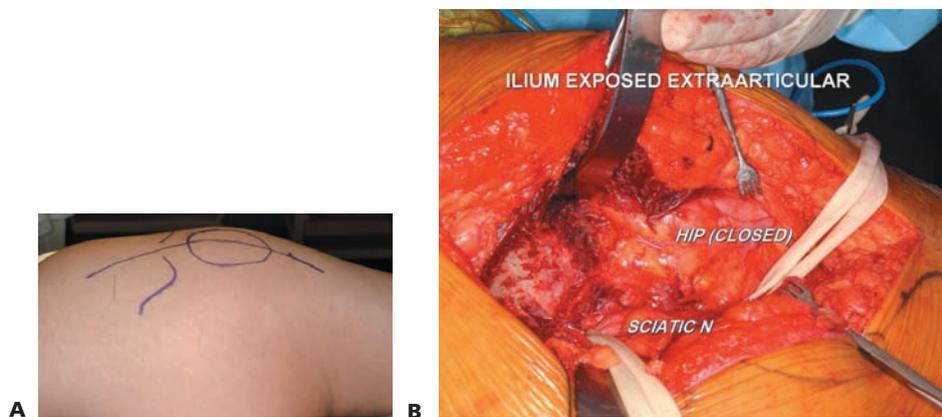
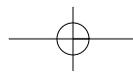


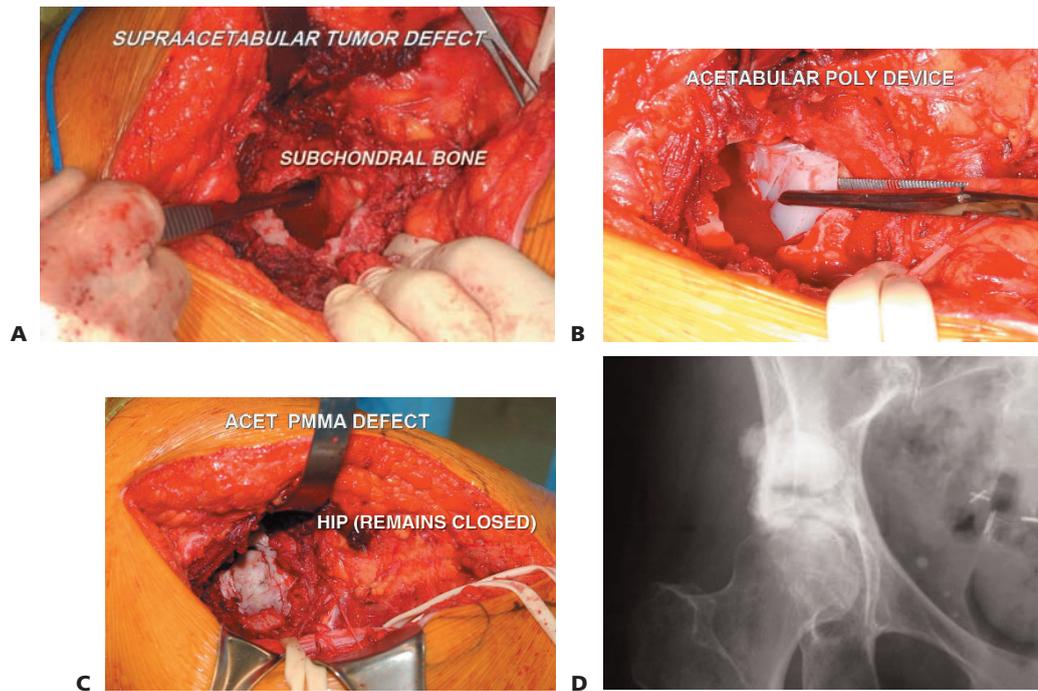
FIG 3 • A. The patient is placed in the lateral decubitus position. The skin incision is carried from the iliac crest to the proximal femur. **B.** Exposure. The sciatic nerve is tagged and protected, and the sciatic notch is identified. The hip joint is left untouched. The iliac bone is exposed by reflecting the gluteus medius and minimus muscles anteriorly.

TECHNIQUES

CURETTAGE AND RECONSTRUCTION

- The lesion is unroofed and curetted (**TECH FIG 1A**).
- The acetabular cartilage and the remaining subchondral bone are supported with a highly cross-linked polyethylene tibial liner, chosen for its concave shape. It is cut to size (**TECH FIG 1B**).
- The remaining defect is then packed with polymethylmethacrylate (**TECH FIG 1C,D**).
- Additional support may be achieved with Steinmann pins inserted in an antegrade or retrograde fashion between the iliac crest and the area of the lesion if the inner wall of the ilium has been destroyed.
- A perineural catheter is inserted into the sciatic nerve sheath for postoperative pain management. Through this catheter, 0.25% bupivacaine can be administered for up to 72 hours postoperatively.





TECH FIG 1 • **A.** The metastatic lesion is unroofed and curetted. In this patient, the subchondral bone supporting the joint cartilage is preserved. **B.** Highly cross-linked polyethylene is cut to fit the defect. The concave side of the polyethylene, taken from a tibial total knee replacement insert, is placed facing the hip joint. **C.** The remaining bone defect is cemented. **D.** Postoperative radiograph showing the defect filled with the polyethylene and cement. The patient ambulates painlessly with a cane after postoperative radiation.

PEARLS AND PITFALLS

CT and radiographs

■ Acetabuloplasty is indicated only for supra-acetabular lesions with minimal medial wall involvement.

Avoid injury to superior gluteal vessels

■ Identify nerve and artery after release of the gluteus maximus.

POSTOPERATIVE CARE

■ Immediate weight bearing should be allowed, because the structure should be stable and virtually pain-free.

OUTCOMES

- Full weight bearing permitted
- Minimal blood loss (<300 mL)
- No infections to date
- Avoids the possible complications of total hip replacement
- Rare tumor progression

COMPLICATIONS

■ Risk of postoperative infection is minimal due to the minimal extent of the surgery.

■ Risk of hip dislocation is avoided, because the joint is not violated.

REFERENCES

1. Harrington KD. The management of acetabular insufficiency secondary to metastatic malignant disease. *J Bone Joint Surg Am* 1981;63A:654-664.
2. Malawer M, Sugarbaker PH. *Musculoskeletal Cancer Surgery: Treatment of Sarcomas and Allied Diseases*. Dordrecht, The Netherlands: Kluwer Academic Publishers, 2001.
3. Marco R, Sheth D, Boland P, et al. Functional and oncological outcome of acetabular reconstruction for the treatment of metastatic disease. *J Bone Joint Surg Am* 2000;82A:642-651.