Conversion of a Hip Disarticulation to a Mid-Thigh, Above-Knee Amputation With a Custom Prosthesis

Daria L. Brooks, MD and Martin M. Malawer, MD
Orthopedic Oncology, Washington Cancer Institute at Washington Hospital Center, Washington DC

STUDY PURPOSE
To describe the evolution and use of the stump prosthesis in which the entire femur is resected and an above knee amputation stump is reconstructed using a custom implant for certain patients with high grade femoral sarcomas.

BACKGROUND
Despite recent advances in limb-sparing surgery, approximately 10% of all femoral sarcomas are not amenable to limb salvage techniques. Those instances where limb-sparing techniques are often not possible include transosseous skip metastases, pathological fractures, and significant diaphyseal extension. In such cases, hip disarticulation is often the recommended surgical option. The energy expenditure of patients with hip disarticulations is purported to be greater than 100% of that used by a non-amputee. In light of this, we are proposing a unique surgical technique that offers patients a surgical option that promotes greater functional outcome.

STUDY DESIGN
4 patients with distal and mid-femoral high grade sarcomas identified as having been treated with hip disarticulation and conversion to an AKA stump between 1980 and 2002.

STUDY POPULATION:
3 men and 1 woman
Patient ages - 14, 38, 42, 55
Patient Diagnoses – osteosarcoma (2)
MFH of bone (1)
synovial sarcoma (1)

Indications for inclusion in this study: inability to achieve safe osseous margins with typical wide resection or above knee amputation and uncontaminated soft tissue around the hip, retrogluteal region and proximal thigh.

STUDY RESULTS
Ambulatory Status: 3 patients walked with above knee prosthesis
Infections: None
Dislocations: None
Secondary Procedures Required: None
Local Recurrences: None
Patient Survival: 3 patients succumbed to disease (one within 5 months of surgery) 1 patient remains alive 15 years later

CONCLUSIONS:
1. Reconstruction of the hip capsule and appropriate muscle balancing is essential for preventing dislocation and contractures and thus optimizing functional outcome.
2. The “stump prosthesis” permits conversion of hip disarticulation to functional above knee amputation and affords a major improvement in quality of life.
3. Though rare, this procedure has a role in the treatment of high grade femoral sarcomas not amenable to conventional limb-sparing techniques.

SURGICAL TECHNIQUE STEPS
1. Creation of Anterior Myocutaneous Flaps
2. Superficial Femoral Artery Ligation
3. Flaps Elevated from the bone to the hip joint
4. Entire Tumor and Femur Removed
5. Custom Bipolar articulated with the hip joint
6. Hip joint reconstruction with 3mm Dacron Tape
7. Muscle Tension and Balancing

The hip joint is reconstructed with 3mm Dacron tape to prevent dislocation.

Large anterior myocutaneous flaps are created during the initial approach.

Once the prosthesis is placed, it should lie in neutral position. Appropriate muscle tensioning and balancing is important in preventing contractures.

Large flaps are elevated from the bone to the hip joint.

A custom prosthesis is used to help facilitate ambulation as an above knee amputee. Holes are placed at the tip of the prosthesis to help with muscle tensioning and balancing.

After the flaps are elevated from the bone and joint, the entire femur and tumor are removed.

After the entire femur and tumor have been removed, the custom bipolar is placed and articulates with the hip joint.

Holes are placed at the tip of the prosthesis to help with muscle tensioning and balancing.