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Background: Limb sparing surgery combined with radiation is the mainstay of treatment for most high grade sarcomas around the knee joint. Resection often includes significant muscles (Quadriceps/Hamstrings) and knee joint capsule that can result in bare bone and exposed articular cartilage. Likewise, popliteal sarcoma resection may result in exposed neurovascular structures. It is important to cover the bone, knee joint and neurovascular structures with soft tissue to mitigate complications from radiation and prevent patella maltracking as well as augment knee function. Rotational muscle flaps utilizing either the medial or lateral heads of the gastrocnemius muscles can be used to provide coverage and restore knee mechanics. Hamstring tendon and sartorius muscle transfers can also be utilized to augment knee extension strength and patella tracking.

Question/Purpose: Our study aims to assess the functional outcomes related to resection of musculoskeletal tumors arising around the knee and coverage using rotational muscle flaps, especially the gastrocnemius muscle flap.

Patients and Methods: We retrospectively analyzed the charts of 5 patients from 2008 to 2015 who underwent surgery for musculoskeletal tumors arising around the knee and were treated with rotational muscle flaps and tendon transfers for soft tissue coverage and to improve knee function. There were 3 males and 2 females. At final follow-up, all patients were evaluated according to pain, range of motion of the knee, patella tracking and function as scaled by the Musculoskeletal Tumor Society (MSTS) score. Local tumor control, survival, and complications were also recorded.

Results: Average length of follow-up was 26.2 months (range: 12-77 mos). Diagnoses included synovial sarcoma (n=2), high-grade pleomorphic sarcoma (n=1), myxoid liposarcoma (n=1), and malignant peripheral nerve sheath tumor (n=1). Site of origin included vastus lateralis=2, vastus medialis=1, popliteal fossa=1, sartorious=1. Local rotational muscle flaps and tendon transfers were taken from the gastrocnemius (lateral=2, medial=2), sartorious (n=2), and biceps femoris muscle (n=1). Split thickness skin grafts were necessary in one case, in which the tumor involved the popliteal fossa. Four out of 5 (80%) patients received either preoperative and/or postoperative radiotherapy. All patients are currently alive and disease free. All patients are pain free and achieved excellent range of motion (> 0 to 120 degrees) of the knee post-operatively and have unlimited ambulatory capacity without an assist device. All patellas tracked normally. All flaps and skin grafts healed without complications. There were no infections and no instances of chronic edema. MSTS score at final follow-up was 30 for all patients. There were no local recurrences, complications, or amputations.

Conclusions: Patients who undergo extensive resections of high grade sarcomas around the knee without soft tissue reconstruction tend to have residual functional limitations and complications from radiation. To our knowledge, there have been no papers published that specifically address these types of procedures and outcomes for high grade sarcomas around the knee that are resected and reconstructed with muscle flaps. Our small cohort of patients who underwent rotational muscle flaps and transfers following resections around the knee have excellent functional outcomes and virtually normal active range of motion. Whenever resection results in bare bone, exposed knee joint or exposed neurovascular structures around the knee joint especially in the setting of radiation exposure, we highly recommend local rotational muscle flaps for coverage to augment function and reduce complication rates.