

Musculoskeletal Stability and Function after Oncologic Resection: More than Just Coverage

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INTRODUCTION: Although relatively rare, bone and soft tissue sarcomas are locally aggressive tumors, necessitating en-bloc resections, which frequently disrupt functional musculoskeletal units. While free tissue transfer can offer solutions to complex defects created by extensive resections, this technique necessitates longer operative times and a mandatory donor site. To mitigate disability, a pre- and intra-operative orthoplastic collaborative approach identified solitary or composite local flaps to restore stability and synergistic function while providing traditional soft-tissue coverage and/or fill. Here, we review our experience using this reconstructive approach in tumor ablative surgery.

MATERIALS AND METHODS: Patients who underwent upper or lower extremity tumor ablation by a single orthopedic surgeon and subsequent reconstruction by a single plastic surgeon from 2011 to 2015 at our institution were identified. Only regional or local solitary/ composite flaps were included. Patient demographics, tumor pathology, operative details, operative time, flap components and defect size were examined. Musculoskeletal Tumour Society Scoring System (MSTS) scores were used to assess functional outcomes after reconstruction.

RESULTS: 8 patients underwent tumor extirpation followed by 9 functional pedicled flap transfers to restore shoulder (3), hip (2), knee (2), and ankle (2) stability. Reconstructions were: Shoulder- scapula fascia, serratus anterior, trapezius flaps; Hip- inferior gluteal/iliotibial band flap to femoral head prosthetic, composite ALT/TFL/ITB flap to remnant gluteus maximus; Knee- gracilis flap (femoral re-neurotization) to patella tendon, composite distal fibula with FHL tendon to reconstruct LCL and proximal fibula defect; Ankle- gastrocnemius to peroneus longus/brevis, soleus to peroneus longus/brevis. Average defect size $130 \pm 112 \text{ cm}^2$; all resulted in musculoskeletal instability on intraoperative stress testing and/or resection of functional muscle units. Mean age 33.9 ± 18.9 years with follow-up 22 ± 9.8 months. 3/3 shoulder cases achieved full/symmetric ROM. 5/5 lower extremity patients ambulated postoperatively (1 required assistive device). Postoperative MSTS scores were excellent: $25.4 \pm 5.5/30$. Complications: pulmonary embolus (1), delayed wound healing (1). 75% received adjuvant radiation, 50% had disease recurrence, 1/8 died of disease.

CONCLUSION: Our cohort of complex defects demonstrated reliable joint stability, range of motion, and strength recovery despite large oncologic resections without the use of microvascular free tissue transfer. An orthoplastic approach wherein a multidisciplinary team identifies and addresses anticipated functional consequences of tumor extirpation can, in one-stage, mitigate disability while concurrently achieving traditional coverage/fill goals.