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Mid-Term Radiological and Functional Results of Biological Reconstructions of Extremity-Located Bone Sarcomas In Children and Young Adults

Erol B; Topkar OM; Basci O; Caliskan E; Tetik C

Bulent EROL, Ass. Prof., MD

bulerol@hotmail.com

Mert Osman TOPKAR, MD

drmerttopkar@gmail.com

Onur Basci, MD

dronurbasci@gmail.com

Emrah Caliskan, MD

dremrahcaliskan@gmail.com

Cihangir TETIK, Prof., MD

tetikc@gmail.com

Introduction: Biological reconstruction is a useful option for reconstruction following bone sarcoma resection. The mid-term functional and radiological outcomes of biological reconstructions after resection of bone sarcomas in children and young adults are presented in this study.

Materials and Methods: Thirty-four patients [average age 17.5 (range, 4 to 38 years)] with primary sarcomas of long bones underwent wide surgical resection and biological reconstruction. The histopathological diagnoses were osteosarcoma (12), Ewing's sarcoma (16), and chondrosarcoma (6). Neoadjuvant/adjuvant chemotherapy and radiation treatment were applied routinely/when required. The bone defects were managed by intercalary (23), osteoarticular (9) reconstructions and arthrodesis (2) with vascularized fibular graft (VFG). VFG was combined with massive allograft (7) or recycling bone (3) in 10 lower extremity reconstructions. The average follow-up was 38.5 months (range, 18 to 88 months).

Results: Graft union (at least on one end) and graft hypertrophy was observed in 33 (97%) patients at 12 months. VFG-allograft/recycling bone osteointegration rate was 100% at 24 months in combined reconstructions. Average final follow-up MSTS scores for lower and upper extremity reconstructions were 76.5% (range, 66.6 to 90%) and 82.5% (range, 53.3 to 100%), respectively. Six (17.6%) complications, including nonunion (1), implant failure (1), infection (2) and skin necrosis (2) required re-operation. The disease relapsed in 7 (20.5%) patients in terms of local recurrence (2; 5.8%) or distant metastases (5; 14.7%). Defect size and VFG length did not correlate with MSTS scores and radiological parameters ($p > 0.05$). Functional results of diaphyseal, intercalary reconstructions were better than metaphyseal and/or osteoarticular reconstructions ($p < 0.05$).

Conclusions: Biological reconstruction of bone sarcomas with VFG can provide permanent stability and progressively increasing functional and radiological results.

Keywords: *biological reconstruction, vascularized fibular autograft*