

Recycled autograft augmented with vascularized fibular graft for reconstruction of bone defects after tumor resection

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Background

Recycled autograft for reconstruction of skeletal defect after wide resection is usually mechanically frail due to devitalizing process. To minimize the associated complications, it could be augmented with vascularized bone graft. The vascularized fibular graft (VFG) provides the immediate restoration of a physiological blood supply and supplementary stability and then cellular elements of the graft might survive to enhance bone union and support strength of the recycled autograft.

Questions/Purposes

We evaluated clinical outcomes of surgical reconstruction using recycled autograft augmented with VFG for bone defects after tumor resections.

Patients and Methods

We retrospectively reviewed the medical records of patients with malignant bone tumors who were managed with recycled autograft augmented with VFG. Functional results were assessed with ISOLS score.

Results

Twelve patients were investigated. Mean age was 25 years. There were 8 osteosarcomas, 3 chondrosarcomas, and 1 MFH. Tumor locations were femurs in 6 patients, humerus in 3, tibia in 2, and radius in 1. Mean length of resection was 18cm. Vascularized fibula graft was harvested and used in the manner of inlay or only graft. Seven of them have been treated with neoadjuvant chemotherapy. Minimum and mean follow-up period was 2 years and 40 months respectively. Three patients died of disease, 2 were alive with disease, and 7 showed continuous disease-free survival at last follow-up. There was 1 local recurrence and 4 pulmonary metastases. Bone unions were obtained at 3.7 months at metaphyseal junctions and 8 months at diaphyseal junctions ($P<0.05$). At diaphyseal junctions, younger aged group and intramedullary location group showed earlier bone union ($P<0.05$). There were 3 non-unions, 4 delayed unions, and 2 recycled bone resorption combined with fractures, although those complications were eventually solved with re-fixation and autogenous bone graft. The mean ISOLS functional score was 81%.

Conclusions

Recycled autograft augmented with vascularized fibular graft provide immediate restoration of physiological blood supply and supplementary stability, and cellular elements of the graft can survive to enhance bone union. Clinical results were excellent with little complications. To obtain excellent results, proper microvascular technique, sufficiently longer graft than resection length, stable internal fixation, and proper protection of reconstructed bone during union process are necessary.