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Long-term Results of Intraoperative Extracorporeal Irradiation to the Autogenous Bone Grafts in Primary Bone and Soft Tissue Malignancies

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Purpose/Objective(s): The purpose of this study is to report the long-term results of intraoperative extracorporeal irradiation to the autogenous bone grafts in primary bone and soft tissue malignancies.

Materials/Methods: We retrospectively analyzed the clinical results of 78 patients treated between 1988 and 2012. Fifty-four (69%) patients had bone sarcomas, 22 patients (28%) had soft tissue sarcomas and 2 patients (3%) had undefined sarcoma. All patients had surgery including, en bloc resection with involved bone, curettage of the tumor from the resected bone, and re-implantation. Intraoperative extracorporeal irradiation was administered to the autogenous bone graft to the anteroposterior opposed fields using 6 or 10 MV photons. The radiation dose to the bone graft was 50 Gy in 75 patients, 60 Gy in 1 patient, and 80 Gy in 2 patients. Median follow-up interval of all 78 patients was 75 months (range, 6-240 months). Local control and overall survival rates were calculated actuarially according to the Kaplan-Meier method.

Results: Treatments in all 78 patients were safely performed. Five and 10-year local control rates within the irradiated field were both 100%. There were 3 local recurrences remote from the re-implanted bones. Distant metastases were detected in 17 patients, and 5-year and 10-year overall survival rates were 90% and 79%, respectively. During the follow-up, Grade 4 and 5 complications did not occur in all 78 patients. Grade 3 complications occurred in 40 patients (infections in 12 patients, fractures in 9 patients and others in 19 patients). Although 32 of the 40 patients with Grade 3 complications required salvage reconstruction surgery after initial treatment, all 32 patients have been living normal daily lives.

Conclusions: Intraoperative extracorporeal irradiation to the autogenous bone grafts achieved excellent local control with few severe late complications in primary bone and soft tissue malignancies.