

Joint preservation surgery for osteosarcoma using a recycled tumor-bearing autograft treated with liquid nitrogen

Norio Yamamoto<sup>1</sup>, Takashi Higuchi<sup>1</sup>, Katsuhiko Hayashi<sup>1</sup>, Akihiko Takeuchi<sup>1</sup>, Shinji Miwa<sup>1</sup>, Hiroyuki Inatani<sup>1</sup>, Yu Aoki<sup>1</sup>, Kensaku Abe<sup>1</sup>, Hiroyuki Tsuchiya<sup>1</sup>

<sup>1</sup> Department of Orthopaedic Surgery, Graduate School of Medical Sciences, Kanazawa University, Ishikawa, Japan

(Introduction)

Osteosarcoma commonly arises in the epiphyseal region during adolescence, and joint preservation is crucial to the maintenance of excellent limb function. In selected cases, we have performed transepiphyseal osteotomy and reconstruction using a recycled tumor-bearing autograft (TBA) treated with liquid nitrogen (LN). This study assessed clinical and functional outcomes.

(Patients and methods)

We evaluated 17 patients with osteosarcoma who underwent joint preservation surgery using a recycled TBA treated with LN. Preoperative staging revealed nonmetastatic disease in all patients. All cases received preoperative and postoperative chemotherapy. Postoperative functional results were evaluated at final follow-up using the Musculoskeletal Tumor Society Score (MSTS).

(Results)

Eight boys and nine girls (mean age at surgery, 11.4 years) were followed on average 32

months (minimum, 12 months). Twelve patients were continuously disease-free, four patients had no evidence of disease, and one patient died of disease. There were no cases of recurrence using LN-treated bone. Postoperative complications included fracture (2 cases) and nonunion (1 case) and were managed by revision osteosynthesis. Deep infection occurred in one case and amputation surgery was necessary. The mean MSTS was 92.1%. All patients, except one patient who underwent amputation, had more than 90 degrees of knee flexion, and 53% of patients had full range of motion at the final follow-up.

(Discussion and conclusions)

Joint preservation surgery and reconstruction has been reported in patients with meta- or diaphyseal osteosarcoma around the knee joint. For reconstruction, tumor-bearing bone treated with LN is a suitable material that provides excellent limb function in adolescent patients with osteosarcoma around the knee joint.