



Case report

Prosthetic reconstruction for tumors of the distal tibia. Report of two cases

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ABSTRACT

Prosthetic reconstruction in two patients with malignant bone tumors of the distal tibia was conducted. The diagnoses were metastatic bone tumor in one patient and low grade central osteosarcoma in another. The mean duration of follow-up was 5.5 years (3 and 8 years). Reconstruction was achieved using custom-made prosthesis (JMM, Japan Medical Materials), which replaced the distal tibia. In the patient with metastasis, local recurrence occurred 8 months after the primary surgery and the recurrent tumor was resected. Both patients were free from neoplastic disease at the latest follow-up. The average functional scores according to the system of the Musculoskeletal Tumor Society were 25 and 23. Custom-made prostheses allow an early return to functional weight-bearing without major complications. This technique provides a safe and effective method of stabilization for properly selected malignant tumors of the distal tibia.

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1. Introduction

Malignant bone tumors of the distal tibia are very rare [1]. Below knee amputation has been a surgical treatment of choice for the local tumor with satisfactory functional results [1,2]. The subcutaneous location and proximity of the distal tibia to the neurovascular bundle and tendons make adequate excision with wide margins of malignant tumors of the distal tibia difficult to achieve [2]. Therefore, there have been only few publications on prosthetic replacement of the distal tibia [1,2].

In this study, custom-made prosthetic reconstruction without talar surface replacement in two patients with malignant tumors of the distal tibia was performed. Hence, the clinical and functional results of this method are being presented.

2. Preoperative planning and custom-made prosthesis

Before operation, the patients were assessed to determine the extent of the local disease and presence of metastases by clinical assessment, plain radiography, and chest tomography (CT). Magnetic resonance imaging (MRI) was also performed to define the extent of the tumor, involvement of the soft tissues, particularly the neurovascular bundle, and level of bone resection.

The prosthetic system (Japan Medical Materials Ltd., Kyoto, Japan) is custom-made based on the anticipated level of resection of tibia for distal tibial bone tumors (Fig. 1). The prosthesis takes approximately 6 weeks to prepare.

3. Operative technique

Surgical approach was determined by the position of the tumor. Meticulous resection was carried out to possibly preserve a wide margin of tissue. The tumor was excised en-bloc (Fig. 2A and B). The proximal intramedullary canal was reamed and the stem was secured with bone cement, with a clinical outcome of appropriate rotational alignment in mind (Fig. 2C). The joint elements made with ultrahigh molecular weight polyethylene (UMWP) were manufactured to fit the talar joint surface. The range of motion and stability of the ankle were evaluated before the skin was closed.

4. Post operative rehabilitation

The patient was mobilized from bed to chair within the first 48 h postoperatively. A short-leg splint was applied after four weeks and then passive and active movements were commenced (Fig. 2D). Partial weight-bearing was allowed at 4 weeks, which progressed to full weight-bearing at about 6 weeks.

5. Functional assessment

Functional outcome was assessed using the Musculoskeletal Tumor Society (MSTS) functional evaluation system [3]. The MSTS score is composed of pain, function, emotional acceptance, walking ability, gait, and use of walking aids, with a higher score indicating better functional outcome.

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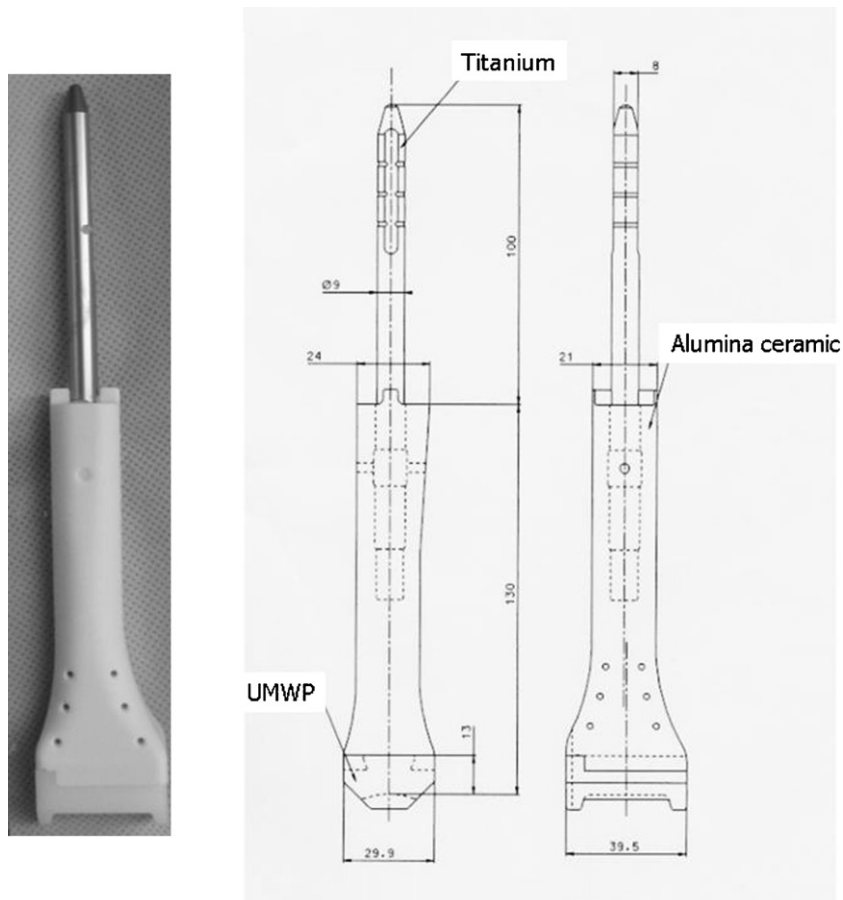


Fig. 1. Custom-made distal tibial prosthesis (Japan Medical Materials). The component is made from titanium (Ti-6Al-4V) intramedullary stem and alumina ceramic body. The articular surface of the joint element is covered with ultrahigh molecular weight polyethylene (UMWP) in order to achieve contact smoothly with the talar surface.

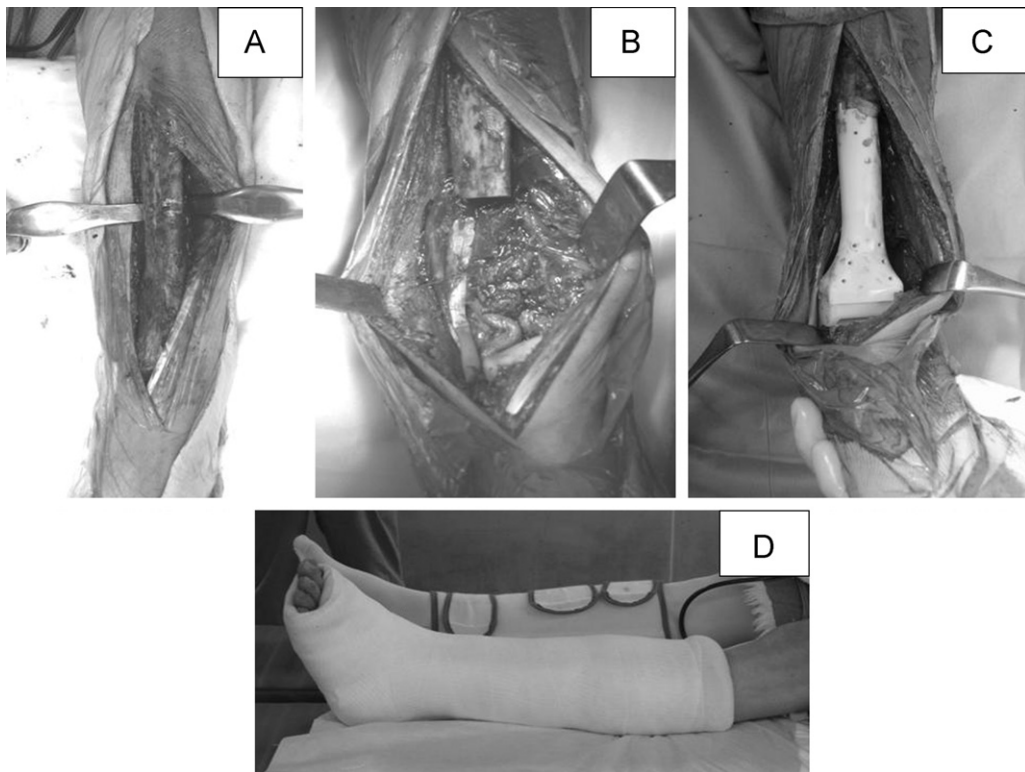


Fig. 2. (A, B) The bone was divided 5 cm above the upper margin of the tumor and resected en bloc. (C) The proximal intramedullary canal was reamed to the appropriate size. The stem of the tibial component was inserted into the medulla of the proximal portion of the tibia and fixed with bone cement, with the clinical outcome of appropriate rotational alignment in mind. (D) A short leg splint was applied for four weeks.

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