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# The longitudinal split technique for narrow canal tibia in a case of distal femur replacement for osteosarcoma



Toru Akiyama\*, Shotaro Kanda, Kazuo Saita

Department of Orthopaedic Surgery, Saitama Medical Center, Jichi Medical University, 1-847 Amanuma-cho, Omiya-ku, Saitama, Saitama, Japan

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## ABSTRACT

**INTRODUCTION:** There are currently no available prostheses that can be used for extremely small femurs or tibias of adult patients in countries where allograft is unavailable.

**CASE REPORT:** We report the case of a 17-year-old girl requiring special limb salvage technique for distal femur reconstruction following resection of malignant tumor. This technique was needed because of a very narrow canal of the tibia. We split bilateral tibial cortices longitudinally with osteotomies to enlarge tibial canal enough to insert conventional endoprosthesis. After insertion of the implant, split tibia reduced with titanium cables and bands, and the split clefts were filled with cancellous bone. Fifteen months after the operation, proper fixation was achieved with bony fusion of bilateral split clefts and ambulation without assistance was achieved.

**DISCUSSION:** Any proper surgical procedure for our patient were reported previously. We developed a conventional non-expandable endoprosthesis for distal femur replacement using the double longitudinal split technique as a solution to this difficult problem.

**CONCLUSION:** Our longitudinal split technique should be applicable to adult patients with skeletal immaturity requiring resection of juxta-articular malignant tumors and in other situations complicated by the presence of a narrow canal.

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## 1. Introduction

Currently, 90–95% of patients with primary musculoskeletal malignant tumors involving the extremities are treated safely with wide resection and limb-salvage surgery with a low risk of recurrence and the same disease-free survival rate as with amputative surgery [1–3]. Limb salvage increases patient satisfaction since it provides immediate mobility, stability, weight bearing, and an improved quality of life due to a more acceptable cosmetic appearance and greater emotional acceptance.

The distal femur has a predilection for developing skeletal sarcomas. A frequently performed distal femur tumor treatment involves distal femur reconstruction with a total knee arthroplasty (TKA) system following tumor resection [4]. However, there are currently no available prostheses that can be used for extremely small femurs or tibias of adult patients.

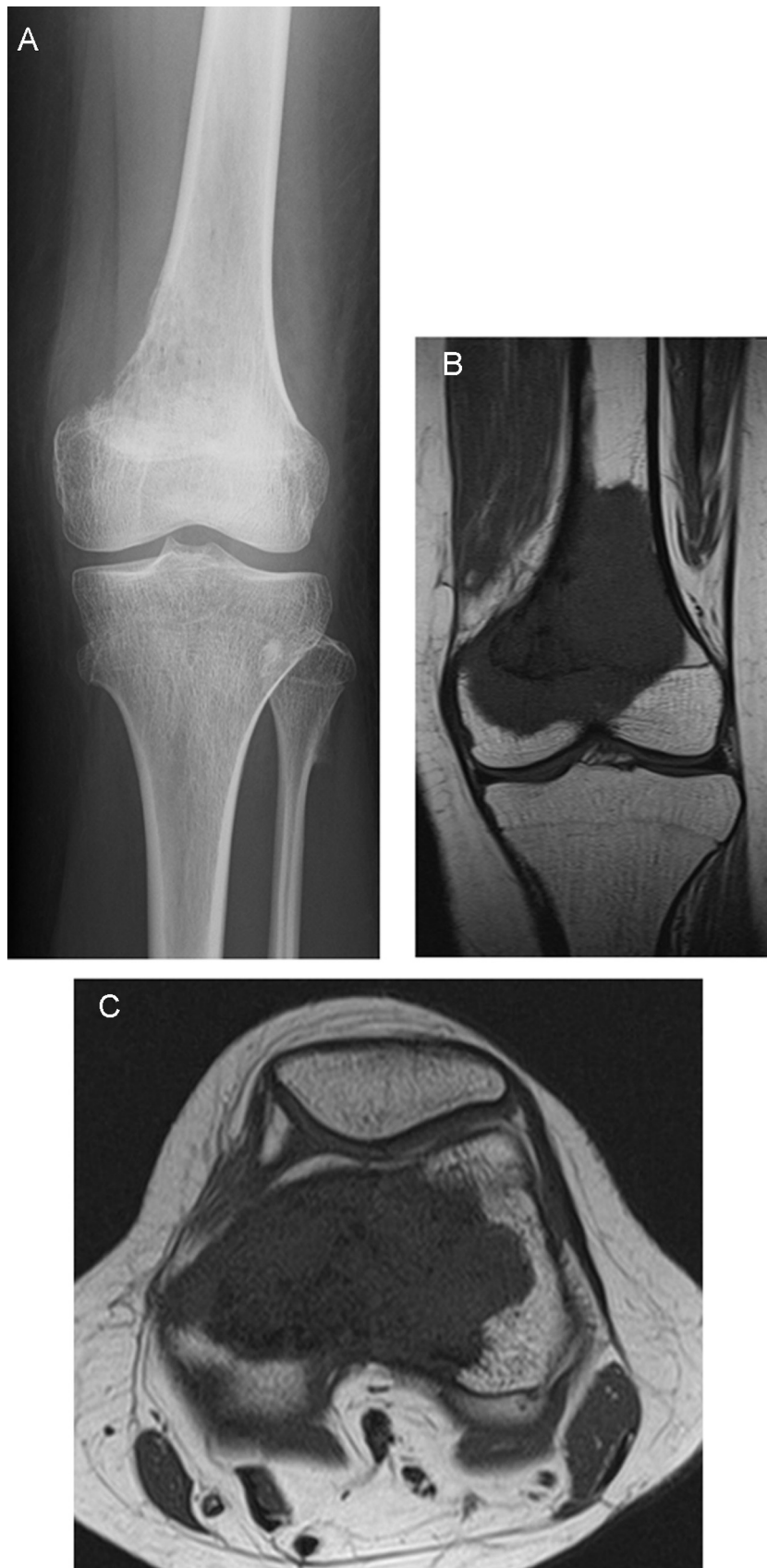
We report that our novel longitudinal split technique can be used with conventional prostheses in skeletally immature adult patients requiring the resection of distal femur malignant tumors.

## 2. Case report

A 17-year-old girl was referred to our hospital for the treatment of a left distal femoral bone tumor. Her gait was normal although she suffered from knee pain. Her height was 138 cm, and her body weight was 32 kg at the time of her first visit. She had been treated between the ages of 3 months and 3 years with chemotherapy and whole body radiation for malignant lymphoma. The skull base radiation for this treatment resulted in growth disturbances. She was treated with growth hormone and thyroid hormone for secondary growth hormone deficiency and secondary hypothyroidism. Radiographs of the knee demonstrated periosteal reaction, an osteolytic lesion in the medial part of the distal femur, and that the growth plate was closed (Fig. 1a). An MRI at the time of presentation demonstrated that the medial part of the articular capsule and one-fourth of the medial part of the patella were invaded by the tumor. Pathology of an open biopsy specimen showed conventional osteosarcoma. Preoperative chemotherapy was administered, and

\* Corresponding author.

E-mail addresses: [toruakiyama827@jichi.ac.jp](mailto:toruakiyama827@jichi.ac.jp) (T. Akiyama), [panda714@hotmail.co.jp](mailto:panda714@hotmail.co.jp) (S. Kanda), [saita-k@jichi.ac.jp](mailto:saita-k@jichi.ac.jp) (K. Saita).



**Fig. 1.** Preoperative anteroposterior (A) radiograph of the left knee of the 17-year-old female patient showing periosteal reaction on the medial aspect of the distal femur. The coronal (B) and axial (C) preoperative MRI showed tumor localization in the distal diaphysis of the femur.

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