

Use of Non-Hinged Endoprosthesis Can Provide Stable Knee Joint and Preserve Adjacent Uninvolved Physeal Growth after Tumor Resection in Children

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Background

Limb salvage in pediatric patients still remains a challenge. During early years, we use hemiarthroplasty to avoid violation of the adjacent growth plate but with a high rate of dislocation. Now we use a non-hinged distal femur endoprosthesis to enhance the stability of knee joint with adjacent physeal preservation.

Questions/Purposes

The purpose of this study is to: (1) determine whether the growth preservation can be achieved on the adjacent uninvolved growth plate, and to what extent the growth ability can be preserved, (2) postoperative function and (3) complications after reconstruction with non-hinged endoprosthesis.

Patients and Methods

The non-hinged endoprosthetic device was implanted in 7 pediatric patients with stage IIB osteosarcoma. The prosthesis consists of a femoral component, including segmental defect body and cemented stem, and a tibial component with design of a non-hinged base plate, small-diameter press-fit stem and derotation fins. A posterior stabilizing polyethylene component is fixed on the tibial component. Implantation of the tibial component requires penetration of adjacent uninvolved bone, through the growth plate, by the press-fit stem. The cases were prospectively followed up with focus on growth rate of adjacent uninvolved bone in the salvaged limb, joint stability and length discrepancy.

Results

There were two girls and five boys with an average age at the time of primary surgery of 10.0 years (range, 8-12 years). All the tumor was located in the distal femur. The average follow was 32.7 months (range, 22-42 months). LARS ligament was used in two patients to enhance the soft tissue reattachment and reconstruct MCL. All the patients were alive at the followup. There were one local recurrence and the patient received local resection. Pulmonary metastasis was observed in one patient and metastasectomy was performed. The adjacent uninvolved bone in the salvaged limb grew by an average of 2.7 cm, and the equivalent bone in unoperated contralateral limb grew by an average of 2.9 cm. The mean MSTS 93 score was 88.9. One recurrent dislocation was observed in one patient and the prosthesis was revised to a rotating hinged distal femur.

Conclusion

The preliminary results showed the non-hinged design can provide more stable knee joint than hemiarthroplasty and the design of a small-diameter stem inserted through central portion of the uninvolved adjacent physis can preserve the growth ability but may cause mild retardation.

