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Two-institution experience of a non-invasive expandable endoprosthesis in the pediatric population

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Background: The optimal choice for limb preserving reconstruction in the growing child following resection for a malignant tumor still remains in debate. Expandable endoprosthesis are a viable and reliable option for limb preservation. The development of non-surgical lengthening provides a non-invasive technique to lengthen the extremity as the child grows. We sought to review the experience of two institutions with this prosthesis.

Questions/ Purposes: Evaluate the surgical outcomes of the procedure. Functional outcomes (MSTS score). Lenghtening complications inherent with this prosthesis.

Patients and methods: Between 2005 and 2014, 33 pediatric patients underwent endoprosthetic reconstruction with a non-invasive expandable. These patients were reviewed from a prospective database. Mean age at surgery was 9.6 (range 4-15). There were 15 females and 18 males. Twenty-seven patients had osteosarcoma and 6 Ewing sarcoma. Patient had standard treatment for malignant bone tumors which including appropriate staging, neoadjuvant chemotherapy, resection and reconstruction followed by adjuvant chemotherapy. Distal femoral replacements were the most common with 25, 5 proximal femurs, 1 proximal tibia and 1 total femur. Three patients were revisions from prior reconstructions. Mean resected length for the primary resections was 19.3 cm.

Results: Median follow-up was 43 months. Twenty-nine patients (88%) were alive at last follow-up. Three patients achieved maximal expansion and were revised to another lengthening component. Mean number of lengthenings was 9.5 (range 0-30) with a mean length expanded of 3.9 cm (0-12cm). Major complications occurred in 8 patients (24%). There were 2 revisions for aseptic loosening, 2 deep infections, and 1 local recurrence that led to an amputation. Two proximal femoral components were converted to total hip arthroplasties due to subluxation and there were 2 peri-prosthetic fractures. Mean time to revision was 46 months. There were no structural failures of the endoprosthesis or lengthening mechanism failures. Mean MSTS score was 26 (range 20-30) at last follow-up.

Conclusion:
This study illustrates our experience with non-surgical expandable endoprosthesis. This device provides a safe non-invasive method of limb lengthening in the growing child, eliminating return to the operating room for lengthening procedures, which can contribute to loss of range of motion and poorer outcomes. Patients have good functional outcomes and acceptable rates of complications. Our results are comparable to other reported medium-term follow-up series. Limitations include