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Background: In the United States, approximately 50-100 skeletally immature patients are affected annually by sarcomas of their distal femur/proximal tibia who may benefit from the use of expandable endoprostheses. Since their emergence, expandable endoprostheses have become an acceptable modality to address the issue of limb length inequality with limb-sparing procedures in skeletally immature patients afflicted with lower extremity bone sarcomas.

Questions/ Purposes: In this report we present a 13-year follow up on a patient treated with a minimally invasive expandable total femur endoprosthesis following limb-sparing resection for an osteosarcoma of the femur.

Patients and Methods: We retrospectively analyzed the chart of an 8-year-old girl with a high-grade osteosarcoma of the distal femur who initially underwent intramedullary rod fixation of the entire femur at an outside institution for a pathological fracture. The patient underwent preoperative chemotherapy with good response as evidenced by fracture healing. Due to contamination of the entire femur by the placement of the intramedullary rod, a total femur resection was indicated. A minimally invasive total femur expandable prosthesis with a unipolar head was implanted. History of illness, length of resection, number of lengthenings, amount lengthened, limb length discrepancy, and complications were reviewed. Functional outcomes were reported according to the Musculoskeletal Tumor Society (MSTS) score.

Results: This patient was followed from 2002-2015. Approximately 177mm of the femur was resected during the operation. The patient underwent 6 expansions for a total of 12 cm. Presently, she has a limb length discrepancy of 3 cm, but ambulates well with a shoe lift. Minor complications included hip stiffness and slow wound healing after an expansion. Eight years post-operatively, the prosthesis reached max expansion at 6 cm. The patient underwent surgery where to collapse the prosthesis and place a new segment to restore the prosthesis to the expanded length. The prosthesis was subsequently re-expanded from this new starting point to a total of 12 cm. One year later the patient began experiencing significant hip pain interfering with ambulation due to acetabular degeneration. She was subsequently converted to a total hip replacement while leaving the remaining prosthesis intact. At most recent follow up at the age of 21, she is pain free and has a minor barely perceptible cosmetic limp. She attends college and can ambulate for prolonged distances without any assist devices. The patient has normal hip and knee range of motion. She has an MSTS score of 28 (93%). There have been no recurrences, deep infections, dislocations or instances of loosening.

Conclusions: This case is a long term follow up of a minimally invasive expandable total femur endoprosthesis utilized for reconstruction following limb sparing resection of a distal femur osteosarcoma associated with a pathological fracture and extensive intramedullary contamination. A good response to preoperative chemotherapy was crucial in the decision making to salvage the extremity. Despite requiring two additional major surgeries, the patient's extremity reached an acceptable degree of expansion and has provided her with excellent function and a great quality of life at long term follow up. There have been no major complications related to the actual surgeries for the expansions. In select patients, minimally invasive expandable endoprostheses can offer a safe and reliable method of reconstruction for managing limb length discrepancies after limb-sparing procedures for lower extremity bone sarcomas. The procedure may avoid amputation with low complication profiles and good functional results.