**Number & Title:**

# 11282 - A Novel "Homolateral Femur Rotation-Lengthening With Allograft Transplantation Technique" As An Option Of Reconstruction For Huge Defects After Pelvic Tumor Resection: Technical Note And Early Experience

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## *Abstract*

***Background*** The surgical treatment of malignant tumors and locally aggressive benign tumors in the pelvis is still very challenging. For isolated resections of the ilium (Type I), the ischium (Type III), or the pubis (Type III), reconstruction may not be necessary to achieve good function postoperatively. For periacetabular resections (Type II), reconstructions are usually required to maintain the femoropelvic continuity and to restore force transmission for a reasonable postoperative function. Various reconstructions have been reported in the literature including: iliofemoral arthrodesis or pseudarthrosis, ischiofemoral arthrodesis or pseudarthrosis, autoclaved autografts, vascularized fibula, Steinmann pins and cement, allografts, saddle prosthesis, custom-made prosthesis, modular hemipelvic prosthesis, etc. For large periacetablular resections and subsequent huge defect, reconstruction options are very limited. As an alternative, the arthrodesis or peudarthrosis could be considered. However, even the lower limb is saved, a primary limitation is the limb shortening, and the patient has to ambulate with assistant devices

with poor gait.

***Questions/purposes*** We developed a novel technique named “homolateral femur Rotation and allograft lengthening technique” to reconstruct huge defects after tumor resection in the pelvis as well as to restore the limb length.

***Patients and Methods*** The surgery was simulated and validated using a bone model based on the patients’ preoperative CT original data (Figure 1). The tumor resection was assisted with computer navigation system. After the tumor is resected, the proximal femur is rotated and lengthened with “Z” osteotomy, and then the lower limb is lengthened with allograft transplantation. The rotated femoral head is expected to develop arthrodesis with the remaining ilium or the sacrum (Figure 2). And the early outcomes of nine patients were reported using the survival status, local recurrence rate, Musculoskeletal Tumor Society (MSTS) Score, limb length discrepancy and complications. There were 3 males and 6 females with a mean age of 39.9 years (Range, 23 to 48). There were two dedifferentiated chondrosarcoma, two low-grade chondrosarcoma, two undifferentiated polymorphic sarcoma, one grade 2 chondrosarcoma, one low-grade osteosarcoma, and one recurrent giant cell tumor of bone. Five (55.6%) of the patients had Type I+II+II resections. And the rest four (44.4%) patients received Type I+II resections.

***Results*** With a mean follow-up of 23.4 months (range, 12 to 44), six patients (66.7%) were free of disease, one patient died of the disease, and two patients were alive with disease. The overall survival rate was 75% at 2 years. One patient had pulmonary metastasis and had complete response after chemotherapy. Three patients (33.3%) had local recurrence. Three patients had postoperative complications. One had local flap necrosis and one had local infection. Both patients were further treated with debridement. Another patient had delayed union of the incision and no further operative procedure

was needed. The mean discrepancy of the lower limb length at the last follow up was 12.8 mm (range 0 to 30). The mean Musculoskeletal Tumor Society score 18 (range, 14 to 24).

***Conclusions*** This challenging procedure provides satisfactory mechanical results, while restoring the femoropelvic continuity and keeping the lower limb length. The only cause of failure in this series was local recurrence, which highlights the importance of the local control of the disease. The authors conclude from this early experience that the "homolateral femur rotation-lengthening with allograft transplantation technique" provides acceptable complication rate and satisfactory function outcome.

*Level of Evidence:* Therapeutic Level IV.

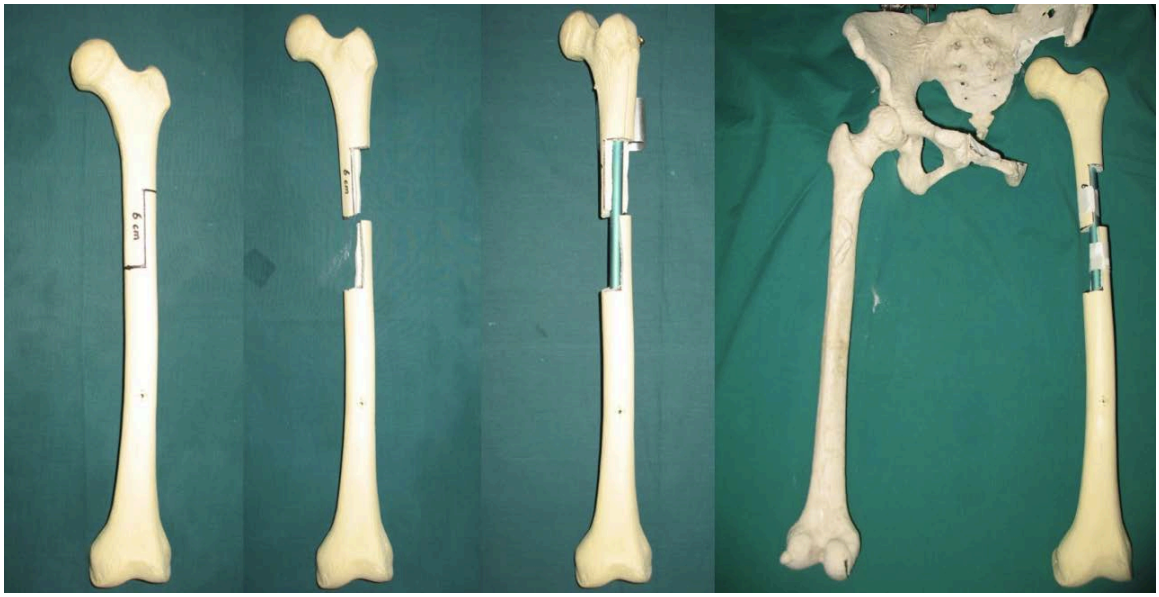


Figure 1. The surgery was simulated and validated using a bone model. After the tumor is resected, the proximal femur is lengthened 6cm with "Z" osteotomy, and then the defect was filled by allograft. The rotated femoral head is expected to develop arthrodesis with the remaining ilium or the sacrum.

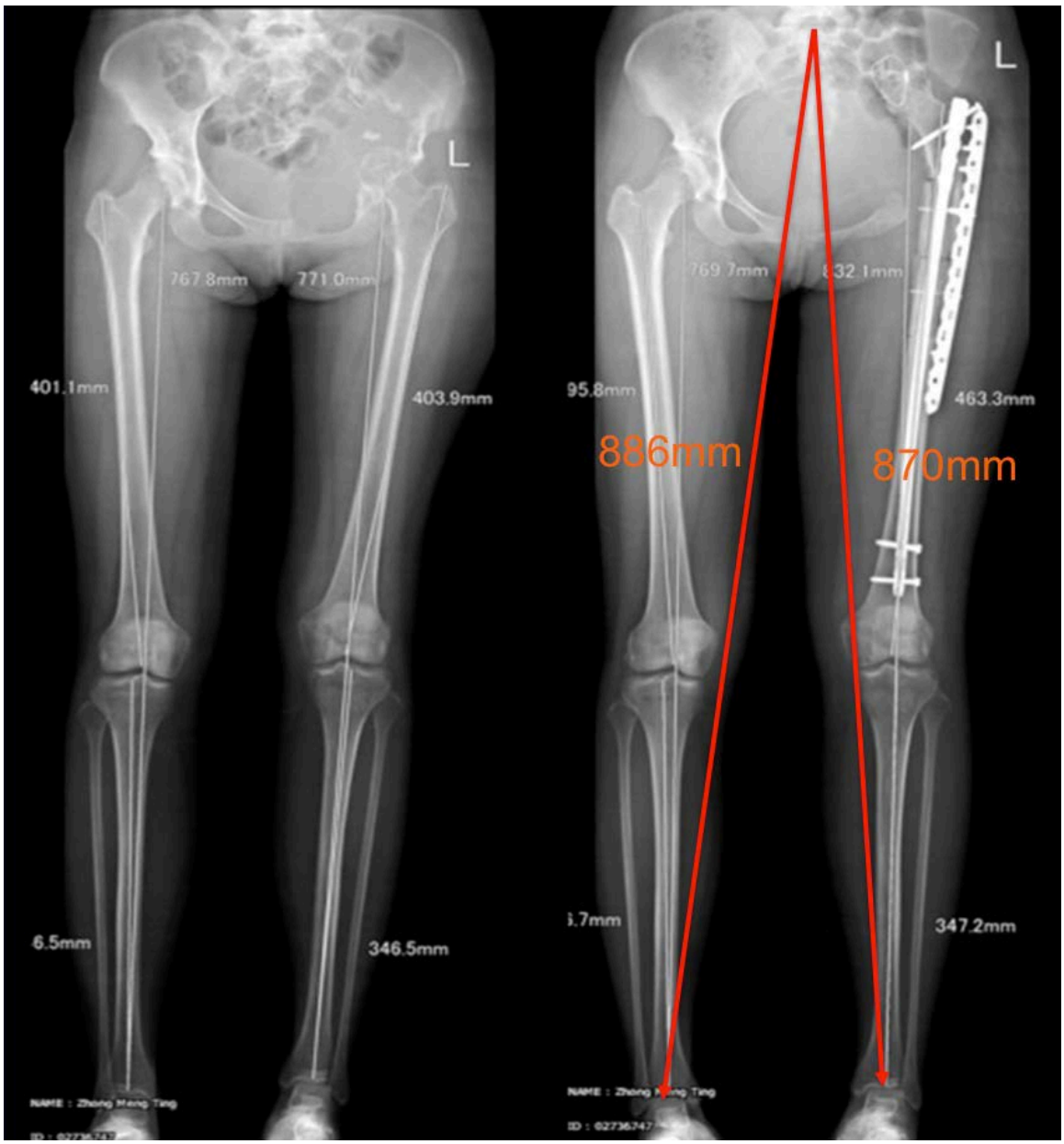


Figure 2. The post-operative X-ray was shown. The discrepancy of both lower limbs was 16mm (within 2cm), which was acceptable for the patient.