Patellar Height and Function Following Proximal Tibia Resection and Endoprosthesis Reconstruction. A Retrospective Analysis Based in 43 Patients.

Background: Rotating hinge megaprosthesis reconstruction is a viable option following resection of proximal tibia tumors. Soft tissue coverage and patellar ligament attachment are major concerns after those procedures. The difficulty to attach the patellar ligament to endoprosthesis can cause increase of patellar height over time, and affect extensor mechanism function.

Objectives: The purpose of this study is to identify variables that influence the knee extensor mechanism function following proximal tibia rotating hinge endoprosthesis reconstruction.

Methods: A retrospective review of the tumor registry and orthopedic oncology database was performed. We reviewed the medical records of all patients who underwent proximal tibia resection and endoprosthesis reconstruction from 1993 and 2013. Only primary procedures with at least one year follow-up were included. We excluded any patient who underwent extra-articular resection, patellectomy, revision of previous prosthesis or allograft reconstruction, expansible prosthesis, distal femur associated to proximal tibia resection, and allograft prosthesis composite. We compared demographic characteristics; surgical variables, including the use or not of patellar resurfacing, type of patellar ligament insertion, amount of tibia resected, and valgus degrees. The patellar height was measured at one to three months of postoperative time and at final follow-up. Additional variables examined were anterior knee

pain (AKP), range of motion (ROM), extension lag (EXL), presence of complications, additional patellar procedures, and ISOLS/MSTS score.

Results: The final cohort comprised 43 patients, 25 males and 18 females. The patient's age range from 13 to 72 years (mean of 35 years) The histologic diagnoses were primary malignant in 35, metastatic carcinoma in four, and benign in four. Thirty patients had a non-resurfaced patella and 13 had resurfaced. Patellar ligament was attached to the tibial component using direct suture to the prosthesis in 26 patients; suture with polypropylene mesh in 14 patients; and 3 patients had the patellar tendon attached to the prosthesis using attachment arms. The mean valgus was 7^{o}, 8^{o} in non-resurfacing and 6^{o} in resurfacing ($p=0.032$). AKP was present in 12 (28%) patients; 9 (30%) in non-resurfacing group and 3 (23%) in resurfaced ($p=0.72$). AKP is associated with decreased range of motion ($p=0.006$), yet AKP was not associated to EXL. The mean EXL was 19^{o} and there was no significant difference between resurfacing (18^{o}) and non-resurfacing (19^{o}) knees ($p=0.61$). Multivariate regression analysis on AKP, ROM and EXL did not indicate any significant association. Immediate postoperative Insall-Salvati ratio (ISR) (mean 1.0) was significantly smaller than the final follow-up ISR (mean 1.24) ($p=0.0007$). The mean Insall Salvati patellar tendon insertion ratio (PTR) also significantly increased from postoperative (2.36) to final follow-up measure (3.03) ($p<0.0001$). The ISR and PTR increased equally in resurfacing and non-resurfacing groups (ISR $p=0.14$; PTR $p=0.30$). The final follow-up ISR was significantly smaller in patients who underwent suture only attachment than in patients who underwent patellar tendon attachment using polypropylene mesh or other type of attachment ($p=0.023$). The general frequency of extensor mechanism complications was similar; yet patellar spurs were present in 3 patients from resurfacing group and in none in

resurfacing group (p=0.02). Complications were not associated to AKP, ROM, and EXL. The number of additional patellar procedures were similar in non-resurfacing group and resurfacing groups (p=1.00), and include two patellar resurfacing in non-resurfacing group. No patients from resurfacing group underwent patellar component revision. The ISOLS/MSTS score was available for 24 patients (mean 73%). Non-resurfacing group mean score was 78% and in resurfacing group was 60% (p=0.18).

Conclusions: AKP is associated with decreased range of motion. Patellar height after proximal tibia resections significantly increased overtime. Propylene mesh was correlated with greater translocation of the patella (alta). Patella alta correlated with increased extension lag, however the functional parameters studied are similar between resurfacing and non-resurfacing patients.