Proximal Femoral Replacement for Trauma Associated with Significantly Worse Outcomes

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INTRODUCTION: Reconstruction of extensive proximal femoral bone loss remains a major challenge for orthopaedic surgeons. While a common solution following tumor resection, proximal femoral replacement (PFR) is sparingly used in non-neoplastic conditions. PFRs have a high complication rate, particularly related to dislocation and infection and for this reason are often considered a limb salvage only procedure. Several studies have reported on non-neoplastic indications (NNI) for PFR but do not compare across cohorts. The aim of this study was to assess the relative complication rates in PFR to further stratify risk profile across indications.

METHODS: Utilizing our mega prosthesis database, we identified all proximal femur replacements performed at our institution from 1999-2021. Surgeries were grouped by tumor involvement as well indication for PFR (metastasis, primary tumor, benign tumor, failed arthroplasty, or trauma: peri-implant fractures, fractures not amenable to primary fixation). Patient demographics and clinical outcomes were collected and compared with a focus on complications, dislocation, revisions, and implant survival.

RESULTS: Of the 331 patients included in this study, 52% received a PFR for metastatic carcinoma (n=182), 19% for primary or metastatic sarcoma (n=63), 11% for revision arthroplasty (n=37), 8% for trauma (n=26), and 3% for benign tumor of bone (n=10). The average length of follow-up for all indications was 2.46 years, with the longest average follow-up being for benign tumor of bone (5.05 years). The average length of inpatient stay for all indications was 7 days, with the longest average inpatient stay being for metastatic carcinoma (8.6 days) and the shortest average inpatient stay being for trauma (4 .8 days).

The average rate of inpatient complications for all indications was 17% (56/ 331) with the most common complication being an unexpected ICU stay (4%; 13/ 331). An indication of benign tumor was associated with the highest rate of inpatient complications at 30% (3/10), as well as the highest rates of unexpected ICU stay at 10% (1/10), and the highest rate of DVT at 10% (1/10), An indication of revision arthroplasty was associated with the lowest rate of inpatient complications at 0% (0/37), as well as the lowest rate of unexpected ICU stay at 0% (0/37).

For all indications, the average rate of readmission within 30 days was 13% (44/331) The highest rates of readmission within 30 days was 23% for trauma (6/26), 22% for arthroplasty (8/37) and 11% for metastasis (20/ 182). For all indications, the average rate for any superficial wound problem within 30 days was 7% (23/332), with the most common. superficial wound problem being wound dehiscence at 2% (8/331). An indication of trauma was associated with the highest rate of superficial wound problems at 12% (3/26) as well as the highest rate of wound dehiscence within 30 days at 4% (1/26).

For all indications, the average rate of reoperation for any cause was 21% (71/331), with the most common reason for first reoperation being deep infection at 7% (24/71). Trauma was associated with the highest rate of reoperation for any cause at 50% (13/26), as well as the highest rates of aseptic wound problems at 4% (1/26), and dislocation at 19% (5/26). For all indications, the average time to first reoperation was 2.23 years. The longest time to reoperation was for benign tumor of bone at 7.2 years, while the shortest time to reoperation was for arthroplasty at 0.5 years. For all indications, the average number of reoperations was 1.76 reoperations. Trauma was associated with the highest number of reoperations, with an average of 2.3 reoperations per patient. Benign tumor of bone was associated with the lowest number of reoperations, with an average of 1.0 reoperations per patient.

The overall rate of dislocation in this cohort was 8% (27/331). The highest rates of dislocation were 38% for trauma (10/26), 7% for metastasis (13/182), and 5% for arthroplasty (2/37). The overall rate of amputation in this cohort was 3% (11/331). The highest rates of amputation were 10% for primary sarcoma (6/63), 4% for trauma (1/26), and 3% for arthroplasty (1/37). The average time to amputation in this cohort was 3.5 years. The shortest average time to amputation was 2.4 years for arthroplasty. In this cohort, the overall rate of implant failure requiring implant removal was 10% (32/331). The highest rate of implant failure requiring implant removal was 19% for trauma (5/26) 16% for sarcoma (10/63), and 10% for benign tumor (1/10). The average time to implant removal was 1.1 years for arthroplasty, 2.5 years for trauma and metastasis and 3.3 years for primary sarcoma.

DISCUSSION: NNI experienced a significantly higher 30-day readmission rate (16% vs 4%, p = 0.001) rate of reoperation (33% vs 16%, p =0.004), deep infection requiring surgery (16% vs 5%, p =0.004) dislocation (19% vs 4%, p = 0.0013) and dislocation requiring revision (11% vs 4%, p = 0.022). Trauma was associated with the highest rate of reoperation for any cause at 50% (13/26), aseptic wound problems (4%:1/26), revision for dislocation (19%: 5/26) dislocation rate (38%:10/26) and implant failure requiring implant removal (19%: 5/26). These results demonstrate that outcomes and complications of reconstruction with PFR vary based on the indication for surgery and demonstrate that neoplastic patients counterintuitively fair better than their non-neoplastic counterparts, especially for trauma, across several outcome measures namely readmission, revision surgery, infection, and dislocation.

SIGNIFICANCE: PFR reconstruction outcomes vary based on surgery indication; neoplastic patients fare better than non-neoplastic across readmission, dislocation, revision, and implant failure.