

POSTER 55

Comparison of fixation techniques for rotationplasty

Mikaela H. Sullivan, M.D., Alexandra M. Arguello, M.D., Todd A. Milbrandt, M.D., Peter S. Rose, M.D., William J. Shaughnessy, M.D., Matthew T. Houdek, M.D.
Division of Orthopedic Surgery, Mayo Clinic, Rochester, MN

Background

Rotationplasty is a reconstructive, limb-sparing surgery for patients with lower extremity musculoskeletal tumors. The procedure involves rotation of the distal lower extremity to allow the ankle to function as the new knee joint and provide an optimum weight-bearing surface for prosthetic use. Fixation is obtained through multiple techniques including plates and intramedullary nails. Complications include nonunion, malrotation, and fracture. There is currently a paucity of data comparing fixation techniques, especially considering these complications.

Purposes

The purpose of this study is to compare fixation outcomes between intramedullary nailing (IMN) and plating (PS) and to review oncologic outcomes in patients undergoing rotationplasty.

Patients and Methods

A retrospective chart review of patients undergoing rotationplasty was performed. We reviewed 25 (16 male:9 female) patients with a mean age of 10 ± 4 years, undergoing a rotationplasty for either a femoral ($n=17$, 68%) or tibial ($n=8$, 32%) tumor. The most common diagnosis was osteosarcoma ($n=21$, 84%). Fixation was obtained with either an IMN ($n=6$, 24%) or PS ($n=19$, 76%). Outcomes of patients undergoing rotationplasty were compared between the IMN and PS groups.

Results

Following surgical resection margins were negative in all patients. The mean time to union was 21 months (range 6-93 months). Patients undergoing fixation with an IMN achieved union at a significantly shorter time compared to patients undergoing fixation with a PS (7 ± 1 vs 28 ± 7 months, $p=0.02$). Eight patients developed a nonunion and patients undergoing fixation with an IMN were less likely to have a nonunion, however this failed to reach statistical significance (OR 0.34, 95% CI 0.01-2.74, $p=0.33$). Postoperative fracture of the residual limb occurred in 7 (28%) patients and patients undergoing fixation with a plate were likely to have a fracture ($n=7$, 37% vs. $n=0$, 0%, $p=0.13$). Following surgery, complications occurred in 13 (52%) patients, most commonly a nonunion ($n=8$). Three patients underwent conversion to a formal amputation secondary to tumor recurrence ($n=2$) and compartment syndrome ($n=1$). Patients undergoing fixation with a plate were more likely to have a postoperative complication (OR 8.6, 95% 0.82-89.1, $p=0.07$). All patients were able to be fitted with a prosthesis following their rehabilitation.

Conclusions

Rotationplasty is an option for limb salvage for young patients with lower extremity tumors. The results of the current study suggest the potential for improved rates of union and a decreased time to union when an intramedullary nail can be used. As such consideration for IMN fixation should be given to all patients undergoing a rotationplasty.