

Active Smoking Is a Risk Factor for Greater Pain Following Nonunion Repair of the Extremities

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Purpose: Nonunion of long bone fractures is a serious complication for many patients. The majority of patients who undergo treatment for long bone nonunion go on to heal with recovery of function and pain relief. Unfortunately, pain relief can be complex in these patients, with many risk factors of postoperative pain yet to be identified. The purpose of this study is to elucidate factors associated with continued pain following long bone nonunion surgery and offer better pain control advice to patients.

Methods: All patients with long bone nonunion presenting to a one of three orthopaedic traumatologists were enrolled in a prospective registry. Enrolled patients were followed at regular intervals for 12 months using the Short Musculoskeletal Function Assessment (SMFA), visual analog scale (VAS), physical examination, and radiographic examination. The registry was reviewed to identify patients with a tibial or femoral nonunion that went on to union with complete follow-up. A Friedman test was conducted to determine differences in pain level preoperatively and postoperatively. Univariate analyses were conducted to identify patient characteristics significantly associated with postoperative pain using a significance cutoff of $P = 0.1$. Significant factors were included in multivariate linear regressions to identify risk factors for pain 3 months, 6 months, and 12 months after nonunion surgery.

Results: 91 patients with tibial or femoral nonunion who went on to union and had complete follow-up were identified. 57 patients (63%) had tibial nonunion. 34 patients (37%) had femoral nonunion. A Friedman test revealed mean pain score decreased significantly by 3 months postoperatively ($P < 0.0005$). Univariate analyses demonstrated age ($P = 0.016$), days from injury to nonunion surgery at our institution ($P = 0.067$), smoking status ($P < 0.0005$), wound status at time of injury ($P = 0.085$), anesthesia ($P = 0.045$), and nonunion location in the bone ($P = 0.047$) were significantly associated with postoperative pain in at least one time point postoperatively. These were included in multivariate regressions that revealed nonunion location ($P = 0.035$) was predictive of pain 3 months postoperatively, smoking status ($P < 0.0005$) was predictive of pain 3 months ($P = 0.012$) and 6 months ($P < 0.0005$) postoperatively, and days from injury to nonunion surgery at our institution was predictive of pain 6 months ($P = 0.024$) and 12 months ($P = 0.004$) postoperatively.

Conclusion: Healed patients have improvement in pain levels after nonunion surgery of the tibia and femur. Orthopaedic surgeons should stress smoking cessation programs and minimize delay to nonunion surgery, in order to maximize relief of pain in this patient cohort.