Motorized Intramedullary Limb Lengthening: Management of and Risk Factors for Fracture

Jason Shih Hoellwarth, Zachary Glassband, Taylor Reif, Austin Thomas Fragomen, S Robert Rozbruch

INTRODUCTION:
Motorized intramedullary lengthening nails (MILN) are a common implant to provide limb lengthening. While there has been substantial literature written about MILN use and complication management, the complication of fractures related to limb lengthening with a MILN has never been the focus of investigation. This research aims to describe our practice's incidence and management of fractures in patients who had MILN surgery, and also evaluate potential risk factors.
METHODS:
Medical records of 541 MILN limb segments were retrospectively reviewed, identifying 18 patients (3%) who sustained fractures (all unilateral). The primary outcomes were anatomic location of the fracture, management technique, and time to weight bearing as tolerated. Additionally, comparison of demographic data was performed between lengthening patients that fractured and those that did not in order to evaluate the potential risks for fracture.
RESULTS:
Fourteen fractures were in the lengthened bone: seven (50.0%) were provided intramedullary nailing, three (21.4%) were managed with protected weight bearing (two with supportive orthosis), two (14.3%) had plate and screw fixation, one (7.2%) had intramedullary nailing with an external fixator, and one (7.2%) had intramedullary nailing with plate and screw fixation. Four fractures were in the ipsilateral limb but different bone: one femoral lengthening patient had a subsequent tibia fracture managed by external fixation, one tibia lengthening patient had a subsequent femur fracture managed with plate and screw fixation, one femur lengthening patient had a subsequent fibula fracture managed with protected weight bearing, and one femur lengthening patient had a subsequent metatarsal fracture managed with protected weightbearing. All patients regained full function of their lengthened limb following healing of the injury, notably full weight bearing independent walking without restriction. No patients experienced a permanent reduction of function due to the fracture. Risk factors significant ($p<.05$) for fracture after MILN lengthening were: female sex, unilateral lengthening, and a shorter total lengthened amount (it is noted that a potential confounder is the large representation of men who had bilateral stature lengthening).
DISCUSSION AND CONCLUSION:
Fracture after limb lengthening surgery is an uncommon complication. Multiple common fracture care options are successful in achieving patient healing and resumption of activities without limitation.