

Audit changes practice; simple education intervention can lead to better outcome for ankle fractures undergoing surgery.

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Introduction/Purpose: Unstable ankle fractures are common orthopaedic injuries and majority requires open reduction and internal fixation (ORIF). The goal of surgery is to achieve anatomical reduction and stable fixation of fracture. Recent literature reports malreduction rate as high as 25% to 33%. There is emerging evidence that malreduction leads to poor patient reported outcome (PROMs) and may render additional surgery. The aim of this study was to evaluate the quality of anatomical reduction and surgical fixation of ankle fractures and the effect of a simple education intervention on the adequacy of reduction of these fractures.

Methods: An audit cycle was completed starting with retrospective review (phase 1) of 114 consecutive cases of ankle fracture that underwent ORIF between October 2006 and December 2007. Data was retrieved from theatre log and PACS. Age, fracture morphology, time to surgery, time to revision surgery and the quality of anatomical reduction were assessed by three surgeons using three radiological parameters (Pettrone's criteria + Weber's dime test). Paediatrics, pathological fractures, open fractures were excluded. The results were conveyed and interventions in the form of regional teaching and introduction of radiological criteria were implemented. Phase 2 (re-audit) was conducted with prospective review of 72 cases between December 2015 and June 2016. Inter-rater reliability was determined using kappa value. Chi-square test was used to compare malreduction rates between 2 phases.

Logistic regression was performed for age, gender, time to ORIF with regards to revision surgery. P value < 0.05 was considered significant

Results: Results of initial cohort showed significant rate of malreduced fixation in 25% of cases (29 out of 114). After implementation of interventions, malreduction rate reduced to 12.6 % (9 out of 72). Of these nine malreduced cases, 3 cases underwent early revision surgery within the first 6 weeks of surgery. There was no significant correlation between age, gender and time to surgery, and time to revision surgery within 3 months of surgical fixation ($p = 0.4$). Using three radiological parameters (Weber's dime test, tibiofibular overlap and medial clear space) the mean kappa values for inter-rater reliability was 0.786 (0.727-0.861), representing a substantial agreement using three radiological parameters in order to avoid failure and or further surgery.

Conclusion: This study demonstrates that simple education intervention locally can lead to better understanding of fixation and reduce the rate of malreduction of these fractures. We suggest using three radiological parameters in correction of corresponding anatomy of ankle mortise is a reliable tool to avoid malreduction. Malreductions were more likely to occur in complex fractures with syndesmotic injuries.