Is Routine Hardware Removal Following Open Reduction Internal Fixation of Tarsometatarsal Joint Fracture/Dislocations Necessary?

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ABSTRACT

Open reduction and internal fixation is an accepted treatment for displaced tarsometatarsal joint fracture dislocations. Fixation is routinely removed after four months once sufficient ligamentous and osseous healing has occurred to restore joint motion and avoid complications of hardware failure. Because few studies report outcomes of tarsometatarsal joint fractures with retained hardware, there is little consensus regarding the optimal time period for hardware removal or if hardware retention leads to adverse outcomes.

We retrospectively reviewed radiographic outcomes of retained hard-ware after open reduction internal fixation of tarsometatarsal joint fractures/dislocations in 61 patients. Assessment of clinical and radiographic results was performed at 2 weeks, 6 weeks, 3, 6,and 12 months after surgical treatment.

Out of the 61 patients that were followed, only two demographic variables demonstrated a moderate correlation with an adverse outcome. Older age correlated with lost reduction and elevated body mass index correlated with hardware failure. The presence of diabetes correlated with an increased risk for post-operative infection but not hardware failure.

During our period of follow up there were 49 patients (80.3 percent) without failure of fixation. In conclusion, our study suggests that routine removal of retained hardware may not be beneficial after open reduction and internal fixation of Lisfranc injuries in patients who have a BMI under 30 or with diabetes.

BACKGROUND

In recent years there has been a shift to have patients begin weight bearing immediately after first metatarsophalangeal arthrodesis. Some believe immediate weight bearing will expose patients to an increased risk for complications after MTPJ arthrodesis. These risks can negatively impact patient recovery by subjecting patients to additional unforeseen costs, delayed return to work or activity.

Though fracture/dislocations at the tarsometatarsal joint (TMTJ) complex are rare injuries with an incidence of 0.2% of all fractures (1), they are associated with significant long-term morbidity.

Tarsometatarsal joint injuries predispose patients to an increased risk for future midfoot pain, limitation of function, posttraumatic arthritis, and deformity (1, 4-11). Early injury recognition and appropriate treatment interventions can lessen the early onset of poor functional outcomes. (2, 3).

Two accepted treatments for TMTJ fracture/dislocations are open reduction internal fixation (ORIF) and primary arthrodesis (2, 3, 6, 12-15). The benefits of primary arthrodesis over ORIF are improved functional outcomes and little need for routine hardware removal.

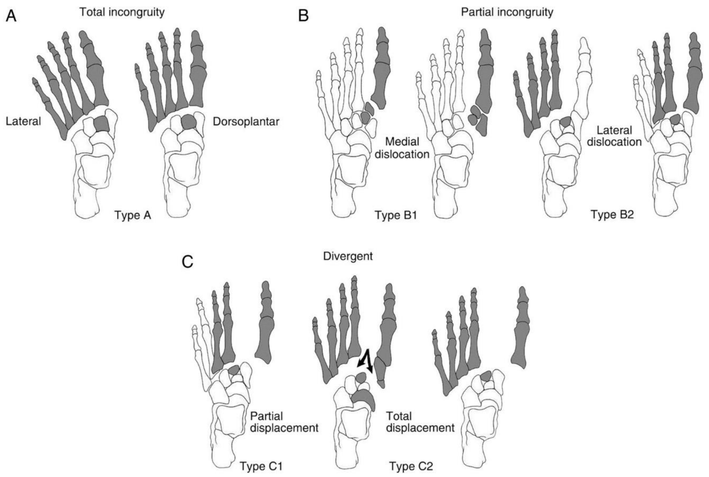
Hardware removal has been a routine practice following ORIF of TMTJ fracture dislocations to restore joint mobility and avoid hardware failure. Because there is a lack of consensus, the decision to remove hardware is often guided by surgeon preference and presence of pain; however, some report routinely removed hardware without patient complaint of symptoms (7,15).

OBJECTIVES

The primary aim of this study was to evaluate radiographic outcomes and report adverse events in patients who have undergone ORIF of TMTJ fracture/dislocations without routine hardware removal.

METHODS

- Approval of the study was granted by our Institutional Review Board. Patient charts were reviewed from Parkland Memorial Hospital, level 1 trauma center and University of Texas Southwestern Medical Center, tertiary academic health care center.
- We performed a retrospective chart review of 61 consecutive patients treated for TMTJ fracture/dislocations by two foot and ankle surgeons between November 2007 and August 2013. Inclusion criteria were: ORIF of a TMTJ fracture/dislocation and presentation to our facility less than 2 weeks from initial trauma. Method 2
- A standard open approach was used and the reduction of the fracture was based on plain radiographs or intraoperative fluoroscopy of the contralateral foot. All patients had screw fixation for injuries involving the first through third tarsometatarsal joints and percutaneous Kirschner wire fixation for injuries involving the fourth and fifth tarsometatarsal joints. Postoperatively, limbs were protected in a posterior splint with a lateral stirrup, kept non-weight bearing for 2 weeks, followed by immobilization in a short leg cast for an additional 4 weeks. At 6 weeks, patients were allowed to weight bear in a protective boot. Plain radiographs were routinely performed at 2 weeks, 6 weeks, 3 months, 6 months, and 1 year postoperatively.



Myerson Classification

RESULTS

	Diabetes N=13	No Diabetes N=48	Male N = 41	Female N = 20	Age (Under 37) N = 35	Age (Over 37) N = 26	BMI (Under 30) N = 34	BMI (Over 30) N = 27
Any Complication	7(53.8%)	22 (45.8%)	16(39%)	13 (65%)	10 (28.6%)	19 (73.1%)	12 (35.3%)	17 (63%)
Return to Surgery	1 (7.7%)	10 (20.8%)	8 (19.5%)	3 (15%)	4 (11.4%)	7 (26.9%)	6 (17.6%)	5 (18.5%)
Infection	2 (15.4%)	0(0%)	1 (2.4%)	1 (5%)	1 (2.8%)	1 (3.8%)	0 (0%)	2 (7.4%)
DVT	0(0%)	3 (6.3%)	1 (2.4%)	2 (10%)	0 (0%)	3 (11.5%)	1 (2.9%)	2 (7.4%)
Wounds	0(0%)	3(6.3%)	2 (4.9%)	1 (5%)	2 (5.7%)	1 (3.8%)	3 (8.8%)	0 (0%)
Hardware Complications	4 (30.8%)	6 (12.5%)	4 (9.8%)	6 (30%)	3 (8.7%)	7 (26.9%)	2 (5.9%)	8 (29.6%)

Demographic Bivariate Analysis

RESULTS

- We found that patients greater than 37 years of age (older age group) as a continuous variable (r_{pb} = 0.37, p =0.001) correlated with lost reduction or delay in wound healing or dehiscence.
- The presence of diabetes correlated with an increased risk for postoperative infection (= 0.37, p = 0.04).
- The rate of infection was 3.3% among all patients and 15% among patients with diabetes.
- The infections occurred in the postoperative period and were not related to hardware. Combination of older age, elevated BMI, and diabetes accounted for 45% of the postoperative surgical complications (r^2 = 0.45)

CONCLUSIONS

- Patients with a BMI greater than 30, non-diabetic, greater than 37 years of age and tobacco use had complications associated with retained hardware at a higher rate.
- Overall, the rate of hardware complication rate was 16.4 % in those who were available for follow up.
- Our study suggests that routine hardware removal may not be necessary in patients with lower BMI.