A Randomized, Prospective Comparison of Bioabsorbable and Steel Screw Fixation of Lisfranc Injuries

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Summary:
The purpose of this study is to prospectively compare the outcomes of bioabsorbable (Smart Screw, Linvatec, Largo, FL) and traditional steel screw fixation of the Lisfranc ligament complex in unstable, ligamentous Lisfranc injuries over a 6-year period. This study shows that using absorbable screws provides results that are equivocal to, if not better than, steel screws. In addition, the use of absorbable screws eliminates the need for an additional surgery to remove hardware.

Introduction:
This study is a randomized, prospective comparison of outcomes following bioabsorbable (Smart Screw, Linvatec, Largo, FL) and traditional steel screw fixation of the Lisfranc ligament complex in unstable, ligamentous Lisfranc injuries.

Methods:
Between September 2006 and July 2011, 30 patients presented with acute, closed, unstable, ligamentous Lisfranc injuries. On the day of surgery, 15 patients were randomized to receive 4.5 mm bioabsorbable screws while the remaining 15 were randomized to receive 4.0 mm steel screw fixation. All 15 patients that received steel screw fixation received an additional surgery to remove this hardware by 9 months from their original surgery. Preoperative and postoperative function and pain was graded using the Foot and Ankle Ability Measures (FAAM) Scoring System and a Visual Analog Scale (VAS) of pain respectively. Radiographs were assessed for joint congruency, stability, and degenerative changes.

Results:
30 of 30 patients (100%) with acute, closed, unstable, ligamentous Lisfranc injuries that randomly received either steel or bioabsorbable screw fixation returned for the final evaluation. All 15 patients that received bioabsorbable screws were evaluated with a mean follow-up time of 44.3 months. The mean FAAM score increased from 32.5 of 100 preoperatively to 95.4 of 100 at the time of final follow-up. The mean VAS pain score decreased from 4.7 of 10 preoperatively to 0.6 of 10 at final follow-up. One patient (6.7%) that received a single absorbable screw for Lisfranc fixation developed an inflammatory reaction at the head of the screw at 2 years after her original surgery. No patients that received absorbable screws developed post-traumatic instability or arthritis. All 15 patients that received steel screws were evaluated with a mean follow-up time of 46.1 months. The mean FAAM score increased from 24.9 of 100 preoperatively to 90.7 of 100 at the time of final follow-up. This postoperative score is lower than that of the absorbable screw group, but not to a statistically significant degree (P=0.05). The mean VAS pain score decreased from 6.5 of 10 preoperatively to 0.9 of 10 at final follow-up. This postoperative score is higher than that of the steel screw group, but not to a statistically significant degree (P=0.10). Aside from hardware removal that was performed in all of these 15 patients by 9 months from their original surgery, none of these patients required subsequent procedures on their injured foot. None of these patients developed midfoot instability after hardware removal. At the time of final follow-up, 2 of these 15 (13.3%) patients have developed post-traumatic midfoot arthritis.

Conclusion:
This study demonstrates that using either bioabsorbable or steel screws to treat unstable, ligamentous Lisfranc injuries results in a high rate of regaining normal midfoot function and stability. However, this
study shows that using absorbable screws provides results that are equivocal to, if not better than, the traditional use of steel screws. In addition, the use of absorbable screws eliminates the need for an additional surgery to remove hardware.