

# Mobility after unstable Lisfranc injury treated with temporary bridge plate fixation: Radiostereometric analysis (RSA) of the 1<sup>st</sup> tarsometatarsal joint after one year



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## Objective

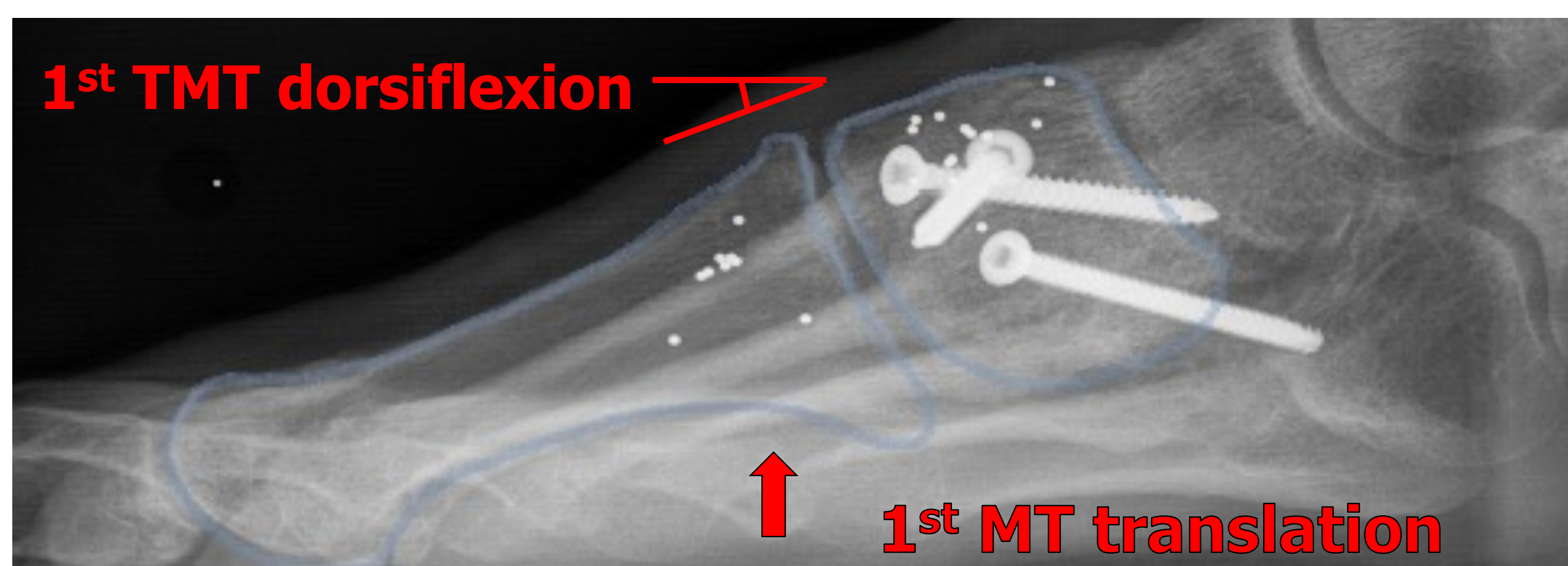
The aim of this study is to examine the mobility in the 1<sup>st</sup> tarsometatarsal (TMT)-joint in patients treated with temporary bridge plate for an unstable Lisfranc injury.

## Conclusion

Restoring movement in the 1<sup>st</sup> TMT joint with this surgical method is possible, but only registered in 2 out of 10 patients present in this study.

## Introduction

Recently, extra-articular, bridge plate fixation has gained popularity in the treatment of unstable Lisfranc injuries (1). A temporary stabilizing plate is expected to provide a more biomechanically favorable result compared to traditional treatment options (2). The patient is estimated to regain joint mobility and potentially reduce the risk of post-traumatic osteoarthritis. However, there are no published studies to validate this theory. Normal 1<sup>st</sup> TMT dorsiflexion is regarded to be  $2.0^\circ \pm 1.3^\circ$  (3).

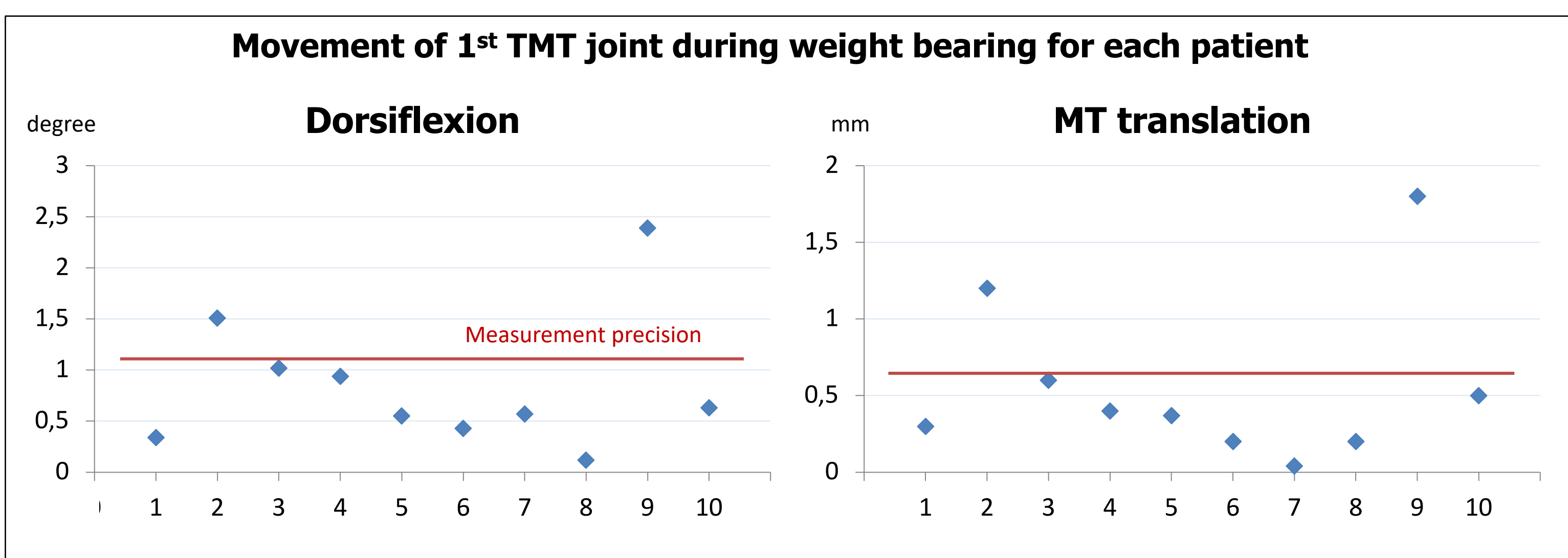


## Results

- Median follow-up time was 14 months (range 12 – 24).
- RSA quality parameters included a mean error of 0.07 (range 0.04 - 0.19) and a mean condition number of 76 (range 53 – 109).
- RSA precision for dorsiflexion and translation was 1.1° and 0.6 mm, respectively.
- All patients had 1<sup>st</sup> TMT dorsiflexion during weight-bearing (median 0.75°, range 0.12° – 2.39°).
- Median 1<sup>st</sup> metatarsal translation was 0.38 mm (range -0.04 – 1.85).
- Only 2 out of 10 patients had combined dorsiflexion >1.1° and translation >0.6 mm above our detected precision values.
- Median AOFAS score was 78 (range 68 – 100).
- 4/10 patients had radiological signs of osteoarthritis (dorsal osteophyte).

## Material and Method

- Inclusion criteria: Acute Lisfranc injuries with instability of the medial 3 TMT joints and no fractures in relation to the first TMT joint. A joint displaying more than 2mm dislocation in any direction during fluoroscopic stress-test was considered unstable.
- 5 women and 5 men were included. Median age was 33.5 (range 23 – 53)
- Surgical treatment: Dorsal bridge plate over the 1<sup>st</sup> TMT joint and primary arthrodesis on the 2<sup>nd</sup> and 3<sup>rd</sup> TMT-joints. All received a "Homerun" screw from medial cunifome to the base of 2<sup>nd</sup> metatarsal bone. The bridge plate was removed 4 months post-operative.
- Tantalum markers were imbedded into the medial cunifome and the 1<sup>st</sup> metatarsal bone for RSA measurements.
- RSA images were obtained after 14 months post-injury to assess 1<sup>st</sup> TMT mobility. Lateral RSA radiographs were done with the patient in a standing position with and without full weight-bearing on the operated foot.
- Measurement of interest: 1<sup>st</sup> TMT dorsiflexion and 1<sup>st</sup> metatarsal translation were documented and compared between the two examinations.
- Double radiographs were used to evaluate measurement precision.
- Final degree of precision was calculated using 1.96xSD.
- American Orthopedic Foot- and Ankle Society (AOFAS) midfoot score was used to document clinical outcome parameters.
- All radiographs were evaluated for radiological signs of osteoarthritis.



## Discussion

RSA can be applied to assess midfoot motion with comparable precision to other joints. Optimal treatment for unstable Lisfranc injuries is still debated. The current standard treatment with open reduction and internal fixation (ORIF) uses transarticular screws that further damages the articular surface (2). Temporary bridge plate fixation is a joint-sparing option that allow anatomic reduction and rigid internal fixation without creating further joint damage. According to our study; temporary bridge plate fixation seems to give a good clinical result after one year based on our AOFAS score findings. However, 40% of our patients had developing radiological signs of osteoarthritis in the 1<sup>st</sup> TMT joint 14 months post injury.