InternalBrace has Comparable Stiffness and Strength as Tightrope for Lisfranc Fixation

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Disclosure

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Our disclosures are in the Final AOFAS Mobile App.
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– Tightrope has been shown to be comparable to screw fixation biomechanically, while allowing physiologic motion.
– No biomechanical study has compared the InternalBrace(IB) to Tightrope or Screw fixation.
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– Tightrope requires larger drill than the IB, can erode into the medial cuneiform, and may irritate the tibialis anterior tendon.

– IB, composed of a fibertape, curved button and biotenodesis screw, may avoid these complications.
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• Methods
  – Three groups of 10 sawbone models.
  – Two fourth generation 20mm cylinder sawbones with open cell foam were fixed with either a 3.5mm conventional screw (top), mini Tightrope (middle) or IB (bottom).
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• Methods
  – Constructs were held in a mechanical testing system and loaded in axial tension at 0.5mm/second until failure.
  – Load-displacement data were plotted for each test.
  – Load and energy to 0.5mm, 1.0mm and 1.5mm of displacement were captured.
Results

– Compared to IB, the screw demonstrated greater stiffness, yield load and energy, and ultimate load and energy, with smaller yield, ultimate and failure displacement.

– When comparing the TightRope and IB, there was no difference in stiffness ($p=0.82$), although the Tightrope performed greater in terms of having a larger yield load, energy and displacement, a larger ultimate strength load, energy and displacement, and a larger failure load, energy and displacement.
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• Results
  – When assessing the load at various distances of displacement, there was no significant difference between the load at 0.5mm displacement (p=0.5).
  – At greater displacement, the load was greater in the Tightrope than the IB.
Discussion

– The IB shows proper stiffness and strength for fixation of ligamentous lisfranc injuries.
– With diastasis >0.5mm the IB shows potential for failure.
– This data supports the current clinical indications for the IB, but further studies are recommended.
References


