



FARIL
Foot & Ankle
Research and Innovation Laboratory
FARIL.MGH.HARVARD.EDU




Arthroscopic Assessment of Syndesmotic Instability: Are We Pulling correctly in Coronal Plane?

Rohan Bhimani, MD, MBA; Bart Lubberts, MD, PhD; Noortje Hagemeyer, MD, PhD;
Jirawat Saengsin, MD; Gregory Waryasz, MD; Daniel Guss, MD, MBA; Christopher
W. DiGiovanni, MD

**Foot & Ankle Research and Innovation Laboratory,
Department of Orthopaedic Surgery,
Massachusetts General Hospital, Boston**




- This study was supported by a grant from the Arthroscopy Association of North America



I (and/or my co-authors) have something to disclose.

Detailed disclosure information is available via:

“My Academy” app; 

Printed Final Program; or

AAOS Orthopaedic Disclosure Program on the AAOS website at <http://www.aaos.org/disclosure>



- Syndesmotic instability is a multiplanar phenomenon, occurring in the coronal, sagittal and translational planes
- Arthroscopic evaluation of the syndesmotic joint is considered the gold standard
- Coronal plane assessment using the lateral hook test has been shown to be an effective technique



COPYRIGHT © 2009 BY THE JOURNAL OF BONE AND JOINT SURGERY, INCORPORATED

Comparison of Two Intraoperative Assessment Methods for Injuries to the Ankle Syndesmosis

A Cadaveric Study

By Karl Stoffel, MD, PhD, FRACS, David Wysocki, MBBS, Edward Baddour, MBBS,
Rochelle Nicholls, BAppSci, MSc, PhD, and Piers Yates, MBBS(Hons), BSc(Hons), MRCS, FRCS(Tr&Orth)

Investigation performed at the Department of Orthopaedic Surgery, Fremantle Hospital, Fremantle; and the Fremantle Orthopaedic Unit, The University of Western Australia, Crawley, Western Australia, Australia



- The impact of the angulation of pull on the coronal plane space of the syndesmotic joint remains unknown
- The minimum amount of force to display syndesmotic instability arthroscopically remains unclear



Aims

- To determine the amount of displacement variation that occurs when the lateral force is angled anteriorly or posteriorly
- To determine the optimal amount of force needed during a lateral hook test to evaluate syndesmotic instability in the coronal plane

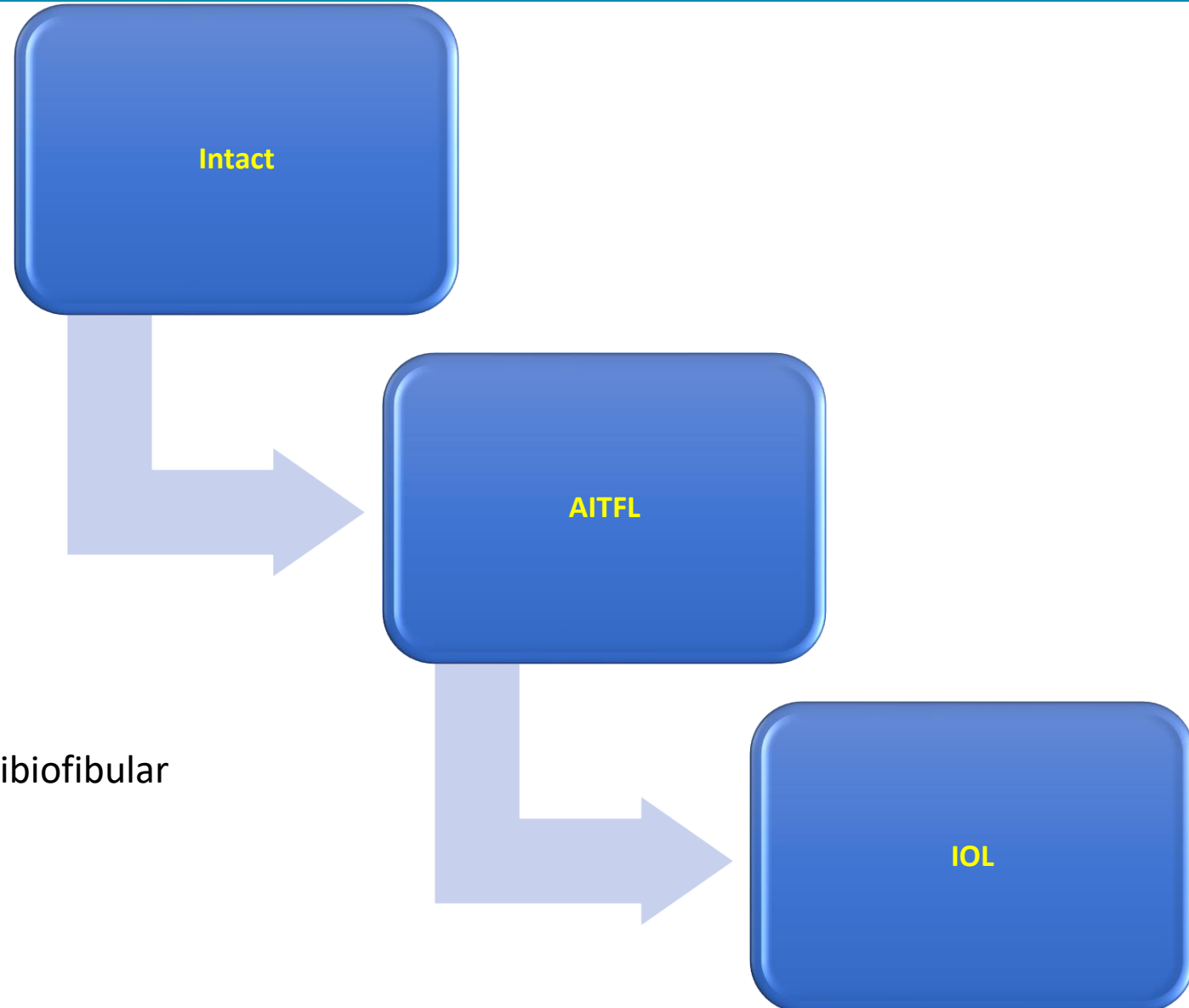
Hypothesis

- Different directions of force application would generate different degrees of diastasis in the syndesmosis



Study Design:-

- Cadaveric study approved by the hospital's IRB
- Ten fresh-frozen above knee cadavers
- Anterior and posterior coronal plane distal tibiofibular space were arthroscopically measured



Abbreviations: AITFL = Anterior inferior tibiofibular ligament; IOL = Interosseous ligament



Measurement Parameters:-

In all scenarios, LHT performed under increasing force from 0-120N, with increments of 20N

LHT was performed in:

- Neutral position
- Anterior inclination of 15 degrees
- Posterior inclination of 15 degrees

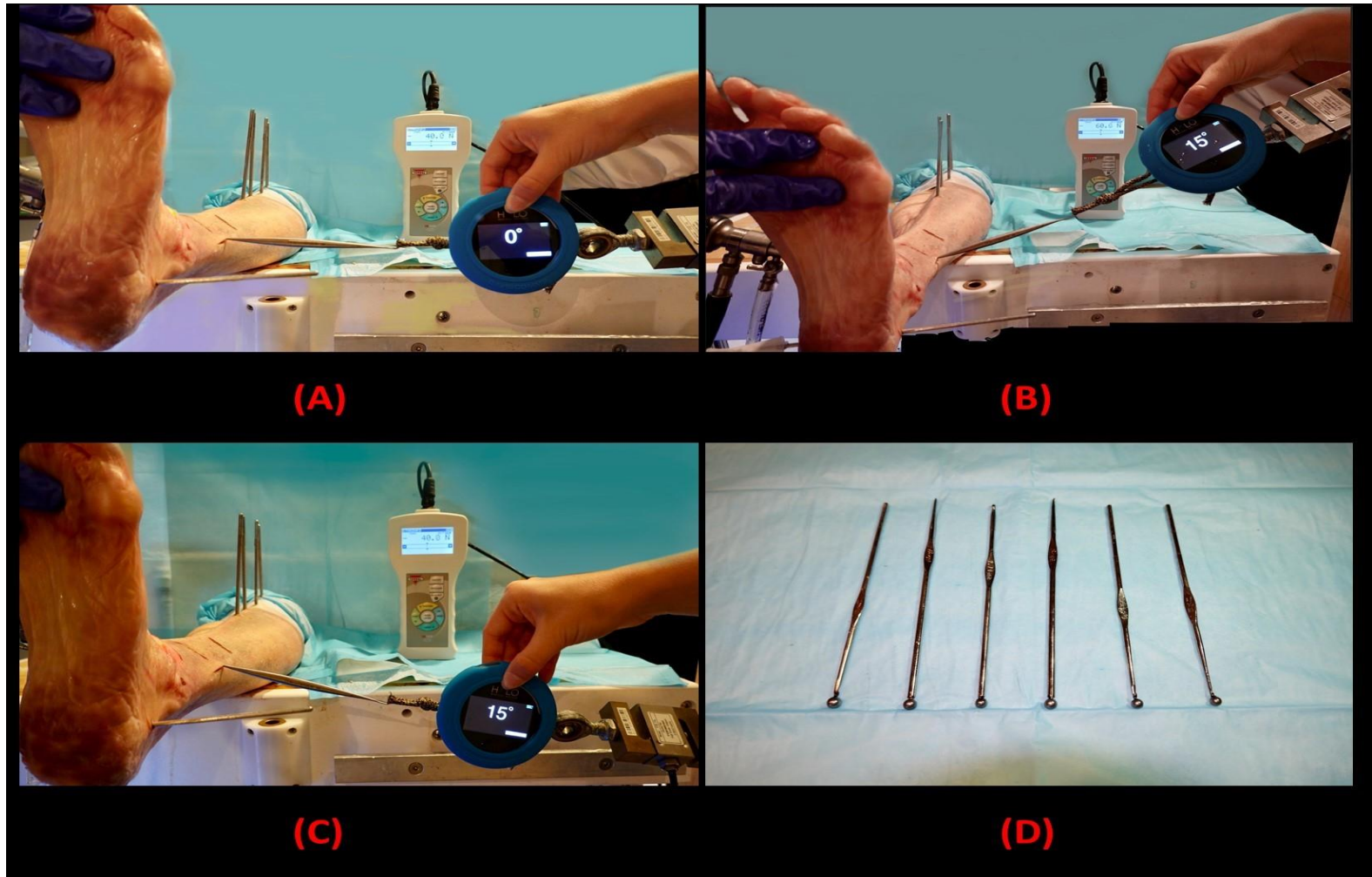


Figure 1: Arthroscopic experimental setup. (A) Coronal plane syndesmotic instability assessment in a neutral position. (B) Coronal plane syndesmotic instability assessment under anteriorly directed force. (C) Coronal plane syndesmotic instability assessment using lateral hook test under posteriorly directed force. (D) Calibrated ball-tipped probes, with an increment of 0.2-mm, used to assess the anterior and posterior coronal plane space at the incisura



RESULTS



Force	Intact Stage			AITFL +IOL stage		
	Neutral pull (mean space ± SD; in mm)	Anterior pull (mean space ± SD; in mm)	Posterior pull (mean space ± SD; in mm)	Neutral pull (mean space ± SD; in mm)	Anterior pull (mean space ± SD; in mm)	Posterior pull (mean space ± SD; in mm)
0N	1.3±0.6	1.3±0.6	1.3±0.6	2.5±0.9	2.5±0.9	2.5±0.9
20N	1.5±0.7	1.4±0.7	1.6±0.7	2.5±0.9	2.5±0.9	2.9±1.0
40N	1.6±0.7	1.5±0.8	1.6±0.7	2.6±0.9	2.5±0.9	3.0±1.0
60N	1.6±0.7	1.5±0.8	1.7±0.8	2.8±1.0	2.7±1.0	3.1±1.0
80N	1.7±0.7	1.6±0.8	1.8±0.8	2.8±1.0	2.7±1.0	3.1±1.0
100N	1.7±0.7	1.6±0.9	1.9±0.8	2.8±1.0	2.7±1.1	3.1±1.0
120N	1.8±0.8	1.7±0.9	1.9±0.8	2.8±1.0	2.7±1.1	3.1±1.0

Abbreviations: AITFL, anterior inferior tibiofibular ligament; IOL, interosseous ligament; N, Newton; mm, millimetres; SD, standard deviation.

Table 1: Diastasis at the anterior third of the Incisura during each stage of ligament transection



RESULTS



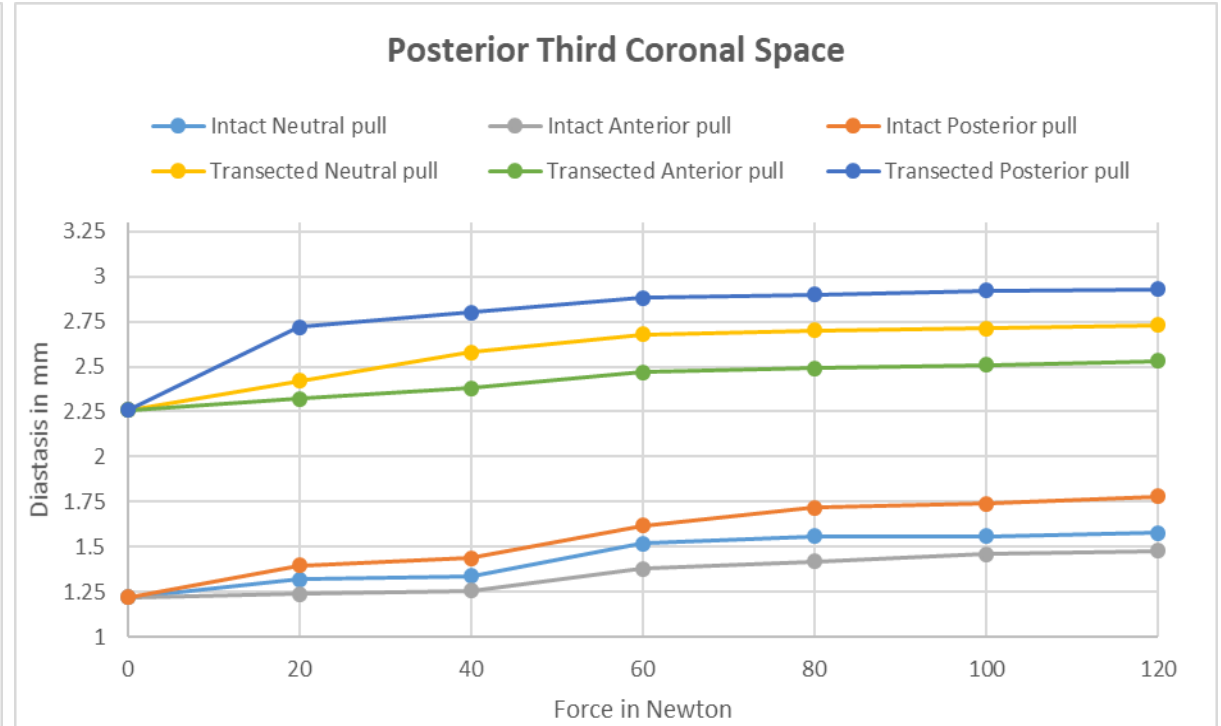
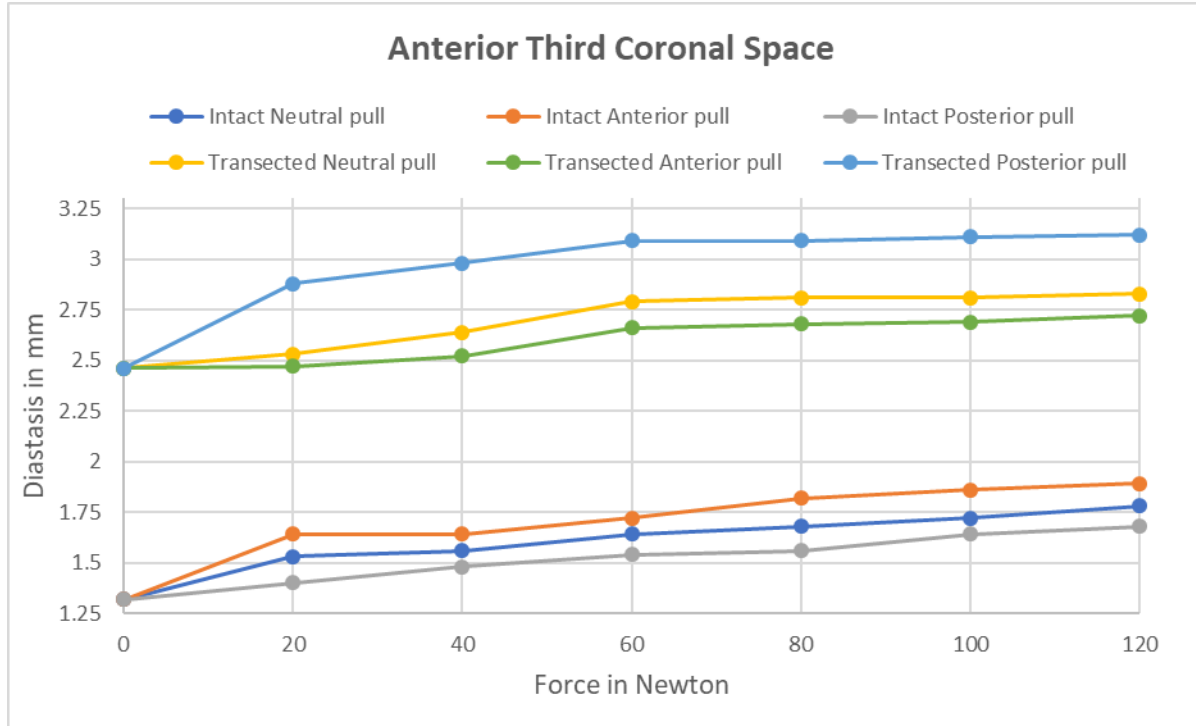
Force	Intact Stage			AITFL +IOL stage		
	Neutral pull (mean space ± SD; in mm)	Anterior pull (mean space ± SD; in mm)	Posterior pull (mean space ± SD; in mm)	Neutral pull (mean space ± SD; in mm)	Anterior pull (mean space ± SD; in mm)	Posterior pull (mean space ± SD; in mm)
0N	1.2±0.2	1.2±0.2	1.2±0.2	2.3±1.0	2.3±1.0	2.3±1.0
20N	1.3±0.3	1.2±0.5	1.4±0.3	2.4±0.9	2.3±1.1	2.7±1.0
40N	1.3±0.3	1.3±0.5	1.4±0.3	2.6±0.9	2.4±1.1	2.8±1.1
60N	1.5±0.5	1.4±0.4	1.6±0.5	2.7±0.9	2.5±1.1	2.9±1.1
80N	1.6±0.5	1.4±0.5	1.7±0.5	2.7±0.9	2.5±1.1	2.9±1.1
100N	1.6±0.4	1.5±0.6	1.7±0.5	2.7±0.9	2.5±1.1	2.9±1.0
120N	1.6±0.5	1.5±0.5	1.8±0.6	2.7±1.0	2.5±1.2	2.9±1.0

Abbreviations: AITFL, anterior inferior tibiofibular ligament; IOL, interosseous ligament; N, Newton; mm, millimetres; SD, standard deviation.

Table 2: Diastasis at the posterior third of the Incisura during each stage of ligament transection



RESULTS



Figures. Arthroscopic assessment of the anterior third coronal plane space at the incisura during the intact stage and after AITFL and IOL ligament transection (Transected stage)



DISCUSSION



- Accurate diagnosis is essential for good clinical outcome and preventing long term morbidity
- A force of 60 N was the threshold after which increase in force did not further increase the syndesmotic diastasis
- Posteriorly directed pull afforded the largest absolute coronal space measurement
- Anterior coronal plane space increased by 0.3 mm and posterior space increased by 0.2mm when subjected to posteriorly direction force
- Our study introduced a new method for diagnosing syndesmotic instability using arthroscopy



CONCLUSION



- Arthroscopic coronal plane evaluation under 60N of direct force is best suited to distinguish stable from an unstable syndesmosis
- Syndesmosis anterior and posterior coronal plane space measurement demonstrate the largest absolute difference when subjected to posteriorly directed force



FARIL

Foot & Ankle
Research and Innovation Laboratory
FARIL.MGH.HARVARD.EDU



Thank you



Website: Faril.mgh.harvard.edu

 @faril_mgh

 @FARILabMGH

