

Structural and Functional Correlates of Chronic Ankle Instability in Military Service Members

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Background

- Lateral ankle sprains (LAS) occur up to 5x more frequently in military service members than civilians and are associated with high recurrence rates.¹
- More than 85% of LAS involve the lateral ligament complex, most commonly the anterior talofibular ligament (ATFL).²
- Up to 40–50% of individuals develop chronic ankle instability (CAI), characterized by recurrent sprains, episodes of giving way, and persistent functional limitations.³

Purpose

- This study investigated the relationships among ligament morphology, joint mobility, mechanical stability, and patient-reported function in military service members with CAI.

Methods

- Eight active/recently retired service members (12 ankles), who met the International Ankle Consortium criteria for CAI were included (male=7, female=1, age=31±5 years, height=1.74±0.05 m, mass=91.3±15.2 kg).
- Participants completed:
 - Cumberland Ankle Instability Tool (CAIT), Functional Ankle Ability Measure –Activities of Daily Living (FAAM-ADL) and –Sport subscale (FAAM-S).
 - Ultrasound of the ATFL for length and thickness.
 - Ligament laxity testing via ankle arthrometer (Ligmaster) for stiffness (low and high load).
 - ROM measured via goniometry for ankle inversion, eversion, plantarflexion, and dorsiflexion.
- Statical analysis included Spearman’s Rho (ρ) correlations to assess relationships among variables ($\alpha=0.05$).

Results

- Dorsiflexion and eversion ROM demonstrated the strongest correlations with patient-reported outcomes.
- ATFL thickness was associated with greater sprain/roll history and lower patient-reported function.

Primary Variable	Correlated Variable	Spearman's ρ	p value
Dorsiflexion ROM	CAIT	0.69	0.01
	FAAM-S	0.75	<0.01
	FAAM-ADL	0.77	<0.01
	LAS/Roll History	-0.80	<0.01
Eversion ROM	CAIT	0.60	0.04
	FAAM-S	0.63	0.03
	FAAM-ADL	0.86	<0.01
ATFL Thickness	LAS/Roll History	0.79 _{LM}	<0.01
	CAIT	-0.67	0.02
	FAAM-S	-0.62	0.03
ATFL Length	Inversion ROM	0.66	0.02

Table 1. Significant Spearman Rho correlations among clinical, self-reported, and ultrasound-derived measures. Positive coefficients indicate that both variables increased together, whereas negative coefficients indicate an inverse relationship. Only statistically significant correlations ($\alpha < 0.05$) are presented.

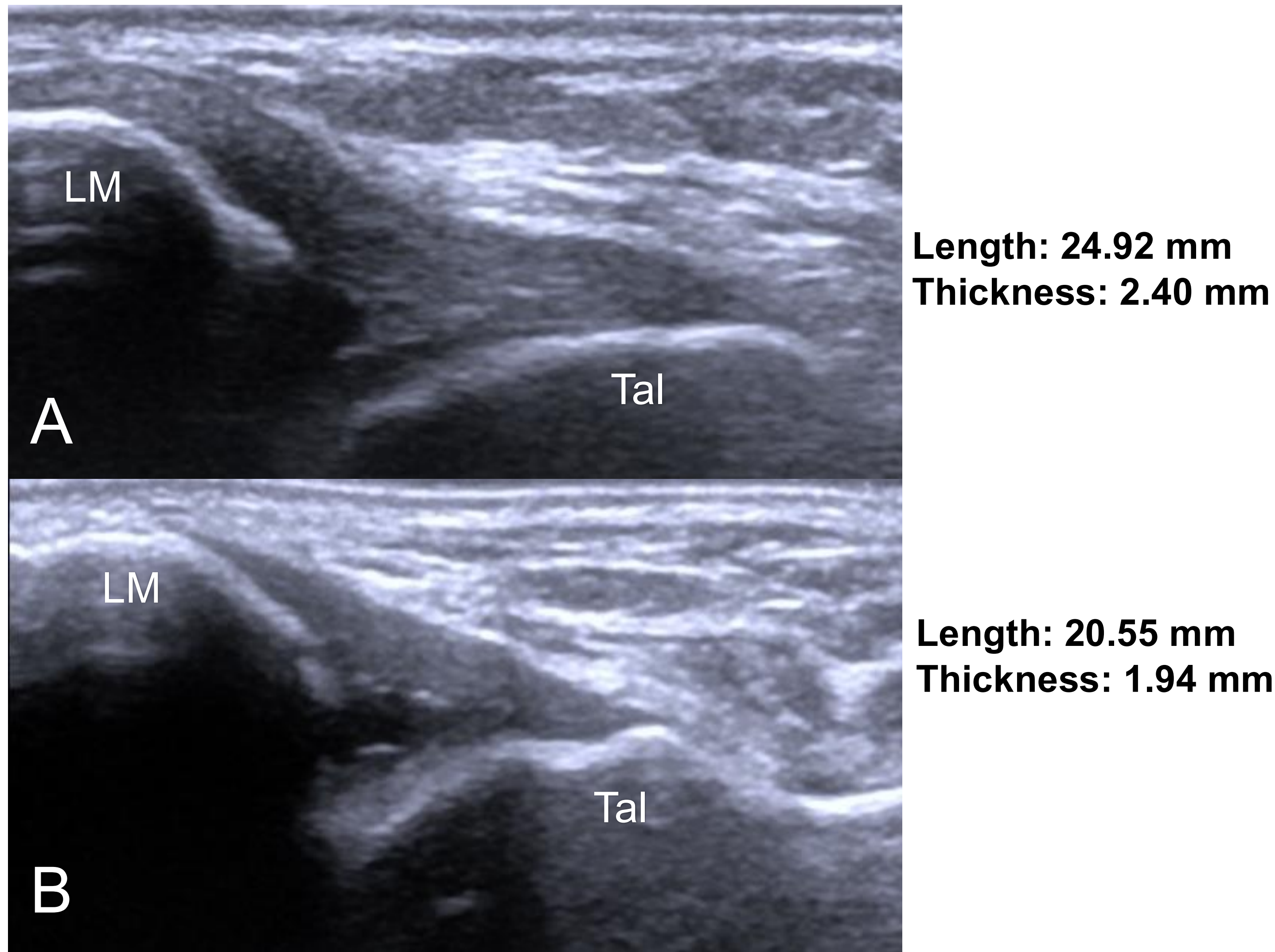


Figure 1: Representative ultrasound images demonstrating increased ATFL thickness in a participant with CAI (A) compared with an ATFL with no previously reported injury (B). LM: Lateral malleolus, Tal: Talus

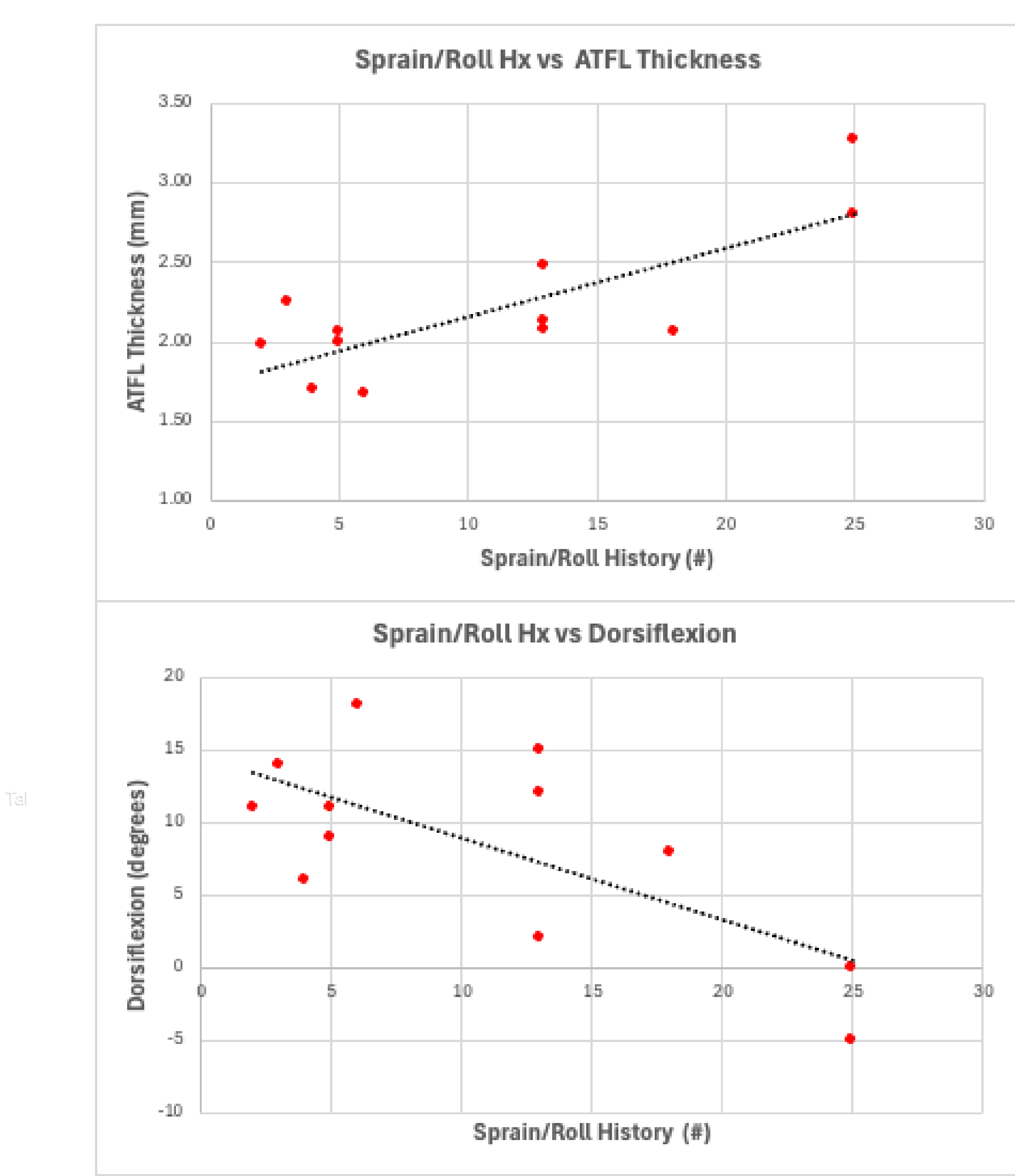


Figure 2. Significant correlations between ankle sprain/roll history and ATFL thickness ($\rho=0.79$, $p<0.01$) and dorsiflexion ROM ($\rho=-0.80$, $p<0.01$).

Conclusions/Clinical Takeaways

- Greater sprain/roll Hx was associated with reduced dorsiflexion and eversion AROM, and increased ATFL thickness, suggesting repeated injury contributes to both structural ligament changes and mobility deficits.
- Patient reported function was consistently associated with ankle mobility and ATFL morphology, supporting a multidimensional assessment approach of CAI.
- Combining patient-reported outcomes with objective mobility and ultrasound measures may improve the clinical evaluation and treatment planning for individuals with CAI.