통증 및 근골격재활

발표일시 및 장소: 10 월 18 일(금) 13:45-13:55 Room A(5F)

OP1-1-4

Stress US for ATFL laxity: A comparison between manual stress and stress device in different ways

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Background

Anterior talofibular ligament (ATFL) is the most frequently damaged structure in lateral ankle sprains. Injured ATFL often develops chronic ankle instability (CAI) that lead to mechanical instability, recurrent giving way and persistent pain and thus results in functional impairment. Manual stress tests (anterior drawer and talar tilt) are in common use but lack sensitivity nor specificity. Stress ultrasound (US) is a good tool for the dynamic assess for the ATFL. However, there is no consensus on the better method to apply the stress.

Methods

Twenty ankles from ten volunteers without a history of ankle injury were measured. ATFL length was defined as the distance between the bony landmarks of lateral malleolus and talus while identifying the fibrillar pattern of the ligament (Fig 1). The ultrasound image was taken 3 times for each position in the following order: (1) neutral with 10’ plantarflexion and 0’ inversion/eversion (neutral); (2) manual stress with maximal talar tilt and plantarflexion to the onset of end-fill (manual); (3) inversion stress via device with leg not rotated(patella upward) (device-supine); (4) inversion stress via device with leg externally rotated position(patella 45’ outward, knee extended) (device-rotation) (Fig 2). We used the Telos stress device and applied 150N of force. The 3 points for the pressure were at the middle of the fibula, head of the fifth metatarsal bone and the midpoint of the above two sites in the opposite direction.

Results

The mean values of ATFL lengths were 1.99 ± 0.02 cm in the neutral, 2.19 ± 0.02 cm in the manual stress, 2.22 ± 0.02 cm in the device-supine, and 2.24 ± 0.02 cm in the device-rotation. The ATFL ratio were 1.10 ± 0.04 in the manual stress, 1.12 ± 0.04 in the device-supine, and 1.14 ± 0.04 in the device-rotation. Data were analyzed with repeated-measures ANOVA with Bonferroni correction. Both ATFL length and ratio showed significant differences between all groups in the post-hoc analysis (Table 1). The intraclass correlation coefficient of single measures for the intra-rater reliability was 0.850 in the neutral, 0.589 in the manual stress, 0.675 in the device-supine, and 0.705 in the device-rotation.

Conclusion

In stress US, using the stress device more elongates the ATFL than the manual maneuver with higher reliability. Compared to the not-rotated position, rotating the leg externally can stretch the ligament more effectively, reflecting the normal anatomical course. We recommend using the stress device with leg external-rotated position in the US evaluation of the ATFL laxity, for clinical practices and further studies.

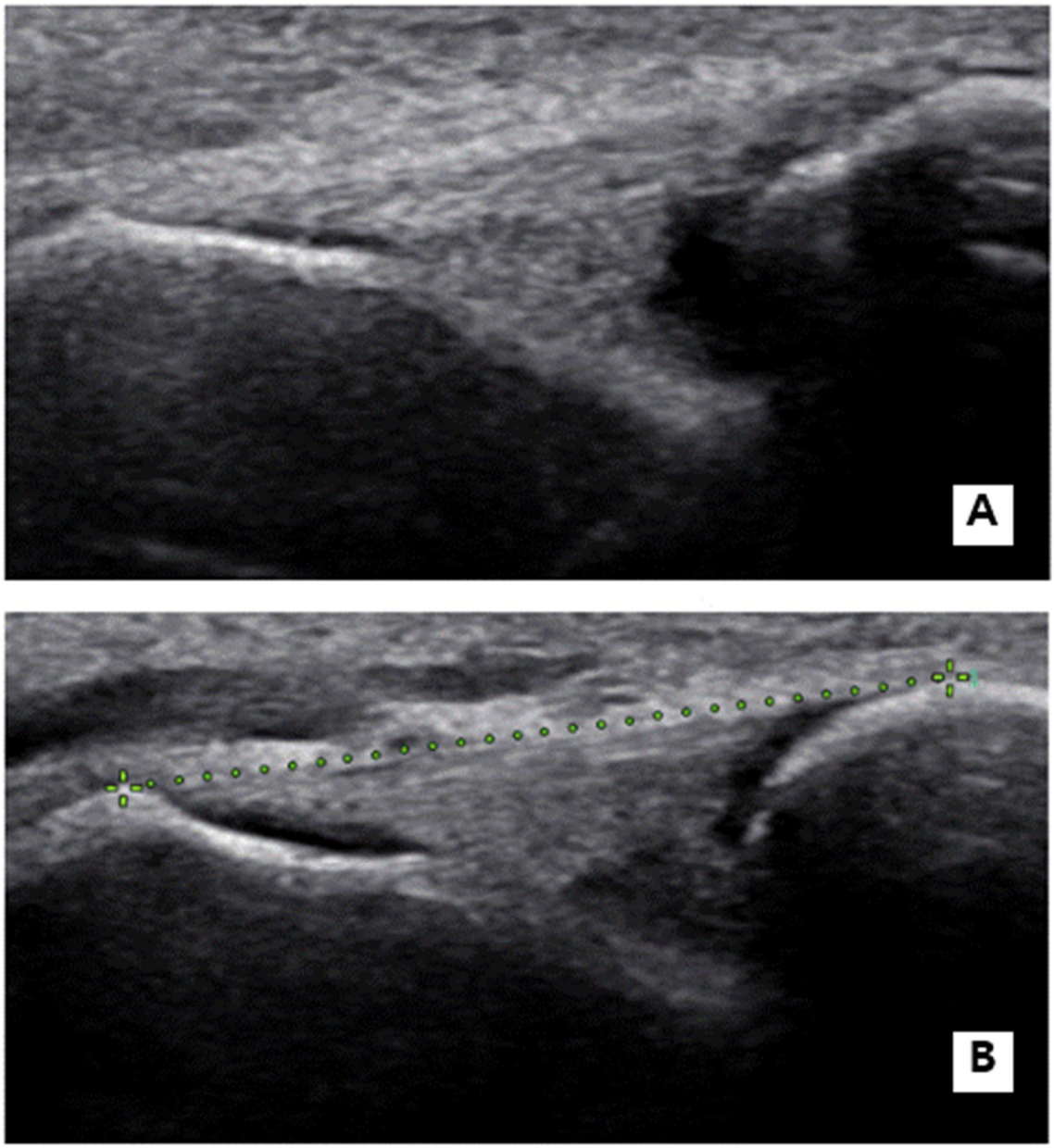

Fig 1 Ultrasound image of the right ankle in a 33-year old female healthy volunteer. A: ATFL between the bony prominence of the talus (left) and the lateral malleolus (right). B. Measurement of the ATFL length between the bony landmarks.

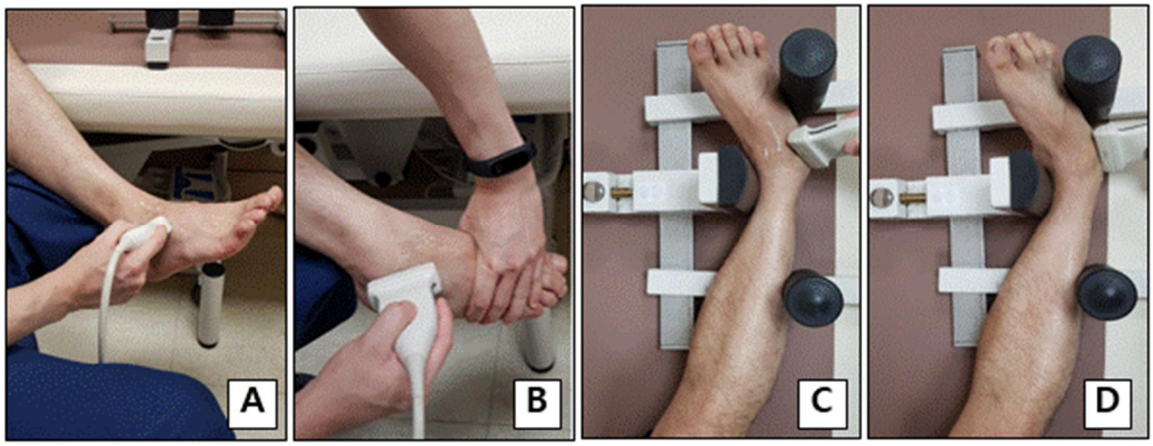

Fig 2. Positions for ultrasound images. A: Neutral, B: Manual stress, C: Device-supine, D: Device-rotation.

Table 1. ATFL lengths and ATFL ratio by different methods

	Neutral	Manual stress	Device-supine	Device-rotation	*p* value
ATFL length (cm)	1.99 ± 0.02	2.19 ± 0.02	2.22 ± 0.02	2.24 ± 0.02	<0.03
ATFL ratio		1.10 ± 0.04	1.12 ± 0.04	1.14 ± 0.04	<0.02

* Values are mean ± SD