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Relationship between lateral ankle laxity and generalized joint laxity in subjects with healthy ankles

Authors: Takuji Yokoe, Takuya Tajima,
Nami Yamaguchi, Yudai Morita, Etsuo Chosa

Disclosures

The authors have no conflict of interest with regard to this presentation.

Introduction

- **Lateral ankle sprain (LAS) and chronic lateral ankle instability (CLAI) are quite common injuries in athletes as well as in nonathletes**

- **Generalized joint laxity (GJL) has been reported to be associated with poor outcomes after the modified Broström procedure [1, 2]**

- **It remains unclear whether GJL is a risk factor for LAS or CLAI**

Objective

To evaluate the relationship between lateral ankle laxity and GJL in healthy ankles using stress ultrasonography (US)

Materials and Methods

- **Study period: From March 2020 to March 2021**

- **Healthy ankles were cross-sectionally recruited**

- **Generalized joint laxity (GJL) was evaluated by Beighton score [3]**

Exclusion criteria of the study

Age < 20 years old; Diagnosis of CLAI; History of recurrent ankle sprains / giving way; Primary LAS within twelve months at the time of recruitment; Prior surgical intervention to the foot and ankle; Persistent foot and ankle pain at the time of recruitment; Osteoarthritis of the ankle; Inflammatory arthritis such as rheumatoid arthritis; Ehlers-Danlos or Marfan syndrome

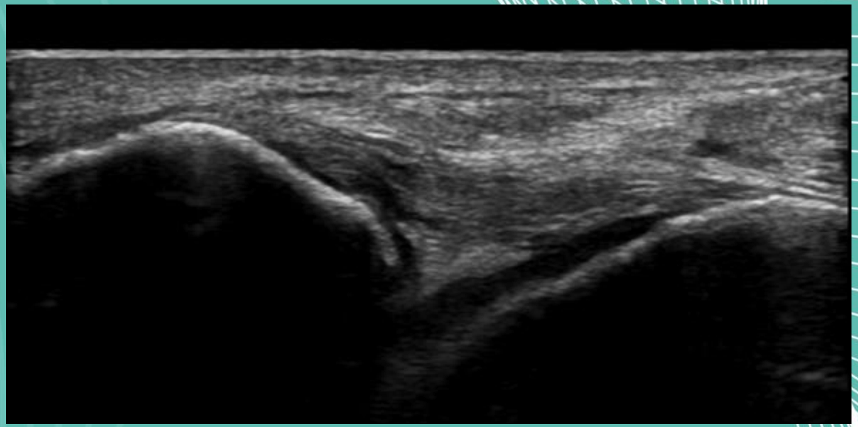
Materials and Methods

- **Lateral ankle laxity was evaluated by modified stress US procedure reported by Lee KT et al [4]**
- **The anterior talofibular ligament (ATFL) lengths were measured in the nonstress (a) and stress condition (b)**

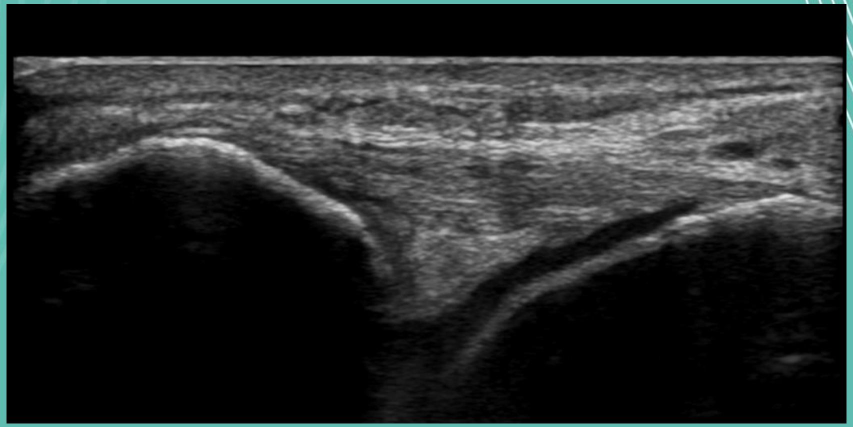
1. Nonstress ATFL length (=A)
2. Stress ATFL length (=B)

ATFL ratio (=B/A)

(a)



(b)



Results

- A total of 333ankles (169 ankles from 96 male subjects and 164 ankles from 88 female subjects) were included

Subject characteristics

	All ankles (n=333)	Male ankles (n=169)	Female ankles (n=164)
Age, year	24.5 ± 2.7	24.9 ± 2.9	24.0 ± 2.3
Height, cm	165.4 ± 9.4	173.0 ± 5.2	157.6 ± 5.4
Weight, kg	59.6 ± 11.2	68.1 ± 8.9	50.8 ± 4.4
Body Mass Index	21.6 ± 2.6	22.8 ± 2.9	20.5 ± 1.5
Foot size, cm	24.3 ± 1.7	25.6 ± 1.0	23.0 ± 1.1
Side of the ankle, n(%)			
right	170 (51.1)	86 (50.9)	84 (51.2)
left	163 (48.9)	83 (49.1)	80 (48.8)

The results of GJL and US evaluation

	All ankles (n=333)	Male ankles (n=169)	Female ankles (n=164)	P value
Beighton score, n (%)				
< 4	264 (79.3)	151 (89.3)	113 (68.9)	< 0.001
≥ 4	69 (20.7)	18 (10.7)	51 (31.1)	
Nonstress ATFL length (mm)	19.5 ± 1.8 (19.3-19.7)	20.4 ± 1.6 (20.2-20.7)	18.6 ± 1.4 (18.3-18.8)	< 0.001
Stress ATFL length (mm)	21.1 ± 2.0 (20.9-21.3)	21.9 ± 1.9 (21.6-22.2)	20.2 ± 1.7 (20.0-20.5)	< 0.001
ATFL ratio	1.08 ± 0.04 (1.08-1.09)	1.07 ± 0.04 (1.07-1.08)	1.09 ± 0.04 (1.08-1.10)	< 0.001

*95% confidence interval is shown in parentheses

Results

The relationship between ATFL ratio and GJL

	ATFL ratio	P value
All ankles		
GJL (-)	1.08 ± 0.04 (1.07-1.08)	0.003
GJL (+)	1.10 ± 0.05 (1.09-1.11)	
Male ankles		
GJL (-)	1.07 ± 0.03 (1.07-1.08)	0.02
GJL (+)	1.11 ± 0.06 (1.08-1.14)	
Female ankles		
GJL (-)	1.09 ± 0.04 (1.08-1.10)	0.24
GJL (+)	1.11 ± 0.05 (1.08-1.11)	

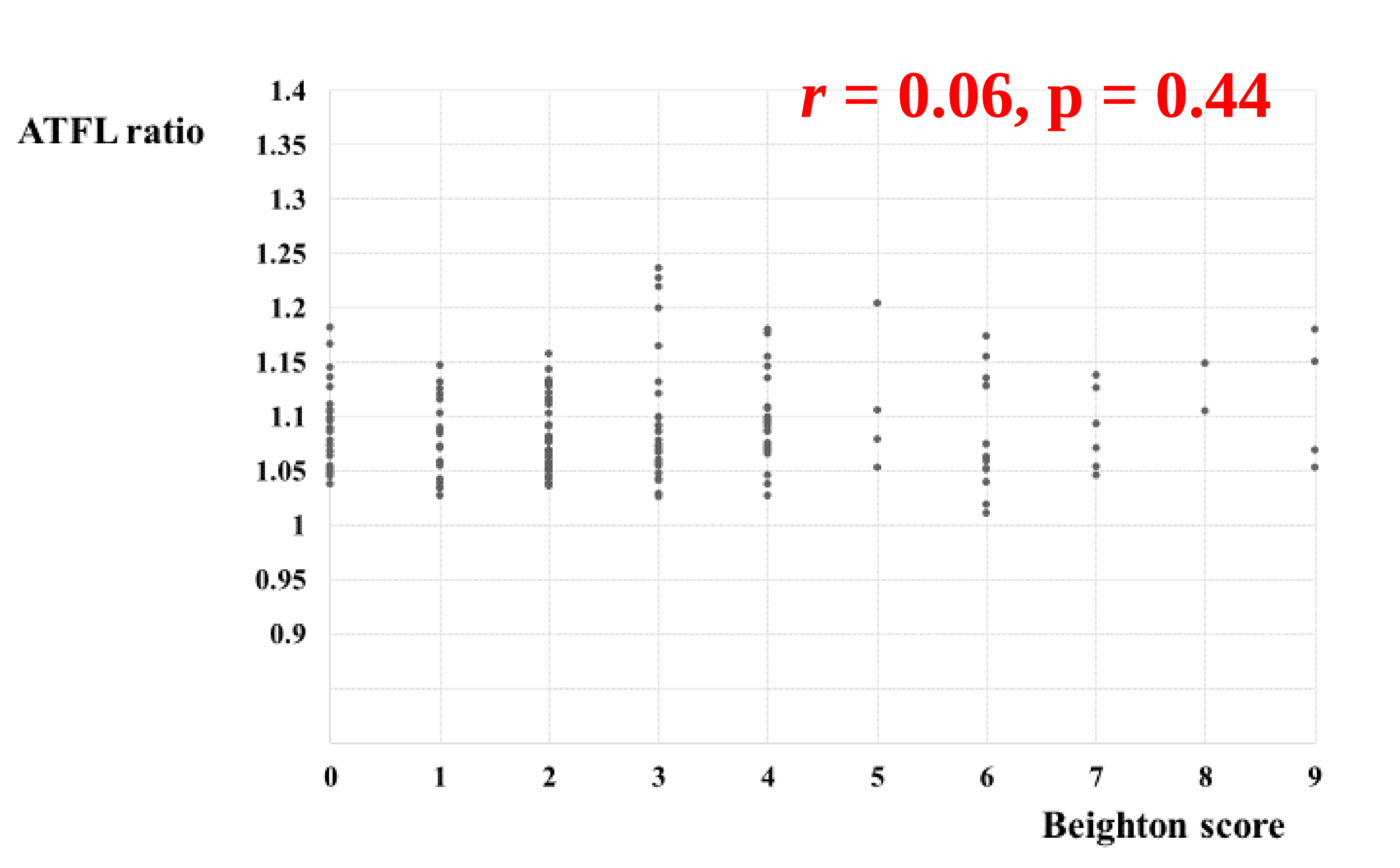
*95% confidence interval is shown in parentheses

Results

The relationship between the cut-off value of BS and ATFL ratio in female ankles

	ATFL ratio	P value
Cut-off score of 4 GJL (-) GJL (+)	1.09 ± 0.04 (1.08-1.10) 1.10 ± 0.05 (1.08-1.11)	0.24
Cut-off score of 5 GJL (-) GJL (+)	1.09 ± 0.04 (1.08-1.10) 1.09 ± 0.05 (1.07-1.11)	0.69

The correlation between the BS and ATFL ratio in female ankles



Discussion

The main finding of this study is that the ATFL ratio was affected by the presence of GJL in men but not in women in this study

- **indicating that the influence of GJL on lateral ankle laxity may differ by sex**

This hypothesis may be supported by several studies;

- **Elite male soccer players with GJL were associated with a higher incidence of injuries than those without GJL [5]**
- **GJL was not a risk factor for injuries in elite female soccer players [6]**

Limitations of the study

- **Not evaluating subtalar instability**
- **Small sample size of the subjects with GJL**
- **Stress was applied manually**
- **Effect of the examiner’s experience on US findings**

Conclusions

- **This study evaluated the relationship between lateral ankle laxity (ATFL ratio) and GJL in healthy ankles using stress US evaluation.**

- **The ATFL ratio was affected by the presence of GJL in men but not in women.**

References

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2. Xu et al, Am J Sports Med, 2016;44:3152-7.
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