

The trapeziometacarpal ligaments: importance of their anatomy in choosing a surgical approach.

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Abstract

Introduction

Pathologies of the trapeziometacarpal joint (TMCJ) are frequent and often require surgical intervention. The dorsoradial ligament (DRL) and anterior oblique ligament (AOL) have been identified as important stabilisers of the TMCJ, crucial for maintaining its integrity.

The objective of this study is to provide detailed anatomical data on both the DRL and AOL to enable hand surgeons to make a founded decision when choosing a particular approach in their surgical procedure.

Materials and Methods

Nine thumbs from 7 fresh-frozen human arms were used for this study. In two cases, we analysed ligaments of bilateral hands. Six specimens were male and 3 were female, with an average age of 71 years. All specimens were obtained via the human body donation programme of the KU Leuven. Before dissection, X-rays and MRI (3T Achieva, Philips Medical Systems, UZ Brussels) were taken of each hand. Seven TMCJ were classified as Eaton stage I and two as Eaton stage II.

The TMCJ was exposed via a combined dorsal and volar approach, reflecting all anatomical structures until the deep ligament layer. The dissection was performed under X4.5 loupe magnification and origin and insertion of both the DRL and AOL were identified. Length and width were measured with a digital calliper before removing individual bone-ligament-bone complexes (incl. trapezium and first metacarpal).

Length and thickness of the ligaments were also obtained on the MRI. The average of 3 measurements per sequence (PDW, T2W and pdspair) and per specimen was used. All data are reported as mean \pm standard deviation (SD). Student's t-tests were used to compare the dimensions of both ligaments.

Results

Both ligaments were identified in each specimen.

The DRL is covered on its dorsoradial side by the tendon of the long pollical abductor, which attaches distally on the lateral side of the first metacarpal and is located just radially to the posterior oblique ligament (POL), which is immediately adjacent to the DRL. The DRL originates from the dorsoradial tubercle of the trapezium and inserts onto the dorsal edge of the base of the first metacarpal. The DRL measurements show a mean length of 10.33 mm (SD: 0.93 mm), a thickness of 1.06 mm (SD: 0.20 mm) and a width of 11.73 mm (SD: 1.32 mm) with a calculated cross-sectional area (CSA) of 12.23 mm².

The AOL is located just beneath the thenar muscles. The AOL originates from the volar tubercle of the trapezium and inserts across the volar ulnar tubercle of the first metacarpal. The AOL measurements show a mean length of 12.16 mm (SD: 1.13 mm), a thickness of 0.64 mm (SD: 0.11 mm) and a width of 13.54 mm (SD: 3.44 mm) with a calculated CSA of 8.74 mm².

These results indicate that there is a significant difference between the thickness and CSA of both ligaments ($p < 0.05$), with the DRL being thicker than the AOL.

Conclusion

Our cadaveric and imaging study demonstrate that the DRL is shorter and significantly thicker than the AOL, which is relatively thin and long. These results suggest that the DRL could play a major role for the TMCJ stability and should be preserved or reconstructed in TMCJ surgery. To demonstrate that the DRL is indeed the most important stabilizer of the TMCJ, the material properties of both ligaments will be tested in a future study.