

Comparison of hip muscle torque waveforms between individuals with femoroacetabular impingement syndrome and injury-free controls

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Summary

This study compared concentric isokinetic torque waveforms of hip muscles of individuals with femoroacetabular impingement (FAI) syndrome to injury-free controls using statistical parametric mapping (SPM). Torque deficits were observed across the whole isokinetic waveform for hip abductor, adductor, and internal rotator torque, while deficits in external rotator were observed on the first $\frac{3}{4}$ of the waveform.

Introduction

Deficits in peak torque during isokinetic contractions have been reported in individuals with FAI syndrome compared to injury-free controls, highlighting the importance of strength assessments and strength training in the rehabilitation of this population [1,2].

Hip muscle isokinetic torque waveforms have not yet been explored in individuals with FAI syndrome. Since it is a motion-related hip disorder, the analysis across the whole range of motion can provide valuable information to the prescription of strengthening exercises in patients with FAI syndrome. This study aimed to compare torque waveforms of hip isokinetic contractions between individuals with FAI syndrome and injury-free controls.

Methods

148 individuals (67 female; Med age of 41 years) diagnosed with FAI syndrome by a surgeon and scheduled for hip arthroscopy; and 148 injury-free controls (67 female; Med age of 39 years) participated in this study.

An isokinetic dynamometer was used to test reciprocal concentric/concentric hip abductor and adductor and hip external and internal rotator torque at 30°/s and with a range of motion of approximately 30°. The affected side (or most affected side in case of bilateral complaint) was analyzed. Each test consisted of 3 repetitions and the 2nd was used for analysis. Torque values within the isokinetic window were normalized to body mass (Nm/kg) and compared between groups through 1-D SPM independent sample t-test ($p < 0.05$).

Results and Discussion

Mean±SD time-normalized torque waveforms for each muscle group in both the FAI syndrome and control groups are shown in Figure 1.

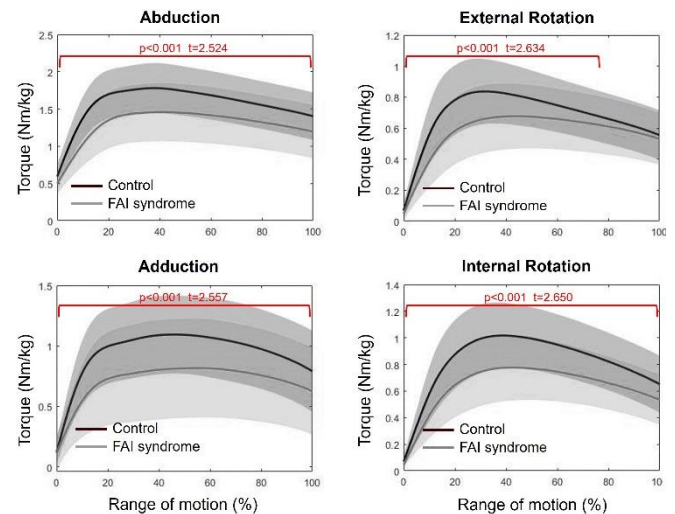


Figure 1: Mean±SD time-normalized hip torque waveforms of abductor, adductor, external rotator and internal rotator muscles. 0% of the range of motion represents the beginning of isokinetic phase of the concentric contraction in each test. Red brackets indicate the windows where between-group differences occur.

SPM analysis revealed decreased abductor ($p < 0.001$), adductor ($p < 0.001$), and internal rotator ($p < 0.001$) torque through the full ROM in FAI syndrome individuals compared to the injury-free controls. Hip external rotator ($p < 0.001$) torque was impaired in the FAI syndrome group compared to controls for the first $\frac{3}{4}$ of the isokinetic ROM.

Conclusions

This is the first study to report hip torque deficits in individuals with FAI syndrome occurring beyond peak torque, being present throughout the entire isokinetic ROM for most of the muscle groups investigated.

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References

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