Assessment of quantitative knee pain in tibial rotations for knee osteoarthritis

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Summary

This study introduces a novel way to quantitatively assess knee pain in tibial rotations, potentially promoting precise assessment and rehabilitation of knee OA.

Introduction

Pain, the hallmark symptom of OA, combined with structural damage and functional decline, positions OA as a major cause of disability worldwide [1]. Nevertheless, quantitatively assessing and effectively treating OA-related pain remains challenging.

Patients with knee OA exhibit reduced tibial rotational motions, possibly as a compensatory adaptation to mitigate mechanical stimuli on surrounding tissues that could otherwise provoke knee pain [2]. Given that, the passive threshold angle at which knee pain is sensed may reflect that surrounding tissues have received mechanical stimuli sufficient to exceed the nociceptive threshold. Identifying the threshold angle of pain in tibial rotations could be beneficial for determining the optimal angles to be modified for better outcomes.

Methods

Ten patients with symptomatic medial knee OA (65.3 ± 9.8 years; 80% females) were included in this study.

Clinical pain/symptoms were assessed using the Knee Injury and Osteoarthritis Outcome Score (KOOS) and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Knee pain was also quantified as the pain threshold angle (PTA) where knee pain was first felt during robotic-controlled slow tibial internal/external rotation (0.5°/sec) (**Figure 1**).

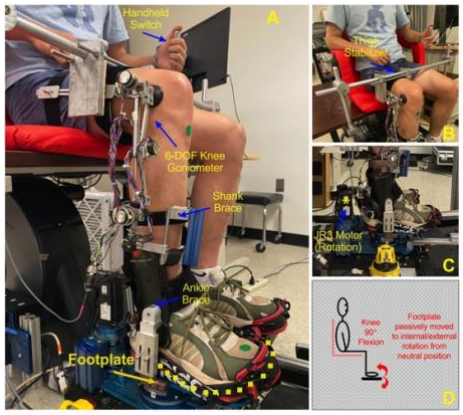

Figure 1: Experimental setup.

Pearson's correlation was used to examine relationships between KOOS/WOMAC and PTA. Paired t-tests were used to compare PTA between internal and external rotations in knee OA.

Results and Discussion

The lower PTA in internal rotation was significantly correlated with worsened KOOS/WOMAC in knee OA patients (r = 0.65–0.77; all P < 0.05) (**Figure 2**). The PTA was smaller in tibial internal than external rotation in patients with knee OA (P < 0.001).

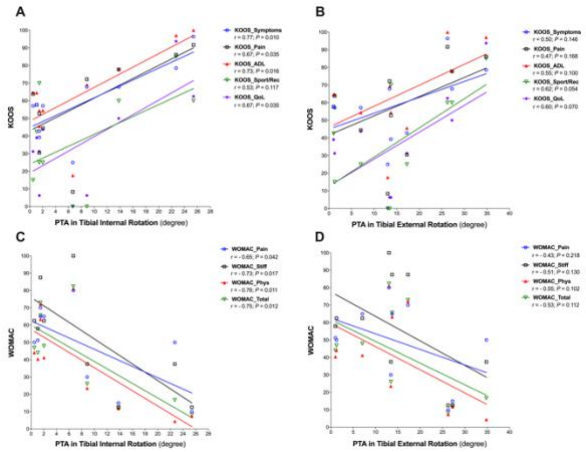

Figure 2: Correlations between PTA and KOOS/WOMAC.

Toe-in/out gait retraining has been used for treating knee OA [3]. The identification of the threshold angle for pain during tibial rotations could help pinpoint the optimal angles for modification in gait retraining, leading to better outcomes for pain reduction.

Conclusions

Smaller PTA, indicating more sensitive pain, has good agreement with worsened rating scores on KOOS/WOMAC. Knee pain is more sensitive in internal than external rotation.

References

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