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Kinematic and Neuromuscular Deficiencies Phenotypes Associated With Patellofemoral Pain Syndrome: A Cross-Sectional Interventional Study

Topic: Biomechanics

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BACKGROUND

The physiopathology of Patellofemoral Pain Syndrome (PFPS) is multifactorial and includes static and dynamic dysfunctions, which are still not fully understood. Many different classifications have been proposed, we used a pragmatic classification that differentiates three major clinical phenotypes: PFPS with objective displacement of the patella (P1), PFPS with extra-patellar alignment deficiency (P2), and PFPS without alignment deficiency (P3).

The main aim was to compare the kinematic deficiencies associated with each of the three main clinical phenotypes diagnosed by a physician expert. The secondary aims were to compare neuromuscular postural and proprioceptive deficiencies associated with each of the three phenotypes.

METHODS

Prospective comparative study. We used the KneeKG® device (EMOVI) to assess 3D femoro-tibial (FT) rotations during gait. We also assessed knee posture (FT alignment and Q angle) using EOS Imaging, foot posture and knee function using clinical tests, neuro-muscular activity using EMG and isokinetic device, and unipodal stability using a posturography platform. Joint angles time series were compared using Statistical Parametric Mapping. We used Kruskall-Wallis test (Dwass-Steel test for post hoc analyses) for group comparison, $p < 0.05$.

RESULTS

We included 45 participants: 29 (64.4%) females, mean (SD) 36.3 (13.7) years, BMI: 22.9 (3.8) $kg.m^{-2}$, symptoms duration: 8.1 (9.6) years. Four participants were classified in P1, 25 in P2, 10 in P3, 6 had the characteristics of both P1 and P2 (forming P4). Increased knee valgus during gait loading differed significantly between groups ($p = 0.03$), P2 exhibiting the highest value [2.1 (1.9)°]. Static knee valgus angle varied significantly ($p = 0.014$), P4 showing the highest value [3.6 (2.0)°]. No differences were found for other parameters.

CONCLUSION

This is the first study to compare the biomechanical parameters during gait in participants with PFPS divided into different clinical phenotypes. Knee valgus may be a marker in specific phenotypes of participants with PFPS.

Statement of Disclosures

None

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