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Unilateral Anterior Knee Pain Is Associated with Medial Patellar Soft-Tissue Insufficiency: Measurement Utilizing Instrumented Patella Stress and Slice Imaging

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Summary:
The increased patellar lateral position after stressed lateral patellar displacement in the painful knee of patients with idiopathic unilateral AKP may potentially explain why some morphologically equivalent knees express pain unilaterally.

Abstract:

Background

Anterior knee pain (AKP) is a common condition in active individuals. Diagnosis of AKP is mostly patient-reported and based on clinical history, physical and imaging examination. Despite its prevalence, a clear relationship between AKP and patellofemoral anatomic instability risk factors or abnormal joint loading has not been well established. Peri-patellar soft tissue structures may play a role in increasing nociception by altering patellar tracking; however, an association between increased patellar mobility and AKP has not been firmly established. Hence, this study purpose was to objectively compare side-to-side patellar position and mobility in patients with unilateral AKP. It is hypothesized that the painful knees present greater patellar mobility than the contralateral nonpainful knees.

Methods

In a prospective cross-sectional design study, a total sample of 359 patients presenting with patellofemoral symptoms (from 2014 to 2016) were identified. Patients with previous knee injuries (chondral, meniscal, ligament) or surgery, bilateral pain, past episode of patellar dislocation or knee trauma, or presenting patellofemoral instability risk factors (trochlear dysplasia, increased tibial tuberosity-trochlear groove distance [TT-TG], increased patellar tilt or increased Caton-Deschamps Index) were excluded. A sample of 23 patients with idiopathic unilateral AKP (30.9 years, 23.4 kg/m2, 43% males) were included within the present study. The nonpainful knee was used as control. Clinical examination was performed in all knees comprising lower limb alignment, patellar tracking, palpation, patellar manual mobilization in full-extension, J-sign, and Zohlen tests. Conventional imaging included the measurement of trochlear sulcus angle, Caton-Deschamps index, TT-TG distance, patellar tilt angle and patellar subluxation (both at rest and upon quadriceps contraction). Patients also underwent patellofemoral stress testing (52.5 N) with a mechanical testing device under magnetic resonance or computed tomography. Measurements were

taken with the patella at rest, after lateral patellar translation and after lateral patellar tilt. Functional outcomes were obtained using the Kujala and Lysholm scores. SPSS software was used to calculate significant differences between the painful and non-painful knee and correlation between clinical, imaging and stressing outcomes. Multivariate logistic regression was computed to identify potential factors associated with AKP and with patellar lateral translation. Cut-off values were determined using ROC curves.

Results

Painful knees showed statistically significant higher patellar lateral position after stressed lateral translation than nonpainful knees (9.8±3.6 vs 7.1±6.3 mm, p=0.028). The adjusted multivariate logistic model identified the patellar position after lateral displacement to be significantly associated with AKP (OR=1.165) and the model (AUC=0.807, p<0.001) showed reasonable sensitivity (67%) and specificity (73%). In turn, patellar tilt, patellar position after lateral displacement, patellar position after external tilt and patellar angle after external tilt were significantly associated with patellar mobility (AUC = 0.884, p < 0.001; sensitivity=79% and specificity=73%), with a cut-off for painful knees of 8.5mm (AUC 0.588, 95% confidence interval 0.469–0.706, p=0.152).

Conclusion

Patients with unilateral AKP showed statistically significant increased patellar lateral position after stressed lateral patellar displacement in their painful knee. The greater lateral patellar mobility may potentially explain why some morphologically equivalent knees express pain unilaterally.