

MRI Compatible Method for Patellofemoral Dynamic Evaluation: Porto-Patella Testing Device

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Summary:

Dynamic evaluation of PF joint in imaging environment allows for a morphological and functional assessment through an objective and reproducible methodology. Correlation with established classic risk factors is found and may detect new risk factors and indicators. Standard effective guidelines for PF diagnosis may be developed in the near future, envisioning better treatment and patient follow-up.

Abstract:

One of the most complex and frequent knee problems, however among the least understood, are the ones related to the patellofemoral (PF) joint. Limitations on the etiopathogenic understanding of PF pathology often compromise the diagnosis due to recurrent lack of correlation between symptoms, physical examination and imaging findings. Nowadays physical examination might be taken as the core procedure on these cases evaluation, although limited to a qualitative rather than quantitative role. This work aims to overcome PF evaluation flaws, with a dynamic and more objective assessment method, which has been broadly claimed in both the scopes of scientific literature and orthopedics clinical practice. Combined or not with classic morphological factors and mimicking the most significant physical examination procedures, dynamic evaluation might allow to detect new risk factors and/or postoperative PF functional assessment indicators; this is our hypothesis.

METHODS

Preliminary tests were performed using a prototype developed for dynamic assessment of PF joint normal and abnormal movement patterns. The device is able to be included on the inner chamber of MRI (and/or CT-Scan) equipments. In a controlled manner, it generates forces up to 65N, in the following vectors: medial-lateral translation, external tilt and rotation of the patella. Considered test population comprised six individuals from each of the following sample types: subjects with no complaints (control); patients diagnosed with potential instability and; patients undergoing isolated MPFL reconstruction with at least 6 months postoperatively. Body mass index up to 30 and a minimum height of 150 cm were respected criteria. Values were correlated with those of classic imaging-derivate measurements: TT-TG, patellar height, patellar tilt and trochlear dysplasia.

RESULTS

Although both postoperatively objective and potential instability cases maintain higher values of TT-TG than control, the MPFL reconstruction group evidenced a kinematic profile (in all vectors) significantly closer to the control group than to the potential instability group. After MPFL reconstruction, there were also no significant differences on functional scores compared to the controls group, however lower values were recorded among potential instability cases.

DISCUSSION

PF joint dynamic assessment in imaging environment allowed morphological and functional evaluation through an

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objective and reproducible methodology. Recorded values of lateral translation appears to have higher correlation with the functional scores (inversely correlated) as well as with clinical records, comparing to the classic recorded values of tilt or even TT-TG. Therefore, preliminary results are in accordance with the initial hypothesis.

CONCLUSION

The methodology presented might be a significant breakthrough on the PF pathology approach. Clinical validation in larger multicenter series, including other surgical techniques constitutes forthcoming achievements that are being developed. Thus, it may generate a severity classification grade and can result on the establishment of so claimed standard guidelines for PF diagnosis, regarding patients treatment and follow-up improvement and favoring health economy and social impact.