Trochlear Dysplasia: Are The Current Classifications And Radiographic Measurements Appropriate In The Skeletally Immature Patient?

Pennock AT, Bomar JD, Stepanovich M
Rady Children's Hospital, San Diego, CA

The assessment and classification of trochlear dysplasia in pediatric patients has yet to be well documented or validated. The aims of the current study were to examine several different measurements/classifications of trochlear dysplasia in skeletally immature patients to assess their inter- and intra-observer reliability and to determine which best predicts patellar instability.

**Purpose:**
The assessment and classification of trochlear dysplasia in pediatric patients has yet to be well documented or validated. The aims of the current study were to examine several different measurements/classifications of trochlear dysplasia in skeletally immature patients to assess their inter- and intra-observer reliability and to determine which best predicts patellar instability.

**Methods:**
Between 2006 and 2013, 63 skeletally immature knees were evaluated for an acute knee injury with an MRI and radiographs. Patients were grouped into two groups based on the presence of patella instability. Trochlear dysplasia was measured/classified using the x-ray and MRI Dejour Classifications, the trochlear depth index (TDI), the lateral trochlear inclination (LTI), and the medial condyle trochlear offset (MCTO). Additionally, the tibial tubercle-trochlear groove (TT-TG) distance was calculated for all patients. Statistical analysis was performed to calculate the inter and intra-observer reliabilities of each measurement, to look at measurement correlations, as well as their ability to discriminate patients with patella instability compared to control patients.

**Results:**
94% of skeletally immature patients with patella instability had trochlear dysplasia. Inadequate radiographs prevented the x-ray Dejour classification from being assessed in 78% of cases. The MRI Dejour classification had the lowest inter and intra-observer reliabilities (k=0.687 and k=0.596 respectfully), while all other measurements were above 0.80. The TDI, LTI, and MCTO all significantly differentiated patients with patella instability compared to those with no instability with critical cutoffs of 3 mm, $17^\circ$, and 1 mm respectively. Patients with a TDI <3 mm or an MCTO < 1 mm were 33x and 38x more likely to have patella instability. The TT-TG was directly correlated with trochlear dysplasia severity. Additionally, in the 16 patients who had 2 MRIs with a mean separation of 22 months, no change in the trochlear dysplasia measurements were identified.

**Conclusions:** Trochlear dysplasia is common in skeletally immature patients with patella instability. The assessment of trochlear dysplasia with axial imaging MRI is reliable and the objective measurements of TDI, LTI, and MCTO are more reproducible than the more subjective Dejour classification.

**Significance:** Proper assessment of trochlear dysplasia is essential in the evaluation and management of patients with patella instability. In skeletally immature patients, several objective measurements can be used to assess the presence and severity of trochlear dysplasia that are reliable, reproducible, and predictive of patella instability.