

## Patellofemoral Anatomy Differs Between Skeletally Immature and Adult Primary Patellar Dislocation

Petri J. Sillanpaa, MD, PhD, FINLAND

Aseem Shaikh, MS, INDIA

Heikki Mikael Mäenpää, MD, PhD, FINLAND

Tampere University Hospital  
Tampere, FINLAND

### Summary:

Anatomical patellofemoral abnormalities are more common in patients with primary patellar dislocation during skeletal immaturity.

### Abstract:

#### Background:

Patellar dislocation is associated with predisposing anatomical factors, such as trochlear dysplasia and increased tibial tubercle – trochlear groove (TT-TG) distance. Patellofemoral (PF) anatomy can be reliably assessed by magnetic resonance imaging (MRI). Primary (first-time) patellar dislocation can occur during childhood or adulthood. The anatomical MRI characteristics of the PF joint in a skeletally immature population with primary patellar dislocation are unknown.

#### Methods:

Two hundred patients were analysed to assess patellofemoral MRI anatomy in skeletally immature and mature population. Fifty patients had primary dislocation during skeletal immaturity and 50 during adulthood, and 100 age-matched subjects without PF pain or instability served as controls. Open physis of the distal femur and continuing growth were required to be considered skeletally immature. MRI measurements included patellar height (Blackburne-Peel and patella trochlear index, PTI), trochlear dysplasia (Dejour classification, grade A to D), trochlear depth, trochlear facet asymmetry and TT-TG distance. Two independent observers analyzed the MRI scans, and interobserver correlations were calculated. Median patient age in the skeletally immature group was 13 years (range, 11–17) and that in the skeletally mature group was 21 years (range 17-28).

#### Results:

Interobserver agreement for all measurements was very high or almost perfect (kappa value 0.70-0.84). The PTI was significantly lower in skeletally immature subjects with patellar dislocation (mean 0.19, SD  $\pm$ 0.09) compared with adults with patellar dislocation (0.29, SD  $\pm$ 0.11;  $p=0.01$ ). Higher grade trochlear dysplasia was more common in the skeletally immature (27% Dejour grade B, C or D in skeletally immature with patellar dislocation vs. 9% C or D in adults with patellar dislocation;  $p=0.05$ ), grade A being the most common (41%) among all patients. Mean TT-TG distance was similar in skeletally immature and mature subjects with patellar dislocation (14mm, SD  $\pm$ 3.4 and 13mm, SD  $\pm$ 3.1). Compared with age-matched controls, the following measurements were significantly different between the patellar dislocation population and the standard population among the skeletally immature: degree of trochlear dysplasia ( $p=0.03$ ), TT-TG ( $p=0.05$ ), PTI ( $p=0.01$ ), and trochlear depth ( $p=0.03$ ). There were no significant differences between MRI measurements in patients with or without patellar dislocation among adults, except mild grade A trochlear dysplasia was more common. None of the adults with primary dislocation had grade C or D trochlear dysplasia.

#### Conclusion:

Anatomical patellofemoral abnormalities are more common in patients with primary patellar dislocation during skeletal immaturity. Primary patellar dislocation in adults is not associated with PF abnormalities other than mild

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trochlear dysplasia. Based on these findings together with those of previous studies, primary dislocation in the pediatric population seem to be associated with a greater risk for recurrent dislocation, whereas adults have a more favourable PF anatomy. Long-term studies are required to confirm the role of PF measurements in patients with patellar dislocation.