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The Prevalence Of Associated Anatomical Risk Factors For Patellofemoral Joint Pathology In Patients Undergoing Rotational Osteotomy And The Implications For Surgical Management

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Background and purpose

Rotational deformities of the tibia and femur are known to be associated with patellofemoral (PFJ) disorders. However, they rarely occur in isolation and are commonly associated with other anatomical abnormalities which affect the PFJ. Purpose of this study is to comprehensively describe the prevalence of associated factors known to affect PFJ mechanics **in a cohort of patients with significant rotational mal-alignment undergoing corrective osteotomy for PFJ disorders.**



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Methods

- patients with PFJ disorders who underwent rotational osteotomy of femur/tibia between July 2009 and February 2020 were included. Patients were excluded if there was no preoperative CT scans available. This resulted in a final study population of 86 . Scans were analysed by two independent observers.
- Parameters of interest were **femoral torsion, tibial torsion, trochlear dysplasia, lateral trochlear inclination angle (LTI), tibial tuberosity–trochlear groove (TT–TG) distance, Insalle-Salvati (IS) and Catone Deschamps Index (CDI).**
- Interclass correlation coefficients (ICCs) and Cohen’s kappa statistics were used to evaluate the interobserver reliability.
- Group comparison between low grade and high-grade trochlear dysplasia, and between female and male patients were done.



Results

- **Rotational tibial osteotomy (RTO)** was undertaken in 81 (94.2%), who had a mean femoral version of $21.31 \text{ deg} \pm 11.93$, tibial torsion of $45.97 \text{ deg} \pm 9$, and TT-TG of $18.15\text{mm} \pm 5.60$. 34 patients (42%) in the RTO group had a pathological value of $\geq 20\text{mm}$.
- **Rotational femoral osteotomy (RFO)** was done in 4 (4.7%). Three had excessive femoral anteversion (mean= 34 ± 2.3) and one had excessive retroversion (-8). They had a mean tibial torsion of 38.5 ± 5.92 , and TT-TG of 22.73 ± 5.28 . Two (50%) in RFO group had a pathological value of $\geq 20\text{mm}$.
- Only one patient (1.2%) had combined rotational osteotomy of femur and tibia



- **Trochlear dysplasia:**
 - High-grade trochlear dysplasia was found in 20 patients (24.7%) in the RTO group, and 2 (50.0%) in the RFO group.
 - low grade dysplasia was found in 44 (54.3%), and 1 (25.0%) patient respectively.
- **Patella Alta:** was found in
 - 30 patients (37.03%) in RTO
 - 2 patients (50%) in RFO



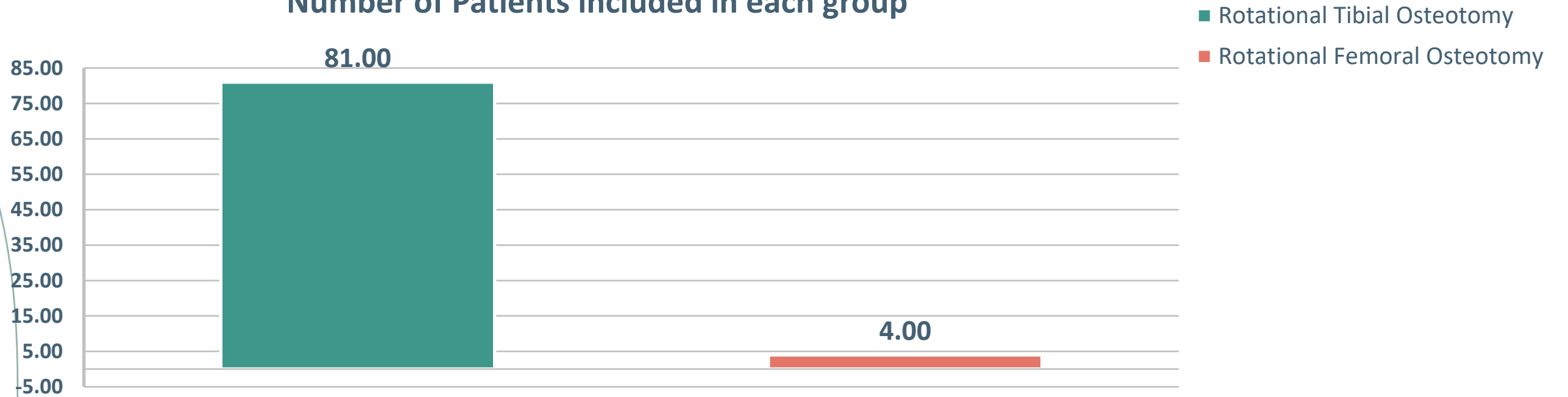
- **Group analysis showed that**

- Higher grade of trochlear dysplasia was associated with higher mean values for TT-TG distance (high grade= 23 ± 5.7 , low grade= 16.7 ± 4.4 , $p < 0.001$).
- A greater proportion of females (73.3%) underwent correctional rotational osteotomy compared to males (26.7%).
- Females showed higher median values for femoral version (female: 22.2 (-8 – 51), male: 13 (-29 – 50), $p = 0.017$) and lower mean values for TT-TG (female: 17.5 ± 5.6 , male: 20.6 ± 5 , $p = 0.020$).

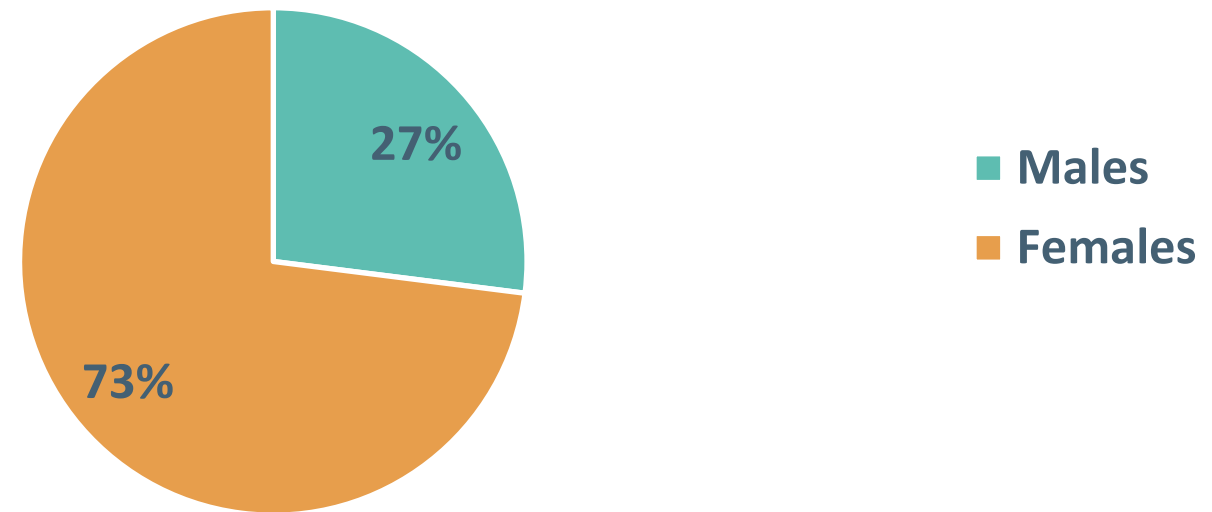


Patient groups

Number of Patients included in each group



Male to Female Ratio

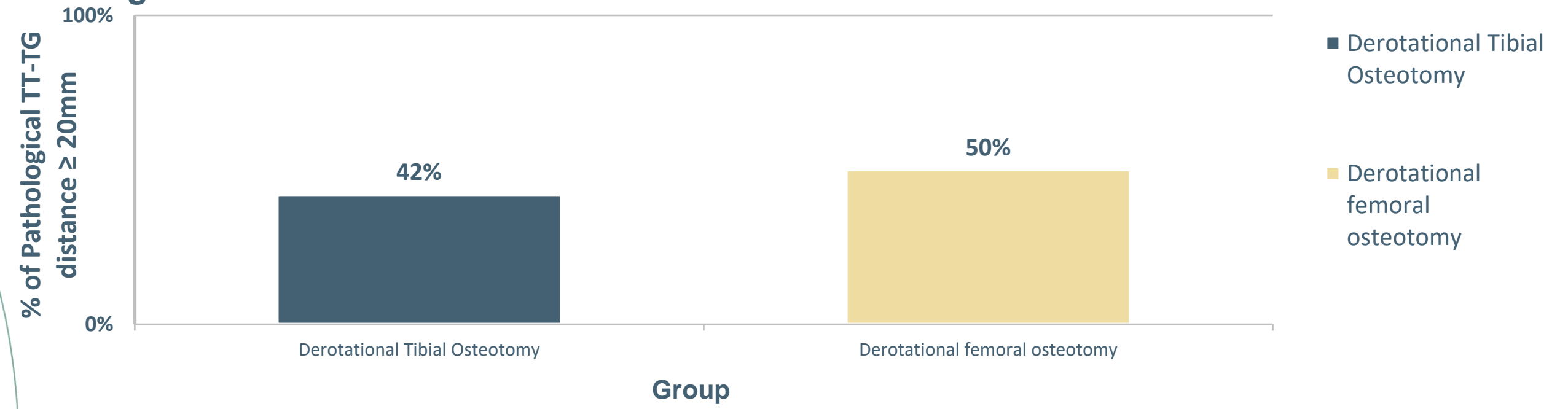


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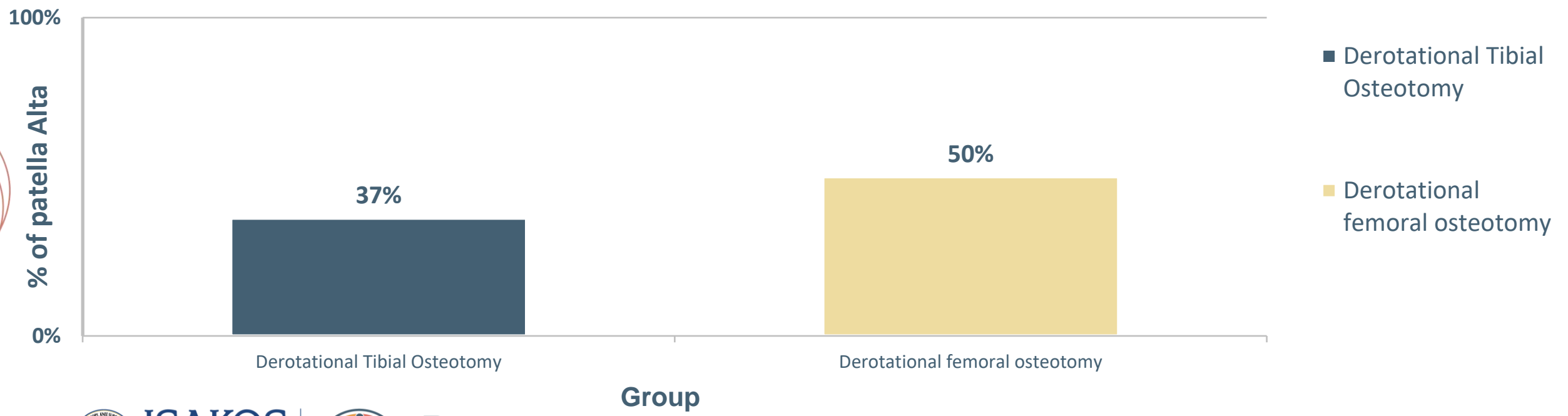


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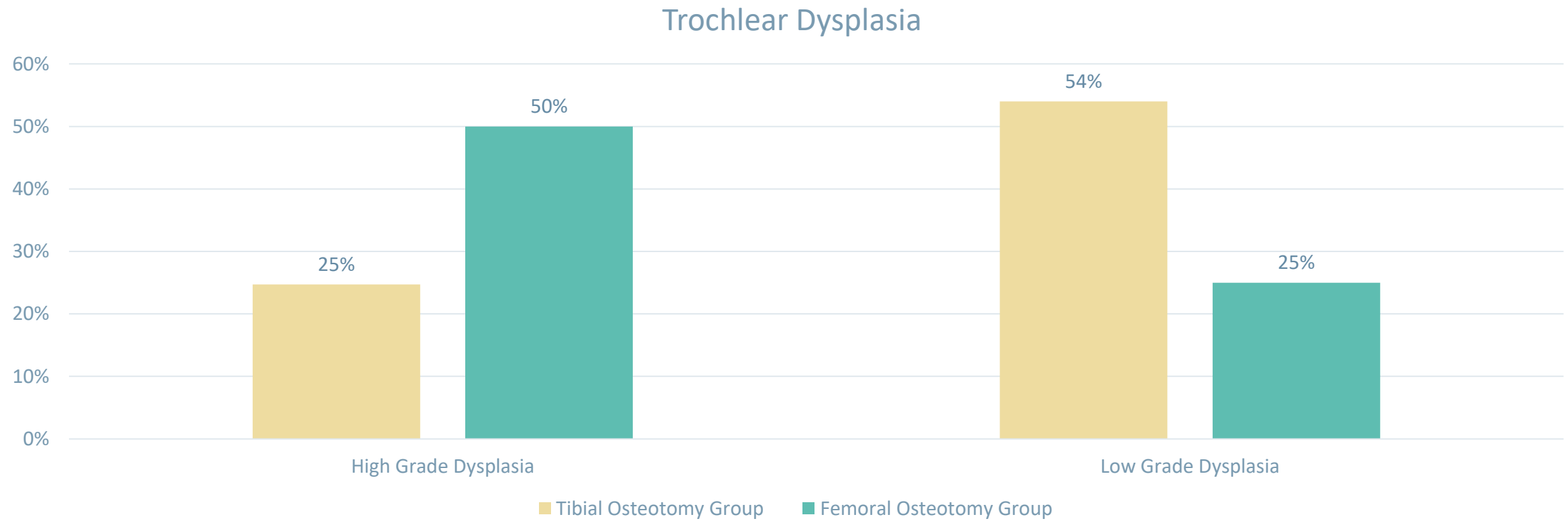
Pathological TT-TG distance ≥ 20 mm



Patella Alta



Trochlear Dysplasia



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Conclusion

- Within this geographical population, Females required corrective surgery more commonly than males and correction of Tibial torsion was significantly more prevalent than femoral torsional abnormalities.
- A high prevalence of associated anatomical risk factors can present in variable combinations in patients undergoing rotational osteotomy for PFJ pain and/or instability. Therefore,
 - a comprehensive assessment of all parameters on imaging is warranted when assessing patients with rotational abnormalities presenting with PFJ pain and or instability
 - Associated pathology should be taken into account when determining the surgical approach to corrective osteotomy in order to address all influential pathology and reduce the potential for creating abnormal anatomy which may have a negative effect on the PFJ.



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