

Towards a Comprehensive Classification for Trochlear Dysplasia: Bridging the Imaging Gap

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Opinion

Classification systems help orthopedic surgeons characterize a problem, suggest a potential prognosis, and offer guidance in determining the optimal treatment [1]. Trochlear dysplasia, a condition affecting the anatomy of the femoral trochlea, is frequently associated with patellofemoral pain, instability, and progression to degenerative arthritis. The misinterpretation or undervaluation of this condition can result in inappropriate or unsuccessful treatment. However, the analysis and classification of this condition are complex, posing a significant challenge for clinicians [2].

Currently, only a few widely accepted classifications exist in the literature. Henri Dejour, in 1987, based his classification on the level of the crossing sign on lateral knee radiographs [3]. Subsequently, in 1998, David Dejour expanded this classification to include the supratrochlear spur and double-contour sign by cross-referencing lateral radiographs with axial slice imaging (CT or currently MRI), proposing a classification of four types based on different combinations of these three signs [4]. Other more recently published classifications are solely based on the trochlea's shape in the axial plane of the MRI, such as the Oswestry-Bristol classification, which defines trochlear shapes as normal, shallow, flat, or convex [5].

The Limitations of Current Classifications

The previously mentioned classifications present several limitations. Firstly, Henri Dejour's classification does not evaluate the cartilaginous trochlea's shape in the axial plane nor includes the analysis of the supratrochlear prominence, an anomaly proven to have a detrimental effect on patellofemoral tracking-a determinant factor in defining dysplasia severity and crucial in determining the necessity for surgical correction. Again, classifications that consider only the axial plane in MRI have the primary limitation of not allowing the identification or quantification of the supratrochlear prominence.

While Dr. David Dejour's classification, incorporating both sagittal radiographs and axial cuts from CT or MRI, addresses the single-plane analysis issue. Nevertheless, it remains a descriptive classification that identifies the presence rather than determines the size of the supratrochlear prominence. Additionally, a common misconception is that the Dejour classification refers to four ordinal categories, in which the severity of dysplasia increases from Type A to Type D; however, the more severe cases are considered Types B and D with significant prominences. Moreover, the reliance on two different imaging modalities introduces logistical challenges, complicating the diagnostic process. A recently published systematic review revealed that out of the 11 studies evaluating the reproducibility of this classification, only two utilized both lateral radiographs and axial slices in MRI or CT, highlighting clinicians' inadequate application and significantly impacting reliability [2]. Similarly, Mendes Santiago Cousinho et al. demonstrated that using only radiographs for classification can lead to a lack of reliability, even among experienced observers, emphasizing the improvement in reliability with combined images [6].

A useful classification system should be reliable and valid. Although the measurement of validity is often difficult and sometimes impractical, reliability- determined by intraobserver and interobserver reliability- is easy to measure and should help as a minimum standard for validation [1].

Essentials of a Comprehensive Classification

Currently, there is an imperative need for a classification proposal to address the aforementioned issues and facilitate clinicians' analysis. This new classification should fill the following gaps:

- Utilize a unified imaging system that analyzes dysplasia in more than one plane.
- Be highly reproducible to enable effective communication among clinicians.
- Identify the trochlear shape and the presence of supratrochlear prominence, allowing its quantification.
- Provide not only a descriptive account but also orientate therapeutic decision-making.

Conclusion

Classification systems play a crucial role in determining the optimal treatment for patellofemoral instability. The ideal classification system for trochlear dysplasia should fulfill specific criteria. Nevertheless, none of the available classification systems fully meet these standards, making its clinical application and therapeutic decision-making challenging. The imperative for a new classification system for trochlear dysplasia is evident; however, it must fulfill the previously mentioned characteristics to be widely accepted by the scientific community.

References

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