

Classification of Lateral Patellar Instability in Children and Adolescents



Shital N. Parikh, MD^{a,*}, Marios G. Lykissas, MD^b

KEYWORDS

- Patella • Patellofemoral • Instability • Subluxation • Dislocation • Nomenclature • Classification
- Habitual

KEY POINTS

- Standardized nomenclature should be used when describing patellar instability patterns to avoid heterogeneity related to the causes and treatment of varied instability patterns.
- Type I (first-time patellar dislocation) and type II (recurrent patellar instability) represent the most common patterns of patellar instability seen in adolescent and young adult patients.
- Medial patellofemoral ligament (MPFL) reconstruction may suffice for most type II patellar instability patients, although all contributing factors should be analyzed.
- Type III (dislocatable) and type IV (dislocated) instability patterns are typically seen in children, although if ignored or in asymptomatic patients, presentation may be delayed.
- MPFL reconstruction would not suffice as an adequate treatment option for type III and type IV instability patterns. Quadricepsplasty is frequently required to realign or lengthen the quadriceps mechanism to stabilize the patella.

INTRODUCTION

Instability of the patellofemoral joint is a common, often challenging, problem that affects between 7 and 49 people per 100,000.^{1,2} The highest risk is noted for young individuals in the second decade of life with a prevalence of first-time patellar dislocation of 31 per 100,000.² The annual prevalence drops to 11 per 100,000 in the third decade and to 1.5 to 2 per 100,000 for patients between 30 and 59 years of age.² Because of the varied cause, varied time of presentation, and its multifactorial nature, treatment of patellar instability is varied as well. Historically, more than 100 different surgical procedures have been described in the literature to address patellar instability, although in the

last 2 decades, the role of medial patellofemoral ligament (MPFL) reconstruction has received the most attention.³

Patellar instability is predominantly in a lateral direction due to the obliquity of the femur in humans as compared with other primates.⁴ Although medial, superior, inferior, rotational, intra-articular, and multidirectional instability patterns have been described, these are rare. For the current article, patellar instability would imply lateral patellar instability. Patellar instability encompasses patellar subluxation and dislocation.

There is significant heterogeneity in the literature related to the causes, contributing factors, and treatment of lateral patellar instability. To address

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^a Division of Pediatric Orthopaedics, Cincinnati Children's Hospital Medical Center, 3333 Burnet Avenue, Cincinnati, OH 45229, USA; ^b Department of Orthopaedic Surgery, University of Ioannina School of Medicine, Dompoli 30, Ioannina, PC 45110, Greece

* Corresponding author.

E-mail address: shital.parikh@cchmc.org

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such a multifactorial issue of patellar instability, the first task is to classify the instability pattern. Ideally, classification systems are used to assess a clinical entity, to enable surgeons to recommend specific treatment options, and to allow comparison of different treatment methods. It should be objective, easy to understand, and of practical value in a clinical setting. The aim of this article is to review the nomenclature and existing patellar instability classification systems and analyze the different instability patterns into a comprehensive system.

EXISTING CLASSIFICATION

The classification systems that are most often used to describe patellar instability are based on either the clinical symptoms or the pattern/cause of the patellar dislocation. Dejour and colleagues⁵ classified patellar instability into 3 types based on the presence of patellofemoral anatomic abnormalities or patellar pain:

1. In major patellar instability, there are more than one documented dislocations.
2. In objective patellar instability, there is one documented dislocation and associated anatomic abnormality.
3. In potential patellar instability, the patient has patellar pain with associated radiographic abnormalities.

The classification system as described by Garin and colleagues⁶ includes major dislocation (permanent or habitual) and recurrent dislocation (potential or objective). Chotel and colleagues,⁷ however, did not recognize potential patellar instability as described by Dejour and Garin and considered it a vague and controversial condition. The authors proposed a more detailed classification system that distinguished 5 clinical patterns, more commonly seen in children. Their classification system did not include traumatic dislocation. The clinical patterns of the Chotel classification system, based on the age of presentation, were as follows:

1. Congenital dislocation: present at birth
2. Permanent dislocation: appeared before the age of 5 years
3. Habitual dislocation during knee flexion: appeared between 5 to 8 years
4. Habitual dislocation during knee extension
5. Recurrent dislocation: in adolescents

Although age may help to diagnose the instability pattern, it cannot be relied on much because patients and families may ignore the instability;

they may be misdiagnosed, or they may present late if the instability was asymptomatic. Sillanpaa⁸ preferred to use the term primary patellar dislocation when patellar dislocation occurred for the first time and secondary patellar dislocation when a dislocation had occurred once previously and occurred again.⁸ The use of the term acute patellar dislocation was discouraged, because it did not differentiate between a first-time dislocation and recurrent dislocation. Hiemstra and colleagues⁹ classified patellar instability as WARPS (weak, atraumatic, risky anatomy, pain, and subluxation) or STAID (strong, traumatic, anatomy normal, instability, and dislocation) with some patients having mixed characteristics. Their classification system was based on the shoulder instability classification system of TUBS (traumatic, unilateral, Bankart lesion, surgery) and AMBRI (atraumatic, multidirectional, bilateral, rehabilitation, inferior shift). Although the existing classification systems are useful, they are not comprehensive.

Before the discussion of the comprehensive classification system, a standardized nomenclature would help in communication and understanding of various terminology used to describe patterns of patellar instability.

NOMENCLATURE

Grelsamer¹⁰ recognized that the study of the patellofemoral joint is complicated by the use of expressions and terms that lack proper definition. Several of these terms, including chondromalacia, subluxation, maltracking, patellofemoral syndrome, and anterior knee pain, may mean different things to different physicians. Similarly, the literature related to patellar instability is confusing because of the lack of standard terminology to describe various patterns of instability.¹¹ For example, the term mild patellofemoral instability has been used in the literature, although no formal definition or grade of severity of instability has been previously defined.¹² Similarly, the term chronic patellar instability may mean recurrent patellar dislocations or persistent symptoms after first-time patellar dislocation. A recent study on the treatment of habitual patellar dislocation in adolescents included patients with recurrent patellar dislocation creating controversial recommendations requiring clarification by the authors.^{13,14} Thus, any discussion related to patellar instability should include precise terms and definitions. **Table 1** includes the definition of terms used to describe various forms of instability in the classification system. The term subluxation merits special description, because it has more ambiguity associated with it.

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