



Summary

Patellar dislocations are mainly characterized by a lateral movement of the patella out of the trochlear groove of the femur. Football, American football, basketball and gymnastics are the most common sports to induce patellar dislocations. However, many individual factors can impact the risk of these injuries and influence the treatment strategy. New evaluation methods like the patellar instability severity score, which is based on the individual risk factors, may be helpful to assess the risk for recurrent dislocations and help the medical management. Non-operative treatment is usually preferred for a primary dislocation without major structural risk factors or structural damage. Surgery is recommended mostly for secondary and recurrent dislocations.

Keywords

Patella – dislocation – knee – risk factors

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Zusammenfassung

Patellaluxationen sind meist durch laterale Bewegung der Patella aus dem Gleitlager des Femur gekennzeichnet. Fußball, American Football, Basketball und Gymnastik sind Sportarten, welche am häufigsten zu Patellaluxationen führen. Zahlreiche individuelle Faktoren können sich auf das Verletzungsrisiko auswirken sowie die Behandlungsstrategie beeinflussen. Hierbei können neu entwickelte Bewertungsmechanismen zu Hilfe gezogen werden, wie der „Patellar Instability Severity Score“, welcher das Vorliegen von Risikofaktoren bewertet. Er kann bei der Wahl einer geeigneten Behandlungsstrategie hilfreich sein. Eine konservative Behandlung wird in der Regel bei Primärluxationen in Abwesenheit von bedeutenden anatomischen Risikofaktoren oder Strukturschäden vorgezogen. Eine operative Versorgung ist in der Regel bei rezidivierenden Patellaluxationen zu empfehlen.

Schlüsselwörter

Patella – Luxation – Knie – Risikofaktoren

REVIEW / SPECIAL ISSUE

Risk factors for patellar dislocations: A narrative review

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Introduction

Patellar dislocations represent 2–3% of all knee injuries [13]. They consist of an abnormal movement of the patella in the patellofemoral groove of the femur, which is characterized by patellar dislocation and subluxation. Generally, the patella dislocates laterally in the coronal plane but it can also dislocate superiorly, inferiorly or rotate about its longitudinal axis without vertical translation. The incidence rate of patellar dislocations represents up to 6.8 per 100,000 person-years in the general population and varies up to 242 per 100,000 person-years depending on the targeted population [3,25,33,35,43,45,57,60]. Patellar dislocations, as all other injuries, are induced by an inciting event in a susceptible person who is characterized by his/her internal risk factors and is exposed to external risk factors [4]. The analysis of the inciting event and the risk factors can help the clinicians in the diagnosis and can also be important in the prevention of the occurrence of the injury. The diagnosis is obvious when the patella is dislocated in a locked position. However, after spontaneous relocation it is far more difficult. The

clinical pathway to detect a first patellar dislocation necessitates a detailed analysis of patient history, including the exact injury mechanism (i.e. inciting event) and the risk factors. This article aimed to review the inciting event as well as the external and internal risk factors associated with the occurrence of the patellar dislocations.

Inciting event

Patellar dislocations often occur in sports. They can be induced by a direct contact on the medial side of the patella knocking the latter out of the joint. However, patellar dislocations are more often induced by a non-contact mechanism, like in twisting or cutting maneuvers. They are the consequence of an internal rotation of the femur on the tibia combined with a contraction of the quadriceps (acting as a lateralizing force), followed by a knee flexion movement combined with an external rotation of the femur [16,32,42]. This non-contact injury mechanism in valgus and early knee flexion is comparable to the valgus collapse susceptible to cause an anterior cruciate ligament (ACL) injury.

External risk factors

Over half of the patellar dislocations occur during athletic activities [3,25,45,57,60]. As such, the active population is more at risk to sustain these injuries (>69.0 per 100,000 person-years) [33,35,57]. American football induces between 6.3% and 39.9% of all sports-related patellar dislocations. Football and basketball induce between 6.9% and 13.5% and between 11.8% and 12.6% of all sports-related patellar dislocations, respectively. Gymnastics (1.2–13.5%), ice hockey (0.7–12.7%) and wrestling (11.4%) are the other main sports inducing them. All these activities involve contacts and cutting situations [40,43,60]. However, the ranking of the sports inducing patellar dislocations is different when athlete-exposure is considered. An athlete-exposure is defined as one athlete participating in one athletic practice of competition. In this case, gymnastics is the most dangerous activity with a rate of 6.2 per 100,000 athlete-exposures followed by American football (4.1 per 100,000 athlete-exposures) and wrestling (3.4 per 100,000 athlete-exposures) [43].

Internal risk factors

The main internal risk factors, that predispose a person to sustain a patellar dislocation, are age, sex, family-history, previous patellar dislocation and anatomy of the knee and lower limb.

The occurrence of patellar dislocations is related to age and is more common in adolescents and young adults under the age of 20. The highest incidence rate (43 per 100,000 person-years) is observed between 9 and 15 years of age [45]. Between 15 and 19 years, this

rate remains 25-fold higher compared to individuals aged between 50 and 54 years [60]. However, patients with rare patellar dislocations, such as the superior and inferior types, are more likely to be older than 38 and present signs of knee osteoarthritis [47].

The influence of sex in the occurrence of patellar dislocations is still being discussed. Waterman et al. did not observe any gender-related difference [60] while three other studies reported that females had a higher risk to sustain patellar dislocation than males [3,25,33], especially when they were aged under 20 years old. Similarly, in teenagers with prior subluxation/dislocation, girls have three times more subsequent dislocations than boys (females: 18.0 per 100,000 person-years; males: 6.0 per 100,000 person-years) [25].

Previous patellar dislocation is recognized as a risk factor of subsequent patellar dislocations (206 per 100,000 person-years) [57]. Patients with a prior history of patellar dislocation have seven times higher odds of subsequent instability episodes during follow-up than first time dislocators [25]. Recurrent dislocations concern between 25% and 69% of patients

with a prior history of patellar dislocation [48,53,58]. These increase the risk for additional cartilage damage [21].

The family history is also important to take into account [12,40]. Indeed, 29% of patients with non-contact patellar dislocation have a positive family history versus only 6% of patients with patellar dislocation induced by contact [40]. Besides the aforementioned risk factors, several anatomical factors have been reported being related to recurrent patellar instability [15,19,24], such as trochlear dysplasia. The latter can be defined by a sulcus angle greater than 145° (defined as the angle formed between lines joining the highest points of the bony medial and lateral condyles and the lowest bony point of the intercondylar sulcus – Fig. 1), the trochlear groove being possibly flat or convex [18]. The sulcus angle has been reported to be abnormal in 14% of first-time dislocators and 11% of recurrent dislocators [25]. Adult dislocators have greater sulcus angle than controls [6,14]. However, this difference could not be confirmed in teenagers [51]. Trochlear dysplasia can also be characterized by the measurement of the trochlear depth (abnormal if



Figure 1
Sulcus angle (ABC).

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