Review Article

Patellar chondromalacia among adolescent athletes - A systematic review

Milanovic F1,2*, Aksovic N3, Bjelica B4, Topalovic N5,6, Arsenovic M6, Bukva B1,6, Bardak S7 and Nikolic D1,6

1Faculty of Medicine, University Children's Hospital, Belgrade, Serbia
2Institute of Anatomy, Faculty of Medicine, University of Belgrade, Belgrade, Serbia
3Faculty of Sport and Physical Education, University of Nis, Nis, Serbia
4Faculty of Sport and Physical Education, University of East Sarajevo, East Sarajevo, Bosnia and Herzegovina
5Institute of Physiology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia
6Faculty of Medicine, University of Belgrade, Belgrade, Serbia
7Faculty of Sport and Physical Education, University of Niksic, Montenegro

Received: 01 May, 2021
Accepted: 22 July, 2021
Published: 23 July, 2021

*Corresponding author: Milanovic F, Faculty of Medicine, University Children's Hospital, Belgrade, Serbia, E-mail: filipmilanovic333@gmail.com

https://www.peertechzpublications.com

Abstract

Knee injuries, acute or chronic are one of the most often injuries in sport, both in adults and adolescents. They mostly occur in contact sports due to torsional and deceleration forces, causing around 80% painful knee conditions that disable sports performance. If chronic, they occur in the form of repetitive microtrauma that generates articular cartilage damage, producing cartilage softening and thinning and causing anterior knee pain. Etiological factors that are also associated with anterior knee pain in the form of patellar chondromalacia are idiopathic or post-traumatic patellar luxation and different types of femoral trochlear dysplasia. Repetitive trauma might cause cartilage fissures, fragmentation and necrosis so the patients can feel retropatellar pain, usually after physical activities. Treatment of patellar chondromalacia is usually conservative but an early diagnosis (magnetic resonance imaging and arthroscopy) is essential in the prognosis of these patients.

Introduction

Review

Knee joint anatomy and biomechanics: Knee joint is consisted of tibiofemoral and patellofemoral joint, covered with articular cartilage and reinforced with articular capsule and ligaments. Both medial and lateral (bigger, more mobile, less vascularized) meniscus, fibrocartilaginous structures absorb the intraarticular pressure. According to some authors, in patients with a total meniscectomy, the force of pressure of the femur on the condyles of the tibia increases by as much as 350%. Knee flexion and extension movements, in the range of 150° are enabled by quadriceps femoris muscle and hamstrings. The maximum degree of internal and external rotation, depending on cruciate ligaments tightening and relaxation is 5–20°, while lateral sliding movement are slight, due to collateral ligaments' tightening [1–9].

Knee sports injuries: Along with the ankle injuries, knee injuries are one of the most common sports injuries. They mostly occur in contact sports (soccer, football, basketball, running) due to torsional and deceleration forces and cause around 80% painful knee conditions that disable sports performance. The pathogenesis of these injuries involves: sudden changes in the direction of movement, sudden stopping or irregular landing, that cause excessive internal rotation and hyperextension in the knee joint. Untimely diagnosed and treated, they can be an introduction to the occurrence of chronic degenerative changes in the knee joint, such as patellar chondromalacia [4,9,10].

Citation: Milanovic F, Aksovic N, Bjelica B, Topalovic N, Arsenovic M, et al. (2021) Patellar chondromalacia among adolescent athletes - A systematic review. Arch Sports Med Physiother 6(1): 001-003. DOI: http://dx.doi.org/10.17352/asmp.000013
**Definition and epidemiology:** Patellar chondromalacia is defined as a painful retropatellar condition, caused by damage of the patellar cartilage, due to repeated stress to the articular surface. Being a common reason for patellofemoral pain syndrome – anterior knee pain, this condition might limit daily life activities. Patients are usually young female athletes in the second decade of life [4,11].

**Etiopathogenesis:** Patellar chondromalacia can be idiopathic, post-traumatic and also a consequence of biomechanical disorders of the extensor apparatus of the knee, such as: reduced strenght of the quadriceps femoris muscle, reduced Q-angle, patella alta or patella infera, patellofemoral malalignment. Patellar malalignment may be related to patellar (sub)luxation, dysplasia of the femoral trochlea as well as deformities of proximal tibia anatomical parameters such as: tibial slope, trochlear depth, lateral trochlear inclination, and lateral patellar tilt. According to some authors, articular cartilage damage (ICRS grade 1-4: cartilage softening, cartilage surface fissures, cartilage fragmentation, cartilage necrosis) in the region of patellofemoral joint is arthroscopically detected in 71% patients with different types of knee trauma, such as: menisci rupture (46%), anterior cruciate ligament rupture (34%) and recurrent patellar luxation (15%) Cartilage damage stimulates transition of proinflammatory cytokines to cartilage as well as the local metabolic changes; chondrocytes increase the secretion of proteoglycans and collagen, enzymatic tissue degradation accelerates so the subchondral bone might terminally be affected with sclerosis, while cartilage becomes softer [6,7,13,14].

**Clinical presentation**

Patients suffering from patellar chondromalacia usually feel anterior knee pain. Pain may increase during activities, especially due to prolonged walking, climbing or descending stairs, walking on uneven surfaces, squats, lifting heavy loads. Occasionally, patients may also experience pain during prolonged sitting when the knee is bent. In severe cases, patients cannot walk properly.

**Diagnosis**

Considering the fact that pathological changes occur in cartilage, radiography is usually not a significant diagnostic method in the examination of patellar chondromalacia. Knee arthroscopy as well as Magnetic Resonance Imaging (MRI) can indicate the extent and degree of tissue damage and decide on further treatment. MRI with a high tissue contrast can detect chondromalacia in the lower stages: signal irregularities, fissures and chondral thinning thus leading to earlier diagnosis and treatment [11,13].

**Treatment**

Treatment can be preventive (elimination of causes such as static disorders), conservative (physical therapy, quadriceps exercises, non-steroid antiinflammatory drugs) and surgical (chondrectomy, ventralization and medialization of the patella, sagittal osteotomy of the patella) [11,15]. The existance of excessive distance between tibial tuberosity and tibial groove, patella alta or patella infera, patellofemoral instability as a functional problem must be treated with tibial tubercle osteotomy, often combined with a soft tissue procedures, in order to obtain a satisfactory result, with a good prognosis and positive functional capacity outcome [16-18]. The most usually used soft tissue procedure is medial patellofemoral ligament reconstruction, as one of the primary methods in the treatment of patellar instability, using hamstring or peroneus longus muscle tendon as a graft [19,20].

**Conclusion**

Repetitive microtrauma in physically active adolescents might also generate patellar cartilage damage, causing anterior knee pain that can significantly reduce daily activities, especially in females. As the most frequent entity of the anterior knee pain, patellar chondromalacia is characterized by the presence of cartilage softening, fissures, fragmentation and necrosis, producing pain that is usually localized retropatellary and stimulated during and after activities, more often in patients with different types of patellofemoral malalignment and anatomical deformities of the femoral trochlea. Early diagnosis and treatment are essential in achieving a good prognosis in patients with patellar chondromalacia.

**References**

1. Milanović F (2020) Procena uspešnosti primene plazme obogaćene trombecitama na regenerativnu sposobnost hrskavice kod sportskih povreda zgloba kolena. Fotokopirnica Kopija: Medicinski fakultet Univerziteta u Beogradu.
2. Mrvaljević D (2010) Articulatio genus. In: Vojislav Busrčević, editor. Anatomija donjeg ekstremiteta, petnaesto izdanje. Beograd: Savremena Administracija 10-17.
3. Milisavljević M (2002) Klinička anatomija – Donji ekstremitet (zglog kolena). Beograd: NAUKA 184-186.
4. Stevanović V (2010) Sportske povrede i bolna stanja kolena. In: Milinković ZB i saradnici, editors. Sportska medicina u pitanjima i odgovorima. Niš: Narodna Knjiga Alfa 364-374.
5. Jonhston BD, Liebert PL (2011) Exercise and Sports Injury. In: Porter RS, Ka-plan JL, editors. The Merck Manual Of Diagnosis and Therapy, 19th edition. New Jersey. Merck Sharp & Dohme Corporation. A subsidiary of Merck & Company, INC - Whitehouse Station 3292-3306.
6. Jakovljević A, Ćulum J, Ćačić A (2018) Uvod. In: Jakovljević A, editor. Plazma obogaćena trombecitama – PRP (Platelets-Rich Plasma). Banja Luka: Zdravstvena Ustavona – Bolnica iz hirurških i internističkih oblasti S-tetik, Sportska ambulanta 12-33.
7. Kleemann RU, Krocker D, Cedaro A, Tuischer J, Duda GN (2005) Altered cartilage mechanics and histology in knee osteoarthrits: relation to clinical assessment (ICRS Grade). Osteoarthritis Cartilage 13: 958-963. Link: https://bit.ly/3wWCqYu
8. Stevens AL, Gharabeb B, Weiss KR, Fu FH, Huang J (2006) Gene Therapy in the Treatment of Knee Disoders. In: Scott WN, editor. Surgery of the Knee, the fifth edition. Philadelphia: Elsevier – Churchill Livingstone 4-32.
9. Durašković R, Radovanović D, Pantelić S, Popović-Ilić T (2009) Sportske povrede. In: Živković D, editor. Sportska medicina, treće, dopunjeno izdanje. Niš: Centar za izdavačku delatnost Fakulteta sporta i fizičkog vaspitanja Univerziteta u Nišu 399-477.
10. Matteo D, Vetere D (2015) Meniscal Lesions. In: Piero Volpi, editor. Football Traumatology – Current Concepts: from Prevention to Treatment 197-203.

**Citation:** Milanovic F, Aksovic N, Bjelica B, Topalovic N, Arsenovic M, et al. (2021) Patellar chondromalacia among adolescent athletes-A systematic review. Arch Sports Med Physiother 6(1): 001-003. DOI: http://dx.doi.org/10.17352/asmp.000013
Citation: Milanovic F, Aksovic N, Bjelica B, Topalovic N, Arsenovic M, et al. (2021) Patellar chondromalacia among adolescent athletes-A systematic review. Arch Sports Med Physiother 6(1): 001-003. DOI: http://dx.doi.org/10.17352/asmp.000013