Chirurgia Narządów Ruchu i Ortopedia Polska – Polish Orthopaedics
ISSN 0009-479X, e-ISSN 2956-4719

A rare case of superior patellar dislocation with intact extensor apparatus of the knee and a minor avulsion fracture of the patellar apex

Rzadki przypadek górnego zwichnięcia rzepki z zachowaniem ciągłości aparatu wyprostnego kolana przy niewielkim awulsyjnym złamaniu szczytu rzepki

Bartłomiej Bobójć[1], Iga Straszecka[2], Bogusław Sadlik[3, 4]

[1]District Hospital of Głogów, Department of Trauma and Orthopaedic Surgery, Głogów, Poland
[2]Wrocław University of Science and Technology, Medical Faculty, Wrocław, Poland
[3]College of Physiotherapy, Wroclaw, Poland
[4]Biological Joint Reconstruction Department ORTHOS Multidisciplinary Hospital Komorowice near Wrocław, Poland

CASE REPORT

Chir Narzadow Ruchu Ortop Pol, 2025; 90(2): X-X

DOI: 10.31139/chnriop.2025.90.2.2

Level of evidence: V

Received: 11.01.2025
Accepted: 12.04.2025
Ahead of print: 05.05.2025

Correspondence:
Iga Straszecka MS,
GO ON Clinic, Ośrodek Ortopedyczno-Rehabilitacyjny
ul. Strzegomska 138, 54-429 Wrocław, Poland
e-mail: igastraszecka@gmail.com

Cite this article:
Bobójć B, Straszecka I, Sadlik B. A rare case of superior patellar dislocation with intact extensor apparatus of the knee and a minor avulsion fracture of the patellar apex. Chir Narzadow Ruchu Ortop Pol, 2025; 90(2): X-X. DOI: 10.31139/chnriop.2025.90.2.2

Abstract

Superior dislocation of the patella is an exceptionally rare condition in musculoskeletal trauma. Furthermore, its detachment from the tendinous structures of the extensor mechanism while maintaining its knee extensor mechanism tendon, appears to be the first such injury reported in the literature. This article presents the case of a 44-year-old male who sustained this injury following a low-energy knee trauma, compounded by a minor avulsion fracture of the patellar apex and damage to the medial retinacula.
This study aimed to present the diagnostic process, the surgical treatment applied, and the assessment of postoperative outcomes. The patient underwent arthroscopy and arthrotomy to stabilize the dislocation and repair the stabilizing structures of the patella. The surgical treatment resulted in the patient's return to activity and satisfactory functional recovery.
This case underscores the importance of prompt diagnosis and appropriately tailored surgical intervention in achieving successful outcomes in the management of superior patellar dislocations.

Key words: superior patellar dislocation, patellar extrusion, arthroscopy, arthrotomy, damage to the medial retinacula, damage to the patellar ligament.

Streszczenie

Górne zwichnięcie rzepki jest niezwykle rzadkim przypadkiem w traumatologii narządu ruchu, a dodatkowo jej wyłuszczenie ze struktur ścięgnistych aparatu wyprostnego rzepki jest prawdopodobnie pierwszym tego typu opisanym urazem w literaturze. W artykule przedstawiono przypadek 44-letniego mężczyzny, który w wyniku niskoenergetycznego urazu kolana doznał tego typu uszkodzenia, dodatkowo powikłanego niewielkim złamaniem awulsyjnym szczytu rzepki i uszkodzeniem troczków przyśrodkowych. W pracy przedstawiono diagnostykę, zastosowane leczenie operacyjne oraz ocenę wyniku leczenia. U pacjenta zastosowano artroskopię oraz artrotomię dla stabilizacji zwichnięcia i uszkodzeń struktur stabilizujących rzepkę. Leczenie operacyjne zakończyło się powrotem do aktywności i dobrej sprawności pacjenta. Przypadek ten podkreśla znaczenie szybkiej diagnozy i odpowiednio dobranej interwencji chirurgicznej w skutecznym leczeniu górnego zwichnięcia rzepki.

Słowa kluczowe: górne zwichnięcie rzepki, wyłuszczenie rzepki, artroskopia, artrotomia, uszkodzenie troczków przyśrodkowych, uszkodzenie więzadła rzepki.

Introduction

Patellar dislocations are relatively common injuries in orthopedic practice, most often associated with lateral displacement of the patella. In contrast, superior patellar dislocation, which involves proximal displacement with minor damage to the patellar ligament but with preserved continuity of the knee extensor apparatus (KEA), is an exceptionally rare clinical phenomenon. Unlike transverse injuries of the patellar ligament or quadriceps tendon, which are relatively common knee injuries, superior dislocation of the patella occurs when it is dislocated intracapsularly into the suprapatellar recess while maintaining continuity with the KEA. Detailed epidemiological data on this type of injury are limited due to its unique and sporadic occurrence. Reports of such injuries in the medical literature are extremely rare, and the lack of extensive epidemiological studies makes understanding the characteristics of these dislocations challenging for clinicians. The case we present: a superior patellar dislocation with detachment from the KEA, with minor damage to the patellar ligament but preserved

continuity of the extensor apparatus, is likely the only one of its kind, as no similar descriptions were found in the available medical literature.

Superior patellar dislocations usually result from high-energy trauma, such as direct impact to the lower part of the patella or sudden, forceful contractions of the quadriceps muscle. They manifest primarily as painful locking of the knee joint, along with the inability to walk or move the lower limb. Such injuries can occur in patients across various age groups and are not gender-specific. However, certain anatomical factors may predispose individuals to superior patellar dislocation. These factors include, among others, a high-riding patella (patella alta), which facilitates the displacement of the patella beyond the intercondylar groove.

Physically active individuals, especially those participating in contact sports, may be more prone to such injuries. Direct trauma to the knee joint from impacts or overloading associated with intensive sports training represents the primary etiological mechanism in this group of patients. Nevertheless, superior patellar dislocations remain exceptionally rare, complicating their recognition and the development of diagnostic and therapeutic management standards.

The rarity of this injury makes diagnosis a challenge. In cases of suspected superior patellar dislocation, a thorough clinical history and detailed physical examination are essential, supplemented by imaging studies such as radiography or magnetic resonance imaging (MRI) [1]. Treatment for these injuries most commonly involves conservative methods, such as closed reduction. However, surgical intervention may be necessary in more complex cases involving significant damage to anatomical structures or when reduction does not yield the desired results [2, 3].

In this article, we present a unique case of superior patellar dislocation with detachment from the KEA, with minor damage to the patellar ligament but preserved continuity of the extensor apparatus. To our knowledge, this is the first such case described in the literature. The discussion of this case aims to highlight this rare type of injury.

Superior patellar dislocation without associated damage to the patellar ligament is exceptionally rare. It was first described in 1956 by Watson-Jones [4, 5]. A review of English-language literature up to 2016 revealed only 23 reported cases of this injury [6]. Searching the literature, we identified 34 cases of superior patellar dislocation, none involving detachment from KEA.

Case Report

A 44-year-old male patient presented to the Emergency Department in December 2020 due to a minor knee joint injury sustained while squatting at work. He complained of intense pain and difficulty moving his right knee joint; however, despite undergoing an orthopedic examination and X-ray imaging, the correct diagnosis was not established, and the patient was discharged. The patient returned to his job a few days after his accident; however, he was completely able to perform daily activities.

Two months later, the patient returned for consultation, now presenting with symptoms of knee joint swelling, restricted mobility to 30 degrees of flexion, and significant pain during maximum possible knee flexion. Ultrasonographic examination revealed displacement of the patella into the suprapatellar recess, a minor avulsion fracture of the patellar apex, and damage to the medial patellar retinaculum while the patellar ligament remained intact. Magnetic resonance imaging confirmed the preliminary diagnosis (Fig. 1–2), showing preserved continuity of the patellar ligament and the KEA of the right knee joint. The patella was noticeably displaced into the suprapatellar recess.

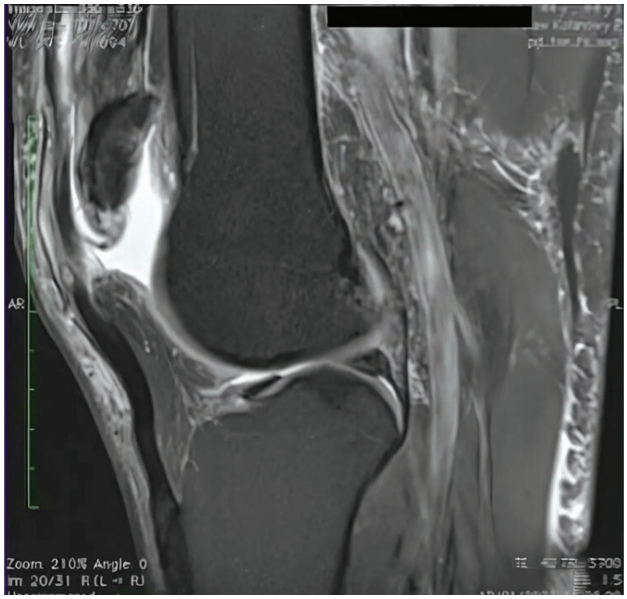

Fig. 1. MRI image in sagittal projection of superior patellar dislocation with its extrusion

Fig. 2. Diagram illustrating superior patellar dislocation with partial damage to the deep part of the patellar ligament, preserved patellar extensor mechanism, and damage to the medial retinacula

Radiographic images also demonstrated a minor avulsion fracture of the lower pole of the patella (Fig. 3).

Fig. 3. Lateral X-ray showing superior patellar dislocation with a minor avulsion of its apex

Operative technique

The patient underwent knee arthroscopy, during which the following procedures were performed: intra-articular adhesions were released, shaving and freshening of the inferior pole of the patella were performed through micro-perforations, and a micro-needling of the proximal attachment of the patellar ligament was carried out (Fig. 4).

A titanium anchor was implanted, to which sutures consisting of a core – a bundle of ultra-high molecular weight polyethylene (UHMWPE) fibers – and a braided coating – polyester and UHMWPE fibers – were attached, which were transcutaneously passed through and anchored to the avulsed fragment of the patella, which was used as a marker to indicate the attachment site of the patellar ligament and to pull the extruded patella to it (Fig. 5).

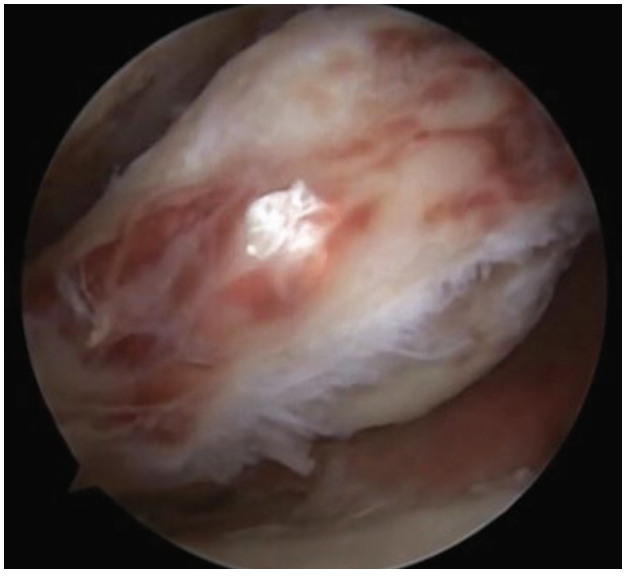

Fig. 4. Arthroscopic image showing superior patellar dislocation with extrusion. The patella is displaced into the suprapatellar pouch

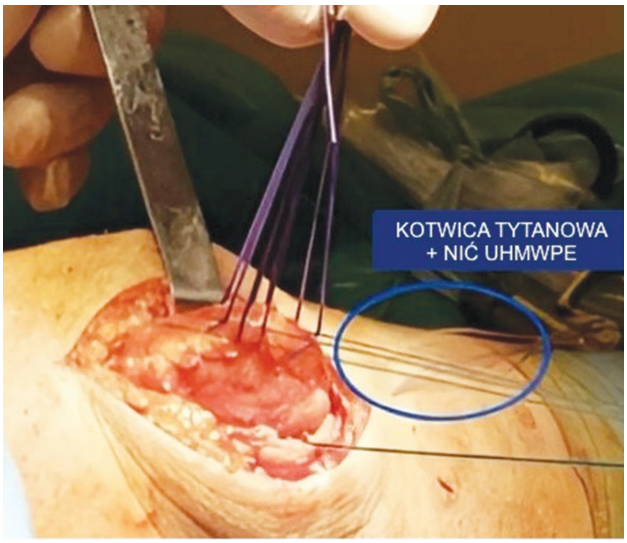

Fig. 5. Intraoperative image – blue ellipse marks the sutures coming from the implanted titanium anchor

As part of the arthrotomy, the patellar bursa and the surface of the patella adjacent to it were refreshed. Three transverse bone tunnels were created through the patella, through which absorbable monofilament sutures, synthetic sutures made from polyglycolic acid trimethylene, were passed, providing high tensile strength and minimal tissue reaction as additional stabilization of the knee extensor mechanism (Fig. 6).

Stabilization of the medial retinacula was performed using a mixed method, combining open and percutaneous techniques with synthetic sutures made of a blend of lactide and glycolide acids and calcium stearate, produced in a braided configuration, which improves their functional properties. The lactide component has hydrophobic properties (Fig. 7).

Stable fixation of the patella in the anatomical position was achieved, confirmed by dynamic control during the arthroscopy (Fig. 8). Additional diagnostics were performed

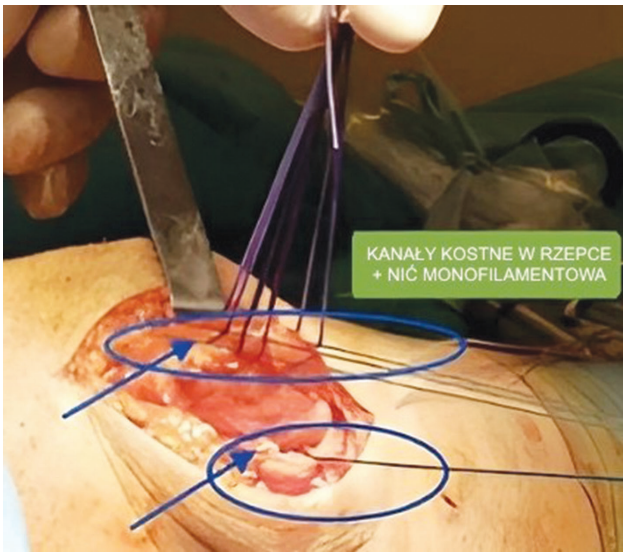

Fig. 6. Intraoperative image – arrows indicate the locations of bone tunnel drilling in the patella; ellipses mark the sutures from these tunnels.

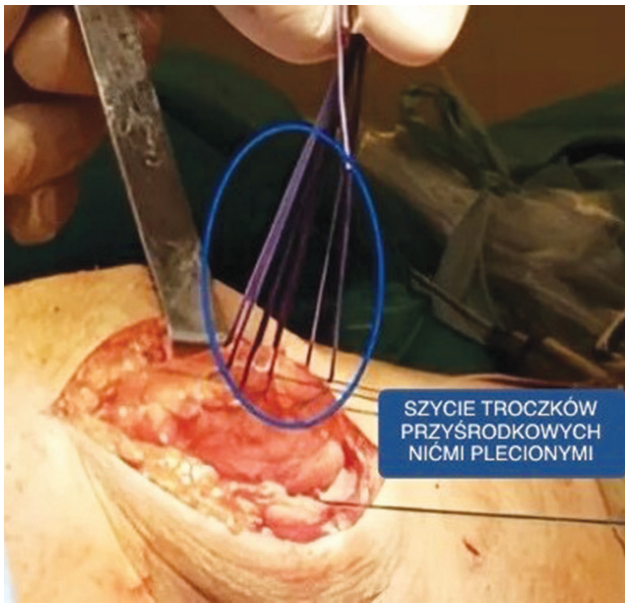

Fig. 7. Intraoperative image – blue ellipse marks the sutures relieving the medial retinacula.

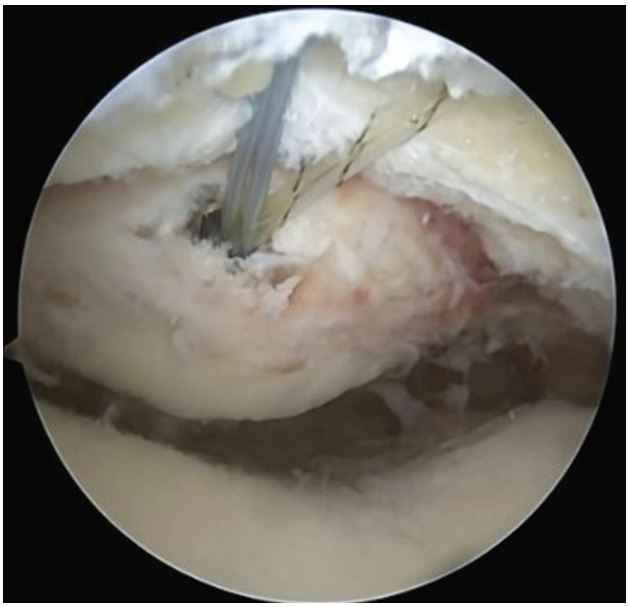

Fig. 8. Arthroscopic image showing the implanted titanium anchor at the apex of the patella with sutures attaching to the patellar ligament.

Fig. 9. Follow-up lateral X-ray of the right knee two months after surgical treatment with the implanted titanium anchor at the apex of the patella.

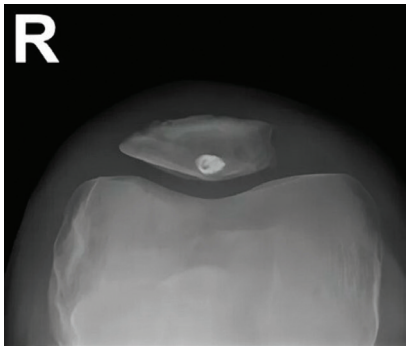

Fig. 10. Axial X-ray of the right patella two months after surgery with correctly implanted titanium anchor.

Fig. 11. Postoperative MRI follow-up after 4 months in sagittal projection.

Fig. 12. Patient performing full flexion of the right knee joint two months after surgery.

Fig. 13. Proper functioning of the extensor mechanism of the right knee two months post-operatively in the patient.

Fig. 14. Patient performing a squat two months after surgical treatment.

4 months after the surgery (Fig. 9–11). After the procedure, the knee was immobilized for 3 weeks in a long knee brace. Rehabilitation started on the 12th day post-surgery, and the patient regained full functionality and returned to work after two months of intensive rehabilitation (Fig. 12–14).

Discussion

Superior dislocation of the patella without rupture of the patellar ligament poses significant diagnostic challenges due to its rarity as a knee joint injury [5,7,8]. Differential diagnosis should include patellar ligament rupture [7]. Most such injuries are initially misdiagnosed as ligament rupture, although a thorough orthopedic examination should differentiate these conditions [9]. A pathognomonic radiographic feature includes proximal displacement of the patella. Ultrasound and MRI can be used to rule out ligament rupture.

The average age of patients with superior patellar dislocation is 58 years, ranging from 43 to 81 years [2, 10]. This demographic profile suggests a possible correlation between age and increased susceptibility to this atypical condition. In older individuals, degenerative processes such as osteoarthritis may weaken the structures supporting the patellofemoral joint, increasing the risk of patellar dislocation. Additionally, biomechanical changes in the joint due to weakened muscles and ligaments and the presence of osteophytes on the superior border of the femoral condyles and proximal patella may cause patellar locking and displacement. Thus, patient age is a significant risk factor, and superior patellar dislocation may be more common in older populations, who often experience chronic orthopedic problems. This makes superior patellar dislocation a critical health issue in an aging society.

Most authors believe that superior dislocation of the patella occurs due to excessive knee hyperextension or direct trauma to the patella, often accompanied by patellar impaction and the presence of osteophytes on the femoral trochlea [11, 12]. In our opinion, the mechanism is somewhat different, as the patella becomes entrapped due to osteophytes on the superior edge of the intercondylar groove or the apex of the patella. During knee flexion, the patella, unable to move along its normal track, becomes detached from the ligamentous-tendinous structures of the knee extensor mechanism [13]. Risk factors include patella alta, ligament laxity, knee recurvatum, and paralytic diseases [8, 14]. The mechanism leading to superior patellar dislocation appears to be associated with forced contraction of the quadriceps muscle, either in the presence or absence of knee hyperextension [2, 10, 15].

Most patients with this type of injury can be treated conservatively through closed reduction of the dislocation [3]. We found two cases of surgical treatment for similar injuries in the literature [2, 3].

As detailed in Bochenek's Anatomy, the anterior knee joint capsule comprises fibers of the quadriceps femoris muscle, which transition into the patellar ligament [16]. This ligament does not entirely attach to the patella–part of it remains in direct continuity with the joint capsule. As early as 1918, Henry Gray described this anatomical relationship, emphasizing the structural and functional unity of the quadriceps tendon and patellar ligament, which extends over the anterior patellar surface, forming an integral unit [17]. Observations from sagittal magnetic resonance imaging support these findings (Fig. 15).

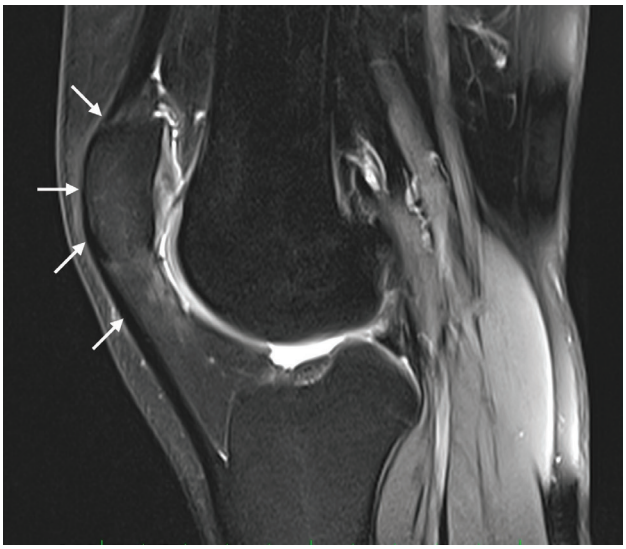

Fig. 15. MRI of the knee in sagittal projection confirming the transition of the quadriceps tendon fibers into the patellar ligament.

Imaging analysis demonstrates that the patellar ligament extends beyond its attachment at the apex of the patella, continuing into the anterior joint capsule and connecting with the quadriceps muscle fibers [17]. During flexion, the patella glides along the femoral trochlear surface downward, and during extension, it moves upward – a path spanning 5–7 cm. In the extended knee position with the quadriceps relaxed, the patella can be displaced laterally. However, atmospheric pressure keeps the patella pressed against its surface, preventing elevation [16].

Orthopedic surgeons should accurately diagnose superior patellar dislocation based on a detailed history, thorough clinical examination, and appropriate use of imaging studies. Obtaining an accurate history of the injury mechanism and conducting a comprehensive clinical examination are crucial. When the diagnosis is uncertain, clinical assessment should be supported by additional imaging studies [11].

Although such injuries are extremely rare, no universally accepted terminology or classification exists describing all types of patellar displacement [8].

Conclusion

The documentation of rare cases of a superior patellar dislocation with detachment from the KEA, with minor damage to the patellar ligament but preserved continuity of the KEA, is crucial for understanding the pathomechanism and treatment of this specific injury. The case of superior dislocation with detachment of the patella from the extensor mechanism we described may be the only recorded case in the literature. Moreover, it highlights the distinction between damage to the extensor mechanism and detachment of the patella, which functions as a sesamoid bone of the joint, and consequently, the optimization of treatment methods.

This surprising dislocation of the patella forces us to look differently at the anatomical and mechanical properties of the KEA from a different perspective. The patella acts as a sesamoid bone that passes through the KEA, increasing the extensor moment of the knee but not transmitting the pulling force of the tibial tuberosity through the body of the patella. The patella only acts as a support for the quadriceps tendon to increase the extensor moment arm of the knee joint.

Looking back, we find the drawing by anatomist Grey [17], who clearly indicated on his engraving of a cross-section of the knee joint that, in most instances of KEA, the patellar ligament extends beyond the patella and the proper patellar ligament is attached to the inferior pole by only a small portion of fibers.

References

1. Jahangir N, Umar M. Spontaneous superior patellar dislocation in young age: case report and reduction technique. J Surg Case Rep. 2017 Mar 9; 2017(3):rjx036. doi: 10.1093/jscr/rjx036. PMID: 28458846; PMCID: PMC5400437.
2. Cusco X, Seijas R, Ares O, Cugat JR, Garcia-Balletbo M, Cugat R. Superior dislocation of the patella: a case report. J Orthop Surg Res. 2009 Jul 30;4:29. doi: 10.1186/1749-799X-4-29. PMID: 19642996; PMCID: PMC2724434.
3. Yip DK, Wong JW, Sun LK, Wong NM, Chan CW, Lau PY. The management of superior dislocation of the patella with interlocking osteophytes – an update on a rare problem. J Orthop Surg (Hong Kong). 2004 Dec;12(2):253-7. doi: 10.1177/230949900401200223. PMID: 15621918.
4. Watson-Jones R. Fractures and Joint Injuries. 5th edn Baltimore: Williams & Wilkins, 1956;792–3.
5. Saleemi AJ, Hussain A, Iqbal MJ, Thuse MG, George AA. Superior dislocation of patella in a rugby player: an update on a extremely rare condition and review of literature. Knee Surg Sports Traumatol Arthrosc. 2007 Sep;15(9):1112-3. doi: 10.1007/s00167-006-0283-7. Epub 2007 Jan 23. PMID: 17242948.
6. Kataoka T, Iizawa N, Takai S. Superior Dislocation of the Patella in a Young Woman without Osteophytes: A Case Report. J Nippon Med Sch. 2016;83(1):24-6. doi: 10.1272/jnms.83.24. PMID: 26960585.
7. Javedani PP, Goldberg LC, Panchal AR. Closed Emergency Department Reduction of a Superior Patellar Dislocation After Blunt Trauma. J Emerg Med. 2018 Oct;55(4):567-569. doi: 10.1016/j.jemermed.2018.06.020. Epub 2018 Aug 10. PMID: 30104035.
8. Ofluoglu O, Yasmin D, Donthineni R, Yildiz M. Superior dislocation of the patella with early onset patellofemoral arthritis: a case report and literature review. Knee Surg Sports Traumatol Arthrosc. 2006 Apr;14(4):350-5. doi: 10.1007/s00167-005-0670-5. Epub 2005 Oct 6. PMID: 16208460.
9. Gakhar H, Singhal A. Superior dislocation of the patella: case report and review of the literature. J Emerg Med. 2013 Feb;44(2):478-80. doi: 10.1016/j.jemermed.2012.03.026. Epub 2012 Jun 30. PMID: 22749849.
10. Dubey V, Sangnod PA, Samant A, Shahane SM. Superior Dislocation of Patella – A Rare Clinical Entity. J Orthop Case Rep. 2019;9(2):42-44. doi: 10.13107/jocr.2250-0685.1362. PMID: 31534932; PMCID: PMC6727440.
11. Clift RK, El-Alami W. Superior patellar dislocation: the value of clinical examination and radiological investigation. BMJ Case Rep. 2012 Dec 10;2012:bcr2012007571. doi: 10.1136/bcr-2012-007571. PMID: 23230252; PMCID: PMC4544200.
12. Lai R, Lau Y. Superior Dislocation of the Patella Treated by Closed Reduction: A Rare Case Report and Review of the Literature. Hong Kong Journal of Emergency Medicine. 2007;14(4):225-227. doi:10.1177/102490790701400406.
13. Kapandji AI. Anatomia Funkcjonalna Stawów. Tom 2. Kończyna dolna, Elsevier Urban&Partner, Wrocław 2013.
14. Teuscher DD, Goletz TH. Recurrent atraumatic superior dislocation of the patella: case report and review of the literature. Arthroscopy. 1992;8(4):541-3. doi: 10.1016/0749-8063(92)90023-5. PMID: 1466719.
15. Bartlett DH, Gilula LA, Murphy WA. Superior dislocation of the patella fixed by interlocked osteophytes. A case report and review of the literature. J Bone Joint Surg Am. 1976 Sep;58(6):883-4. PMID: 956235.
16. Bochenek A, Reicher M. Anatomia człowieka. Tom 1. Red. Warszawa: PZWL Wydawnictwo Lekarskie, 2010, 995 s. ISBN 978-83-200-4323-5.
17. Gray H. Anatomy of the Human Body. Philadelphia: Lea & Febiger, 1918.

Declaration of conflicting interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Declaration of AI and AI-assisted technologies
No part of the manuscript was written by artificial intelligence.