Discoid meniscus, a Rare Cause of Knee Mono-arthritis in Children (A case report and literature review)

Abstract

Introduction: Knee pain is one of the most common musculoskeletal complaints in children and adolescents. There are relatively wide differential diagnoses for knee monoarthritis in children. Discoid meniscus, the most common congenital anomaly of the knee, can have a wide range of symptoms, such as pain, swelling, limited range of motion, and mechanical symptoms, including clicking, snapping, popping, and locking of the knee. We are reporting on such a case that had a late diagnosis and was being treated as rheumatoid arthritis.

Case presentation : A 6-year-old girl presented with a 4-year history of pain, swelling, and limited range of motion in the left knee, being treated with the diagnosis of Juvenile Rheumatoid arthritis(JRA), with lack of response to treatment. Suspicion of discoid meniscus was entertained by physical examination, and imaging studies and confirmed by arthroscopy. The patient underwent arthroscopic saucerization and lateral meniscus repair.

conclusion: According to this case report , discoid meniscus should be considered as an important, rare differential diagnosis in children presenting with knee pain and swelling.

Keywords: knee; pain; Juvenile Rheumatoid arthritis, meniscus

Accepted: *45 days before printing*

Abdolsalam Razzaghi ,MD[1]; Mohammad Ayati Firoozabadi,MD[1]; SM Javad Mortazavi, MD[1]

1. Joint Reconstruction Research Center, Tehran University of Medical Sciences, Tehran, Iran.

Corresponding Author:
Seyed Mohammad Javad Mortazavi
Email address:
smjmort@yahoo.com

Introduction

Knee pain is one of the most common musculoskeletal complaints in children and adolescents, and is more common in physically active patients. Up to 54% of athletes experience some degree of knee pain annually. The differential diagnosis for knee pain is relatively broad, which can make it challenging for physicians to diagnose and trea[(1)].

The pattern, presentation, and duration of arthritis help to differentiate between various differential diagnoses. Monoarthritis involving the knee can present acutely or chronically. Some of the possible differential diagnoses for chronic cases include juvenile idiopathic arthritis (JIA), chronic hemarthrosis, benign and malignant bone tumors, chronic infections such as tuberculosis, and various other diseases and intra-articular lesions such as pigmented villonodular synovitis (PVNS) and sarcoidosis[(2)].

One cause of knee pain is a discoid meniscus, which can be accompanied by other symptoms such as swelling, and mechanical symptoms including clicking, snapping, popping, and locking of the knee. A discoid meniscus is the most common congenital abnormality of the knee, involving a spectrum of different meniscal shapes, characterized by excessive coverage of the lateral tibial plateau[(3)]. The prevalence of discoid meniscus is 0.4-20%, which is higher in Southeast Asian countries such as Korea and Japan, although the true prevalence is unknown due to the lack of symptoms in many patients. A discoid meniscus is more likely to tear than a normal meniscus, which can occur even after a low-energy trauma[(4)].

According to Watanabe's classification[(5)], the discoid meniscus is divided into three types: Type 1 complete discoid meniscus, Type 2 incomplete, and Type 3 Wrisberg or unstable. The type of discoid meniscus, especially its stability or instability, and the presence of pain and mechanical symptoms determine the kind of treatment and prognosis[(6)]. this study aims to present a patient with chronic knee pain with a diagnosis of discoid meniscus to demonstrate that a strong clinical suspicion is necessary to diagnose this pathology in children, especially in cases that occur at a young age.

Iranian Journal of Orthopaedic Surgery
Vol. 21, No. 3 (Serial No. 82), summer 2023, p. 99-103

Case presentation

A 6-year-old girl presented with left knee pain and swelling for the past 4 years. The patient's symptoms began at the age of 2 with morning stiffness, swelling, and clicking. She continued with impaired knee movement and difficulty walking due to the inability to extend the knee fully. The parents did not report any history of trauma.

various tests were performed to investigate and diagnose the disease, and the patient had a positive rheumatoid factor (RF) and C-reactive protein(CRP) (1+), and a White blood cell (WBC) count of 16600 in complete blood count (CBC). Based on the symptoms and tests, the patient was diagnosed with juvenile rheumatoid arthritis (JRA) for 4 years and was treated with weekly methotrexate. The parents mentioned two intra-articular corticosteroid injections to reduce the patient's symptoms. After repeated visits and no response to treatment, the patient was referred to the knee clinic and underwent an examination.

On examination, there was swelling and limited knee extension (10 degrees of flexion contracture) with a range of motion of 0-10-120 (20 degrees of flexion limitation and 10 degrees of flexion contracture). Anteroposterior(AP) and lateral radiographs of the knee were obtained, and on the AP radiograph, increased lateral joint space was seen. (Figure 1).

With Magnetic resonance imaging (MRI), the patient was diagnosed with type 3 discoid meniscus. On MRI, the discoid meniscus was seen trapped in the intercondylar notch. The patient underwent surgical treatment. On arthroscopy, the patient had a complete and unstable lateral discoid meniscus and was easily mobilized using a probe. Therefore, the patient underwent arthroscopic saucerization and repair of the lateral meniscus with a synovial attachment using the outside-in technique (although the posterior meniscus repair is usually performed using the inside-out technique, in this patient, due to the senior surgeon's skill, the outside-in technique was used) (Figure 3).

After surgery, full range of motion and full weight-bearing were started for the patient. In a one-month follow-up, the patient's pain was completely relieved, and full extension and flexion were achieved, with a range of motion of 0-140 degrees.

Figure 1: Radiograph (anteroposterior view) of the left knee: Increased joint space on the lateral side is observed.

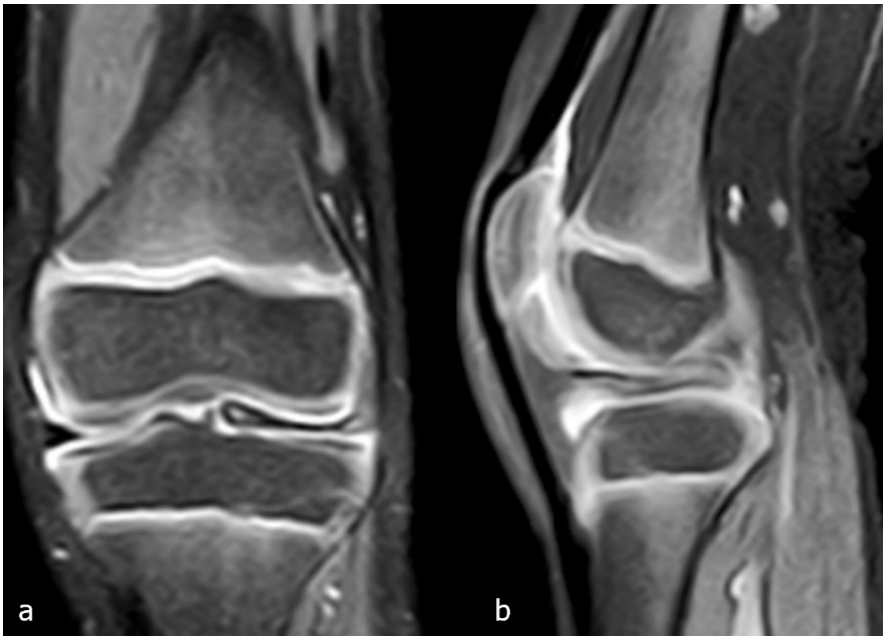

Figure 2: Fat-suppressed MRI of the left knee:
a. Coronal view with discoid meniscus covering the entire of lateral tibial plateau
b. Sagittal view showing a discoid meniscus entrapped in the intercondylar notch.

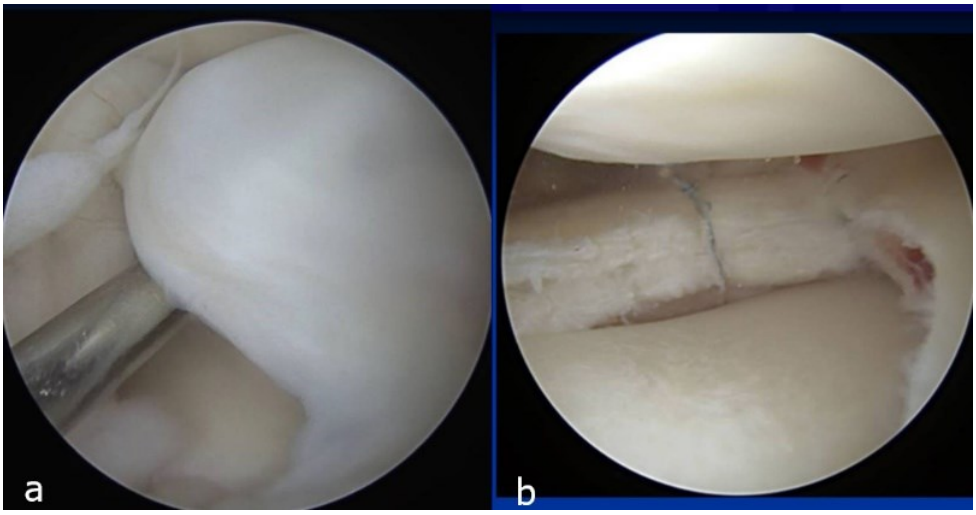

Figure 3: Arthroscopic view:
a.Discoid meniscus before saucerization.
b: Discoid meniscus after saucerization and outside-in technique repair.

Discussion

Unstable discoid lateral meniscus (Wrisberg type) is a rare condition characterized by excessive mobility and instability of the meniscus due to the absence of posterior attachments to the tibia. In this condition, the only attachment of the lateral meniscus is the Wrisberg ligament, which can be complete, incomplete, or normal in shape[3]. In this patient, the Wrisberg-type discoid meniscus was complete and associated with instability and locking.

The most common clinical findings in these patients include pain, swelling, locking, and an audible or palpable "clunk" during knee flexion or extension[7].
In the patient under study, all of the above symptoms and an audible clunk were present since the age of two and were observed during the physical examination.
The diagnosis of discoid meniscus, in addition to clinical symptoms, requires various diagnostic modalities such as radiography, ultrasound, and MRI. Among these, MRI and direct visualization during arthroscopy are considered the most effective methods for differentiating between complete and incomplete types. As the initial diagnostic modality, radiography can help us differentiate between complete and incomplete cases. The presence of findings such as increased lateral joint space, cupping of the lateral tibial plateau, hypoplasia and squaring of the lateral femoral condyle, hypoplasia of the tibial spine, high fibular head, and condylar cut-off sign is indicative of a complete discoid meniscus[8, 9].
In a study by Song JG and colleagues[8], increased joint space, condylar cut-off sign, and high fibular head were mentioned as three useful radiological findings for screening patients with complete discoid meniscus. In the patient under study, increased lateral joint space was evident on the AP view of the knee radiograph.
Beck JJ and colleagues[10] demonstrated that adult MRI criteria can be used to diagnose discoid meniscus in children and adolescents. They showed that a bow-tie appearance on more than three sagittal views, coverage of more than 70% of the tibial plateau on sagittal views, a width greater than 14 mm on coronal views, and coverage of more than 20% of the tibial plateau on coronal views are suitable for diagnosing lateral discoid meniscus.
In 1989, Silverman[11] introduced five diagnostic criteria for diagnosing discoid meniscus. According to these criteria: 1. The presence of at least three consecutive 5mm sequences with continuity between the anterior and posterior horns of the meniscus. 2. upper-lower height in the augmented mid-zone generating a bowtie shape in the sagittal view. 3. A difference in the size of the anterior and posterior horns of the meniscus, which are usually symmetrical. 4. The presence of a complete meniscus on all MRI sequences in the coronal view from anterior to posterior of the knee, which normally should only be seen in the posterior and anterior sequences. 5. Increased transverse diameter of the meniscus greater than or equal to 15 mm or greater than or equal to 20% of the width of the tibial plateau on coronal view.
In the patient under study, increased superior-inferior height of the meniscus, increased bow-tie appearance on sagittal views, and continuity between the anterior and posterior horns of the meniscus on all coronal cuts from anterior to posterior, and coverage of more than 20% of the lateral tibial plateau on coronal views were evident. In this patient, the meniscus was a complete discoid type (type 1), covering the entire surface of the lateral plateau (more than 20% of the plateau surface and a meniscal width in the midbody of more than 15 mm).
The treatment of discoid meniscus can be either conservative or surgical. According to a study by Yang and colleagues, there are three indications for non-surgical treatment: 1. Asymptomatic lesions discovered incidentally. 2. Cases with mild clinical symptoms that do not affect the patient's normal daily activities and sports. 3. Cases with severe symptoms caused by other concomitant diseases[12]. According to Yang's study, two indications for surgery include 1. Lesions that affect the patient's daily activities. 2. Mild symptoms in young patients. There are various treatment options, including partial meniscectomy (such as saucerization or reshaping), partial meniscectomy with repair, total or subtotal meniscectomy, and meniscal allograft transplantation. Several factors such as patient age, type of discoid meniscus, lesion location, knee stability, and patient activity level influence the choice of treatment[13].
Nicholson and colleagues found that if a partial meniscectomy is performed, the remaining meniscal tissue should be evaluated for instability and concomitant tears. They stated in this study that concomitant tears should be repaired using the all-inside suture technique for posterior meniscal tears, inside-out for midbody tears, and outside-in for anterior tears[14]. When performing saucerization, the amount of meniscus to be preserved is controversial, and most researchers agree on preserving 6 to 8 mm of the peripheral meniscus[15].
In this study, due to the presence of clinical symptoms and impaired function, surgical treatment was chosen as the appropriate treatment option, and the patient underwent arthroscopic surgery. During arthroscopy, a complete discoid meniscus of

the Wrisberg type without posterior attachments (unstable) was observed. Initially, saucerization was performed while preserving a suitable peripheral rim, and then it was reattached to the capsule using the outside-in technique.

In a study by Kose and colleagues, age was identified as the most important factor determining patient prognosis, and prognosis worsened with increasing age, while gender, disease type, presence or absence of tears, and duration of symptoms did not affect patient prognosis[16].

A one-month follow-up of the patient revealed a pain-free knee with a full active and passive range of motion.

Conclusion

Unstable lateral discoid meniscus (Wrisberg type) is an uncommon cause of chronic pain, limited motion, and some degree of swelling in children, and may be mistaken for many other causes of mono-arthritis, including inflammatory diseases such as juvenile idiopathic arthritis (JRA). A strong clinical suspicion is necessary to differentiate discoid meniscus from other diseases. We recommend that lateral discoid meniscus be considered as an important differential diagnosis in children presenting with mono-arthritis of the knee.

References

1. Yen Y.-M. Assessment and treatment of knee pain in the child and adolescent athlete. Pediatric Clinics, 2014; 61(6): p. 1155-1173 https://doi.org/10.1016/j.pcl.2014.08.003. PubMed PMID: 25439017.
2. Prabhu AS, Balan S. Approach to a child with monoarthritis. The Indian Journal of Pediatrics, 2010; 77: p. 997 https://doi.org/10.1007/s12098-010-0131-0. PubMed PMID: 20821284.
3. Kaushal SG, Menghini D, Sanborn RM, Kramer DE, Heyworth BE, Kocher MS et al.MRI Analysis of Knee Bony Morphology Variations in Children and Adolescents With Lateral Discoid Meniscus Compared With Asymptomatic Healthy Controls. The American Journal of Sports Medicine, 2023; 51(12): p. 3190-3196 https://doi.org/10.1177/03635465231190792. PubMed PMID: 37641845.
4. Ellis Jr HB, Wise K, LaMont L, Copley L, Wilson P. Prevalence of discoid meniscus during arthroscopy for isolated lateral meniscal pathology in the pediatric population. Journal of Pediatric Orthopaedics, 2017; 37(4): p. 285-292 .doi:10.1097/BPO.0000000000000630. PubMed PMID: 26356314.
5. Watanabe M, Takeda S, Ikeuchi H. Atlas of arthroscopy. (No Title), 1979.
6. Wasser L, Knörr J, Accadbled F, Abid A, Sales De Gauzy J. Arthroscopic treatment of discoid meniscus in children: clinical and MRI results. Orthopaedics & Traumatology: Surgery & Research, 2011; 97(3): p. 297-303 https://doi.org/10.1016/j.otsr.2010.11.009 .PubMed PMID: 21435965.
7. Kocher MS, DiCanzio J, Zurakowski D, Micheli LJ. Diagnostic performance of clinical examination and selective magnetic resonance imaging in the evaluation of intraarticular knee disorders in children and adolescents. The American journal of sports medicine, 2001; 29(3): p. 292-296 https://doi.org/10.1177/03635465010290030601. PubMed PMID: 11394597.
8. Song JG, Hwi Han J, Ho Kwon J, Shetty GM, Anthony M Franco L, Young Kwon D, et al. Radiographic evaluation of complete and incomplete discoid lateral meniscus. The Knee, 2015; 22(3): p. 163-168 https://doi.org/10.1016/j.knee.2014.11.012. PubMed PMID: 25782983.
9. Kim SJ, Moon SH, Shin SJ, Radiographic knee dimensions in discoid lateral meniscus: comparison with normal control. Arthroscopy: The Journal of Arthroscopic & Related Surgery, 2000; 16(5): p. 511-516. https://doi.org/10.1053/jars.2000.4380. PubMed PMID: 10882447.
10. Beck JJ, Wahle CF, Wood A, Bennett A, Jackson N. Utility of Adult-Based Discoid Lateral Meniscus Diagnostic Criteria in a Pediatric Population. Orthopaedic Journal of Sports Medicine, 2024; 12(4): p. 23259671241239036. https://doi.org/10.1177/23259671241239036. PubMed PMID: 38617887; PubMed Central PMCID: PMC11010757.
11. Silverman JM, Mink JH, Deutsch AL, Discoid menisci of the knee: MR imaging appearance. Radiology, 1989; 173(2): p. 351-354. https://doi.org/10.1148/radiology.173.2.2798867. PubMed PMID: 2798867.
12. Yang B, Logan CA, Feroe AG, Kocher SD, Williams KA, Kocher MS. Utility of stability and tear location in a classification system for discoid meniscus surgical planning. Journal of Pediatric Orthopaedics, 2022; 42(1): p. e50-e54 .https://doi.org/10.1097/bpo.0000000000001975. PubMed PMID: 34889833.
13. Yang S, Zhang S, Li R, Yang C, Zheng J, Wang C, et al. Chinese experts consensus and practice guideline on discoid lateral meniscus. Orthopaedic Surgery, 2023;15(4): p. 915-929 .https://doi.org/10.1111/os.13687. PubMed PMID: 36878896; PubMed Central PMCID: PMC10102324.
14. Nicholson A, Petit L, Egger A, Saluan P, Carter CW. Current Concepts: Evaluation and Treatment of Discoid Meniscus in the Pediatric Athlete. American Journal of Orthopedics (Belle Mead, NJ), 2018; 47. https://doi.org/10.12788/ajo.2018.0107. PubMed PMID: 30650166.
15. Adachi N, Ochi M, Uchio Y, Kuriwaka M, Shinomiya R. Torn discoid lateral meniscus treated using partial central meniscectomy and suture of the peripheral tear. Arthroscopy: The Journal of Arthroscopic & Related Surgery, 2004; 20(5): p. 536-542. https://doi.org/10.1016/j.arthro.2004.01.028. PubMed PMID: 15122147.
16. Kose O, Celiktas M, Egerci OF, Guler F, Ozyurek S, Sarpel Y. Prognostic factors affecting the outcome of arthroscopic saucerization in discoid lateral meniscus: a retrospective analysis of 48 cases. Musculoskeletal surgery, 2015; 99: p. 165-170. https://doi.org/10.1007/s12306-015-0376-x. PubMed PMID: 25986993.