

Symptomatic Discoid Lateral Meniscus Treated with Arthroscopic Procedure: Observations in 20 Knees

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ABSTRACT

Introduction: Discoid meniscus is a broad disc like congenital anatomical abnormality of the meniscus. Discoid meniscus is often revealed clinically during childhood. However, many patients with discoid meniscus remain asymptomatic and presents late. Surgery is needed only for symptomatic discoid meniscus. There has been considerable debate about the best treatment options for symptomatic discoid meniscus. The purpose of this study was to evaluate the effectiveness of the arthroscopic procedures for the symptomatic discoid meniscus.

Methods: Twenty patients with symptomatic lateral discoid meniscus were reviewed retrospectively after arthroscopic surgery with a minimum follow up period of 12 months. There were 8 males and 12 females with a mean age of 20.7 years (range, 7-42 years). Symptoms included pain in 80%, popping and snapping in 50%, locking in 50%, giving way in 60% cases; and objective signs included loss of extension in 40% and positive McMurry test in 60% cases. Arthroscopic saucerization and partial lateral meniscectomy or total meniscectomy was performed according to the type and pathology of the discoid meniscus.

Results: The operations on all the 20 knees were successful without complications. The results showed 80% good to excellent, 20% fair, and none poor. The patients were followed

up for a minimum period of 12 months and most of them started normal activities after 3-4 weeks.

Conclusion: Treatment of symptomatic torn discoid meniscus by arthroscopic procedure is safe, simple with minimal operative trauma and fewer complications. These procedures can be done with standard arthroscopic setup and portals, and no special instrumentation is required. The outcome is better and recovery is earlier than the open procedure.

Key words: Discoid Meniscus; Arthroscopic Saucerization; Partial Meniscectomy.

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INTRODUCTION

A discoid meniscus is a congenital dysplastic meniscus in which atypical development of the meniscus leads to a broad disc like configuration. The lateral discoid meniscus is common than the medial. It is larger, wider and thicker than the normal fibrocartilaginous meniscus of the knee and covers the tibial plateau more than the normal one.^{1,2} Discoid lateral menisci were first described in the late 1800s.³ The stated prevalence of discoid meniscus in various studies varies between 0.4% and 17%.^{2,4,5} In addition to clinical features, accurate diagnosis has become possible using magnetic resonance imaging (MRI) and arthroscopy.

Conservative treatment, which includes life style modification and physiotherapy, is adequate for non-symptomatic and incidentally found discoid lateral meniscus. An intermittent follow-up for the exclusion of symptoms and a physical examination permits early detection of any deterioration and helps in planning appropriate

treatment.⁶ Surgery is needed in case of symptomatic torn discoid meniscus causing pain and locking or limiting the movement of the knee joint. The surgical methods for discoid lateral meniscus tear include open or arthroscopic procedures, which can be subdivided into total meniscectomy, partial meniscectomy and saucerization with or without suture repair of a meniscal tear.

The traditional treatment for discoid meniscus is open total meniscectomy, in which almost whole meniscus is resected. This procedure frequently leads to the early development of cartilage degeneration and other complications.⁷ Current biomechanical studies of the knee leads to better understanding and documentation of the importance of the menisci to normal joint function. Improvement and development of arthroscopic techniques, particularly saucerization and partial meniscectomy, preserve the part of the meniscus and keeps its normal shape. These procedures for symptomatic discoid meniscus has

achieved excellent outcomes⁸ and permitted more accurate diagnosis and better treatment of the lesion.^{9,10} Therefore, arthroscopic partial meniscectomy and saucerization have been advised for the better functional outcome.¹¹

We retrospectively investigated the short-term clinical results of arthroscopic procedures for discoid lateral meniscus in 20 knees. The purpose of this study was to evaluate the effectiveness of the arthroscopic treatment in patients with the symptomatic discoid meniscus.

MATERIALS AND METHODS

Twenty patients with symptomatic lateral discoid meniscus were reviewed retrospectively after arthroscopic surgery with a minimum follow up of 12 months (12-18 months). All the arthroscopic procedures were done by the same surgeon between

2014 to 2015. All patients received a variable period of conservative treatment before surgery. There were 8 males and 12 females with a mean age of 20.7 years (range, 7-42 years).

The pre-operative patient's assessment included detail history, physical examination (table 1). The injured knee was also assessed by X-ray and MRI. Any significant history of pain, locking, catching, clicking, or other mechanical symptoms and effusion was noted. Initial complete knee examinations were performed which included the presence or absence of effusion, presence of clunking, joint line tenderness and the range of motion. Special tests for meniscus (McMurry test) and ligament stability were also performed (table1). Four patients had a history of some form trauma during playing soccer. The preoperative MRI features were all coincided with those of the arthroscopic examination.

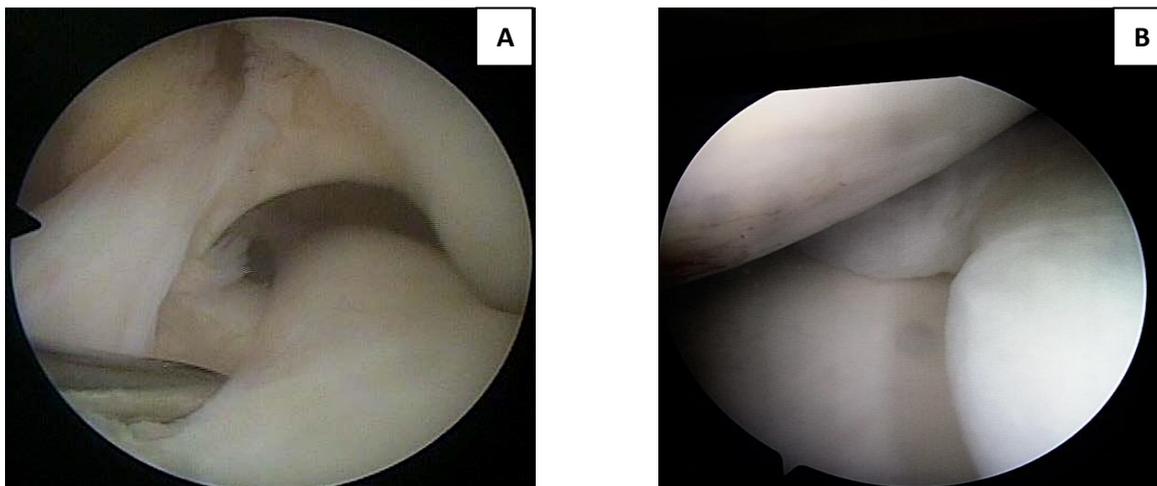


Figure 1: (A) Complete type and (B) incomplete type of discoid lateral meniscus.

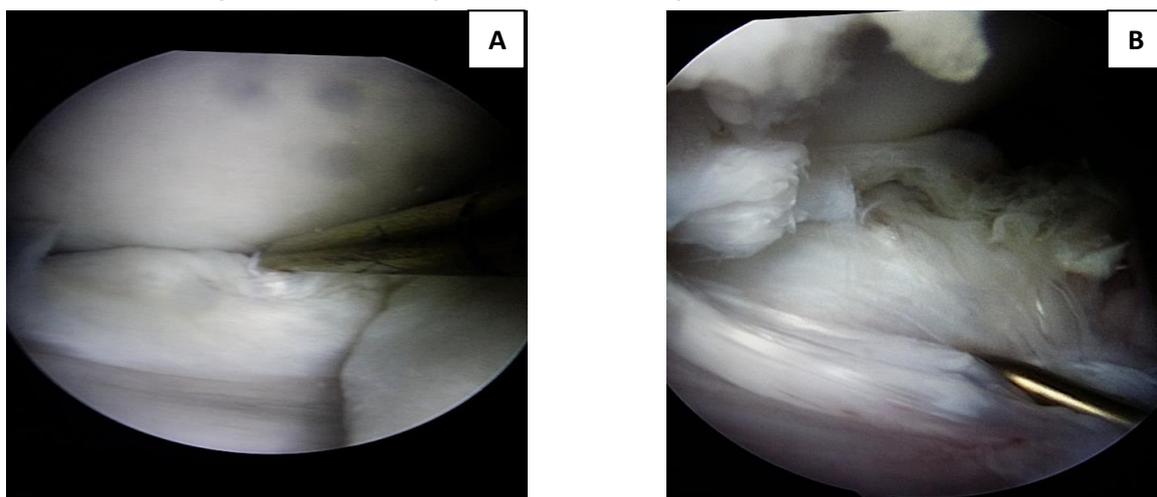


Figure 2: (A) Longitudinal tear and (B) complex tear of the lateral discoid meniscus.

All arthroscopic procedures were performed under spinal anesthesia. The patients were placed in the supine position, with the knee flexed at 90°. Two portals, anteromedial and anterolateral, were used for viewing and using arthroscopic instruments. A 4mm 30° arthroscope was used in all procedures. First diagnostic arthroscopy was done to detect the pathology within the knee. After that, patients were placed in the figure of four positions for better access to the lateral compartment. Arthroscopic probe was used to identify the type of discoid lateral meniscus and evaluate the stability, position, and extent of the meniscus tear.

Watanabe classification system was used intraoperatively to classify the discoid meniscus. There are mainly three types of discoid meniscus (complete, incomplete, or Wrisberg type), which is based on the degree of coverage of the tibial articular surface and stability.¹²

In this study, there were 17 complete and 3 incomplete variety of discoid menisci (fig 1) and all the cases had some form of tears (fig 2). Tears of the discoid meniscus were classified with respect to the location, type, and pattern of instability. There were associated chondral damage (Outerbridge- Grade 1 & 2) in the lateral tibial plateau and lateral femoral condyle in 4 cases. No

other pathology was detected during arthroscopy. The exact technique for partial meniscectomy and saucerization depends on the type and configuration of the tear. According to the type and extent of the tear, partial discoid meniscectomy and saucerization

were performed on 16 knees with the complete variety of discoid meniscus (table 2). The purpose of saucerization and partial meniscectomy is to create a stable and functional normal looking remaining meniscus that will provide adequate shock absorption.

Table 1: Clinical features of the 20 patients

Symptoms		Signs	
Pain	16 (80%)	Effusion	08 (40%)
Limping	16 (80%)	Joint line tenderness	10 (50%)
Popping and snapping	10 (50%)	Clunking	10 (50%)
locking	10 (50%)	Loss of extension	08 (40%)
Giving away	12 (60%)	Positive McMurry test	16 (80%)
Swelling	08 (40%)		

Table 2: Arthroscopic procedures according to types of meniscus and tear pattern

Type of discoid meniscus	Tear pattern	Type of arthroscopic procedure	No. of patients
Complete	Horizontal cleavage tear	Saucerization and partial meniscectomy	16
Complete	Complex tear	Total meniscectomy	01
Incomplete	Bucket handle tear	Partial meniscectomy	01
Incomplete	Longitudinal tear	Partial meniscectomy	01
Incomplete	Complex tear	Total meniscectomy	01

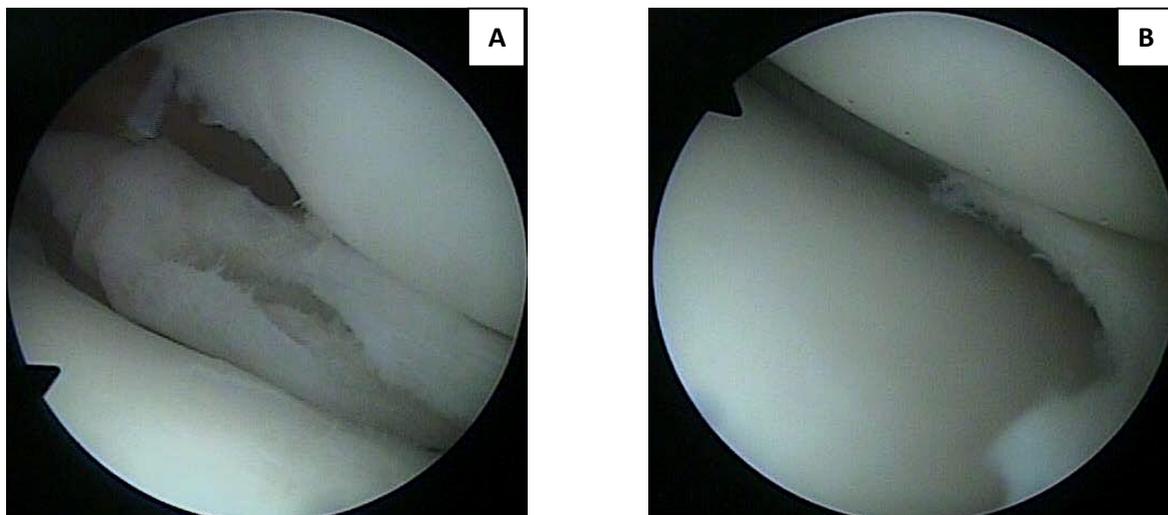


Figure 3: (A) Horizontal tear is seen after saucerization. (B) After partial meniscectomy and resection of lower lip of the horizontal tear.

We first performed saucerization, consisting of centrifugal resection with a punch and shaver to obtain a normal crescent shaped meniscus and 6-8 mm peripheral main body rim of the meniscus was preserved.¹³ Then, the remaining meniscus and the tear was assessed by a probe. As the tears (Horizontal) were non-repairable in most of our cases, partial meniscectomy was performed to remove the lesioned zone (figure 3.A). Most of the cases with the horizontal tear in the complete variety, no abnormality was evident on the femoral surface of the discoid. We had to cut some part of the meniscus and probed to detect the tear. In some cases of horizontal tear, we resected the degenerated of the tear and kept the upper one (figure 3.B). Following the partial meniscectomy, the resected edge was smoothed.

Partial meniscectomy alone was performed on 2 cases of the incomplete discoid meniscus with a longitudinal tear in one case and a bucket handle tear on the other case. Total meniscectomy was done on 2 knees with a complex tear (figure 4). The arthroscopic procedure of incomplete discoid meniscus tears is easier and quite similar to partial meniscectomies performed for a normal meniscus tear. After the procedure, the joint was thoroughly lavaged and the arthroscopic portals were stapled. Postoperative rehabilitation started soon after the surgery with all the patients instructed to perform muscular training focusing on quadriceps femoris muscle. They were instructed to do isometric quadriceps exercises. Range of motion (ROM) exercises of the knee joint were performed in the second week, and patients could walk with walking sticks. Four weeks after surgery, most of the

patients went back to normal life and continued the above training. All 20 patients were followed up for a minimum period of 12 months (ranging from 12 to 18 months). The Tegner Lysholm

knee scoring scale was used to assess the function of the knee prior to surgery and during the follow-up, and the results were compared using a Student's t-test with SPSS.

Table 3. The Tegner Lysholm score measured preoperatively and postoperatively.

Time	Tegner Lysholm knee scoring	
	Range	Average
Preoperative	42-76	62.85
12 months after operation	78-99	89.75

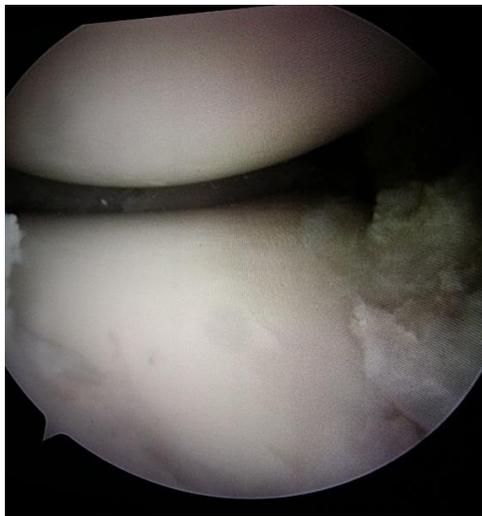
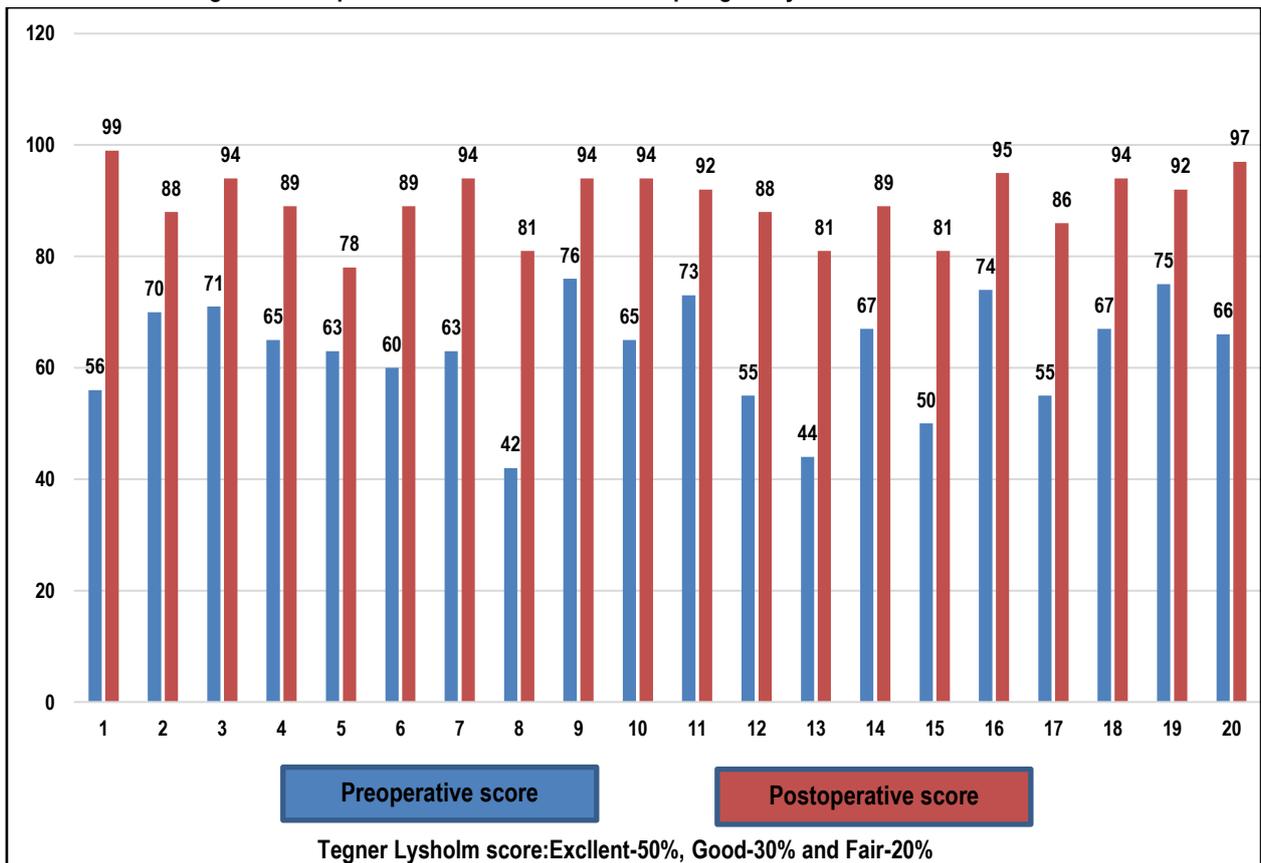


Figure 4: After total meniscectomy.



Figure 6: Sagittal T2-weighted MRI shows a horizontal cleavage tear in a discoid lateral meniscus.

Figure 5: Preoperative and 12 months follow-up Tegner Lysholm score of all 20 cases



RESULTS

The operations on all the 20 ($n=20$) knees were successful without major complications. The patients basically had normal activities after 3-4 weeks and followed up for a minimum period of 12 months. The mean Tegner Lysholm-score was 62.85 (range, 42-76) before the operation and increased significantly ($P<0.05$) to 89.75 (range, 78-99) during the follow-up (table 3). 80% ($n=16$) of the operations achieved excellent or good clinical results and none of the knees had a poor result (figure 5).

Three patients had pain and mild swelling of the knee joint immediately after surgery and persisted for few weeks. 6 patients complained of mild pain and discomfort in the lateral joint line of the operated knee with occasional locking and giving way soon after surgery, but improved after 4 to 6 months. All the patients experienced improvement of their symptoms after surgery. However, during follow-up outcome score was less in 2 patients with total meniscectomy than the others. Overall, our experience showed the beneficial effect of arthroscopic procedure for the symptomatic discoid meniscus.

DISCUSSION

Persistence of the initial embryonic arrangement may be the cause of development of discoid meniscus, but a unanimously accepted explanation for the development of discoid lateral meniscus has not yet been established.^{2,14} It is more common on the lateral side than the medial. Discoid lateral menisci have been reported to occur at the rate of 1.5-3% in the general population¹⁵ and the Asian population has a slightly higher rate of occurrence.¹⁶

Normal functions of the meniscus, particularly shock absorption and load bearing, cannot be maintained by the injured discoid meniscus.¹⁷ Structural differences also exist between normal and discoid meniscus. Collagen fibrils in discoid meniscus are asymmetrical, misaligned and decreased in number. The thickened cartilage, because of its anatomic properties, is more prone to tear with sports activities when compared with a normal meniscus. As the discoid meniscus is thicker and has poorer vascularity than normal meniscus, abnormality in the knee is often seen in torn discoid meniscus due to increase mechanical and shear forces in the knee (tibio-fibular compartment) joint.¹⁸ As a result, degeneration of articular cartilage occurs and which may lead to early development of osteoarthritis.

The symptoms of discoid meniscus depend on the type, location (medial or lateral) and the presence of a tear.¹⁹⁻²¹ In 1910, Kroiss et al first described the term "snapping knee syndrome" because of its clinical presentation.²² The snapping knee may have associated with pain, giving away, effusion, limitation of movement, clicking, or locking. Discoid meniscus causes symptoms primarily in children and adolescents.²³ However, Symptoms due to tear can appear at any age. Our findings also showed that symptomatic discoid meniscus patients with different ages (7-42 years), which is similar to other reports in the literature.^{4,24,25}

Pain is the main symptom in the majority of the cases. In our experience, pain with limping was the common symptom. Sixteen (80%) out of twenty patients had pain during some form of activity, particularly during squatting and climbing stairs (table 1). These findings are similar to other studies.^{26,27} However, the classical clunking or snapping so characteristic of the discoid meniscus was

found only in 10 (50%) of our cases. We found locking during knee extension in 10 patients and positive McMurray test on physical examination in most of the cases (80%). This is probably due to some form tears in the discoid meniscus. Other associated clinical findings like swelling, popping, giving away, effusion and loss of extension were also found.

Radiographs are usually normal in the discoid meniscus. However, a pre-operative radiograph can exclude other causes of knee pain, including different types of arthritis, fracture, and tumour. Researchers have described classical radiographic findings of discoid meniscus, which include lateral joint space widening and cupping of the tibial plateau.^{4,28} In our series, none of the knees displayed these classic findings. MRI and Arthroscopy can accurately diagnose the types of the discoid meniscus and its pattern of tears. In MRI, a discoid meniscus is seen as an abnormally wide body on three or more standard sagittal images (figure 6). It can perfectly detect the type, extent, and position of the tear.^{29,30}

MRI also plays an important role in diagnosing and planning before arthroscopic procedures for symptomatic discoid meniscus, particularly in complete variety with horizontal tears. In these cases, no abnormality was usually obvious on the femoral surface and the tear was detected after cutting off some part of the meniscus and probing the remaining resected part. However, an arthroscopic examination should be performed for the final decision regarding the size, shape, and stability of the meniscus, and the state of the injury.

Watanabe classification system is commonly used to classify the discoid meniscus into three main types (complete, incomplete and Wrisberg type).¹² The complete type is the most common type of discoid meniscus, which is thick, wide and fills the entire tibial plateau. Horizontal cleavage tear is the most common type of tear, particularly in complete discoid meniscus.² Longitudinal tears, including bucket handle tears, are also present in children with the discoid meniscus.^{16,31,32} In this series, we classified discoid meniscus by using the system of Watanabe. We observed that 80% ($n=16$) of the tears were horizontal cleavage with an upper and lower lip. All these tears were present in the complete variety. One bucket handle tear and a longitudinal tear was found in patients with incomplete discoid meniscus (figure 2.A). 2 complex tears (combination of horizontal and longitudinal tears) were also detected during arthroscopy (figure 2.B). There were associated chondral damage (Outerbridge- Grade 1 and 2) in the lateral tibial plateau and lateral femoral condyle in 4 cases.

Conservative treatment is recommended in many asymptomatic children with the discoid meniscus.¹⁶⁻¹⁸ Surgical treatment is not indicated in an otherwise asymptomatic knee with the incidental finding of the discoid meniscus. The traditional treatment for a discoid lateral meniscus tear is to open the joint and resect the meniscus. However, open total meniscectomy has a detrimental effect on the knee and often leads to arthritis of the knee.⁷ Because of concerns about the development of degenerative arthritis following complete meniscectomy, arthroscopic partial meniscectomy and saucerization is usually recommended treatment with an attempt to convert meniscus back to a more normal shape and size.^{33,34}

With the development of newer techniques, the recent literature supports a timely arthroscopic treatment for symptomatic discoid lateral meniscus and it is universally accepted that arthroscopic

discoid partial meniscectomy and saucerization is the best option.^{31,35,36} In cases of persistent lesion after saucerization, partial meniscectomy is recommended.³⁶ In our study, 20 patients (20 knees) with torn discoid lateral meniscus were treated by the arthroscopic procedure. Among the 20 knees, 16 knees (80%) with a complete variety of discoid meniscus were treated by saucerization and partial meniscectomy. We first performed saucerization and after that partial meniscectomy was done to remove the lesioned zone. Partial meniscectomy alone was performed on 2 cases of the incomplete discoid meniscus.

Many studies have shown better results with partial meniscectomy of the torn discoid lateral meniscus.³⁶⁻³⁹ The results of our study also showed that saucerization and partial meniscectomy is superior to total meniscectomy. In case of the partial meniscectomies, we preserved a rim of 6-8 mm in complete-type lesions and 8-10 mm in incomplete-type lesions. As a result, the process of cartilage degeneration is delayed and the function of the knee joint is less affected. Occasionally, total meniscectomy is required in a complex tear of the discoid lateral meniscus. Although total meniscectomy can lead to early development of osteoarthritis,⁷ we had to perform total meniscectomy on 2 knees with a complex tear. In these cases, the tear was too severe that the meniscus cannot be preserved.

Previous studies reported good to excellent outcome regarding arthroscopic procedures for the discoid meniscus. Aichroth et al. reviewed 52 children with 62 discoid lateral menisci and an average follow-up of 5.5 years and recommended arthroscopic partial meniscectomy for the symptomatic discoid meniscus.²⁶ Chiang and colleagues reviewed 41 patients and stated that they achieved 90% excellent outcomes after partial meniscectomy.⁴⁰ In our study, the result of the arthroscopic procedure was satisfactory too. However, our follow-up period was short and the number of patients was less than the other studies. The results showed 80% good to excellent outcome (figure 5). 20% of the patients with complex tear with associated chondral damage, who had total meniscectomy showed fair outcome. Many factors may affect the outcome of the arthroscopic procedure for the discoid meniscus. Delay in the treatment can affect the outcome of the surgery.³⁹ Out of 10 patients, 4 patients in our study came late and their results after surgery were not excellent. Therefore once the diagnosis is confirmed, early surgery is recommended in symptomatic patients with a tear in the discoid lateral meniscus. We also noticed that patient's age, type of tear and associated chondral injuries can affect the outcome. In our study, 2 patients with complex tear with associated chondral damages showed fair outcome & a postoperative result is relatively worse in old patients

CONCLUSION

Arthroscopic saucerization and partial meniscectomy is an effective method of treatment for the discoid lateral meniscus tear. In our experience, short-term (12 months) clinical outcomes of 20 cases were satisfactory. These procedures can be done with standard arthroscopic setup and portals, and no special instrumentation is required. Arthroscopic procedures for discoid meniscus are safe, simple with minimal operative trauma and fewer complications. After saucerization & partial meniscectomy, maximal preservation of the remaining meniscus is possible. As a result, incidence of early development of osteoarthritis is low and patient can recover quickly.

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