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Torn Discoid Lateral Meniscus: The Outcome of Meniscus Preserving Surgery

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ABSTRACT

Background: Meniscus abnormalities associated with discoid lateral meniscus are frequently observed.

Objective: The study's goal was to assess the clinical and functional outcomes of 14 patients with discoid lateral meniscus treated between July 2020 and May 2023 after arthroscopic meniscoplasty with correction of the concomitant meniscal tears.

Patients and methods: There are 14 knees in this series. These patients had a mean of 19 years. Eight men and six females were present. Repetitive locking, excruciating clicking, and loss of complete extension were the primary presenting symptoms. Prior to surgery, MRI confirmation of the pathology was available for every patient. Twelve knees had peripheral menisco-capsular separation. Following the meniscus disc's central saucerization, all patients had an intact meniscus body cleavage tear. The related tears were repaired using either an inside-out approach or completely inside sutures. The IKDC score, symptoms, and complications were taken into consideration when evaluating the clinical outcome.

Results: Reviewing the cases took an average of 43 months. The IKDC mean score ranged from 65.5 to 102.5. The outcome was satisfactory for twelve patients. There were two cases with complications: One case had a meniscal repair that had not healed, and the other case had only regained flexion up to 125 degrees without full range of motion.

Conclusion: It was helpful to stabilize the unstable tear of the symptomatic discoid lateral meniscus by saucerization and repair, which preserve knee function and improve the clinical result during the midterm follow-up period.

Keywords: Torn discoid, Lateral meniscus, Meniscus preserving surgery, Knee.

INTRODUCTION

The discoid meniscus is an anomaly not uncommonly seen that occurs mainly on the lateral knee compartment and it is rare to be found on the medial side. Young [(1)] was the first one to report discoid meniscus in the literature. The estimated incidence of discoid meniscus ranges from 0.4% to 20% [(2, 3)].

These abnormalities change the knee's natural kinematics and increase the risk of injury to the thicker, more substantial meniscus. Due to shearing forces between the femoral condyle and the abnormally formed meniscus, a frequent tear pattern in discoid meniscus is the horizontal cleavage tear, which is present in nearly all cases of discoid meniscus [(4, 5)].

During knee arthroscopy, discoid lateral meniscus instances frequently occur for unrelated pathology without any pertinent clinical symptoms. A popping sound and snapping of the knee felt and heard by the patient, is a common presenting symptom in young children. This is usually subtle and unrelated to a specific traumatic event. Later on, the patient may experience pain and mechanical symptoms of locking, as well as limited knee extension due to an unstable meniscus following trauma that causes it to become trapped during knee extension [(6, 7)].

Watanabe *et al.* [(8)] classification system is commonly used to describe the discoid meniscus. They described 3 morphological anomalies: Type 1 complete type with disk-shaped meniscus that covers almost all the tibial plateau, type 2 incomplete type, which is smaller than type 1 with partial tibial plateau coverage both type 1 and type 2 are stable with intact posterior capsular attachment and type 3 Wrisberg type, which is unstable meniscus due to torn posterior capsular attachment [(8)].

With the progress of arthroscopic surgical techniques and understanding the importance of meniscus preserving surgery, also due to well-documented higher incidence of arthritic changes at long-term follow-up with total meniscectomy. The concept for the treatment of symptomatic discoid lateral meniscus changed from total meniscectomy to meniscus sparing surgery that is repair of the remaining unstable portion and arthroscopic partial meniscectomy to restructure the meniscus (saucerization) [(9)]. Therefore, this study aimed to assess the surgical technique and initial outcomes of arthroscopic treatment for symptomatic discoid lateral menisci in children and young adults.

PATIENTS AND METHODS

In the period from July 2020 to May 2023, 14 knees with symptomatic discoid lateral meniscus were treated arthroscopically by the same surgeon. Preoperative AP and lateral knee X-rays were obtained that provided little information to support the diagnosis. Preoperative MRI for all cases confirmed the lateral meniscus pathology in all cases and if revealed discoid-shaped meniscus in three or more successive sagittal cuts and in coronal cuts diagnosis was confirmed (Figure 1).

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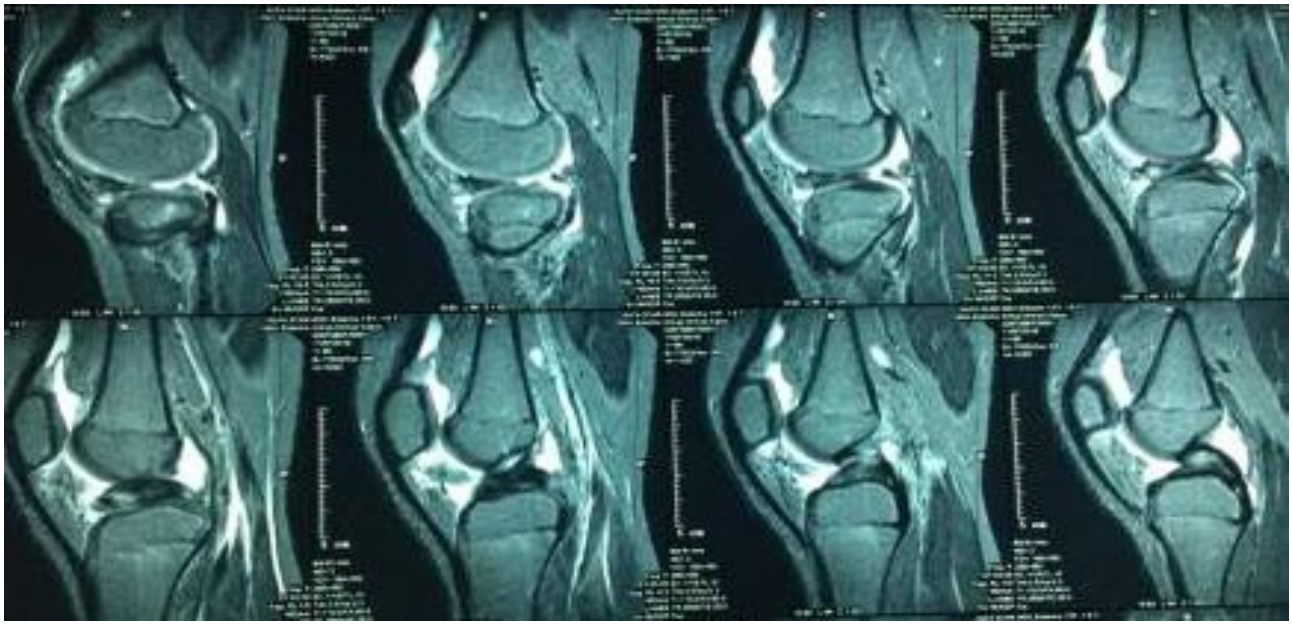

Figure (1): Continuous attachment of the anterior and posterior horns on four successive sagittal MRI cuts.

Figure (2): Coronal MRI cuts showed discoid lateral meniscus.

Surgical technique: Patients were placed in the supine posture and given spinal anesthetic, along with the application of a tourniquet. With the knee in figure of four positions to allow easy access to the lateral knee compartment, direct visualization and probing of the meniscus were used to examine the accompanying posterior capsular separation. Arthroscopic diagnosis of the discoid lateral meniscus and its morphology was recorded, regardless of the extent of the lesion. Shavers and punch forceps were used for saucerization. With punch forceps, start at the middle of the meniscus and cut backwards and forwards to restore the lateral meniscus to its original shape, leaving 6–8 mm of normal meniscal tissue outside the femoral condyle. To smooth the border, the meniscal edge was shaved with a 4.5 mm shaver. Following the saucerization process, meniscal stability and cleavage rips were evaluated once again. Every unstable meniscus was fixed, the kind of repair depends on where the tear is. Anterior horn injuries were repaired from the outside in, but posterior horn tears were repaired entirely inside (Figures 3 & 4).

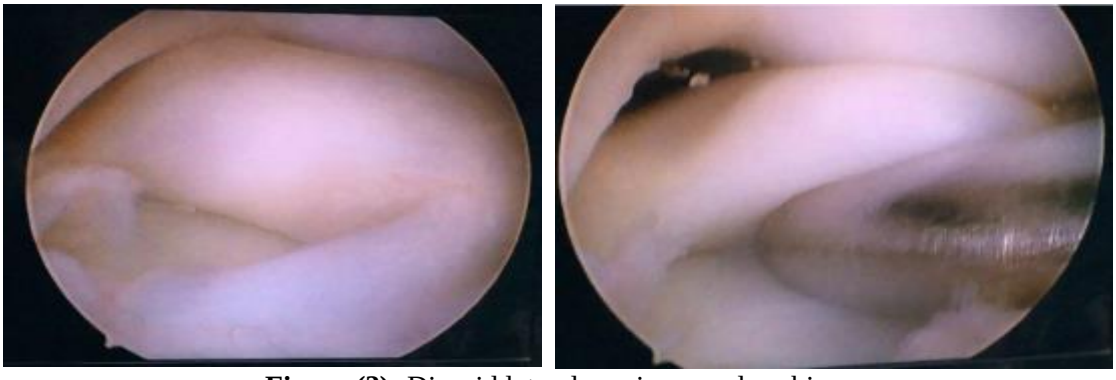

Figure (3): Discoid lateral meniscus and probing.

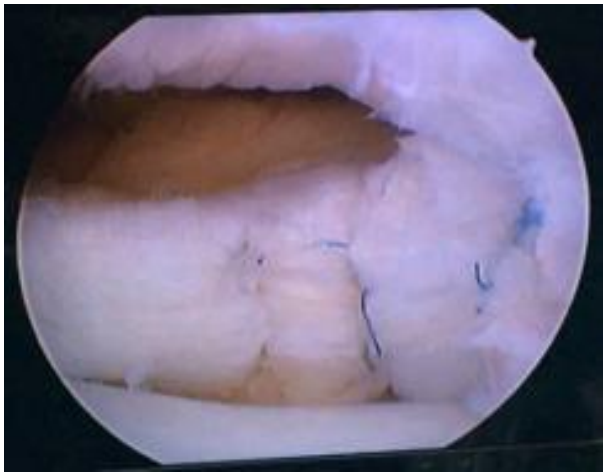

Figure (4): Repair of remaining part after saucerization.

A week-long above-knee splint was applied as part of the postoperative rehabilitation program, along with early quadriceps workouts. After that, for four weeks starting in the second week, a hinged knee brace was worn at full extension. The fourth week showed a 90° increase of flexion. You can resume full ROM after 8 weeks. As soon as the patient is capable of getting out of bed, touch weight bearing is initiated. However, full WB was permitted starting in the eighth week, with partial WB beginning in the fourth.

Ethical approval: The Ethics Committee of Menoufia Faculty of Medicine approved this investigation. Each participant completed a permission form when all information was received. Throughout its implementation, the study complied with the Helsinki Declaration.

Statistical analysis

The obtained results were characterized by their mean ± SD for numerical data and frequency (percentage) for qualitative data using instant software, version 3.10 (Graphed, USA). The Paired t-test and P values were evaluated. $P \leq 0.001$ was highly significant.

RESULTS

Fourteen knees with discoid lateral meniscus had arthroscopic saucerization, with simultaneous repair of associated posterior menisco-capsular detachment in twelve of them. Cleavage tear was present in (71.4%) of cases. The prospective clinical data were recorded for all patients. There were 42.8% females and 57.2% males. The mean age at the time of surgery was 18.35 ± 5.02 years (ranging between 11 - 27 years), with a range of 4 weeks to 10 weeks for the preoperative symptom duration. The presenting symptoms about preoperative range of motion were loss of the last 15 degrees of extension that was noted in 64.3% of cases with near normal flexion of the knee, painful clicking in 57.2% of cases, and repeated locking in 78.5% of cases. All cases presented after traumatic events (Table 1).

Table (1): Baseline demographic and clinical characteristics of the studied cases

Variable	Cases (n=14)
Age (years), mean ± SD	18.35 ± 5.02
Gender, n (%) Males Females	 8 (57.2%) 6 (42.8%)
Side of meniscus abnormality, n (%) Right side Left Side Medial	 9 (64.3%) 5 (35.7%) 0 (0%)
Duration of symptom (months), Mean ± SD	6.14± 2.1
Trauma, n (%) Present Absent	 14 (100%) 0 (0%)
Complete tear, n (%) Present Absent	 10 (71.4%) 4 (28.6%)
Loss of full extension, n (%) Present Absent	 9 (64.3%) 5 (35.7%)
Locking, n (%) Present Absent	 11 (78.5%) 3 (21.5%)
Clicking, n (%) Present Absent	 8 (57.2%) 6 (42.8%)

Data were presented as frequency (percentage), or mean ± SD.

Every patient had arthroscopic care and in every instance, arthroscopic saucerization was feasible. Through operational classification, 71.4% were full and 28.6% with incomplete varieties of the menisci were identified. Twelve of the patients had the posterior menisco-capsular detachment, and every instance had a cleavage tear. Evidence of chondromalacia was observed in 78.5% of patients upon the articular surfaces' examination (Table 2).

Table (2): Operational characteristics of the studied cases

Variable	Cases (n=14)
Incomplete variant, n (%) Present Absent	 10 (71.4%) 4 (28.6%)
Articular surfaces examination, n (%) Chondromalacia Normal	 11 (78.5%) 3 (21.5%)

Data were presented as frequency (percentage).

A mean of 36 ± 12.05 months, ranged between 24 and 60 months were followed up on the cases. Symptoms at the final follow up including ROM, painful clicking and repeated locking all were improved. Except for one case with residual lateral knee

pain without mechanical symptoms and one case when flexion was limited to 125 degrees without regaining complete range of motion. After surgery, the International Knee Documentation Committee (IKDC) score was highly significantly increased from 47.42 ± 7.34 points before the operation to 84.38 ± 1.86 points after the operation ($p < 0.001$). Except for two, every patient recovered to their pre-injury level of activity and expressed complete satisfaction with the operation (Table 3 and figure 5).

Table (3): Surgical outcome of the studied cases

Variable	Cases (n=14)
Duration of follow-up (months)	36 ± 12.05
Pre-operative IKDC score	47.42 ± 7.34
Post-operative IKDC score	47.42 ± 7.34

Data were presented as mean ± SD.

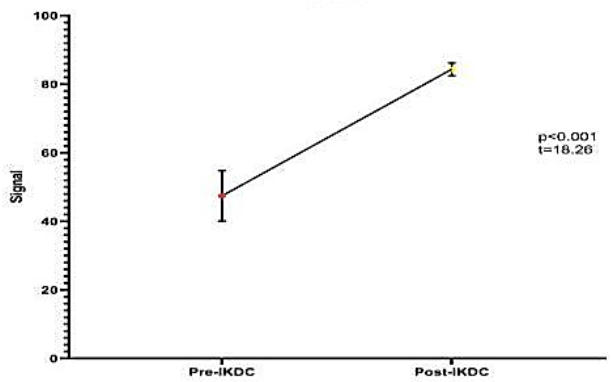

Figure (5): Comparison between pre- and post-IKDC. Paired t-test was applied.

DISCUSSION

The lateral meniscus is crucial in kinematics, load transmission, and dissipation of forces throughout the knee joint. The lateral menisci of discoid abnormally shaped that is thicker and larger than normal, which exposes the menisci to greater shear and mechanical pressures. With resulting posterior meniscal capsular detachment and cleavage tear [10, 11].

Orthopedic surgeons now avoid total meniscectomy for symptomatic unstable discoid lateral menisci as many studies with long-term follow-up documented a higher incidence of arthritic changes after total meniscectomy. Arthroscopic saucerization of the discoid meniscus with the repair of associated tears to the capsule is now the recommended treatment [12, 13].

In our study, we reported excellent results with an improvement of IKDC score from 37 to 82.5 at mid-term follow-up. All patients returned to their pre-injury level of activity.

Aiming to treat discoid lateral meniscus, **Vandermeer and Cunningham** [14] reported on their extended follow-up investigation that involved arthroscopic saucerization and repair of the accompanying tears. At the last follow-up, they reported good or exceptional results, 66 percent of patients going back to their previous degree of engagement. After over 4 years of follow-up, **Ahn *et al.*** [15] found no functional impairment.

Meniscal instability was seen in 12 out of 14 knees in our investigation. **Klingele *et al.*** [16] had recently evaluated the prevalence of peripheral instability and found that in children with discoid lateral menisci, 28.1% (36 of 128) exhibited peripheral instability. Our findings are in line with the body of research that currently supports meniscus-preserving surgery as a means of treating lateral menisci that are symptomatic. These outcomes demonstrated the procedure's mid-term effectiveness, but further long-term follow-up information is required.

The small sample size of this study is one of its weaknesses. Nonetheless, given the pertinent published research, this proportion of instances is acceptable, and a clear and predicted outcome can be obtained with appropriate patient management and attentive monitoring of every patient.

CONCLUSION

It was helpful to stabilize the unstable tear of the symptomatic discoid lateral meniscus by saucerization and repair which preserved knee function and improved the clinical result during the midterm follow-up period.

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Conflict of Interest: Nil.

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