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Arthroscopic Management of Symptomatic Discoid Lateral Meniscus in Children and Adolescents: Is Repair Always Necessary?

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Abstract

Background: Discoid lateral meniscus (DLM) is a congenital knee anomaly with a reported prevalence of up to 13% in Asiatic populations, often necessitating surgical intervention when symptomatic. The optimal management whether arthroscopic repair or saucerization alone remains a subject of debate.

Aim of Study: To determine whether all symptomatic DLM cases in children and adolescents require arthroscopic repair or if saucerization alone is sufficient.

Patients and Methods: A prospective case series included 20 patients (13 male, 7 female; aged 7–18 years) with symptomatic DLM who underwent arthroscopic saucerization. Repair using the outside-in technique was performed for unstable or torn menisci. Outcomes were assessed at 1, 6, and 12 months using the Lysholm score (0–25, higher scores indicating less pain) and range of motion (ROM).

Results: Of 20 patients (14 right knee, 6 left knee), 2 had bilateral DLM. The mean Lysholm score was 15.25±3.43, with 16 patients scoring ≥15. Mean ROM at 6 weeks was 77.05±2.30 degrees (p<0.001), improving progressively to 12 months. Saucerization alone was performed in 14 stable cases, while 6 unstable/torn cases required repair. No postoperative infections or complications were reported.

Conclusion: Saucerization alone is effective for stable symptomatic DLM, while repair is indicated for unstable or torn menisci. These findings support a tailored surgical approach, particularly relevant for Asiatic populations with a higher DLM prevalence. Larger studies with longer follow-up are recommended.

Level of Evidence: IV (case series).

Key Words: Discoid lateral meniscus – Arthroscopy – Saucerization – Repair – Pediatric orthopedics – Knee surgery.

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Introduction

THE discoid lateral meniscus (DLM) is a congenital variant characterized by central hypertrophy, disrupting the typical C-shaped anatomy of the meniscus. Its prevalence varies globally, ranging from 0.4% to 17%, with a notably higher incidence of up to 13% in Asiatic populations **[1]**. Bilateral presentation is reported in 79–95% of cases, and symptomatic DLM often manifests as mechanical symptoms such as snapping, pain, or limited range of motion (ROM) **[2]**. In pediatric and adolescent patients, untreated symptomatic DLM can lead to progressive knee dysfunction, meniscal tears, and early osteoarthritis, underscoring the need for timely intervention **[3]**.

Historically, surgical management of DLM has evolved from open meniscectomy to arthroscopic techniques. Arthroscopic saucerization, which reshapes the meniscus into a more anatomical form, is widely accepted to alleviate symptoms while preserving meniscal tissue **[4]**. However, in cases with meniscal tears or instability, repair is often advocated to restore biomechanical stability and prevent long-term degenerative changes **[5]**. Despite these advances, the necessity of repair for all symptomatic DLM cases remains controversial. Some studies suggest saucerization alone suffices for stable menisci, while others emphasize repair to address tears or instability **[2,7]**.

The higher prevalence of DLM in Asiatic populations, including India, highlights the regional relevance of this condition. Previous studies, such as those by Lee et al. and Vandermeer et al., have provided insights into DLM management, but data specific to pediatric cohorts in this region are limited **[6,7]**. This prospective study aims to evaluate whether arthroscopic repair is always necessary

for symptomatic DLM in children and adolescents, hypothesizing that saucerization alone is sufficient for stable cases, with repair reserved for unstable or torn menisci. The findings may guide clinical practice, particularly in regions with a higher DLM burden.

Material and Methods

This prospective case series was conducted at [insert institution] between January 2022 and December 2023 after obtaining approval from the institutional ethics committee (Approval No. [insert number]). Informed consent was obtained from the guardians of all participants.

Study population:

Twenty patients aged 7–18 years with symptomatic DLM were enrolled. Inclusion criteria included age 7–18 years, clinical symptoms (e.g., pain, snapping, or limited ROM), and radiologically or arthroscopically confirmed DLM via magnetic resonance imaging (MRI) or intraoperative visualization. Exclusion criteria included patients over 18 years, those with concomitant knee injuries (e.g., anterior crucible ligament tears), or those with prior knee surgery. The cohort consisted of 13 males and 7 females, with 14 right knees and 6 left knees affected; 2 patients presented with bilateral DLM.

Surgical technique:

All procedures were performed under general anesthesia by a single orthopedic surgeon experienced in arthroscopic techniques. Standard anterolateral and anteromedial portals were established for diagnostic arthroscopy using a 4-mm 30-degree arthroscope. Arthroscopic saucerization was conducted using a bucket-handle punch to reshape the meniscus into a stable, anatomical form, aiming to preserve at least 6–8mm of peripheral meniscal tissue to maintain biomechanical function. Intraoperative assessment determined meniscal stability and the presence of tears. In cases with unstable menisci or tears (e.g., horizontal or longitudinal tears extending to the peripheral zone), repair was performed using the outside-in technique with 2-0 Prolene or Vicryl sutures. Sutures were placed at 3–4mm intervals to ensure secure fixation, and the stability of the repair was confirmed by probing.

Postoperative care was tailored to the procedure. Patients who underwent saucerization alone were allowed weight-bearing as tolerated after 2 weeks, with a progressive rehabilitation program focusing on quadriceps strengthening and ROM exercises. For patients requiring repair, the knee was immobilized in a hinged brace at 0 degrees for 4 weeks, followed by partial weight-bearing for an additional 2 weeks. Rehabilitation included gradual ROM exercises (starting at 0–90 degrees) and muscle strengthening, with full weight-bearing permitted by 8 weeks.

Outcome measures:

Outcomes were assessed at 1, 6, and 12 months postoperatively. The Lysholm score (range 0–25, with higher scores indicating less pain and better function) was used to evaluate pain and functional outcomes. ROM was measured in degrees using a goniometer, with preoperative baseline values compared to postoperative measurements. Complications such as infection, re-tear, or persistent symptoms were recorded.

Statistical analysis:

Data are presented as means ± standard deviation (SD). A paired *t*-test was used to compare preoperative and postoperative ROM, with a *p*-value of <0.05 considered statistically significant. Statistical analysis was performed using SPSS software (version 25.0, IBM Corp., Armonk, NY, USA).

Results

The study cohort included 13 males and 7 females, with a mean age of 12.5 years (range: 7–18 years). Of the 20 patients, 14 had right-knee involvement, 6 had left-knee involvement, and 2 had bilateral DLM, resulting in a total of 22 knees treated. The mean preoperative Lysholm score was 8.50±2.10, indicating significant pain and functional limitation. Postoperatively, the mean Lysholm score improved to 15.25±3.43 at 12 months, with 5 patients scoring 20 (excellent), 11 scoring 15 (good), and 4 scoring 10 (fair) (Fig. 1). Notably, 16 patients (80%) achieved a score of ≥ 15, indicating satisfactory pain relief and functional recovery.

The mean preoperative ROM was 45.20±5.10 degrees. At 6 weeks postoperatively, the mean ROM increased to 77.05±2.30 degrees ($p<0.001$ compared to baseline), with further improvement to 110.50±3.20 degrees at 12 months (Fig. 2). Saucerization alone was performed in 14 patients (70%) with stable menisci, while 6 patients (30%) with unstable or torn menisci required repair in addition to saucerization (Fig. 3). The laterality of DLM cases showed a predominance of right-knee involvement (70%) (Fig. 4). No postoperative infections, re-tears, or other major complications were reported during the 12-month follow-up.

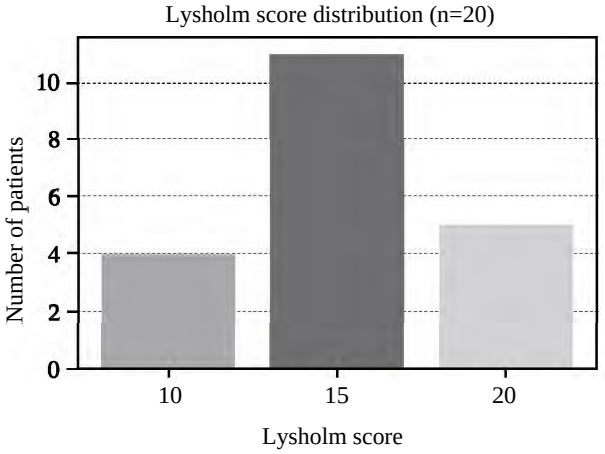

Fig. (1): Distribution of Lysholm scores among 20 patients.

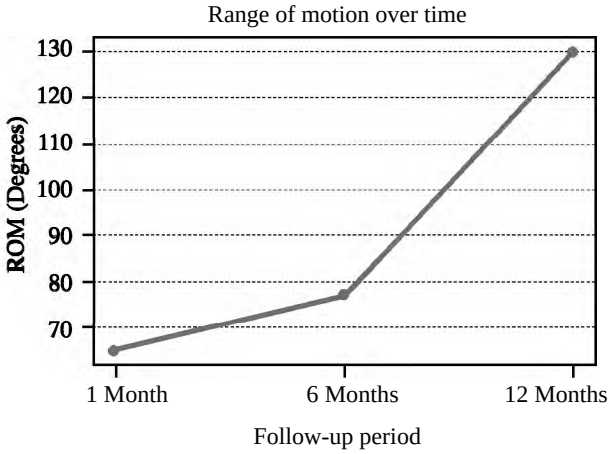

Fig. (2): Improvement in range of motion (ROM) over time postoperatively.

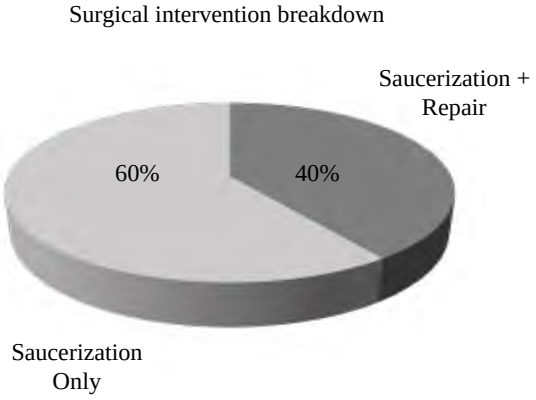

Fig. (3): Proportion of patients undergoing saucerization only versus saucerization with repair.

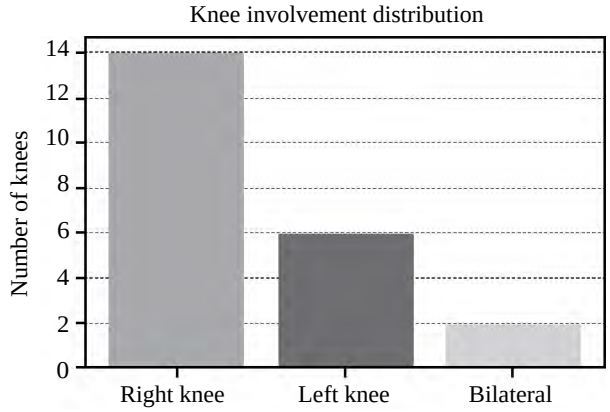

Fig. (4): Laterality of symptomatic DLM cases in the study cohort.

Discussion

Symptomatic DLM in children and adolescents requires careful management to restore knee function and prevent long-term degenerative changes. This study demonstrates that arthroscopic saucerization alone is effective for stable menisci without tears, achieving satisfactory Lysholm scores (mean: 15.25±3.43) and ROM recovery (110.50±3.20 degrees at 12 months). In contrast, repair combined with saucerization was necessary for unstable or torn DLM, aligning with findings by Lee et al. and Vandermeer et al. [6,7]. These results support a tailored surgical approach based on intraoperative assessment of meniscal stability and integrity.

The higher prevalence of DLM in Asiatic populations (up to 13%) underscores the regional relevance of this study, particularly for countries like India, where access to specialized pediatric orthopedic care may vary [1]. Saucerization alone offers a less invasive option for stable DLM, reducing surgical complexity and recovery time, which is particularly beneficial in pediatric patients. For unstable or torn menisci, repair enhances outcomes by preserving meniscal stability, potentially lowering the risk of future osteoarthritis a concern given the young age of this cohort. The 70% predominance of right-knee involvement observed in this study is consistent with prior reports and may reflect biomechanical or developmental factors, though the exact etiology remains unclear [2]. The 10% bilateral prevalence (2/20 patients) supports the recommendation for routine contralateral knee imaging, as asymptomatic DLM in the contralateral knee may become symptomatic over time [2].

Compared to previous studies, this study provides specific insights into pediatric outcomes. Kocher et al., reported similar success with saucerization in stable DLM cases but noted a higher reoperation rate in patients with untreated instability

[2]. Lee et al., **[6]** emphasized the role of repair in complex tears, reporting improved outcomes with combined saucerization and repair, consistent with our findings. However, our study uniquely highlights the applicability of these techniques in an Asiatic cohort, where DLM is more prevalent, and access to advanced imaging (e.g., MRI) for early diagnosis may be limited in some settings.

The clinical implications of this study are twofold. First, saucerization alone can be a cost-effective and less invasive option for stable DLM, making it feasible in resource-limited settings common in parts of India and other Asiatic regions. Second, for unstable or torn menisci, repair should be prioritized to optimize outcomes, particularly in young patients where preserving meniscal function is critical for long-term knee health. Surgeons should perform thorough intraoperative assessments to determine meniscal stability and tailor the procedure accordingly.

Limitations of this study include the small sample size (n=20), which limits the generalizability of the findings, and the 12-month follow-up period, which may not capture long-term outcomes such as osteoarthritis development. The predominance of right-knee involvement and the presence of bilateral cases warrant further investigation into potential anatomical or genetic predispositions. Additionally, the lack of a control group (e.g., comparing saucerization alone vs. repair in similar cases) restricts the ability to draw causal conclusions. Future research should involve larger, multicenter studies with extended follow-up periods (e.g., 5–10 years) to assess the durability of these interventions and their impact on knee joint longevity. Comparative studies evaluating outcomes in Asiatic versus non-Asiatic populations could further elucidate regional differences in DLM presentation and management.

Conclusion:

Arthroscopic saucerization is a sufficient treatment for stable symptomatic DLM in children and adolescents, while repair is indicated for unstable or torn menisci. This tailored approach is particularly relevant for Asiatic populations, including India, where DLM prevalence is higher. Larger, multicenter studies with longer follow-up are needed to validate these findings and assess long-term outcomes, such as the risk of osteoarthritis in this young cohort.

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Conflict of Interest:

The authors declare no conflicts of interest.

Funding:

This study received no specific funding.

Ethics Approval:

This study was approved by the Ethics Committee of the Department of Orthopedic Surgery. Informed consent was taken from each patient's parent or legal guardian after explaining the steps of the procedure, its anticipated benefits, potential complications, and follow-up regimen.

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العلاج بالمنظار للغضروف الهلالى الوحشي الديسكويدى العرضى لدى الأطفال والمراهقين: هل الإصلاح ضرورى دائماً ؟

يتناول هذا البحث موضوع تمزق الغضروف الهلالى الديسكويدى الجانبى لدى الأطفال والمراهقين، ويستعرض فعالية التدخل الجراحى بالمنظار لعلاج هذه الحالات.

شملت الدراسة ٢٠ مريضًا خضعوا لإجراء تقنيّات السوسرة، وقد تم إصلاح الغضروف فى الحالات غير المستقرة أو الممزقة.

أظهرت النتائج تحسنًا كبيرًا فى درجات الألم والمدى الحركى للركبة خلال فترة المتابعة التى امتدت حتى ١٢ شهرًا. أُجرى الإصلاح باستخدام تقنية الخياطة من الخارج إلى الداخل. بيّنت الدراسة أن السوسرة وحدها فعالة فى الحالات المستقرة، بينما الإصلاح ضرورى فى حالات التمزق أو عدم الاستقرار. تشير النتائج إلى أهمية تقييم ثبات الغضروف أثناء الجراحة لتحديد الإجراء المناسب.

وتوصى الدراسة باتباع نهج فردى لكل حالة بناءً على التقييم داخل غرفة العمليات، مع التأكيد على أهمية المتابعة طويلة الأمد لتحديد احتمالات المضاعفات المستقبلية مثل الفُصال العظمى المبكر.