

Clinical and Radiological Outcomes of Cheilectomy in High-Grade Hallux Rigidus: A Retrospective Analysis

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ABSTRACT

Objective: This retrospective study aims to assess the clinical and radiological outcomes of cheilectomy in patients diagnosed with Grade 3-4 Hallux Rigidus.

Materials and Methods: Nineteen patients (21 feet) who underwent cheilectomy between January 2016 and September 2018 were retrospectively analyzed. Clinical evaluation included a range of motion (ROM), Visual Analog Scale (VAS), and American Orthopedic Foot and Ankle Society (AOFAS) scoring. Radiological assessment involved examining osteophyte recurrence and arthrosis progression through both anteroposterior (AP) and lateral X-ray images.

Results: The average patient age was 52 years, with a mean follow-up of 26.2 months. Following cheilectomy, significant improvements in dorsiflexion and total joint ROM were observed compared to preoperative levels ($p=0.001$). VAS scores significantly decreased at the last follow-up compared to preoperative values ($p=0.018$). Based on AOFAS scoring, 19 out of 21 feet achieved good to excellent results, while 2 patients showed poor outcomes. Radiologically, no osteophyte recurrence was noted. One patient required arthroplasty revision.

Conclusion: Cheilectomy may offer favorable outcomes in well-selected patients with high-grade Hallux Rigidus, particularly when joint mobility preservation is desired over arthrodesis.

Keywords: Cheilectomy outcomes, hallux rigidus treatment, joint mobility preservation

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INTRODUCTION

First metatarsophalangeal (MTP) joint osteoarthritis, or hallux rigidus, is the most common arthritic condition in the foot; It has been found that 2.5% of patients older than 50 years of age have degenerative arthritis of the first MTP joint. Hallux rigidus, which can be treated conservatively and surgically, is the second most common problem after hallux valgus among first-line foot pathologies.^[1] Surgical interventions encompass a spectrum of procedures including soft tissue release, debridement, osteophyte excision, cheilectomy, arthroplasty, and arthrodesis. While conservative methods are typically emphasized for Grade 0-1 cases, cheilectomy emerges as a preferred option for Grade 2 hallux rigidus.^[2-5]

Although outcomes following osteotomies and arthroplasties have exhibited variability, cheilectomy and first MTP joint arthrodesis have consistently demonstrated favorable results across multiple studies.^[6] Existing literature generally advocates for arthrodesis over cheilectomy in cases of severe degenerative arthritis or where there is significant cartilage loss exceeding 50% (Grade 3-4). However, despite its effectiveness in pain alleviation, arthrodesis may not always fulfill functional expectations.^[7-9]

The optimal surgical approach for advanced hallux rigidus remains contentious. Consequently, cheilectomy, characterized by its less invasive nature, has emerged as a viable option for patients seeking to preserve joint mobility. This study



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aims to retrospectively evaluate the clinical and radiological outcomes of patients with high-grade (3–4) hallux rigidus who underwent cheilectomy.

MATERIALS and METHODS

We conducted a retrospective analysis of patients who underwent cheilectomy for the diagnosis of Hallux Rigidus between January 2016 and September 2018. Local ethics committee approval was obtained (Approval Number: KAEK/2022.05.115), and the study adhered to the principles outlined in the Declaration of Helsinki.

Patients included in the study met the following criteria: they exhibited high-grade (Grades 3–4) symptomatic arthrosis, were unresponsive to conservative treatment, declined arthrodesis, and expressed a desire to preserve joint mobility. Patients who underwent low-grade cheilectomy or opted for arthrodesis or arthroplasty were excluded from the study.

Demographic characteristics such as age, gender, affected side, classification according to Coughlin and Shurnas,^[2] and duration of follow-up were assessed.

Conservative treatment was initially recommended for all patients, with surgical intervention reserved for those who failed to respond to conservative measures. While cheilectomy was recommended for Grade 1 and 2 cases, arthrodesis was advised for Grade 3 and 4 cases. For Grades 3–4 patients desiring joint mobility preservation, cheilectomy was proposed after a thorough explanation of associated risks.

Surgical Technique

Under either general or regional anesthesia, the joint was accessed via a standard dorsomedial incision over the distal first metatarsal, with a capsule opening. Osteophytes in the dorsal aspect of the distal metatarsal and proximal phalanx were excised (Cheilectomy). Joint mobility was assessed, and if dorsiflexion was inadequate, additional dorsiflexion was achieved by excising a dorsal wedge from the distal portion of the metatarsal and proximal phalanx (Figs. 1, 2).

Following achievement of pain control in the postoperative period, early mobilization is encouraged to prevent adhesions. After two weeks, once the wound sutures are removed, gradual weight bearing is permitted.

Clinical assessments of our patients included preoperative and postoperative evaluation of range of motion (dorsiflexion angle) of the first metatarsophalangeal joint (1.MTP), Visual Analog Score (VAS) at final follow-up, and functional status using the American Orthopedic Foot and Ankle Society (AOFAS) scoring system.^[10]

Radiographic assessment included evaluating osteophyte recurrence and arthrosis progression using both anteroposterior (AP) and lateral X-ray images.

Statistical Analysis

Statistical analysis was conducted using Microsoft Excel (2007) (USA). Descriptive statistics (mean, standard deviation, median, frequency, rate, range) were employed. Student's t-tests were utilized to compare data distribution between the two parameters. A statistical significance level of $p < 0.05$ was set for all analyses.

RESULTS

The study enrolled 19 patients, comprising 5 males and 14 females, with an average age of 52.15 years (range: 43–75). Among them, 11 patients underwent surgery on the right side, 6 on the left, and bilateral cheilectomy was performed in 2 patients, resulting in a total of 21 first metatarsophalangeal (MTP) joints examined. According to the Coughlin and Shurnas classification, 12 MTP joints were classified as Grade 3, while 9 were Grade 4 arthrosis. The mean follow-up duration was 26.2 months (range: 12–42) (Table 1).

Preoperatively, the average joint range of motion was 9.21 degrees (range: 0–20), which improved to 24.47 degrees (range: 0–60) postoperatively, showing a significant enhancement in dorsiflexion and overall joint movements after cheilectomies ($p = 0.001$). The preoperative visual analog score (VAS) averaged 6.89 (range: 5–9), decreasing to 5.36 (range: 0–9) postoperatively, with a statistically significant reduction ($p = 0.018$). Based on the American Orthopedic Foot and Ankle Society (AOFAS) score evaluation, good to excellent results were achieved in 19 out of 21 cases, with poor outcomes observed in 2 patients (Table 1).

Radiologically, no osteophyte recurrence was detected, although joint space narrowing was noted, which did not correlate with clinical symptoms. No wound complications were reported among the patients. The two patients with poor outcomes had Grade 4 arthrosis, and one of them required arthroplasty revision due to persistent complaints. The other patient declined any revision recommendations.

DISCUSSION

Our study demonstrated that while we did not achieve consistently low Visual Analog Scale (VAS) scores, the treatment approach employed significantly reduced VAS scores for the majority of patients, leading to clinically satisfactory outcomes.

First metatarsophalangeal (MTP) joint arthrosis commonly presents two primary issues in patients: pain and diminished mo-



Figure 1. A patient's perioperative image following cheilectomy and dorsal wedge excision

bility. While osteophyte removal effectively alleviates pain and improves mobility in early-stage pathologies, advanced-stage conditions often involve partial or complete cartilage destruction, limiting the efficacy of pain reduction measures.^[11]

Although arthrodesis has yielded highly successful outcomes in patients with advanced-stage arthrosis,^[12] there exists a subset of patients who prefer to maintain joint mobility. Despite the acknowledged low success rate in this patient cohort, it is common for individuals to request osteotomies aimed at osteophyte removal and restoration of joint mobility. Several studies in the literature address this topic. In a retrospective study involving 165 patients, Sidon et al.^[13] advocated for cheilectomy as an effective and reliable method for treating hallux rigidus (Grades 1–3). They observed low revision rates and mild to moderate pain recurrence during long-term follow-up in patients who underwent cheilectomy. Similarly, in a retrospective study of 89 patients, Teoh et al.^[5] reported comparable outcomes between minimally invasive and traditional open methods, with excellent results observed in Grade 1 cases. However, 10% of Grade 2 and Grade 3 patients required arthrodesis. While the sample size in our study was small, 10% of our patients necessitated alternative surgical interventions due to treatment failure.



Figure 2. Preoperative and postoperative radiographic images of a patient who underwent cheilectomy and dorsal wedge excision

Table 1. Demographic information and monitored parameters for all patients

	Patients who underwent cheilectomy n=19	
Age		
Mean±SD	52.15±8.62	
Min-max	43-75	
Gender		
Male	5	
Female	14	
Affected side		
Right	11	
Left	6	
Bilateral	2	
Coughlin and shurnas classification		
Grade 3	12	
Grade 4	9	
Follow-up time (months)		
Mean±SD	26.21±11.71	
Min-max	12-42	
Preoperative joint ROM (dorsiflexion degree)		
Mean±SD	9.21±6.29	
Min-max	0-20	
Postoperative joint ROM (dorsiflexion degree)		p=0.001
Mean±SD	24.47±18.62	
Min-max	0-60	
Preoperative VAS		
Mean±SD	6.89±1.41	
Min-max	5-9	
Postoperative VAS		p=0.018
Mean±SD	5.36±2.69	
Min-max	0-9	
AOFAS (Total 21 MTP Joints)		
Excellent	9	
Good	10	
Middle	0	
Poor	2	

SD: Standard deviation; ROM: Range of motion; VAS: Visual analog score; AOFAS: American Orthopedic Foot and Ankle Society; MTP: Metatarsophalangeal

In a retrospective study involving 96 patients conducted by Ruff et al.,^[8] the Valenti procedure, a modified version of cheilectomy, was performed on the Grade 4 patient group. It was observed that dorsiflexion increased and pain decreased in all patients. Similarly, in our study, all patients experienced an increase in range of motion and a reduction in pain. However, revision surgery was required in one patients during subsequent periods due to recurrence and persistent pain.

In their review, Galois et al.^[9] noted that cheilectomy has been successfully employed in the literature for early to mid-stage hallux rigidus, while arthrodesis has been established as the gold standard for advanced-stage cases. However, they highlighted limitations of arthrodesis in patients requiring joint mobility. Various arthroplasty techniques have been attempted for advanced-stage arthrosis, but the rates of short- to mid-term complications remain high. Instead,

cheilectomy or similar osteotomies are preferred for patients with a less active lifestyle, yielding better outcomes. The authors reported unsatisfactory results with interposition arthroplasty or synthetic cartilage applications. They underscored that uncertainties persist due to clinical variations, the lack of prospective and comparative studies, and the absence of long-term follow-up data.

In a similar study focusing on advanced arthrosis, 69 out of 81 patients (85.2%) who were followed for 2 years reported satisfaction with the treatment.^[14] Likewise, in our study, 17 out of 19 patients (89.4%) expressed satisfaction, demonstrating comparable satisfaction rates between the two studies.

Despite advancements in arthroplasty techniques aimed at preserving joint mobility, concerns persist regarding their cost and clinical outcomes.^[15] Given the high complication rates and low patient satisfaction associated with arthroplasty, investigations into non-arthroplasty alternatives continue. Concurrently, research into symptom alleviation through novel techniques, such as metatarsal shortening via various osteotomies or alteration of joint surface angles, is ongoing.^[16]

A significant advantage of cheilectomy appears to be its provision of a pathway to revision for all alternative methods. An unsuccessful cheilectomy does not preclude the possibility of subsequent arthrodesis, arthroplasty, or osteotomy.^[17]

Study limitations include its retrospective nature, small sample size, lack of a control group, and absence of comparison with alternative treatment methods. Further studies with prospective designs, inclusion of control groups, and long-term follow-up are warranted.

CONCLUSION

While our patient cohort is limited in size, there is a clear need for more extensive research focusing on Grade 4 cases. We advocate considering cheilectomy as a viable alternative to arthrodesis in carefully selected individuals with advanced-grade hallux rigidus, particularly those who prioritize preserving joint mobility. We believe that offering cheilectomy as an option holds promise for enhancing patient outcomes and merits further investigation in future studies.

Disclosures

Ethics Committee Approval: The study was approved by the Kanuni Sultan Süleyman Training and Research Hospital Clinical Research Ethics Committee (No: 2022.05.115, Date: 12/05/2022).

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