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Case Report

Osteochondral Lesion of Talus Treated by Mosaicplasty from the Knee as Donor Site, Orthopedic Surgery Ward. Tobruk Medical Center, L

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Abstract

Background: Osteochondral lesions of the talus (OLT) represent a frequent cause of chronic ankle pain and disability, particularly in young and active individuals. Conservative management often provides limited benefit in advanced cases, making surgical treatment a necessary option. Mosaicplasty, which involves the transfer of autologous osteochondral grafts, has gained recognition as an effective method for restoring articular cartilage integrity. This study aimed to evaluate the clinical outcomes of mosaicplasty in patients with advanced talar dome lesions. **Material and Methods:** A descriptive case series was conducted at the Orthopaedic and Traumatology Department of Tobruk Medical Centre between January 2010 and December 2022. Twenty-one patients with MRI-confirmed Bristol/Hepple grade ≥3 OLT were included. The cohort consisted of 18 males and 3 females, with a mean age of 30 years (range: 20–41). Lesions were right-sided in 12 patients and left-sided in 9. Based on lesion site, 15 were anteromedial and 6 were anterolateral. Seven patients were aged 20–30, thirteen were 30–40, and one was over 41. Medial malleolar osteotomy was performed in 5 patients. Fifteen cases had a history of sports-related ankle trauma. Exclusion criteria were diabetes mellitus, neglected or chronic ankle injuries, arthritis, rheumatologic or metabolic disease, prior ankle surgery, or age above 45. The follow-up period ranged from 3 to 4 years. **Results:** Most patients experienced significant pain relief, improved ankle motion, and functional recovery. Outcomes were slightly better in the anteromedial group compared to anterolateral lesions. Younger patients and those with acute sports injuries achieved more favorable results. No major complications, graft failure, or severe donor site morbidity occurred. **Conclusion:** Mosaicplasty is a safe and effective surgical technique for advanced talar dome OLT, providing consistent pain reduction, improved joint function, and successful return to activity. Larger, long-term controlled studies are warranted to confirm these findings.

Keywords: Osteochondral Lesion; Talus; Mosaicplasty; Knee; Donor Site

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INTRODUCTION:

Osteochondral lesions of the talus (OLT), commonly referred to as osteochondritis dissecans (OCD) of the talus, are increasingly recognized as a major cause of chronic ankle pain and disability, particularly in young and physically active individuals. These lesions are characterized by focal damage to the articular cartilage and the underlying subchondral bone of the talar dome. In many cases, the pathological process involves separation or instability of the osteochondral fragment, potentially leading to chronic joint symptoms, mechanical dysfunction, and long-term degenerative changes such as osteoarthritis if left untreated [1]. The etiology of OCD talus is multifactorial, with trauma being the most prominent cause. Reports suggest that up to 85% of OLTs are associated with a previous traumatic event, such as ankle sprains or fractures [2]. However, atraumatic factors may also contribute, including genetic predispositions, osteonecrosis, endocrine disorders, and repetitive microtrauma commonly observed in high-impact sports and military activities. For instance, disturbances in blood supply due to repeated inversion injuries may impair subchondral bone integrity, making it susceptible to fragmentation and collapse [3,4].

Additionally, systemic conditions such as hypothyroidism or chronic steroid use may compromise bone metabolism, contributing to the pathogenesis of OCD talus in certain patients [5].

The prevalence of OCD talus is not negligible. In a large cohort study, the incidence of OLTs following ankle trauma was reported to be around 6.5%, based on clinical assessment, radiography, and MRI evaluation [6]. The medial aspect of the talar dome is more commonly affected than the lateral side, likely due to anatomical differences and the biomechanics of the ankle joint during inversion injuries. Clinically, patients often present with persistent pain, joint swelling, and mechanical symptoms (such as catching or Locking, tenderness to palpation, and restricted range of motion, particularly during weight-bearing activities or athletic performance [7]. Diagnosis is typically established through a combination of clinical history, physical examination, and imaging studies. While plain radiographs may reveal subchondral lucencies or loose bodies, magnetic resonance imaging (MRI) remains the gold standard for assessing the stability, size, depth, and cartilage integrity of the lesion. The Berndt and Harty classification system, which was originally based on radiographic findings, is commonly used to grade the severity of these lesions—from small subchondral compression (stage I) to displaced osteochondral fragments (stage IV) [8]. More recently, MRI-based classification systems have been introduced to improve preoperative planning and evaluate treatment outcomes [9]. Management strategies for OCD talus are largely determined by lesion size, stability, location, chronicity, and skeletal maturity. Non-operative options such as restricted weight-bearing, immobilization with a cast or walking boot, and physical therapy are typically reserved for stable, early-stage lesions or skeletally immature patients with intact overlying cartilage [10]. However, when conservative therapy fails or in cases of advanced lesions, surgical intervention becomes necessary to restore joint congruity and prevent progressive joint degeneration.A variety of surgical techniques have been developed over the past three decades. These include bone marrow stimulation procedures (such as microfracture, drilling, and abrasion arthroplasty), autologous chondrocyte implantation (ACI), osteochondral autograft transplantation (OATS), and mosaicplasty, among others [11,12]. While microfracture is relatively simple and cost-effective, it often results in the formation of fibrocartilage rather than native hyaline cartilage, which may deteriorate over time and lead to suboptimal long-term outcomes, especially in larger lesions [13]. Mosaicplasty, a type of osteochondral autograft transplantation, has emerged as a promising surgical technique, particularly for moderate to large lesions (1.5–3.0 cm^2) in young, active patients. First

introduced by Hangody et al. in the 1990s, mosaicplasty involves harvesting multiple cylindrical osteochondral plugs from a non-weight-bearing area of the patient's own knee and transplanting them into the talar defect [14]. The term "mosaic" refers to the tight packing of these cylindrical plugs to recreate a continuous hyaline cartilage surface. The advantages of mosaicplasty include transplantation of viable hyaline cartilage, structural support from subchondral bone, and relatively rapid integration into the recipient site [15]. Hangody and colleagues reported favorable outcomes in their early studies, demonstrating good to excellent functional results in up to 90% of patients treated with mosaicplasty for talar lesions [16]. A multicenter study by the same group in 2001 further validated these findings, with high satisfaction rates and significant improvements in pain scores and functional ankle scores [17]. Other independent studies have corroborated the effectiveness of mosaicplasty in restoring ankle function and facilitating return to sports, though concerns remain regarding donor site morbidity, technical difficulty, and long-term durability of the grafts [18,19]. Despite increasing adoption of mosaicplasty as a preferred treatment for advanced OCD talus, comprehensive evaluation of its efficacy remains essential, particularly in diverse patient populations and across varying lesion characteristics. Moreover, data regarding long-term outcomes, reoperation rates, and comparisons with other surgical techniques remain limited. As such, there is a clear need for additional research that explores the indications, outcomes, and patient-reported satisfaction associated with mosaicplasty in the treatment of osteochondral talar defects. Therefore, the present study aims to assess the clinical efficacy of mosaicplasty in patients with OCD talar dome lesions. By analyzing both short-term and long-term outcomes—including pain relief, return to activity, radiological integration of grafts, and potential complications—this research seeks to contribute valuable data to support evidence-based surgical decision-making in this challenging area of orthopedic and sports medicine.

MATERIAL AND METHODS:

This descriptive case series included 21 patients who presented to the Orthopaedic and Traumatology Department at Tobruk Medical Centre between January 2010 and December 2022. All patients were diagnosed with osteochondral lesions of the talus graded 3 or higher according to the Bristol/Hepple MRI classification system. Specifically, 8 patients were diagnosed with grade 3 lesions, 10 with grade 4, and 3 with grade 5. The study population consisted of Physical therapy exercises appeared to be advantageous for continued improvement. At the conclusion of the follow-up, none of the ankle radiographs displayed arthritic changes. Near the conclusion of the follow-up period, the majority of cases were satisfied with their treatment. In roughly 16 cases, 76.12% reported an outstanding outcome. 3 (14.29%) had favorable outcomes. Table 4 and 3 females, with a mean age of 30 years (ranging from 20 to 41 years). Laterality of the lesion showed that 12 cases affected the right ankle, while 9 cases involved the left.

Patients were stratified into three age groups:

- 7 patients were aged 20–30 years,
- 13 patients were aged 30–40 years, and
- 1 patient was over 41 years old.

Lesion location was categorized into two groups:

- 15 patients had anteromedial talar dome lesions,
- 6 patients had anterolateral lesions.

A medial malleolar osteotomy was performed in 5 cases to facilitate access to the lesion. Additionally, 15 patients reported a history of sports-related ankle injuries. The study excluded patients with diabetes mellitus, neglected ankle trauma, ankle arthritis, rheumatologic or metabolic diseases, prior ankle surgeries, or those older than 45 years. Inclusion criteria

Required patients to be younger than 45 years, with no previous ankle surgery, and with clinically stable ankles.

The maximum follow-up period ranged between 3 to 4 years

Surgical technique:

Under spinal or general anesthesia, a tourniquet was applied to the affected limb, and the surgical area was cleaned. A diagnostic arthroscopy was carried out through the anteromedial and anterolateral portals to obtain diagnostic data regarding the lesion. Depending on the location of the lesion, the arthroscopy was followed by a medial or lateral ankle incision. In medial localized lesions, the medial malleolus osteotomy was performed in 5 cases only because the lesion was medially and more posteriorly preceded by drilling of the MM before the osteotomy. After the lesion location was fully exposed, any fibrous tissue and the small bone piece were carefully removed, and the lesion size was assessed. Consequently, the ipsilateral knee joint was reached through a lateral parapatellar incision. A properly proportioned osteochondral graft extracted from the non-weight-bearing portion of the lateral femoral condyle of the femur using the proper osteotome and hammer, because we do not have osteochondral. Autograft transfer system set (OATS) inserted harvested grafts into the defect site. As determined by the contours of the talus lesion & the motion of the ankle joint was assessed following cleansing of the surgical area. The medial malleolar osteotomy was fixed by a 4.5 mm malleolar screw and k. wire in cases which underwent medial malleolus osteotomy, then the surgical site closed appropriately over a drain, as for the cases where the OCD is on the lateral site of the talar dome, we perform our incision on the anterolateral aspect of the ankle with following the same steps that were with the medial talar dome lesion, except the

malleolar osteotomy. (The operated extremity was immobilized for a maximum of 6 weeks in a short leg splint following the operation, then removed with intra-articular hyaluronic acid injection, and partial weight bearing with active ankle exercise was initiated to restore the ROM, after three-month full weight bearing can be allowed following a radiographic to assure proper bone healing and union of the medial malleolus. The subsequent procedures include plain radiography, as well as the pain evaluation was carried out by a visual analogue scale (VAS) (1- 10) [10], and functional consequences were assessed by the American Orthopedic Foot and Ankle Society (AOFAS) [11]. The questionnaire was filled out for every patient preoperatively and at three to four years postoperatively.

Figure 1: (Pre-operative x ray and MRI showing osteochondral lesion of talar dome)

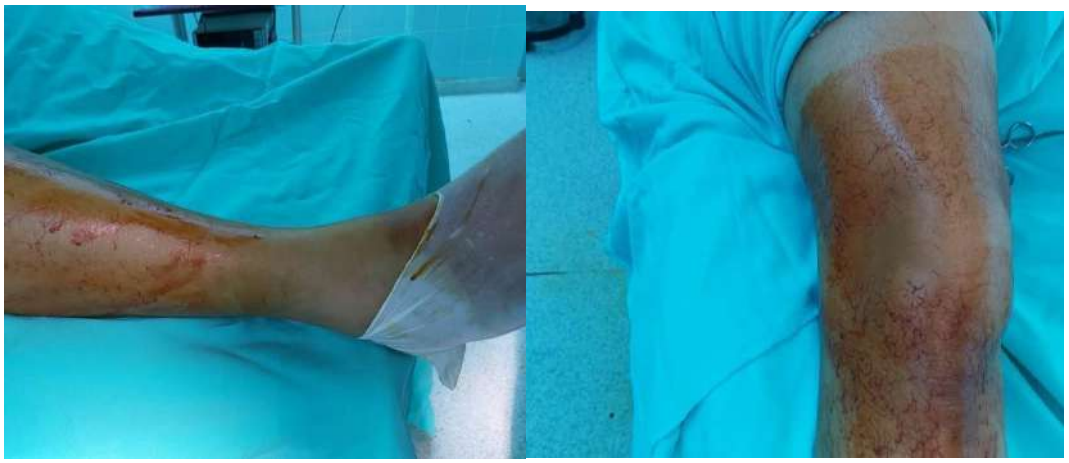

Figure 2 :(pre-operative picture showing affected ankle and donor knee sterilization)

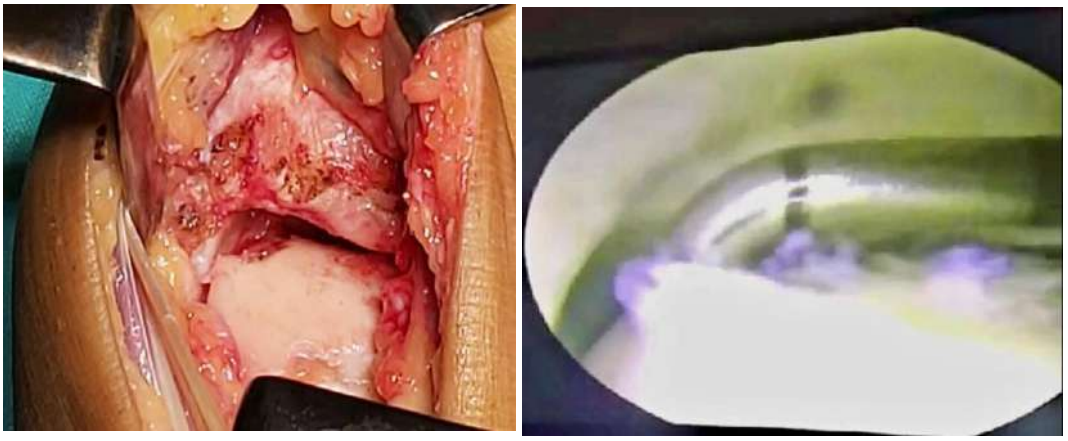

Figure 3: (intra-operative picture showing arthroscopic and open OCD)

Figure 4: (showing incision of affected side and the donor side of knee)

Figure 5 :(showing donor site of the graft and graft itself, and the inserted graft and fixation of the medial malleolus)

Figure 6: (showing post-operative Helgan injection intra articular and ankle Foot orthosis

Statistical analysis

SPSS v26 (IBM Inc., Armonk, NY, USA) was utilized for statistical analysis. Using the Shapiro-Wilks test and histograms, the normality of the data distribution was assessed. The mean and standard deviation (SD) were used to present quantitative parametric data. Non- parametric quantitative data were presented as the median and interquartile range (IQR). The frequency & percentage (%) of qualitative variables were displayed. The paired sample t-test was applied to contrast the population means of two samples that were highly correlated.
P -value less than 0.05 was estimated statistically significant.

RESULT:

Our research involved 16 (76.19%) males & 5 (23.81%) females with a mean ± SD age of 44.48 ± 7.76 years. Sport injury was the predominant mechanism of injury15 (71.43%) then work injury 6 (28.57%). Regarding classification of lesions by preoperative MRI classification, there were 7 (33.33%) patients in stage II, 12 (57.14%) in stage III, and 2 (9.52%) in stage IV. Table1

Table 1: Demographic data of the researched patients

		n= 21
Age (years)		**44.48 ± 7.76**
Sex	**Males**	**16 (76.19%)**
	Females	**5 (23.81%)**
Mechanism of injury	**Sport injury**	**15 (71.43%)**
	Work injury	**6 (28.57%).**
Classification of lesions by preoperative MRI	**Stage II**	**7 (33.33%)**
	Stage III	**12 (57.14%)**
	Stage IV	**2 (9.52%)**

Data are presented as mean ± SD, or frequency, MRI: magnetic resonance imaging

Chart1 : Diagram showing the distribution data of the side and talar dome affected

Table 2 showed that the VAS score was significantly decreased from 6.86 ± 1.2 before surgery to 3.19 ± 0.81 after surgery, AOFAS scores were also improved and increased from 47.1 ±2.57 to 79.33 ± 5.32 after surgery (P<0.001).

Table 2: Regarding VAS and AOFAS scores of the studied patients

	Before surgery	After surgery	P value
VAS	6.86 ± 1.2	3.19 ± 0.81	**< 0.001***
AOFAS scores	**47.1 ± 2.57**	**79.33 ± 5.32**	**< 0.001***

Data are presented as mean ±SD, statistically significant as P value <0.05.

Regarding preoperative complaints of patients, most of them reported symptoms of edema, tenderness, and locking joints before surgery. We observed that after surgery, most of the patients showed improvement in these symptoms. There was a significant improvement in the patient's symptoms after surgery compared to before the operation. Throughout the first 3 weeks following surgery, every case reported knee tenderness and pain; after that improved. There was no locking, instability, or effusion. Table 3

Table 3: Patients who complain of the studied patients

	Before surgery	After surgery	P value
Swelling	19 (90.48%)	5 (23.81%)	**< 0.001***
Tenderness	16 (76.19%)	4 (19.05%)	**< 0.001***
Joint locking symptoms	**16 (76.19%)**	**3 (14.29%)**	**< 0.001***

Data are presented as frequency (%)

Throughout the disease, the affected side's range of motion typically decreases relative to the healthy side, whereas the change in ankle range of motion (dorsiflexion, plantar flexion, inversion, and eversion) following the operation improved, but it was not statistically significant

Chart2 : The range of motion and the change in ankle range of motion before and after surge

Physical therapy exercises appeared to be advantageous for continued improvement. At the conclusion of the follow-up, none of the ankle radiographs displayed arthritic changes. Near the conclusion of the follow-up period, the majority of cases were satisfied with their treatment. In roughly 16 cases, 76.12% reported an outstanding outcome. 3 (14.29%) had favorable outcomes. Table 4

Table 4: Patient satisfaction of the researched cases

	n= 21
Excellent	**16 (76.19 %)**
Good	**3 (14.29%)**
Moderate	**2 (9.52%)**
Fair	**0 (0%)**

Data are presented as mean ± SD, median (IQR) or frequency

Regarding complications 3 cases 14.2% had complication include one case had mild pain with sport training as well as wound dehiscence and the other one had restriction of ankle extension about 35 degree the last one had slight abnormality during walking.

Figure 7:(showing both x ray and MRI study after 5 years follow up No any signs of joint arthritis or cystic changes)

DISCUSSION:

The findings of this study support the effectiveness of autologous osteochondral transplantation (mosaicplasty) as a viable surgical solution for patients with osteochondral lesions of the talus (OLT) who did not respond to initial treatment methods such as drilling or microfracture. Patients who underwent mosaicplasty reported significant reductions in pain and improved functional outcomes, demonstrating that the procedure is both safe and clinically beneficial for restoring ankle function in active, young patients. A wide range of treatment modalities exists for osteochondral lesions of the talar dome, including conservative management, fragment excision, curettage (with or without drilling), microfracture, and cancellous bone grafting [12,13]. While arthroscopic debridement combined with drilling remains the standard treatment for small, stable lesions, its effectiveness decreases significantly for larger, cystic, or recurrent lesions. Literature reports success rates of 85–87% with this approach [14,15], but the regenerated fibrocartilaginous tissue lacks the mechanical integrity of native hyaline cartilage, limiting its long-term efficacy [16].To overcome these limitations, newer surgical options such as osteochondral autograft transfer system (OATS), mosaicplasty, and autologous chondrocyte implantation (ACI) have been developed to restore the biomechanical and biological properties of hyaline cartilage [17,18]. Mosaicplasty, in particular, involves harvesting cylindrical plugs of healthy cartilage and subchondral bone—typically from a non-weight-bearing area of the ipsilateral knee—and transplanting them into the talar defect. This technique enables the direct replacement of damaged tissue with viable, structurally sound autologous grafts.Although the technique shows promising outcomes, donor site morbidity remains a recognized concern. Studies have reported morbidity rates of up to **15–16%**, attributed to harvesting from otherwise healthy knees [19]. Despite this, the trade-off appears justifiable given the significant symptomatic and functional improvements observed. In our study, the **Visual** Analog Scale (VAS) score decreased significantly from 6.86 ± 1.2 preoperatively to 3.19 ± 0.81 postoperatively, while the American Orthopaedic Foot & Ankle Society (AOFAS) score increased from 47.1 ± 2.57 to 79.33 ± 5.32,

with both changes being statistically significant ($P < 0.001$). These results are consistent with those reported by Sabaghzadeh et al. [20], who observed a reduction in VAS from 7.4 to 3.2 and an increase in AOFAS from 42.1 to 78.6 following mosaicplasty. Likewise,

CONCLUSION:

Based on our findings, mosaicplasty represents a reliable and effective surgical option for patients with advanced osteochondral lesions of the talus, particularly those who have failed conservative and less invasive interventions. The procedure was associated with significant pain reduction, restoration of ankle function, and high patient satisfaction, making it a strong candidate for inclusion in the treatment algorithm for younger, active patients with stable ankle joints. Nevertheless, the technique is not without drawbacks—notably donor site morbidity—and should be applied with careful patient selection. Future randomized, controlled, multicenter trials with larger sample sizes and long-term follow-up are essential to further validate these findings and refine surgical indications and outcomes.

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Conflict of Interest: Nil

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