

**FASST**  
Foot & Ankle Symposium & Surgical Techniques

Brought to you in partnership by

**BESPA** GLOBAL  
**DES MOINES UNIVERSITY**  
MEDICINE & HEALTH SCIENCES

**Talar Osteochondral Lesion:  
"Filling" the Defect**

Sean T. Grambart DPM FACFAS  
Assistant Dean of Academic Affairs, Des Moines University, College of  
Podiatric Medicine and Surgery  
Past-President, American College of Foot and Ankle Surgeons

---

---

---

---

---

---

---

---

**Disclosure**

**FASST**  
Foot & Ankle Symposium & Surgical Techniques

Brought to you in partnership by

**BESPA** GLOBAL  
**DES MOINES UNIVERSITY**  
MEDICINE & HEALTH SCIENCES

- Partner, BESPA Global
- Orthosolutions, Design Team Member
- ACFAS, Speaker

---

---

---

---

---

---

---

---

**Microfracture in the Treatment of  
Osteochondral Lesion of the Talus**

**FASST**  
Foot & Ankle Symposium & Surgical Techniques

Brought to you in partnership by

**BESPA** GLOBAL  
**DES MOINES UNIVERSITY**  
MEDICINE & HEALTH SCIENCES




---

---

---

---

---

---

---

---

**Arthroscopic Microfracture for Osteochondral Lesions of the Talus**  
**Functional Outcomes at a Mean of 6.7 Years in 165 Consecutive Ankles**

**Prognosis**

**FASST**  
 FORTHMAN STRENGTH & SPORTS PERFORMANCE  
 BESPA  
 UNIVERSITY OF MANHATTAN

*Sung-Ho Choi, MD, Gun-Woo Lee, MD, PhD, and Moon-Sun Lee, MD, PhD  
 Investigation performed at Department of Orthopedic Surgery,  
 Chonnam National University Medical School and Hospital,  
 Gwangju, Republic of Korea*

**Background:** Arthroscopic microfracture for osteochondral lesions of the talus (OLT) has shown good functional outcomes. However, some studies have reported that functional outcomes deteriorate over time after surgery.

**Purpose:** To use various functional scoring systems to evaluate functional outcomes in a large sample of patients with OLT treated by arthroscopic microfracture.

**Study Design:** Case series; Level of evidence, 4.

**Methods:** The study cohort consisted of 165 ankles (156 patients) that underwent arthroscopic microfracture for small to mid-sized OLT. The mean lesion size was 73 mm<sup>2</sup> (range, 17-146 mm<sup>2</sup>), and the mean follow-up period was 6.7 years (range, 2.0-13.6 years). The Foot and Ankle Outcome Score (FAOS), American Orthopaedic Foot & Ankle Society (AOFAS) ankle-hindfoot scale, visual analog scale (VAS) for pain, and 36-item Short Form Health Survey (SF-36) were used to compare the functional outcomes between the preoperative and final follow-up assessments.

*The American Journal of Sports Medicine 2020*

---



---



---



---



---



---



---



---



---

**Arthroscopic Microfracture for Osteochondral Lesions of the Talus**  
**Functional Outcomes at a Mean of 6.7 Years in 165 Consecutive Ankles**

**Prognosis**

**FASST**  
 FORTHMAN STRENGTH & SPORTS PERFORMANCE  
 BESPA  
 UNIVERSITY OF MANHATTAN

*Sung-Ho Choi, MD, Gun-Woo Lee, MD, PhD, and Moon-Sun Lee, MD, PhD  
 Investigation performed at Department of Orthopedic Surgery,  
 Chonnam National University Medical School and Hospital,  
 Gwangju, Republic of Korea*

**TABLE 2**  
**Functional Outcomes of Osteochondral Lesions of the Talus After Arthroscopic Microfracture<sup>a</sup>**

	Preoperative	Final Follow-up	P Value <sup>b</sup>
FAOS pain	67.8 (30.6-83.3)	88.0 (61.1-100)	<.001
FAOS symptoms	69.7 (26.6-85.7)	88.8 (57.1-100)	<.001
FAOS ADL	77.4 (33.8-86.8)	92.3 (67.7-100)	<.001
FAOS sport/rec	51.5 (20.0-75.0)	79.4 (40-100)	<.001
FAOS QOL	48.5 (18.5-62.5)	76.0 (43.8-100)	<.001
AOFAS ankle-hindfoot scale	71.0 (47.0-84.0)	89.5 (63.0-100)	<.001
VAS pain	6.2 (4.0-8.0)	1.7 (0-6.0)	<.001
SF-36	62.4 (27.4-76.6)	76.2 (42.1-98.0)	<.001

- Good functional outcomes and improved quality of life according to FAOS, AOFAS, SF-36, and VAS were maintained after arthroscopic microfracture and did not deteriorate at a mean follow-up of 6.7 years.

**Conclusion:** Arthroscopic microfracture showed good functional outcomes and improved quality of life with maintenance of satisfactory outcomes at a mean follow-up of 6.7 years. Therefore, arthroscopic microfracture seems to be reliable as a first-line treatment for OLT at an intermediate-term follow-up.

*The American Journal of Sports Medicine 2020*

---



---



---



---



---



---



---



---



---

**Long-term results of microfracture in the treatment of talus osteochondral lesions**

**Prognosis**

**FASST**  
 FORTHMAN STRENGTH & SPORTS PERFORMANCE  
 BESPA  
 UNIVERSITY OF MANHATTAN

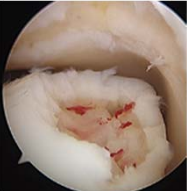
*Gülhan Pekel<sup>1</sup>, Ali Ergun<sup>2</sup>, Mehmet Emin Evli<sup>3</sup>, Taha Kuzhan<sup>4</sup>, Önder Kılıçdağ<sup>5</sup>, Mehmet Akçi<sup>6</sup>*

**Purpose**

- Clinical and radiographic outcomes of arthroscopic debridement and microfracture for osteochondral lesions of the talus

**Methods**

- 82 patients
- Mean defect size was 1.7 ± 0.7 cm<sup>2</sup>
- Arthroscopic debridement and microfracture for osteochondral lesions
- Minimum 5-year follow-up



*Knee Surg Sports Traumatol Arthrosc (2016) 24:1299-1303*

---



---



---



---



---



---



---



---



---

### Long-term results of microfracture in the treatment of talus osteochondral lesions

Gökhan Pala<sup>1\*</sup>, Ali Ersoy<sup>2</sup>, Mehmet Emin Erdi<sup>3</sup>, Taha Kuzluoğlu<sup>4</sup>, Önder Kılıçoğlu<sup>5</sup>, Mehmet Aygün<sup>6</sup>

## Prognosis

**Results**

- Mean preoperative AOFAS score was 58.7 ± 5.2 (49–75)
- Mean post-operative AOFAS score was 85.5 ± 9.9 (56–100)
- At the last follow-up, 35 patients (42.6%) had no symptoms
- 19 patients (23.1%) had pain after walking more than 2 h or after competitive sports activities
- Radiological assessments showed 27 patients (32.9%) had a one-stage increase in their arthritis level

*Knee Surg Sports Traumatol Arthrosc (2016) 24:1299–1303*

Demographics	
Number of patients	82 patients
Gender	49 male/33 female
Lesion location	Medial talar 47 Lateral talar 35
Control lesion	7
Mean age	35.9 ± 13.8 years (18–68)
Mean follow-up	125.2 ± 35.1 months (61–217)
Mean lesion size	1.7 ± 0.7 cm <sup>2</sup> (0.5–3)
Mean AOFAS score	Pre-op: 58.7 ± 5.2 (49–75) Post-op: 85.5 ± 9.9 (56–100)
Mean VAS score	Pre-op: 19.4 ± 8.2 (0–54) Post-op: 14.8 ± 9.7 (0–5)
The Berndt and Harty classification	Stage 1: 21 patients Stage 2: 30 patients Stage 3: 17 patients Stage 4: 17 patients
Symptoms at last follow-up	No symptoms in 35 patients (42.6%) No symptoms in daily living but had difficulty in other activities: 19 patients (23.1%) Pain with activity (walking >2 h or competitive sports): 19 patients (23.1%) Swelling: 4 patients Pain with forced dorsiflexion: 10 patients Pain with pain: 3 patients Revision operation: 2 patients

---

---

---

---

---

---

---

---

---

---

---

---

### Are We Missing Something??

**FASST**  
FACULTY OF SPORTS SCIENCE  
BESPA  
DULAKHAT UNIVERSITY

---

---

---

---

---

---

---

---

---

---

---

---

### Relationship Between Bone Marrow Lesions on MRI and Cartilage Degeneration in Osteochondral Lesions of the Talar Dome

Tarzanlı Hakkı, MD, PhD\*, Yılmazlı Hüseyin, MD, PhD<sup>2</sup>, Akın Savaş, MD<sup>3</sup>, Hacıoğlu Yalçın, MD<sup>4</sup>, Yılmaz Tarzanlı, MD<sup>5</sup>, Türkmen Özgür, MD<sup>6</sup>, Hacıoğlu Hakan, MD<sup>7</sup>, and Hacıoğlu Hakan, MD, PhD<sup>8</sup>

## Planning

**Abstract**

**Background:** In the evaluation of osteochondral lesions of the talar dome (OLT), bone marrow lesions (BML) are commonly observed in the subchondral bone on magnetic resonance imaging (MRI). However, the significance of BML, such as the histology of the overlying cartilage, is still unclear. The purpose of this study was to investigate the relationship between the BML and cartilage degeneration in OLT.

**Methods:** Thirty-three ankles with OLT were included in this study. All ankles underwent CT and MRI and had operative treatment. The ankles were divided into 2 groups, depending on the presence of bone sclerosis (ie, with or without) in the host bone just below the osteochondral fragment (nonsclerosis group and sclerosis group). The area of BML was compared between the 2 groups. Biopsies of the osteochondral fragment from 20 ankles were performed during surgery, and the correlation between the BML and cartilage degeneration was analyzed. The remaining 13 ankles had the CT and MRI compared with the arthroscopic findings.

**Results:** The mean area of BML in the nonsclerosis group was significantly larger than that in the sclerosis group. In the histologic analysis, there was a significant and moderate correlation between the Mankin score and the area of BML. The mean Mankin score in the nonsclerosis group was significantly lower than that in the sclerosis group.

**Conclusions:** This study revealed that a large area of BML on MRI exhibited low degeneration of cartilage of the osteochondral fragment, while a small area of BML indicated sclerosis of the subchondral bone with severe degeneration of cartilage. The evaluation of BML may predict the cartilage condition of the osteochondral fragment.

**Level of Evidence:** Level III, comparative series.

- 33 Ankle with OLTs
- All had MRI and CT
- With or Without Bone sclerosis
- Area of Bone Marrow Lesion
- 20 ankles had biopsy of the OLT
- 13 ankles were evaluated

---

---

---

---

---

---

---

---

---

---

---

---

**Relationship Between Bone Marrow Lesions on MRI and Cartilage Degeneration in Osteochondral Lesions of the Talus Dome**

**Planning**

FASST  
 FORTH AND SOUTHERN SYDNEY  
 UNIVERSITY  
 COLLEGE OF DENTISTRY  
 BIRSBPA

Tammyah Makki, MB, PhD\*, Yaswanth Suresh, PhD, PhD\*, Philip Stone, PhD\*,  
 Huanhuan Youkhanan, PhD\*, Toshiro Tsuyuguchi, PhD\*, Tatyana, PhD\*,  
 Prashanth K. Suresh, PhD\*, and Richard Attwells, PhD, PhD\*

- Large area of BML exhibited low degeneration of cartilage
- Small area of BML indicated sclerosis of the subchondral bone with severe degeneration of the cartilage

---

---

---

---

---

---

---

---

---

---

**Vascular Compromising Effect of Drilling for Osteochondral Lesions of the Talus: A 3-Dimensional Micro-Computed Tomography Study**

FASST  
 FORTH AND SOUTHERN SYDNEY  
 UNIVERSITY  
 COLLEGE OF DENTISTRY  
 BIRSBPA

Dingyu Wang, M.D., Zhongcheng Shen, M.D., Xuan Fang, M.D., Chen Jiao, M.D.,  
 Qionwei Guo, M.D., Yuelin Hu, M.D., Jiahao Yu, M.D., Ph.D., Dong Jiang, M.D., and  
 Weisang Zhang, Ph.D.

**Purpose**

- ❖ Optimal drilling depth and direction for OCD of the talus

**Methods**

- ❖ 12 cadaver tali perfused with a contrast agent and then scanned with a micro CT

*Arthroscopy: The Journal of Arthroscopic and Related Surgery, Vol 35, No 10 (October), 2019*

---

---

---

---

---

---

---

---

---

---

FASST  
 FORTH AND SOUTHERN SYDNEY  
 UNIVERSITY  
 COLLEGE OF DENTISTRY  
 BIRSBPA

Raikin, SM; Elias, I; Zoga, AC; et al.  
*Osteochondral lesions of the talus: localization and morphologic data from 424 patients using a novel anatomical grid scheme.*  
 Foot Ankle Int. 28(2):154-61, 2007

---

---

---

---

---

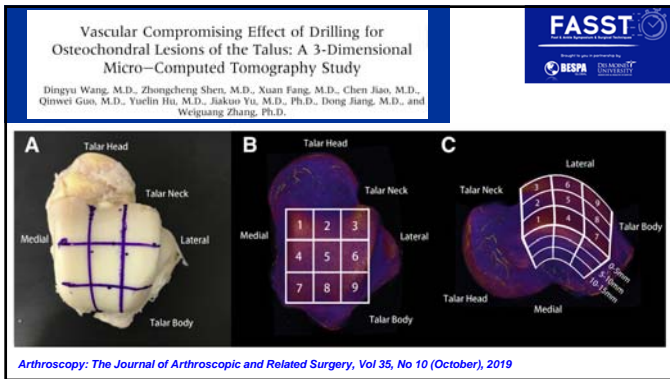
---

---

---

---

---




---

---

---

---

---

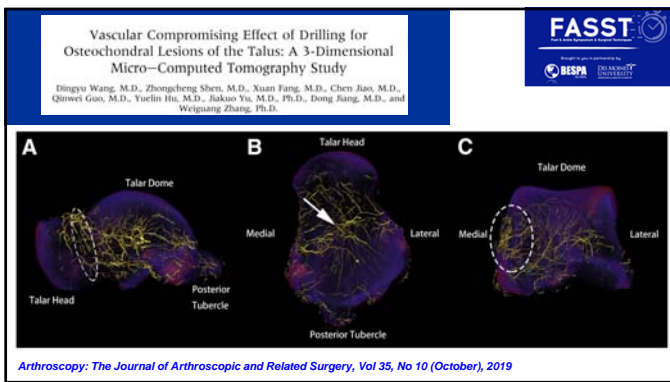
---

---

---

---

---




---

---

---

---

---

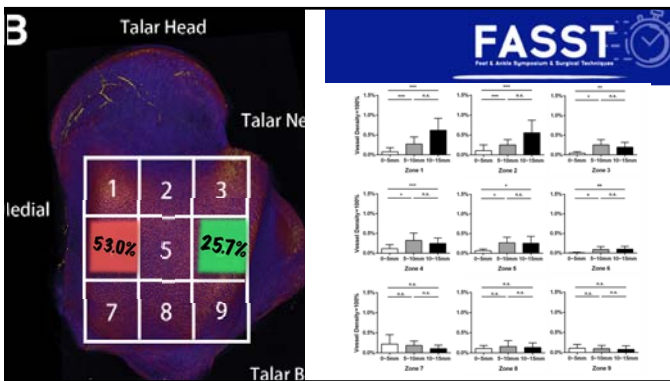
---

---

---

---

---




---

---

---

---

---

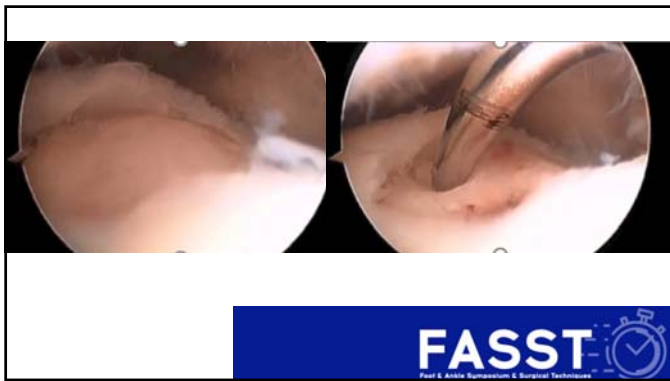
---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

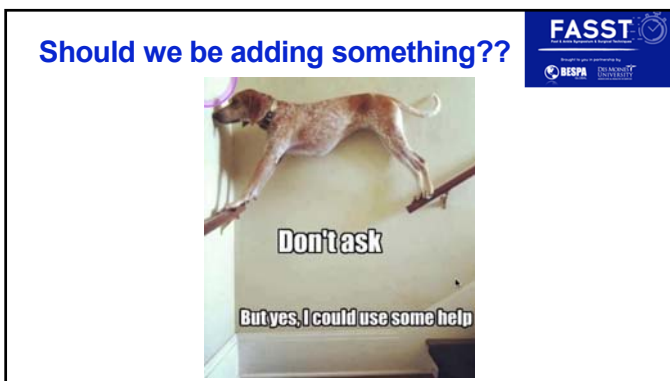
---

---

---

---

---



---

---

---

---

---

---

---

---

Foot and Ankle Surgery  
journal homepage: www.elsevier.com/locate/foot

**FASST**  
Foot & Ankle Symposium & Surgical Techniques  
BESPA  
THE MCKINLEY GROUP

### A prospective evaluation of bone marrow aspirate concentrate and microfracture in the treatment of osteochondral lesions of the talus

Evelyn P. Murphy<sup>a</sup>, Niall P. McGoldrick, Mark Curtin, Stephen R. Kearns

**ABSTRACT**

**Background:** The term osteochondral lesion (OCL) refers to a defect involving the chondral surface and or subchondral bone. These lesions are associated with ankle injuries with bony and soft tissue and cause pain, decreased range of motion, swelling and impact adversely on quality of life. To date the standard treatment has been isolated microfracture (BMF). The aim of this study was to compare the outcomes of BMF alone to BMF augmented with bone marrow aspirate concentrate (BMAC) in the treatment of ankle OCLs.

**Methods:** This study was a prospective cohort study carried out from 2010–2015 in a single surgeon's practice. Patients from 2010–2012 were treated with microfracture alone while patients from 2013–2015 were treated with microfracture augmented with bone marrow aspirate concentrate and fibrin glue. Self-reported patient outcome measures were measured. Complications, revision rates, and visual analogue pain scores were compared.

**Results:** 101 patients were included in the study, 52 patients were in the microfracture group while 49 patients were in the microfracture/BMAC group. The minimum follow-up for both groups was 36 months. Both groups had a statistically significant improvement in pain scores, quality of life scores, participation in sport and activities of daily living. The revision rate was 28.8% in the microfracture group versus 12.2% in the microfracture/BMAC group, which was statistically significant,  $p < 0.05$ . The majority of the lesions were less than 1.5 cm<sup>2</sup> in diameter in both cohorts.

**Conclusions:** Microfracture and bone marrow aspirate concentrate appears to be a safe and effective treatment option for osteochondral lesions of the talus. The addition of bone marrow aspirate concentrate does not result in any increase in ankle or donor site morbidity. It is a well-tolerated therapy which decreases revision rates for treatment of the osteochondral lesions when compared to microfracture alone.

Level of evidence: Level III.

*Foot and Ankle Surgery 25, 2019*

- Prospective Cohort Study
- 52 Patients in Microfracture
- 49 Patients in Microfracture/BMAC
- Minimum of 36 months follow up

Δ - Change in scores	Mean	Std. dev.	Std. error mean	95% CI. lower	95% CI. upper	t	Sig. (2-tailed)
Δ Symptoms	21.81	16.97	3.5	29.15	14.47	6.36	0.000
Δ Pain	17.22	16.76	3.95	25.13	9.11	4.4	0.000
Δ ADL	9.56	15.045	3.13	16.07	3.06	3.049	0.006
Δ Sports	23.41	23.55	4.66	32.77	13.06	4.69	0.000
Δ QOL	23.76	24.46	5.10	34.35	13.17	4.63	0.000

Δ - Change in scores	Mean	Std. dev.	Std. error mean	95% CI. lower	95% CI. upper	t	Sig. (2-tailed)
Δ Symptoms	26.38	23.04	3.36	27.14	13.63	6.02	0.000
Δ Pain	19.897	23.06	3.07	26.08	13.71	5.47	0.000
Δ ADL	15.649	20.58	3.00	21.69	9.60	5.21	0.000
Δ Sports	27.15	25.77	3.76	34.72	19.58	7.22	0.000
Δ QOL	33.41	28.24	4.12	41.70	25.12	8.11	0.000

Scale 1–10	Mean improvement in group	Std. error	Significance
Group 1: microfracture	3.04	0.53	P < 0.05
Group 2: BMAC and microfracture	3.44	0.18	P < 0.05

**FASST**  
Foot & Ankle Symposium & Surgical Techniques

Foot and Ankle Surgery  
journal homepage: www.elsevier.com/locate/foot

**FASST**  
Foot & Ankle Symposium & Surgical Techniques  
BESPA  
THE MCKINLEY GROUP

### A prospective evaluation of bone marrow aspirate concentrate and microfracture in the treatment of osteochondral lesions of the talus

Evelyn P. Murphy<sup>a</sup>, Niall P. McGoldrick, Mark Curtin, Stephen R. Kearns

**ABSTRACT**

**Background:** The term osteochondral lesion (OCL) refers to a defect involving the chondral surface and or subchondral bone. These lesions are associated with ankle injuries with bony and soft tissue and cause pain, decreased range of motion, swelling and impact adversely on quality of life. To date the standard treatment has been isolated microfracture (BMF). The aim of this study was to compare the outcomes of BMF alone to BMF augmented with bone marrow aspirate concentrate (BMAC) in the treatment of ankle OCLs.

**Methods:** This study was a prospective cohort study carried out from 2010–2015 in a single surgeon's practice. Patients from 2010–2012 were treated with microfracture alone while patients from 2013–2015 were treated with microfracture augmented with bone marrow aspirate concentrate and fibrin glue. Self-reported patient outcome measures were measured. Complications, revision rates, and visual analogue pain scores were compared.

**Results:** 101 patients were included in the study, 52 patients were in the microfracture group while 49 patients were in the microfracture/BMAC group. The minimum follow-up for both groups was 36 months. Both groups had a statistically significant improvement in pain scores, quality of life scores, participation in sport and activities of daily living. The revision rate was 28.8% in the microfracture group versus 12.2% in the microfracture/BMAC group, which was statistically significant,  $p < 0.05$ . The majority of the lesions were less than 1.5 cm<sup>2</sup> in diameter in both cohorts.

**Conclusions:** Microfracture and bone marrow aspirate concentrate appears to be a safe and effective treatment option for osteochondral lesions of the talus. The addition of bone marrow aspirate concentrate does not result in any increase in ankle or donor site morbidity. It is a well-tolerated therapy which decreases revision rates for treatment of the osteochondral lesions when compared to microfracture alone.

Level of evidence: Level III.

*Foot and Ankle Surgery 25, 2019*

- Microfracture Group


  - 28.8% Re-operation Rate

- Microfracture Group/BMAC

  - 12.2% Re-operation Rate

## Do I/We need to have more patience?

I had my patience tested.  
I'm negative.



---

---

---

---

---

---

---

---

---

---

### Analysis of the Changes in the Clinical Outcomes According to Time After Arthroscopic Microfracture of Osteochondral Lesions of the Talus

Tan Yong Kim, MD<sup>1</sup>, Seung Hyun Song, MD<sup>2</sup>, Jung Han Bae, MD, PhD<sup>3</sup>, Yeon Gu Hwang, MD<sup>4</sup>, and Bi O Jeong, MD, PhD<sup>5</sup>

**Abstract**  
**Background:** Arthroscopic microfracture can effectively treat osteochondral lesions of the talus (OLTs). However, very few studies have reported on symptomatic improvement duration and time when symptomatic improvement ceases. This study aimed to investigate the clinical outcome changes after arthroscopic microfracture in patients with OLT.  
**Methods:** Among patients who underwent arthroscopic microfracture for OLT, 70 patients were available for follow-up for more than 3 years. Of these, 4 patients who showed worsening or no improvement in the 8 months after surgery were excluded, and a total of 66 patients were included in the analysis. To analyze and compare the clinical outcome changes according to time, the visual analog scale (VAS) and American Orthopaedic Foot & Ankle Society (AOFAS) ankle-hindfoot scores were evaluated every 3 months up to 1 year postoperatively and every 1 year thereafter. The clinical outcome differences based on the lesion size, lesion location, lesion consistency, presence of cyst and bone marrow edema, age, sex, and obesity were analyzed.  
**Results:** The preoperative and final follow-up VAS scores significantly improved from 6.2 ± 1.1 to 1.2 ± 1.1 (P < .05) and the AOFAS score from 43.1 ± 7.3 to 91.0 ± 7.3 (P < .05). The overall success rate for arthroscopic microfracture in this study was 88.6%. The postoperative VAS and AOFAS scores at 3, 6, 9, 12, 24, and 36 months were 3.7 ± 1.4, 2.5 ± 1.3, 2.0 ± 1.1, 1.6 ± 1.2, 1.2 ± 1.2, and 1.2 ± 1.2 and 74.7 ± 10.3, 80.5 ± 8.9, 84.3 ± 7.4, 88.3 ± 7.3, 91.0 ± 7.5, and 92.8 ± 7.5, respectively, showing significant improvements up to 2 years. After 2 years, the symptoms did not improve but were maintained at a certain level up to 3 years. No clinical outcome differences based on the lesion size, lesion consistency, presence of cyst and bone marrow edema, age, sex, and obesity were observed.  
**Conclusion:** Symptomatic improvement early after arthroscopic microfracture for OLT was observed continuously for up to 3 years postoperatively. Symptom improvement was maintained without worsening for up to 3 years after surgery. Determining the final outcome of microfracture at least after 2 years would be reasonable.  
**Level of Evidence:** Level IV, case series.



- 64 patient that underwent arthroscopic microfracture
- Minimum 3 year follow up

---

---

---

---

---

---

---

---

---

---

### Analysis of the Changes in the Clinical Outcomes According to Time After Arthroscopic Microfracture of Osteochondral Lesions of the Talus

Tan Yong Kim, MD<sup>1</sup>, Seung Hyun Song, MD<sup>2</sup>, Jung Han Bae, MD, PhD<sup>3</sup>, Yeon Gu Hwang, MD<sup>4</sup>, and Bi O Jeong, MD, PhD<sup>5</sup>

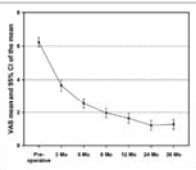


Figure 1. Results according to the VAS over the follow-up time frame. CI, confidence interval; VAS, visual analog scale.

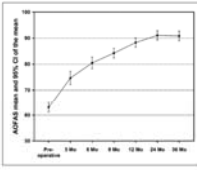



Figure 2. Results according to the AOFAS ankle-hindfoot scores over the follow-up time frame. AOFAS, American Orthopaedic Foot & Ankle Society; CI, confidence interval.



- "In patients with OLT treated with successful arthroscopic microfracture, it would be reasonable to determine the final outcome at least after 2 years"

---

---

---

---

---

---

---

---

---

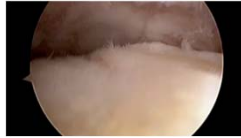
---



### Take Home Points



- 1. Pre-op Imaging
- 2. Drilling the Proper Depth
- 3. Giving it Time to Heal



---

---

---

---

---

---

---

---

### Surgical Pearls/Q&A Thank You!



We want your feedback! Results from the evaluation will be used in the planning of future FASST conferences.

The evaluation URL was provided in the email you received on Thursday and can be found in the Q&A box.

Certificates will be available for download by 5 pm CT on Monday, July 27. Instructions on how to access your certificate can be found on the conference materials website.

---

---

---

---

---

---

---

---