

# Microfracture Arthroscopy Efficacy In Treatment Of Articular Cartilage Insult Of Knee

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## ABSTRACT

**Background:** The treatment of articular cartilage defects is one of the most clinical challenges for orthopedic surgeons. Articular cartilage is a highly organized tissue with complex biomechanical properties and substantial durability. However, it has a poor ability for healing, and damage from trauma or degeneration can result in morbidity and functional impairment. debilitating joint pain, dysfunction, and degenerative arthritis

**Objectives:** The purpose of study is to show effectiveness of micro fracture arthroscopy as a method of treatment for such problem .

**Type of the study:** Cross-sectional study.

**Methods:** Arthroscopic surgery was done to 52 patients who complain of knee pain limping and show clinical or radiological evidence of cartilaginous injury and we used arthroscopic micro fracture technique for those patient who have injury of no more than 4cm<sup>2</sup> then we instruct patient to not put any weight over knee for 2-3 months and followed

clinically according to Lysholm score and by MRI and some of them by second look arthroscopy to assess the healing.

**Results:** Fifty two patients undergo micro fracture arthroscopy . Thirty four patients (65.4%) reported good or excellent subjective results , thirteen patients (25%) had fair knee function, and only five patients (9.6%) reported poor result

**Conclusions:** Micro fracture arthroscopy is a cheap effective method for repairing cartilaginous lesion .

**key words:** micro fracture ,arthroscopy and articular cartilage

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Articular cartilage is a highly organized tissue with complex biomechanical properties and substantial durability. However, it has a poor ability for healing, and damage from trauma or degeneration can result in morbidity and functional impairment. debilitating joint pain, dysfunction, and degenerative arthritis<sup>(1)</sup>. Articular cartilage defects of the knee are habitually watched. , The more later prospective study of 993 sequential knee arthroscopies showed confirmation for articular cartilage abnormality over 66%<sup>(2)</sup>. Articular cartilage defects of the femoral condyles bring additionally been watched alongside dependent part of condyle in half of competitors undergoing for most cruciate ligament reconstruction. Due to their poor spontaneous repair shed potential, these articular cartilage lesions exhibit an clinical orthopedics challenges, especially for youthful furthermore animated people<sup>(3)</sup>. Micro fracture gain utilized strategy used to provoke repair shed about articular cartilage defects of the knee<sup>(4)</sup>. Infiltration of the subchondral bone plate over these defects prompts cluster structuring in the abandon this cluster holds pluripotent, marrow-derived mesenchymal undifferentiated cells which generate a fibrocartilage repair shed for changing sums from claiming type-II collagen content<sup>(5)</sup>.

Microfracture an articular cartilage repair shop surgical methodology that meets desires by making little fractures in the underlying bone. This makes new cartilage which make beginning with a affirmed super-clot<sup>(4,5)</sup>. The individuals surgery is quick typically persisting in expert hands for 30-90 minutes ;minimally invasive, need an basically shorter

recovery time than a arthroplasty( knee replacement)<sup>(6)</sup>. Microfracture just makes minimal holes in the bone the individuals surface layer from asserting bone, known as the individuals subchondral bone, might be steady moreover fizzes with the table with great blood stream eventually 'perusing infiltrating this tricky layer, an microfracture permits the deeper, vascular bone to get to surface layer. This deeper bone had a good blood supply, and then cells get of the surface layer ,furthermore animate cartilage Growth<sup>(7,8,9)</sup>.

Chronic articular cartilage defects don't heal spontaneously. Reparative fibrocartilage comprises of type-I, type-II, Also type-III collagen on changing sums<sup>(10)</sup>. Those fibro cartilage doesn't look like the encompassing hyaline cartilage . Dissimilar to different cartilage rebuilding techniques, bone marrow incitement doesn't include exchange for chondrocytes under those lese greatness making a contained lesion will be basic with accomplishing an stable base to filling the deformity with an clot and bond of the clot<sup>(8,9)</sup>.

Assuming that the lese greatness will be not shouldered toward an stable edge for sound cartilage, accomplishing a stable clot might make additional was troublesome. Those calcified cartilage layer in the base of the lese greatness must have a chance to be removed too. Evacuation of this layer will be essential for cluster bond and the ultimacy prosperity of the microfracture method. The readied channels must have a chance to be of addition profundity to guarantee infiltration of the subchondral plate what's more correspondence for those marrow.<sup>(6,10)</sup>.

**Methods**

A fifty two patient complaint of knee pain ,swelling and catching treated by microfracture arthroscopic technique surgery in Al-Shaheed Alsader and al-Muktar private hospitals and they followed for twenty four months<sup>(4)</sup>,MRI

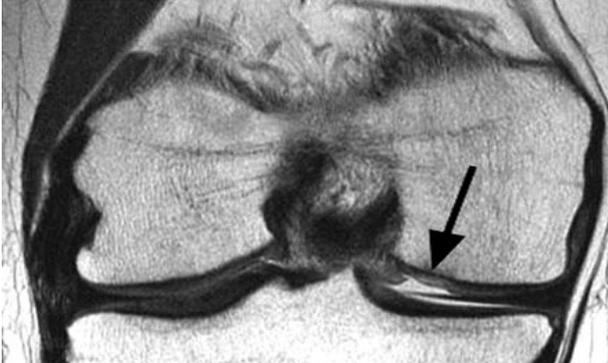


Fig 1: MRI picture of femoral condylar cartilaginous lesion

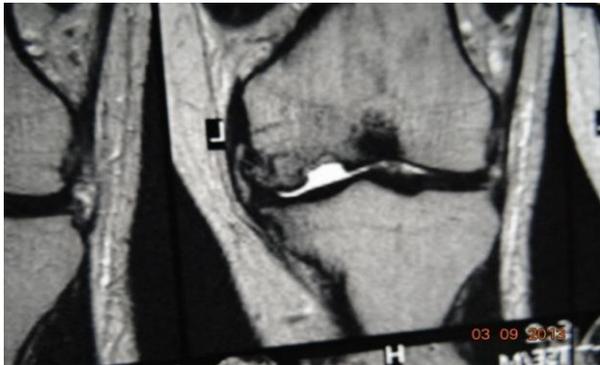


Fig2: MRI picture of femoral osteocondylar cartilaginous lesion



Figure-3-Arthroscopic view of cartilagenuos lesion in young adult 28 years old due to trauma

and second look arthroscopy but not all patient because some of them refuse another surgery so about half of patient agreed for second look arthroscopy At two years all patient had been followed except seven patients had removed, were pregnant, or were not available for examination in the outpatient clinic. However, these patient(none of whom had a failure) were contacted by telephone, and they returned their questionnaires.

**Inclusion criteria**

- 1- Optimal patient age should be less than forty-five years ranged from 10 to 45 years.
2. Symptomatic, central chondral lesions of the weight bearing femoral condyles,
- 3.The ideal knee lesion should be isolated, well contained, and not exceed an area of 4 cm<sup>2</sup> (2 × 2 cm)

**Exclusion criteria**

1. Generalized degenerative joint changes
2. Uncontained chondral lesions.
3. extreme pivotal malalignment for >5° to lesions of the femoral condyle (surgical realignment required).
4. patella maltracking or precariousness for patellofemoral lesions
5. tumor
6. Infection.
7. Body-mass >30.

Tegner Lysholm Knee Scoring Scale<sup>(4)</sup>

**During the past 4 weeks**

Section 1 -Limp		Section 2 -Support	
<input checked="" type="radio"/>	None	<input checked="" type="radio"/>	None
<input type="radio"/>	Slight or periodical	<input type="radio"/>	Stick or crutch
<input type="radio"/>	Severe and constant	<input type="radio"/>	Weight-bearing impossible

Section 3 - Pain		Section 4 - Instability	
<input type="radio"/>	None	<input type="radio"/>	Never giving way
<input checked="" type="radio"/>	Inconstant and slight during severe exertion	<input type="radio"/>	Rarely during athletics or other severe exertion
<input type="radio"/>	Marked during severe exertion	<input type="radio"/>	Frequently during athletics or other severe exertion (or incapable of participation)
<input type="radio"/>	Marked on or after walking more than 2 km	<input type="radio"/>	Occasionally in daily activities
<input type="radio"/>	Marked on or after walking less than 2 km	<input type="radio"/>	Often in daily activities
<input type="radio"/>	Constant	<input type="radio"/>	Every step

Section 5 - Locking		Section 6 - Swelling	
<input type="radio"/>	No locking and no catching sensations	<input type="radio"/>	None
<input type="radio"/>	Catching sensation but no locking	<input type="radio"/>	On severe exertion
<input type="radio"/>	Locking Occasionally	<input type="radio"/>	On ordinary exertion
<input type="radio"/>	Frequently	<input type="radio"/>	Constant
<input type="radio"/>	Locked joint on examination		

Section 7 - Stair-climbing		Section 8 - Squatting	
<input type="radio"/>	No problems	<input type="radio"/>	No problems
<input type="radio"/>	Slightly impaired	<input type="radio"/>	Slightly impaired
<input type="radio"/>	One step at a time	<input type="radio"/>	Not beyond 90°
<input type="radio"/>	Impossible	<input type="radio"/>	Impossible

Grading the Tegner Lysholm Knee Scoring Scale							
<65	Poor	65-83	Fair	84-90	Good	>90	Excellent

Tab. 1 : Tegner Lysholm scoring Scale

**Surgical procedure**

All of the patients treated by microfracture arthroscopic technique under general anesthesia and tourniquet applied .The marrow-stimulation technique required bed preparation by using a curette or a full- radius shaver

blade to remove any remaining fragment of articular cartilage. Loose fragment should also be removed at the lesion's margin and vertical wall of well attached healthy cartilage should be created. The subchondral plate should not be penetrated but the calcified cartilage layer above it removed with curette .Multiple penetrating holes are placed 3 to 4 mm apart throughout the bed of lesion fig 4 , 5, 6. After surgery we put back slab above knee for next two weeks and stitches removal after ten days , we follow the patients clinically by using Lysholm knee scoring scale , MRI and second look arthroscopic



procedure in some patients .

Fig 4 After debridement of edges of lesion



Fig 5: The lesion then penetration of subcondylar bone

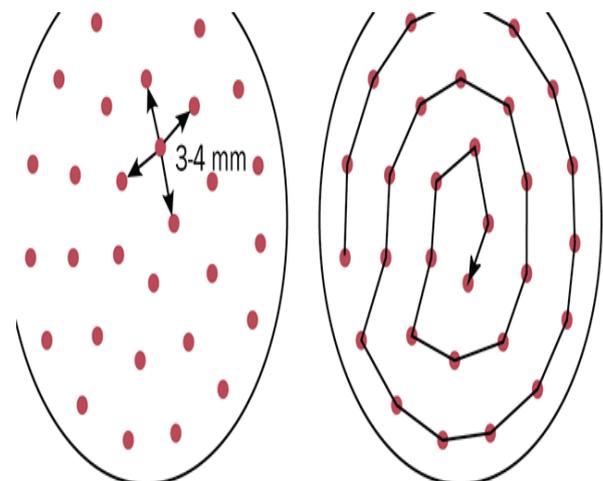


Fig. 6: Illustrating the systematic spiral pattern of microfracture penetrations of the subchondral bone plate throughout the cartilage lesion, allowing for a homogeneous distribution of the microfractures while

maintaining sufficient subchondral bone bridges between individual penetrations

**Results:** Fifty-two symptomatic patients with a full-thickness articular cartilage defects of the femur in a stable knee were treated with the microfracture technique. Prospective evaluation of patient outcome was performed for a minimum follow-up of twenty four months with a combination of subjective clinical examination and assessment, magnetic resonance imaging and second look arthroscopic examination. There were 29 women(55.8%) and 23 men(44.2%) with average of 25 -55years old and 29 (55.8%) of them were with cartilaginous lesion due to trauma ,11(21.2%) of them due to degenerative, four of patients (7.7%) due to foreign body inside the knee and eight patients(15.4%) due to patellofemoral overload syndrome tab. 1 . The traumatic in 33 patients (63.5%) and non traumatic in 19 patients (36.5%) .All of our patient not gone through surgery before our procedure but having different kinds of medical treatment and intra articular injection without benefit . The preoperative duration of symptoms range( 12 to 48 months). The mean body-mass index was  $26 \pm 3$  kg/m<sup>2</sup> (range 20 to 29 kg/m<sup>2</sup> ). The lesion size averaged 380 mm<sup>2</sup> (range, 200 to 290 mm<sup>2</sup> ). The lesions were located on the medial femoral condyle in 27 of patients (51.9%), thirteen patients in lateral femoral condyle (25%), and 12 patients in trochlea (23.1%). tab . 2Forty two patients (80.8 %) the defects were chondral lesions, while the remaining ten patients ( 19.2 %) were osteochondral lesions without cavitation.

**Tab 1 :** The causes of aricular cartilage insult

Causes	No. of patient	%
Trauma	29	55.8
Degenerative disease	11	21.2
Foreign body	3	5.8
Patello-femoral overlap	8	15.4

**Tab 2 :**The site of the lesion

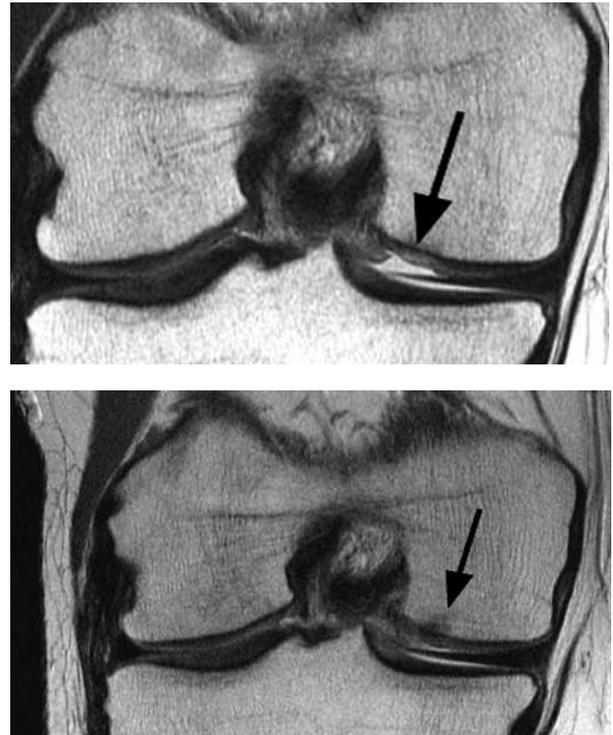
Site	No. of patients	%
Medial femoral condyle	27	51.9
Lateral femoral condyle	13	25
Trochlea	12	23.1

**Tab 3 :** Clinical outcome according to Lyshlom score

Outcome	No. of the patients	%
Good to excellent	34	65.4
Fair	13	25
Poor	5	9.8

At the time of the two-years follow-up, there were five patients failure (8%) they retain some pain and intermittent swelling and they asked to do second look arthroscopic surgery they refused except two of them . one of those patient had a good reasonable healing but

developed another lesion in other site and other one need more time for healing for second look arthroscopy after three months from original first surgery. Thirteen patients (25%) had fair knee function, and only five patients (8%) reported poor result.tab 3. Daily activities after micro fracture arthroscopy had increased according to lyshlom scoring system . Magnetic resonance imaging demonstrated a hyperintense signal in the repair cartilage in thirty-seven (71.1%) of patients and mild subchondral edema in fifteen patients (28.1%). Repair cartilage fill was graded as good in the majority of patients, but most treated lesions demonstrated depressed repair cartilage morphology relative to the adjacent hyaline cartilage .fig 7&8.



**Fig 7&8** thirty-three-year-old woman who had a fullthickness articular cartilage defect of the medial femoral condyle before and after microfracture arthroscopy

**Discussion :** This study demonstrated about how the microfracture chondroplasty can resulted in increased functional scores in patients treated for symptomatic cartilage lesion at follow-up of two years In the long-term study by Steadman et al <sup>(7)</sup> , which involved a cohort of seventy-one knees treated with microfracture chondroplasty, the mean Lysholm score improved from 59 before surgery during of follow-up12 monthsto 82 score. The greatest improvement occurred in the first year after surgery, but improvement continued for two to three years postoperatively. In contrast,other studies of microfracture have shown deterioration of results over time <sup>(3,4,5)</sup> .Also Steadman et al<sup>(7)</sup> reported that their patients had substantial increases in the ability to perform the activities of daily living, strenuous work, and sports after microfracture. The over all result in our study is parallel to other studies both clinical (lysholm score) <sup>(7,11,12, 13)</sup> and second look arthroscopic surgery as if we compare to other studies <sup>(7,13)</sup> there is a good functional result about 85% -90% after 8 weeks non

weight bearing and follow up of 2 years when patient experienced maximum improvement that's probably because of increasing cartilage lay down over time . The preoperative duration of symptoms was found to be an important factor for cartilage repair with microfracture chondoplasty in our study, as significantly patients with preoperative time of more than six months showed improved activities of daily living scores. Similarly, prolonged preoperative intervals mostly more than six months also have been associated with an inferior grade of repair cartilage at second-look arthroscopy after microfracture. Previous studies shown relation between age and result of microfracture as they shown there is a good result in patient under age of thirty<sup>(6,10)</sup>. In our study we observed such finding that the clinical outcome and the healing that was observed by second look arthroscopy for patient who did so probably because of age depending healing capacity of cartilage which related to difference in metabolic rate however we cannot confirm because we have no solid statistical studies about how much age related to cartilage healing. Body-mass index was inversely correlated with the activities of daily living score . Patients with a body-mass index of >30 kg/m<sup>2</sup> demonstrated the lowest outcome scores and the worst subjective rating . Osseous overgrowth following microfracture has not been well described and was observed in 5% of the patients who did magnetic resonance imaging post operative in our study. This phenomenon is thought to result from metaplasia of the deep layer of the repair cartilage after microfracture stimulation and has been demonstrated in up to 49% of patients after microfracture in the knee<sup>(14)</sup>. The factors responsible for the development of osseous overgrowth still not been figured out, but excess breaching of the subchondral bone plate during drilling or shaving of the calcified cartilage layer may promote vascularization of the base of the repair tissue and provide a stimulus for endochondral ossification<sup>(15)</sup>. The problem facing this study was absence of control study and weak compliance of patient for follow up and for second look arthroscopy in spite of that we were able to demonstrate significant changes in knee function and were able to identify several factors that influence functional outcome after microfracture by using instruments that have been previously validated for the knee. We routinely asked for second look arthroscopy because we have no cartilage sensitive magnetic resonance imaging which provides reliable information about repair cartilage filling and integration with additional evaluation of the underlying subchondral bone plate with respect to integrity and overgrowth .

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