# Hoffa Disease: Results of Arthroscopic Treatment of Anterior Knee Pain

## Hoffa Hastalığı: Diz Ön Ağrısının Artroskopik Tedavisinin Sonuçları

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## ABSTRACT

**Objective:** Hoffa disease is characterized by impingement between the patellofemoral or femorotibial joints because of hypertrophy and fibrosis owing to inflammation triggered by acute trauma (85% of the cases) or recurrent micro-traumas (15% of the cases) of the infrapatellar fat pad (IFP) and causes anterior knee pain. We aimed to evaluate the clinical and functional results of the treatment of painful infrapatellar fat pad (Hoffa disease) with arthroscopic resection.

**Material and Methods:** Arthroscopy was performed in 22 patients with anterior knee pain and Hoffa disease as an isolated lesion. A standard anteromedial working portal and a high anterolateral imaging portal was used in all cases. The patients were treated by resecting the affected part of the fat pad. The Lysholm knee and Tegner activities of the patients were compared pre-operatively and post-operatively at 3 months and 1 year.

**Results:** The average age of the patients was calculated as 34 years (19-49). The average pre-operative symptom period was 14 months (7-22). The mean follow-up period was 18 months (14-30). Nine patients were involved in regular sports activity. Three patients had a history of knee sprain. Three patients were actively involved in sports, and had a history of occasional recurrent sprain. Ten patients had no history of trauma. The Lysholm score was calculated as 56.76 preoperatively, 65.68 at the post-operative 3rd month and 73.97 at the post-operative 1st year. According to the Tegner activity score level, the symptoms improved in all patients except three and they returned to pre-injury status.

**Conclusion:** Conservative treatments such as non-steroidal inflammatory drugs, physiotherapy, and local anesthetic or steroid injections can reduce the complaints. However, conservative treatments have been reported to be generally ineffective. Partial resection of the fat pad is indicated when conservative treatment is ineffective. We believe Hoffa disease should be arthroscopically treated as recovery of the symptoms and functions can be expected after arthroscopic resection of the fat pad.

**Key Words:** Anterior knee pain, Hoffa disease, Infrapatellar fat pad, Patellofemoral pain syndrome

## ÖZ

**Amaç:** Hoffa hastalığı infrapatellar yağ yastığı (İYY)'nin, akut travma (olguların %85'i) veya tekrarlayan mikrotravmalar (olguların %15'i) sonucu tetiklenen inflamasyonu sonrası hipertrofi ve fibrozisiyle, patellofemoral veya femorotibial eklemler arasında sıkışması ile karakterizedir ve diz ön ağrısına neden olur. Ağrılı infrapatellar yağ yastığının (Hoffa hastalığı)'nın artroskopik rezeksiyon ile tedavi edilmesinin klinik ve fonksiyonel sonuçlarını değerlendirilmeyi hedefledik.

**Gereç ve Yöntemler:** Diz ön ağrısı olan ve izole bir lezyon olarak Hoffa hastalığı olan 22 hastada artroskopi uygulandı. Tüm olgularda standart anteromedial çalışma portalı ve yüksek anterolateral görüntüleme portalı kullanıldı. Hastalar yağ yastığının etkilenen kısmının rezeke edilerek tedavi edildi. Ameliyat öncesi ve ameliyat sonrası 3 ay ve 1 yıl sonra hastaların Lysholm diz ve Tegner aktiviteleri karşılaştırıldı.

**Bulgular:** Hastaların yaş ortalaması 34 (19-49) olarak hesaplandı. Ortalama ameliyat öncesi semptomların süresi 14 ay idi (7-22). Ortalama takip süresi 18 aydı (14-30). Hastaların 9 tanesinin düzenli spor aktivitesi mevcuttu. Üç hastanın dizinde burkulma öyküsü mevcuttu. Üç hasta aktif spor ile uğraşıyordu ve ara ara tekrarlayan burkulma öyküleri mevcut idi. On hastada hiçbir travma öyküsü yoktu. Lysholm skoru preop 56.76, ve post op 3. ay 65.68 ve post op 1. yıl 73.97 olarak hesaplandı.

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Tegner etkinlik seviyesine göre, 3 hasta dışındaki tüm hastaların şikâyetlerinde düzelme oldu ve yaralanma öncesi durumuna döndü.

**Sonuç:** Nonsteroid antienflamatuvar ilaçlar, fizyoterapi, lokal anestezik veya steroid enjeksiyonu gibi konservatif tedaviler yakınmaların azalmasını sağlayabilir. Ancak konservatif tedavinin genellikle yetersiz kaldığı bildirilmiştir. Konservatif tedavi yetersiz kaldığında yağ yastığının parsiyel rezeksiyonu endikedir. Yağ yastığının artroskopik rezeksiyon sonrası semptom ve fonksiyonlarında düzelme olacağından Hoffa hastalığını artroskopik olarak tedavi edilmesi kanaatindeyiz.

**Anahtar Sözcükler:** Diz ön ağrısı, Hoffa hastalığı, İnfrapatellar yağ yastıkçığı, Patellofemoral ağrı sendromu

## INTRODUCTION

Hoffa disease is characterized by an impingement between patellofemoral or femorotibial joints because of hypertrophy and fibrosis after inflammation triggered by acute trauma (85% of cases) or recurrent micro-traumas (15% of cases) of the infrapatellar fat pad (IFP), and causes chronic anterior knee pain (1).

Although the function of the IFP, which is a structure in the knee more sensitive to pain, is not completely known, it is believed to have a series of functions, including biomechanical and neurovascular support and stabilization of the knee joint. However, no consensus exists regarding the pathogenesis, clinical definition and treatment of Hoffa disease. It is often diagnosed by elimination of other probable diagnoses (2).

Albert Hoffa first defined the IFP impingement after being exposed to inflammatory hypertrophy in 1904 and stated that it led to knee pain or dysfunction (3). Hoffa disease is characterized by pain in the anterior knee as a result of inflammation or impingement of the Hoffa fat pad caused by recurrent acute or chronic micro-traumas (4).

Inflammation is distinct in the acute phase of the disease, and the contraction caused by scar and fibrous tissue in the IFP results in pain during the chronic period. The fibrous tissue may transform into fibrocartilage tissue and calcify. The disorder is one of the significant reasons of anterior knee pain, and is frequently diagnosed using magnetic resonance imaging (MRI) (5,6). In this study, we aimed to compare the clinical and functional results of treatment of painful IFP (Hoffa disease) with arthroscopic resection and its advantage over non-operative treatment.

## MATERIALS and METHODS

A total of 22 patients presenting to the University of Health Sciences, Antalya Training And Research Hospital with anterior knee pain and Hoffa disease as an isolated lesion between January 2016 and August 2018 were retrospectively evaluated. The study was approved by the hospital ethics committee for clinical research. The ethics protocol number of the research is 2019-230. All patients were diagnosed using MRI. Meniscal tear and medial ligament injury of the knee were ruled out by MRI imaging (Figure 1A, B). None of the patients underwent physical therapy and rehabilitation before surgery. Patients received only analgesic drug treatment. At one month post-operatively, all patients started rehabilitation, which was continued until a complete knee joint range of motion was achieved. The patients completed a general information form before surgery, and those having isolated anterior knee pain underwent arthroscopy. The standard anteromedial study portal and high anterolateral imaging portal were used for all patients (Figure 2). The patients were arthroscopically treated by resecting the affected part of the fat pad. The pre- and post-operative values of Lysholm knee and Tegner activities of the patients were compared at 3 months and 1 year, respectively (Table I, II). Patients who previously underwent knee surgery, had meniscal or medial ligament injury of the knee, osteoarthritis, neurogenic disease such as muscle power weakness or obesity were excluded from the study.

### *Inclusion Criteria*

The inclusion criteria were as follows: unilateral anterior knee pain, intact anterior cruciate ligament, posterior cruciate ligament, meniscus, lateral and medial collateral ligaments; no previous knee surgery, lack of neurological or muscular disorder and normal orientation and cooperation.

### *Exclusion Criteria*

The exclusion criteria were as follows: osteoarthritis, history of knee surgery, meniscal pathologies, knee cartilage abnormalities, knee ligament injuries; incompliance with follow-up visits and patients without sufficient mental status (Alzheimer's, dementia, etc.).

### Statistical Evaluation

Student's *t*-test was used for paired samples and Pearson correlation test was used for statistical analysis. $P<0.05$ at a confidence interval of 95% was considered significant. Data was evaluated using the SPSS 15.0 Windows program.

## RESULTS

The mean age of the patients was 34 years (19-49 years). The mean pre-operative symptom period was 14 months (7-22 months). The mean follow-up period was 18 months (14-30 months). Nine patients were involved in regular sport activity and three had a knee sprain history. Three patients were involved in active sports with sprain histories from time to time. No trauma history was noted in 10 patients.

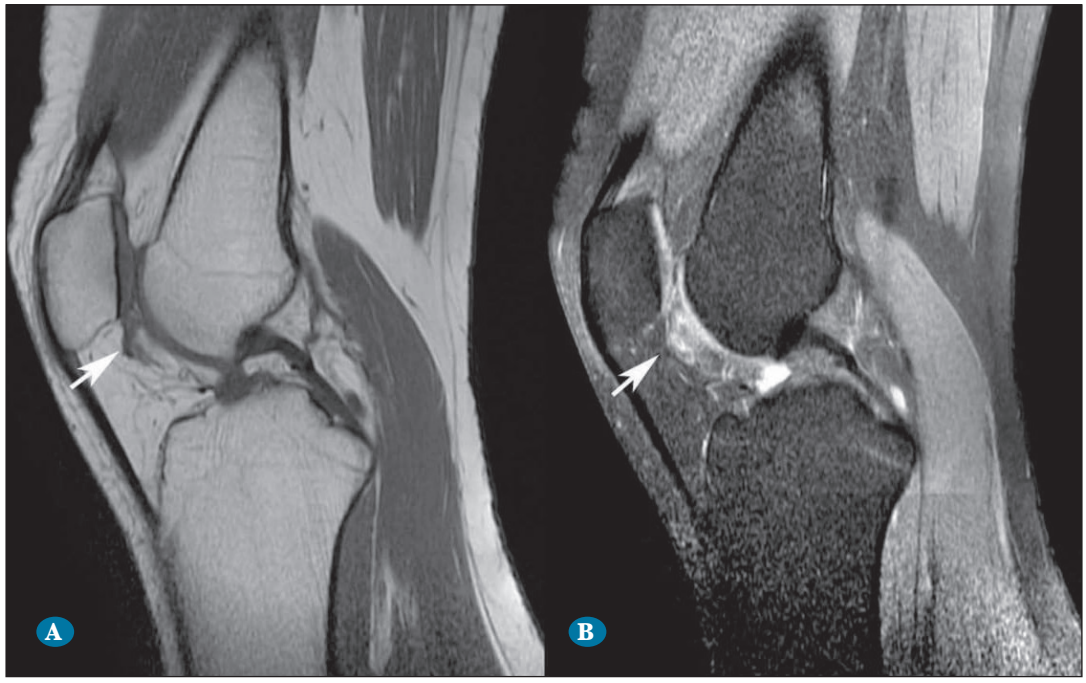


**Figure 1:** In the superior part of infrapatellar fat pad, Hypointense (**A**) is observed in T1 images. T2 images show hyperintense (**B**) signal feature.

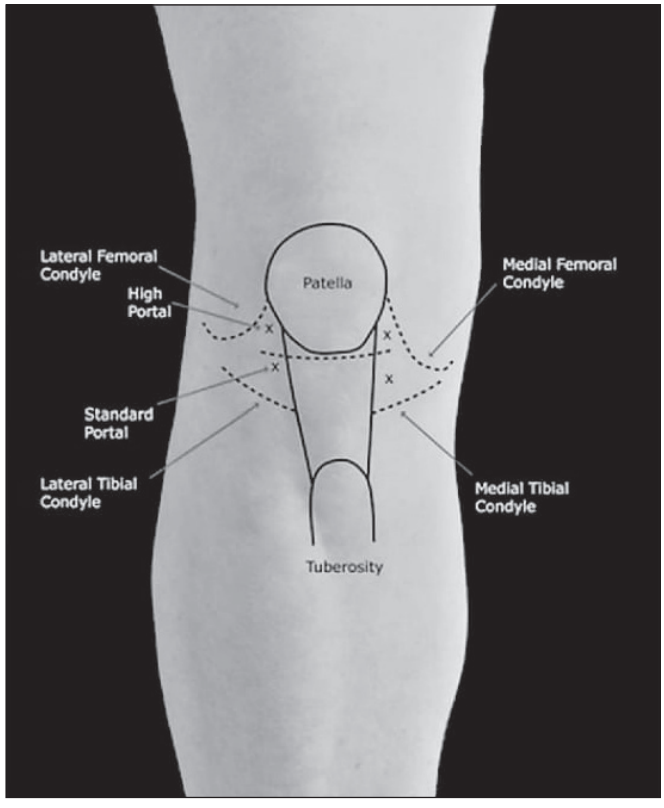


**Figure 2:** Anterolateral High Portal.

The Lysholm score was 56.76, 65.68 and 73.97 pre-operatively, in the third post-operative month and in the first post-operative year, respectively. Based on the Tegner activity levels, all patients showed symptom recovery and returned to the pre-injury condition, except three patients. We believe that these three patients had a generalized chronic inflammatory condition. Therefore, it is crucial to rule out generalized synovitis or a chronic inflammatory condition before the fat pad resection. No post-operative complication such as embolism or infection was observed in any patient.

## DISCUSSION

Non-steroidal anti-inflammatory drugs, physiotherapy and conservative treatments such as a local anesthetic or steroid injection may provide relief of complaints.

IFP pathology is typically successfully managed with physical therapy (7). Physical therapy interventions attempt to restore the biomechanics of the patellar tracking through active interventions, passive interventions and optimising lower extremity mechanics. This is done by improving pelvic control with gluteal muscle training and improving the foot function with or without orthotics.

Injections of local anaesthetic and corticosteroids have also been used to treat IFP pain (8). Injection of 6 cc of 2% lidocaine and 40 mg of methylprednisolone acetate often results in the IFP pain improvement. Conservative treatment was generally ineffective and partial resection of the fat pad is considered in this case (9). A study on ultrasound-guided alcohol ablation of the IFP reported that patients experiencing symptoms for >21 months failed to respond to conservative treatment (10).

Notably, the patients' complaints decreased after arthroscopic surgical intervention for anterior knee pain in some case series and cohort studies (11-14). Kumar et al. reported that the increase in the Lysholm score was inversely proportional to the duration of the symptoms

**Table I:** Lysholm knee score.

**Limping (5 points)**
Never = 5
Mild or periodically = 3
Strong and continuous = 0

**Support (5 points)**
No support = 5
Walking stick or crutches = 2
Impossible = 0

**Restraining (15 points)**
No restraining or restraining feeling = 15
Has the feeling, but no restraining = 10
Occasional restraining = 6
Frequent = 2
Joint restrained at examination = 0

**Instability (25 points)**
Never miss a step = 25
Seldom, during athletic activities or other strong-effort exercises = 20
Frequently during athletic activities or other strong-effort exercises (or unable to participate) = 15
Occasionally in daily activities = 10
Frequently in daily activities = 5
At each step = 0

**Pain (25 points)**
No pain = 25
Intermittent or mild during strong-effort exercises = 20
Marked during strong-effort exercises = 15
Marked during or after walking more than 2 Km = 10
Marked during or after walking less than 2 Km = 5
Continuous = 0

**Swelling (10 points)**
No swelling = 10
Upon strong-effort exercises = 6
Upon usual exercises = 2
Continuous = 0

**Climbing stairs (10 points)**
No problem = 10
Slightly damaged = 6
One step at a time = 2
Impossible = 0

**Squatting (5 points)**
No problem = 5
Slightly damaged = 4
Not exceeding 90 degrees = 2
Impossible = 0

**Total score:** _____

**Score table:** Excellent: 95 – 100; Good: 84 – 94; Fair: 65 – 83; Poor: < 64

**Table II:** Tegner activity score.

| | |
|---|---|
| Level 10 | Competitive sports- soccer, football, rugby (national elite) |
| Level 9 | Competitive sports- soccer, football, rugby (lower divisions), ice hockey, wrestling, gymnastics, basketball |
| Level 8 | Competitive sports- racquetball or bandy, squash or badminton, track and field athletics (jumping, etc.), down-hill skiing |
| Level 7 | Competitive sports- tennis, running, motorcars speedway, handball<br>Recreational sports- soccer, football, rugby, bandy, ice hockey, basketball, squash, racquetball, running |
| Level 6 | Recreational sports- tennis and badminton, handball, racquetball, down-hill skiing, jogging at least 5 times per week |
| Level 5 | Work- heavy labor (construction, etc.)<br>Competitive sports- cycling, cross-country skiing,<br>Recreational sports- jogging on uneven ground at least twice weekly |
| Level 4 | Work- moderately heavy labor (e.g. truck driving, etc.) |
| Level 3 | Work- light labor (nursing, etc.) |
| Level 2 | Work- light labor<br>Walking on uneven ground possible, but impossible to back pack or hike |
| Level 1 | Work- sedentary (secretarial, etc.) |
| Level 0 | Sick leave or disability pension because of knee problems |

before surgery (12). Therefore, the cited study recommended that surgery should not be delayed beyond three months if fat pad impingement is suspected on clinical grounds. In our study, 19 patients (86%) returned to their pre-injury condition.

Adulkasem et al. saw a regression in anterior knee pain after subtotal excision of the IFP in their 30-patient case series (14). Moreover, no recurrence of the symptoms observed at follow-up. In our study, the symptoms were resolved and returned to their pre-injury condition in all patients (86%) except for three.

Ogilvie-Harris et al. used the Cincinnati rating system to evaluate the post-operative results of 11 patients who underwent arthroscopy and observed a post-operative score of 46 compared with 32 pre-operatively (15). Moreover, they observed a significant improvement in the symptoms and functions during the 72-month mean follow-up period.

Liu et al. examined patients who underwent arthroscopic partial or subtotal resection of the IFP in a 55-case series and found that partial resection was as effective as subtotal resection and could be an alternative treatment option when the fat pad was more protected (16). They showed that the probable patella baja occurrence decreased because the IFP protection contributed to the tendon repair of the fat pad.

In our case series, subtotal resection was performed and no complications were observed in any patient. However, based on the Tegner activity levels, three patients did not return to their pre-injury condition, probably because they had a generalized chronic inflammatory condition. Therefore, it is crucial to rule out generalized synovitis or a chronic inflammatory condition before the fat pad resection.

## CONCLUSION

IFP is known to be a source of anterior knee pain. Non-operative treatments for IFP pathology include physical therapy, patellar taping and steroidal injections. When these are not effective, procedures like fat pad excision, partial resection, synovectomy or infrapatellar plica release have been used to treat the IFP pathology effectively. Notably, Hoffa disease may be arthroscopically treated with an improvement in clinical symptoms and a decrease in pain after arthroscopic fat pad resection.

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