

# Arthroscopic Treatment of Benign Tumors and Tumor Like Lesions Located in and Around the Knee Joint

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**Introduction:** Analysis of surgical outcomes and complications of patients who had tumor or tumor-like lesions in the knee joint and around and underwent arthroscopic excision.

**Method:** 23 patients who had tumor or tumor-like lesions in and around the knee joint and treated arthroscopically between the years 2013 and 2016 were evaluated retrospectively. The mean post-operative follow-up of all patients was 21.2 months (6-37 months) and all of them are still under follow-up.

**Results:** No peroperative or post-operative complications were observed in the patients. On post-operative month 3 MRI controls, it was accepted that complete resection could be performed in all patients. None of the patients had recurrences.

**Conclusion:** Arthroscopic resection of tumoral lesions in circumference of the knee joint with good selection of suitable patients, good preoperative planning and proper surgical technique has low complication risk and excellent results.

**Keywords:** Knee, Arthroscopy, Intra-articular tumor, Synovectomy, Treatment

## Introduction

Arthroscopy is a minimally invasive and effective method for evaluation and treatment of disorders in circumference of the knee joint. But there may be undesirable outcomes in the presence of an unsuspected malignancy. Therefore, a careful and systematic evaluation should be performed preoperatively (1).

Many studies have shown that benign intra-articular lesions can be successfully arthroscopically resected after careful preoperative

evaluation (2-9).

In the orthopedic clinic of our hospital, which is the largest tumor hospital in our country, open surgical and arthroscopic operations due to tumoral diseases and non-tumor orthopedic pathologies have been performed intensively by experienced surgeons for many years. The aim of this study was to retrospectively analyze 23 patients who had tumor or tumor-like disease in knee and around the knee joint and underwent arthroscopic treatment.

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## Material and Method

Between 2013 and 2016, 22 patients who had tumoral lesions in the knee and around the knee joint and had arthroscopic treatment of tumoral lesions were retrospectively evaluated. All of the participants were orthopaedic patients and who signed the informed consent forms. The cases who had lesions intraarticular or periarticular of knee and underwent open surgery (femur tibial or patellar bone tumors, large/atypical lesions unsuitable for arthroscopic surgery, lesions with malignancy risk in evaluation of orthopedic-radiology) have not included to this study.

In the preoperative period, medical histories, physical examinations, laboratory parameters and imaging findings of all patients were evaluated and discussed with a radiologist who specialized in orthopedic tumors. No malignancy was thought in all of the cases. The pathological material was examined histopathologically by the musculoskeletal pathologist. 12 patients (x%) were male and 11 patients (x%) were female and the mean age was 38.1 years (14-68 years). Patients were followed for at least 6 months and all patients are still under follow-up. The mean follow-up was 21.9 months (range, 6-37 months)(Table-1).

Six of the patients were treated for osteochondromatosis. 3 of the lesions were located in the posterior, 1 in the posterolateral, 1 in the femur lateral condyle, and 1 in near of the anterior cruciate ligament. 3 of the patients were treated for tenosynovial giant cell tumor. 3 lesions were also in the infrapatellar region. 3 of the patients were treated for aspecific chronic synovitis; 2 of the lesions were widespread intraarticularly, 1 was located in the infrapatellar region and the other in the medial compartment. Two of the patients had posterolateral

ganglion cysts. In 1 of 2 patients with haemangioma, cyst was located in lateral condyle of the femur; and in other patient, it was located infrapatellar. Two patients had synovial cyst. Synovial cyst located around of anterior cruciate ligament in a patient, around of lateral meniscus in one patient. Synovial lipomatosis around the lateral condyle of the femur in 1 patient, rheumatoid nodule in the posterior compartment in 1 patient, synovial meniscus cyst in around of the lateral meniscus in 1 patient, and common gouty tophi in 1 patient were in existence. When the settlements were examined; 4 infrapatellar, 4 posterior compartments, 3 posterolateral, 3 around the lateral condyle of femur, 3 diffuse settlements, 2 anterior cruciate ligaments, 2 around of lateral meniscus, 1 posterior of medial meniscus and 1 infrapatellar + medial located. All patients were performed single-session arthroscopic surgical resection. Evaluation criteria were resection quality, complications and recurrence rate.

In some patients, the lesion was detected on direct radiograph/MRI due to massive symptoms; In some cases was is detected when meniscus rupture, patellar tendinitis, cartilage pathologies and other pathologies were investigated. In these patients, both tumor resection and lateral relaxation, meniscus suture/debridement were applied at one session. For this reason, the evaluation of the operation time and functional evaluation were not performed in this study.

All surgeries were performed with the same standardized surgical procedure by 2 surgeons. Patients were operated under spinal/rarely general anesthesia, supine position with tourniquet. In all interventions involving the posterior half, the knee was always held in the flexion at least 90 degrees. Thus, it was aimed to reduce

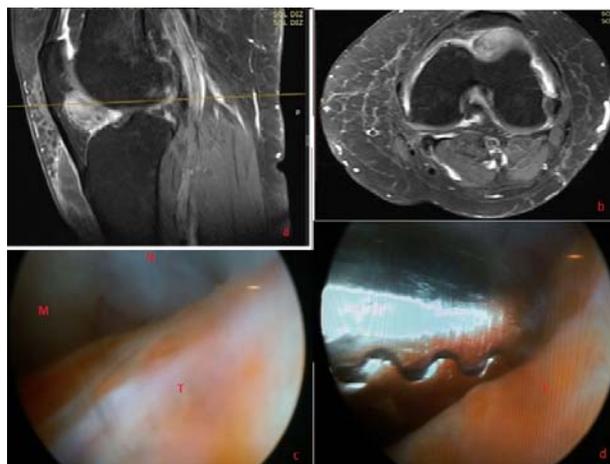
the risk of iatrogenic injury of the popliteal artery, common fibula and saphenous nerve and other posteriorly located important structures. All patients underwent diagnostic first examination using a classical anteromedial and anterolateral portals with 30 degrees oblique and 4.5 mm arthroscopy. Additional portals were used for visualization and/or instrumentation when necessary with assessment of the lesion and additional pathologies. In some cases, combined posteromedial / posterolateral portals with anterior portals and the transeptal approach developed by Louisia et al were used for posterior located lesions. Operations were completed for lesions around of femoralcondyl, from superomedial, superolateral, proximal superolateral or near of these portals to were considered to provide the most comfortable access and best resection.

After resection, bleeding was controlled if there was bleeding. After arthroscopic examination to evaluate the quality of the resection, intervention was performed if an additional lesion that requiring intervention was detected and in the cases when it was considered necessary, the procedure was terminated by placing a suction drain.

The patients who underwent only resection of tumoral lesion were started active and passive exercises 48 hours after of the drain was removed; Additional rehabilitation programs were applied to patients who additional processes were done according to the type of operation. All patients were evaluated post-operatively at 3 weeks for sutures retrieval and initial control examination. In the following period, 3<sup>rd</sup> month MRI control for quality of resection and recurrence control; after that MRI was performed 6<sup>th</sup> month, 1<sup>st</sup> year and thereafter annually for recurrence.

## Results

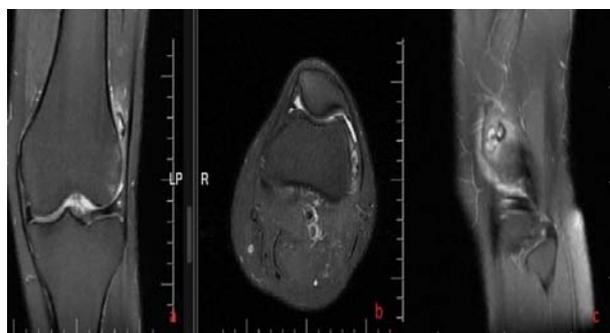
The average duration of hospital stay was 1.3 days (range 1-3 days). The mean duration of post-operative follow-up was 21.2 months (range 6-37 months). All the patients are still under our control.



**Figure 1a-1b:** Infrapatellar tenosynovial giant cell tumor; Preoperative MRI sagittal and axial sections.

**Figure 1c-1d:** The arthroscopic appearance of tumoral lesion on the anterior of femoral condyles when the knee in the flexion state (M: medial condyle, T: tumoral lesion, N: inter-condylar notch).

None of the patients had any peroperative or post-operative complications. On post-operative Month 3 MRI controls, it was accepted that complete resection could be performed in all patients. None of the patients had recurrences.



**Figure 2a, 2b, 2c:** Synovial lipomatosis around the lateral condyle of the femur; Preoperative coronal, sagittal and axial MRI sections

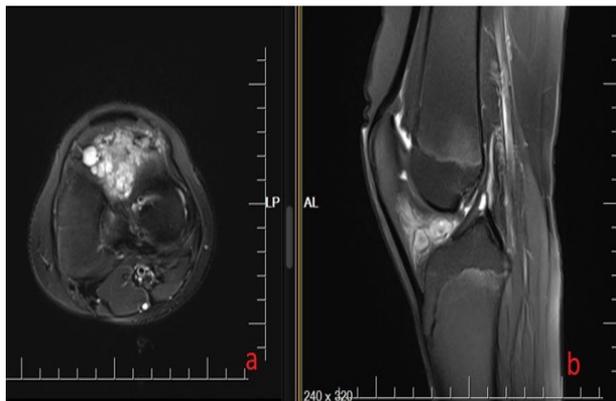


Figure 3a-3b: Infrapatellar synovial haemangioma; Preoperative MRI sagittal and axial sections

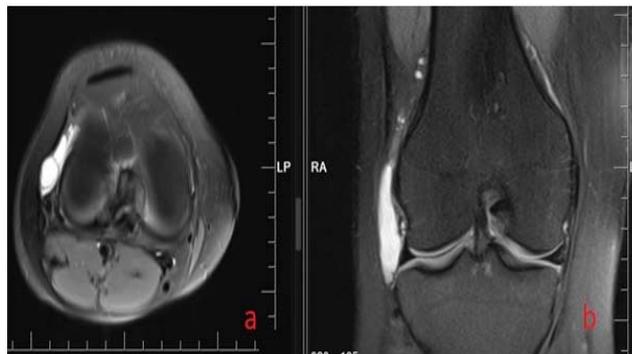


Figure 6a, 6b: Lateral meniscal cyst in the knee; Preoperative MRI axial t2 and coronal fat-sat sequence images

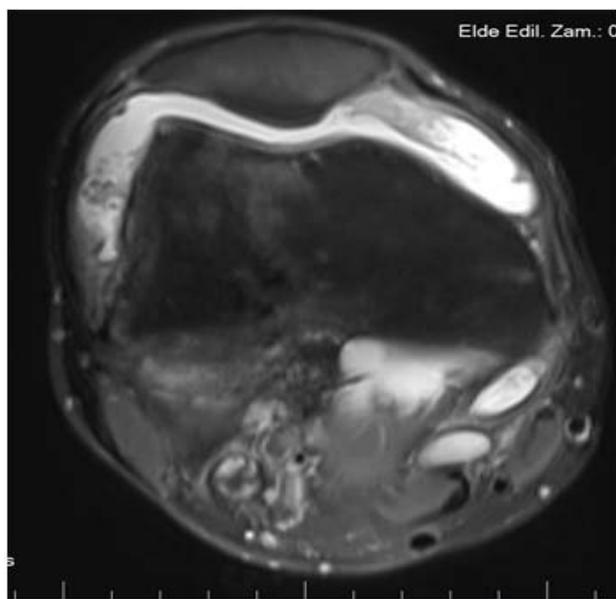


Figure-4: Chronic active synovitis in the knee; Preoperative MRI axial t2 fat-sat image

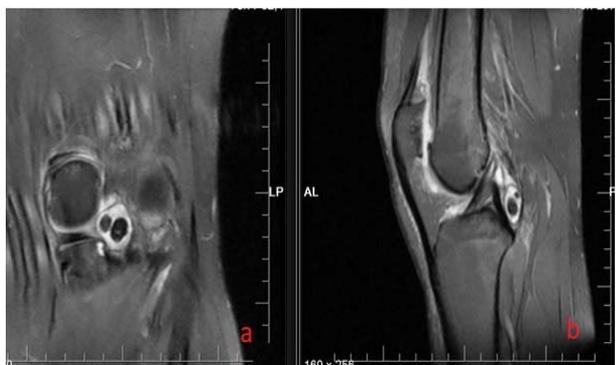


Figure-5a, 5b: Synovial osteochondromatosis in the knee; Preoperative MRI coronal and sagittal fat-sat images

### Discussion

Arthroscopic biopsy provides adequate tissue for diagnosis in the majority of periarticular tumors. In addition, for diagnosis of tumor-like lesions such as some intra-articular infections and tophus, they are useful that arthroscopic examination of intraarticular tissues and culture of the synovial tissue can be done (9). However, in lesions which are suspected malignancy, there is a risk of arthroscopic dissemination compared to conventional biopsy (1,3,10).

The main outcome of this study is benign tumors and tumor-like lesions in and around the knee joint can be treated successfully by arthroscopic method, because of that it is minimally invasive surgery and it has lower iatrogenic risk.

The most common side effects of arthroscopic procedures are orthopedic re-admission, unplanned re-operation, any wound complication, VTE and non-fatal PE (11). We did not see any perioperative complications in our patients who underwent arthroscopic treatment and had periarticular tumors. However, we did not include isolated complications related to treatment of non-tumor lesions, such as the patients who underwent meniscus suture did not show usual healing and they needed re-operation. Arthroscopically, we have not seen

wound complications in any patient despite the fact that we applied both the treatment of tumor lesion and the repair of additional intra-articular pathologies at the same session. So, we think that this approach is feasible and risk is low.

Arthroscopically, one of the most important issues in the excision procedure of the tumor lesion is flexion of knee joint when applying technics involving posterior compartment. In this position, important anatomic structures such as the common fibular, popliteal artery are folded back and the risk of iatrogenic neurovascular injury is minimized (12, 13). We have implemented this rule with care in all cases and we have never seen iatrogenic injury in our patients.

Periarticular osteochondromes are often outside the joint. If symptomatic, they cause clinical symptoms due to traumatic contusion and pressure on joints, adjacent muscles, nerves or blood vessels (4, 14). Arthroscopic excision of intraarticular osteochondromas which are knee and hip placement has been previously reported (4, 8). The most common diagnosis of synovial osteochondromatosis in our series was successfully treated arthroscopically.

Arthroscopic and open procedures for tenosynovial giant cell tumors, also known as pigmented villonodular tenosynovitis, have been described (14-16). According to the metaanalysis performed by Auregan et al., no significant difference was found recurrence rates between after open or arthroscopic excision in PVNS and in addition, fewer complication rates were reported in arthroscopic surgery(17). In our study, only three of the patients who were operated due to periarticular DHT were treated with arthroscopic technique and no patients were relapsed. Nonspecific chronic synovitis treat-

ment is open or arthroscopic synovectomy (18). In our study, there were three patients who were treated successfully arthroscopically. Symptoms did not recur in any patient.

Synovial or meniscal cysts are relatively rare and they may be associated with meniscal tears or ganglion cysts. They are usually asymptomatic and they are found incidentally on MRIs or arthroscopes for investigating other intra-articular pathologies. Treatment is often arthroscopic decompression during the treatment of other intra-articular pathologies (7). This study included 2 synovial cysts and 2 ganglion cyst 1 meniscal cyst treated with arthroscopy.

Treatment of intraarticular hemangioma is questionable like the treatments of other 194 vascularly originated tumors (19). Treatments like embolization and open excision have been defined and in addition arthroscopic excision is performed rarely (2, 3). We only included patients who applied arthroscopic treatment from hemangioma cases in our clinic.

Treatment of rheumatoid nodules is usually not necessary unless the pain or mechanical function of the patient is interrupted (20). In our case, in a patient with no previous articular disease, a histopathological examination of tissue that was taken during the arthroscopic treatment of symptomatic intraarticular soft tissue mass, showed as a rheumatoid nodule.

In a patient without articular disease, gout tophus can be confused with neoplastic processes when it develops as an intra-articular soft tissue mass (21). With arthroscopic evaluation, the lesion can be easily seen and excised.

With MRI, the appearance of tumor and the relationship with other anatomical structures can be fully observed. MRI helps in diagnosis and surgical planning (22). We think that it would be more appropriate to decide on

localization, especially considering the iatrogenic risks, rather than depending on full classical portal localization. As we mentioned in our study except other 6 classic portal localization considering the localization according to tumor localization intraoperatively is more convenient.

This study has some limitations. This study is a retrospective study and has relatively low number of patients. Because of the recurrence rate alterations according to tumor type and group is highly heterogeneous, the recurrence rate of the study is controversial. However, no recurrence or complication is observed in any case. This shows that the arthroscopic procedure is feasible in these cases.

## Conclusion

Arthroscopic resection of tumoral lesions in circumference of the knee joint with selection of suitable patients, good preoperative planning and proper surgical technique, has low complication risk and excellent results.

## Acknowledgments

All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The funders had no role in study design, data collection, and analysis, or preparation of the manuscript.

## Conflict of Interests

The authors have no conflict of interest.

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