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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

# VARUS DİZİLİM BOZUKLUĞU VE PRİMER OSTEOARTROZLU DİZLERDE TOTAL DİZ PROTEZİ SONRASI PROKSİMAL TİBİOFİBULAR KAYNAKLI AĞRI HASTA MUTSUZLUĞUNA NEDEN Mİ?

## DOES PROXIMAL TIBIOFIBULAR JOINT MEDIATED PAIN MAKE PATIENTS UNHAPPY AFTER TOTAL KNEE ARTHROPLASTY IN KNEES WITH PRIMARY OSTEOARTHRITIS AND VARUS MALALIGNMENT?

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**ÖZ**

**AMAÇ:** İleri evre gonartrozlarda proksimal tibiafibular eklem (PTFE) ile tibiofemoral eklem (TFE) arasındaki klinik ilişki daha önce gösterilmemiştir. Bu retrospektif çalışmanın amacı son evre gonartrozu olup diz protezi uygulanan genu varum deformiteli hastalarda PTFE'in klinik değerlendirmesidir.

**GEREÇ VE YÖNTEM:** İleri evre osteoartrozu olup diz protezi uygulanan genu varum deformiteli hastalar değerlendirmeye alındı. PTFE'in klinik muayene bulguları ile PTFE tipi, hamstring gerginliği, ve lateral eklem aralığı (LEA) hassasiyeti arasındaki ilişki ki-kare testi kullanılarak araştırıldı. Ayrıca tanımlayıcı istatistikte kullanıldı.

**BULGULAR:** Çalışma grubu (5 erkek ve 49 kadın; ortalama yaş 62.7 yıl; 46-81 arasında) elli dört hastadan oluşmaktadır. 30 hastanın (%55.6) her iki dizi ameliyat edildi. Ortalama takip süresi 21.6 ay (12-49 ay). PTFE hassasiyeti, hamstring gerginliği ve LEA hassasiyeti sırasıyla altı (%7.1), dört (%4.8), ve altı (%7.1) dizde tespit edildi. Altı dizde (%7.1) horizontal tip PTFE varken, yetmiş sekiz dizde (%92.9) oblik tip PTFE vardı. Oblik tip PTFE olan dizlerde PTFE hassasiyeti (ki-kare testi, p=0.000) , LEA hassasiyeti (ki-kare testi, p=0.000), hamstring gerginliği (ki-kare testi, p=0.000) tespit edildi.

**SONUÇ:** Varus dizilim kusuru olan ileri evre dejeneratif eklem hastalığı nedeniyle diz protezi yapılan hastalarda, PTFE'in ameliyat sonrası lateral diz ağrısının kaynağı olmadığı ortaya konmuştur. Bununla birlikte oblik tip PTFE bu dizlerde potansiyel ağrı kaynağı olabileceği düşünülebilir..

**ANAHTAR KELİMELER:** Proksimal tibiofibular eklem, Total diz protezi, Lateral diz ağrısı, Osteoartrit

**ABSTRACT**

**OBJECTIVE:** Presence of a clinical correlation has not been demonstrated between tibiofemoral joint (TFJ) and proximal tibiofibular joint (PTFJ) in knees with severe osteoarthritis. The purpose of this retrospective study is to clinically evaluate PTFJ in patients with total knee arthroplasty (TKA) performed for end-stage primary osteoarthritis with genu varum deformity.

**MATERIALS AND METHODS:** Patients with TKA performed for severe osteoarthritis with genu varum deformity were retrospectively evaluated. Relationships between PTFJ clinical examination findings and PTFJ type, hamstring tightness, and lateral joint line (LJL) tenderness were investigated using the chi-square test. Also, descriptive statistics were used.

**RESULTS:** Fifty-four patients (five male and 49 female; mean age 62.7 years; range 46-81 years) constituted the study group. Both knees were operated in 30 (55.6%) patients. Average follow-up period was 21.6 months (range 12-49 months). PTFJ tenderness, hamstring tightness, and LJL tenderness were established in six (7.1%), four (4.8%), and six (7.1%) knees, respectively. There were six (7.1%) knees with horizontal type PTFJ and 78 (92.9%) knees with oblique type PTFJ. PTFJ tenderness was determined in knees with oblique type PTFJ (chi-square test, p=0.000), knees with LJL tenderness (chi-square test, p=0.000), and knees with hamstring tightness (chi-square test, p=0.000).

**CONCLUSIONS:** PTFJ does not seem to be the exact source of lateral knee pain after TKA operations in knees with severe degenerative joint disease and varus malalignment. However, it should be considered that oblique-type PTFJ may have the potential to create pain in these knees.

**KEYWORDS:** Proximal tibiofibular joint, Total knee arthroplasty, Lateral knee pain, Osteoarthritis

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## INTRODUCTION

Proximal tibiofibular joint (PTFJ) has been presented as a fourth compartment of the knee joint (1). In primary osteoarthritis, there is symmetric involvement of the tibiofemoral joint (TFJ) and PTFJ initially (2). Radiographic involvement level between TFJ and PTFJ are correlated in knees with severe primary osteoarthritis (3). However, the presence of a clinical correlation has not been demonstrated between them (4). It is still controversial whether PTFJ is the cause of lateral knee pain (LKP) in patients with total knee arthroplasty (TKA) performed for end-stage primary osteoarthritis. The purpose of this retrospective study is to clinically evaluate PTFJ in patients with total knee arthroplasty performed for end-stage primary osteoarthritis with genu varum deformity.

## MATERIALS AND METHODS

This cross-sectional retrospective study was approved with decision number 2009/5-34, by Afyon Kocatepe University, Medical Faculty Ethics Committee on 19.03.2009. Patients with TKA performed for Kellgren-Lawrence stage III-IV osteoarthritis with genu varum deformity between 2008 and 2009 were retrospectively evaluated to constitute the study group for this cross-sectional study (5). The hospital records were investigated for etiology of the osteoarthritis. Patients with primary osteoarthritis were enrolled in the study group; however, patients with secondary osteoarthritis due to inflammatory disease, trauma, infection, and osteonecrosis were excluded from the study. Also, patients with less than one year follow-up were excluded from the study. Patients were invited to the outpatient clinic via telephone. PTFJ was evaluated clinically and radiographically in patients who attended the outpatient clinic.

The patients were asked whether they had pain on the lateral side of the knee. Also, knees were evaluated for full knee extension and at least 90° flexion arcs. All knees were tested for gross instability. Sagittal plane instability was examined with anterior/posterior drawer tests of the ninety degree flexed knee, and coronal plane instability was examined with varus/valgus stress tests at extension, 30° flexion, and 90° flexion (6). There was no patellar component in all. Lateral retinaculum and patellofemoral (PF) joint tenderness (patellar grind test) were evaluated (7). Knees with gross instability and painful lateral retinaculum and/or PF joint were excluded from the study. Antero-posterior and lateral radiographs of the knee were evaluated to reveal evident findings of component loosening (wider and more extensive zone(s) of lucency around the components, and component migration) and lateral overhang of the tibial base plate, which were exclusion criteria (8,9). Inclusion criteria for the study are shown in **Table 1**. The special PTFJ radiographs were taken in the AP plane with patients in the supine position and the knee at 45° of internal rotation to evaluate the type of PTFJ according to the Ogden classification (10-12). Ogden classified this joint as two types, horizontal and oblique; 20° is considered the limit of the horizontal type joint inclination and any inclination greater than that is considered an oblique type joint (**Figure 1**) (12).

**Table 1:** Inclusion criteria for the study.

| INCLUSION CRITERIA |
|---|
| **CLINICAL** |
| Genu varum deformity |
| Primary osteoarthritis |
| ≥ 1 year follow-up |
| Stable knee |
| No patellofemoral pain |
| No lateral retinaculi tenderness |
| No flexion contracture |
| Full extension |
| **RADIOLOGICAL** |
| No loosening |
| No base-plate lateral overhang |

Pain/tenderness in PTFJ, hamstring tightness at the lower extremity, and lateral joint line (LJL) tenderness at the knees were investigated. The PTFJ was examined for pain and tenderness by 1) grasping the fibular head between the thumb and index finger and pressing it in both

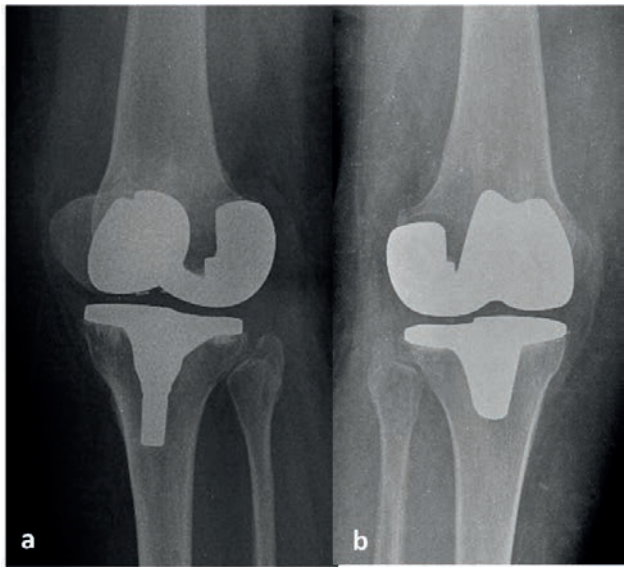


**Figure 1:** PTFJ images in knees with total knee arthroplasty; a-oblique type, b-horizontal type.

the anterolateral and posteromedial directions, with the knee relaxed in 45° flexion and 2) applying manual pressure to this joint during active ankle movements (13). Hamstring tightness was defined as either an inability to flex the hip joint to at least 90° with the knee fully extended or flexion of the patient's knee to some degree during straight leg raises with knee full extension or slight involuntary flexion of the knee during straight leg elevation (14-16). LJL sensitivity was investigated by palpation of this area. Results were exported to SPSS 11.0 (SPSS Inc., Chicago, IL, USA) for analysis. Relationships between PTFJ clinical examination findings and PTFJ type, hamstring tightness, and LJL tenderness were investigated using the chi-square test. P values of less than 0.05 were considered significant. Also, descriptive statistics were used.

## RESULTS

Eighty-three patients with TKA performed for Kellgren-Lawrence stage III-IV osteoarthritis with genu varum deformity were retrospectively enrolled in the study. The hospital records revealed seven patients with inflammatory arthritis and nine patients with less than twelve months follow-up. These 16 patients were excluded from the study. The remaining 67 patients were invited via telephone. Fifty-six patients responded and came to the outpatient clinic.

No patient suffered from LKP. In all knees, there was at least 90 degrees flexion without flexion contracture. The knees were stable in extension, 30° and 90° flexion. There was PF pain/lateral retinaculum tenderness and positive PF grind (compression) test with minimal tenderness in one and three patients, respectively. The patient with lateral retinacular tenderness was excluded from the study. The other three patients were not excluded due to absence of retinacular tenderness and lack of major symptoms. There was no knee with component loosening findings on radiographs, but lateral overhang of the tibial base plate was determined in one patient who was excluded from the study. Consequently, 54 patients (five male and 49 female; mean age 62.7 years; range 46-81 years) constituted the study group. Both knees were operated simultaneously in 30 (55.6%) patients. There were 44 (52.4%) left and 40 (47.6%) right knees. Average follow-up period was 21.6 months (range 12-49 months). In clinical evaluation; PTFJ tenderness, hamstring tightness, and LJL tenderness were established in six (7.1%), four (4.8%), and six (7.1%) knees, respectively. On radiologic evaluation, there were six (7.1%) knees with horizontal type PTFJ and 78 (92.9%) knees with oblique type PTFJ. Hamstring tightness, LJL tenderness, and PTFJ type in knees with PTFJ tenderness can be seen in **Table 2**. PTFJ tenderness was determined in knees with oblique type PTFJ (chi-square test, p=0.000), knees with LJL tenderness (chi-square test, p=0.000), and knees with hamstring tightness (chi-square test, p=0.000).

**Table 2:** Relationship between PTFJ tenderness and hamstring tightness, LJL tenderness, and PTFJ type.

| | | Hamstring tightness | | LJL tenderness | | PTFJ type | |
|---|---|---|---|---|---|---|---|
| | | + | - | + | - | *Horizontal* | *Oblique* |
| PTFJ tenderness | + | 4 | 2 | 6 | 0 | 0 | 6 |
| | - | 0 | 78 | 0 | 78 | 6 | 72 |

LJL: Lateral joint line, PTFJ: Proximal tibiofibular joint

## DISCUSSION

PTFJ is an underestimated pain source on the lateral side of the knee (1,3,17,18). Numerous diseases affecting the PTFJ may cause LKP (19). Therefore, the joint is especially important in patients with TKA. A few reports about primary osteoarthritic involvement of this joint have been published (2,3,20,21).

Arthritic involvement of PTFJ in patients with early stage primary knee osteoarthritis has been reported previously (2). Also, the radiologic degree of osteoarthritis in PTFJ correlates strongly with the degree of arthritis in TFJs with severe degenerative joint disease (DJD) and varus malalignment (3). An anatomical communication between these joints, reported to be 10-63%, can be held responsible for the similar level of osteoarthritic involvement (1,17,18,22). Inflammatory enzymes transferred via this anatomic communication possibly contribute to the advancement of arthritis in the respective compartments (3). However, the PTFJ can be directly affected by primary osteoarthritis, too (19).

Although there are intermediate varieties, there are basically 2 types of joint present; oblique and horizontal (12,23). The oblique type has smaller joint surface area, associated with less mobility and increased pressure per square millimetre of cartilage (12). It seems oblique PTFJs are prone to degenerative changes. Results supporting or rejecting this idea have been reported in different studies (2,3).

Despite similar level radiologic osteoarthritic involvement of both joints, few reports have focused on clinical correlation between them in knees with DJD (4). Positive correlation has not been observed between the clinical findings of PTFJ and TFJ (4). This is compatible with the study by Öztuna et al (2). We observed similar results; pain and tenderness could be detected by physical examination (with provocative tests) only in six knees (7.1%). All the PTFJs with pain/tenderness had oblique joint type. However, positive correlation couldn't be shown between PTFJ type and clinical symptoms statistically, even though clinical sensitivity was detected mostly in oblique-type PTFJs in a previous study (4). Although there are anatomical disadvantages, joint monitoring of different clinical results in oblique type PTFJs may be related to variables of the articular surface contours (24). Moreover, variable anatomy of the articular surface of oblique-type PTFJ has been noted by Ogden before (12). No patients presented with complaints of lateral knee pain. Nevertheless, pain and tenderness during provocative physical examination of the joint may be due to synovitis (4).

The combination of symptomatic PTFJ and lateral hamstring tightness was reported by De Franca (17). LKP and hamstring tightness can be observed in PTFJs that have been exposed to trauma in young patients (11). Hamstring tightness may be found in PTFJs with primary arthritis. Physical examination (with provocative test) of the PTFJ was positive in all knees with hamstring tightness in this study. However, Özcan et al (4). found a lack of correlation regarding symptoms. LJL tenderness was present only in knees with oblique-type PTFJ. But it does not seem possible to talk about the existence of a relationship between them.

Limitations of our study include the limited number of knees analysed, the failure to investigate the lumbar spine DJD, and the lack of standardised follow-up period for all patients. DJD in the lumbar spine may also lead to hamstring tightness. The small number of positive results regarding PTFJ pain and tenderness, hamstring tightness, and LJL tenderness makes a claim for calculation of statistical significance impossible. Therefore, we need prospective randomised studies to arrive at a definite conclusion.

In conclusion, PTFJ does not seem like the exact source of lateral knee pain after TKA operations in knees with severe degenerative joint disease and varus malalignment. However, it should be considered that oblique type PTFJ may have the potential to create pain in these knees.

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