

Evaluation of Generalized Factors to Patellofemoral Pain Syndrome

Cain JG*

Department of Medicine and Health Sciences, Universiti Sultan Zainal Abidin, Malaysia

Abstract

Several studies have presented evidence of nerve damage and hyper-innervation into the lateral retinaculum in patients with patellofemoral mal-alignment. In those individuals, neural growth factor is overexpressed in the nerve fibre and vessel wall and stimulates the release of substance P in the free nerve endings. Fulkerson described the palpation of the patellar retinaculum as follows: With the knee in full extension, portions of the lateral and medial knee retinacula are palpated gently to see if there is an obvious source of pain in any one location.

Keywords: Accurate palpation; Lateral retinaculum; Patellar tilt; Manual assessment; Medial side; Knee flexion;

Introduction

The patella should be displaced medially and laterally, stressing all portions of the peripatellar retinaculum to see if this reproduces pain. For more accurate palpation, the patella should be displaced to the side undergoing examination so that the retinacular fibres to be examined are placed under tension while being brought away from their underlying structures [1]. Evaluation should also include careful palpation of the vastus lateralis tendon insertion into the proximal patella. The proximal deep lateral retinaculum interdigitates with the dense insertion of the vastus lateralis into the patella. Boden have demonstrated that excessive lateral tilt of the patella can lead to decreased medial patellar mobility and abnormally high forces between the lateral facet of the patella and the lateral trochlea. Grelsamer and McConnell describe a method of performing the patellar tilt test as follows, In the supine position, the test is performed with the knee extended and the quadriceps relaxed [2]. The degree of medial and lateral patellar tilting is determined by comparing the height of medial patella border with that of lateral patellar border. The examiner places his or her thumb and index finger on the medial and lateral border of the patella. Both digits should be of equal height. If the digit palpating the medial border is more anterior than the lateral border, then the patella is tilted laterally. If the digit palpating the lateral border is more anterior than the medial border, then the patella is tilted medially [3]. Kolowich provide the following description of an alternative method of testing for patellar tilt, standing at the foot of the examination table, the examiner lifts the lateral edge of the patella from the lateral femoral condyle.

Methodology

An excessively tight lateral restraint is demonstrated by a neutral or a negative angle to the horizontal with males tending to be tighter than females by five degrees. Tomsich who used a goniometer in this evaluation, placed the calipers of the instrument over the medial and lateral aspects of the patella and reported improved intratester and intertester reliability. The patellar mobility test measures passive patellar mediolateral range of motion from the patellar resting position and indicates the integrity and tightness of the medial and lateral restraints [4]. Puniello observed an association between patellar hypomobility and a tight iliotibial band. Hypermobility with lateral patellar glide is correlated with laxity of the medial patellofemoral ligament or the patellomeniscal ligament and is often noted in association with patellar subluxation. Kolowich provide this description of the patellar mobility test, The test is performed with the knee flexed few degrees

and the quadriceps relaxed. This can be done resting the knee over the examiner's thigh or with a small pillow underneath the knee as shown in Figure 1. The patella is divided into four longitudinal quadrants and then an attempt is made to displace the patella in a medial direction followed by displacement in a lateral direction under the guidance of the examiner's index finger and thumb [5]. According to those investigators, lateral patellar mobility of three quadrants was suggestive of an incompetent medial restraint. Medial mobility of only one quadrant was consistent with a tight lateral restraint, and medial mobility of three or more quadrants suggested a hypermobile patella. As with other techniques of patellar position, the assessment of mediolateral mobility is difficult to quantify by manual assessment [6]. Joshi and Heatley observed lateral patellar mobility of few mm in women and few mm in men and suggested that mobility of few mm is within normal limits. As with other measurements of patellar position, however, the reliability of these measurements is quite low. Skalley used a handheld patellar pusher, which is a calibrated device that



Figure 1: Knee flexed few degrees and the quadriceps relaxed.

*Corresponding author: Cain JG, Department of Medicine and Health Sciences, Universiti Sultan Zainal Abidin, Malaysia, Tel: 09874984103, Email: cainjg@unimelb.edu.au

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exerts a fixed force to more accurately report average patellar mobility [7]. The patellar apprehension test was initially described few years ago by Fairbank, who wrote that while examining cases of suspected recurrent dislocation of the patella, he had been struck by the marked apprehension often displayed by the patient when the patella was moved laterally. Hughston depicted the apprehension test as follows, this test is carried out by pressing on the medial side of the patella with the knees flexed about few degrees and with the quadriceps relaxed. It requires the thumbs of both hands pressing on the medial side of the patella to exert a laterally directed pressure [8]. Accordingly, the leg with muscles relaxed is allowed to project over the side of the examining table and is supported with the knees at few degrees of flexion by resting the leg on the thigh of the examiner who is sitting on a stool. In this position the examiner can almost dislocate the patella over the lateral femoral condyle. The patient becomes uncomfortable and apprehensive as the patella reaches the point of maximum passive displacement, with the result that he begins to resist and attempts to straighten his knee, thus pulling the affected patella back into a relatively normal position. Tanner suggested a modified version of the patellar apprehension test [9]. Those investigators believed that the displacement of the patella in a distal lateral direction would be a more sensitive method than classic lateral displacement in showing a deficiency of the medial restraints.

Discussion

The apprehension test grossly detects patellar instability and is less sensitive in detecting Patellofemoral Pain Syndrome. Korkala observed that the patellar apprehension test was positive in fewer than half of the patients with clearly symptomatic chondromalacia and was rarely positive in mild cases of that disorder. The patellar compression test is performed when the patient is supine with knees extended [10]. The examiner moves the patella superiorly and inferiorly while compressing the patella against the femoral groove. If pain results, the test is considered positive. Hand and Spalding noted that patients with patellofemoral pain had a high probability of receiving a positive result from the patellar compression test, not only for the affected knee but also frequently for the unaffected knee, this calls into question the specificity and utility of that test as a diagnostic tool [11]. Patellofemoral Pain Syndrome is frequently associated with deficits of lower limb flexibility. Several retrospective studies have shown an association between decreased quadriceps or hamstring muscle flexibility and patellofemoral pain in athletes as shown in Figure 2. In their prospective study of athletes with Patellofemoral Pain Syndrome, Witvrouw also confirmed an association between tight quadriceps



Figure 2: Tight quadriceps muscles create high patellofemoral stresses.

and the development of Patellofemoral Pain Syndrome, this supports the concept that tight quadriceps muscles create high patellofemoral stresses during sports or the activities of daily living, thus potentiating Patellofemoral Pain Syndrome [12]. Those investigators did not, however, find a correlation between Patellofemoral Pain Syndrome and hamstring tightness. A convenient method of measuring the heel to buttock distance is by fingerbreadths of the examiner's hand. Many young active patients can bring their heels to their buttock or at least within a few fingerbreadths. When the heel comes less than eight fingerbreadths from the buttock, it is more convenient to record quadriceps flexibility as degrees of prone knee flexion. Several studies also suggest that iliotibial band tightness may contribute to the development of Patellofemoral Pain Syndrome [13]. In a study of few ballet dancers, Winslow and Yoder found a correlation between iliotibial band tightness and Patellofemoral Pain Syndrome. Data analysis revealed that the degree of tibial external rotation used by dancers with iliotibial band tightness was significantly greater than that in dancers without iliotibial band tightness. Those researchers suggested that a tight iliotibial band pulls the patella laterally during the knee flexion movement, thus increasing patellofemoral joint reaction forces. There are several methods of measuring the tightness of the iliotibial band, clinical observation, goniometer, and inclinometer [14]. Gose and Schweizer depicted the following simple system for describing the position of the involved leg with reference to the horizontal or sagittal body plane, If the leg can be passively stretched to a position horizontal but not completely adducted to a table, it constitutes a minimal tightness. If the leg can be passively adducted to horizontal at best, it constitutes a moderate tightness. If the leg cannot be passively adducted to horizontal, this constitutes a maximal tightness. Reid described the use of a goniometer to qualify the tightness of the iliotibial band as follows the stationary arm of the instrument remains parallel to the horizontal axis, and the mobile arm moves along the long axis of the adducting thigh from the anterosuperior iliac spine to the midpatella. Some studies, however, show no decrease in quadriceps strength in patients with Patellofemoral Pain Syndrome as opposed to control subjects [15]. Messier have used isokinetic testing to evaluate muscle strength in runners with Patellofemoral Pain Syndrome and found no significant differences in knee flexion or extension strength in patients with Patellofemoral Pain Syndrome and controls. In their prospective study of infantry recruits with Patellofemoral Pain Syndrome, Milgrom found that recruits with Patellofemoral Pain Syndrome exhibited greater isometric quadriceps strength than did those without the disorder. In a prospective study, Witvrouw found that subjects with Patellofemoral Pain Syndrome and controls exhibited no significant difference in quadriceps and hamstring muscle strength.

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Conflict of Interest

None.

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