

# Effectiveness of patellar mobilization in patellofemoral pain syndrome

## Abstract

Patellofemoral pain syndrome (PFPS) is a common cause of knee pain, resulting from different pathologic issues in the knee such as Osgood-Schlatter, patella synovitis, patellar instability, and chondromalacia. Diagnosis requires subjective and objective examinations, sometimes requiring imaging for diagnosis. Common symptoms of PFPS are pain beneath or sides the patella and deep pain below the kneecap. This pain and dysfunction is caused by excessive load or prolonged repetitive in the patellofemoral joint or due to decreased strength in of hip abductors. This report will focus on patellofemoral stability and mobility, which involves active and static stabilizers that control movement of the patella within the trochlea groove, known as patellar tracking and the effectiveness of patellar mobilization on this condition.

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**Baraa Hussain Alsulaimani**

King Abdulaziz University, Almarwah, Saudi Arabia

**Correspondence:** Baraa Hussain Alsulaimani, King Abdulaziz University, Almarwah, Jeddah, Saudi Arabia, Tel 00966544606142, Email bhalsuleman@kau.edu.sa

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## Introduction

Patellofemoral pain syndrome (PFPS) is a common cause of knee pain in young people, especially who are regularly active in sports involving running and jumping.<sup>1,2</sup> PFPS usually involves pain in the anterior part of the knee or pain beneath or sides the patella, resulting from conditions such as Osgood-Schlatter, patella synovitis, patellar instability, patellar hypomobility, and chondromalacia.<sup>3</sup> This pain and dysfunction results from excessive load or prolonged repetitive in the patellofemoral joint (PFJ).<sup>1</sup> Another common reason for PFS pain are decrease strengthening of hip abductors and increase power of adduction muscles, knee ligaments injuries, and foot issues.<sup>1</sup> Symptoms are commonly aggravated by walking up or down stairs, climbing or descending hill, squatting, lunge, running, biking and sitting with knee 90 degree for long time.<sup>1-4</sup> Detailed subjective and objective examination sometimes involves imaging is necessary for diagnosis.<sup>2,4</sup> To determine the exact source of pain leg strength, alignment, Q-angle, and knee ROM, as well as check patella functions such as tracking, mobility, and normal anatomical features should be assessed.<sup>2-4</sup> This research focuses on patellofemoral stability and mobility. Stability of the patellofemoral joint involves active and static stabilizers that control movement of the patella within the trochlea groove, known as patellar tracking, that are affected by stabilizing forces such as the patellar tendon, quadriceps tendon, and the nearby soft tissues such as iliotibial band. Loads on the patella during walking vary between one third and one half of body weight, approximately three times the body weight during walking up stairs, and with squatting reach up to seven times the body weight. Therefore, the possible causes of anterior knee pain must be understood to determine an adequate treatment.<sup>4</sup>

For patellofemoral mobility provocative tests such as patellar grind, patellar tilt, and patellar glide tests can be used.<sup>4</sup> A good management of the causes of anterior knee pain is needed for exact diagnosis and for determining an effective treatment plan. For example, in the case of patellar mobilization the goal is to reduce pain as quick as possible, but only short-term results will be achieved. Most PFPS management protocols tend to focus on strengthening exercises alone and neglect the therapeutic value of manual therapy. This purpose of this report is to show that a combined approach including strengthening exercises and patellar mobilization is most effective.

## Patient description

Twenty-four year old active and fit female patient complaining

of sudden anterior right knee pain that has been occurring for one month. Patient described 7/10 NPRS pain during sitting with knee 90 degrees, and pain reaching to 9-10/10 NPRS with activities. No swelling noticed but clicking sounds noticed during knee movement. Difficulties climbing and descending stairs, going up and downhill, running, squatting, and cannot lunge at all. No clear mechanism of knee pain but pain felt more medially and on lower one third of thigh. Pain described as ache with restriction sensation. Patient visited general physician (GP) three times and one time for physiotherapist (PT) two weeks after occurrence. Home stretching exercises were recommended, but patient saw no improvement. Patient eased the pain by shaking her leg and fully extending it. Client cannot sit for long, run, squat, go up and down stairs or hill, and lunge.

## Examination

Observation of patient showed normal walking pattern, good posture, and nice alignment. Patient's foot was fully arched. Knee was clear from any bruising and effusion. Functional assessments included walking up and down stairs, squatting, single leg squatting, and lunging. Stairs assessment showed tenderness on medial side of right knee when patient started to increase load for getting up and with going down stairs pain was observed in the same area when she put the knee in bending position starting for taking foot off. Squatting and single squatting was painful and sometimes impossible. In addition, lunging reached the 0/10 in PSFS scale. Standard range of motion assessment showed the patient was able to flex right knee from fully extended position up to 70 degrees but then pain increased around the medial side of the patellofemoral joint and patient felt some tensioning over lower part of vastus medialis. Patella mobility examination exposed some restriction toward outside, and patient reported that "I feel some pulling on my lower medial side of thigh" when pushing the patella downward and then stopping to move normally. Also, by comparison into other knee, patella showed much more freedom in movement than the right one. Special provocation tests were used to confirm hypothesis and other tests were conducted to rule out other diagnoses such as patellar glide test, patellar tilt, and patellar grind.<sup>4</sup>

## Diagnosis

After complete assessment including seeking comparable signs combined with clear symptoms of PSFS in medial side of right knee according to some restrictions caused limitation of patella movement was diagnosed (hypomobility).

## Treatment

Lateral patellar mobilization techniques grade 4 for 3 minutes was utilized, then patient was asked to walk up and down stairs, squat, lunge, etc., for reassessment. Patient's condition improved only 50%. Patient climbed stairs and descended approximately without pain. Patient reached more than 90 degrees in squatting by both knees and 70 degrees within one leg. Patient also reported that she could not lunge at all, but after patellar gliding, could lunge about 60%. After another session of lateral patellofemoral mobilization for another 3 minutes also involving medial mobilization the functional tasks were reassessed. Patient showed much improvement over first treatment session (about 10% more). In the third session inferior glide into lateral and medial patellar mobilization was added. Patient showed huge improvement of pain, knee movements, and functions. After third treatment on the same day, client was near to normal lunging but still reported a bit of tenderness and discomfort in medial area.<sup>5,6</sup>

## Evaluation

Patient came for follow-up session a three weeks after treatment and all comparable signs such as climbing and descending stairs, sitting, squatting, and lunging were assessed. The re-examination showed pain-free functional movements through all these actions. Patient discharged with problems fully resolved.

## Discussion

There are different estimations and theories concerning the etiology and management of anterior knee pain.<sup>7</sup> However, hypothesis regarding the etiology of PFPS is associated with increased stress in patellofemoral joint and articular cartilage issues.<sup>8</sup> Patellofemoral joint becomes hypomobile due to swelling, weakness, tightness, and pain resulting in adhesions of muscles, and connective tissues that is frequently a cause of PFPS. Another possible cause for hypomobility is excess lateral patellar angling due to patellar medial restriction subsequent to increased pressures between the outside surface of the patella and the lateral side of trochlea.<sup>9</sup> Six weeks of joint immobilization (hypomobility) leads to loss of joint flexibility by reduction of capacity of the joint cavity and elevated intra-articular pressure resulting in a significant loss of joint fluid.

Glycosaminoglycans (GAG) are found in connective tissue and thus loss of lubrication and increased irregular collagen between fibers case results in limited joint movement and stiffness.<sup>10,11</sup> Therefore, extreme tension of the lateral structures prevents the patella from going back normally into the trochlear groove.<sup>12</sup> According to Haim (2006), a positive patellar slope was significant for PFPS subjects compared to normal group.<sup>13</sup> The major contributing factors of PFPS are malalignment of the leg or the patella, muscles power imbalance, and overuse of knee.<sup>7</sup> The quadriceps pull on the patella to extend the knee. This muscle plays a vital role in the incidence of PFPS.<sup>14</sup> Traditional physiotherapy programs focus on strengthening of quadriceps especially vastus medialis to improve patellar tracking.<sup>15,16</sup> The purpose of exercise treatment is to help the patella stay in the right position during movement as well as to decrease related pain associated with movement when patella is in the wrong track and position by proprioceptive neuromuscular assistance.<sup>17</sup> In general, PFPS treatments concentrate on the patellofemoral joint and include reinforcement of the vastus medialis oblique (VMO), taping, soft tissue mobilization, and patellar mobilization.<sup>16</sup> Exercising programs require between 3-6 weeks or more to achieve the goal.<sup>18,19</sup>

According to Maitland 1985, mobilization described as a passive movement is a commonly used treatment for patients with a variety of neuromusculoskeletal disorders. It has two main purposes: First, it aims to reduce pain and restore functional movement such as passive swinging and continued stretching; secondly, it aims to preserve normal joint range of motion.<sup>20,21</sup> Consequences of hybomobility include structural changes in tissue tension, bounciness, contour, smoothness, etc. Functional changes also consist of diminished strength, endurance, and coordination.<sup>22,23</sup> Clinically, limited joint mobility affects the quality and quantity of movement. A patellar mobilization can be used to recover the flexibility of the patellofemoral joint,<sup>24</sup> and passive repetitive gliding to the first resistance is used to improve nutrition, blood flow, and lubrication in the joint that helps develop mobility. The goal of passive mobilization is also to help normalize joint kinematic gliding and rolling movement.<sup>22,25</sup> Moreover, mobilization has a neurophysiological effect.

Various authors have documented the strong hypoalgesic reaction to mobilization.<sup>20</sup> Two studies have shown decreased patellar mobility within PFPS patients. Witvrouw (2000) reported that medial and lateral patellar mobilization were beneficial in PFPS but the findings were not significant.<sup>26</sup> On the other hand, regarding to my treatment result, patellar mobilization was effective at reducing pain and restoring the patellofemoral joint functional within 1 to 3 sessions in the same day. Moreover, to choose an appropriate PFPS treatment, clinicians should assess patient's needs and experiences, presentation and values, in addition to the standard treatments to create an effective treatment approach.<sup>27,28</sup>

## Conclusion

Patellofemoral pain syndrome (PFPS) is a common cause of knee pain, resulting from different pathologic issues in the knee. Common symptoms of PFPS are pain beneath or sides the patella and deep pain below the kneecap due to excessive load or prolonged repetitive in the patellofemoral joint or due to decreased of muscles strength. There are different estimations and theories concerning the etiology and management of anterior knee pain, but it is believed that PFPS is associated with increased stress in patellofemoral joint and articular cartilage issues and the patellofemoral joint becomes hypomobile that is frequently a cause of PFPS. However, as shown here patellar mobilization was effective at reducing pain and restoring the patellofemoral joint functional within one to three sets in the treatment session. My results approved after re-examined all comparable signs that patient discharged with problems fully resolved. Therefore, after assessment of patellar mobilization techniques, patellar mobilization resulted in huge improvement and near complete return of normal mobility.

## Acknowledgment

I declare that the work presented is my work and where other work has been used it has been appropriately acknowledged.

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