



Application of bodybuilding for correction of musculoskeletal disease in Patellofemoral Pain Syndrome - a case report

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Abstract

Background: Medicine and Physical Education can work together to solve many health problems. Bodybuilding is a multidisciplinary area whose goals can range from body development to the correction of postural problems and the resolution of various pathologies related to human movement. In the case in analysis, the patient presented (at rest) localized pain (twinges) in the anterior face of the left knee, with an intensity of five (0-10 scale), without phlogistic signs, which worsens when performing the squat, hindering him from leaving the bed without pain. Symptoms were exacerbated when descending stairs. Through anamnesis and directed physical examination, it was considered the possible differential diagnosis of pain in the anterior portion of the knee: Diseases in menisci, anterior and posterior cruciate ligament injuries, diseases of knee collateral ligaments, diseases of knee cartilage, diseases of patellar tendon tendinitis and patellar chondromalacia. After a correct diagnosis of patellofemoral pain syndrome, a conservative treatment was performed using bodybuilding. The results were positive after four months of treatment. From this case, it can be concluded that bodybuilding can be an alternative solution for the conservative treatment of Patellofemoral Pain Syndrome

1. INTRODUCTION

This case report describes a case of knee pain treatment through bodybuilding, in which it was possible to end the pain and allow the subjective to return to normal activity after four months of clinical intervention, which occurred after two years without treatment success. According to Patel A. (2007), the differential diagnoses for pain complaints on the anterior face of the knee, are numerous. However, after careful evaluation of the patient, it was possible to do the correct diagnosis of the Patellofemoral Pain Syndrome (PFPS), enabling the therapeutic success.

The knee pain, especially pain related to Patellofemoral Pain Syndrome, has a high prevalence in society, affecting mainly females in the ratio of two women for one man, with an incidence of approximately 11-14% of physically inactive population, 25-40% of the people practicing physical exercises, and 36% of cyclists (Collins et al., 2018; Crossley, Stefanik, et al., 2016; Crossley, Van Middelkoop, et al., 2016; Powers, Witvrouw, Davis, & Crossley, 2017; Smith et al., 2018; Van Middelkoop, Van Linschoten, Berger, Koes, & Bierma-Zeinstra, 2008; Wood, Muller, & Peat, 2011). In the present case study, there was a failure in the initial treatment (Gao, Zhong, & Wang, 2018; Porto, 2017; Porto & Porto, 2013; Rolf, 2007), making the patient stay two years with the same problem and with the prognosis getting worse. Considering the risk of poor prognosis in the treatment, the correct diagnosis is fundamental, in this case the wrong diagnosis has not permitted the correct choice of therapeutic line. According to Christer Rolf (2007) the non-absolute closure of the diseases diagnosis, such as Patellar Chondromalacia, is the career's end of many young athletes. In the case under analysis, the patient reports that, since the period of the first incident, the doctor did not share his diagnosis. It was used the standard CARE standard (Gagnier et al., 2013) in the case description. The main objective of this case study was to apply the bodybuilding method as a conservative treatment for Patellofemoral Pain Syndrome, and, as a secondary aim, to demonstrate that a good anamnesis and physical examination are fundamental for a correct diagnosis.

2. CASE STUDY

HMSF, 25 years old, Caucasian male, student, motorcycle rider, motocross practitioner, works part-time as a receptionist at a Portuguese fitness academy. He presented as the main complaint: pain in the anterior face of the knee, with difficulties in walking and going down stairs. History of the present illness: at the age of 22, in 2015, he fell while riding a motorcycle, doing motocross at a low speed. He presented pain (twinge) in the left knee with localized character, with an intensity of five (in a scale from 0 to 10), with a lot of discomfort when getting up and when doing the squat, without phlogistic signs in the area. He reported that he was using the safety protectors of motorcyclists. He was assisted at the hospital by the medical team and a radiography on the lower limbs was performed showing no fracture. He was treated with non-steroidal anti-inflammatory (Diclofenac Sodium 50mg every 8 hours) for 2-3 days, and ice during 10 min for 2-3 times per day. At the time, he reported that, when taking the medication, he did not present intense pain, allowing him to do daily activities while the medication was acting. Three days after the use of the medicine, he returned to practice Motocross, referring that when he positioned in order to sit on the motorcycle, he felt a slight pain. However, at the end of 3 hours of training, he returned to experience more intense pain, with no change in pain's character. He was advised by his doctor to maintain the medication and was oriented to a physical therapy service.

In January 2015, he began the treatment with physiotherapy, completing 30 sessions in approximately two and a half years until May 2017, reporting no improvement, having intermittent pain during the day. He received several physical therapy treatments without any signs of improvement. This treatment failed to keep him from pain during his motocross training and daily activities. Pain accompanied him for 2-3 days after practicing. He reported worsening pain when performing the squat movement, climbing stairs and down stairs.

Over the two years, the pain gradually increased reaching an intensity of 8-10 in the scale of 0-10, when performing the squat movement. The pain hindered him when getting out of bed and going up and down stairs after training motocross, or when he was at his work over two hours without any pain.

In May 2017, he sought for the help of a Sport Sciences Professional (Personal Trainer) and a Medicine Professional that, through detailed anamnesis and physical examination, diagnosed Patellofemoral Pain Syndrome, hypertrophy of the left gluteus maximus, knee valgus, defining, as treatment, muscle strengthening.

During 3-4 months of treatment, the patient presented reduction of pain without medication, maintaining a regular localized training, at least 3 times a week, until having a muscular balance with strengthening of the weakened area, leading to the end of pain and absence of complaint after the return the motocross activities, as well as in daily activity.

The patient expressed the desire to continue practicing motocross, as it is his favorite sport. He did not present in his anamnesis any change concerning his health history, denying the common childhood diseases, or any other disease. He describes that he has always showed a compatible growth with age and that he always practiced physical exercise. Regarding his family history, no family diseases related to his pain were found.

2.1 Clinical findings

The physical examination was divided into two stages, the static physical examination (Figure 1) and the dynamic physical examination (Figure 2). In the ectoscopy it was observed: knees valgus, increased muscular volume in the right lower limb when comparing to the left one. Maneuvers and palpation were performed to evaluate menisci, collateral ligaments, patellar tendon, anterior and posterior cruciate ligaments.



Figure 1. Patient Static Evaluation

(A) Patient's ectoscopy, observing the muscular volume of the left leg greater than the right, and knee valgus. (B) Measurement of lower limbs. (C) Evaluation of the Meniscus Apley Test. (D) Tibial plateau evaluation with palpation of the meniscus, as well as the test of the anterior drawer of the anterior cruciate ligament and the palpation of the patellar tendon, and its fixation of the tibial tuberosity. (E) Evaluation of medial structures of the knee articulation.

After static evaluation, dynamic evaluation was performed (Figure 2), with a strength test (Moura, 1997) for lower limbs, with evaluation of the quadriceps and posterior thigh muscles. Double Leg and Single Leg tests were performed.



Figure 2. Patient Dynamic Evaluation

(A) Hyper valgism in the squat movement; (B) Thighs Posterior evaluation; (C) Evaluation of Medium and Minimum Muscle Buttocks; (D) Quadriceps strength evaluation; (E) Evaluation of strength of the Glute Maximum of the knee articulations.

For identifying instability in the final movement of the double leg squats, failing to complete the 90 degrees and inability to perform the single leg movement due to pain and insecurity of the patient, hip adduction with hyper valgism was observed during the double leg movement, and the strength of the gluteus medius and minimum muscles during the movement of leg abduction with resistance was evaluated through gym equipment. The strength of the gluteus maximum was evaluated with the hip trust movement, in which the patient reported mild pain and instability of the left leg and the left side of the buttock.

2.2 Diagnostic evaluation

After anamnesis and physical examination, the main diagnostic hypothesis was Patellofemoral Syndrome Pain - patellar chondromalacia, related to muscular disequilibrium. The diseases of the meniscus, injuries of the anterior and posterior cruciate ligament, diseases of the collateral ligaments and the cartilage and tendinitis of the knee and patellar tendon, were disregarded through physical examinations.

It was proposed bodybuilding training, three times a week, [Table 1](#). The recovery time expected for pain improvement and the return to motocross activities was approximately 3-4 months. All treatment occurred without adverse effects reported by the patient.

Table 1. Schedule of Treatment and Therapeutic Interventions from May 2017

Months	0-3 (may- july)	4-6 (august- october)	6-9 (november –january)	9-12 (february- april)
Applied exercises	1- Abductor chair 2- Isometric squat with Swiss Ball 3- adductor chair	1- Abductor chair 2- Squat w / dumbbells 3- Sink w / Dumbbells	1- Squats on Smith 2- Pelvic Elevation 3- Abductor chair 4- Leg Press Horizontal	1- free squat 2- Pelvic Elevation 3- Leg Press 45 4- Abductor chair
Load per exercise	1- 35kg 2- free(no weight) 3- 30kg	1- 50 kg 2- 10kg 3- 10 kg	1- 10 kg 2- 17,5kg 3- 60 kg 4- 70kg	1- 25kg 2- 30 kg 3- 100kg 4- 70kg
Weekly training volume	1x per week	2x per week	2x per week	2x per week
Complaints	Lack of strength, acute pain in the left knee zone	Lack of strength, acute pain sporadically in the left knee zone, without pain at rest	Lack of confidence in the performance of movements. No pain reported	No complaints reported

2.3 Follow-up

Through a new evaluation on September 1, 2018, one year after pain cessation ([Figure 3](#)): the patient showed significant improvement in the muscle groups' strength, without complaint at rest or after 3-hour motocross training. However, after the dynamic assessment of the patient it was perceived an instability of the movements performed with the left leg support during the single leg, with disequilibrium, hyper valgism of the movement, and equilibrium compensation with arms movements related to the right side. It was also observed that during the hip trust, the patient still reported mild instability of the left lower limb. However, with significant improvement of movement biomechanics and strength compared to the beginning of treatment.

From this new evaluation the patient reported that thigh flexion movement with extended leg during the curves in motocross training was still difficult, with the left leg posing as support. Herewith, treatment and training with maintaining quadriceps strength and strengthening the buttocks to improve knee stability was performed, introducing training proprioception and isometrics to maintain strength and muscle mass without pain and daily activity restrictions, as well as to allow him to improve the performance in motocross.



Figure 3. Patient Dynamic Evaluation after 1 year of training without pain

(A) Double Leg performed without complaints without a change in Strength to 90 degrees. (B) Single Leg evaluation (C) Evaluation of valgism and right movement, demonstrating that alteration of postural movement occurs when the single leg is performed with the left leg to keep the equilibrium during the movement. (D) Evaluation of Hip Thrust with improved strength and mild left side disequilibrium reported.

3. FINAL REMARKS

Patellofemoral Pain Syndrome presents a high prevalence in society, affecting 25-40% of the physically active population currently. The Patellofemoral Pain Syndrome is the major cause of medical care related to musculoskeletal diseases of the lower limbs, capable of generating temporary or definitive discharge of athletes and workers (Blønd & Hansen, 1998; Callaghan & Selfe, 2007; Fairbank, Pynsent, van Poortvliet, & Phillips, 1984; Halabchi, Abolhasani, Mirshahi, & Alizadeh, 2017; Hall, Foss, Hewett, & Myer, 2015; Myer et al., 2010; Rathleff, Rathleff, Olesen, Rasmussen, & Roos, 2016).

The considered risk factors of aggravation or sprouting of Patellofemoral Pain Syndrome are: knee valgus, contact areas between the patella and the femur, disequilibrium of the quadriceps and gluteous muscle, more specifically, in the strength muscle loss of the medium gluteus since it is the main knee articulations stabilizer (Barton et al., 2014; Contreras, Vigotsky, Schoenfeld, Beardsley, & Cronin, 2015; Kim, Unger, Lanovaz, & Oates, 2016; Shanbehzadeh et al., 2014; Souza & Powers, 2009).

Treatment of the Patellofemoral Pain Syndrome must be wide to correct all the aggravating gaps. Thus, the physical examination with complete and detailed anamnesis is fundamental for the correct diagnosis and effective therapy. In the case in question, it was possible to apply a training plan through bodybuilding exercises that could solve the muscular disequilibrium of the patient (Collins et al., 2018; Crossley, Van Middelkoop, et al., 2016; Powers et al., 2017).

The limitation of this case can be represented by the difficulty of using a single guideline with bodybuilding treatments for the general population, when therapeutic individualization is required in each case of patients with PFPS.

It can be stated that anamnesis and physical examination should not be neglected, and, when provided with proper attention, it is possible to do the correct diagnosis, making use of the complementary exams when they are necessary. Even with a predisposition for the appearance PFPS, in patients with knee in valgus (Collins et al., 2018; Powers et al., 2017), the maintenance of muscle mass is undoubtedly the best way for healthy articulations, avoiding muscle injuries and increasing the ability to withstand overuse of muscles and muscle overload in daily tasks.

From the patient's perspective: The patient reported after being asked: What did you expect before you started treatment and how do you see the results in the first 6 months and currently?

"I expected to not feel pain; it was uncomfortable to live with pain even in the most basic movements. I wanted results in three months, but it took longer. The satisfaction and

accomplishment of doing a mere squatting without load and without pain was the best moment in a long time. I really felt fulfilled and complete with the training"

Informed consent form:

The Informed Consent Form was applied to the Patient Based on Annex A of *ISO 12894:2001* ([Organization for Standardization \(ISO\), 2001](#)).

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