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Case report

Immediate effects of hip mobilization on pain and baropodometric variables – A case report

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ABSTRACT

Manual therapy is an important tool for the treatment of musculoskeletal disorders of mechanical origin. Since the hip is an important structure for weight bearing as well as static and dynamic balance, it is suggested that hip impairments may affect weight distribution. Both static and dynamic balance are dependent on adequate joint mobility which in the presence of any kind of alteration can lead to modifications of plantar pressure distribution patterns which, in turn, can be detected by computerized baropodometry. The aim of this study was to verify clinical and baropodometric immediate effects of a single session of hip mobilization in a patient with chronic anterior hip pain. A physically active 21-year old patient underwent a pre-intervention assessment which included pain rating, active and passive range of movement, passive accessory movement as well as static and dynamic barodometry. The intervention consisted of an anteroposterior grade III + mobilization of the right hip, which was conducted with patient in left side-lying with the right hip flexed at approximately 45°. After the intervention, the patient's pain was reduced and there was an improvement in the active movement related to the pain generation. Baropodometric assessment showed plantar peak pressures shift on both feet, from forefoot to rear foot, and there was also reduction in anteroposterior center of pressure displacement on static recording.

1. Introduction

Hip disorders in adults are multifactorial and frequently related to joint macro or microtraumas or even to degenerative process inherent to age (Zimny, 1998). Manual therapy is often employed by physiotherapists to treat musculoskeletal disorders at the vertebral spine and extremities (Hengeveld and Banks, 2005). Among various available techniques, joint mobilization has shown to be effective for many conditions, such as low back pain (Childs et al., 2004), knee (Deyle et al., 2000) and hip (Hoeksma and MacDonald, 2005; Wright et al., 2011) osteoarthritis. The decision of whether to apply the technique must not be based on a tissue-specific reasoning (Bialosky et al., 2009), but on a detailed physical examination in order to establish if the disorder presents a mechanical component.

Under a biomechanical viewpoint, recent evidence has shown that hip motion during quiet standing is not small but as large as or even larger than ankle joint motion, suggesting the importance of the hip joint to postural control even during quiet standing (Suzuki et al., 2012). Based on this, the authors hypothesized that individuals with hip disorders could present alterations in static and dynamic balance, since both conditions are the result of a complex interaction between various mechanisms, such as proprioceptive postural afferents, motor control, kinesthetic memory and adequate joint mobility (Winter, 1991; Grassi et al., 2011).

These alterations can be investigated through computerized baropodometry, which has been used to assess the kinetic relationship between body and ground in gait, running, jumping and orthostasis (Grassi et al., 2011). Thus, it is possible to detect functional alterations through the abnormal behavior of variables like center of pressure (CoP) stability, feet contact discrepancy and increased peak plantar pressure (PPP) (Lopez-Rodriguez et al., 2007).

To date, there are few studies reporting the use of baropodometry to investigate the effects of manual therapy. Grassi et al. (2011) evaluated asymptomatic individuals before and after sacroiliac joint (SIJ) thrust manipulation. Lopez-Rodriguez et al. (2007) performed thrust manipulation at the talocrural joint in subjects with ankle sprain and Alburquerque-Sendin et al. (2009)

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assessed the immediate effects of talocrural thrust manipulation in healthy individuals. No studies were found regarding the effect of hip mobilization on baropodometric variables. Consequently, the effect of hip mobilization on postural control has not been assessed yet, which highlights the novelty of this study. This is an exploratory case report that aimed to verify clinical and baropodometric responses to hip mobilization in a young female, presenting with chronic pain of mechanical characteristics on the anterior aspect of the hip.

2. History

The patient was a 21-year old female ballet dancer for fifteen years (three to four times a week, regularly), whose main complaint was pain on the anterior aspect of the right hip when performing combined active abduction and external rotation of the hip (Fig. 1). The patient reported that she began to feel pain associated with extremes of this movement on both hips in 2009. Since then, the patient suspected femoroacetabular impingement, but the radiography and magnetic resonance imaging results dismissed that suspicion. She denied any popping, clicking, snapping, giving away, loss of balance, numbness or tingling. The left hip received osteopathic treatment resulting in no current complaints. The right hip, however, remained symptomatic.

3. Objective examination

After giving informed consent, the patient's physical examination was conducted in the physiotherapy laboratory at the Federal University of Health Sciences of Porto Alegre, in accordance with the Principles of the Declaration of Helsinki. No lower limb atrophy or edema was noted. Manual hip muscle strength testing did not reveal any weakness. Range of motion (ROM) was measured passively by standard goniometry for hip flexion, extension, abduction, adduction, external rotation and internal rotation. According to Holm et al. (2000), hip goniometry has moderate to low intra examiner reliability. For all movements, values of ROM were within normative values (Norkin and White, 1997), without significant discrepancies between legs. The Thomas test and Ely's test were positive for the left lower limb, indicating hip flexor shortening, and more specifically, shortening of the rectus femoris muscle. Both tests have shown moderate intra examiner reliability (Peeler and Anderson, 2008a, 2008b). Thus, only one examiner was designated to conduct these tests. Palpation was conducted with the patient supine-lying and did not reveal tenderness in the tendons proximal to the hip joint, in the hip joint itself, the groin region, as well as the thigh muscles. Passive accessory movement (PAM) was tested at the hip joint in order to reproduce the patient's comparable sign (pain on the anterior aspect of the hip), which was elicited by an anteroposterior (AP) PAM with the hip flexed. On the Numeric Pain Rating Scale (NPRS), she reported 0 out of 10 (0/10) at rest and 5/10 during combined active abduction and external rotation of the hip (with 0 being no pain, and 10 being the worst pain ever felt).

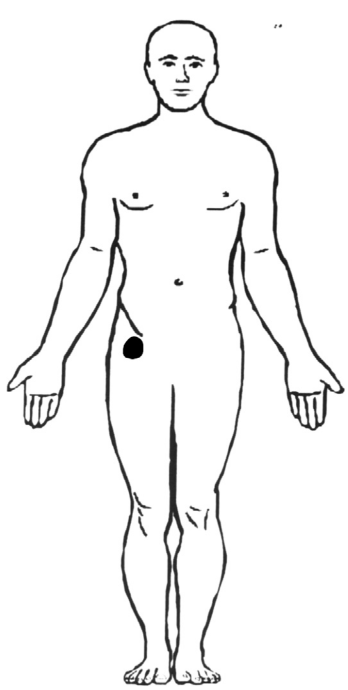

Fig. 1. Body-chart.

4. Baropodometric assessment

Baropodometry was performed using a Foot Work Pro® pressure platform. Static recording and stabilometry were conducted with the patient in quiet standing for 30 s, having her feet aligned in a comfortable position. Dynamic recordings consist of measurements during self-selected gait speed. The patient walked in both directions along a 5-m straight line with the baropodometer at halfway. The midgait protocol was adopted and ten successful trials were registered for each foot. A trial was considered successful if the subject made a clean pressure plate contact using the most habitual gait, without targeting. Both static and dynamic baropodometric assessment was done pre and immediately after intervention.

5. Outcomes measures

The primary outcome was the pain intensity at rest and during the active movement that elicited the pain complaint, as assessed by the NPRS, whose minimum clinically relevant difference is two points (Farrar et al., 2001). Secondary outcomes were related to baropodometry variables. Static measures included localization and magnitude of PPP, feet contact area, AP oscillation and laterolateral (LL) oscillation of CoP. Dynamic measures also included localization and magnitude of PPP, feet contact area and time of feet contact. A qualitative appreciation of gait line was performed, representing CoP displacement during dynamic recordings.

6. Intervention

Intervention was conducted immediately after the clinical and baropodometric assessment. The patient was positioned in left side-lying, with the right hip flexed at approximately 45°. In this position, the therapist placed both thumbs on the anterior aspect of the hip joint (Fig. 2) and performed an AP grade III + mobilization, for three times of 60 s each. Reassessment, by asking the patient to do the painful active movement, was done after each 60 s.

7. Results

7.1. Clinical response to intervention

At pre-intervention assessment, the pain at rest was 0/10 and the pain on active abduction plus external rotation (painful movement) was 5/10 on the NPRS. After the first repetition, pain on active movement decreased to 3/10 and after three repetitions, pain was 1/10. Pain at rest did not change during and after intervention.