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CASE STUDY

Massage therapy effects in a long-term prosthetic user with fibular hemimelia

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Summary *Background:* Individuals with lower limb amputation (LLA) commonly experience low back pain (LBP). Although massage effects on LBP are well-documented, research regarding massage for individuals with LLA is scarce.
Objectives: This study evaluated the effectiveness of massage therapy to promote activity level, decrease LBP, and improve health-related quality of life (HRQOL) in a long-term prosthetic user.
Methods: The 50-day study consisted of two baseline sessions, seven treatment sessions that included a 50-min massage applied to major gait muscles, and two follow-up sessions. Pedometer-measured ambulatory activity level, visual analog scale-measured pain level, and RAND-36 Health Survey 1.0-determined HRQOL were assessed.
Results: Pain level decreased, HRQOL increased, and no change occurred in ambulatory activity level.
Conclusion: For the participant, therapeutic massage intervention lead to successful LBP symptom management.

Introduction

Therapeutic massage can effectively relieve the symptoms of chronic low back pain (cLBP) with rare adverse effects (Brosseau et al., 2012; Cherkin et al., 2011; Chou and Haffman, 2007; Furlan et al., 2008; Imamura et al., 2008; Netchanok et al., 2012; Tsao, 2007). Low back pain (LBP) occurs more frequently in individuals with lower limb amputation (LLA) than the general population (Ehde et al., 2000, 2001; Ephraim et al., 2005; Smith et al., 1999).

In unilateral LLA, preferential loading on the intact side causes structural imbalance and myofascial changes, leading to an adaptive gait pattern and LBP (Duclos et al., 2007; Ehde et al., 2001; Flood et al., 2006; Gailey et al., 2008). LBP in individuals with LLA arises from a myofascial source as opposed to degenerative changes (Gailey et al., 2008; Kulkarni et al., 2005). Individuals with LLA rank LBP more bothersome than residual limb pain or phantom limb pain (Smith et al., 1999).

Scant evidentiary support exists for the use of therapeutic massage for individuals with LLA aside from the initial rehabilitation phase. Literature searches failed to identify any studies on therapeutic massage for LBP management

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in individuals with LLA. A multidisciplinary approach to pain management for long-term prosthetic users seems to be gaining acceptance (Flood et al., 2006; Gailey et al., 2008; Pasquina et al., 2006). This study assesses if therapeutic massage effects for cLBP treatment can be translated to an individual with LLA.

Intervention efficacy was measured through pedometer-recorded ambulatory activity level, visual analog scale (VAS) indicated pain level, RAND-36 Health Survey 1.0 (RAND-36) determined health-related quality of life (HRQOL), and a participant-completed open-ended questionnaire. The study objective was to examine the effect of a specific therapeutic massage protocol on ambulatory activity level, pain level, and HRQOL of a long-term prosthetic user. It was hypothesized that therapeutic massage intervention would increase ambulatory activity level, decrease pain level, and improve HRQOL. Maintenance of observed changes was anticipated from the intervention period to the follow-up period.

Background

Fibular hemimelia, the most common long bone deficiency, occurs in 5.7—20 per million live births (Rodriguez-Ramirez et al., 2010). Typical presentation is unilateral, encompassing a spectrum of severities and associated abnormalities (Baek et al., 2008; Birch et al., 2011; Rodriguez-Ramirez et al., 2010; Tomás-Gil et al., 2002). Type II, rudimentary or absent fibula, is most common (Walker et al., 2009). The lower extremity on the affected side is smaller, shorter, and slower-growing than the unaffected side, resulting in a progressive leg-length discrepancy (LLD).

Severity and patient preference determine treatment (Birch et al., 2011). Treatment normalizes LLD and promotes normal weight bearing (Tomás-Gil et al., 2002), with the goal of avoiding a pathologic gait (Naudie et al., 1997). Lifetime high quality of life is also desired (Walker et al., 2009). Three typical treatment routes are an orthopedic shoe lift, limb lengthening, and amputation. Syme ankle disarticulation, a common amputation for this condition, creates a distal weight bearing, aesthetically acceptable residual limb (Pasquina et al., 2006) with adequate prosthetic clearance at adulthood. Long-term complications are rare with Syme amputation (Krajbich, 1998). Ideally Syme amputation is performed in early childhood, before adaptive gait patterns are established (Krajbich, 1998; Naudie et al., 1997; Tomás-Gil et al., 2002). Fibular hemimelia treated with amputation results in a normal level of physical functioning (Walker et al., 2009).

Therapeutic massage for chronic low back pain

The therapeutic massage protocol reflects established LBP protocols (Cherkin et al., 2011; Field et al., 2007; Hernandez-Reif et al., 2001; Lowe, 2009), musculoskeletal issues that individuals with LLA experience (Ehde et al., 2000; Friel et al., 2005; Gailey et al., 2008), and results from initial assessment of the participant. Primarily using classical massage techniques, this protocol addresses muscles, tendinous attachments, and fascia in the low back, thighs, and gluteals. Techniques were chosen to reduce muscular imbalances and to promote pain relief.

Chronic pain conditions, such as cLBP, have both physiological and psychological components. The physiological component of cLBP includes: physical changes to the brain (Seminowicz et al., 2011), to the thoracolumbar fascia (Langevin et al., 2011), to the core muscles (Friel et al., 2005; Hides et al., 2011; Kamaz et al., 2007), and in trunk ROM (Hidalgo et al., 2012); and functional system changes in brain neurochemistry (Wand et al., 2011), in muscle activation (Santos et al., 2013), and in cortical activity (Wand et al., 2011; Tsao et al., 2008). The psychological component of cLBP includes: anxiety and depression (Ivo et al., 2013; Campbell et al., 2013); negative self-perception (Tveito et al., 2010); and kinesiophobia (Campbell et al., 2013). Overlap of these two domains in cLBP is evidenced as associated pain (Tveito et al., 2010), altered interoception (Mehling et al., 2013), and sleep disturbance (Siengsukon et al., 2013).

The multidimensional nature of cLBP can make treatment difficult. Psychological, physical, and interdisciplinary interventions have been applied to cLBP. Therapeutic massage can address both the physiological and psychological components of cLBP (Field et al., 2007; Hernandez-Reif et al., 2001; Moyer et al., 2004; Netchanok et al., 2012). Functional improvement (Cherkin et al., 2011; Field et al., 2007; Hernandez-Reif et al., 2001; Netchanok et al., 2012), decreased disability (Cherkin et al., 2011; Preyde, 2000), decreased anxiety (Hernandez-Reif et al., 2001; Field et al., 2007; Netchanok et al., 2012), decreased depression (Field et al., 2007; Hernandez-Reif et al., 2001), decreased pain (Cherkin et al., 2011; Field et al., 2007; Hernandez-Reif et al., 2001; Preyde, 2000) and decreased sleep disturbance (Field et al., 2007) have been noted as effects of therapeutic massage for cLBP. The Ottawa Panel concluded that massage may relieve symptoms of LBP and reduce associated disability (Brosseau et al., 2012).

Methods

Profile of participant

The case study participant is a 42-year-old woman employed as a prosthetic technician. She was born with right fibular hemimelia type II, related ipsilateral complications of femoral hypoplasia and patellar absence, and a fully functional foot with all lateral rays. The participant wore a straight-leg brace to immobilize the knee joint and a shoe lift on the affected side. By age 7, her LLD was greater than 7 cm. At this time she had a Syme amputation. During the surgery a right patella was constructed from a piece of her left pelvis, eliminating the need for a straight-leg brace. Her right patella is laterally deviated.

She has had a variety of socket designs and prosthetic feet. Currently her major prosthetic components include a carbon fiber socket, a 3-mm cushion liner, prosthetic socks, and a foot with a multi-axial ankle. She has had no major prosthetic issues.

At intake her chief complaint was recurrent right torso pain — especially the low back and the scapular region. The cLBP was more bothersome than the scapular pain and aggravated by any minor, common prosthetic issue. To manage the cLBP, the participant utilized heat packs,