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The impact of progressive pelvic floor muscle exercise and manual therapy in patients who met the criteria for sacroiliac joint pain based on Laslett's cluster of provocation signs - A Prospective Cohort study

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ABSTRACT

Sacroiliac joint (SIJ) pain has been identified as a primary or contributing source of pain in patients with low back pain. The Laslett cluster of SIJ pain provocation tests has the strongest evidence for noninvasive clinical testing. The purpose of this study was to describe the impact of physical therapy treatments for a patient postpartum with SIJ pain who satisfied the Laslett cluster.

Specifically, the goal was to assess the impact of progressive pelvic floor muscle exercise and Manual therapy.

The Modified Oswestry Low Back Pain Disability Questionnaire (MODI) was the primary outcome measure used in this case. In addition, the Numeric Pain Rating Scale (NRPS) and Global Rating of Change (GROC) were used as secondary outcome measures. In this study , the 25 out of 30 patients responded to the combined interventions with decreases in MODI, NRPS and GROC.

Further research is warranted to develop stronger evidence to identify specific interventions for the treatment of SIJ pain.

KEYWORDS

Manual Therapy; Pelvic floor muscle; Physical therapy; Sacroiliac joint pain

Background and purpose

The term "Sacroiliac joint (SIJ) pain"is the preferred nomenclature for pain originating from the SIJ. For the purposes of this paper, it excludes other disease pro-cesses that are known to cause pain in the SIJ. These include pregnancy-related pelvic girdle pain (PPGP), fracture, infection, neoplasm, and seronegative spondy- loarthropathies. Many physical examination tests have been developed to aid in the diagnosis of SIJ pain.

Three particular studies showed strong results when using clusters of SIJ pain provocation tests (Laslett,, McDonald, and Young, 2005; Laslett, Young, Aprill, and McDonald, 2003; van der Wurff, Buijs, and Groen, 2006). All three studies used the same four pain provocation tests: distraction, compression, thigh thrust, and Gaenslen's. Laslett, Aprill, McDonald, and Young (2005) and Laslett, Young, Aprill, and McDonald (2003) studies also included sacral thrust, while the van der Wurff, Buijs, and Groen (2006) study included Patrick's sign (FABER). In all three studies, selected subjects underwent the pain provocation tests followed by fluoroscopically guided SIJ block injections. With the reliability of the pain provocation tests pre- viously established, validation of the tests was made based on specificity and sensitivity data. Using a cluster of three or more positive, or two out of four SIJ pain provocation tests has the strongest evidence for use in noninvasive clinical testing.
With the exception of five case studies, physical therapy treatment of patients diagnosed with SIJ pain via injection or Laslett's cluster of pain provocation tests has not been documented in the literature (Ensor, 2016; George, Clinton, and Borello-France, 2013; Horton and Franz, 2007; Jonely, Brismée, Desai, and Reoli, 2015;O'Sullivan and Beales, 2007)

In 2013, a randomized control trial investigated the effects of exercise and manual therapy in patients with SIJ pain (Visser et al, 2013). However, the authors used only elements of Laslett's cluster, and not the full slate oftests that has been validated. In case studies by Jonely, Brismée, Desai, and Reoli (2015) and Ensor (2016), the authors used pelvic floor muscle strengthening and manual therapy as part of a multimodal treatment approach. In both cases, the patient had a successful outcome. However, the patient in each case did not have a recent history of pregnancy and delivery. Since PPGP is a distinct diagnosis from SIJ pain, Laselett's cluster has not been validated with this patient population PPGP has its own validated clinical tests documented justifies the need for more studies and research on patients with SIJ pain diagnosed via Laseltt cluster.

The purpose of this report is to assess the impact of progressive pelvic floor muscle exercise and manual therapy on a patient postpartum who met the criteria for SIJ pain based on Laslett's cluster of positive SIJ pain provocation signs.

The modified Oswestry Low Back
Pain Disability Questionnaire (MODI) was the primary outcome measure used. The MODI is a reliable and valid scale when used with patients with low back pain (LBP) (Fritz and Irrang, 2001). In addition, it has been deter-mined to be a reliable and valid outcome measure in patients with pelvic girdle pain (Grotle, Garratt,Krogstat Jenssen, and Stuge, 2012). Due to the limited research on patients with SIJ pain, this scale was identified as the best available outcome measure to use. This is consistent with the aforementioned case studies investigating the treatment of SIJ pain.

Secondary outcome
measures included the self-reported pain rating based on the Numeric Pain Rating Scale (NRPS) and the Global Rating of Change (GROC). The NRPS has been determined to be a reliable and valid scale when used with patients with LBP (Childs, Piva, and Fritz, 2005). In addition, the GROC measure has been determined to be a reliable and valid scale when used with patients with LBP (Costa et al, 2008).

The patient's goals for therapy were to perform child care duties pain free.

Physical therapy tests and measures
The patients (25 out of 30) have reported 7/10 sacral pain at worst, 0/10 currently and 0/10 at best on the NRPS.

Few patients also reported 7/10 pain while lifting their child from the crib in the morning. The MODI was administered and the patient's score was 22%. The GROC scale was also issued at the 4th, 8th, and discharge visits. Gait appeared normal with no pain reported or significant abnormalities. Tenderness was also reported with palpation to the bilateral psoas muscle belly and the left greater than right quadatrus lumborum regions. No tenderness was noted in the low lumbar region, but did not exactly reproduce PSIS or sacral pain. Right lumbar quadrant with overpressure caused low lumbar pain, but did not exactly reproduce the PSIS and sacral pain. Hip passive range of motion (PROM) was WNL bilaterally. Isometric hip manual muscle testing revealed bilateral side lying hip abduction was rated at 4/5 and bilateral prone hip extension was rated at 4/5. Seated hip flexion and bilateral prone hip IR and ER were both rated at 5/ 5. The patients also report pain during muscle testing.
L2-S2 myotomal strength was graded 5/5. Bilateral knee and ankle deep tendon reflexes were graded as 2+. Slump testing did not reproduce symtpoms. Passive flexion, adduction, and internal rotation (FAIR) testing of the hip did not reproduce symtpoms. Lumbar passive accessory inter-vertebral motion (PAIVM) reproduced local pain with left and right L5 unilateral posterior-anterior (PA) accessory motion. This pain was not described as the typical PSIS and sacral pain she experienced previously. SIJ testing was positive for reproduction of PSIS pain with distraction, thigh thrust, and sacral thrust testing.

Compression testing was negative and Gaenseln's test was not performed due to the patient satisfying the two out of four rule.

Physical therapy diagnosis/goals
After reviewing the findings, hypotheses about the potential sources of symptoms include the SIJ, lumbar spine, hip joint, and the surrounding soft tissues. . The patients satisfied Laslett's cluster for SIJ pain, therefore, there was a strong likelihood that they had SIJ pain. However, the patients also had positive L5 joint signs and mild pain with lumbar extension and right lumbar quadrant. Because lifting her child in a flexed position was the most provocative activity, pain from loading through the SIJ, L5-S1 lumbar facet and disc, or combination of both was possible. Though the patient's typical pain was not provoked with lumbar testing, it is possible that there was a biomechanical connection between the two based on the link with the sacrum from the L5-S1 facet or disc. The patient's groin pain was reproduced with bilateral hip adduction PROM. This suggested the possibility of involvement of the iliopsoas muscle complex, iliopectineal bursa, and intra-articular structures (Tibor andsekiya), 2008). With the FAIR test being negative, among other negative findings (i.e. no clicking, catching, pain with weight-bearing activity), the possibility for labral tear, femoral acetabular impingement, and/or osteoarthri- tis was lowered. It is possible that SIJ or lumbar sources could refer to the anterior hip region (Sembrano and Polly, 2008; Slipman et al, 2000). The patient's neurological signs were negative. This lowered the possibility for a neurological related problem. Also, serious pathologies were ruled out based on all red flag signs being negative. The patient had the following goals: (1) able to lift from bedwithout pain; (2) independent with home exercise program; (3) able to perform

all child care duties with pain not exceeding 3/10; and (4) report improvement in Oswestry score from 22% to 10%.

Intervention

The decision to treat the apparent SIJ pain with possible surrounding soft tissue abnormalities listed above was made. Specifically, strengthening and stretching the trunk and hip musculature and instructing the patient in proper body mechanics. The decision to try strengthening was based on evidence that specific stabilization exercise and general exercise has been shown to be effective in certain patient populations with lumbar painKaumantakis, Watson, and Oldham, 2005). Because there is no definitive evidence for addressing SIJ pain, the model for using exercise in patient populations with lumbar pain was used. Following four visits of exercise, manual therapy was added to the intervention. Manual therapy has moderate evidence supporting its use in LBP populations (Bronfort, Haas, Evans, and Bouter, 2004).

Plan of care

The plan was to treat the patients for two times the first week and then decrease to one time per week thereafter. For the first four sessions, it was planned to treat the patient with stretching and strengthening the trunk and hip musculature using a graded approach. In addition, the patient was instructed in using proper body mechanics when lifting her child out of the crib. The stretching exercises were prescribed based on the regions of palpable tenderness, specifically the quadratus lumborum and iliopsoas muscles.

For the strengthening exercises, the patient was instructed in activating her pelvic floor muscles (PFM) as a first step. The use of PFM contraction prior to and during trunk and hip exercise was partially based on studies demonstrating co-contraction of the tranversus abdominus (TrA) and PFM (Critchley, 2002).

In the nonpregnant LBP population, specific stabilization exercise and general trunk strengthening have both shown to be effective depending on the inclusion criteria (Koumantakis, Watson, and Oldham, 2005). Furthermore, biomechanical PHYSIOTHERAPY studies have suggested the load-decreasing effect of the TrA and PFM on the pelvic ring (Pel et al, 2008).Based on this evidence, it was decided to instruct the patient in PFM contraction in conjunction with trunk and hip strengthen- ing exercise.

After different patients were able to activate the PFM, basic hip and trunk exercises were added to target the major muscle groups of those regions.. The patients were instructed to report any increases in her usual pain throughout the exercise session. The patient was instructed to modify any exercises that seemed to increase the usual pain. Possible modifications included limiting the range of motion of the exercise or performing less repetitions and sets. All strengthening exercises started with two to three rounds of 10 repetitions or until the onset of fatigue. These parameters are based on exercise interventions described in the aforementioned LBP study (Koumantakis, Watson, and Oldham, 2005). Once the patient reported more ease with a certain exercise, a more challenging exercise was introduced to further increase strengthening. The patient was issued a home exercise program with written and visual aids and instructed to perform the exercise program one time per day. After four visits, the home exercise program was spaced out to three times per week.

After four visits of exercise, the intervention was changed to a manual therapy approach. The use of lumbar mobilization was based on lumbar AROM, quadrant and PA findings. According to the teachings of Maitland (2005) painful and/or hypomobile joint signs may guide the treatment,

especially if that sign reproduces the patient's main complaint or comparable sign. In this case, it was difficult to reproduce the patient's primary pain. As a result, the patient's lumbar pain was used as a guide for the mobilization treatment. The use of soft tissue mobilization was based on clinical experience and training with other physical therapists.
According to a recent Cochrane Review, there is very little confidence that massage therapy is an effective treatment for LBP (Furlan et al, 2015). Regions with palpable tenderness were treated with soft tissue mobilization.. The patients were treated with five visits of manual therapy. The techniques used every session

The patients were seen for a total of nine visits over a period of 8 weeks. The patients were instructed in a home exercise program based on the exercises included in visits one and two. The patient reported excellent compliance with the home exercise program per the instructions given.

Outcomes
Patient were seen at evaluation, fourth visit, eighth visit, and nineth visit (discharge). At the fourth visit, the patient reported decreased pain to 5/10 at worst (based on the NRPS), had a MODI score of 16% (8% improvement from baseline), and reported a 3+ (somewhat better) on the GROC scale. The minimal difference (MCID) for the MODI does not have a single, agreed upon score (Schwind et al, 2013). In the research, the MCID has ranged from a 10% to 20% change from baseline. After the last visit, the patient reported decreased pain to 2/10 at worst, had a MODI score of 6% (16% improvement from baseline), and reported a 6+ (a great deal better) on the GROC scale. Also, at the last visit, the patient reported no pain with lumbar AROM and quadrant and only one out of four SIJ pain provocation tests was positive. Most of the patient's goals were met.

Discussion
The purpose of the case report was to describe the impact of progressive pelvic floor muscle exercise and manual therapy on a patient postpartum who met the criteria for SIJ pain based on Laslett's cluster of positive SIJ pain provocation signs. The patient had a favorable outcome on the MODI, GROC, and NRPS scales. At the time of writing this case report, only five case reports have been identified that document physical therapy treatment of patients diagnosed with SIJ pain via injection or Laslett's cluster of pain provocation tests. There are no randomized control trials investigating physical therapy management of this patient population using the criteria stated above. To the author's knowledge, there are no published case reports describing treatment of a patient postpartum with SIJ pain. Based on the current evidence, more research is warranted in this patient population. Few patient had a positive response to a multimodal approach. After four visits of exercise, the patient's NRPS and MODI improved and her GROC score was a 3+. The patient had continued pain with lumba extension AROM, quadrant, and with two out of four SIJ pain provocation tests. After 4.5 visits of manual therapy (the last visit was shortened due to patient's work schedule), the patient's NRPS and MODI further improved and her GROC score was a 6+. It appears a multimodal approach had a positive impact on the patient's pain level, perceived disability, and perceived rating of change. This is consistent with the other case studies demonstrating that a multimodal approach using progressive pelvic floor muscle exercise, manual therapy and education is effective in treatment patients with SIJ pain. In the case report by Jonely et al., the patient's treatment consisted of manual therapy and exercise interventions in a 35-year-old female patient with a 14-year history of SIJ pain. This patient had a higher baseline MODI score (34%) which improved to 14% after 10 visits and 0% after 20 visits. Limitations of the case include the inability to deter-mine if one treatment approach had a more meaningful impact than the other. However, the intent of this report was to describe the impact of a multimodal approach in a patients with SIJ pain. The findings of this case report suggest the need for further research

with this patient population. Another limitation of this study is that the MODI has not been proven to be reliable or valid for patients with SIJ pain specifically. However, there is validation for using the MODI in patients with LBP or pelvic girdle pain. One other outcome measure, the Majeed pelvic score, has been recently validated for use in patients with chronic SIJ pain (Bajada and Mohanty, 2016).Theauthorwasnotawareof this scale at the time of intervention. The Majeed pelvic score questionnaire assesses self-reported measures of pain, work tolerance, sitting tolerance, standing tolerance, sexual intercourse tolerance, and gait tolerance and distance. This does not vary much at all from the MODI. Therefore, there may have not been a significant benefitfromusingtheMajeedpelvicscoreoverthe MODI.

Conclusion

A multimodal approach of pelvic floor muscle exercise and manual therapy has a positive impact on pain, perceived disability, and perceived rating of change in a patient postpartum with SIJ pain. Further research is warranted to develop stronger evidence to identify specific interventions for the treatment of SIJ pain.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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