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Idiopathic Pelvic Girdle Pain as it Relates to the Sacroiliac Joint

Links between the Hip and the Lumbar Spine (Hip Spine Syndrome) as they Relate to Clinical Decision Making for Patients with Lumbopelvic Pain

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Abstract

This narrative review focuses on the links between the hip and lumbar spine in the context of lumbopelvic pain. The literature regarding this topic is variable, found in many disciplines of care using different terminology. Collectively these inconsistencies add to the complexity of understanding the current evidence as it pertains to clinical practice. We have chosen to review studies that describe and assess overlapping pain distributions between the lumbar spine and hip, hip osteoarthritis and lumbopelvic pain, improvements in low back pain following hip arthroplasty, association of hip range of motion and lumbopelvic pain, and lumbopelvic motion and hip motion as they relate to low back pain and gender. The links between the hip and lumbar spine may provide the clinician important information to make decisions and recommendations for people presenting with the clinical symptom complex including lumbopelvic pain.

Introduction

Healthcare providers are often challenged to differentiate hip and lumbar spine disorders in people who present for evaluation and treatment of lumbopelvic pain.[1-3] Further, when people present with coinciding symptomatic end stage degenerative disorders of both the hip and lumbar spine it can be difficult to determine which treatment should be recommended and in what order.[4] For example, in patients with spinal stenosis and neurogenic claudication coinciding with a gait disorder related to painful hip osteoarthritis (OA), knowing which to treat with or without surgery and which to perform first can be difficult. The distribution patterns of pain related to the lumbar spine, pelvic girdle, and hip overlap. To add to the diagnostic and treatment complexity, the movement patterns of all three regions are linked, pain may be related to any or all of these locations, and these disorders may be structural, movement based, or physiological. These disorders also present with similar symptoms. The integrated complexity of lumbopelvic pain may in fact be a reason our understanding of the cause of lumbopelvic pain is limited. In turn, this may perpetuate the nomenclature of "nonspecific low back pain" to describe people with lumbopelvic pain that can often become a chronic health disorder.

Hip disorders have their own separate complexity, particularly when determining an intra- versus extra-articular source of pain. Pain distributions can include the groin, lateral hip, and posterior pelvis. Although groin pain is the most common distribution of pain from intra-articular hip pain, Khan and colleagues[5] found that 47% of people with hip pain related to hip OA had pain radiating below the knee. Lesher et al[6] reported the collective baseline pain diagrams of patients who experience 90% or greater pain relief following an image-guided intra-articular hip injection for the treatment of hip OA. In addition to groin pain, patients reported a wide variety of pain distribution, including the posterior pelvic (pain below L5), the lower extremity, and the foot. In a study[7] comparing pain distributions reported by patients with symptomatic hip OA and idiopathic osteonecrosis of the femoral head, 77% of people (92 hips) reported pain in the thigh, knee, lower leg, and low back, in addition to

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pain in the groin, buttock, and lateral hip. Patients with hip OA reported low back pain (LBP) more frequently than those with idiopathic osteonecrosis. In several studies, patients undergoing surgery for intra-articular hip disorders without hip OA including acetabular labral tears, femoroacetabular impingement (FAI), and developmental hip dysplasia, LBP, and/or posterior pelvic pain was reported in 17.3%-38% of patients.[8-10] Further, 12% of patients with FAI reported posterior thigh pain.[9] Collectively, this literature suggests there is overlap of the pain distributions between the hip and the spine which contributes to the complexity of evaluating patients with lumbopelvic pain.

The term "hip-spine syndrome" is used in studies describing coexisting hip and lumbar spine disorders.[1-4,11] Offierski and MacNab[11] were the first to describe the theoretical subgroups of the hip-spine syndrome including simple, complex, and secondary. The simple subgroup includes a structural diagnosis existing in both the lumbar spine and hip, but only one is causing the disability. The complex subgroup includes patients with degenerative changes of the hip and lumbar spine contributing to pain and overlap with one another without one source being clearly identified as the cause of the disability. The secondary subgroup includes patients with adaptive changes occurring in one region contributing to symptoms in the other with the consequence of the development of LBP. These proposed subgroupings have not been validated and there is intermixing of the terms pain and disability. Nevertheless, Offierski's defined subgroups of the hip-spine syndrome provides a guide to interpret the literature and apply to patient evaluation and treatment.

However, there is a larger body of research dedicated to assessing the relationships between the hip and the spine that does not use the term, "hip- spine syndrome." Further, the literature has expanded to include studies of hip pain, LBP, and posterior pelvic pain prior to the onset of degenerative structural changes in any of these three regions.[9,10,12-15] Given the variety of researchers and healthcare providers dedicated to studying and treating lumbar spine and hip disorders, the literature is distributed in a wide variety of sources. Organizing and summarizing this literature is difficult due to the variability in terminology and context of the studies.

The purpose of this narrative review is to present selective literature using Offierski's subgroupings to guide organization and presentation of the evidence regarding the connections between the hip and the lumbar spine as they apply to patients with lumbopelvic pain. This review will be limited to literature related to hip OA and LBP, co-existing structural changes in the hip and lumbar spine, relationship of hip arthroplasty or arthrodesis and LBP, hip range of motion and LBP, and early lumbopelvic motion and LBP. A better understanding and awareness of the literature that provides evidence regarding the links between the hip and the spine will give healthcare providers guidance in assessing patients and requesting appropriate diagnostic testing. In turn, this can lead to appropriate timing and use of interdisciplinary care during a patient's care pathway that includes medical and/or surgical treatment. Potentially, this will lead to better utilization of healthcare dollars directed by a mechanism rather than symptom alone.

Simple Subgroup

The review of this subgroup of the hip-spine syndrome includes selected studies that involve structural diagnoses existing in both the lumbar spine and hip, but where only one of the disorders was determined to be the source of the primary disability for the patient. In this section we present literature regarding radiographic hip OA in people with hip and LBP and cadaver studies assessing for both hip and lumbar spine OA.

Radiographic Evidence of Coexisting OA in the Hip and Relationships to Clinical Symptoms of Hip and Low Back Pain

In the clinical setting, radiographic findings of degeneration and OA of the lumbar spine are found in more than 50% of patients.[16] Often these degenerative findings are attributed to aging or familial collagen makeup that can be associated with pain but not universally associated with a specific symptom complex of LBP.[16,17] Radiographic hip OA prevalence has been found to be 27% in adults ≥45 years of age.[18] Several studies have assessed coexisting hip pain in the setting of radiographic hip OA.[19-24] Croft et al found minimal joint space to be the best radiographic criteria to correlate with hip pain,[24] and Arden et al[19] noted that severe radiographic OA was found in 16% of people with hip pain and in 3% of people without hip pain. In the Framingham Osteoarthritis Study of 1850 participants, the prevalence of radiographic hip OA was 19.6% whereas the prevalence of hip symptoms and radiographic OA was only 4.2%.[25] In another large study, the Osteoarthritis Initiative,[18,22] hip radiographs of 8732 hips in 4366 people were assessed and the sensitivity of radiographic hip OA associated with hip pain localized to the groin or anteriorly was 15.8% with a specificity of 94.1%. In summary, not unlike lumbar spine radiographic OA, radiographic hip OA, even in a severe state, does not consistently correlate with the clinical symptom complex of hip pain. To answer the question as to whether these hip radiographic findings affect outcomes of people with LBP, Hicks et al[26] found that people 60-85 years of age with chronic LBP more commonly had hip symptoms and worse quality of life measures as compared to age- and gender-matched controls.

Some of the initial literature using the hip-spine syndrome description included patients with LBP who were found to have radiographic hip OA. Saunders et al[27] described a cohort of 75 LBP patients and found that patients with LBP were more likely to have radiographic hip OA as compared to controls. French et al[28] reported that 16/24 (66.7%) people with LBP and radiographic hip OA were, on average, 7.69 years younger and with larger pain distributions and higher pain and disability compared to those without LBP. In a study assessing for LBP in 285 patients prior to undergoing total hip arthroplasty (THA),[29] 60.4% reported LBP of which 18.9% rated their LBP to be moderate in intensity. Women were found to report significantly ($P = .006$) more moderate to severe pain as compared to men. Of note, the body diagram patients used to report their pain distribution included only the axial spine and did not include the posterior pelvis or lower extremities. This may have led to underreporting in some patients whose LBP distribution of symptoms was distal to L5 in the trunk and included the lower extremity. In a study[30] of 983 patients aged 55 and older presenting with primarily hip or knee pain in the setting of radiographic OA, 58% of the cohort also reported LBP at the time of presentation. This baseline report of LBP predicted greater hip and knee joint related pain and disability at 1-5 year follow-up (95% confidence interval [CI], 0.4-4.6; $P = .023$) with a strong association between pain and disability in patients with hip OA (95% CI, 5.1-17.7; $P = .001$).

Cadaveric studies have also contributed to our understanding of the structural changes in the hip and spine. In a study investigating the contribution of hip OA towards development of spine OA, Weinberg et al[31] examined 625 cadavers and concluded that age was the greatest predictor of the development of OA of the hip and spine. Further, structural changes at the lumbosacral-pelvis junction are influential in the development of hip and spine OA. Gebhart et al[32] looked for an association between cam hip deformity and OA of the lumbar spine in cadavers. They assessed the proximal femur alpha angle and the anterior femoral head and neck offset and the coexistence of OA of the lumbar spine in 456 male and 94 female cadavers with a mean age of 47.8 ± 16.2 years. An increase in the alpha angle and a decrease in the head and neck offset were significantly associated with the presence of lumbar spine OA.

Complex Subgroup

The complex subgroup of the hip-spine syndrome includes studies of people with degenerative changes of the hip and lumbar spine found to contribute to pain that overlaps between the two regions without one source identified as the cause of the associated disability. We present literature related to this subgroup to include studies of improvement in LBP following treatment of hip OA with hip arthroplasty. These demonstrate that treatment of one disorder, the hip, had an impact on improving the other disorder, LBP, despite the fact that the people had identified structural changes thought to be associated with their LBP.

Hip Arthroplasty Treatment for Hip OA and Coexisting Lumbar Spine Disorders

Initial literature describing the links between the hip and LBP were, at the time, surprising findings of the outcome of treatment. The relationship of hip OA and LBP were first noted based on improvement in both LBP and hip pain following treatment of the hip. Several publications[33-35] describe patients with hip OA treated with hip arthroplasty in the setting of coexisting symptomatic lumbar spinal stenosis. In 1979, one of the first descriptions of the hip-spine syndrome[33] included eight patients with continued posterior hip pain following hip arthroplasty. Lumbar spine decompression in six of the patients completely relieved their remaining symptoms. In 1983, de la Caffiniere and Rocolle[34] described 11 patients with lumbopelvic pain including groin pain with continued symptoms following hip arthroplasty and were found to have lumbar spinal stenosis. The authors concluded that patients experiencing pain following hip arthroplasty should be assessed for symptoms referred from the lumbar spine. Other literature has described patients with LBP in the setting of hip arthroplasty. Ben-Galim et al first described patients' reports of improvement of LBP following hip arthroplasty.[35] The authors assessed 25 consecutive patients evaluated for both hip and lumber spine pain and function 3 months prior to surgery and 2 years following hip arthroplasty. The mean preoperative LBP visual analog scale (VAS) score improved from 5.04 to 3.68 following hip arthroplasty ($P = .006$). Both spine ($P = .0011$) and hip function ($P = .01$) significantly improved following hip arthroplasty and the improvements were maintained at 2-year follow-up. In a retrospective review of 3335 patients who had undergone hip arthroplasty, Prather et al[36] found that 17% of these patients had received care for LBP within 2 years preceding or following hip arthroplasty and had worse pain and function following hip arthroplasty as compared to those who did not undergo treatment for LBP. On average, patients treated for LBP were older and 60% were female. The length of an episode of care and cost of care was significantly greater ($P = .02$ and $P < .001$, respectively) in patients treated for LBP within the 2 years preceding or following hip arthroplasty. Similarly, Ellenrieder et al[37] prospectively assessed LBP, function and quality of life factors in 42 patients prior to hip arthroplasty. Thirteen patients with LBP and 29 without LBP were assessed preoperatively, and at 12, 24, and 60 months following surgery. Although both groups improved over time, those without LBP had significantly greater improvement in pain, function, and quality of life. The group with LBP had significant improvement in pain and function over time but lacked improvement in quality of life measures. The authors concluded that lumbar spine disorders should be evaluated prior to hip arthroplasty and should be taken into consideration when determining prognosis.

In a study of over 2800 patients undergoing unilateral primary hip arthroplasty, Chimenti et al[38] found 60.5% (1707/2820) of the cohort to report mild or greater LBP preoperatively, and 58.4% (997/1707) of these patients experienced improvement in their LBP as indicated by a change of at least one degree of pain severity on a pain intensity Likert scale from the modified Oswestry Disability Index. Of the patients reporting severe LBP prior to hip arthroplasty, 80% reported improvement at follow-up. Comparisons made between patients with and without improvement in LBP showed that patients with improved LBP were more likely to have a household income greater than $45 000, have private insurance, an educational background extending beyond high school, report pain in fewer joints, and a lower chronic disease burden. Patients with improved LBP reported significantly better mental and physical scores at baseline and better pain and function scores for both of their hips. Further, patients with improvement in LBP also had a significant difference in the amount of overall improvement (51.96 vs. 44.58, $P < .000$). Relatedly, a study[39] assessing outcomes following hip arthroplasty reported worse pain (95% confidence interval [CI] 2.57 to 6.12), quality of life measures (95% CI -0.112 to −0.066) and satisfaction (95% CI 4.05 to 8.02) in patients who had previous lumbar spine surgery. As a whole, these studies suggest that overall, hip arthroplasty helps improve lumbar spine related pain and function.[40]

Though the cause and effect of these relationships between outcomes for hip arthroplasty and lumbar spine disorders are not fully understood, there is emerging literature assessing the structural alignment relationships between the lumbopelvic junction and the hip. Weng et al[41] assessed radiographic sagittal alignment of pelvis, hip, and spine at baseline and 1 year following hip arthroplasty. Validated instruments were completed for pain and hip and lumbar spine function. Of the 69 patients, 39 (56.5%) reported LBP prior to surgery. At follow up, 17/39 (44%) reported resolution of LBP and 22/39 (56%) reported improvement. The authors concluded the arthroplasty procedure corrected the abnormal sagittal spinal-pelvic-leg alignment that may have helped to improve LBP. Further, improvement in hip flexion and global spinal balance may have also contributed to reduced LBP. Another study[42] aimed to describe the relationship between femoral neck anteversion, LBP, and spinopelvic parameters in patients undergoing hip arthroplasty for hip OA. Coexisting unilateral hip OA and LBP was associated with femoral neck anteversion of the arthritic hip and spinopelvic misalignment. Following hip arthroplasty, hip pain, LBP, and spinopelvic parameters improved.

Secondary Subgroup

The secondary subgroup review focuses on studies with people with adaptive changes occurring in one region contributing to symptoms in the other with the consequence of the development of LBP. The relationship between hip rotation and LBP is an important one because forces applied externally can be transmitted from the lower extremity to the pelvis and trunk. This mechanism allows for movement at the hip to influence load, stress and, ultimately, movement at the lumbar spine. This section of the review discusses the relationship of hip range of motion, early lumbopelvic motion, and the effects of gender regarding early lumbopelvic motion as they relate to LBP.

Low Back Pain Associated with Hip Arthrodesis

A small group of studies reporting LBP in patients with hip arthrodesis is a good example of the secondary subgroup of the hip spine syndrome. In two small descriptive studies of six[43] and nine[44] patients with hip arthrodesis, all of the patients reported LBP. Similarly, in a more recent study,[45] 28 patients (40 hips) prospectively followed after hip arthrodesis and converted to hip arthroplasty were found to have a satisfactory fusion lasting on average 20.4 ± 13.0 years (range 3-56). The indication for conversion to arthroplasty in 14 (50%) patients was LBP. In the Karol et al study,[44] 7/9 demonstrated excessive motion of the lumbar spine and ipsilateral knee. Other studies have reported the most common complaint that contributes to the patients' decision to convert their hip arthrodesis to a hip arthroplasty is LBP.[46-50]

LBP Associated with Reduced Hip Range of Motion

LBP patient populations including patients with hip arthrodesis, patients with FAI and patients involved in rotational sports suggest a common link between LBP and reduction in hip range of motion .[9,44-63] One hypothesis to explain this link between reduced hip range of motion and LBP is the reduced hip motion results in compensatory lumbar spine motion leading to the development of LBP.[51-53]

A growing body of literature suggests a link between hip range of motion and LBP. Hip range of motion in subgroups of people with LBP have less: active internal rotation,[54,55] passive internal rotation,[51,56] lead leg active and passive internal rotation,[57-59] dominant leg active and passive internal rotation,[54] hip flexion,[60] passive hip extension,[61] and total hip rotation.[54,62] In a study assessing hip range of motion in patients with chronic LBP, Lee and Kim[63] assessed 69 patients for trunk stability via a series of physical examination tests performed with the patient in standing, sitting, and prone positions. Patients determined to have trunk instability (n = 39/69) on examination had significantly less hip range of motion ($P < .01$) as compared to the patients determined to have trunk stability (n = 30/69). The greatest hip range of motion differences were found between the two groups in hip flexion and internal rotation.

In a prospective evaluation of hip range of motion in 101 consecutive patients presenting for evaluation of LBP, Prather and colleagues[13] found these LBP patients to have significantly less passive hip flexion ($P = .008$) and hip internal rotation ($P = .02$) as compared to asymptomatic age- and gender-matched controls. LBP patients with reduced passive hip flexion reported worse baseline lumbar spine function (modified Oswestry Disability Index, $P = .04$) and hip function (modified Harris Hip Score, $P = .03$). Provocative hip tests that resulted in groin, lateral hip with or without posterior pelvic pain were found in 60 of these LBP patients. Hip radiographs were obtained in this subgroup of LBP patients and 77% (48/60) were found to have no or minimal radiographic findings of hip OA. This is the first cohort of patients described to have components of the hip spine syndrome prior to the onset of radiographic hip OA.[14]

Early Lumbopelvic Motion with Hip Movements and LBP

Hip rotation and transmission of force across the trunk and pelvis allows the hip to influence movement in the lumbar spine. When these movements at the hip occur repetitively, tissue overload at the lumbar spine occurs, which can lead to LBP.[64]

Over the past 20 years, researchers and clinicians have proposed that repetitive lumbopelvic motion contributes to the development of LBP.[64-66] Several studies demonstrate the association between increased early lumbopelvic motion during movement of the trunk and lower extremities and LBP during physical examination tests that involve movement and activities of daily living.[67-72] A body of literature describes the relationship between LBP and lumbopelvic motion via tests performed in prone while directing hip rotation.[64,73-78] Panjabi and White[75] described this movement as "early coupling" of hip rotation with lumbopelvic rotation. Initial studies described the hip and lumbopelvic region moving together in one motion during the early part of hip external rotation. Scholtes et al[79] found that people with chronic LBP demonstrate earlier and greater lumbopelvic rotation during hip external rotation as compared to people without LBP. Several studies have found early lumbopelvic motion during external rotation of the hip[73,76] as well as movement of the lower extremity[64,74,77,78] to be associated with an increase in LBP.

Several comparative studies involving people that participate in rotational sports have helped our understanding of the effects of repetitive hip rotation and LBP. Van Dillen et al[62] assessed hip motion in 35 males and 13 females with a mean age of 26.56 ± 7.44 years who regularly participated in rotational sports with half of them assigned to the LBP group (n = 24) and half assigned to the no LBP group (n = 24). Of the people who played rotational sports, those with LBP had less overall hip rotation and greater asymmetry of rotation between sides as compared to people without LBP. The authors concluded that assessing the demands of activities that people participate in on a regular basis that affect demands placed on the hip and trunk are important to develop LBP treatment and prevention programs. In another study assessing the impact of repetitive motion of the hip required in rotational sports participation, Sadeghisan et al[53] found that people with LBP participating in rotational sports had more pelvic rotation during active hip internal rotation. This again demonstrates the effect of repetitive rotational motion at the hip and trunk and links to LBP.

Gender and Lumbopelvic Motion Associated with Hip Motion

Direction of hip rotation, early lumbopelvic motion, and LBP have gender-specific associations.[53,73,76,80] In a study of gender differences, Gombatto et al[73] compared LBP symptoms in 27 males and 19 females using three dimensional kinematic assessment of motion during hip external rotation. During the first 60% of hip external rotation, men had a greater percentage of maximum lumbopelvic rotation as compared to women ($P < .01$). Additionally, more men than women demonstrate lumbopelvic motion within the first half of available range hip external rotation.[76] More men (70.4%) as compared to women (36.8%) had pain with hip external rotation ($P = .02$). In a follow-up study Hoffman et al[80] assessed lumbopelvic motion in relation to hip internal rotation and found men to have more lumbopelvic rotation ($P < .001$) and earlier rotation onset with the initiation of hip internal rotation ($P < .001$) as compared to women. More men (60%) reported an increase in LBP with hip internal rotation as compared to women (34.5%) ($P = .05$).

Lumbopelvic Motion, Hip Motion, and Treatment

The links between hip motion and LBP are evolving beyond the association with passive range of motion restrictions and repetitive movement patterns. A body of literature focuses on the effects of controlling hip and lumbopelvic motion as a component of treating LBP.[59,81] Scholtes et al[81] found that both people with and without LBP could improve ($P < .01$ for all comparisons) the amount of hip external rotation prior to the onset of lumbopelvic rotation and reduce the lumbopelvic rotation during a single training session. They found that people without LBP were able to improve their maximal lumbopelvic motion to a greater degree ($P = .07$) between baseline assessment and one training session as compared to people with LBP. Van Dillen et al[77] found that within a session the majority of patients undergoing a set of standardized tests to control lumbopelvic motion during hip rotation had reduced the LBP symptoms during 8 of 9 tests. Hence, further study of these relationships between hip rotation and lumbopelvic motion are important to further our understanding of the cause of LBP and potential movement directed physical treatment options.

Treatment Effects Directed at Specific LBP Subgrouping

Regardless of the method used to place people with LBP into subgroups, the impact of controlling lumbopelvic motion in the context of hip rotation is gaining a greater volume of evidence. Further, systematic analysis of movement patterns in the setting of pain provoking and mitigating symptoms show similarities and difference in symmetry of hip rotation and lumbopelvic motion.[82]

People with LBP grouped via movement patterns as directed by the movement impairment system and provided specific treatment based on this grouping were compared to people with LBP receiving general strengthening and stretching.[83] Those in the LBP group with specific treatment had significantly decreased lumbopelvic rotation and greater hip rotation before the onset of lumbopelvic rotation following treatment directed at hip external and internal rotation. The nonspecific group had significantly increased lumbopelvic rotation and no change in hip rotation prior to the onset of lumbopelvic rotation. People receiving specific treatment as directed by their movement patterns had less and later onset lumbopelvic rotation with hip rotation whereas those receiving nonspecific treatment did not. Park et al[84] completed a comparative study of a 6-week specific motor control exercise program as compared to a stretching program with the aim to reduce compensatory pelvic motion during active prone knee flexion and LBP. Patients were placed into subgroups by their movement patterns and provocation and relief of their symptoms. All 36 of the participants in this study were in the specific subgroup of lumbar-rotation-extension and were randomly assigned to the stretching group versus the motor control group. A 3-D motion analysis system measured the amount of range and timing of onset of pelvic motion and knee flexion during active prone knee flexion. Muscle activity and onset time of activity of the erector spinae and hamstrings were also assessed using surface electromyography. The motor control treatment group had a significant ($P < .01$) decrease in and delay in the onset of pelvic tilt, pelvic rotation, and lumbar erector spinae activity during active prone knee flexion. Further, this group experienced less intense LBP as compare to those in the stretching treatment group ($P < .05$).

Treatment Effects and Gender

Knowing that hip rotation and lumbopelvic motion differ by gender, it is not surprising that gender should be taken into consideration to best direct specific movement interventions. Hoffman et al[85] assessed people with LBP who underwent physical therapy treatment aimed to reduce lumbopelvic motion during hip internal rotation. The authors assessed the effect of gender on the ability to reduce lumbopelvic motion during hip internal rotation. Both men and women were found to have less lumbopelvic rotation and greater hip rotation post treatment compared to baseline. Men had greater lumbopelvic rotation with less hip rotation prior to the onset of lumbopelvic rotation compared to women's pre- and posttreatment measurements. Though both genders reduced lumbopelvic motion compared to baseline, men continued to have greater and earlier lumbopelvic motion.

Conclusion

This narrative review is far from being inclusive of all literature currently available. We chose to summarize literature we have found to have direct impact on our clinical and research decisions. We suspect that in the near future, there will be additional impactful work that will need to be added to this compilation.

Differentiating the contributions of structural and movement pattern dysfunction of the lumbopelvic girdle and hips in people with LBP is an ongoing challenge for researchers and healthcare providers. Our understanding of the relationships between the spine and hip have evolved since the original publication of the syndrome due to larger clinical reports of people experiencing improvement in LBP symptoms following total hip arthroplasty for primary hip osteoarthritis or as a secondary surgical intervention following hip arthrodesis. These clinical studies fit well in the description of the hip-spine syndrome as described by Ben-Galim. Our knowledge is starting to develop outside the context of degenerative structural changes. Research has focused on hip rotation, lumbopelvic motion, their links to LBP, and the potential to develop LBP. The findings from these studies point to the importance of assessment of hip rotation and lumbopelvic motion by healthcare providers. A small but growing body of literature is beginning to emerge including clinical descriptions of patients with LBP and hip movement changes without degenerative changes of the hip but, instead, hip deformity. Further, descriptive studies of patients treated surgically and nonsurgically for hip deformity also report LBP and/or posterior pelvic pain suggesting more research is needed to understand the links between LBP and symptomatic. Future studies are needed to address treatment and prevention of related lumbopelvic pain, hip pain, and impairment.

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Disclosure

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