Chronic Sacroiliac Joint and Pelvic Girdle Pain and Dysfunction Successfully Managed with a Multimodal and Multidisciplinary Approach: A Case Series

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ABSTRACT

Background and Purpose: Sacroiliac joint (SIJ) or pelvic girdle pain (PGP) account for 20-40% of all low back pain cases in the United States. Diagnosis and management of these disorders can be challenging due to limited and conflicting evidence in the literature and the varying patient presentation. The purpose of this case series is to describe the outcome observed in 3 patients presenting with pain in the SIJ region treated with an interdisciplinary and multimodal treatment approach. **Methods:** Three patients presented with chronic PGP and dysfunction who had failed previous conservative management. Each was treated with a series of prolotherapy, joint manipulations, pelvic belting, and stabilization exercises. **Findings:** All 3 patients reported being pain-free at 6 months as well as at 24-month follow-up. **Clinical Relevance/Conclusion:** This case series demonstrates the importance of a collaborative model of care for managing persons with chronic PGP and dysfunction who have failed conservative management.

Key Words: manipulation, pelvic belting, prolotherapy, therapeutic exercise

BACKGROUND AND PURPOSE

The worldwide prevalence of persistent low back pain (LBP) ranges from 10-45%.[1-4] The prevalence of LBP within the United States is 20-30%.[5] Of those cases, 20-40% are associated with sacroiliac joint (SIJ) or pelvic girdle pain (PGP). Many factors are associated with pain and dysfunction of the SIJ and pelvic girdle (PG) including trauma, congenital hypermobility, arthritis (degenerative, systemic, infectious), pregnancy, and idiopathic causes.[6,7] Considering the high cost to society and the potential for long term disability, providing effective and efficient interventions for LBP and PGP are a common goal for clinicians.

According to the European guideline on PGP, impairments of the SIJ are not limited to intraarticular pain and often include impairments of the surrounding muscles or connective tissues, as well as, aberrant and asymmetrical movement patterns within the region of the lumbo-pelvic-hip complex.[7] These impairments have a negative impact on the PG's role in support and load transfer between the lower extremities and trunk. This variability in observed impairments increases the challenge of SIJ diagnosis and management.

According to a 2010 systematic review, clinicians are unable to reliably consider the pain referral pattern or history of specific pain provoking activities when considering a diagnostic classification.[8] Additionally, there is conflicting evidence supporting the diagnostic utility of many clinical and imaging examinations.[9-11] These combined factors make diagnosis challenging.

Management of SIJ and PG dysfunction varies and includes providing pelvic stability via a pelvic belt, manipulation, exercise, surgical fusion, intra-articular injections, acupuncture, prolotherapy, plasma rich platelet injections, neuroaugmentation, and radiofrequency ablation.[12-14] The purpose of this case series is to describe the outcome observed in 3 patients presenting with pain in the SIJ region treated with an interdisciplinary and multimodal treatment approach.

CASE DESCRIPTION

Case 1

A 43-year-old male with a chronic history of insidious right posterior pelvic pain. He was a competitive football player and wrestler in college and continued to remain active including running, cycling, and weightlifting daily. His previous treatment included chiropractic and physical therapy that emphasized spinal and pelvic manipulations as well as flexibility and stabilization exercises. He reported that the interventions were helpful but did not eliminate the need for continued care.

Case 2

A 30-year-old nulliparous female with a chronic history of right posterior pelvic pain following an injury as a college athlete participating in crew. She reported slipping in a boat and falling onto her sacrum. Her previous conservative management included physical therapy that emphasized pelvic manipulations, use of a pelvic belt, and stabilization exercises. She reported that interventions were helpful but had not allowed her to return to full activity and function without pain.

Case 3

A 32-year-old nulliparous female with a chronic history of insidious right > left posterior pelvic pain and a history of Ehlers-Danlos Syndrome (EDS). The patient's previous conservative management included pelvic manipulations, use of a pelvic belt, and stabilization exercises. She reported that the interventions were helpful but did not eliminate the need for continued care and considering her diagnosis of EDS she desired a more sustainable solution.

Examination

After obtaining consent, all patients underwent a clinical examination that included assessment of posture, a screen of the lumbar, thoracic, hip regions, repeated movements, and provocation and mobility testing of the pelvic girdle. Remarkable findings are reported in Table 1.

Clinical Impression

A combination of tests and measures were used to classify the patients with impaired joint mobility, motor function, and muscle performance of the pelvic girdle. Observation was used to assess for aberrant lumbopelvic motion patterns. The observed inability of the patient to dissociate femoral movement from lumbo-pelvic movement further supported a classification of impaired

Table 1. Remarkable Clinical Examination Findings of the Three Patients

Test and Measure	Initial Evaluation	6 months	2 years
Case 1			
Numeric Pain Rating Scale Score	4/10	0/10	0/10
Forward flexion test right	Positive	Negative	Not Tested
Seated flexion test right	Positive	Negative	Not Tested
Active straight leg raise test right	Positive	Negative	Not Tested
Sacroiliac joint distraction test	Positive for posterior pelvic pain on right	Negative	Not Tested
Sacroiliac joint compression test right	Negative	Negative	Not Tested
Sacroiliac joint thigh thrust test right	Positive	Negative	Not Tested
Lumbo-pelvic movement control screening	Inability to dissociate movement of the femur from the lumbo-pelvic girdle in multiple planes	Able to dissociate movement of the femur from the lumbo-pelvic girdle in multiple planes	Not Tested
Palpation	Pain in the region of the right posterior superior iliac spine and along the long dorsal sacroiliac ligament	Unremarkable	
Global Rating of Change Score			+7
Case 2			
Numeric Pain Rating Scale Score	4/10	0/10	0/10
Forward flexion test right	Positive	Negative	Not Tested
Seated flexion test right	Positive	Negative	Not Tested
Active straight leg raise test right	Positive	Negative	Not Tested
Sacroiliac joint distraction test	Positive posterior pelvic pain on right	Negative	Not Tested
Sacroiliac joint compression test right	Positive	Negative	Not Tested
Sacroiliac joint thigh thrust test right	Positive	Negative	Not Tested
Lumbo-pelvic movement control screening	Inability to dissociate movement of the femur from the lumbo-pelvic girdle in multiple planes	Able to dissociate movement of the femur from the lumbo-pelvic girdle in multiple planes	Not Tested
Palpation	Pain in the region of the right posterior superior iliac spine and along the long dorsal sacroiliac ligament	Unremarkable	
Global Rating of Change Score			+7
Case 3			
Numeric Pain Rating Scale Score	6/10	0/10	0/10
Forward flexion test right	Positive	Negative	Not Tested
Seated flexion test right	Positive	Negative	Not Tested
Active straight leg raise test right	Positive	Negative	Not Tested
Sacroiliac joint distraction test	Positive posterior pelvic pain bilateral	Negative	Not Tested
Sacroiliac joint compression test right	Negative	Negative	Not Tested
Sacroiliac joint thigh thrust test right	Positive	Negative	Not Tested
Lumbo-pelvic movement control screening	Inability to dissociate movement of the femur from the lumbo-pelvic girdle in multiple planes	Able to dissociate movement of the femur from the lumbo-pelvic girdle in multipl planes	Not Tested
Palpation	Pain in the region of the right > left posterior superior iliac spine and along the long dorsal sacroiliac ligament, bilaterally	Unremarkable	
Global Rating of Change Score			+6

motor function and muscle performance of the pelvic girdle. Although mobility tests of the pelvic girdle generally have poor diagnostic utility, the investigators used the standing (Sp: 87) and seated forward flexion test (Sn: 3, Sp: 90) to confirm a remarkable mobility deficit on the right side in each patient case.[18]

The distraction and thigh thrust test reproduced remarkable posterior pelvic pain on the right in all patients and bilaterally in Case 3. The distraction test has moderate specificity (Sn 60, Sp 81) and the thigh thrust test has moderate sensitivity (Sn 88, Sp 69) aiding the clinician to rule in the sacroiliac joint as the primary pain generator.[15] Finally, the active straight leg raise test was observed to be remarkable with testing on the right side in all 3 patients. The active straight leg raise (ASLR) test should be included in the clinical examination of a patient with PGP as it has moderate specificity (Sp 0.94, Sn 0.87) and aids the clinician in screening for impaired ability to stabilize the pelvic girdle.[16,17] Based on these findings (see Table 1), the 3 patients were diagnosed with sacroiliac joint dysfunction and pelvic ring instability.

Intervention

Each patient was treated by the primary author using a right sacroiliac joint nutation manipulation (Figure 1), muscle energy technique for pubic symphysis (Figure 2), and application of a pelvic ring belt positioned below the level of the anterior superior iliac spine. A nutation manipulation was based on the remarkable observed forward flexion test on the right, which also correlated with the patient's primary symptomatic side. Upon reassessment within 2 weeks, it was noted that the patients were unable to maintain a normal pelvic alignment when retesting with the forward flexion test. Since each patient did not have success with their prior conservative management, it was suggested that the patients consider prolotherapy to assist with the goal of pelvic girdle stabilization.

Prolotherapy is an injection-using a sclerosing agent at the ligament-bone interface to induce an inflammatory response and the deposition of collagen fibers in weak connective tissue. Our injection mixture contains 10 mL of Dextrose 50% (D50), 5 mL of 0.5% bupivacaine, and 5 mL of 1% lidocaine. The final concentration of dextrose is 25%. Secondary to the ring-like nature of the pelvis the target is the bilateral sacroiliac joints for extra-articular injection along both sides of the joint with 5 mL of the aforementioned mixture (Figure 3A). The iliolumbar ligament at the distal end of the transverse process of L5 bilaterally was targeted with 2.5 mL of the injection mixture (Figure 3B). Finally, the pubic symphysis was injected with 2 mL of the D50 mixture (Figure 3C). These injections were performed by the physician under fluoroscopic guidance, the injectate is delivered via a 25-gauge, 3.5" spinal needle following skin preparation with chlorhexidine and skin anesthesia with 1% lidocaine. The injections are performed 3 times, with 2 weeks between each set of injections. The physical therapist meets the patient at each visit and alignment of the pelvic girdle is assessed. If needed, a pelvic manipulation is performed to promote proper alignment prior and post each set of injections.

Physical therapy focused on progression of a home based lumbo-pelvic stabilization program that first addressed activation of the core including the transverse abdominus, multifidus, and pelvic floor muscles. Once the patient was able to perform and hold a coactivation of these muscles he or she worked on the ability to dissociate femoral movements from lumbo-pelvic movements in multiple planes and at varying speeds.

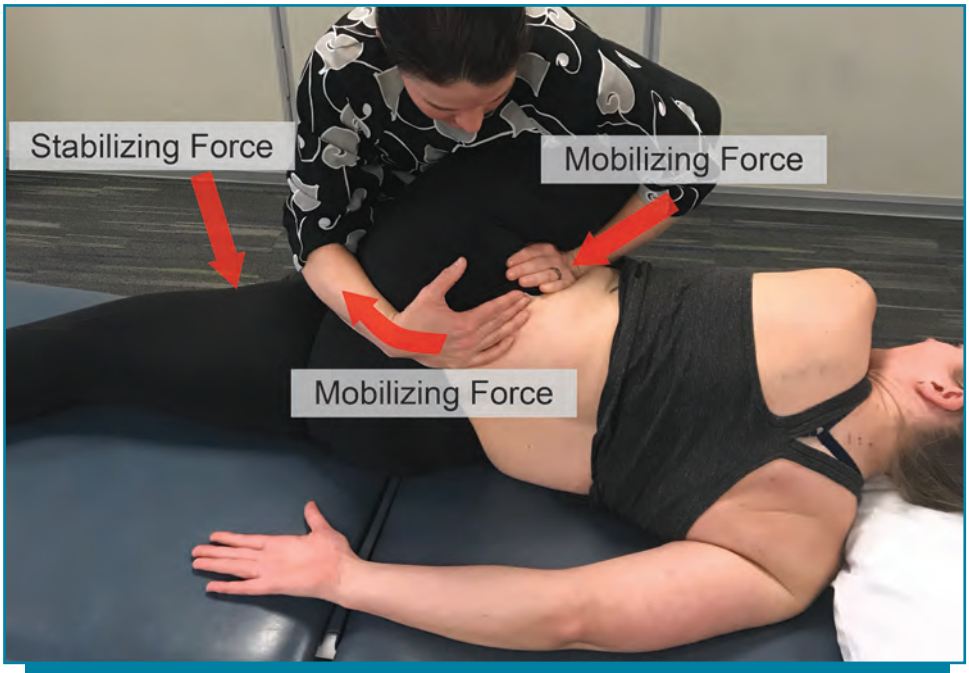

Figure 1. Sacroiliac joint nutation manipulation positioning for the left sacroiliac joint.

Figure 2. Muscle energy technique for pubic symphysis. A, Resisted hip abduction isometric. B, Resisted hip adduction isometric.

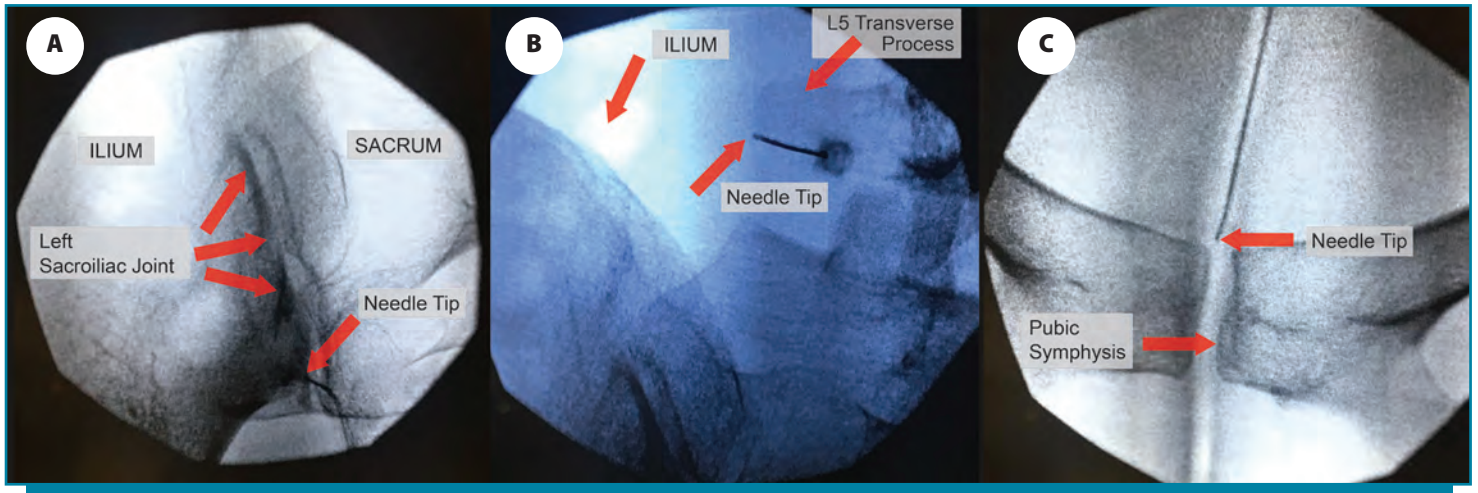

Figure 3. Fluoroscopic images of prolotherapy injection. A, Left sacroiliac joint. B, L5 transverse process. C, Pubic symphysis.

The program was then progressed to include a combination of static and dynamic movement progressions. The specific exercises were adapted based on the individual needs of each patient. A sample of various stabilization exercises are listed in Table 2. Each patient was seen at the initial phase of the exercise progressions and then two weeks later to review or modify their program; the stabilization program lasted 6 months. The use of a pelvic belt was continued up to 3 months followed by wear only at night for an additional month.

OUTCOMES

All 3 patients reported being pain-free at 6 months and all examination findings were observed as unremarkable. At 2-year follow-up, all patients reported a remarkable response to the intervention as recorded on the Global Rating of Change scale (GRoC).[19] See Table 1 for results.

DISCUSSION

This case series describes the successful management of persistent posterior pelvic girdle pain using a collaborative model. A combination of prolotherapy, pelvic girdle manipulation, use of a pelvic belt, and lumbo-pelvic stabilization exercises allowed all 3 patients to report their symptoms as "a great deal" to "very great deal better" at 24 months follow-up. Additionally, it is well known that SIJ and PGP is more prevalent in women and more specifically in pregnant and postpartum women.[7] This case series included the successful management of one male and two nulliparous females. On another note it is also well known that persons with EDS have persistent issues associated with joint hypermobility.[20] In this case series, the authors were able to report the successful management of a young woman with persistent PGP who also had EDS.

The pelvic girdle is able to resist shear forces across the pelvis using a combination of both form and force closure; however, an imbalance can result in pain and dysfunction. The treatment protocol for these 3 patients was designed to improve pelvic girdle stability by promoting force closure to treat persistent pelvic girdle dysfunction. Use of a sacroiliac compression belt is a common intervention in the conservative management of SIJ dysfunction. In a hypermobile SIJ, the body's anatomical form and force closure mechanisms can be impaired, resulting in lumbo-pelvic pain and instability. In patients with increased SIJ laxity, compression belts are intended to provide an external stabilizing force similar to the internal support normally provided by the transverse abdominis, multifidus, internal oblique, and pelvic floor muscles.[21,22] The use of a compression belt around the pelvis may help "improve proprioception and balance and to increase force closure in the sacroiliac joint", particularly in peripartum females.[21] An author recommends the belt be worn just inferior to the anterior superior iliac spines, rather than around the pubic symphysis, for maximum stability.[21] Often, a sacroiliac belt is used in combination with other interventions such as stabilization exercises, rather than a standalone modality. Our group used belts to assist with stabilization of the pelvis throughout the prolotherapy injection period and up to 16 weeks post prolotherapy. This timeframe respects purported tissue healing time lines and scar tissue maturation.[23]

Multiple researchers have reported that joint manipulation produces significant positive outcomes in persons suffering from SIJ dysfunction;[24,25] however, few provide reasoning for the specific manipulation selected.[26-29] Contrary to past research, the authors used the clinical examination to dictate the selected technique. Additionally, therapeutic stabilization exercises have been found to be efficacious for persons with LBP as well as PGP.[24,25] It is suggested that muscles need at least 6 weeks to exhibit neuromuscular adaptation;[30] therefore, it was the goal of the authors to provide an exercise progression respecting this timeline for each phase of rehabilitation.

There have been conflicting results when comparing exercise alone with exercise and joint manipulation combined.[25] However, Nejati et al[24] performed a randomized controlled trial examining the difference between joint manipulation, joint manipulation with stabilization exercises, and stabilization exercises alone. A single session of joint manipulation was found to improve reported function and pain at 6 weeks as compared to daily stabilization exercises and daily stabilization exercises combined with a single session joint manipulation. However, exercise and exercise with manipulation were superior to manipulation alone at 12 weeks. All groups exhibited statistically significant changes in pain and reported function at 12 weeks follow-up, with no treatment superior to the other. Despite reported positive outcomes, on average, interventions did not result in resolution of pain or reported dysfunction. Additionally, the reported outcomes were observed to trend back toward base-line measures at 12-week follow-up, which may suggest the need for additional interventions and/or self-care strategies to maintain the positive outcomes. The authors have observed simi-

Table 2. Sample Stabilization Exercise Protocol

Exercise Intervention	Parameters
Phase I: Protective phase 1-2 months	**Phase I: Protective phase 1-2 months**
1. Transverse abdominus, levator ani, and multifidus	6–60 second hold 10 repetitions, daily
1a. Prone hip Active ROM IR/ER with knee bent to 90° (progression)	30-60 repetitions, daily
1a. Supine hip Active ROM IR/ER in hooklying (progression)	30-60 repetitions, daily
2. Isometric: Hip abduction, belt around knees	6–60 second hold, 5–10 repetitions, 3 times per week
2a. Isometric: Bridge, hip abduction belt around knees, and latissimus dorsi (progression)	6–60 second hold, 5–10 repetitions, 3 times per week
3. Isometric: Hip adduction	6–60 second hold, 5–10 repetitions, 3 times per week
3a. Isometric: Bridge, hip adduction with yoga block, and latissimus dorsi (progression)	6–60 second hold, 5–10 repetitions, 3 times per week
Phase II: Controlled motion phase 3-4 months	**Phase II: Controlled motion phase 3-4 months**
4. Isometric: Wall bridge, hip abduction, and latissimus dorsi	6–60 second hold, 5–10 repetitions, 3 times per week
4a. Isometric: Single leg wall bridge, hip abduction, and latissimus dorsi (progression)	6–60 second hold, 5 repetitions each side, 3 times per week
5. Isometric: Wall bridge, hip adduction, and latissimus dorsi	6–60 second hold, 5–10 repetitions, 3 times per week
5a. Isometric: Single leg wall bridge, hip adduction, and latissimus dorsi (progression)	6–60 second hold, 5 repetitions each side, 3 times per week
6. Quadruped fire hydrant	6–60 second hold, 5 repetitions each side, 3 times per week
6a. Alternating arm-leg raise (progression)	6–60 second hold, 5 repetitions each side, 3 times per week (no > 2.5 minutes each leg)
7. Front plank on knees and elbows	6–60 second hold, 5–10 repetitions, daily
7a. Front plank on toes and elbows (progression)	6–60 second hold, 5–10 repetitions, daily
8. Side plank on knees and elbow	6–60 second hold, 5–10 repetitions each side, 3 times per week (no > 2.5 minutes each side)
9. Isometric: Wall sit, hip abduction with belt, and latissimus dorsi	6–60 second hold, 5–10 repetitions, 3 times per week
9a. Isometric: Wall sit, hip abduction with belt, and latissimus pull downs with TheraBand (progression)	20 pull downs, 5 repetitions, 3 times per week
10. Isometric: Wall sit, hip adduction with yoga block, and latissimus dorsi	6–60 second hold, 5–10 repetitions, 3 times per week
10a. Isometric: Wall sit, hip adduction with yoga block, and latissimus dorsi pull downs with TheraBand (progression)	20 pull downs, 5 repetitions, 3 times per week
11. Isometric: Standing hip abduction	6–60 second hold, 5–10 repetitions each side, 3 times per week (no > 2.5 minutes each side)
Phase III: Return to function phase 5-6 months	**Phase III: Return to function phase 5-6 months**
12. Heel strike to foot flat with latissimus dorsi activation with TheraBand resistance	5x20 repetitions, each side, performed 3 times per week
12a. Heel strike hop with latissimus dorsi activation with TheraBand resistance (progression)	3x20 repetitions, each side, performed 3 times per week
13. Front plank on toes alternating leg lifts add ankle weights as tolerated	6–60 second hold, 5–10 repetitions each side, daily (no > 2.5 minutes per leg); add ankle weight as tolerated
14. Side plank on ankles with hip abduction leg lift	6–60 second hold, 5–10 repetitions each side, daily (no > 2.5 minutes each side); add ankle weight as tolerated
Abbreviations: ROM, range of motion; IR, internal rotation; ER, external rotation	

lar findings and have adopted a multi-modal approach including prolotherapy when conservative management of exercise and manipulation do not resolve impaired joint mobility, motor function, and muscle performance of the pelvic girdle.

When conservative management is not successful, surgical intervention may be warranted. Fusion stabilization procedures may be performed unilaterally or bilaterally, depending on patient presentation, with the intent to reduce range of motion in the SIJ in order to improve overall pelvic stability.[31] However, current evidence is limited regarding the efficacy of surgical fusion for the management of SIJ syndrome. Authors suggest that "results are variable, with good to poor outcomes reported."[32] One recent

randomized controlled trial by Dengler et al[33] reported that patients who underwent SIJ arthrodesis demonstrated significant improvements of 50% reduction in LBP and dysfunction compared to those who received conservative treatment.[13,34] According to a collaborative model of PGP representing the collective views of a group of experts, "SIJ surgery" was suggested as the third most effective intervention to impact a patient's quality of life and pain; however it was considered less effective in improving a patient's level of disability.[32] Despite these results, it should be noted most available literature reports on small sample sizes and patients with multi-year persistent SIJ pain, thus limiting the generalization of results.

The authors of the current case report recommend the use of prolotherapy as a less invasive means to improve pelvic girdle stability without the increased risks associated with surgery. Prolotherapy has the potential to preserve pelvic ring function in women of child bearing years. Prolotherapy is not currently recommended as an intervention by the European Guideline on PGP secondary to the limited supportive research. Yelland et al[35] failed to show a significant difference between groups treated with either a series of 6 prolotherapy injections and exercise or normal activity or a control injection of lidocaine and exercise or normal activity. However, the exercises Yelland et al[35] suggested were not specific to muscle groups purported to support force closure and were not progressive to challenge return to function demands. Additionally, the protocol used for the 3 patients in this case series not only used a series of 3 injections every 2 weeks but also included manipulation of the pelvic girdle, as needed, prior to the procedure and application of pelvic girdle compression belt to assist with immobilization during collagen maturation.

This is a retrospective, single-center, single-physical therapist, and single-physician case series. Secondary to the limited number of cases the ability to generalize these findings to persons with PGP are limited. Therefore, it would be beneficial to further explore these issues using more robust approaches such as within a randomized controlled approach. Although the passage of time could account for the observed success and high patient satisfaction rating, this is probably unlikely considering the persistent nature of symptoms and previous management in these patients without resolution prior to being treated by the authors of this case series. This case series highlights the importance of a collaborative model of care for managing persons with persistent PGP and dysfunction who have failed conservative management.

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