TREATING GROIN AND HIP FLEXOR PAIN USING PRIMAL REFLEX RELEASE TECHNIQUE™: A CASE SERIES

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ABSTRACT

Background and Purpose: The nervous system plays a significant role in groin/hip flexor pain which is a common complaint in the active population. Patient examinations that lack consideration of the nervous system's involvement may result in chronic pain and dysfunctional breathing patterns due to continuously excited (also known as "up-related") primal reflexes. Primal Reflex Release Technique™ (PRRT™) is a novel treatment paradigm that was designed to calm primal reflexes from their excitatory state. The purpose of this case series was to describe the effects of down-regulating primal reflexes using PRRT™ on pain, function, and breathing pattern dysfunction in subjects who presented with groin and hip flexor pain and exhibited hyperesthesia to TriggerRegions™ in areas of respiration.

Case Descriptions: Six subjects with acute groin and/or hip flexor pain were examined using a battery of tests including muscle integrity strength and range-of-motion (ROM) measurements, special orthopedic tests, breathing functionality and PRRT™ rib palpation assessments. If subjects were determined to be potential PRRT™ responders through PRRT™ rib palpation assessments, the technique was performed according to PRRT™ guidelines. Outcome measures including the Numeric Pain Rating Scale (NPRS), Patient Specific Functional Scale (PSFS), the Global Rating of Change (GRoC) Scale, and the Disability in the Physically Active (DPA) Scale were collected to determine the effects of the treatment.

Outcomes: All subjects demonstrated full resolution of pain as reported on the Numeric Pain Rating Scale, and the change was statistically ($p = 0.001$) and clinically significant. All subjects returned to optimal function as reported on the Patient Specific Functional Scale, and the change was both clinically (minimal detectable change) and statistically significant ($p = 0.001$). All subjects returned to normal breathing function as observed through the seated assessment of lateral expansion test. The number of treatments (mean = 1.83 ± 1.16) and time to the resolution of symptoms was minimal (mean = 2.833 ± 2.56 days).

Discussion: By assessing and treating abnormal breathing patterns, postulated to be a result of a sustained excitatory nervous system, subjects returned to full activity, without pain, in less than three days. After a two-week follow-up, subjects remained functionally pain free. Considering the state of the nervous system in the presentation of musculoskeletal pain and not focusing all treatment on local muscle structures may be beneficial. A multifaceted assessment approach is needed to determine other pain factors.

Level of Evidence: Level 4

Key Words: Adductor pain, Breathing Assessment, Primal Reflexes

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INTRODUCTION/BACKGROUND

Groin and hip flexor injuries often result in significant time lost from athletic activity,¹ which is likely partially due to the difficult differential diagnostic procedure associated with this presentation.² Diagnostic difficulty arises due to patients complaining of general groin pain who may have experienced a variety of mechanisms of injury and presentations including direct musculoskeletal pain and dysfunction or indirect referred pain pathologies, such as gynecological dysfunction, appendicitis, or sports hernia.^{3,4} Referred pain to the groin area most likely is due to anatomical course of the genitofemoral nerve through the psoas major, a strong hip flexor.⁵ Common mechanisms of injury include resisted hip flexion or passive hip hyperextension, usually caused by running, sprinting, or participating in change-of-direction activities.^{6,7}

Sprinting during athletic activities is demanding on both the musculoskeletal and respiratory systems.⁸ Rapid movement of the diaphragm during inhalation and exhalation results in an excess of carbon dioxide (CO₂) and creates an acidic environment within the muscle tissue.⁸ The body may then respond by interpreting this reaction as respiratory distress, which may trigger dysfunctional diaphragmatic movement. Normal breathing patterns require input from the sympathetic nervous system;⁹ however, if the body anticipates a threat to normal breathing rhythm, it will activate the brain's defense reflex system and signal the primal startle response to initiate an increase in sympathetic nervous system involvement.¹⁰ Receiving constant signals from the sympathetic nervous system could impact resolution of symptoms after injury or overuse, because the patient remains in a heightened state of neurological stress.^{11,12} Patients with dysfunctional diaphragmatic movement may also report pain in the hip girdle structures in because the psoas major (a primary hip flexor) and quadratus lumborum both run superiorly into the region of the diaphragm via fascial, musculotendinous and ligamentous connections.¹³

Determining the correct diagnosis of the primary structures involved in groin and hip flexor pain is critical to the selection of the most appropriate intervention and to the reduction of time lost to injury.^{1,14} Because of the possibility of multifaceted origins

of groin and hip flexor pain, a multidisciplinary approach to treatment is needed if effective and positive outcomes are to be achieved. Such an approach involves musculoskeletal, neurological, and diaphragm dysfunction assessments. If the state of the nervous system is not assessed and treated (perhaps through calming excited reflexes), local interventions and rehabilitation directed at the hip region can be extensive in nature and, ultimately, ineffective.

Traditionally, treatment of a suspected muscle injury would include rest, ice, compression, and elevation (RICE) for the first 24 to 72 hours.^{1,2,7,13} As pain decreases and rehabilitation begins, additional methods are used to return the patient to activity. Some treatment protocols, involving both passive movement and active strengthening components, are more effective than others, and many require a significant amount of time and commitment to physical therapy.¹³ Passive interventions for groin and hip flexor pain consisting of manual massage, stretching, and modalities have been shown to not be as effective as an active strengthening program; however strengthening programs could take between 8 to 12 weeks to produce effective results.¹³ Due to the extensive amount of time needed for an active strengthening program to produce positive results, an investigation into an expedited effective treatment technique for treating groin and hip flexor pain is needed. One novel treatment paradigm that has the potential to treat groin and hip flexor pain is Primal Reflex Release Technique™ (PRRT™).

Primal Reflex Release Technique™ is designed to treat primal reflexes that have been elicited during the startle or withdrawal (nociceptive) response to injury. The paradigm includes a one-minute nociceptive exam that evaluates TriggerRegions™, which are areas of hyperesthesia that are sensitive to the smallest amount of pressure. The clinician bilaterally palpates given areas and determines if the patient responds to touch in any of three ways: a gasp, a groan, or a grimace. Areas that elicit those responses are treated with PRRT™ and are then reassessed for changes in tightness or tenderness, or for thickened appearance. Individual areas are also assessed independently of the 1-minute nociceptive exam and are treated using specialized PRRT™ intervention techniques.^{15,16}

The treatment technique involves reflexively and reciprocally inhibiting the aforementioned reflexes that are in a constant state up regulation and due to injury. The treatment is performed by lightly tapping the facilitated areas' deep tendon reflexes (DTR) for approximately 12 seconds. Tapping these areas stimulates the reflexive properties within the muscle without causing increased pain.^{15,16}

The following case series was based on the premise that primal reflexes elicit protective neuromuscular mechanisms after injury and that dysfunctional breathing patterns can result from reflexive muscle splinting of the muscles of respiration, in turn causing nervous system dysfunction. The purpose of this case series was to describe the effects of down-regulating primal reflexes using PRRT™ on pain, function, and breathing pattern dysfunction in subjects who presented with groin and hip flexor pain and exhibited hyperesthesia to TriggerRegions™ in areas of respiration.

CASE DESCRIPTION

The subjects (n = 6) in this case series were all females whose primary complaint was hip flexor and/or general groin area tightness and pain. The subjects were all otherwise healthy and were physically active in either collegiate or recreational sports at the time of injury. Their ages ranged from 18 to 26 years (mean = 21.33 ± 2.94; Table 1).

CLINICAL IMPRESSION #1

The subjects reported various mechanisms of injury during athletic activity; however, all subjects described a history of pain in her hip/groin area after explosive

athletic movements, such as sprinting, jumping, stopping, or changing direction. All injuries were acute in nature and occurred within three days of their initial examination. All subjects were evaluated using an extensive injury history and standard orthopedic examination of the hip (e.g., range of motion (ROM) measurements, strength assessments, special tests for region specific hip musculature involvement); which included Ely's test and Thomas test for muscle length and restriction (Table 1). Subjects were to be excluded from this case series if any of the following was suspected during the initial examination: fractures, hip pointers, acetabulofemoral joint pathology (e.g., labral tear), or complete muscle rupture. Institutional review board (IRB) approval at Texas Woman's University was given prior to the collection of all patient outcomes, and all subjects gave informed, written consent for sharing the outcomes of their treatments.

EXAMINATION

Initial orthopedic testing resulting in a positive response to either Ely's test or Thomas test indicated subjects could receive local muscular treatments for rectus femoris spasticity or anterior/lateral capsular restrictions; although no local muscular or capsular manual therapy treatments were performed on any of the subjects. Furthering testing also included diaphragm and breathing assessments to determine if nervous system dysfunction or involvement could be the basis of the resulting hip pain.

DIAPHRAGM/BREATHING ASSESSMENTS

Subjects were classified as PRRT™ responders based on rib palpation findings acquired during each

Table 1. Intake Outcome Scores/Special Tests.											
Patient	Age	Sport	DPA	NRS	PSFS	GRC*	Ely's Test	Thomas Test	Tenderness/Restriction	SALE	Intervention
1	20	Soccer	31	7	6	5	-	+	1 st rib (**same side)	Vertical	1
2	19	Gymnast	22	2.6	7	6	-	+	6 th and 7 th ribs (**same side)	Vertical	3
3	23	Rec SB	35	6	6	7	-	+	1 st rib (**opposite)	Vertical	1
4	18	Softball	28	2.6	4	3	+	+	1 st rib (**opposite)	Lateral	1
5	26	Coach	21	4	7	7	+	+	11 th and 12 th (bilateral)	Balanced	2
6	22	Soccer	25	7	7	2	-	+	1 st rib (**same side)	Lateral	1
*After first treatment, ** side as hip complaint Intervention: 1 – Cough to same side as rib tenderness; 2 – Cough to opposite side of rib tenderness; 3 – Horizontal arm-pull DPA: Disability in the Physically Active scale, NRS: Numeric Pain Rating Scale, PSFS: Patient Specific Functional Scale, GRC: Global Rating of Change scale, SALE: Seated Assessment of Lateral Expansion											

Table 2. Total number of 3 sets of 3 repetitions performed during first through fourth treatments.

Patient	1 st treatment	2 nd treatment	3 rd treatment	4 th treatment
1	3	2	n/a	n/a
2	3	n/a	n/a	n/a
3	2	n/a	n/a	n/a
4	4	2	n/a	n/a
5	2	n/a	n/a	n/a
6	4	3	3	1

Figure 1. Finger placement for 1st and 2st rib palpation.

Figure 2. Finger placement for 6th and 7th rib palpation.

patient's initial evaluation (Table 2). Rib palpations were performed at intake, each subject's visit, discharge, and at the two-week follow-up. Rib palpations were performed to assess for rib tenderness and movement restriction in three different areas and to determine the appropriate PRRT™ treatment to utilize. The three assessed areas included the first and second ribs (Figure 1), the sixth and seventh ribs (Figure 2), and the eleventh and twelfth ribs (Figure 3). All areas were assessed bilaterally. All six subjects were classified as potential PRRT™ responders because they exhibited rib tenderness involving at least one of the rib palpation locations. Specific palpation locations and directions were determined as instructed in the PRRT™ paradigm.^{15,16}

Rib and abdominal movement during breathing were assessed using the Seated Assessment of Lateral Expansion (SALE), which is similar to the modified Manual Assessment of Respiratory Motion (MARM) test.¹⁷ The SALE was performed at intake, each subject's visit, discharge, and the two-week follow-up. The SALE was performed with the patient seated comfortably on a plinth, with knees in flexion and hanging from the plinth (Figure 4). The clinician sat behind the patient and placed her hands on the lower lateral rib cage, bilaterally (Figure 5). The patient was instructed to breathe normally, and an assessment of the overall vertical motion relative to the overall lateral motion was recorded as "lateral motion," "vertical motion," or "balanced motion."¹⁸

Figure 3. *Finger placement for 11th and 12th rib palpation.*

Figure 5. *SALE: Clinician hand placement.*

Figure 4. *SALE: Patient position.*

OUTCOMES SCALES

To assess the effect of the treatment, the following patient outcome scales were collected: The valid¹⁹ and reliable²⁰ cumulative verbal Numeric Pain Rating

Scale (NPRS) was used to assess for the pain level at the current time, the best pain level in the past 24 hours, and the worst pain level in the past 24 hours. The NPRS is an 11-point scale (0-10), where 0 equaled “no pain” and 10 equaled “extreme pain.”²¹ Current NPRS and the Global Rating of Change (GROC) Scale scores were taken at the end of each treatment session. The GROC scale that was used in this case was a 15-point patient-reported perception scale that quantified the extent of improvement or regression experienced by the patient as a result of treatment.²² The scale begins with -7 (“a very great deal worse”) and ends with 7 (“a very great deal better”).²³

The valid and reliable²⁴ Patient Specific Functional Scale (PSFS) was taken to assess the subjects’ level of functional activity. Using an 11-point scale (0-10), each patient rated one formerly-functional activity that had become dysfunctional due to injury. A score of 0 represented the patient’s inability to perform the activity; a score of 10 represented a full return to functional activity.²⁴ The NPRS, PSFS, and GROC were collected at intake, daily, and at discharge; the GROC collected at intake was collected immediately after the first treatment intervention.

The valid and reliable²⁵ Disability in the Physically Active (DPA) scale was taken to assess patient

Table 3. Discharge Outcomes Scores/Special Tests.										
Patient	DPA	NRS	PSFS	GRC*	Ely's Test	Thomas Test	Tenderness	SALE	Total # of days from intake to discharge	#Treatments
1	19	1	9	6	-	-	None	Balanced	5	2
2	16	0	10	7	-	-	None	Balanced	1	1
3	25	0	9	7	-	-	None	Balanced	1	1
4	24	0	9	6	-	-	None	Balanced	2	2
5	18	0	9	7	-	-	None	Balanced	1	1
6	20	1	10	7	-	-	None	Balanced	7	4

*Overall from intake to discharge
DPA: Disability in the Physically Active scale, NRS: Numeric Pain Rating Scale, PSFS: Patient Specific Functional Scale, GRC: Global Rating of Change Scale
SALE: Seated Assessment of Lateral Expansion.

impairment, functional limitation, disability, and health-related quality of life.²⁵ The DPA Scale is a questionnaire in which responses are based on a scale ranging from 1 (no problem) to 5 (severe problem) across 16 items; 16 points are subtracted from the total to create a total possible score range from 0 to 64 points.²⁵ A normal, healthy range has been observed to be a score of less than 35.²⁵ The DPA scale was collected at intake and discharge, only. All outcome measures were repeated at a two-week follow-up, although only four of the six subjects were able to follow up at two weeks post discharge.

CLINICAL IMPRESSION #2

After assessing for dysfunctional breathing patterns and hyper-sensitivity of rib palpations, subjects were classified as possible PRRT™ responders and treated using the indicated methods of the technique. Initial improvements in patient outcome measures taken both pre- and post-treatment determined that the intervention was indicated for all the subjects' primary complaint, thus the intervention was used until the subject was successfully discharged (Table 1 and Table 3).

INTERVENTION

All subjects were treated individually in a single clinician's athletic training clinic. All rib palpations and treatment sessions were performed with the patient in a supine position. If the patient exhibited first and second rib tenderness, or if the clinician felt any resistance to palpation within the rib space, the patient was instructed to laterally rotate the

head to the involved tender side as far as was comfortable and extend the arms straight, so the fingers pointed toward the toes (Figure 6). Next, the patient performed an active side-bend to the side where the tenderness was noted (e.g., right side tender: turn head to the right and side bend to the right), reached down as far as was possible toward the knee while forcefully coughing with each side bend (Figure 7). Each patient performed three sets of three side-bend/cough repetitions before being reassessed for first and second rib tenderness. If tenderness was

Figure 6. PRRT intervention: Patient position head turn to the same side.

Figure 7. PRRT intervention: Patient side bend with cough.

Figure 9. PRRT intervention: Completion of arm drop.

Figure 8. PRRT intervention: Patient horizontal arm raise with clinician hand placement.

reported or resistance was observed, the patient performed three additional sets of three side-bend/cough repetitions and was then reassessed.

If the patient exhibited sixth and seventh rib palpation tenderness on either the right or left side associated with the costo-sternal region, she was instructed to lie in a supine position and flex the arm on the involved side to approximately 100°. The patient was then told to abduct approximately 10° from that position (Figure 8). The clinician stood at the involved side and placed a hand on the

wrist of the flexed and abducted arm. The clinician then instructed the patient to pull toward the opposite hip in a diagonal fashion (e.g., across the chest) while the clinician resisted the motion (Figure 8). The clinician's isometric resistance was provided for five seconds and was then released. The resistance was strong enough that when it was released, the patient was not able to control or stop the horizontal movement to the opposite hip (Figure 9). The horizontal arm pull was performed for three sets of three repetitions, and then the sixth and seventh ribs were reassessed for tenderness and movement restriction. If tenderness was reported or movement restriction of the ribs was present, three additional sets of three pulls were performed, and the patient was reassessed again.

If the patient exhibited eleventh and twelfth rib tenderness associated with the PRRT™ diaphragm-specific reflex release assessment, she was then instructed to turn her head to the uninvolved side and then side bend to the involved side while coughing (e.g., right side tender: turn head to the left and side bend to the right) (Figure 10). The patient was asked to perform three sets of three repetitions, after which the eleventh and twelfth ribs were reassessed for tenderness and movement restriction. If tenderness was noted, three additional sets of three repetitions were performed.

All treatment interventions were applied in groups of three sets of three repetitions until rib tenderness and/or movement restriction was resolved, at which point the current NPRS for groin and hip flexor pain

Figure 10. PRRT intervention: Patient position head turn to the opposite side, side bending and cough.

and the PSFS were taken. The number of sets performed by each patient varied during each treatment session: The first session required the most sets ($3 \pm .894$), with Subject 6 requiring the maximum number of four sets, and Subject 3 needing the minimum number of two sets. If a subject needed additional treatment sessions, $2.33 \pm .577$ sets were needed for the second treatment session, while the third and fourth treatment session required three and one set, respectively (Table 2).

DATA ANALYSIS

To evaluate a change in pain and functional scores over time, a one-way repeated measures analysis of variance (ANOVA) was performed using SPSS (SPSS version 23.0; SPSS Inc., Chicago, IL, USA). No significant difference ($F_{2,2} = 13.796$, Wilk's $\lambda = .068$, $p = .068$, partial $\eta^2 = .932$, power = .523) in pain was reported over time from intake (mean = 5.65 ± 1.044) to discharge (mean = $.500 \pm .289$) to the

two-week follow-up (mean = 0). However, the large effect size²⁶ implied by partial η^2 indicates that over 90% of the positive variability, or improvement in pain, may be attributed to the PRRT™ treatment intervention. Further, Cohen's d effect size calculations ($d = 6.723$) indicated a large magnitude of effect of PRRT™ on pain, with less than 20% of the follow-up scores coinciding with pain scores taken at intake. Although a statistically significant difference was not found in the initial ANOVA, post hoc comparisons were conducted because of the exploratory nature of this study and the risk of a Type II error due to the observed low power (.523); thus, further statistical comparisons were needed to assess any other potential differences across time. Pairwise comparisons revealed a significant difference (mean difference = $5.15 \pm .850$, $p = .027$, 95% CI: 1.022, 9.278) between intake and discharge scores, as well as a significant difference between intake and the two-week follow-up (mean difference = 5.65 ± 1.044 , $p = .037$, 95% CI: .581, 10.719), scores. Moreover, the mean differences between intake and discharge and intake and the two-week follow-up both exceeded the NPRS minimal clinically significant difference (MCID), and were, therefore, clinically significant.²¹ No difference was noted from discharge to follow-up (mean difference = $.500 \pm .289$, $p = .545$, 95% CI: -.902, 1.902), which indicates that subjects remained within the same level of pain that they achieved at discharge and did not have a return in symptoms.

A one-way repeated analysis of variance (ANOVA) was conducted to determine a change in functional scores over time. For the PSFS, a significant difference ($F_{1,3} = 121.000$, Wilk's $\lambda = .024$, $p = .002$, partial $\eta^2 = .976$, power = 1) was reported over time

Table 4. Two-week Follow-up Outcome Scores/Special Tests.

Patient	DPA	NRS	PSFS	GRC*	Ely's Test	Thomas Test	Tenderness/Restriction during rib palpations	SALE
1	21	0	9	7	-	-	None	Vertical
2	18	0	10	7	-	-	None	Balanced
3	26	0	9	7	-	-	None	Balanced
6	19	0	10	7	-	-	None	Lateral

*Overall from intake to 2-week follow up
DPA: Disability in the Physically Active scale, NRS: Numeric Pain Rating Scale, PSFS: Patient Specific Functional Scale, GRC: Global Rating of Change scale, SALE: Seated Assessment of Lateral Expansion

from intake (mean = $6.500 \pm .577$) to discharge (mean = $9.500 \pm .577$) to the two-week follow-up (mean = $9.250 \pm .500$). Mean differences in scores between intake and discharge and between intake and follow-up exceeded the MDC²⁴ for the PSFS, which added clinical meaning to the statistical differences observed in outcomes scores.

A repeated measures ANOVA was also performed to assess for differences in scores measuring patient impairment, functional limitation, disability, and health-related quality of life as indicated by the DPA Scale. No significant difference ($F_{2,2} = 9.332$, Wilk's $\lambda = .097$, $p = .097$, partial $\eta^2 = .903$, power = .404) was found for subjects' DPA Scale scores. Post hoc comparisons were conducted and pairwise comparisons revealed significant differences between intake and discharge scores (mean difference = 8.250 ± 1.652 , $p = .046$, 95% CI: .227, 16.273) and between intake scores and follow-up scores (mean difference = 7.250 ± 1.377 , $p = .040$, 95% CI: .563, 13.937). No difference (mean difference = $-1.000 \pm .707$, $p = .757$, 95% CI: -4.434, 2.434) was observed between discharge scores and follow-up scores. Additionally, all subjects were discharged within the normal, healthy ranges of a score that is less than 23 for the DPA scale.²⁵

The patient-reported perception of the extent of improvement after PRRT™ treatment, which was measured by the GROC, also suggests effective treatment as mean scores after the first treatment application (5.00 ± 2.097) to discharge ($6.66 \pm .516$) to the two-week follow-up ($7 \pm .000$) increased. After the first treatment application, most GROC scores (67%) were reported as “quite a bit better”, which is equal to +5 on the scale, or higher. Additionally, at the two-week follow-up, all of the subjects reported a GROC score (+7) coinciding with “a very great deal better”, which suggest the subjects perceived a large level of improvement over the course of treatment.

DISCUSSION

In this case series, the positive patient outcomes from using PRRT™ may have occurred because the treatment is aimed at treating nervous system dysfunction.^{15, 16} The reported ineffective and extensive treatments of groin and hip flexor injuries^{14, 27} could be the result of failure to reset (or down-regulate)

reflexes that remain in a constant state of excitement (or up-regulation) after injury. Not assessing and addressing nervous system involvement could lead to chronic groin and hip flexor pain, and, due to movement compensations developed because of pain, may place the patient at risk for further injury to the hip girdle musculature. In chronic groin pain cases, symptoms are often complex and uncharacteristically more varied than that of other muscle injuries in other parts of the body.²⁸ After sustaining injury to the groin area, patients have reported areas of pain migrating, over time, to the medial thigh and rectus abdominis.²⁸ Pain signals referred to those areas could be the result of an active nociceptive reflex contributing to central sensitization, and not necessarily the result of soft tissue damage.

An increased response to various stimuli, such as mechanical pressure, chemical substances, light, sound, cold, heat, and electricity, are all outcomes of the processes involved in central sensitization;²⁹ thus, patients' sensitivity to rib palpation during the PRRT™ evaluation could indicate a presence of an over-reactive central nervous system. In addition, assessment of breathing function could also offer insight into the cause of referred groin and hip flexor pain, because sympathetic nerve outflow to skeletal muscles varies during normal respiratory cycles. Sympathetic output decreases during inspiration and then rises to its peak during the end stage of expiration;¹² thus, a disruption in normal breathing patterns would affect the normal influence of the nervous system and could render it dysfunctional.³⁰ The common mechanism of injury for all subjects in this case series involved running or sprinting at their maximum speed, which can cause labored breathing that affects diaphragm movement. The results of the SALE determined that all subjects presented with dysfunctional breathing patterns during the initial examination, which could offer support for nervous system dysfunction postulated through abnormal breathing patterns.

By assessing and addressing the nervous system through primal reflex examination and by correcting breathing patterns, subjects in this case series returned to pain-free functional movement. The physiology behind a true muscle tear or strain was not present in these cases; although the subjects

presented with pain and dysfunction in the hip flexor/groin area. Had an actual tear occurred, resetting the nervous system through diaphragm regulation would not have resulted in tissue healing over such a short period of time. No other treatments were performed on these subjects during the active treatment period, nor were any performed during the two-week follow-up period. All subjects participated in full activities during the treatment time period and were not limited in any activities of daily living or sport-related activities.

Several limitations were present within this case series. The clinician administering the treatment was a novice in the uses of PRRT™ and was trained through an introductory home study course. Currently, six levels of PRRT™ are available and offer more advanced techniques as the levels increase. Moreover, the clinician only treated the diaphragm based on rib palpations when other evaluations and treatments within the paradigm may have led to improved results. Other limitations involve the homogeneous nature and size of the sample. All subjects in the study were female, active, and younger than 25 years of age. The results are not generalizable, to all subjects of varied ages, activity level, and of the male sex. Future research could include assessing subjects using the PRRT™ one-minute nociceptive exam and treating all areas in excitatory stress to observe if less time is needed to reach functional pain free activity in subjects presenting with hip flexor or groin area pain. Further research could also include a larger and more diverse sample size.

CONCLUSION

By assessing and treating using Primal Reflex Release Technique™, all subjects in this case series experienced a complete resolution of pain and returned to optimal functional activity without the use of traditional therapeutic exercise or local treatment to hip muscles. Breathing also returned to functional status by the end of treatment, and the subjects remained pain-free and functional up to two weeks after discharge, with no further intervention or activity restrictions.

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