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Conservative management of pelvic pain and dysfunction

GUEST EDITOR
MAREK JANTOS, PHD
Section Editor Chronic Pelvic Pain

It's a pleasure to introduce the first Pelviperineology issue for 2020. The focus of this special issue is on conservative management of chronic pelvic pain and dysfunction. Pelvic syndromes represent a constellation of disorders that are complex, span various specialties and require extensive knowledge and expertise for effective management. To advance the management of these conditions, the contributing authors share their knowledge, experience and practical solutions highlighting the role of complimentary therapies. As we begin the new decade it's important to re-appraise the developments of recent years and note what they may foreshadow in terms of future trends. Several points deserve a mention.

There is a very evident paradigm shift in the classification, diagnosis and management of pelvic pain syndromes. The role of myofascial pain is more widely recognized. The most recent American College of Obstetricians and Gynecologists Practice Bulletin on Chronic Pelvic Pain (Number 218)* reflects this trend. Today, few if any, would subscribe to the diseased organ hypothesis as an explanation of chronic pelvic pain syndromes. In the past, interventions based on such presumptions were not only ineffective, but at times harmful. Current opinion considers the organ to be an innocent bystander, but the organs' immediate environment - the collagenous soft tissue, its malleability, elasticity and tensional balance, are in focus and receive far greater scrutiny. The association between dysfunctional muscle states and pelvic disorders has been well established and accepted, but what does it tell us in relation to pain and organ dysfunction? What are the actual mechanisms by which non-relaxing or overly relaxed muscles lead to dysfunction in organs and systems? Evidence points to the fascial system as the overlooked and mediating variable that regulates visceral function. With this shift in focus, first line interventions and therapies are being reconsidered and new approaches developed.

It is fortuitous that one of the new frontiers in the study of anatomy is the body-wide fascial system. In appraising pelvic disorders attention needs to be directed to ligaments, muscles, joints, fascia and viscera. Given that fascia is the primary communicator of mechanical information it is clearly implicated in the mechanisms of pain. The central location of the pelvis makes it an area of tensional convergence between the upper trunk and the lower limbs. The continuity of fascia which links the abdominal, pelvic and lumbar regions with the upper and lower extremities, paves the way for understanding why abdominal incisions and lumbar injuries are frequently associated with pelvic and bladder symptoms.

What is also interesting to note is that the fine tensional balance within the collagenous network impacts the highly reactive microscopic ganglia embedded in fascial architecture. These are the ganglia that control the peristalsis of each organ. Peristalsis is a local phenomenon. Consequently, injury, scars, adhesions, infections, recurrent inflammation, hormonal fluctuations, hydration, inactivity, muscle overactivation and emotional stress, all directly impact the dynamics of the fascial system and the function of organs. This role of the fascial mechanism is not yet adequately understood and deserves extensive study.

Conceptually, how does this impact the management of pelvic pain syndromes? If we consider that the pelvic region is subject to some of the most invasive medical procedures, ranging from caesarean sections, pelvic repair surgeries, synthetic mesh, tension tapes, grafts and bulking agents, laser treatments, and a range of -ectomies (hysterectomies, cystectomies, vestibulectomies and colectomies…), as well as the many laparoscopies investigating suspected endometriosis and organ disease, all of these directly impact the fine dynamics of the fascial system. When the malleability and elasticity of fascia are affected, it undoubtedly becomes implicated in visceral disorders and pain syndromes. With this in mind, the general appraisal of patients should include a functional neuromuscular assessment as well as an assessment of fascial dynamics.

A new mechanisms-oriented perspective on pain would be a sign of progress. Minds open to change pave the way to success and new beginnings. In this issue we begin with research on pain mapping, followed by a discussion on the mechanisms of central and peripheral sensitization, and new research on the role of biofeedback and magnetic stimulation in pelvic rehabilitation. These are complimented by two excellent case studies highlighting the application of the Stecco method of Fascial Manipulation. Each author generously shares valuable insight and information, contributing to existing knowledge. For every clinician, an evidenced based practice is power, making the management of pelvic syndromes more effective. I wish all of the recipients of Pelviperineology insightful reading.

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Pain mapping: A mechanisms-oriented protocol for the assessment of chronic pelvic pain and urogenital pain syndromes

MAREK JANTOS

Adelaide, Australia

ABSTRACT

Objective: Chronic pelvic pain (CPP) and various pelvic dysfunctions are best assessed by consultants with knowledge and training in myofascial pain. The prevalence of myofascial pain is recognised but what is needed is a validated protocol to guide physical examination of pelvic structures. Pain mapping was developed to assist with localising active and passive sources of pain, evaluating its severity, temporal characteristics, topography and mechanisms and guiding therapy.

Materials and Methods: This is a prospective study involving the pain mapping of 320 female volunteers, consisting of women diagnosed with chronic urogenital pain (CUP), and of a comparison and control group. The protocol uses three pain maps to guide assessment of the external urogenital area, internal pelvic floor structures and paraurethral region, and follows an established strategy to maintain consistency.

Results: The mean age of the CUP group was 34.7±12.1 years; 31.6±10.1 for the gynaecology comparison group; and 35.5±11.5 for the control group. There were no significant differences in age or parity, the groups were well matched for statistical comparison. The highest pain scores from Map A were noted around the vestibule and urethral meatus; from Map B included all of the internal pelvic structures tested; and from Map C all points were painful and accounted for the highest scores of all the points mapped. Logistic regression analysis identified two points from each of the three maps (a total of six points), that provide 94% accuracy in the diagnosis of chronic urogenital pain syndrome.

Conclusion: The pain mapping study demonstrates the benefits of using an established protocol for localising and assessing pelvic pain. The results highlight the role of peripheral mechanisms, in the form of myofascial changes associated with pain and organ dysfunction. The paraurethral area appears to be the primary generator of CUP symptoms and diagnostically is the most reliable in differentiating between CUP cases and asymptomatic controls. As an anatomical region the paraurethral area is an overlooked source of pain and rarely tested during diagnostic assessments.

Keywords: Bladder pain syndrome; chronic pelvic pain; chronic urogenital pain; myofascial pain; pain mapping; vulvodynia

INTRODUCTION

The diagnosis and management of chronic pelvic pain (CPP) requires extensive knowledge and expertise. The pelvis is a well-defined region but anatomically complex. It consists of bones, multiple layers of muscle and fascia and housing within its bony structure various organs that belong to biological systems that converge in its confines. As a result CPP is difficult to localise. Any persistent pain that is experienced between the umbilicus

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and the upper thighs can be classified as CPP, even if its origin is unknown and cause difficult to identify. The aim of this study is to further establish the validity of a pain mapping protocol for the assessment of CPP.

CPP is defined as a recurrent or persistent pain, unrelated to menstruation, intercourse or pregnancy, that lasts at least six months and causes functional impairment requiring medical or surgical treatment.[1,2] When potential organic pathologies are excluded and pain persists and has a life-altering impact, it is classified as a chronic pain syndrome. Without knowing the pathogenesis and mechanisms of such pain syndromes their management is difficult. With the prevalence of CPP syndromes in the general population estimated to be as high as 39% it poses a challenge to clinical practice.[3] These pain disorders account for almost half of all laparoscopies and a significant number of hysterectomies.

Myofascial pain is widely recognised as a source of CPP, but this has not always been the case. Three decades ago, the prevalence of myofascial disorders in CPP was estimated to be around eight percent, while current estimates place it at 85-90%.[4,5] The ability to identify myofascial pain is contingent on the training of the health consultant. If the patient is seen in a primary care setting only 30% of CPP cases receive a diagnosis of myofascial pain syndrome, but if seen in a dedicated pain centre the figure is 85% or higher.[5,6] Very few physicians have been trained to assess pain of muscle and fascial origin.[7] Without this training, gynaecologists, urologists and proctologists are left with the only option of managing pain according to the standard protocols available to them.[7,8] This highlights the dual need of training and of protocols for in-clinic assessments.

Myofascial pain necessitates a physical examination of all pelvic structures; muscles, joints, ligaments, fascia and viscera; and must include a functional appraisal of the biomechanics of pelvic soft tissue.[9] To date clinical assessments have relied on the cotton swab test, commonly referred to as the Kaufman Q-tip test.[10] This is especially the case with chronic urogenital pain (CUP) conditions, which affect the reproductive and urinary systems. The Q-tip test has been used for clinical and research purposes for over 30 years. Its focus is limited to examining tenderness within the vulvar vestibule, as originally proposed by Friedrich.[11] This falls short of the recommendations of consensus statements advocating bilateral palpation of muscles, and a functional assessment of pelvic structures.[12]

In the past CPP was commonly attributed to end-organs such as bladder, bowel and external genitalia, but more recently the focus has shifted to myofascial changes and high-tone pelvic muscle dysfunction.[13-16] Another cause, that was often suspected, was endometriosis. However, recent studies found no correlation between level of disease and severity of pain, suggesting that myofascial factors should be considered.[8,17,18] Studies of internal pelvic muscles show that tenderness best differentiates between symptomatic and asymptomatic women.[19,20] Nulliparous women with no lower urogenital tract symptoms report no tenderness, while 94% of women with CUP report clinically significant levels of tenderness.

To enable consistency and precision of myofascial assessment there is a need for a standardised protocol. An extensive literature review of assessment procedures notes that “a standardised and reproducible protocol…does not currently exist, and few providers evaluate for pelvic floor myofascial pain even in patients presenting with pelvic pain…”.[7]

A pain mapping protocol, developed by the author and his associates, has been described in literature and its validity is further tested in this study.[21,22] It uses predefined examination points and a clearly outlined strategy to ensure consistency and reliability of the assessment procedure. Both active and passive sources of pain can be identified and evaluated in terms of severity, temporal characteristics and topography. In reproducing pain and symptoms, the process validates the patients reports and provides an evidence base for the planning of treatment. Importantly, pain mapping is focused on the complex question of “where the pain is coming from,” not on the basal one of “where is the pain?” It shifts the focus from an oversimplified topographical approach using body forms, to one localising the source of pain and examining the peripheral mechanisms involved.

Three pain maps are used in this study, each one was developed on the basis of clinical work, literature reports and cadaver dissections.[22] The first pain map focuses on the external urogenital area (Map A), in particular on the superficial tissue of the vulva, thought to be related to chronic vulvar pain. The second pain map looks at the deep fascia and pelvic muscles (Map B), and the third map (Map C), developed by the author and his associates, examines the paraurethral and bladder area, thought to be the source of bladder pain.

MATERIALS AND METHODS

This is a prospective study based on the pain mapping of 320 consecutive volunteers attending a multidisciplinary women’s health clinic in Lublin, Poland. The aim of the study was to test a standardised pain mapping assessment protocol to localise the source of pain; assess its severity, quality and topography in women diagnosed with CUP syndromes; and to compare their pain profiles with the profiles of women presenting with other gynaecological problems but no pain, and with asymptomatic women who were part of a control group.

Participants consisted of volunteers who agreed to participate after receiving an overview of the study, its aims and methods. The inclusion criteria stipulated that the participants must be 18 years of age or older and able to provide consent. The exclusion criteria included pregnancy, birth or pelvic surgical procedure in the last three months, a history of major reconstructive surgery, a known diagnosis of active endometrial disease or any other concurrent illness.

Based on the medical diagnoses volunteers were allocated to the subgroup shown in Figure 1.

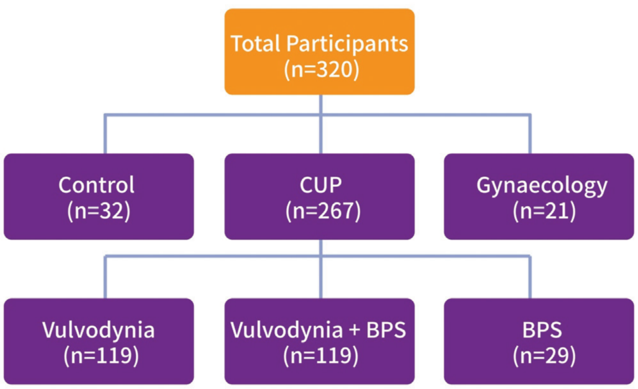

Figure 1. Study subgroup comparison structure.
CUP: Chronic urogenital pain, BPS: Bladder pain syndrome

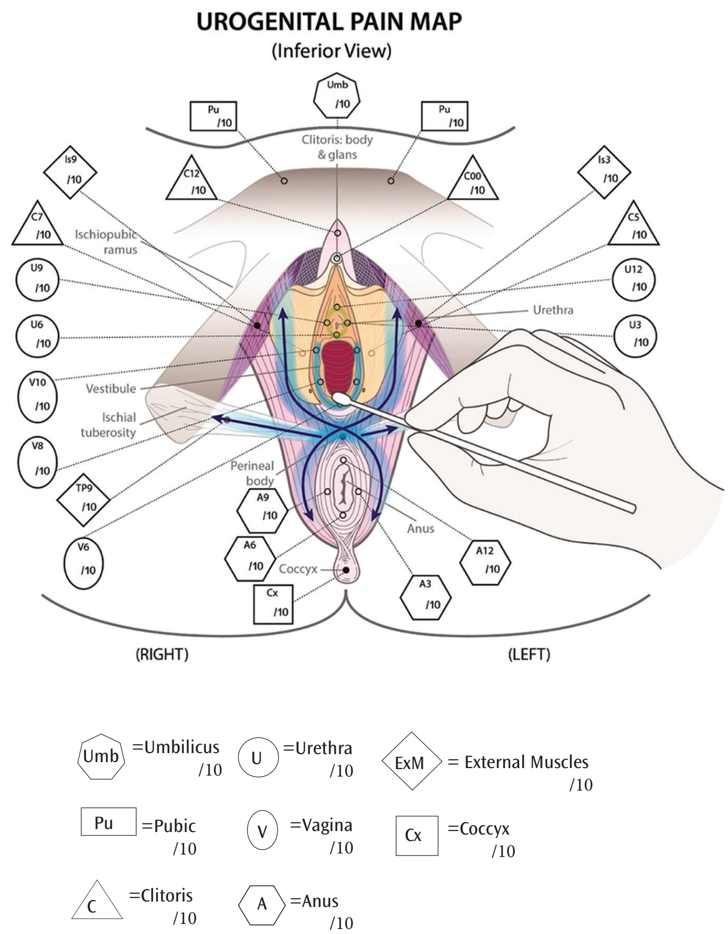

Figure 2 A. Map A–External Urogenital Pain Map, identifying external assessment points

The Control group consisted of women attending the clinic for routine PAP smear surveillance only and had no history of gynecological, urological or CUP symptoms. The women in the Gynecology group presented with gynecological problems that included PAP smear abnormalities, pelvic inflammatory disease, lichens sclerosis or polycystic ovarian syndrome, but no history of pain. The CUP group was made up of those diagnosed with vulvodynia or bladder pain syndrome (BPS) or having a dual diagnosis of both vulvodynia and BPS. Instruments used in the study included a consent form and a study questionnaire and three pain maps for recording information derived from the physical examination. Map A was used for examining the external urogenital area (27 Points); Map B for the internal examination of pelvic muscles (15 points); and Map C for palpation of the paraurethral area (12 points). These three maps are shown in Figure 2A-C.

The assessment of each point required three items of information: a pain severity score using a verbally administered 0-10 numerical rating scale (NRS), where zero is no pain and ten the most severe pain experienced.[23] A list of pain descriptors using adjectives from a modified McGill Pain Questionnaire list[24] and a record of the patients account of the spatial distribution of pain as experienced at the time of examination.

The examiner and her assistants were well versed in the identification of the mapping points, having participated in several earlier pain mapping studies. A more detailed description of the pain mapping protocol, its development and validation are discussed elsewhere in literature.[25] The examination procedure consisted of a medical exam performed by a tertiary specialist (a female gynaecologist) to exclude any anatomical problems or current infections and diseases, which was followed by the pain mapping assessment. Prior to pain mapping, participants were asked to empty their bladder. The pain mapping was carried out in a lithotomy position in a gynaecology chair. All points were examined

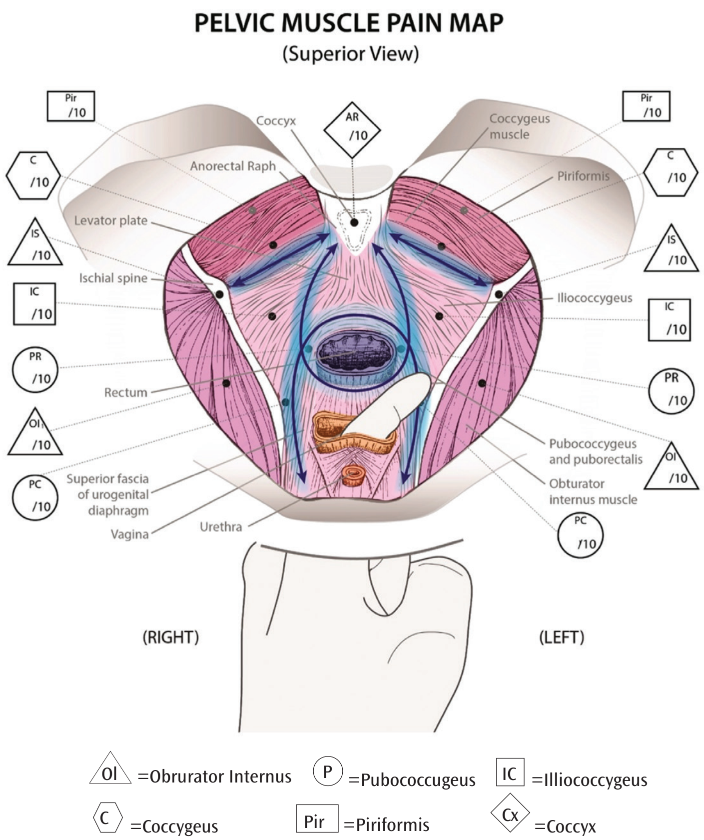

Figure 2 B. Map B–Internal pelvic structures assessed

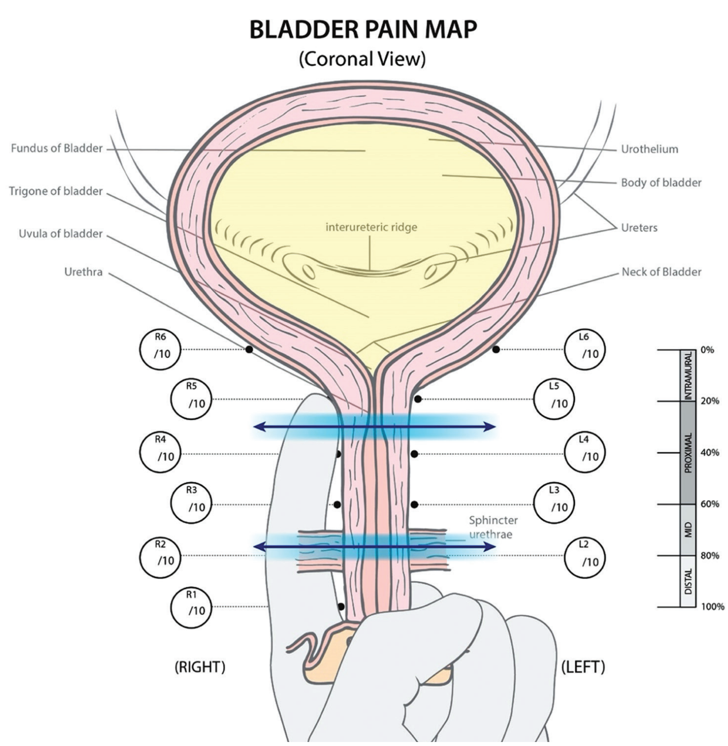

Figure 2 C. Map C–identifying paraurethral assessment points

by gloved hand using either digital pressure or Q-tip for the vestibular and anal points. The Q-tip was a fine 15 cm long examination stick, lightly moistened with hypoallergenic, pure paraffin ointment. The pressure for digital palpation was 0.4-0.5 kg/cm^2 and for Q-tip testing 0.1-0.2 kg/cm^2 as per earlier studies.[22]

Points examined on Map A included the pubis, transverse and perineal points (using digital pressure), vestibule, urethra, clitoris and anus (using Q-tip), all points were marked on the basis of a perineal/pelvic clock as shown in Figure 2A. The pelvic floor assessment in Map B included bilateral examination of all of the pelvic muscles, and ischial spine. This was carried out by the examiner using a single digit inserted into the vaginal canal as shown in Figure 2B. Each participant was instructed to relax the pelvic muscle by self-dilating with the assistance of a diaphragmatic breathing technique, to ensure a more comfortable digital insertion and assessment of pelvic points. In instances of extreme sensitivity, the participants were given the option of having 10% lidocaine gel applied to the introital area. The gel was used only upon completion of Map A and prior to Map B and C assessments. The first task prior to palpation of pelvic points was a simple test to evaluate pelvic muscle strength, using the Oxford scale.

CUP is associated with non-relaxing pelvic muscles, functional shortening of muscles and a general contracture, associated with loss of muscle elasticity leading to narrowing the central hiatus. These observations were always noted in the course of pelvic assessment. Next all of the points were palpated, using the palmar side of the finger, and data recorded. Map C was completed by rotating the examiners' hand so that the palmar side faced the urethra and bladder. Each of the six points on the left and then six points on the right, just lateral to the urethra, were palpated with the pointer finger, starting with the 100th percentile, then moving to the 80th, 60th, 40th, 20th and 0 percentile, level with the vesical neck, as shown in Figure 2C.

The data from pain mapping provided an individualized pain profile for each participant. The results were reviewed with each individual. Additional assessments were carried out by members of the multidisciplinary team where each participant underwent a general physiotherapy and postural assessment, and a psychology assessment. For the purposes of this report, only pain mapping data will be analysed.

Ethics approval was granted by the Bioethics Commission of the Medical University of Lublin for routine clinical assessment and collection of pain mapping information (approval no: KE-0254/226/2014, date: 26.06.2014). Each participant's anonymity was maintained by complete de-identification of data prior to data analysis.

Statistical Analysis

A range of statistical analyses were used, including, t-tests for comparison of two means, chi-square tests for independence between categorical variables, Pearson correlation coefficient, analyses of variance and logistic regression analyses.

RESULTS

The mean age of the CUP group was 34.7±12.1 years; 31.6±10.1 for the Gynaecology group; and 35.5±11.5 for the Control. There was no significant difference in the mean ages of the CUP, Gynaecology group and Control group. The age distribution for the CUP group showed that prevalence in this study peaked around age 25. Parity for each group was similar (0.7±1.0). With no significant differences in age or parity, the groups were well matched for statistical comparison.

The first stage of data analysis focused on comparing mean pain scores for each point for the CUP groups, with the mean pain scores of the Gynaecology and Control groups. The summary of the data is presented in Figure 3. For purposes of this study pain mapping scores on any of the points that were greater or equal to 2/10 (≥=2) were considered clinically significant.

The severity of pain ratings for all points in the CUP group is shown in Figure 4.

Thirteen points on Map A and all points on Map B and Map C differentiated between pain groups and controls. With the remaining points on Map A there was no significant pain reported. These points are of no clinical or diagnostic value.

CUP group ratings were analysed by anatomical region. On Map A, the CUP group as a whole, identified the vestibular points, in particular the posterior fourchette, as being most painful, followed by the urethral points, with no significant pain in the clitoral, umbilical and anal region. On Map B, with the exception of the deep piriformis muscle, all points were rated as significantly painful. On Map C three trends were noted; the paraurethral points were assigned the highest pain ratings of all three maps by all of the CUP women; pain scores progressively increased from the distal to the proximal portion of the urethra; and pain on the left side of the urethra was consistently higher than on the right side of the urethra.

A between groups comparison was made on the three maps. In the control group the mean pain scores across all points were less than two, therefore clinically not significant. For women in the Control group, the highest mean pain score reported was on Map A point V4 (left vestibular region–1.3/10). The control group also reported some pain on other vestibular points (AV 2,4,6,8,10), but the pain scores were less than 2 and were not clinically significant. From the data it is clear that pain was not a feature of the asymptomatic group on any of

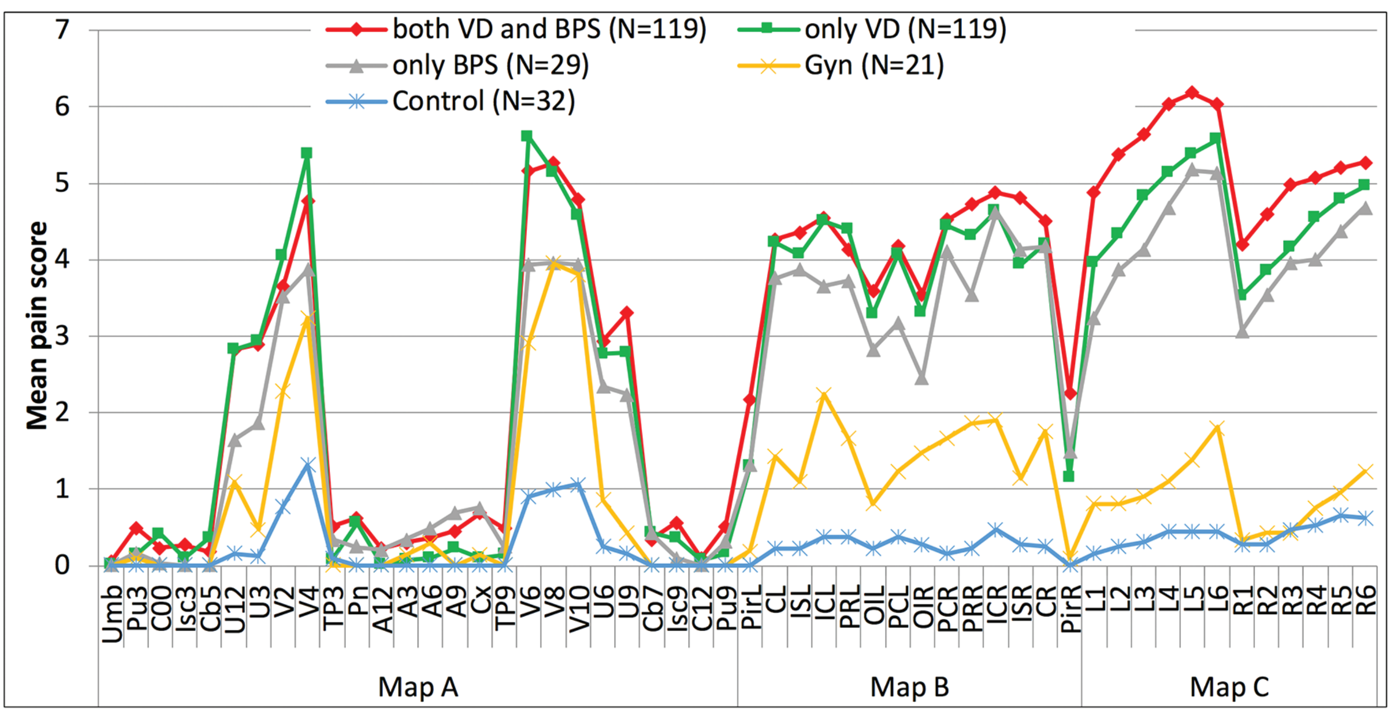

Figure 3. Mean pain scores for all points on Map A, B and C, across all groups. VD: Vulvodynia; BPS: Bladder pain syndrome

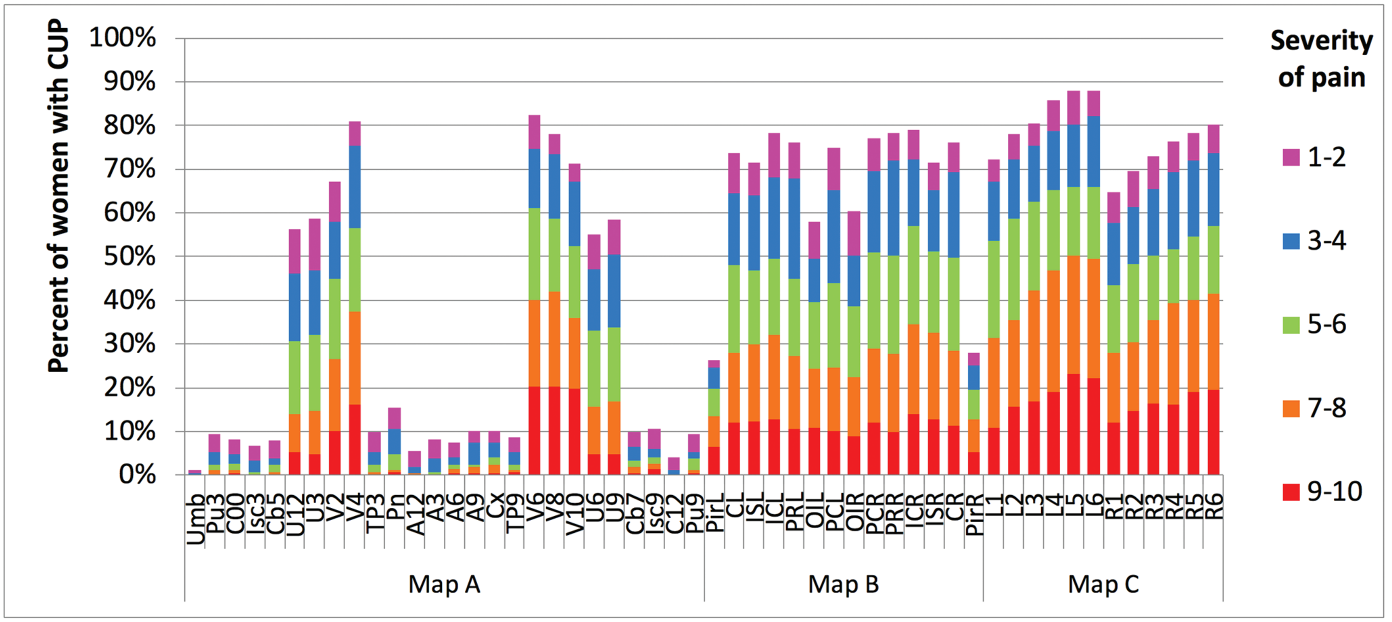

Figure 4. Severity of pain ratings for each point on the three maps

the points examined. On Map A, significant differences were noted between the CUP, gynaecology and control groups on all of the urethral and vestibular points. On Map B and C all of the points palpated showed significant differences between CUP, gynaecology and control group.

Pain scores of the CUP subgroups of vulvodynia and BPS were compared. On Map A, women with vulvodynia only, reported higher scores than those with vulvodynia and BPS or BPS only. On Map B and C women with the dual diagnosis of vulvodynia and BPS reported highest scores with no significant difference between the two subgroups. Pain mapping reliably differentiated between vulvodynia and asymptomatic controls. However, the sub-classification of vulvodynia into provoked and spontaneous showed no significant differences between these two groups.

Logistic regression analysis of pain scores from the three pain maps using four different models identified the most reliable diagnostic points. In model 1, comparing the pain data from CUP and control subjects, the points most closely and reliably associated with a diagnosis of CUP are AV6, AV10 and AU9. In Model 2, 3 and 4, if the pain scores on each pain map are considered as independent variables, then on Map A, points AV6 and AU 9 are the most reliable predictors, and on Map B points BISL and BPRR, and on Map C the points CL2 and CL5 are the most reliable for the diagnosis of CUP.

For the CUP women, the mean Oxford scale score was 2.6 (±1.9) and was significantly lower, and by implication the muscles appeared weaker, when compared with the mean score of the Control group, which was 3.5 (±1.7). The CUP group though reporting the highest pain scores had weaker pelvic muscles.

The referred pain patterns (pain topography) were recorded and analysed. In the CUP group, the points on Map A that were reported as painful, produced localised pain only, this was evident in the posterior fourchette and around the urethral meatus and is shown in Figure 5A. None of these points referred pain to distant locations. Points on Map B, in

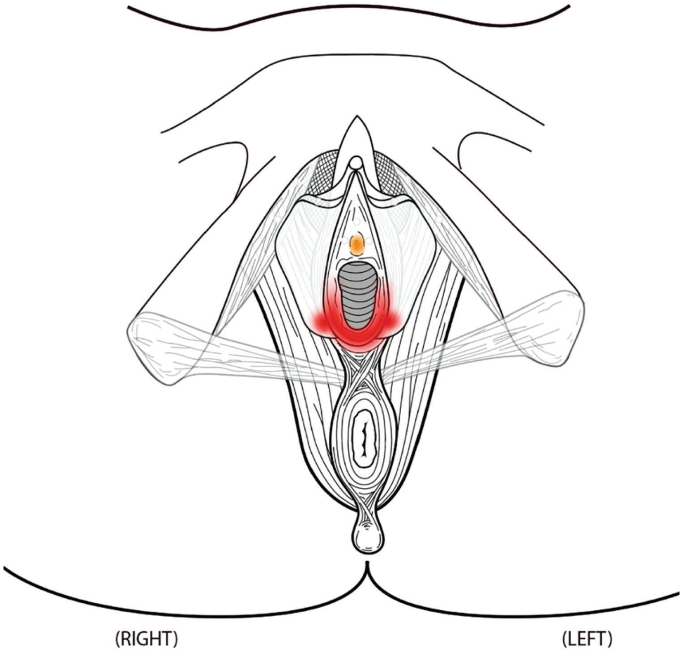

Figure 5 A. Referred pain from Map A

addition to localised tenderness, referred pain to more distant points, including abdomen, hips, lower back and groin, with some points in the posterior section of the pelvis reproducing faecal urge and irritation of the bladder. The referred pain areas are shown in Figure 5B. The referred pain patterns from Map C are most complex and extensive as shown in Figure 5C. Pain in the paraurethral area was experienced locally upon palpation, in addition pain was referred to the umbilical region, the right and left iliac region, epigastric regions (reproducing sensation of suprapubic pressure, lower back, groin and soles of the feet (reported as a burning sensation).

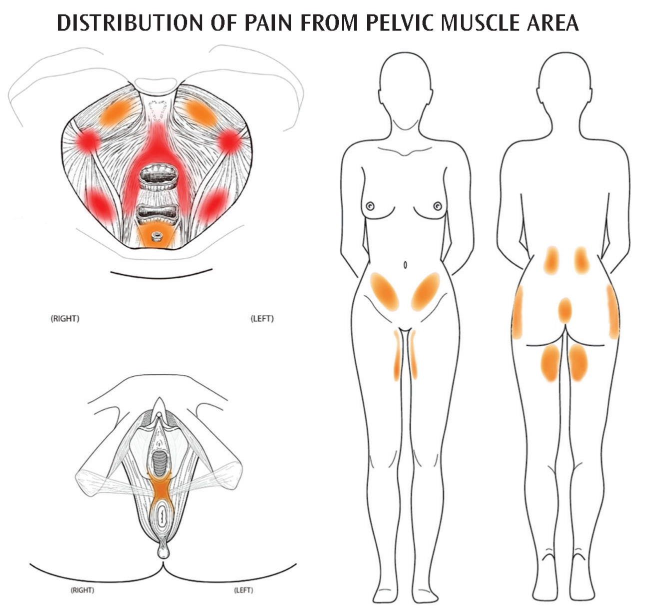

Figure 5 B. Referred pain from Map B

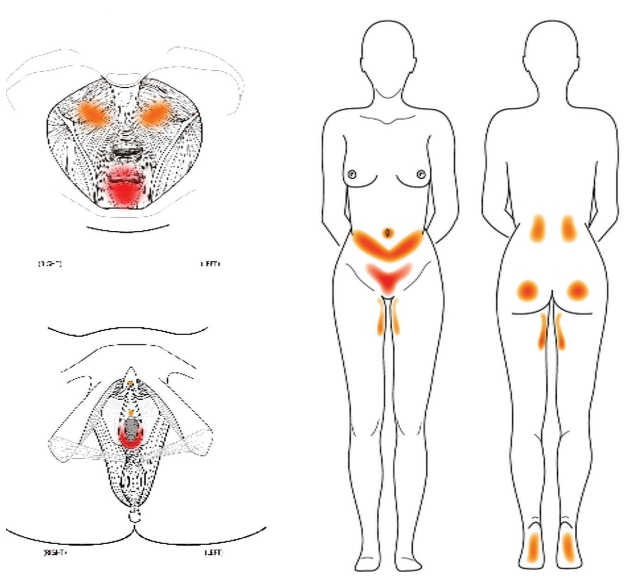

Figure 5 C. Referred pain from Map C

In addition, the paraurethral points reproduced bladder urge of varying severity, clitoral pain (even in women who did not report symptoms of clitoral pain) and sensations of arousal in women who presented with persistent arousal disorder symptoms. Paraurethral pain in the majority of women existed as passive pain and was reproduced during physical examination. None of the CUP women during initial screening complained of pain in the paraurethral area.

DISCUSSION

This is the largest pain mapping study undertaken to date. It is based on data derived from a sample of 320 symptomatic and asymptomatic volunteers. The large sample size is one of the strengths of this study. The pain mapping protocol focussed on the physical examination of a series of predefined points as shown in the three pain maps in Figure 2A-C (Map A, B and C). The research is original and first to map pain arising from the paraurethral area. It provides unprecedented insight linking the origins of pain with symptoms reported by women diagnosed with CUP.

The term "pain mapping," refers to the process of localizing pain, and establishing a relationship between the source of pain and the symptoms experienced by each individual.[21,22] Pain mapping data also provides a pain profile of the CUP group and reliably differentiates between symptomatic and asymptomatic women. From the analysis it is evident that pain is not a characteristic of asymptomatic women but is a defining feature of CPP and CUP.[20]

Examination of each groups pain profiles provides evidence that specific points when palpated reproduced the pain and symptoms reported in CUP. These points provide evidence of the myofascial origin of pain, in contrast to the erroneous assumptions made in the past that pain was of diseased organ origin.

Assessment of points listed in Map A, identifies the vestibule and urethral meatus as two of the most sensitive structures. However, of the 27 points examined, only nine points (all relating to the vestibule and urethra), were reported as painful. Surprisingly, the Q-tip test of the vestibule showed that in asymptomatic women the genital area can also be sensitive and painful. The superficial fascia of Coles makes up the vestibular tissue, and as such causes localised discomfort but no referred pain. Only the richly innervated deep fascia refers pain to more distant areas.[26] Women who typically report genital irritation triggered by wearing tight clothing, may be experiencing superficial fascial sensitivity. The Q-tip test which has been used for over 30 years, as a primary diagnostic tool with vulvodynia, only assess superficial sensitivity with insufficient attention being given to other potential sources of pain and symptoms that are typically associated with CPP and CUP. A Q-tip test provides limited information and may potentially lead to misleading conclusions.

Analysis of data from Map B shows that with the exception of the piriformis muscle, all points were rated as significantly painful. Each of these points differentiated between symptomatic and asymptomatic cases. In addition to pain at the point of palpation, these points referred pain to distant areas within and outside of the pelvis as shown in Figure 5B. Palpation of the deeper pelvic muscles - the iliococcygeus and puborectalis, referred pain to the anorectal area and reproduced a sense of bowel urge. The coccygeus and piriformis muscles referred pain to the lower back, buttocks and tailbone area, while the obturator internus muscle produced pain that radiated into the lower back, hip, abdominal quadrants and thighs. Given that these structures are associated with deep fascial tissue the referred pain patterns were much more extensive.

On Map C, the paraurethral points consistently provided the highest pain ratings of all the points mapped, making this the most painful anatomical region examined. Pain originating from the paraurethral area was often distressing and described as burning, sharp, stabbing and sometimes as itching. Mean pain scores in the paraurethral area increased from the distal to proximal section of the urethra, and pain scores on the left side of the urethra were higher than those on the right side.

The twelve points examined reproduced urethral and bladder pain, urge, clitoral pain, sensation of suprapubic pressure, referred pain to the umbilicus, pubic area, left and right inguinal quadrants, groin, gluteal area, lower lumbar region, and in some instances to the soles of the feet, as shown in Figure 5C. Examination of the paraurethral points reproduced many of the symptoms commonly reported by CUP cases. Yet, none of the symptomatic participants reported paraurethral pain prior to examination. The pain appears to be imperceptible, and a form of latent, passive pain, that is only reproduced by physical palpation of the area. This finding highlights the need for physical examination to follow a given protocol irrespective of the pain areas reported by a patient. This study provides direction and is key to the most relevant points for assessment.

The highest pain scores were noted on Map C and require some potential explanation. There are several reasons why this may be the case. The unusually high pain scores may be related to the density of innervation and vascularization of the anterior vaginal wall and urethral lumen.[27] The upper two thirds of the urethra and anterior vagina are fused into a single structure. This structure is enveloped by the bulbo-clitoral organ and forms part of the highly sensitive female sexual complex. As such, it is an area that may be the primary source and cause of dyspareunia, which is poorly understood and unexplained in literature. Another reason for the high pain scores is that the posterior pubis is a significant point of tensional convergence for pelvic muscle and endopelvic fascia. As an anchoring point for the pubocervical fascia that spans the urogenital hiatus, and for the pelvic diaphragm and the ligaments that hold the urethra, bladder and vagina in place, it is prone to inflammation, fascial densification, increased sensitivity, pain and tensional dysregulation that impacts all organs in its proximity. Given that the muscles, ligaments and organs form one unified structure held together by the endopelvic fascia, this area may be highly reactive to any tensional changes.

In women who reported experiencing urinary urge, palpation of paraurethral points consistently reproduced the sensation of an irresistible desire to void. The sudden urge to void was often reported as causing more distress than the sharp, burning pain associated with palpation. Within the investing fascia are the extramural and intramural ganglia that regulate the micromotions and peristaltic movement of organs and glands.[28] Since these ganglia are highly reactive to alterations in fascial tension, whether due to non-relaxing pelvic muscles, fascial restriction or palpation pressure, the sense of urge is consistently reproduced during physical examination. Dysregulation of bladder pacemaker action is a sign noted in 70% of BPS patients.[16] Reproduction of these exaggerated sensations in the bladder, in the absence of any changes in intravesicular pressure, points to local mechanisms within investing fascia mediating bladder excitability.

A subgroup of CUP women reported experiencing clitoral pain, known as clitorodynia, a localised form of vulvodynia. Others reported symptoms of persistent genital arousal, a form of unwanted sexual arousal.[29,30] Both of these symptoms were reproduced by palpation of the paraurethral points. Even among symptomatic women who did not specifically report clitoral pain, palpation of the area produced pain radiating into the clitoral glans. Given that the sensitive bulbo-clitoral organ surrounds the urethra and vagina the mechanisms of pain can be better understood. The fact that clitoral pain is only reproduced by paraurethral examination and not by a Q-tip test of the clitoral glans, illustrates that an organ can be an innocent bystander affected by referred pain but not be the source of pain. On the basis of pain mapping the mechanisms leading to clitoral pain and persistent genital arousal may be related to and arise from changes in soft tissue in the anatomical region but unrelated to any suspected disease process. Furthermore, clitoral pain and persistent genital arousal appear to be a part of the CUP continuum, originating from the paraurethral area, and do not constitute separate disorders.

CONCLUSIONS

Several important findings arise from this study with significant implications for the management of CPP and CUP. It is evident that the use of a consistent protocol for physical examination of pelvic structures and for the localisation of pain and symptoms is essential.

Using a validated pain mapping protocol facilitates consistent and accurate assessment. Pain mapping can be used in various formats. Logistic regression analysis showed that pain mapping can be used as a reliable diagnostic guide. Selecting just two points from each map can provide 94% accuracy of diagnosis. It can also be used in an abbreviated form for reliable assessment and establishing individual pain profiles. Otherwise, the extended form can be used for research purposes as was the case in this study.

The traditional Q-tip test provides limited information and should not be relied upon for diagnostic purposes. Limiting assessment to the superficial fascia of the vestibule does not explain the wide range of symptoms experienced by women with CUP. The deep fascia of the pelvic muscles and the paraurethral area appears to be the more critical mechanism by which referred pain is communicated throughout the body. Understanding the continuity of fascia which links the abdominal, pelvic and lumbar regions explains the mechanism by which abdominal, groin and lower back pain interlink with pelvic pain and organ dysfunction.

Another insight from this study is that pressure application to deeper tissue impacts on organ function. The sensation of bowel and bladder urge is potentially mediated by tensional changes that activate local ganglia involved in regulating peristalsis of the bowel and micromotions of the bladder.[28] Tensional variations in visceral fascia may also be the mechanism by which so many of the pelvic disorders are co-morbid to each other.

Vulvodynia, BPS and irritable bowel syndrome are the most common co-morbidities noted.

The fact that the mean Oxford scale score for the CUP group was significantly lower than the control group [2.6 (±1.9) vs 3.5 (±1.7) respectively], is most likely an indication of fatigue due to non-relaxing muscles seen in chronic pain cases. Muscle fatigue should not be confused with muscle weakness.

To date the lack of objective protocols for the assessment of CUP results in costly and invasive tests in search of non-existent pathology. Women often reported undergoing multiple laparoscopies and ultrasounds with negative findings.[7] Clearly the focus was directed to the wrong causes and mechanism of pain. Likewise, cystectomies, cliterodectomies, vestibulectomies and the total removal of reproductive organs in young women, did not eliminate or reduce the severity of urogenital pain, again highlighting the fact that organs are not the source of pain.[31,32] A number of recent studies examining the relationship between pain and endometriosis found no correlation between severity of pain and level of disease. Each of the studies recommended that pain of myofascial origin should be explored and addressed in therapy.[8,17,18]

The results of this pain mapping study provide essential information on the profiles of CUP syndromes, the mechanisms of pain, and pave the way for innovative interventions and therapies. Therapies guided by pain mapping assessments need to focus on fascial restrictions and densification of fascia which can occur in response to tissue trauma, scars, inflammation or emotional tension. Whatever the trigger may be, normalising muscles and mobilising facial tissue need to be the primary focus of therapy. Further research on pain mapping and profiling of specific disorders will provide knowledge and insights. One of the weaknesses of this study is that it compared only two CUP disorders and the numbers in the BPS group were relatively small. Larger samples should be used in the future. The pain profiles of various diagnostic groups need to be compared, including those of women who present with endometriosis. Many of these disorders need to be better understood from further mechanismms-oriented research.

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Distinguishing sources of pain: Central vs peripheral mediation

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ABSTRACT

Research in chronic pain often fails to distinguish the pain source: central vs peripheral. In this review, I lay out a case for a greater consideration of a peripheral pain source, namely myofascial trigger points. Findings from our group are presented indicating that trigger points are alpha sympathetically innervated and are not directly related to the cholinergic neuro-muscular system. Treatment implications are discussed.

Keywords: Myofascial pain trigger points; sympathetic muscle innervation

INTRODUCTION

Chronic pain, although difficult to define, is now clearly recognized as a major health problem creating a world-wide burden.[1] It is useful to classify chronic pain as having a primarily central vs a peripheral etiology. Clear cut examples of centrally mediated pain are phantom limb pain, Fibromyalgia (allodynia and hyperalgesia), and perhaps Complex Regional Pain Syndromes. A great deal of work has been published to try and elucidate the neural, behavioral and cognitive aspects of centrally mediated pain. An excellent recent review tries to model brain plasticity in brain organization for these pain syndromes.[2]

"A large body of converging evidence suggests that chronic pain is not simply a temporal extension of acute pain but involves distinct mechanisms. The transition of acute pain into a chronic disorder involves activity dependent changes (that is, functional plasticity) at many different interconnected levels, ranging from the molecular to the network level, at several anatomical avenues in the nociceptive pathway.[3,4] This interconnectivity can explain why even small molecular changes, such as a single point mutation, can result in large changes at the behavioural or clinical levels that are caused by amplification along multiple scales of plasticity. Mechanisms involving functional plasticity have been studied extensively and have revealed a range of modulatory factors that change the sensory, emotional and cognitive components of pain (reviewed in.[5-8] However, recent data show that functional plasticity changes are accompanied by structural re-modelling and reorganization of synapses, cells and circuits that can also occur at various anatomical and temporal scales[8,9] thereby further adding complexity and a large dynamic range, and potentially accounting for the development of pain that extends over longer periods of time. Structural re-modelling of connections has not been studied as widely as functional plasticity, and it remains unclear whether it represents a cause or a consequence of chronic pain"[2](p.20).

While this perspective is clearly informative and relevant to pain syndromes involving allodynia or hyperalgesia, it may be missing a large number of chronic pain disorders that may have a peripheral source. In this paper, I would like to focus on myofascial or muscular pain, which appears to constitute the largest number of chronic pain patients[10,11] and may be relatively independent of the central sensitization discussed above.

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Our group has struggled with the lack of a clear mediational model connecting psychological stress and muscle pain (Diagram 1). There seem little doubt that psychological/emotional features play a role in pain, but other than postulating a central nervous system pain amplification system, little was known about this “mind to muscle connection”. Naïve theories postulated that stress caused striate muscle groups to contract chronically, thus producing overuse and pain. The problem here is that there is no evidence that painful muscles have byproducts associated with pain, nor are they chronically contracted [based on surface electromyogram (EMG) studies]. There is some indication that a fascial contracture may occur, but this new line of research has not been widely recognized.[12] In fact, an exhaustive search for a peripheral biomarker associated with chronic pain, has turned up no meaningful answers.

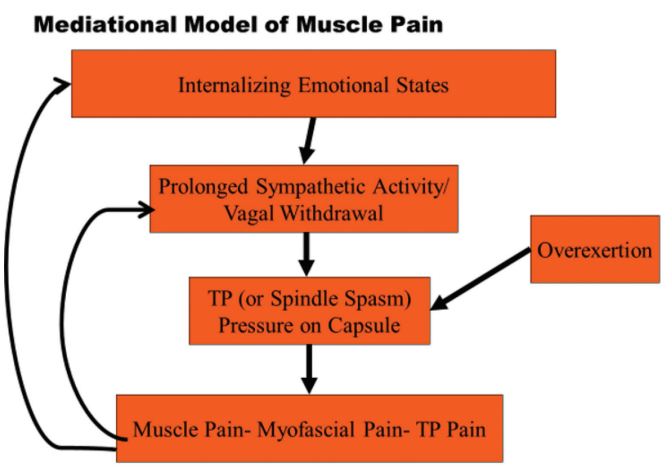

Diagram 1. Mediational model of Muscle pain
TP: Trigger point

Increasingly, pain from local nodules called trigger points has emerged as a promising source of muscle pain syndromes such as tension headache, neck pain, low back pain, pelvic floor pain, etc.

Shah et al.[13] provide a detailed historical perspective on myofascial or trigger point pain. While the concept of myofascial trigger points (MTrPs) can be traced back to Guillaume de Baillous (1538-1616) of France, the pioneering work of Janet Travell marks the coming of age of this pain conceptualization.[14,15] Travell et al.[15] catalogued the location of MTrPs throughout the body in great detail in two volumes of their handbook. Their exhaustive analyses are widely accepted as accurate. While the underlying physiology of MTrPs is quite controversial, a number of features are widely accepted: Associated stiffness

Localized point tenderness in muscle

Stimulation produces local and referred pain Often with a palpable taut band

Twitch

Trigger because like a gun trigger is initiated with pressure Produces pain in another place-(target).

While the myofascial perspective is now widely known as applying to tension headache, neck pain, upper body pain, lower back pain, etc., recent work has focused on pelvic floor pain. Jantos et al.[17] have described in detail a peripheral pain model that incorporates the myofascial perspective.[16-18]

Thus, MTrPs represent a peripheral source of pain, at least partially, and I would argue, substantially independent of central sensitization. For this reason, more emphasis on these pain syndromes is warranted.

MATERIALS AND METHODS

Mediational model

Our group began investigating MTrPs about 20 years ago. We began by trying to find a biological signature using surface electromyographic methods. This approach proved unfruitful. Needle electrodes were then proposed, but where should the needle be inserted in the muscle? A medical student (Dawn Bravata), working with us on various projects suggested a trigger point in the trapezius muscle. At that time Travell’s work[19] was not well known nor accepted in medical circles, so we were quite skeptical at this suggestion. But in a rare fit of open-mindedness we tried inserting the needle into a tender nodule in the trapezius and—Eureka,—the needle EMG (nEMG) monitor lit up at a very specific locale. A second needle nearby in non-tender tissue remained electrically silent. Figure 1 shows a typical finding.

This method was then perfected and the first systematic study run and published.[19]Almost all of the subsequent studies used this methodology. We estimate that we have tested over 300 patients in this manner. With rare exception, we get the same pattern.

A series of pharmacological studies followed[20] that showed that the nEMG activity in the trigger point (TP) was unaffected by curare (a powerful cholinergic blocker that blocks all motor neuron activity), but dampened by phentolamine (an alpha-sympathetic blocker, see Figure 2). Unaffected by acetylcholine, the usual motor neuron neuro-transmitter, but blocked by a sympathetic blocker, this work seemed to offer a hypothesis about the pathways for sympathetically mediated peripheral pain in muscle.

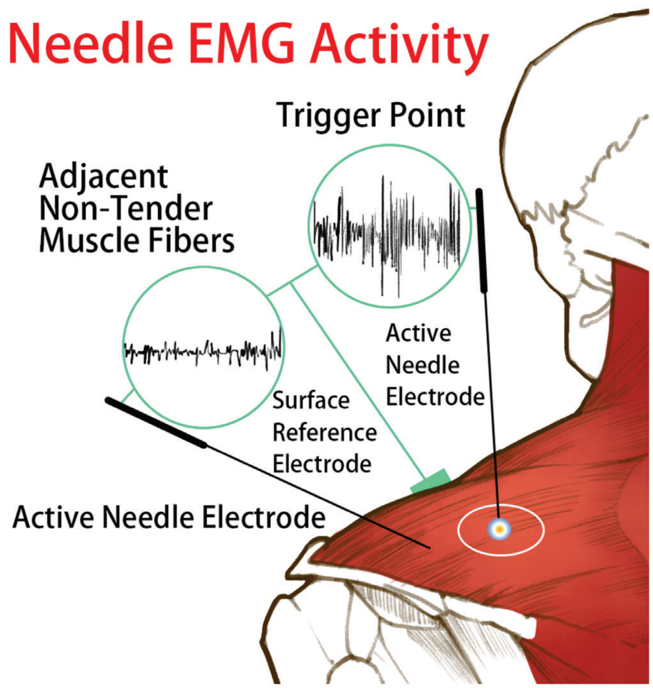

Figure 1. Needle EMG (nEMG) paradigm. Left circle shows activity in the non-tender site, right circle for the trigger point
EMG: Electromyogram

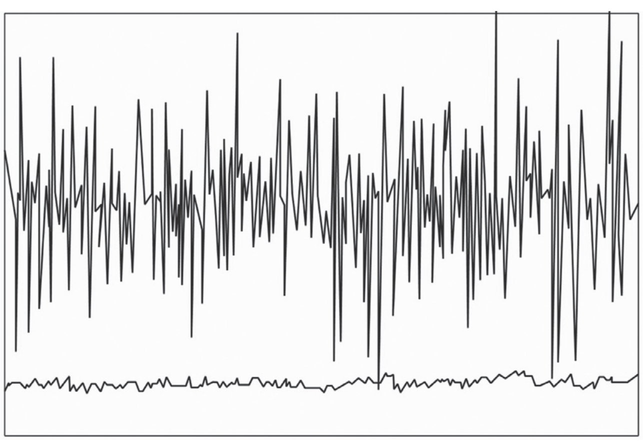

Figure 2. It shows the nEMG action potentials for Curare, lower is the non-tender adjacent site
nEMG: Neddle electromyogram

We then began a series of psychophysiological studies. My student, McNulty et al.[21], gathered subjects with palpable TPs and found that the TP, but not the adjacent site responded vigorously to psychological stress. As our theory predicted, the non-tender site remained silent during the stress. It seems that the muscle contraction we see in the clinic during stress can be inhibited with instruction (and perhaps the fear of moving a needle in the muscle). Another student, Banks[22] replicated the McNulty paradigm but added a relaxation component. TPs were clearly activated during stress but activation decreased during Autogenic Relaxation. Lewis et al.[23] found the same relationships existed in pain patients.

Since we were unsure of the nature of the psychological stimuli that would invoke a TP response, we then undertook a series of studies to elucidate the emotional stimuli. Gadler et al.[24] used interview techniques to try and elicit TP responses and found that during recall, very high nEMG activity was produced (up to 120 micro-volts). Professional actors were used by Cafaro[25] to see if dramatically expressed or inhibited emotions would produce higher TP activity. They didn't; it seems that recall of an emotional event drives the TPs at about the same rate as an angry or volatile outburst.

RESULTS

Based on these results, we postulate a mediational model of chronic muscle pain that yields potential treatment models. Figure 3 illustrates the broad model. It is hypothesized that chronic muscle pain syndromes result from activation of MTrPs by overstretch, emotional stress, or other sources that create a powerful afferent signal to pain perception centers in the brain. Thus, chronic sources of stress such as anxiety, worry, or other internalizing emotional states can fuel activity in the MTrP.

We have postulated that the MTrPs are actually muscle spindles (the intrafusal fibers within capsules responsible for stretch perception and regulation). This idea has been challenged, but is worthy of further exploration.[13]

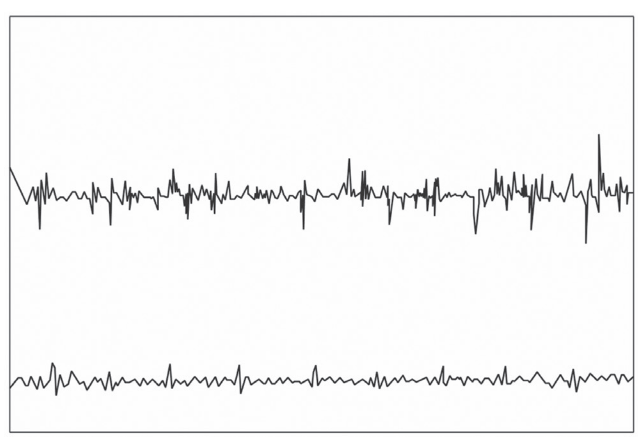

Figure 3. It shows the nEMG action potentials for Phentolamine, lower is the non-tender adjacent site
nEMG: Neddle electromyogram

DISCUSSION

Treatment models

It has long been recognized that techniques such as acupressure, massage, or dry needling are effective in reducing pain in MTrPs, at least temporarily (c.f.)[26, 27] Longer term relief has been a more elusive goal. Based on the above model, we have postulated that combining techniques that reduce sympathetic outflow with manual release techniques might offer longer term relief. One such technique, that has gained increasing support is Heart Rate Variability Biofeedback (HRVB).

In this protocol, patients learn to breathe at a specific rate diaphragmatically so as to greatly increase beat to beat heart rate accelerations during inhalation and decelerations during exhalations. Regular practice at this resonance frequency increases autonomic flexibility such that the vagus can limit sympathetic outflow to various target organs.[28-31] By combining this type biofeedback-based home practice technique, we have found that pain relief is prolonged dramatically, presumably because re-stimulation of the MTrPs is limited by better autonomic balance and a more robust parasympathetic (vagal) tone.[32-34]

The rapid response to the above treatment protocols seems to imply that central sensitization plays a relatively minor role in these syndromes, as compared to Fibromyalgia for example.

CONCLUSIONS

The growing recognition of the burden of chronic pain requires complex analyses that recognize the sources of pain. It is argued here, that recognizing the important role of peripheral sources of pain, specifically MTrPs, can greatly enhance treatment models so as to reduce pain, restore functionality, and reduce treatment costs.

DISCLOSURES

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Efficacy of pelvic floor magnetic stimulation combined with electrical stimulation on postpartum pelvic organ prolapse: a retrospective study

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ABSTRACT

Objective: To evaluate the effect of pelvic floor magnetic stimulation combined with electrical stimulation on postpartum pelvic organ prolapse.

Materials and Methods: A retrospective study was performed by reviewing the clinical records of postpartum patients with pelvic organ prolapse (POP). POP stage, pelvic floor muscle (PFM) strength, and intrapelvic surface electromyography were compared before and after 20 treatment sessions of combined pelvic floor magnetic and electrical stimulation.

Results: A total of 90 patients' data files were analyzed. One-hundred percent (90 of 90) of the patients improved by decreasing one stage of POP; 93.3% (84 of 90) of patients improved their PFM; the amplitudes for phasic, tonic and endurance contraction were all significantly increased.

Conclusions: The cocktail scheme combining magnetic stimulation, electrical stimulation and biofeedback, not only increases the awareness of PFM, but also improves the PFM contraction and POP stage.

Keywords: Electrical stimulation; pelvic floor magnetic stimulation; pelvic organ prolapse; postpartum

INTRODUCTION

Pelvic organ prolapse (POP) is a condition in which organs fall down or slip out of place and present as a bulge or herniation of a pelvic organ. POP is classified as a cystocele, rectocele, uterine prolapse, enterocele or vault prolapse. The prevalence of POP, based on a clinical evaluation, in general population of females was considered to be more than 30%, while prevalence based on vaginal bulge symptoms ranged between 5 and 10%.[1] Symptomatic POP may cause substantial discomfort, lower quality of life and restrict daily activities. An estimated lifetime cumulative risk of 7-11% POP surgery has been reported and reoperation is common.[1] Prevention and diagnosis of early symptoms is important. The incidence rate of POP stage ≥II is estimated to be between 18-56% 3 to 6 months' postpartum.[2,3] Pregnancy, childbirth, and heavy lifting can weaken the structure of the vagina and cause POP.[4]

Treatment options vary depending on the severity of symptoms and the degree of prolapse. Conservative management includes lifestyle advice, pessary, pelvic floor muscle (PFM) training (PFMT), biofeedback, electrical stimulation, to mention some of the common interventions, and these are usually adopted for mild to moderate degrees of POP. Evidence suggests pessary and PFMT are also effective first-line treatments for women

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with POP in stages I, II and asymptomatic stage III. Activity of the PFM plays a critical role in providing structural support to the pelvic organs.[5] Several randomized controlled trials (RCTs) have shown that PFMT is effective in reducing symptoms and reversing or preventing further development of POP.[6,7] PFMT can improve the performance, extension, and elasticity of the levator ani and perineal muscles. Furthermore, a blind RCT found that PFMT significantly improved PFM strength and thickness, elevated the bladder neck, narrowed the area of levator hiatus, and reduced the length of muscle in females with POP. These morphologic changes after PFMT reveal that strength training of PFM may potentially prevent or reverse postpartum POP.

The ability to perform a proper contraction of pelvic muscles is essential for PFMT to be effective. Most women don't know their pelvic floor, and it is estimated around 30-50% of women do not know how to contract their PFM correctly.[8] Alternatively, most women activate and co-contract other muscles including the glutei, adductors, and abdomen, exhibit apnea, inhale too deeply, or trigger PFM to move downward (opposite to the desired action). Sometimes, it is enough for the therapist to provide verbal instruction on how to contract the muscles correctly, at other times, biofeedback or electrical/magnetic stimulation is necessary. Intravaginal electrical stimulation or magnetic stimulation can help women recognize and strengthen their PFM.

Electromyography (EMG) biofeedback provides instant, performance-dependent, visual and/or auditory feedback that measures the function of muscles and thus helps to increase self-consciousness and teach correct contraction of the muscle. The visual feedback is beneficial to the patient to learn how to upregulate underactive muscle or downregulate overactive muscle.[9]

In the pelvic floor area, electrical stimulation induces skeletal muscle training, remodels smooth muscle and/or connective tissues to enhance the pelvic floor support function. It helps to develop PFM awareness and is therapeutic for patients who present with PFM weakness.[10]

Magnetic stimulation relies on the use of electric current caused by a time-varying magnetic field. Depolarization of neural tissue tends to be distinct after either electrical or magnetic stimulation. Therefore, presumably, they affect the musculature of pelvic floor in a similar manner. Magnetic stimulation can result in hypertrophy of the PFM, change the proportions of type I and II fibers, and enable greater recruitment. In women with stress urinary incontinence (SUI) who can't isolate or contract their PFM sufficiently, the superiority of magnetic stimulation over sham therapy has been confirmed.[11] Currently, despite the widespread use of magnetic stimulation in urinary incontinence, overactive bladder, constipation, there is no research on the effect of magnetic stimulation on postpartum POP.

A question that remains unanswered is whether patients can benefit from a combined therapy involving magnetic stimulation, biofeedback and electrical stimulation, rather than any one of these methods on its own? Although there is clear evidence that each of the strategies taken individually improves muscle strength, there is no research to test if the combination of these techniques used alternately produces better results than when carried out individually. The aim of this study was to evaluate the efficacy of pelvic floor magnetic stimulation combined with electrical stimulation and biofeedback on postpartum POP.

MATERIALS AND METHODS

This study is a retrospective study of patients from June 2018 to June 2019. Patients' clinical records were reviewed to gather information about each patient's presenting problem at their first postpartum checkup (from 42 days to 180 days after delivery), the treatment that was provided and the therapist-assessed outcome at the final treatment session.

All patients who finished 20 sessions of treatment including combination of magnetic stimulation, electrical stimulation and biofeedback were enrolled in the group.

Inclusion criteria: age between 20-38 years; full-term pregnancy; single birth; POP-Q stage I or II.

Exclusion criteria: stages III or IV prolapse; with SUI or POP prior to pregnancy; third or fourth degree perineal tears; cancer in pelvic region; neurologic disorders; receiving other treatments for prolapse; serious illness to mother or child; any interruption for more than 2 weeks during treatment period; anyone with either a cardiac pacemaker or metallic hip implant.

Intervention

At the first postpartum check-up appointment (at day 42 or later), a standardized history was recorded and all women were educated in verbal and written form to perform PFMT. After they were taught how to contract their PFM correctly, all women underwent an assessment of PFM strength using a Modified Oxford scale. All participants undertook to do three sets of PFMT exercises daily for 8 weeks and were supervised during the 8 weeks' treatment.

Treatment regimen

The total treatment regimen included 20 sessions. The first five sessions were pelvic floor magnetic stimulation, three times per week. Then the patients practiced PFMT with the assistance of biofeedback from the sixth to tenth session, followed by 15 minutes electrical stimulation, three times per week. Then the eleventh, thirteenth, fifteenth, seventeenth and nineteenth session was magnetic stimulation and the twelfth, fourteenth, sixteenth, eighteenth and twentieth session was electrical stimulation combined with biofeedback-assisted PFMT.

Biofeedback-assisted PFMT

The surface EMG (sEMG) biofeedback exercises were adopted to assist with PFMT. To record the PFM, a single channel sEMG vaginal probe (two longitudinal stainless electrodes on both sides) was used in connection with a Myotrac Infiniti (Thought Technology Ltd., Montreal, PQ, Canada). Two abdominal patch electrodes were attached to monitor any abdominal muscle co-contraction during PFM contraction. The rectified mean square sEMG signal from the intravaginal probe, monitoring pubococcygeus muscle, was displayed together with the abdominal tracing.

The double channel system is necessary to teach patients how to contract the PFM muscles without co-contracting abdominal muscles. The feedback screen was always set within the range of the individuals flick and tonic contraction, to train them to improve their ability of the coordination, strength and endurance of PFM. The biofeedback-assisted PFMT lasted 15 minutes per session.

Electrical stimulation

Electrical stimulation was delivered using the same instrument used for biofeedback-assisted PFMT. The placement of the vaginal probe was the same as previous description. The stimulus consisted of a fixed parameter asymmetric biphasic current: frequency 30 Hz, pulse width 300 μs, work time/rest time 8 s/10 s, ramp up 1 s, ramp down 1 s. Pulse intensity was regulated to the most tolerable intensity. Electrical stimulation session lasted 15 minutes.

Pelvic floor magnetic stimulation

During treatment, patients were seated fully clothed in an armchair of Magneuro60F (Nanjing Vishee Medical Ltd., Nanjing, Jiangsu, China). Within the armchair's seat was a magnetic field generator (stimulation coil) which was connected to and controlled by the main engine. The treatment frequency of the pulsed magnetic field was 30 Hz and the treatment intervals were intermittent (5 s on and 5 s off). The amplitude (0-100%) was adjusted to the most tolerable intensity. Treatment session lasted 20 minutes.

Outcome measures

The primary outcomes were measured as stage of POP. Secondary outcomes were PFM strength and intrapelvic sEMG readings.

POP stage

Stage of POP was diagnosed using the reliable POP-Quantification examination (POP-Q) in which the defined maximal point of vaginal descent is measured relative to the hymen during strain with the woman in a supine lithotomy position. The POP-Q examination was conducted by a fixed gynecologist who followed a rigorous protocol and a standardized procedure.

PFM strength

PFM strength was measured using Modified Oxford Scale, performed using digital assessment. During digital examination, the examiner asked the woman to contract her PFM without any assistance from abdominal, hip and leg muscles, and then assigned a score out of 0-5 (0-no contraction, 1-flicker, 3-weak, 4-moderate, 5-strong).

Intrapelvic sEMG assessment

The Glazer Protocol was used for assessment of PFM. The protocol was developed by Glazer and Hacad[12], and records and analyses the sEMG signal associated with the neuromuscular activation of PFM. The Glazer Protocol is composed of a fixed series of contraction and relaxation, directed via on-screen sEMG tracing templates and voice commands. The fixed sequence of muscular activity includes: 60 s pre-baseline rest, five phasic (quick flick) contractions with 10 s interval between each contraction (phasic contraction), five 10 sustained contractions with 10 s interval between each contraction (tonic contraction), 60 s endurance contraction, 60 s post-baseline rest. The EMG signal and data analysis were conducted using the Myotrac Infiniti and Bioneuro Infiniti. The amplitudes for phasic, tonic and endurance contraction were analysed.

Statistical Analysis

Data was analysed using SPSS, version 19. All data were presented as mean ± standard deviation (SD) of the mean. Paired t-tests were conducted to compare the data of pre-treatment and post-treatment. P value was set to ≤0.05.

RESULTS

A total of 90 patients met inclusion for this study. Of these women, 26.7% had stage I and 73.3 % had stage II POP; 12.2%, 25.6%, 55.6%, 6.6% had degree 0, 1, 2 and 3 PFM muscle strength (Table 1). After 20 times of treatment, 100% of the patients improved by decreasing one stage of POP (Table 2). For improvement of PFM strength, only 6.7% patients' PFM strength didn't change. 93.3% of patients improved their PFM. 10% patients increase two degrees (Table 3). According to EMG values, after 20 treatment sessions, the amplitudes for phasic, tonic and endurance contraction were all significantly increased ($p<0.01$) (Table 4).

DISCUSSION

This study shows that a "cocktail" scheme (magnetic stimulation, electrical stimulation and biofeedback) is associated with significant improvement in the stage of postpartum POP, and PFM strength for postpartum women. After receiving two months of "cocktail" treatment, the patients with stage II POP recovered to normal or stage I POP, and enhanced PFM muscle strength. The EMG assessment showed a very significant change. Other researchers also reported significant improvement following 16-week of PFMT, plus lifestyle advice intervention, showing significant improvement in POP symptoms and POP-Q measurements, and 45% change in POP stage.[13] PFMT appears to be crucial to the conservative management of POP, but an insufficient treatment dose or low adherence to training will significantly decrease the improvement rate. Biofeedback was originally introduced to treat urinary incontinence, constipation, overactive bladder and chronic pelvic pain. The basic goal is to make patients aware of their muscle function and enhance the quality of PFMT. However, it has been shown to be an effective approach to increase the PFM strength and alleviate the symptoms of POP.[14] Electrical stimulation is commonly used when rehabilitating muscles because it activates nerve fibers. Pelvic floor electrical stimulation has been used to stimulate the pudendal nerve for PFM activation. Intravaginal electrical stimulation may help patients identify and contract their PFM, strengthening these muscles and substantially assisting with pelvic floor dysfunction.[15] Electrical stimulation is used separately or together with PFMT to alleviate urinary incontinence (UI) symptoms, but it is seldom put to use in POP treatment, yet its impact has been confirmed in PFM strength improvement.

Table 1. The demographic characteristics of the participants

		Value
Stage of POP	Stage I	24
	Stage II	66
PFM strength	0	11
	1	23
	2	50
	3	6
Age (mean ± SD)	-	29.50±3.58
Vaginal delivery number	-	80
Cesarean delivery	-	10
BMI (mean ± SD)	-	23.18±3.12

POP: pelvic organ prolapse, PFM: Pelvic floor muscle, SD: Standard deviation, BMI: Body mass index

Table 2. Change in severity stage from pre-treatment to post-treatment

Change in stage	People (n=90)
From stage I to 0	24
From stage II to I	66
-1 stage	90

n: Number

Table 3. Change in PFM strength from pre-treatment to post-treatment

Change in PFM strength	People (n=90)
+2 degrees	9
+1 degree	77
No change in degree	6

PFM: Pelvic floor muscle, n: Number

Table 4. Change in intrapelvic sEMG value between baseline, 6 weeks' postpartum and post-treatment (n=90)

	Pre-treatment (μV)	Post-treatment (μV)	p
Phasic contractions	18.87±8.65	31.48±6.66	1.30E-21
Tonic contractions	13.17±6.17	29.53±4.40	1.32E-45
Endurance contractions	12.84±6.15	27.55±3.76	1.22E-45

sEMG: Surface electromyography

Magnetic stimulation therapy is a new way of providing noninvasive, passive stimulation to the pelvic floor. In 1998, the United States Food and Drug Administration approved this new form of conservative therapy for UI. An electrical coil generates pulsed magnetic fields which generate an induced ion surge, at the tissue level. The electrical eddy currents lead to depolarization of the membrane. It allows PFM to contract and in time the training leads to a reduction of UI symptoms. Magnetic stimulation alleviated UI frequency, improved micturition and quality of life of UI patients. In particular, patients who may not have the ability to do normal PFMT can be treated using this method.

Culligan's team performed a randomized, double-blinded, sham-controlled study of postpartum extracorporeal magnetic innervations to restore pelvic muscle strength at six weeks' postpartum. They found that using eight weeks of treatment (twice weekly) with 50 Hz magnetic stimulation for 20 min/session to regain PFM strength after childbirth as ineffective.[16] However, in present research the combination of magnetic and electrical stimulation resulted in a significant increase in PFM strength. The different results may be due to: (1) treatment protocol; in Culligan's trial, all patients only received magnetic stimulation, whereas in the present study, we combined magnetic stimulation, electric stimulation and biofeedback together. Biofeedback is useful to help patients master how to contract PFM correctly and efficiently, improving their score when practicing PFM strength assessment; (2) the frequency of 50 Hz chosen in Culligan's trial is not optimal for strengthening PFM. In the present study, 30 Hz is used for both electrical and magnetic stimulation.

Study Limitations

The limitation of this study is that there was no control group. RCTs are needed before drawing any definitive conclusions on the effect of pelvic floor magnetic stimulation combined with electrical stimulation in prevention and treatment on postpartum POP.

CONCLUSIONS

This is the first study to report a cocktail scheme for postpartum POP management. For young women who suffer POP after vaginal or cesarean section delivery, rehabilitation of the PFM is important in the prevention and treatment of POP according to Norton's dry boat theory. But for some reasons, the home-based PFMT is not a good recommendation for postpartum women in China due to the special postpartum care culture. Chinese postpartum women are always concerned about the new babies so that it's common for them to forget to practice PFMT. Forgetting to do PFMT is the main cause of low adherence. Therefore, development of a high adherence treatment scheme is important for them. The cocktail scheme combining magnetic stimulation, electrical stimulation and biofeedback, not only increases the awareness of PFM, but also improves the PFM contraction, finally improves the POP stage.

DISCLOSURES

The author declares no conflict of interest, no financial support by any grant or research sponsor, and no competing financial interest.

Authorship Contributions

Medical Practices: Lin Zhang, Xiaojuan Lv, Concept: Jiasong Tang, Design: Jiasong Tang, Data Collection or Processing: Lin Zhang, Xiaojuan Lv, Analysis or Interpretation: Lin Zhang, Literature Search: Lin Zhang, Writing: Jiasong Tang.

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Introduction to the Fascial Manipulation® model for case reports

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ABSTRACT

The Fascial Manipulation® method is a concept based on fascial anatomy and physiology. Based on research, the biomechanical model for internal dysfunctions offers possibilities for effective treatment of such ailments as: vulvodynia, constipation, urinary incontinence, chronic urogenital pain, painful intercourse, scars post surgical intervention and many more. For a comprehensive outline of FM treatment, it is necessary to take part in a FM course. This introduction is intended as general information for the two case studies that follow.

Keywords: Biomechanical model; catenary; center of coordination (CC); center of fusion (CF); densification; Fascial Manipulation; internal dysfunction

The Fascial Manipulation (FM) method was created by the Italian physiotherapist Luigi Stecco.[1] Initially, the method was used to treat dysfunctions of the musculoskeletal system by manipulation of points referred to as Centers of Coordination and Centers of Fusion.[2] Its application has been extended to internal dysfunction, which, it is hypothesized arises from densification of fascia at the superficial, deep, visceral, vascular and glandular fasciae. Any impediment to gliding between endofascial fibers and interfascial planes can cause anomalous tension, inflammation, dysfunction and pain or alteration in internal organs function.

The fundamental structure in FM is the myofascial unit. This unit is made up of muscle fibers, nerves, vessels, ground substance (the extracellular matrix of connective tissue) and fascia which connects all these components. FM acts most of all on the ground substance, which is pliable and modifiable, when subjected to adequate pressure. Fasciae consist of adaptable elastic fibers, as well as inextensible collagen fibers. Elastic fibers can elongate and shorten only if they are immersed in a normal ground substance (i.e. not too viscous). If the consistency of the ground substance changes to being more viscous it gives rise to fascial 'densification', which is marked by the loss of fascial adaptability. Densification is mainly caused by overuse, trauma, cold and changes associated with metabolic syndromes. The most important ingredient that determines ground substance viscosity is hyaluronan. Depending on the strain to which it is subject, hyaluronan can become either more or less dense. If the hyaluronan assumes a more packed conformation, the loose connective tissue inside the fascia and underlying muscle is compromised, and this forms the basis of the common phenomenon known as "myofascial pain".[3,4] While

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densification of the fascia results from a modification of the fluid state of hyaluronan towards a more gel state, the frictioing produced by manipulation of the fascia can reverse this process through a local increase in tissue temperature. As the body part is manipulated, therapist commonly perceive a sudden improvement in tissue glide.[5]

With increased research on the structure, physiology and continuity of the fascial system, the concept of FM has expanded to incorporate a working model for the management of functional disorders of internal organs. This model is based on the civil engineering concepts of tensile structures, which closely correspond to the anatomy of the human trunk. There are two interconnected tensile structures which act on each other:

- An external tensile structure-consisting of four trunk cavities and head, including muscles and fascia: cp-caput, cl-column, th-thorax, lu-lumbi, pv-pelvi,
- An internal tensile structure-made of fascial structures which provide anchorage to internal organs and fascia which surrounds every single organ.

The main task of tensile structures is to maintain the correct vital space within the cavity that houses a particular organ apparatus. The terms “apparatus” refers to a group of organs that perform the same function, e.g. digestive or respiratory. Within each tensile structure we may distinguish three lines of tension: antero-posterior, lateral-lateral and oblique. The tensional balance of these lines is the basis for maintaining the correct shape of the body container and of the pressure inside each individual cavity. The fascial continuity of individual tensile structures (caput, collum, thorax, lumbi, pelvis) creates a trunk catenary labelled in the same manner as identified above. In order to maintain proper tension, these structures utilize the myofascial system of the trunk and limbs, which consist of proximal pivot points (shoulder and hip girdle) and distal anchoring elements called distal tensors (wrist and ankle). The role of proximal pivot points and distal tensors is to maintain and regulate tensional forces of the trunk. It means, that every alteration in the fascial system, irrespective of where it is, may have significant implications for the trunk wall, altering tension, pressure and affecting its adaptability to changing conditions, both in the internal and external soft tissue environment. According to the FM method there are four sequences consisting of two apparatuses in each sequence, except for the Receptor Sequence:

- Digestive and Respiratory Apparatuses (ADI & ARE) are part of Visceral Sequence (SE-VI),
- Urinary and Circulatory Apparatuses (AUN & ACI) are part of Vascular Sequence (SE-VA),
- Endocrine and Hematopoietic Apparatuses (AEN & AHE) are part of Glandular Sequence (SE-GL),
- Mechanoreceptor, Photoreceptor and Chemoreceptor Apparatuses (AMR, APR, ACR) are part of Receptor Sequence (SE-RC).

In the case of internal dysfunction, these systems play an important role. A System consists of anatomical structures extended along the body, which have a similar organization and are responsible for such functions as: metabolism, thermoregulation and immune reactions. Systems have two components, external and internal. The external part of the system is directly connected to the superficial fascia and the internal part is related to the internal fascia associated with the apparatus. The superficial fascia (an external part of the system) connects components such as: lymphatic vessels and nodes of the lymphatic-immune system (SLI), adipose tissue for adipose-metabolic system (SAM), glands for cutaneous-thermoregulation system (SCT) and receptors for neuro-psychogenic system. The internal part of the systems consists different apparatuses which play a role in immune defense, metabolic process, thermoregulation and responses to environmental changes. Prevertebral and paravertebral ganglia are used to connect the external part of the system (superficial fascia) with the internal part of the system (internal fascia of apparatuses).[4]

FM treatment requires in clinic movement and palpatory verification, to identify the catenary that requires treatment and interferes with internal motility. During palpation the therapist’s aim is to find the most altered line of tension by palpating points on the trunk, shoulder and hip girdle (pivot points) and in the distal segments of the limbs (distal tensors). As far as superficial fascia treatment is concerned, the human body is divided into quadrants: antero-medial, antero-lateral, postero-medial and postero-lateral. Each system requires a specific manual technique for palpation and treatment. For superficial fascia therapist use palpations of the quadrants of the superficial fascia in order to identify “attractor points”.

The term “attractor” signifies a compressed point (or area of attraction) within a quadrant that, as it densifies, tends to compensate itself by attracting the nearby skin retinaculum structures. Depending on the assessment and any alterations identified in the superficial fascia, a particular technique is chosen, either mobilization–SLI, pinching–SAM, or scratching–

SCT. For each sequence and system there is a particular protocol used depending on the outcome of palpatory verification.[4,6]

FM acts on the peripheral systems according to certain principles. Fascial therapist does not attempt to substitute the lymphatic deficit with drainage, or the circulatory lymphatic deficit of the adipose tissue with massage, or the neurological deficit with stretch. Instead, fascial therapist frees the compressed lymphatic vessels, stimulates the retinacula of the adipose tissue and manipulates the fascia that is compressing a peripheral nerve. In order to free a lymphatic vessel or a compressed nerve, fascial therapist acts in the quadrant that is proximal to the area of deficit. For dysfunctions that tend to imitate an internal organ disorder and are localized in one segment of the trunk, manipulation of some points on the tensors of trunk wall is proposed. This proposal is based on an engineering principle related to tensile structures. For dysfunction of the apparatus (i.e. urogenital), therapists work along the catenaries of the trunk (lines of tension) and the tensors of the limbs. FM uses the same points that correspond to acupuncture points.

Almost all acupuncture points are indicated for both musculoskeletal and internal dysfunctions. The difference between acupuncture and FM lies in the way that the points are stimulated and in the combination of the points that are used. Moreover, different manual approaches are used to stimulate points, or small areas, based on the principle that fascia is the only pliable and malleable tissue in our body. What is also worth mentioning is the fact that, fascia interacts with muscle spindles within the musculoskeletal system, and it also interacts with neuronal network of the internal organs, which is possible on account of fascial elasticity, fluidity and correct basal dimension.

For more comprehensive outline of FM treatment, it is necessary to take part in a FM course. This introduction is intended as general information for the two case studies that follow (Diagram 1).

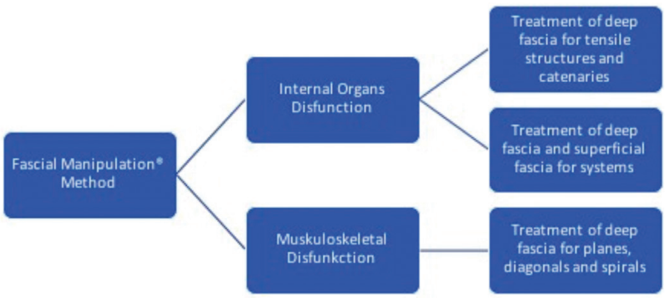

Diagram 1. Fascial Manipulation treatment organization

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Case report: Treatment of episiotomy scars according to the concept of Fascial Manipulation®

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ABSTRACT

The widespread use of episiotomy contributes to pelvic floor muscle dysfunction and concomitant complaints. The biomechanical model of the Fascial Manipulation method addresses the consequences of episotomy. Ailments such as painful intercourse, dysuria, chronic pelvic pain can be successfully treated using the Fascial Manipulation model.

Keywords: Care of the scar tissue; chronic urogenital pain; dysuria; episiotomy; Fascial Manipulation; pelvic sensitization; pudendal nerve neuralgia

INTRODUCTION

This case study highlights the application of the Fascial Manipulation® (FM) method to the treatment of episiotomy scars. It provides general information concerning episiotomy scars, and outlines an approach based on FM concepts, and provides useful suggestions about the care of the scar tissue. On the basis of evidence from this case study and literature in general the concluding remarks questions the ongoing use of episiotomies.

Episiotomy is the most commonly used surgical procedure despite the fact that its effectiveness has never been proven. On the contrary, research since the early 1980s provides new evidence of the harmfulness of this procedure.

Medical standards should be based on current, reliable and credible scientific research. This would give doctors and midwives confidence that what they are doing is best for their patients, based on the effectiveness of a given procedure. In the case of episiotomy, the procedure is still widely used, in spite of recommendations to the contrary.

The history of the episiotomy dates back to the 17th century and the first use of forceps. The first mention of this procedure in obstetric literature appears at the beginning of the 19th century. Canadian sociologist Ian Graham, who studied the history of episiotomy in Anglo-Saxon countries, writes that the incision was initially treated distrustfully and as a last resort, even for fear of infection. One of the promoters of routine episiotomy was the influential American obstetrician Joseph De Lee. In 1913 he published the thesis that every delivery is a pathological process and requires surgical intervention.[1-3] His suggested delivery method consisted of using anesthesia, making an extensive episiotomy and bringing out the baby with forceps. In the first half of the 20th century, routine episiotomies gradually gained widespread acceptance; in the US in the 1930s and 40s; in Great

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Britain and other European countries in the 1950s and 60s. Until the 1980s, neither doctors, midwives, nor women questioned the need for routine incision in the perineum, though the benefits have never been proven.

In the 1980s, thanks to the popularization of evidence-based medicine and the emergence of movements promoting women-friendly obstetrics, the routine episiotomy was criticized. The World Health Organization (WHO) in the document "Childbirth is not a disease" recommended limiting the use of episiotomy because "there is no excuse for routine episiotomy".[2] Currently, the recommendations of the WHO regarding the conduct of normal delivery states "There is no credible evidence that liberal or routine episiotomy has positive effects. Research clearly shows the opposite. In a number of normal deliveries, an episiotomy is justified, but it is recommended to limit the use of this procedure".[1] Experts from the WHO state that it is justified to use an episiotomy in 5-20% of births.[3] It is also noteworthy that The Cochrane Library, refers to the procedure as one whose harmfulness and lack of effectiveness have been proven beyond reasonable doubt.[4,5]

The classification of perineal injuries during delivery (according to the International Classification of Diseases) provides the following guidelines,

First degree- rupture of the vagina and skin of the perineum without disturbing the pelvic floor muscles,

Second degree–pelvic floor rupture, perineal and vaginal muscles,

Third degree–rupture involving the external anal sphincter, Fourth degree–rupture involving the rectal mucosa.

These guidelines are outlined in brief and are referred to in the following case study and discussion.

CASE REPORT

Anna is a 30-year-old medical practitioner referred for physiotherapy on account of severe recurrent back pain of one month's duration, with pain severity rated as 6/10 on the VAS. Worsening of the pain occurs when she carries her six-month old baby, and during defecation when pain is rated as 3/10 on the VAS. Anna had a natural delivery with an episiotomy. However, her backpain predates the birth by 14 years. Comorbidities that the patient complained about include: night teeth clenching and wearing braces for 19 years, dysmenorrhea for 15 years, (8/10 on VAS), morning feet pain since she was 13 years old (5/10 on VAS), and irritable bowel syndrome for three years. Based on the FM model, the treatment hypothesis considered the endocrine apparatus and the caput segment (head) as the most involved according to the chronology of symptoms and the FM principle that "old is gold"- referring to the chronology of symptoms.

Treatment and results of the fascial manipulation concept

Anna was provided with four sessions of FM and two sessions of scar mobilization. The first session was dedicated to the following points as shown in Figure 1 and Figure 2.

At the time of the second session she reported no back pain and being able to carry her baby without any problems, or with only mild discomfort (2/10 on VAS). There was no more discomfort

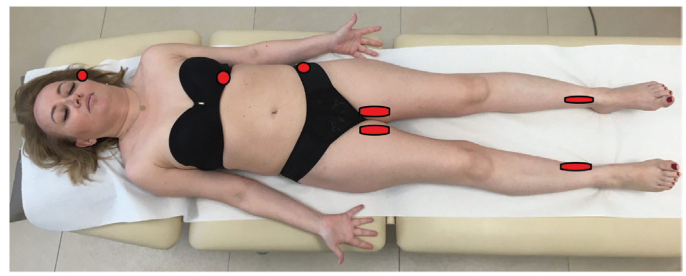

Figure 1. Anterior points. IRCP2 rt (head), IRTH lt (chest), IRPV rt, (pelvis), qANMECX bi (thighs), qANMETA3 bi, (calves)

during defecation. The therapist decided to continue the treatment started during first session and manipulate following points as shown in Figure 3.

Figure 2. Photo of posterior points. ERCP3 rt (head), ERTH lt (chest)

After two weeks patient reported full improvement in back pain (0/10 VAS) and also in morning feet pain (1/10 VAS). During the next two sessions mobilization of the episiotomy scar was performed and one week later she was provided training in automobilization of scar tissue. At the time of the third session of FM, one month later she reported a significant improvement in dysmenorrhea (4/10 VAS). Anna still reported feeling bloated due to her irritable bowel syndrome (5/10 VAS). Palpatory verification highlighted points for manipulation as shown in Figure 4 and 5.

The fourth session took place one month later, to verify any improvement in dysmenorrhea and other complaints of the patient. In the case of dysmenorrhea there was a further improvement (2/10 on VAS), now described as a feeling of discomfort, but no pain. As far as bloating was concerned, sensations decreased to the level of 3/10 on the VAS. In that case, after palpatory verification, therapist decided to manipulate the following points as shown in Figure 6 and Figure 7.

After these sessions Anna was asked to make a phone call in case of worsening of symptoms and pain. Two months after her last treatment a follow up phone call was made and she reported that there was no noticeable pain or any worsening of co-morbidities. The same phone call was made after four, six, and eight months following treatment and there was no worsening of symptoms and pain reported by the patient.

The authors recommend the use of the FM method in the treatment of disorders after episiotomy depending on the three phases of tissue healing. Wound healing is divided into continuous and overlapping phases including coagulation, inflammatory response phase (the first 48-72 h after the injury); proliferation phase that includes the formation of extracellular matrix (ECM), angiogenesis and re-epithelization (days 4-21); and final remodeling or maturation phase, which may last up to a year.[6-9] This final regeneration phase results in the formation of a scar with excess collagen and an absence of cutaneous fat and hair follicles.[10] Fibrillar collagen, as a main structural component of the ECM, has a crucial role both in the elasticity and the strength of an intact skin and scar tissue.[11] Both normal and pathological scars are the result of deposition of collagen type I and III, although collagen synthesis in hypertrophic scars is two to three times as much as in normotrophic scars.[12] Collagen III increases more than type I in the early stages of wound healing but decreases during maturation phase to normal levels.[13]

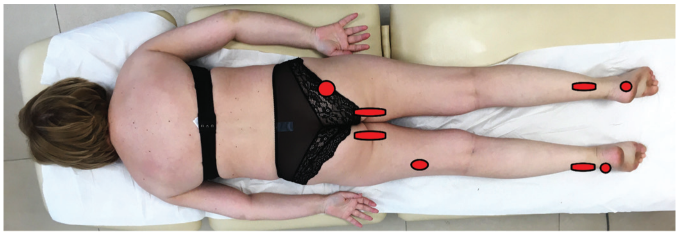

Figure 3. Photo of points treated during second session. qREMECX bi (thights), RELATA3 bi (calves), ERCX rt (m.piriformis), ERGE lt (distal part of left thight), RELAPE2 rt, RELAPE1 lt (foot)

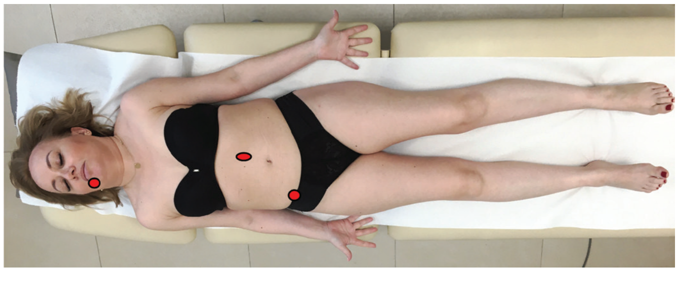

Figure 4. Photo of anterior points. ANMECP3 rt (head), ANMELU2 lt (above umbilicus) ANPV rt (pelvis)

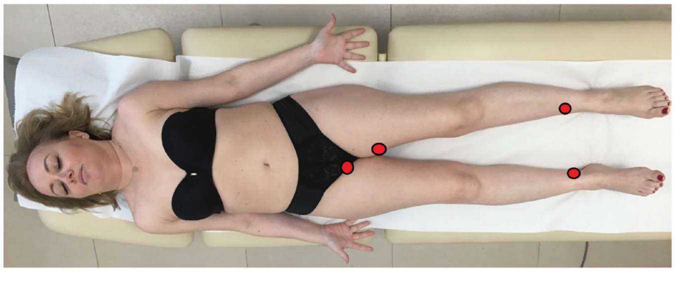

Figure 5. Photo of anteriorpoints. ANMECX rt (the groin) ANMETA2 rt (calf), MECX lt (thight), ANMETA1 lt (calf)

Figure 6. Photo of posterior points. REMECP3 rt, RECP3 lt (head), REMETH2 rt (chest), REMEPV1 rt (sacrum), REMECX lt (coccyx)

Figure 7. Photo of posterior points. REMEGE2 rt (blowe the knee) REMEPE2 lt (foot)

The approach to treatment and its goals should be set out for the individual patient, based upon scar evaluation, patient's characteristics, and expectations in order to reduce the scar volume, minimize subjective symptoms, i.e., pain and pruritus, and to improve function and esthetic appearance.

Inflammatory, coagulation phase (48-72 h)

In this phase, in addition to typical wound care procedures, it is recommended to perform deep-fascial therapy at the level of the pelvis segment away from the wound site. The choice of points for therapy depends on the palpation. The therapist selects the most altered tensile structure (anteroposterior, lateral or oblique) and manipulates the densified points from a given tensile structure. The goal of this treatment is to reduce perineal tone and balance pelvic pressure and improve drainage. We treat the points in the front first and then the back of the pelvis.

Proliferation phase (4-21 days)

In this phase, we work on segments of the trunk and lower limbs, healing so-called catenaries (carrying lines) and further tensors on the lower limbs. The therapist chooses one of the three catenaries and performs treatment once every 5-7 days. We treat one catenary at each session. We perform three treatments depending on patient's needs. After three treatments, in most cases, all abnormal tension in the fascia of the trunk and extremities should disappear. If there are complications such as lower limb edema, the therapist may perform superficial fascia quadrant therapies directed at the superficial lymphatic system.

Remodeling phase (up to one year)

A patient in this phase is only treated if there are unresolved ailments in the second treatment period or if she has received treatment without treatment of earlier phases. Patients with dyspareunia and the pudendal nerve entrapment are the ones who present most often. If there is a problem with urinary incontinence as a result of a rupture of the perineum, third or fourth degree, we perform treatment of the urinary apparatus according to FM, where the therapist balances the pressure in the pelvis and eliminates the incorrect tension of the fascia from the lower limbs. In the case of sexual disorders, we offer psychogenic system therapy depending on the type of dominant germ layer. Ectodermal layer requires treatment of the superficial fascia in quadrants of the whole body. Mesodermal layer requires treatment of deep muscular fascia of the whole body and endodermal layer requires treatment of the digestive tract through a deep fascia with catenary.

The goal of this treatment is to regain normal sensation from receptors in the affected fascia and to balance the autonomic tension. For the purposes of this case report, local work will be shown when there is pudendal nerve entrappment, which causes serious problems at the perineal level. The pudendal nerve may be entrapped in the following places; under the piriformis muscle in the subpiriformis canal, at the passage between the sacro-spinal and sacro-tuberous ligaments; in the Alcock canal; or in the superficial fascia in the terminal area along the ischial-pubic branch. Moreover, neuralgia of the pudendal nerve can cause neuropathic pain of varying severity in the perineum, where pain is defined as intense, sharp, with a burning sensation and sometimes as numbness. In some instances, it can cause a sensation of a foreign body in the anus or vagina (sympathy), these are common presentations. Pain is one-sided or often medial, more intense during the day when sitting or wearing tight clothing. Neuralgia of pudendal nerve is often associated with pelvic sensitization and problems with the urinary system (pollakiuria, dysuria), anorectal dysfunction (dyschezia, increased pain after defecation, or before defecation). Sexual problems are often present (dyspareunia, intolerance of vulvar contact, exacerbation of pain after intercourse, persistent genital arousal).

In order to release the nerve at the buttock level, Stecco proposes the treatment of fascial point associated with the piriformis muscle- ER CX, the point in the deep fibers of the gluteus maximus REME CX and RE CX as shown in Figure 8 and Figure 9.

For the entrapment of the pudendal nerve in the Alcock canal, the author suggests a gentle release of the superficial fascia at the level of the obturator foramen, the quadrant qREME CX, photo on the side of the foramen. For entrapment of nerve in the area of the terminal branches, we treat the quadrant qANME CX along the ischial-pubic branch as shown in Figure 10, Figure 11 and Figure 12.[14]

CONCLUSIONS

The FM method proposed by Lugio Stecco is a new approach to the treatment of disorders in the myofascial system, which can be effectively used to eliminate disorders after an episiotomy. Disorders that are a consequence of complications following a perineal rupture or poorly healing scar causes can present in varying ways and have multiple origins. The versatility of the FM method allows for fast elimination of disorders and helps to improve quality of life. However, further clinical trials are required to confirm the positive results of the therapeutic effects observed by the authors.

DISCUSSION

In case of Anna the treatment hypothesis was based on her hormonal problems related to dysmenorrhea and other dysfunctions at the head level reflected in clenching of teeth and necessity of braces. From the FM point of view the oldest changes in the fascial system are assumed to be the cause of compensations developing in the body. Dysmenorrhea arises on account of increased myofascial tension in the pelvic region. Episiotomy scar, also contributes to changes in the pelvic region and to alterations in the myofascial system which could be the source of back pain six months after delivery. Although an

Figure 8. Photo of point at ER CX for release entrapment of the pudendal nerve under piriformis muscle

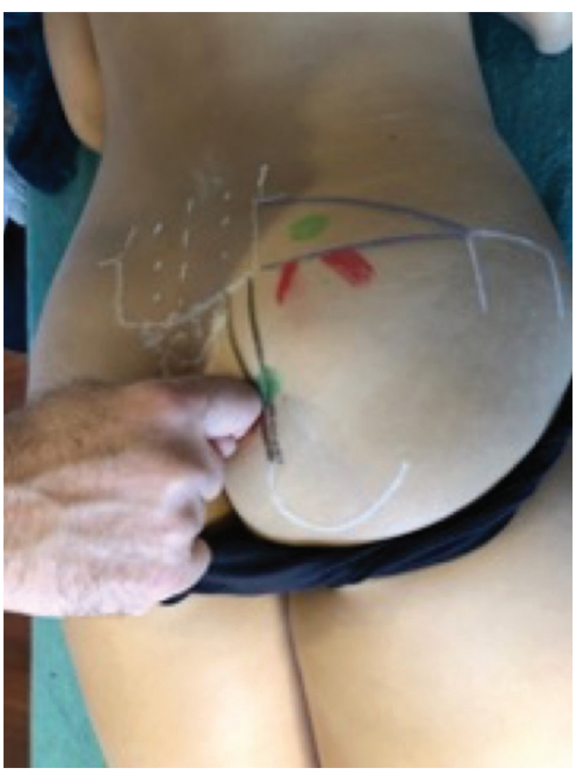

Figure 9. Photo of the treatment of the point of RE CX for release entrapment of the pudendal nerve under sacro-tuberous ligament

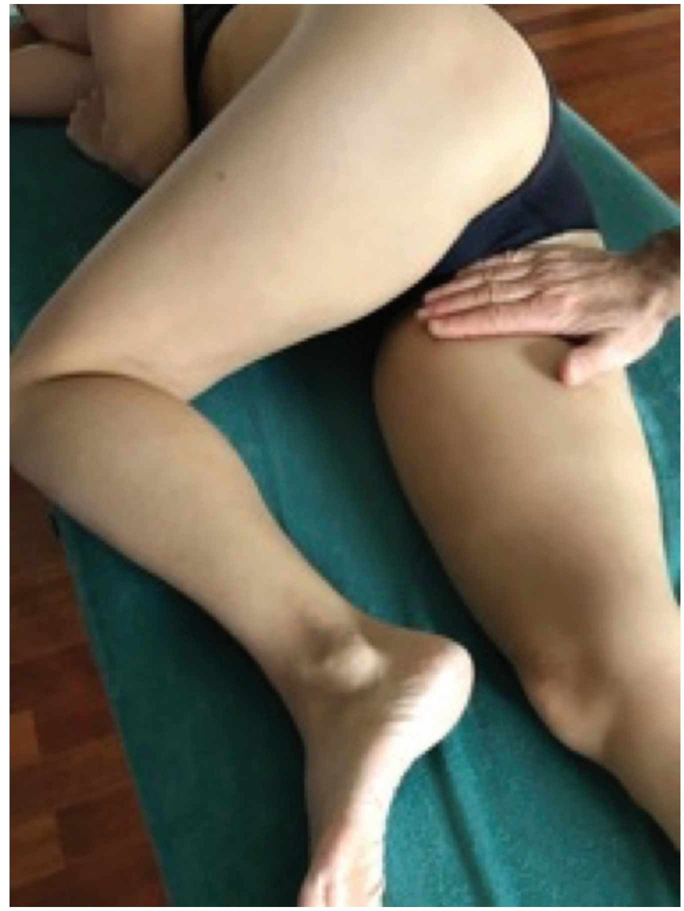

Figure 10. Photo of Quadrant REME-CX for treatment of superficial fascia innervated by pudendal nerve. Treatment focused on branches of pudendal nerve merging from Alcock's canal till the moment of release and restoring gliding between fascial layers

episiotomy scar could be considered as a source of recurrent pain, the treatment always should cover the whole body and be focused on the oldest dysfunction in the body. The principle of "think locally and treat globally" is pertinent to these cases. For this reason, Anna's treatment was global, but also focused on the trauma of the perineum during delivery. It is also worth asking if an episiotomy is a good idea when it may be a potential source of dysfunction and altered myofascial tension. One of the most frequently cited reasons for using a routine episiotomy is to protect the perineum. The question is - how can you protect something while damaging it? An episiotomy corresponds to a second-degree rupture, while women who give birth without an incision most often have a perineum without injury or with a first-degree rupture.

An analysis of 350 medical publications from 1860-1980 carried out in the early 1980s did not confirm any benefits from routine incision in preventing deep perineal injuries of anus, pelvic muscles

Figure 11. Photo of quadrant ANME-CX for the treatment of superficial fascia and terminal branches of pudendal nerve. Treatment focuses on terminal branches of the nerve via treating of the alteration of superficial fascia consistence till the moment of release and restoring the gliding of fascial layers

Figure 12. Photo of scar treatment. For the purposes of this article, an example of a scar mobilization is shown by the example of Caesarean section scar. We rub at the site of the altered scar till the moment when the therapist will feel releasing of the tissue

or fetal head injuries.[15] The authors cite a study comparing perineal healing between one and two weeks after delivery in a group of 181 women undergoing episiotomy and in a group of 186 women who did not undergo surgery. All women belonged to the low-risk group, the delivery was natural. Only 2% of women in the group without episiotomy had grade III and IV tears, compared to 15% in the group with incision. In the incision group, 7.7% of women with prolonged perineal healing were reported compared to 2.2% in the non-incision group. The difference is statistically significant when eliminating women from the incision group who have not suffered from any injury (53%). In none of the four cases of fourth degree rupture in the group of patients without incision was there prolonged healing. By contrast in the incision group, 27 women had third degree rupture and in 18.5% there was prolonged healing of the perineum. Furthermore, two infections were noted, both in the perineal incision group.

Other authors mention various negative consequences of routine incision. These include further incision rupture, significant blood loss, dyspareunia (pain during intercourse), perineal soreness, long healing, infections. According to Sarfati et al.[16], blood loss as a result of an episiotomy is comparable to blood loss by caesarean section. McGuiness et al.[17] briefly reviewed research showing that an episiotomy does not protect pelvic floor muscle tone, nor does it protect from rapture or harm to the fetus. Instead, it increases the risk of infection, including fetal infections, increases pain and dyspareunia, and also causes significant blood loss. Routine episiotomy does not prevent perineal injuries, pelvic floor muscle damage, organ prolapse or fetal hypoxia. Rather it increases the risk of third and fourth degree tears, infection, prolonged wound healing, prolonged dyspareunia and perineal pain and sexual disorders such as lack of interest in sex or lack of an orgasm.

Perineal care after delivery should be a routine procedure regardless of whether the perineum has been injured or not and there are a few rules to follow. Before fetal placenta delivery, it is worth asking a woman to do a series of Kegel exercises. Rhythmic muscle contractions are a good start for regeneration processes and maintaining the elasticity of tissues stretched during delivery. During the puerperium, a woman should avoid any lifting of weights (i.e. a tub filled with water or shopping bags). Patient should also avoid doing housework that requires long periods of leaning, such as vacuuming carpets. Failure to follow these guidelines can have serious consequences - the pelvic muscles and ligaments of the uterus may never return to their former elasticity - causing ailments attributed to births such as lowering of the reproductive organ and incontinence. It is worth remembering that, doing regular Kegel exercises after delivery restores elasticity to tissues stretched during pregnancy.

Care of the incised or torn perineum should be an important aspect of postnatal care. It is good for patients to remember that panty liners should be cotton as those with a mesh surface cause painful burns and healing problems. Pads should change frequently. The wound should be well ventilated and a hair dryer used to dry the area after bathing. After each urination and stool, wash the perineum with water without cleaning agents. If the perineum is swollen, apply cold compresses. For washing and rinsing perineum during the healing process, you can use: infusion of calendula, oak bark or arnica, lavender oil (three drops of oil dissolved in a small amount of milk and one liter of water), tea oil (a few drops per three liters of water), Szostakowski lotion or Tantum Rosa solution (these can be bought in sachets at the pharmacy). If the wound was painful and is not healing well, it is worth rinse it with 10% NaCl. Avoid hip baths as they can accelerate the dissolution of stiches. Arnica five or nine CH (five granules three times a day) should be used as a homeopathic remedies during this period.

DISCLOSURES

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Peer-review: Externally peer-reviewed.

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Case report: Application of the biomechanical model of Fascial Manipulation® in the case of vulvodynia

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ABSTRACT

Vulvodynia is one of the more common pelvic floor dysfunction that women suffer from and affects up to 20% of women and is mostly seen as a dysfunction of the pelvis, lumbar spine and hip joint. It is not enough to base gynecological or physiotherapeutic interview only on the symptoms associated with this region of the body, but even seemingly “unrelated” symptoms such as endocrine dysfunctions or skin alterations, which at first may seem unrelated to physiotherapy, need to be taken in consideration. Vulvodynia is a complex and multidimensional problem requiring a comprehensive approach. The Fascial Manipulation concept is the only physiotherapeutic method giving the possibility of such a global analysis of a patient and focused on the cause of effective treatment. The data collected in detail, combined with the motor and palpation verification, allow the therapy to be planned in detail and with a very good result.

Keywords: Chronic urogenital pain; Fascial Manipulation; pelvic floor dysfunction; vulvodynia

INTRODUCTION

This case study will present the possibilities of the Fascial Manipulation® (FM) method to a complex pelvic floor dysfunction, as seen in everyday physiotherapy practice. It provides an overview of treatment and the outcomes with a one year follow up.

Vulvodynia presents as a spectrum of symptoms, often described as persistent or provoked burning in the vulva area of at least six months duration, as typically seen in chronic pelvic pain (CPP) conditions.[1] As a chronic pain syndrome, vulvodynia effects various aspects of a woman’s life; personal, social and economic. When literature portrays the disorder as a global and holistic dysfunction, with a range of comorbidities, it implies a need for a global, holistic and multidisciplinary approach to the management of the problem.[2] Physiotherapists are well qualified to address such pain disorders, giving due attention to the anatomical and physiological factors from a myofascial perspective, an appropriate first line of intervention.[3,4] In this article we demonstrate the application of the biomechanical model of (FM) method for internal dysfunction as an effective treatment of CPP in cases such as vulvodynia

CASE REPORT

Ewelina is a 28-years-old woman, working as a clerk for the last four years. She was referred by a gynecologist, who diagnosed her with vulvodynia, based on the presence of symptoms of nine years duration. Over the last two months she experienced symptoms of burning, itching, painful tampon insertion and painful intercourse. These symptoms progressively increased until they became unremitting and as a result, she sought a medical consult.

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During the initial assessment a number of other problems were identified. Over the last nine years she also experienced bilateral back pain, which increased after giving birth five years ago and was aggravated by house work. Predating these problems, she reported complaints in extremities, involving her hand and also the head. These date back to when she was a one year old and developed a distal phalanx of the fourth right finger after a cut, which resulted in a bad scar. When she was three-years-old she started to have sight problems involving myopia and began to squint more with her right eye. Ten years ago, she was diagnosed with insulin resistance in conjunction with polycystic ovaries. Six years ago, she developed problems with temporomandibular joint (TMJ), more on the right than on the left, which was manifested in pain and clicking while eating. What is also worth mentioning is that over the last three years she experienced hormonal fluctuations resulting in androgenic alopecia for three years, acne for two years, as well as hypothyroidism for one and half years. According to the biomechanical model guidelines the oldest problem and dysfunction may lead to fascial compensation. According to a working hypothesis based on the model, the hand was a sign that the first segment was affected, from where, all other compensations started, moreover, the glandular and vascular sequences, cutaneous and thermoregulatory systems became involved, including the receptor sequence, together with the photoreceptor apparatus.

Assessment, treatment and results

For the assessment of burning, itching, painful tampon application and painful intercourse the VAS scale was used as well as a self-assessment of life satisfaction. During first session the patient rated the level of burning and itching sensations as 6/10; painful tampon application and sexual intercourse as 9/10, which meant that sexual intercourse and tampon application were impossible. Her self-assessment of life satisfaction was rated as 8/10, which meant that she was not satisfied (1-3 very satisfied, 4-6 satisfied, 7-10 not satisfied).

She underwent eight sessions of FM, with a frequency of six sessions of one per month and two sessions bi-monthly. First session took place on 27th of March 2018 and the last one on 18th of December 2018.

First session, based on the above hypothesis consisted of an assessment which was performed focusing on the Receptor Sequence, which is closely related to functional coordination of the head, hands and feet. The oblique catenary was treated. The next session focused on the oblique catenary as well. Next two session revolved around the structure of the latero-lateral line, and the treatment of this catenary gave the expected result. The three catenaries are shown in Figure 1, Figure 2 and Figure 3.

Subsequent therapies were aimed at balancing the tension in the myofascial system. In general, there were 54 points (CFs and CCs) treated and 26 quadrants of superficial fascia.

The final result was very good, with burning and itching sensation completely resolve (0/10); both tampon application and sexual intercourse became possible with no pain (0/10); and self-assessment of life satisfaction was 3/10 (very satisfied). The most positive effect was noted after the fourth session, when the level of pain and burning sensations decreased to 3/10. What is also worth mentioning is the fact that all other comorbidities, such as bilateral back pain, TMJ pain, clicking and acne disappeared. Moreover, during a follow up ultrasound of the abdominal wall, the number of ovarian cysts decreased from 16 to only one. The result of the therapy was again verified by a follow up phone call a month later, and then after 4 months, 8 months and 12 months following the conclusion of therapy. After the final follow up the gains were still present and none of symptoms came back.

Using the model of the FM method interconnects autonomic, visceral and hormonal connections creating the potential to impact multiple systems. This enables such results as balancing hormonal levels, decreasing the number of ovarian cysts and improving acne. This may seem unattainable by means of manual

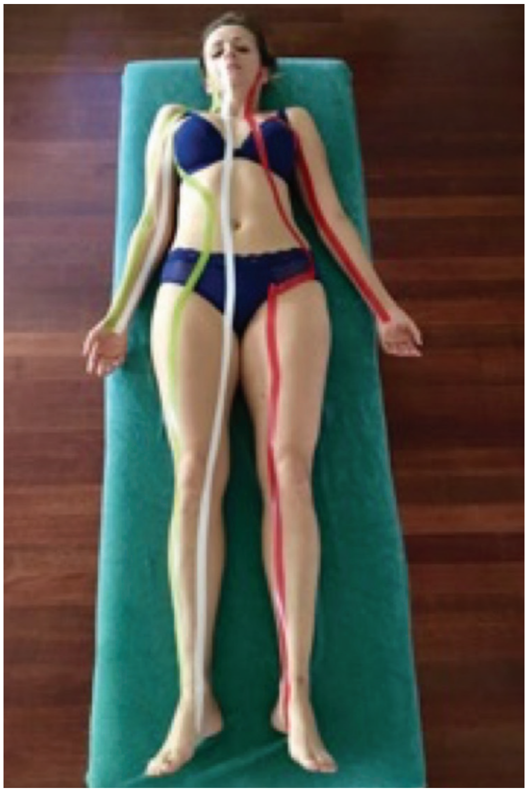

Figure 1. Photo of the three catenaries in front. White line; AP, Yellow line; catenary LL, Red line; OB
AP: Anterio-posterior, LL: Latero-lateral, OB: Oblique catenary

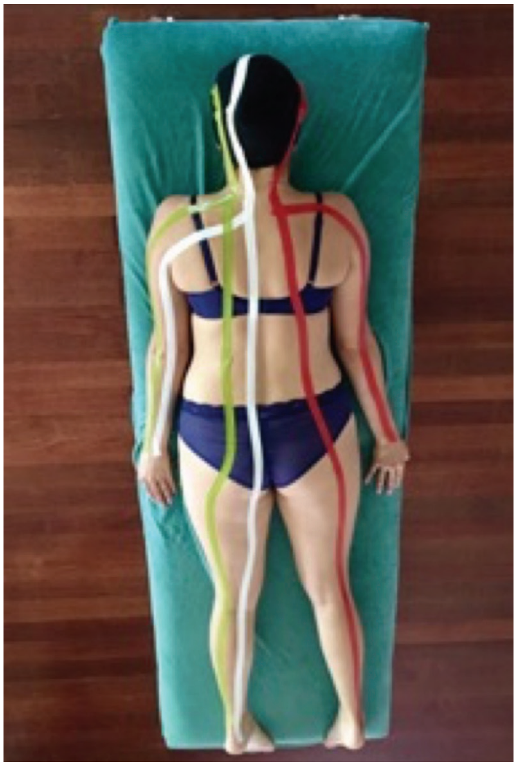

Figure 2. Photo of posterior catenaries

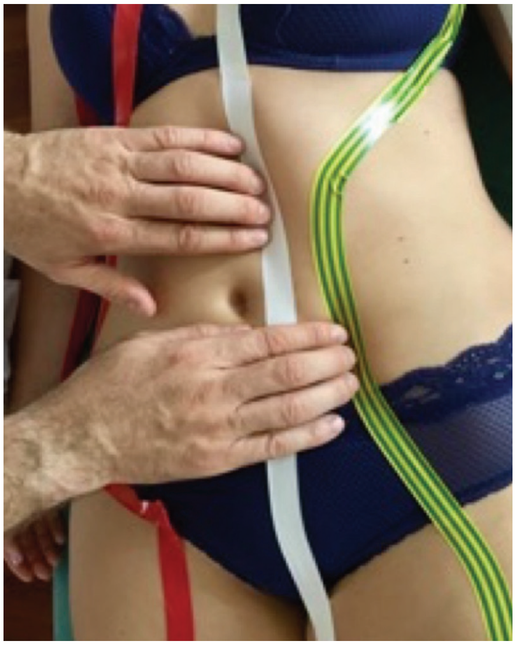

Figure 3. Photo of comparative palpation of the anterio-posterior and latero-lateral catenary. The aim of palpation is to localize the most altered point of points creating the line of tension of each catenary

therapy but it can be explained by the FM model which says, that improving or restoring appropriate vital space for the organ has positive influence on its function.[5,6] Such results are attainable as demonstrated in the case study presented. Further research into fascial mechanisms will assist in further elaborating the mechanisms and means by which such outcomes are possible.

CONCLUSIONS

Based on the above case, the FM method may prove to be an effective tool for the treatment of patients with chronic urogenital pain. The global approach to dysfunction allows for a cause-oriented, or source-oriented treatment of an altered fascial system. In the case of Ewelina, the key element turned out to be manipulation of the fascia in the extremities of the body, hands, head and feet, triggered by trauma to the right finger in childhood which became a starting point for fascial imbalance. Therefore, we can hypothesize that no matter what problem the patient has, the most important element is to find the primary disorder in the fascial system. This is especially the case when dealing with long-lasting chronic pain, involving sensitive and delicate areas such as the pelvic floor, both from the perspective of the patient, and their relations with a partner or husband.

DISCUSSION

The complexity of CPP affects up to 20% of women and is mostly seen as a dysfunction of the pelvis, lumbar spine and hip joint.[7] It is not enough to base gynecological or physiotherapeutic interview only on the symptoms associated with this region of the body, but even seemingly "unrelated" symptoms such as endocrine dysfunctions or skin alterations, which at first may seem unrelated to physiotherapy, need to be taken in consideration.[8] Hartman and Sarton[9] claims that normalizing all disorders may be pivotal in decreasing complaints of chronic vulvar pain and sexual dysfunction. There are suggestions that pelvic floor muscles hypertonicity is a perpetuating factor in CPP, but it is worth asking why pelvic floor muscle are in a hypertonic state?[10] Are they the source of problem or a symptom of fascial imbalance in the body? Berghmans[11] emphasis on the role of musculoskelatal compensations, as a significant contributor, forms part of a holistic approach to the CPP. The biomechanical model and FM method helps to ensure that nothing is overlooked or missed because of its thorough data collection protocol and acknowledgement of the psychological component.[11]. There is no significant evidence that treating local hypertonicity provides long lasting results, in light of the fact that a 50% improvement is equal to placebo effect.[12]

Many authors emphasize the need to create a protocol for the assessment and treatment of vulvodynia. Due to the huge variability of potential causes of provoked vulvodynia, the FM method seems to meet the criteria of a diagnostic and therapeutic tool in such a complex problem as CPP.[13] Morin et al.[14] states that there is not enough research information to provide a clear directive on how to secure the best result in dealing with provoked pelvic pain in cases such as vestibulodynia. Studies with high risk of bias and focused on local treatment (biofeedback, dilators, electrical stimulation) were partially successful but only in reduction of pain and not in eliminating the pain.[14] Similar observations were made by Gentilcore-Saulnier et al.[15]. Although the author recognizes the role of myofascial factors in CPP, they overlook the importance of the continuity of the fascial system in the human body. It is also worth mentioning that an incorrect activation of the autonomic nervous system (ANS) is a possible and important element in provoking symptoms. Itching, burning sensations are related to superficial fascia and cutaneous nerves, which have direct connection with paravertebral and prevertebral ganglia of the ANS. These interactions are well described in the FM model and may also explain some of the psychogenic components of CPP. This helps in understanding how psychological and emotional aspects may impact on pelvic floor muscles and why they are important in the assessment of CPP.[16] This is significant in light of the fact that a prior diagnosis of anxiety disorder may contribute to a tenfold increase in sexual pain.[17] Many authors propose a multidisciplinary approach to the management of CPP. Consequently, physiotherapeutic, psychological and educational aspects are all important in achieving a long-lasting result. The FM method is consistent with such an approach.[18,1,19]

DISCLOSURES

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