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OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

NR 3/2023 (23) KWARTALNIK ISSN 1642-0136



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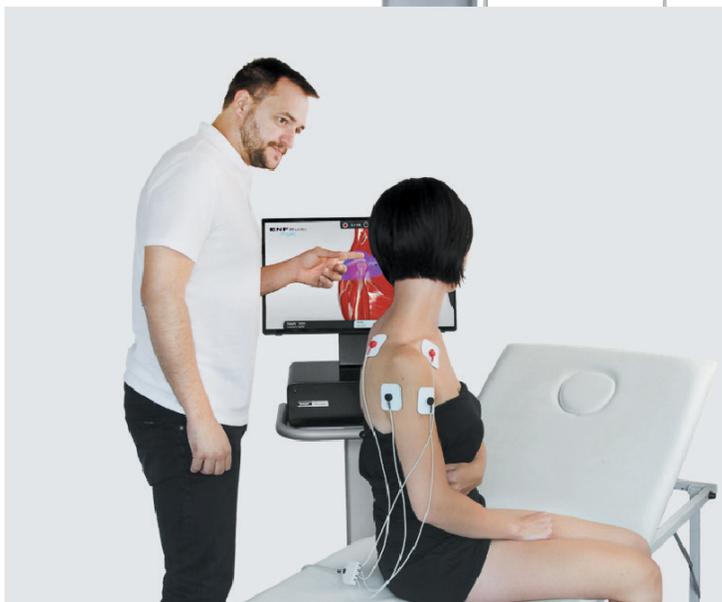
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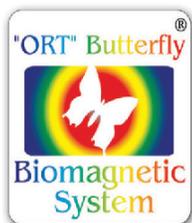
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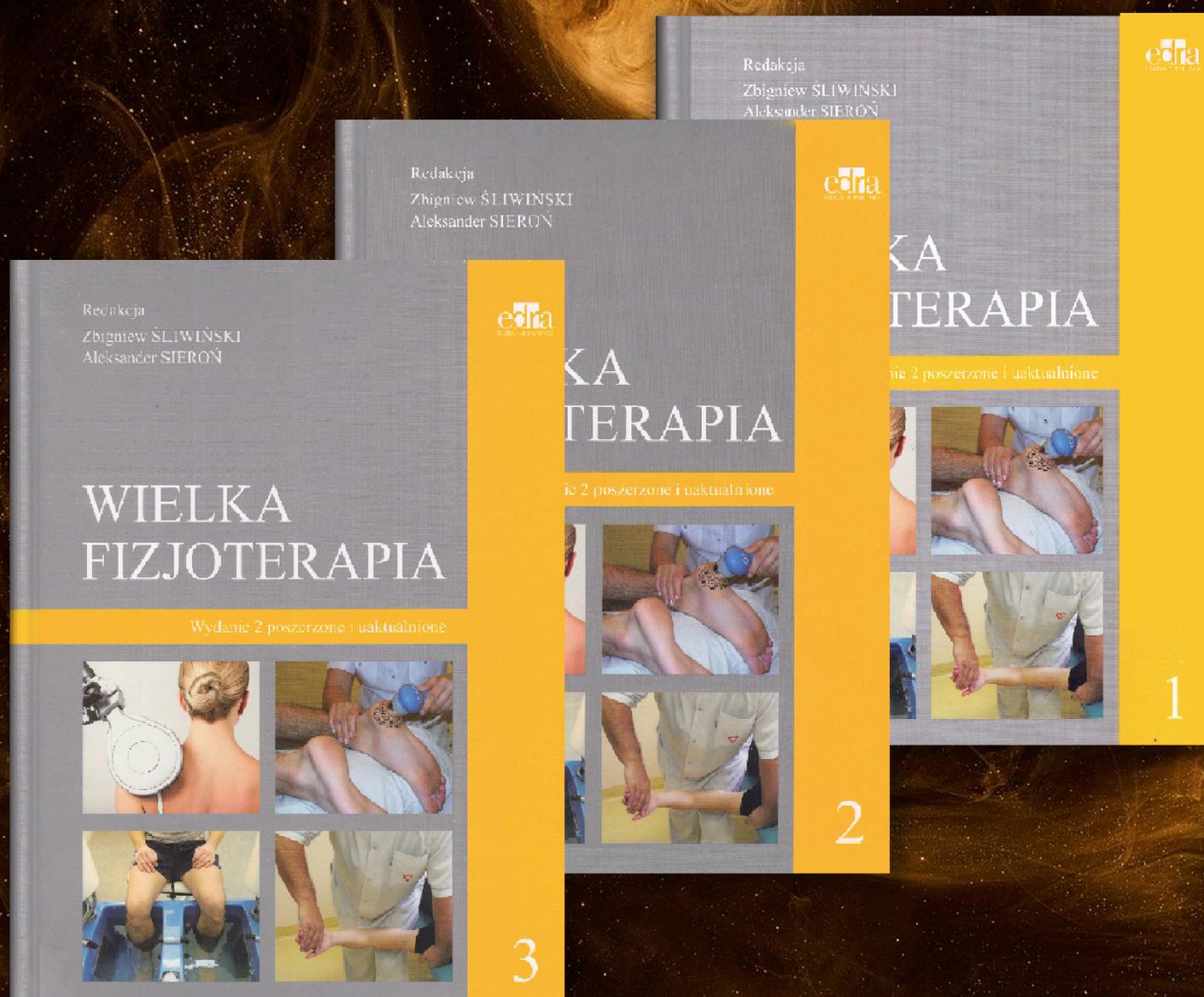


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Manual therapy for myofascial pelvic pain: A case report and narrative review

Terapia manualna dla bólu miednicy o podłożu miofascjalnym: opis przypadku i przegląd narracyjny

Amira N. Abdellatif^{1(A,B,C,D,E,F)}, Amel M. Youssef^{1(A,B,C,D,E,F)}, Hamada A. Hamada^{2(A,B,C,D,E,F)}, Karima A. Hassan^{3(A,B,C,D,E,F)}

¹Physical Therapy for Woman's Health, Faculty of Physical Therapy, Cairo University, Giza, Egypt

²Physical Therapy for Biomechanics, Faculty of Physical Therapy, Cairo University, Giza, Egypt

³Physical Therapy for Orthopedics, Faculty of Physical Therapy, Cairo University, Giza, Egypt

Abstract

Background. Myofascial pelvic pain (MFPP) is characterized by the presence of tender myofascial trigger points (MTrPs) in the muscles and fascia of the pelvic floor. Pelvic floor manual therapy is frequently suggested as the first line of treatment for MFPP.

Main body of the abstract. The existing literature affirms the beneficial outcomes of manual therapy in the treatment of MFPP and offers a concise summary of how these techniques are applied to patients with MFPP. Literature includes ten techniques; (1) myofascial trigger point release, (2) Thiele massage, (3) internal self-massage, (4) perineal massage, (5) combined manual techniques, (6) pelvic myofascial mobilization, (7) manual visceral therapy, (8) connective tissue manipulation, (9) scar release, and (10) internal coccyx manipulation.

Methods. A narrative review was carried out to summarize the available evidence on pelvic floor manual therapy techniques for MFPP.

Key content and findings. Upon review of the current research landscape, twenty-five studies met the inclusion criteria. Available evidence suggests that pelvic floor manual therapy is effective in the treatment of MFPP.

Conclusion. Although current available studies are limited in number with limitations in study design, manual therapy is considered a promising, effective, and safe option for the treatment of MFPP.

Keywords:

myofascial pelvic pain, chronic pelvic pain, myofascial trigger points, manual therapy, manipulation

Streszczenie

Wstęp. Ból miednicy o podłożu miofascjalnym (MFPP) charakteryzuje się obecnością wrażliwych punktów spustowych mięśniowo-powięziowych (MTrPs) w mięśniach i powięzi dna miednicy. Terapia manualna dna miednicy jest często proponowana jako pierwsza linia leczenia MFPP.

Istniejąca literatura potwierdza korzystne wyniki terapii manualnej w leczeniu MFPP i oferuje zwięzłe podsumowanie, jak te techniki są stosowane u pacjentów z MFPP. Literatura zawiera dziesięć technik; (1) uwalnianie punktów spustowych miofascjalnych, (2) masaż Thiele, (3) wewnętrzny samomasaż, (4) masaż krocza, (5) łączone techniki manualne, (6) mobilizacja miofascjalna miednicy, (7) manualna terapia narządów wewnętrznych, (8) manipulacja tkanki łącznej, (9) uwalnianie blizny, oraz (10) wewnętrzna manipulacja kości guzicznej.

Metody. Przeprowadzono przegląd narracyjny w celu podsumowania dostępnych dowodów na temat technik terapii manualnej dna miednicy dla MFPP.

Kluczowe treści i wyniki. Po przeglądzie aktualnych badań, dwadzieścia pięć badań spełniło kryteria włączenia. Dostępne dowody sugerują, że terapia manualna dna miednicy jest skuteczna w leczeniu MFPP.

Wnioski. Chociaż obecnie dostępne badania są ograniczone pod względem liczby i mają pewne ograniczenia w projekcie badania, terapia manualna jest uważana za obiecującą, skuteczną i bezpieczną opcję leczenia MFPP.

Słowa kluczowe:

ból miednicy o podłożu miofascjalnym, przewlekły ból miednicy, punkty spustowe miofascjalne, terapia manualna, manipulacja

Case summary

S.G., a 28-year-old pharmacist woman gravida 1 para 1001, presented with symptoms of obstructed defecation syndrome (ODS), including urge incontinence, dyspareunia, and pelvic pain. Three years ago, she had a difficult labor that necessitated a Caesarean section. The symptoms started soon after delivery and gradually worsened over time. S.G. experienced a burning and sharp pain at the anal opening (rated 9/10 on the VAS), accompanied by abdominal discomfort. The pain occurred intermittently, about four times a week, coinciding with defecation, and referring to the perineum during the menstrual period. S.G. also reported intense pain during sexual intercourse (rated 10/10 on the VAS) and during various activities like walking and driving. S.G. found occasional pain relief by assuming a squatting position during bowel movements or using a stool to elevate her feet. On occasion, she took ibuprofen which provided some alleviation of her pain. To avoid pain, she had ceased sexual intercourse with her husband or performance of any strenuous exercise. S.G. did not exhibit any signs or symptoms of vaginitis or urinary tract infection.

Physical examination revealed hyperlordotic lumbar curvature with coccyx hypomobility and tenderness (10/10 VAS). External palpation of S.G.'s pelvic floor muscles (PFMs) within the anal triangle revealed tenderness. Internal examination revealed the presence of multiple trigger points (TrPs) bilaterally across the entire pelvic floor, with significant hypertonicity observed in both coccygeus and obturator internus muscles. S.G.'s modified Chronic constipation score (CCS) was 26/30, while her ODS score was 20/20. Additionally, biofeedback demonstrated elevated resting muscle tone, accompanied by difficulty and delayed relaxation.

The MRI revealed findings of an enlarged retroverted uterus with diffuse adenomyosis and mild fibrotic type endometriosis outside the uterus in the deep pelvis. There was also a borderline cystocele with hypermobility of the urethra and a mild anterior rectocele. During straining, there was a slight increase in the anteroposterior diameter of the perineal hiatus, measuring 6 cm (normally less than 5 cm). Furthermore, moderate pelvic floor descent was noted.

The histopathological findings revealed mild active inflammation of the ileum with lymphoid hyperplasia.

The physician provided S.G. with an explanation of the diagnosis, pelvic myofascial pain syndrome (MFPP), and discussed potential treatment options, including a referral for pelvic floor physical therapy. S.G. received a six-week course of manual therapy for her pelvic floor, along with receiving guidance on an appropriate diet, proper toilet habits, and techniques for pelvic floor relaxation. The procedure was well-tolerated, with S.G. reporting no pain upon palpation of the TrPs afterward. After six weeks of physiotherapy, S.G. reported a significant decrease in pain (1/10 VAS). She was able to resume sexual activity with minimal dyspareunia (2/10 VAS). The improvement percentages of constipation and urinary incontinence symptoms were 60% and 50%,

respectively. Upon examination, her pelvic floor exhibited no tenderness, with only a few TrPs or signs of hypertonicity observed. After a one-month follow-up, S.G. reported complete resolution of pain and the ability to engage in activities such as running, driving, and intercourse without experiencing any pain.

Quick points

- Myofascial pelvic pain (MFPP) is a prevalent but underdiagnosed condition that contributes to a significant proportion of chronic pelvic pain cases and overlaps with other chronic pain conditions, including endometriosis.
- Pelvic floor manual therapy or pelvic floor myofascial physical therapy (MPT) is commonly prescribed as a first line of treatment for MFPP.

Introduction

Myofascial pelvic pain (MFPP), also known as myofascial pelvic pain syndrome, is characterized by pain originating from the muscles and fascia of the pelvic floor. The primary diagnostic feature of MFPP is the existence of myofascial trigger points (MTrPs) within the pelvic floor muscles (PFMs) and in distant areas [1]. The development of MFPP involves multiple interconnected mechanisms, making its pathogenesis complex [2]. Its reported prevalence ranges considerably from 14% to 78% [3].

In many cases of chronic pelvic pain, MFPP is recognized as a primary or contributing cause of pain. Various treatment options are available for MFPP, including physical therapy and localized trigger point (TrP) injections. Among these options, TrP injection has been extensively studied and has the strongest scientific evidence to support its effectiveness. However, it should be noted that any procedure involving the introduction of foreign substances through the skin carries a risk of skin or soft tissue infection. Pelvic floor myofascial physical therapy (MPT) or pelvic floor manual therapy is commonly recommended as the initial treatment choice for MFPP [2].

Pelvic floor myofascial physical therapy aims to alleviate hypertonicity, decrease sensitivity to pain, enhance the functioning of the body's inhibitory system, and reduce psychological distress such as anxiety, pain catastrophizing, somatization, and depressive symptoms. A previous study indicates that MPT positively affects blood flow in the pelvic and vulvar regions, enhances mobility in these areas, normalizes muscle tone, and desensitizes sensitive areas. These holistic effects make MPT a comprehensive therapeutic approach for individuals with chronic pelvic pain syndrome (CPPS) [4].

Various studies have reported the effectiveness of both external and internal MPT in the improvement of MFPP [1, 5, 6]. Nevertheless, there is significant variation in the approaches used by clinicians and their reporting methods, which poses challenges when comparing studies. This literature review aims to provide a comprehensive summary of the different manual techniques employed for MFPP. The present article adheres to the guidelines outlined in the Narrative Review reporting checklist (accessible at <https://tau.amegroups.com/article/view/10.21037/tau-22-143/rc>).

Materials and methods

An extensive literature search was carried out using databases such as PubMed, Cochrane, Science Direct, Pedro, REHABDATA, and SAGE. The criteria for inclusion were clinical trials published in English from the inception of the databases until 2023. Furthermore, the references of the identified studies were examined to identify additional relevant articles. The keywords used in the search encompassed terms such as myofascial pelvic pain, chronic pelvic pain, myofascial trigger points, manual therapy, and manipulation.

Discussion

Numerous studies have highlighted the considerable advantages of pelvic floor MPT in alleviating pain and improving the quality of life for both males and females with MFPP. However, the research in this field is hindered by the diversity of study designs, manual therapy techniques, and outcome measures, which make it challenging to determine the effectiveness of treatments. Additionally, this diversity complicates the determination of proper treatment duration, frequency, and applicability across different conditions. This review aims to shed light on the existing research on the utilization of pelvic floor MPT for treating MFPP and offers a concise overview of current manual techniques for the pelvic floor.

Clinical picture

Any pelvic floor muscle can generate MTrPs, which commonly generate sensations or pain in the nearby tissues as well as in distant areas following specific referred pain patterns. Each pelvic floor muscle has its own unique referred pattern. The pain experienced can be continuous or intermittent. Resting symptoms may appear and disappear, but they are frequently triggered by certain factors such as menstruation, extended walks, sitting for long period, bowel movements, or sexual intercourse. The nature of the pain can range from a vague and diffuse to a sharp and localized sensation. The pain experienced by numerous women with MFPP is often characterized as having an "achy," "heavy," or "deep" quality. On the other hand, rectal and clitoral pain tends to be sharp and piercing. Vaginal introital pain is frequently described as a burning sensation [4, 7].

Diagnostic approach

The diagnosis of MFPP primarily relies on the patient's history and physical examination. To identify a TrP, specific clinical criteria have been established, which include: a) a palpable taut band; b) an extremely tender nodule within the taut band; c) reproduction of the woman's pain when pressure is applied to the tender nodule; and d) experiencing pain when stretching or attempting a full range of motion. Another indicator of a TrP is the occurrence of a palpable and visible local twitch response, commonly known as a "jump sign," upon palpation of the TrP [7].

Assessment

The diagnosis of MPPS relies predominantly on the patient's

history and physical examination. A comprehensive assessment of the patient's history is crucial for accurately diagnosing and effectively managing MPPS [8].

The standardized assessment includes observing the patient's gait, examining the lower back and abdomen, and performing a systematic external and internal examination of the genital area. The diagnosis of MFPP is typically made through digital palpation of the pelvic floor during a clinical examination. It is essential to obtain informed consent from patients and provide them with a comprehensive explanation of the examination procedure and its purpose [9]. Harm-Ernandes et al. has outlined a detailed assessment protocol for MFPP [8].

Evidence of MPT techniques for MFPP

Pelvic floor manual therapy, also known as myofascial manual therapy (MPT), involves the skilled application of hands-on techniques aimed at relaxing, lengthening, stretching, and massaging tight muscles, leading to improved blood circulation in the pelvic area and alleviation of myofascial tender points. Apart from its local effects on the pelvic floor, the pain-relieving benefits of MPT may also be related to systemic processes that affect pain perception. MPT helps reduce central sensitization, a phenomenon where the sensitization of neurons at the spinal and supraspinal levels contributes to the development and persistence of referred and distant pain in the spinal and supraspinal structures [3].

Research findings indicate a direct connection between the anatomical impact of MPT on the width of the levator ani muscle. Studies have observed a lengthening of the levator ani muscle in patients with CPPS after undergoing MPT. This lengthening is associated with the extent of improvement in clinical pain ratings [10].

Manual therapy techniques

The literature has documented three different techniques for grasping the pelvic floor during MPT [11]:

a) Flat palpation (suitable for the superficial PFMs or the perineum): The therapist uses his/her fingertip to gently glide over the fascia and palpate across the specific fibers that require examination.

b) Deep palpation (suitable for the deep PFMs): It involves palpating through the intervening tissue that overlies the muscles with taut bands or TrPs.

c) Pincer palpation (utilized for more accessible tissue such as the perineal body, levator ani attachment, or deep PFM): It involves grasping the muscle between the fingertip and thumb. This technique allows for the application of pressure or rolling of the fibers in a forward and backward motion to identify taut bands. Additionally, internal to external pincer palpation can be employed to treat PFMs in patients whose size allows for this. Moreover, pincer palpation can be utilized to treat the external anal sphincter vaginally. When possible, tissue can be mobilized through rolling, medial-to-lateral, or cephalad-to-caudad/ caudad-to-cephalad movements.

Myofascial trigger point release

The technique of myofascial trigger point release involves the identification of a TrP, followed by the application of digital

pressure either internally (intravaginal and intrarectal) or externally at palpation points where the pain score is above [1] on VAS. The pressure applied is approximately 1 kg/cm², adjusted according to individual tolerances. Continuous compression is maintained until the muscle relaxes, with compression times ranging from 15 to 90 seconds. At one more point, 4-5 repetitions of compression are performed after pressing the entire TrPs again, representing a single course of treatment [6].

The barrier release technique involves the gradual application of pressure to the TrP until the barrier is encountered. The pressure is then maintained until the clinician observes a decrease in tension under the palpating finger. Once this occurs, the finger applies increased pressure to proceed to the next barrier, following the relaxation of the tissues. The clinician continues to apply gentle pressure until the tension subsides under the finger. Utilizing myofascial release and

paradoxical relaxation techniques can be highly beneficial in managing myofascial pain syndrome [12].

Theile massage

The technique involves applying massage pressure within the patient's tolerance along the direction of the muscle fibers, starting from the origin and moving toward the insertion. This motion is repeated 10 to 15 times for each session, targeting specific muscles in the following order: coccygeus, iliococcygeus, pubococcygeus, and obturator internus, (fig.1). Ischemic compression can be delivered to trigger sites for 10 to 15 seconds at the practitioner's discretion. On average, each treatment session lasted less than 5 minutes. To ensure sufficient time for any inflammation or discomfort to subside from the prior session, massages are scheduled at least 2 days apart. Patients receive two massages every week for a total of 5 weeks [13].

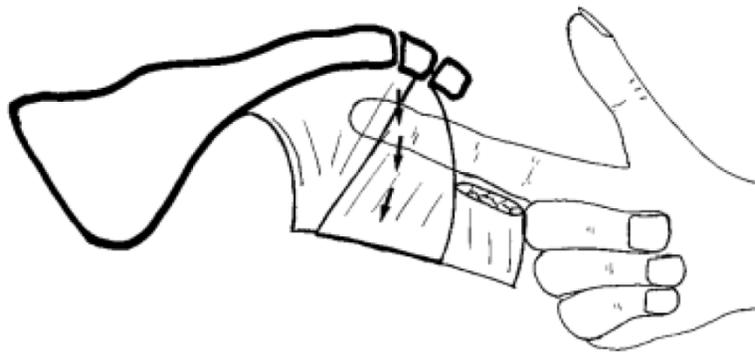


Fig. 1. Thiele massage in the direction of muscle fibers [14]

Internal self-massage

Women are frequently educated on self-care methods that involve stretching the leg, trunk, and PFMs, as well as performing TrP release using dilators, trigger point wands, or their fingers. Husbands can also receive training to assist with self-care at home, addressing intimacy concerns, and offering a supportive treatment plan. Physioballs and foam rollers are valuable tools for self-stretching and self-myofascial release [7].

Utilizing a personal therapeutic wand designed for internal self-treatment can effectively address painful pelvic TrPs and serve as an alternative to regular manual PT. This approach offers patients a valuable, accessible, and convenient tool to enhance their treatment. Various types of pelvic wands are available, including regular wands, thermal pelvic wands, and vibrating pelvic wands [14, 15, 16].

Patients are provided with instructions to use their fingers, wearing a lubricated glove, to access internal TrPs within comfortable reach. For internal TrPs that are beyond their finger's reach, they are advised to utilize the Wand as an extension of their finger. It is important to note that TrP pain can manifest both at the muscle insertion sites and within the muscle itself [16].

During the initial training period, patients receive instructions

on various techniques, including (a) lubricating and gently stretching the rectal or vaginal opening before inserting the wand, as well as applying lubricated gloves on the wand tip using a water-based gel. Great care should be taken to ensure the insertion of the wand is smooth, avoiding any tissue dryness or resistance; (b) locating both internal and external TrPs related to pelvic muscles, particularly around; (c) the TrPs associated with pelvic muscle tension are released through careful application of varying pressure amounts on the TrPs, following guidelines on proper pressure, and employing techniques such as gradual stroking and strumming of the muscle region while performing systematic contraction and relaxation of the affected muscles [15].

Wand manipulations are recommended regularly, typically 3 to 4 times/week, with each session lasting about 5 to 10 minutes. These manipulations aim to release the pelvic floor from active painful TrPs, as well as areas of myofascial tenderness and restriction. The patient receives instructions to assume a supine position with her back and head elevated at a 45-degree angle to palpate anterior TrPs. For the palpation of lateral and posterior TrPs, the patient is advised to assume a side-lying position, (fig.2). The process starts at the 1 and 11 o'clock positions and progresses towards the posterior region. When transitioning from vaginal to rectal self-treatment or vice versa,

the glove covering on the wand's tip is replaced [14]. After identifying deep TrPs, the patient is instructed to slowly withdraw the wand in half-inch increments to recheck at a shallower depth. This process is repeated until the wand is fully removed. Gradually increasing pressure is applied to each TrP, starting with a gentle motion technique lasting 10 to 12 seconds to precisely locate the TrP, followed by static

holding pressure for 15 to 90 seconds until the subsidence of tenderness around the TrP. During the initial therapeutic maneuvers, acute flare-ups of pain are predicted, similar to what commonly occurs in manual treatments administered by physical therapists or physicians. However, patients are instructed to avoid causing additional discomfort or pain beyond a level of 5 to 7 on the VAS [14, 16].

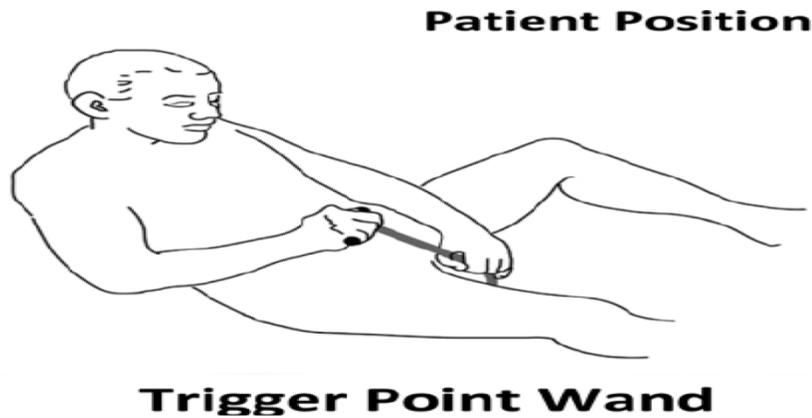


Fig. 2. Patient position during massaging anterior pelvic floor muscles [14]

Perineal massage

By executing massage techniques accurately, the woman will gain awareness of her pelvic floor tone and learn how to effectively relax it (fig.3). with clean hands and short nails, ask the patient to lie in the lithotomy position and lubricate the

perineal region. Then insert both thumbs deep in the vagina 3-4 cm and press down toward the anus and to both sides and maintain for 1-2 minutes. After that massage the fourchette in a U-shaped manner stretching the vaginal wall dorsally and laterally for 2-3 minutes [17].



Fig. 3. Perineal massage [17]

Combined manual therapy techniques

The effectiveness of the barrier technique of myofascial release can be further improved by integrating it with other techniques such as contract/relax, post-isometric relaxation, reciprocal inhibition, and proprioceptive neuromuscular facilitation. By combining various manual therapy techniques, optimal results can be achieved. The therapy sessions should be continued until tenderness and tightness subside, typically requiring 1 to 2 sessions/week for 8 to 12 weeks, according to the symptoms' severity and duration. The frequency of therapy decreases as the severity of TrPs and muscle tension diminishes [18].

According to: [19]

1. The contract/relax technique: operates on the principle that muscle tightness can be lowered following a voluntary contraction. When applying this technique to pelvic floor TrP, the therapist's transvaginal/transrectal finger is used to maneuver the constrained region of the levator ani muscle until the point of restriction is detected. Subsequently, the patient is instructed to contract the levator ani against the resistance provided by the therapist's finger. As the patient relaxes, the therapist assists in elongating the muscle.

2. Post-isometric relaxation technique: involves isometric contraction of the levator ani against the resistance provided by

the transvaginal/rectal finger that palpates the TrP. Then, the treating finger aids in facilitating the lengthening process as the patient achieves complete voluntary relaxation.

3. Reciprocal inhibition: refers to the phenomenon where the agonist muscle relaxes while the antagonist muscle contracts. During manipulation of pelvic floor MTrPs, the patient is instructed to contract the abdominal muscles (the antagonist) to begin a Valsalva maneuver. This action facilitates the release of MTrPs, removing the inhibitory effect on the pelvic floor lengthening. Subsequently, the patient can practice relaxation and contraction of the pelvic floor by reducing the abdominal wall involvement.

4. Proprioceptive neuromuscular facilitation: involves utilizing

"less involved parts" to promote a balanced antagonism of the reflex activity of muscle groups and components of motion. The patient applies resistance by exerting firm manual pressure on the knees during the mass movement pattern known as "knee pushes" to inhibit the pelvic floor and any TrP inside it. This contraction is sustained for five counts and then repeated five times, (fig.4). A pelvic floor relaxation or "drop" is then conducted if possible. It should be emphasized that repeating pelvic floor "drops" is only recommended if the patient can perceive the lengthening of the pelvic floor and its return to the resting position. For targeted treatment of a pelvic floor TrP, manual manipulation of the TrP can be performed while executing the resisted pattern.

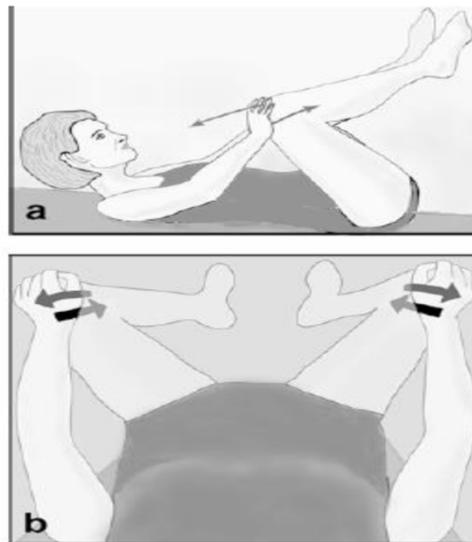


Fig. 4. During the "knee pushes", the pelvic floor muscles experience reflexive inhibition through isometric contraction of the hip flexors, abductors, and external rotators. a lateral view; b view from above [19]

Weiss et al. [18] employed another approach of internal combined manual therapy techniques to relieve MFPP in interstitial cystitis (IC) patients. Due to the close anatomical proximity between the bladder and its muscular support, internal manual therapy can provide subjective symptom improvement in IC. The concurrent application of external muscle stretching (piriformis stretch or isometric pubococcygeus stretch) with external heat promotes better muscular relaxation.

1. In women, tenderness often manifests in the muscles and connective tissue located laterally to the urethra, specifically the urinary sphincter, periurethral tissues, and pubourethralis. This tenderness can be alleviated through compression against the symphysis pubis accompanied by lateral traction (fig. 5). Initially, gentle pressure is applied, gradually increasing as the patient becomes accustomed to the technique to prevent muscle spasms. This process is repeated multiple times.

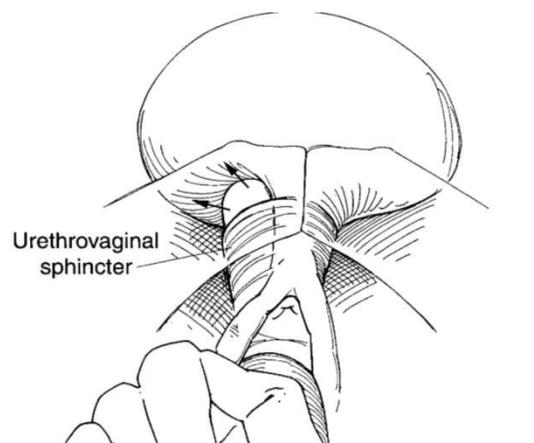


Fig. 5. Compression with lateral traction [18]

2. Posterior traction: can be applied transvaginal or transrectal (fig. 6). As the patient contracts the pubovaginalis muscle, posterior traction is exerted, leading to an isometric contraction that counters resistance. This specific stretching technique induces a reflex-inhibitory response, effectively

reducing muscle tension and promoting increased relaxation and elongation of the muscle. Subsequently, with the examiner's finger repositioned in a more posterior location, the patient is instructed to repeat the isometric contraction multiple times, enhancing further muscle elongation.

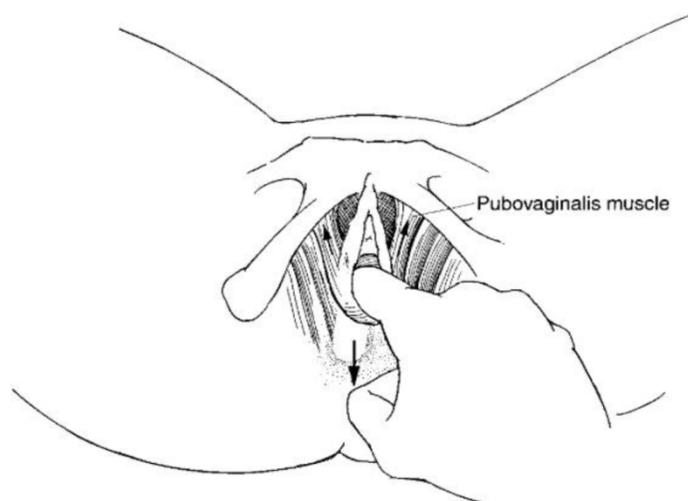


Fig. 6. Compression with posterior traction [18]

3. Rectal stretching of the urogenital diaphragm: A similar approach applies to both males and virgin girls. The focus is on the endopelvic fascia, pubococcygeus muscle from the bladder neck to membranous urethra, and the urogenital diaphragm (fig. 7). Through repetitive compression, the tissue is gradually

loosened, resulting in decreased sensitivity. During this maneuver, the curved internal finger is directed towards the examiner, facilitating internal stretching of the urogenital diaphragm. The posterior margin is demarcated by the superficial transverse perineal muscle that restricts posterior movement.

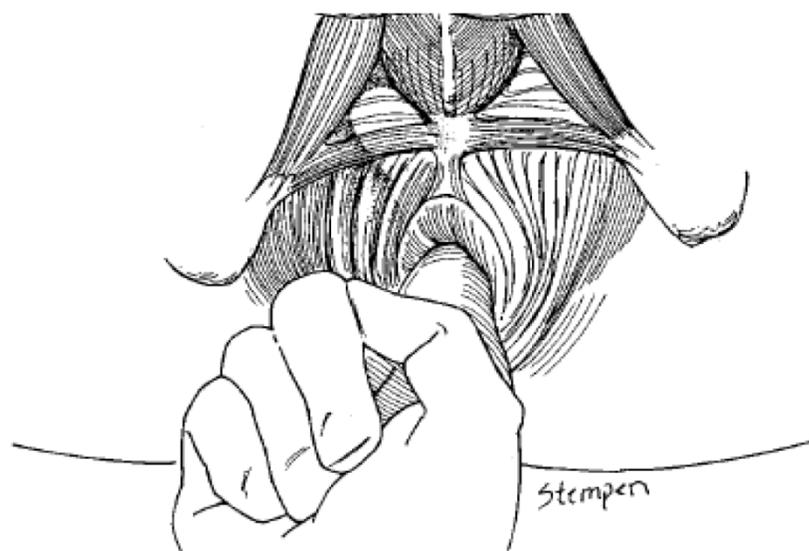


Fig. 7. Stretching of the urogenital diaphragm [12, 18]

4. Obturator internus (OI): can be identified by instructing the patient to laterally push the knee against the hand. This action produces contraction, shortening, and widening of the OI beneath the levator muscle, making it easily distinguishable. Then, TrPs within the OI can be released through a combination of compression and stretching, while observing any increase in pain

beneath the palpating finger when the patient performs pubococcygeus muscle contraction. Compression can be particularly effective when the patient performs piriformis stretch by bringing the thigh on the same side towards the opposite shoulder. To enhance the stretch, difluoromethane spray-stretch techniques and/or heat application can be utilized (fig. 8).



Fig. 8. Compression and stretching of obturator internus muscle assisted by external stretching [12]

Pelvic myofascial mobilization (MM)

Pelvic myofascial mobilization (MM) involves manual manipulation of the fascia within and surrounding the pelvic region. This technique can be applied externally or internally. External myofascial mobilization (EMM) focuses on utilizing manual therapy techniques that take into account the connectivity and transmission of forces within the myofascial system [20].

Myofascial release (MFR) and fascial manipulation (FM) are the two frequently used MM techniques. MFR applies a prolonged stretch with varying levels of load to the myofascial complex, aiming to restore its optimal length, reduce pain, and enhance functionality. On the other hand, FM focuses on manipulating specific myofascial units within the fascia, aiming to restore tensional balance when treated properly [21].

The EMM treatment for CPPS involves mobilization of the fascia in the lumbopelvic region, guided by the fascial connections of the trunk's oblique chain system and the abdominopelvic viscera (fig. 9). The EMM treatment encompasses various areas, including: (1) right external oblique (EO), left internal oblique (IO), and hip adductor complex (HAC); (2) left EO, right IO, and HAC; (3) right latissimus dorsi (LD), thoracolumbar fascia (TLF), and left gluteus maximus (GMx); (4) left LD, TLF, and right GMx; (5) abdominopelvic viscera, involving the ipsilateral LD, ipsilateral TLF, and contralateral GMx posteriorly, and ipsilateral EO, contralateral IO, and HAC anteriorly. It is recommended to undergo five sessions, with each session lasting 30 minutes. EMM is a hands-on therapy performed using bare hands or a fascial gun to mobilize fascial restriction in specific dysfunctional regions [5].

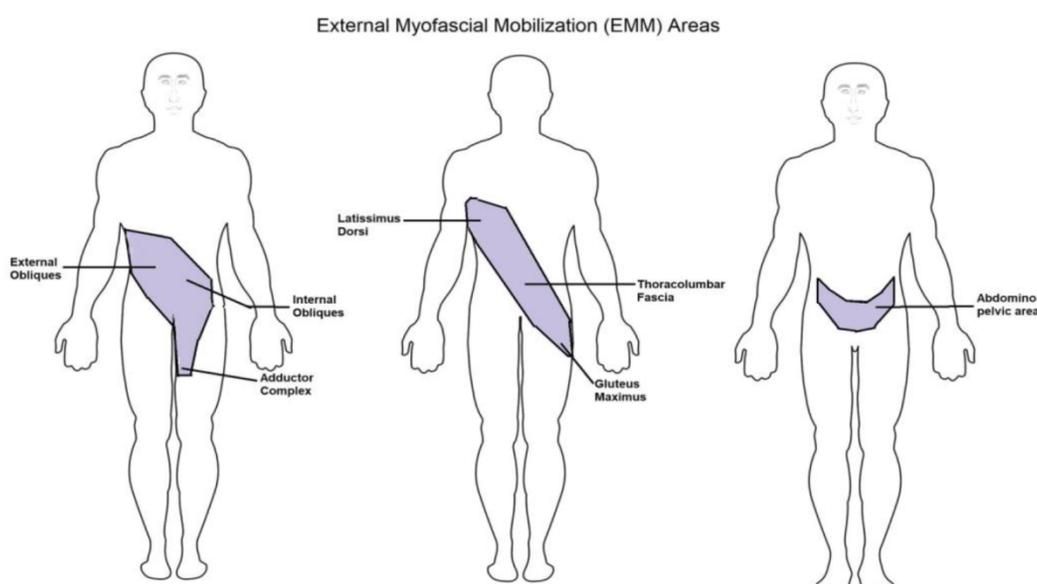


Fig. 9. EMM treatment areas [5]

Manual Visceral therapy

Visceral mobilization targets restrictions and adhesions in the visceral organs, which can be a source of referred pain. This pain can also extend to the pelvic region. The application of visceral mobilization techniques has shown effectiveness in reducing pelvic floor myalgia [22].

Research has shown the beneficial impact of manual therapy on the fascia, suggesting that manual visceral therapy (MVT) can reduce the densification of the visceral fascia and promote bladder compliance. Moreover, considering the connection between the visceral system and the pelvic floor muscles (PFM) through the endopelvic fascia, MVT can enhance the function of these muscles [23].

In a systematic review with meta-analyses, it was found that osteopathic treatment interventions, including the use of MVT maneuvers, resulted in a substantial and clinically significant improvement in female pelvic floor dysfunction compared to untreated control groups [24].

Connective tissue manipulation

Connective tissue manipulation, also known as skin rolling, involves elongating connective tissue and enhancing blood circulation in areas where blood flow is reduced, mast cell release is increased, and neurogenic irritation is present [25]. In MFPP patients diagnosed with interstitial cystitis/painful bladder syndrome, connective tissue manipulation has shown effectiveness when compared with global massage [26]. The endopelvic fascia serves as the attachment point between the intra-pelvic organs and the pelvic wall. This fascia is continuous with the visceral and abdominal fascia in a cephalad direction. According to Myers, the pelvic floor is a complex structure that is part of the Deep Front Line (DFL) [27]. The DFL originates distally from the tibialis posterior, long toe flexors, fascia of popliteus and knee capsule, and continues through the posterior intermuscular septum, adductor magnus, minimus, brevis, and longus, pelvic floor fascia, levator ani, obturator internus fascia, anterior sacral fascia, and anterior longitudinal ligament. It then extends cephalad by connecting to the fascia of the posterior diaphragm, crura of the diaphragm, central tendon, pericardium, and mediastinum [28].

These intricate structures are interconnected with the pelvic floor muscles through the hip and core muscles, and it appears that disturbances in any of these structures can impact the others. Given that dysfunction in one structure can influence the functioning of the rest, it is logical to expect that improving one structure can lead to some degree of improvement in the others [27].

External techniques for manipulating connective tissue are highly

valuable for releasing restricted tissue in the perineal region where all pudendal nerve branches, including the inferior rectal, perineal, and dorsal clitoral nerves, are distributed. They are also effective for the area supplied by the posterior femoral cutaneous nerve. They can significantly impact the function of the internal PFMs. When dealing with pelvic floor dysfunction, it is recommended to perform an internal assessment initially, followed by external tissue treatment, and then another internal assessment is conducted to evaluate the impact of these external restrictions on the PFMs' internal behavior [11].

Fitzgerald and Kotarinos [19] reported a connective tissue manipulation protocol effective for MFPP:

1. Abdominal fascia's connective tissue manipulation involves performing skin rolling on both lower abdominal quadrants towards the umbilicus and from side to side (Fig. 10). The abdomen is implicated in pelvic floor dysfunction, and manipulating the abdominal connective tissue proves to be effective. Palpation techniques can target superficial and deep taut bands and TrPs in the abdomen as well [11].
2. During manual manipulation of the thigh's connective tissue, providing support to the calf proves to be beneficial (Fig. 11). Using minimal lubrication, the therapist employs all ten fingers to stroke the tissues in a direction from the knee toward the groin. It is important to adjust the treatment based on the patient's tolerance. This procedure can be painful, and bruising on the thighs might occur in the days following even minor manual release work.
3. When addressing the inferior-medial buttocks (ischio-rectal fossa) while the patient is in a supine position with flexed knees, additional support beneath the knee on the treated side can be beneficial. The therapist grasps the medial buttock and rolls it between the thumb and fingers. The taut bands in the area are targeted by applying pressure, following the barrier release technique of myofascial manipulation (Fig. 12).
4. Afterwards, to enhance subcutaneous tissue mobility in this area, the therapist immobilizes and holds the tissues while the patient performs gentle hip flexion and produces traction to any tight bands within the tissues. Subsequently, with the hips and knees bent at approximately 90 degrees, the therapist's extended fingers are inserted into the tissues of the ischio-rectal fossa, exerting pressure toward the lateral pelvic side wall. The tissues are then mobilized upward, either with or without the patient's assistance through a cough (which brings the pelvic floor downward and facilitates the release).



Fig. 10. Connective tissue restrictions in the abdominal wall can be released by manual 'skin-rolling' [19]

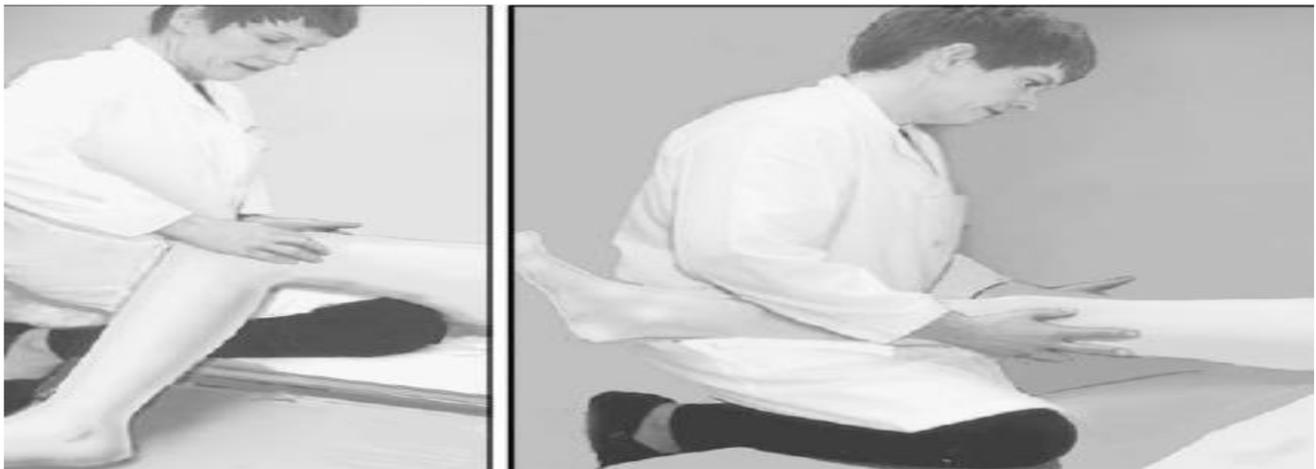


Fig. 11. During the release of restrictions in the subcutaneous connective tissue of the iliotibial tract and medial thigh, providing support to the leg below the knee facilitates therapy [19]

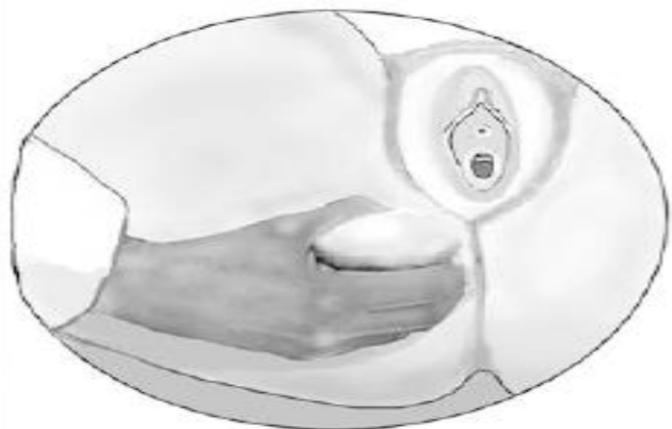


Fig. 12. When performing the release of connective tissue restrictions in the inferior-medial buttocks, a firm grasp is applied to the restricted area, followed by elevating the ipsilateral knee to bring the hip into flexion. Inset: Common site of connective tissue restriction in the medial buttock [28]

Scar release

Scar tissue mobilization is an important part of physical therapy for women who have had abdominal or pelvic surgery. It helps reduce pain, maintain normal function, and enhance mobility by loosening the scar tissue and making it more elastic. Similar to connective tissue and visceral manipulation, scar mobilization techniques also improve the movement of nearby structures [29]. The common manual approaches involve strumming and stroking along and across the scar, as well as rolling it between the fingers and thumbs to soften and release it [28].

Morrison and colleagues [30] investigated the impact of a

myofascial physical therapy method that involved mobilizing scar tissue at the clitoral prepuce. The patient, a 41-year-old woman, was suffering from lower back and pelvic pain, dyspareunia, and anorgasmia, following a vulva injury from blunt trauma. During the initial assessment, myofascial issues and clitoral phimosis were identified. After receiving 11 treatment sessions over 16 weeks, the patient experienced complete relief from all symptoms.

Internal coccyx manipulation

Megan and Chaiban et al. [31] compared three manual intrarectal techniques for coccydynia; (a) Thiele massage, (fig.6), (b) Intrarectal mobilization: In this technique, the

coccyx is held between the external thumb and the internal index finger while applying flexion, extension, and rotation. Immediately after, Maigne's technique is performed, the coccyx is maintained in hyperextension by applying pressure to the ventral aspect of the inferior sacrum with the index finger, while counterpressure is exerted on the superior aspect of the posterior sacral surface using the heel of the external left hand (fig.13), (c)

Internal stretching of levator ani: This technique gradually stretches the levator anus using the internal index finger until it makes contact with the coccyx. Once in contact, the finger remains stationary for 3 minutes and is repeated three times per session (fig.14). According to the findings of Megan and Chaiban et al. [31], massage and levator anus stretching showed greater effectiveness compared to sacrococcygeal mobilization.

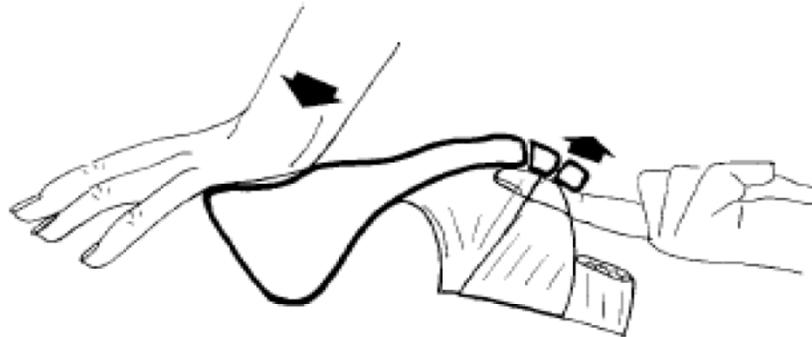


Fig. 13. Maigne's technique of coccygeal mobilization [31].

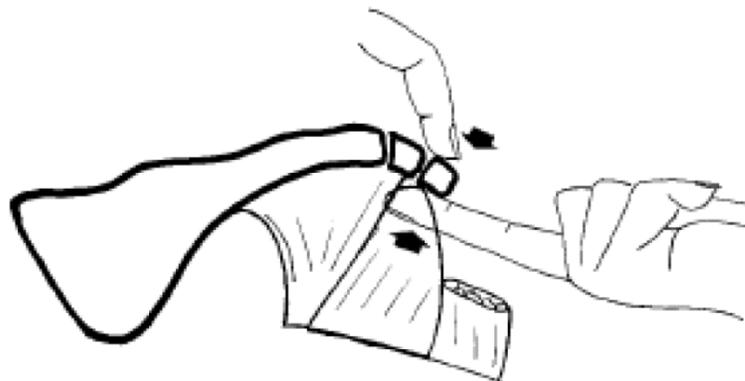


Fig. 14. The internal finger touches, but does not mobilize the coccyx. The external finger checks to ensure that the coccyx is being kept still. This maneuver results in the stretching of the coccygeus, the levator anus, and the external sphincter [31].

Conclusions

Manual therapy is a potential conservative therapy for women experiencing infertility. The existing literature encompasses ten different approaches; (1) Myofascial trigger point release, (2) Thiele massage, (3) Internal self-massage, (4) perineal massage, (5) combined manual techniques, (6) pelvic myofascial mobilization, (7) manual visceral therapy, (8) connective tissue manipulation, (9) scar release, (10) internal coccyx manipulation. The wide array of manual therapy approaches showcases the vast array of possibilities for

managing infertility, each with its unique scope and potential. It is strongly recommended to conduct further research using diverse study designs to obtain robust evidence and identify the key factors that contribute to positive outcomes.

Adres do korespondencji / Corresponding author

Amira N. Abdellatif

E-mail: amira.nagy@rocketmail.com

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