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ORIGINAL ARTICLE

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Rehabilitation of the short pelvic floor. II: Treatment of the patient with the short pelvic floor

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Abstract Several urogynecologic syndromes are associated with the clinical finding of a short, painful, tender and weak pelvic floor and a variety of connective tissue abnormalities. Techniques for rehabilitation include the avoidance of perpetuating factors, rehabilitation of extrapelvic musculoskeletal abnormalities, the use of manual techniques and needling to promote resolution of connective tissue problems, closure of any diastasis recti, and transvaginal/transrectal manual release of muscular trigger points and contractures. Therapy can be facilitated by pudendal or epidural nerve block. Patients contribute to their success through home maintenance programs.

Keywords Pelvic floor dysfunction · Physical therapy · Trigger points

Abbreviations *TP* Trigger point · *PFM* Pelvic floor muscles

Introduction

The clinical significance of the short, hypertonic pelvic floor is increasingly being recognized, and techniques for the evaluation of patients presenting with symptoms suggestive of this disorder have previously been described [1]. We submit our clinical experience with the treatment of this condition.

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Steps in rehabilitation of the short pelvic floor

We have found that rehabilitation of the short pelvic floor is generally successful and timely when we use the approaches described below. It is our experience that progress made with the application of the techniques listed first will often lessen the eventual need for the later techniques.

During rehabilitation of the short pelvic floor it is important to avoid activities that are known to exacerbate the patient's condition. For example, patients with short and tight pelvic floor muscles (PFM) should usually stop repetitive concentric PFM contractions ('Kegel exercises') at first, even if urinary incontinence is present. Asking a patient with a short pelvic floor to repetitively contract the PFM is as illogical as asking a patient with a hip flexor contracture to repetitively flex the hip in the hopes of restoring normality. Additionally, if a significant diastasis recti exists the patient should be advised against performing standard abdominal wall strengthening exercises (routine sit-ups) without abdominal wall support (see below). Recommendations concerning the advisability of vaginal coitus are individualized: patients with significant dyspareunia may wish to abstain from vaginal intercourse until some progress has been made with normalization of the PFM. In fact, most patients with significant PFM abnormalities suffer from dyspareunia and are already sexually abstinent.

During therapy some patients may need to avoid certain types of clothing that can increase the irritability of the bladder through cutaneovisceral reflexes and by causing vasoconstriction in the referral zone areas. For example, some patients benefit from avoiding underwear with elastic legs, tight slacks or jeans, and panty hose that have two types of knit with a seam at the body–thigh interface.

Usually, patients are treated for 1 h weekly. Patients who are highly symptomatic often benefit from more frequent treatments, and patients who travel from out of State for treatment will often undergo daily treatments

of 2 h, for a week at a time. Typically, patients require at least 10 visits.

Rehabilitation of extrapelvic musculoskeletal abnormalities

Extrapelvic musculoskeletal abnormalities noted during gait analysis, postural assessment, trunk and extremity range of motion, and muscle length/strength testing are addressed to eliminate their impact as perpetuating factors in pelvic floor problems. Skeletal asymmetries such as a lower limb length inequality or small hemipelvis would be managed appropriately. Muscular imbalances are managed with individualized therapeutic exercise programs, including active and passive stretching, neuromuscular re-education and progressive strengthening. Postural misalignments are addressed with a variety of manual therapies, including muscle energy techniques, joint mobilization and joint manipulation. These techniques are exhaustively described in standard textbooks and are not repeated here [2, 3].

Connective tissue manipulation

Generally, attention to connective tissue manipulation should occur early, and often continues at some level throughout the entire course of therapy. Subcutaneous connective tissue restrictions/panniculosis usually respond to the application of pressure over several treatments by progressively softening and becoming increasingly homogeneous to palpation. Associated muscle trigger points (TP) frequently respond to the treatment of subcuticular panniculosis.

Involved areas of the lower abdomen are easily approached using skin-rolling. We frequently work from bilateral lower abdominal quadrants toward the umbilicus, and from side to side (Fig. 1). Resistant areas of subcutaneous panniculosis are approached from all angles until they yield to manipulation.

Fig. 1 Connective tissue restrictions in the abdominal wall can be released by manual 'skin-rolling'

When manually working the connective tissue of the thighs, we find that supporting the calf is helpful (Fig. 2). With minimal lubrication, all 10 fingers of the therapist are utilized to stroke the tissues from the knee towards the groin. The initial treatment of these areas can be particularly painful (frequently producing a marked 'pinching' feeling), and the pace of treatment needs to be adjusted to the tolerance of the patient. Bruising over the thighs is not uncommon during the days following even minimal manual release work.

When approaching the subcuticular abnormalities found in the inferomedial buttocks, we usually have patients lie in the supine position with the knees flexed. Some patients benefit from support below the knee on the side being treated. The medial buttock panniculosis is grasped and rolled between the thumb and fingers. Pressure is applied to the taut bands as is described in the barrier release technique of myofascial manipulation [4]. Subsequently, increased mobility of the subcutaneous tissues in this region is promoted by grasping and immobilizing the tissues while the patient gently flexes the hip and places traction on any taut bands within the tissues (Fig. 3). Connective tissue abnormalities in this area can be particularly difficult to resolve manually, and here we frequently rely on dry needling and/or TP injections to accelerate progress. Therapists without access to a practitioner willing to help with needling will make slower progress but will eventually achieve the same release with a purely manual approach.

Where appropriate, the connective tissues of the ischiorectal fossa can be released in a fashion similar to that recommended by Kuchera [5]: with the patient in the supine position and with hips and knees flexed to about 90°, the extended fingers of one of the therapist's hands are placed into the tissues of the ischiorectal fossa with pressure towards the lateral side wall of the pelvis. The tissues are then mobilized cephalad with or without the assistance of a cough from the patient (which brings the pelvic floor caudad and promotes the release).

We have found that areas of panniculosis proving resistant to manual release usually respond quickly when the tissues are dry-needled using several 29G acupuncture needles (Fig. 4). The area of panniculosis is grasped between thumb and index finger of the non-dominant hand, and the needle inserted into the core of the area. The needle is manipulated through the area in a pecking fashion but without exiting the skin insertion site, with immediate changes in the tissues usually being appreciated. Because dermatographia is also common in these patients, a red skin flare is frequently provoked by grasping the tissues and needling them. After 'pecking' through areas of panniculosis, needles are left in the subcutaneous tissues until any skin flare in the area subsides (usually over a period of approximately 10 min) [6]. The needles are then removed and manual skin-rolling again applied. Most of our patients find this dry needling is not particularly uncomfortable at the time. However, bruising in the area and a feeling of soreness is not uncommon during the following 2 or 3 days. When

Fig. 2 When releasing subcutaneous connective tissue restrictions of the iliotibial tract and medial thigh, supporting the leg below the knee facilitates treatment

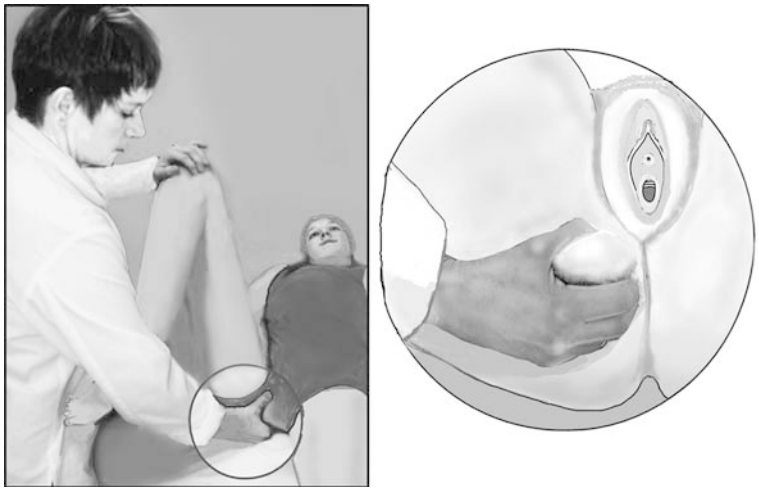

Fig. 3 During release of connective tissue restrictions of the inferomedial buttocks, the restricted area is grasped firmly, then the hip brought into flexion by elevating the ipsilateral knee. Inset: Common site of connective tissue restriction in the medial buttock

Fig. 4 Dry needling is frequently useful in the release of resistant subcutaneous connective tissue restrictions

dry needling is required, it is typically repeated weekly for a total of 2 or 3 weeks, usually just prior to manual therapy by the physical therapist.

Release of scars

We utilize the usual manual methods for softening and release of scars, including 'strumming and stroking' along and across the scar and rolling the scar between fingers and thumbs. Very frequently we hasten scar remodeling by the use of dry needling, during which a series of acupuncture needles is arranged around the periphery of the scar, angled inferiorly. When the needles are placed, we usually 'peck' under the scar several times before leaving the needles in place for several minutes [6]. Usually a significant 'flare' reaction spreading from the scar is evident at the time of first needling, and resolves over several minutes. Frequently

this reaction is less marked with subsequent needling. When dry needling in this fashion does not result in marked softening of the scar within two or three treatments, or even as an initial approach, we frequently choose instead to inject the scar with local anesthetic. For example, the entire length and depth of the scar can be infiltrated with up to 30 ml of 0.25% bupivacaine at one session. Typically, this will be repeated weekly for two or three injections in total. Ideally, injection of local anesthetic is followed immediately by manual mobilization. Infiltration of scars with a long-acting local anesthetic such as bupivacaine provides several hours of anesthesia, allowing therapists to achieve greater degrees of manual mobilization than would otherwise be possible.

In our experience, abdominal or perineal scars with any degree of associated connective tissue restriction need to be released. The scar should be manually or otherwise addressed at the time of each treatment session until it is entirely fluid in its movement over underlying tissues.

Closure of any diastasis recti

Because the pelvic floor and abdominal wall muscles function in concert, optimal function of the PFM will not be achieved while any significant diastasis of the abdominal wall remains, i.e. closure of any diastasis is critically important in rehabilitation of this region [7, 8, 9]. The patient gradually accomplishes this closure through twice-daily sets of isolated contractions of the supported rectus abdominis muscles. This support is achieved by wrapping and tightening a sheet around the midsection at the level of the umbilicus (Fig. 5) [10, 11]. The patient is advised to simply lift her head and chin on to her chest during these exercises. Breath holding is avoided by asking the patient to count out loud as she holds her head up. Once the diastasis has closed (over a period of about 6 weeks) the patient can then further rehabilitate the abdominal wall by beginning to contract transversus abdominis ('suck in your abdomen' or 'blow out hard as if you are blowing out the candles on a cake') and adding posterior pelvic tilting and progressive abdominal strengthening. It is important to avoid standard abdominal exercises until any diastasis is closed because continued traction on muscles that are separated leads to continuing overuse injury of the muscles and only reinforces the presence of TP in the suprapubic area.

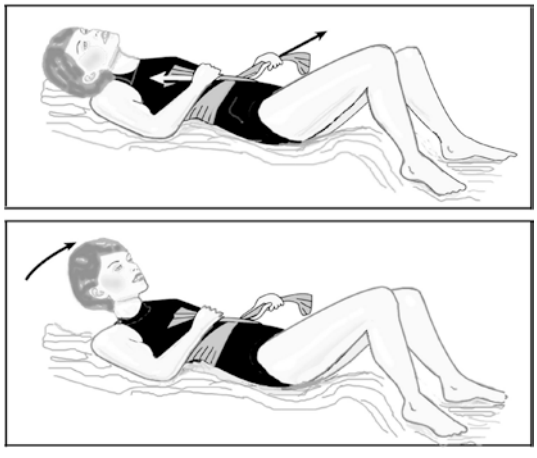

Fig. 5 During exercises to close the diastasis recti, the rectus abdominis musculature is brought together using a sheet or other gentle binding

Transvaginal manual therapy

During transvaginal manual therapy any TP in the PFM are first addressed. There are many methods to release TP, whether they are found externally or internally within the pelvis. One such method is known as the barrier release technique. Progressive pressure is applied into the trigger point until a tissue barrier is met. Once the tissue barrier is felt, pressure is maintained until the barrier releases. Pressure is then increased again until a new tissue barrier is felt. This technique can be enhanced by combining it with other techniques: contract/relax, postisometric relaxation and reciprocal inhibition.

The contract/relax technique is based on the premise that muscle tightness is reduced after a voluntary contraction. To execute this method with pelvic floor TP the transvaginal/transrectal finger moves the restricted area of the levator ani to the point where the restriction is felt. The patient is then asked to isotonically contract the levator against the resistance of the therapist's finger. As the patient relaxes the elongation of the muscle is enhanced by the therapist.

Contract/relax is the basis for the postisometric relaxation technique [12]. The levator ani is contracted isometrically against the resistance of the transvaginal/rectal finger palpating the TP. The treating finger then assists with the lengthening process during complete voluntary relaxation.

Reciprocal inhibition describes the relaxation of an agonist muscle during contraction of the antagonistic [13, 14, 15, 16]. As a pelvic floor TP is being manipulated, the patient is asked to contract the abdominal wall (the antagonist) to initiate a Valsalva maneuver. With release of the TP the lengthening of the pelvic floor is no longer inhibited. The patient is then able to practice pelvic floor relaxation and contraction with decreasing involvement of the abdominal wall.

Proprioceptive neuromuscular facilitation is the utilization of 'less involved parts to promote a balanced antagonism of reflex activity of muscle groups and of components of motion' [14]. To inhibit the pelvic floor, and any TP within it, resistance is applied by the patient to the mass movement pattern of 'knee pushes' involving flexion, abduction and internal rotation of the hip joint (Fig. 6). The patient resists this 'up and out' movement

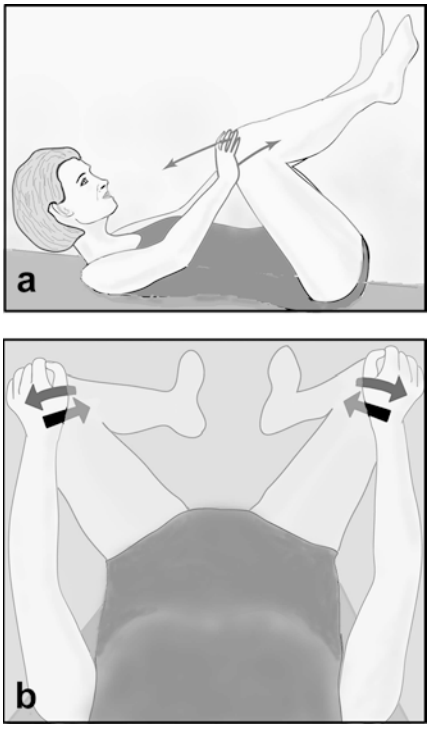

Fig. 6a, b During 'knee pushes' the pelvic floor musculature is reflexly inhibited by isometric contraction of the hip flexors, abductors and external rotators. **a** lateral view; **b** view from above

by firm manual pressure on the knees. The contraction is held for a count of 5, and repeated up to five times. If possible, a pelvic floor 'drop' or relaxation is then performed. Repeat pelvic floor 'drops' should only be done if the patient's proprioception is sufficient that they feel the lengthening of the pelvic floor and its return to the resting position. To specifically address a pelvic floor TP, the TP can be manually manipulated during the execution of the resisted pattern.

Trigger points within the obturator internus can be released from a transvaginal or a transrectal approach. Once the TP is located, the above release techniques may all be applied. To use reciprocal inhibition for TP release, the TP is located transvaginally/rectally while the patient is in a hook-lying position. Once located, the patient is asked to isometrically adduct the lower extremity of the involved side. The treating finger applies pressure into the taut band of the trigger point, enhancing the lengthening process that is initiated by the isometric adduction contraction. During the treatment process, while changes are made within the TP the released muscle is actively contracted and relaxed through its full range of motion to incorporate the changes made in the muscle into normal function.

TP that do not respond to these manual techniques can be released by transvaginal injection of bupivacaine. The simplest approach is to use a trumpet designed for administration of pudendal nerve blocks. It is possible to inject several TP at one session, and we commonly inject up to 30 ml 0.25% bupivacaine into the PFM during one treatment session. It is ideal if these injections can be followed immediately by the manual work necessary to achieve TP release.

Techniques for rehabilitation of the abnormal iliopsoas, piriformis, quadratus lumborum and gluteal muscles are well described in standard texts [2, 3] and are not repeated here.

Occasionally, in order to facilitate myofascial work through the vagina it is necessary that therapy be immediately preceded by bilateral pudendal nerve blockade. This is within the training of all general obstetrician/gynecologists, and simply involves transvaginal administration of 10 ml 0.25% bupivacaine 1 cm inferior to each ischial spine. Where adverse pudendal nerve tension is present, pudendal nerve blockade is occasionally the only means to achieve worthwhile progress with transvaginal manual therapy. With all local anesthetic blocks it is wise to advise the patient that because anesthesia allows much more extensive manual work to be performed, an increase in muscle soreness may be experienced for several days afterwards. This is not due to the injection itself, but rather to the extended ranges of motion permitted during treatment.

Monitoring of progress during rehabilitation

It is important to monitor progress during rehabilitation of the PFM. Typically, patients will undergo weekly treatments for 6–10 weeks. They should be advised that some initial deterioration in pelvic floor symptoms is not uncommon. Although improvements in symptoms are obviously encouraging for patients, initial marked improvements are not always sustained. Usually symptom relief becomes sustained only as therapy progresses. Steady overall improvement in symptoms reassures both the therapist and the referring physician that the diagnosis of a primary problem with the PFM is correct. Failure of symptomatic improvement after a reasonable trial of appropriate physical therapy should lead to a reconsideration of the diagnosis.

Any of several symptom monitoring systems is likely to be helpful. We monitor progress by asking patients to complete a visual analog pain scale ('Please place a checkmark on the scale below, indicating how much pelvic or bladder pain you have had during the past month') and, for patients with irritative bladder symptoms, responding to the Interstitial Cystitis Symptom Index and Problem Index [17].

Home maintenance

An individualized home program is designed for each patient. The goal of this is to incorporate and utilize the changes made during therapy and to facilitate greater changes during the next therapy session.

a. Abdominal wall: Stretching exercises are the mainstay of an exercise program for abdominal wall muscles with acute trigger points. Once TP are resolved, diastasis correction begins. Finally, progressive abdominal strengthening can be started.
b. Knee pushes: Knee pushes are recommended at least twice a day, in the morning and at night before bedtime. Many patients complain of increased urinary urgency and frequency in the morning, and knee pushes after the first morning void can facilitate pelvic floor lengthening to decrease the sense of urinary urgency. Similarly, knee pushes before bedtime can reduce some forms of nocturia.
c. Pelvic drops: Pelvic lengthening, or 'pelvic drops' should not be started until the patient has a good sensation of pelvic floor motion. If allowed to do pelvic drops without adequate sensation the patient may rely on Valsalva maneuvers to lengthen the pelvic floor. The risk of inappropriate Valsalva is reduced by asking for just five repetitions of 5 s each. Pelvic drops are easier to execute and produce greater appropriate sensation after knee pushes.
d. Timed voiding: For patients with urinary frequency, a program of timed voiding can be an extremely useful desensitization technique. Patients are asked to void at discrete time intervals rather than in response to an urge to void. The voiding interval is gradually lengthened during several weeks of therapy. Often, knee pushes and/or pelvic drops can ease the postponement of voiding.
e. Manual working of tissues of abdomen/thighs/scars: Between therapy sessions patients can continue to manually massage, roll and stroke all accessible connective tissue restrictions themselves with good cumulative effect.

Conclusion

We here present our experience for consideration by practitioners faced with the challenge of patients with complex pelvic floor disorders. At our center, we are attempting to quantify symptom improvement among these patients in order to further characterize those likely to respond to manual therapy as a primary approach. For patients in uncontrolled pain, consultation with a pain management service for temporary adjunctive pharmacotherapy can be helpful.

Patients who do not respond to the above methods within a reasonable timeframe (8–10 weeks) merit reexamination and reconsideration of the diagnosis, possibly with further testing and/or radiographic imaging. A minority of patients may require osteopathic manipulation of underlying skeletal abnormalities of the pelvis in order to remain pain free.

When patients have been treated for short PFM, they must be educated in (a) activities to be avoided and (b) stretches to be undertaken if any latent TP again become active, or if an unavoidable painful pelvic stimulus occurs (e.g. urinary tract infection), to avoid relapsing into the adverse muscle 'holding pattern' that originally caused the problem. For example, we ask all patients to avoid bearing down to assist bladder emptying. This promotes coactivation of the abdominal wall and PFM, and can lead to chronic voiding dysfunction.

Finally, we recommend that the pelvic floor be formally assessed prior to beginning any program of pelvic floor exercises. It is important to avoid the routine recommendation to all women with urinary urgency, frequency and/or incontinence that they 'do Kegels' –this recommendation to a patient with a short, tight and therefore weak pelvic floor will greatly exacerbate their condition.

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Editorial comment

The authors nicely describe a syndrome called short pelvic floor syndrome. Healthcare providers who treat and diagnose conditions of the female pelvic floor should be aware of and versed in both the diagnosis and the treatment of conditions that can cause pelvic pain. To date this area has been poorly understood and very poorly studied. Hopefully preliminary data such as these will stimulate more collaboration between clinicians and physical therapy specialists, so that these very difficult patients can be better served.