The Treatment of Pelvic Pain with Acupuncture: Part 1

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Abstract

This paper presents an overview of the biomedical model of myofascial pelvic pain (MPP) and its treatment using a Western acupuncture approach. The discussion includes an introduction to the function and anatomy of the pelvic girdle; a definition of pelvic pain, with research that supports the use of acupuncture as an effective intervention in the management of chronic myofascial pelvic pain (CMPP); a clinical reasoning model to assist practitioners in making a correct diagnosis and providing effective intervention for the management of CMPP; a description of the Western acupuncture approach for the deactivation of trigger points within the abdominal wall, pelvic basin and hip; and an exploration of the use of acupuncture in pregnancy-related pelvic pain with relevant support from research trials. Part Two of this paper will be presented in a future issue of this journal, and will demonstrate how the Western and traditional Chinese models of MPP can be integrated. In the opinion of the author, neither model offers all the answers, but the two can be integrated for a successful and sensitive approach to the management of this complex pain state.

Introduction

According to Weisl (1955), the first medical practitioners to express an interest in the pelvic girdle were Hippocrates (460-377BCE), Vesalius (1543CE) and Pare (1643CE). Research over the last 50 years has revealed significant information pertaining to the anatomy and function of the pelvic girdle. As the human body has evolved the pelvic girdle has developed towards the provision of stability, facilitating the most bioenergetically efficient gait in the mammalian population (Mohagheghi et al, 2007). The pelvic girdle supports the abdominal organs and provides a dynamic link between the vertebral column and the lower limbs. Dysfunction within the pelvis, however, offers the clinician one of the most common - yet taxing - conditions to treat amongst male and female musculoskeletal pain presentations.

Vleeming et al (1995c) have contributed a wealth of information, validated through research, which has now become part of the foundation of an integrated approach for the manual rehabilitation of the lumbopelvic region. The necessary diagnostic tests, procedures, treatment interventions and exercises, however, remain open to debate; the aetiology of pain structures remains obscure, and the relationships between pathologies such as adhesions, endometriosis, pelvic congestion and pain responses are inconsistent. The aetiology and pathophysiology of pelvic pain remains at best hypothetical, and treatment approaches are often empirical or polypragmatic (Zerman et al, 2001). The integrated model of function (Lee et al, 1998; 2003) continues to be used as a foundation for the assessment and treatment of the lumbopelvic complex amongst manual therapists. This paper presents an approach that uses Western acupuncture with myofascial trigger point release and/or traditional Chinese acupuncture within a manual therapy model; it has not been presented previously and has therefore not been validated by research. It has, however, been subjected to clinical audit and as such seeks to offer the clinician some alternative tools for the management of this complex condition.

Interstitial cystitis (IC), painful urination syndrome (PIS) and chronic pelvic pain (CPP) have recently been collectively renamed chronic pelvic pain syndrome (CPPS) (Shaeffer, 2006; National Institute of Health, 2009). Within the Western biomedical model, this syndrome has traditionally been diagnosed and treated based solely on symptoms. Indeed, most modern studies of acupuncture mechanisms and most clinical outcome studies follow Newtonian principles of cause and effect, and therefore offer limited scope for individual practitioner interpretation and multiple treatment inputs, which are essential for complex pelvic pain presentations. As a result, this research must be interpreted in the context in which it has been undertaken (Fuhrer et al, 2005), and may reveal nothing more than a statistical analysis of facts rather than an effective model of clinical reasoning for the management of this condition. Clinical reasoning here is defined as 'the thinking behind clinical practice, without which practice becomes a technical operation' (Jones, 1995).

Within the traditional Chinese medical (TCM) model, the concept of root and branch diagnosis

and treatment is undertaken by carefully assessing signs and symptoms (the branch) without losing an understanding of the underlying cause (the root). This is done in order both to alleviate superficial symptoms as well as – ultimately - heal the condition. With these principles in mind this paper presents two parts of a whole: the yin and yang of chronic myofascial pelvic pain (CMPP) management. The yang approach involves the deactivation of trigger points (TrPts) and the rebalancing of superficial qi flow through the meridians (the author refers to the presentation of a dysfunctional muscle complex as a yang presentation, affecting as it does the superficial physiology and meridian systems). The yin aspect involves the deeper work of managing postural dysfunction and the ingrained habits of poor body use, which takes more time to achieve. Both approaches may offer sufficient intervention to address symptoms, but when combined, they offer the clinician greater diversity and flexibility to heal, rather than merely manage the symptoms of CMPP.

Competing theories are abundant as to the origins, causes and even definition of CPPS. Hypothesis-driven studies of a disease presentation without an identifiable underlying pathology or pattern are, however, inherently limited in the information they can provide. Despite intriguing clues regarding its pathogenesis, CPPS remains poorly understood and poorly defined both in terms of its aetiology and its effective management (Dimitrakov et al, 2009). This can be attributed in part to the complexity of the pelvic anatomical structure, its innervation and the significant influence of parasympathetic and sympathetic mechanisms on the integrity of the pelvic bowl.

CPPS has been defined as non-cyclical abdominal and pelvic pain of at least six months' duration, and affects 3.8 per cent of women between 15 and 73 years of age in the UK (Gomel, 2006). It is associated with significant material cost to society, as well as considerable emotional and financial costs to the patient and their family (Zondervan et al, 2001). It affects 15 per cent of women of reproductive age, and 50 per cent of all laparoscopies and 10 to15 per cent of all hysterectomies are undertaken in response to a diagnosis of CPPS (Reiter, 1990, 1998). To date there is no generally accepted classification for male CPPS (see Table 1.1), and therefore CPPS in men remains the symptom of an underlying cause rather than a diagnosis in itself (in women a diagnosis of CPPS is taken as standard and may not involve underlying pathology). Over 54 per cent of male patients presenting with CPPS have pain in the scrotal, perineal, inguinal and bladder areas (Zermann et al, 2001). CPPS often involves referral to urologists, neurologists, psychiatrists, psychotherapists, gastroenterologists and orthopaedic specialists; eventually a manual therapy referral is often made in a last attempt in order to establish a diagnosis. There is evidence that CPPS is relatively poorly understood, even by those specialising in the area of manual treatment of pelvic pain, and certainly by the wider health care community (Chaitow, 2007). Unsurprisingly the rate of major depression in subjects with CPPS is in the order of 30 to 45 per cent (Heim et al, 1998).

Male chronic pelvic pain syndrome (CPPS)	
A.	Non-malignant pain
I.	Associated with chronic urinary tract/pelvic organ dysfunction
II.	Associated with neurological disease (i.e. peripheral neuropathy)
III.	Associated with orthopaedic disease (i.e. lumbar disc prolapse)
IV.	Post bacterial/viral inflammation (i.e. acute prostatitis)
V.	Post surgery
VI.	Idiopathic (i.e. myofascial pain)

Adapted from Zermann et al (2001)

Table 1.1: **Suggested classification of male pelvic pain**

Matthias et al (1996) undertook a telephone survey of 17,927 households to identify women between the ages of 18 to 50 years who had experienced pelvic pain. Of the eligible women, 14.7 per cent reported experiencing pelvic pain in the previous three months - a staggering incidence of 9, 200 women. 61 per cent of the 14.7 per cent that met the study criteria were sexually active, and of this group 88 per cent reported pain during or after intercourse.

Basic anatomy of the pelvis

The pelvis is a closed ring of bone (Fig 1.1) and includes:

- The two pelvic inommonates
- The sacrum
- The coccyx
- The two femurs

Six (or sometimes seven) joints:

- Two sacro-iliac joints
- The sacroccygeal
- The intercoccygeal
- The public symphysis
- Two hip joints

There are 35 muscles that attach to the sacrum, which function with the ligaments and fascia to produce synchronous motion and stability of the trunk and extremities (Lee, 2007). Chaitow (2005) suggests that our ignorance of the fascia is profound, and yet far-reaching changes can be achieved by attending to tight fascial layers using fascial release techniques. Kuchera et al (1993) suggest four crossover sites where fascial tensions can be noted, all of which correspond with areas of common musculoskeletal pain:

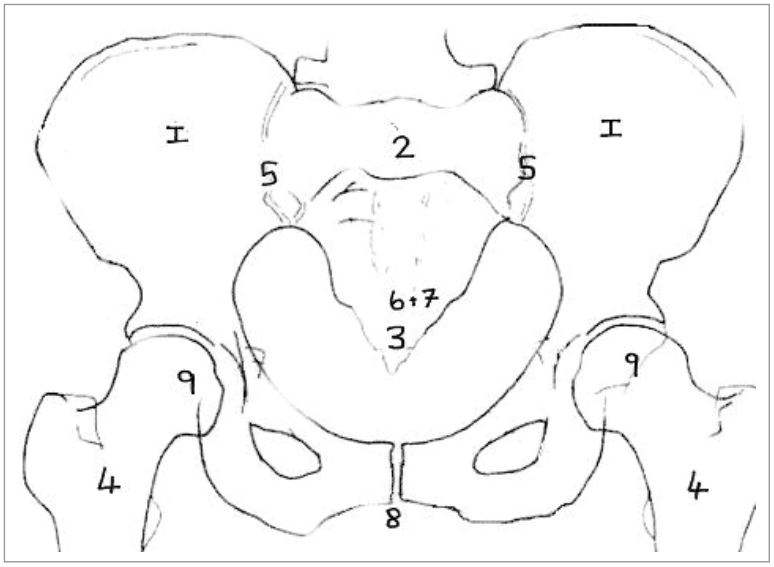

Figure 1.1: **The anatomical composition of the bony pelvic basin**
Key: 1 ischia, 2 lumbosacral junction, 3 tip of coccyx, 4 neck of femur, 5 sacroiliac joints, 6 & 7 body of coccyx, 8 pubic symphysis, 9 head of femur

- The occipito-atlantal (occipital and upper cervical headache)
- The cervico-thoracic (chest and arm pain)
- The thoracolumbar (common site for low back pain)
- The lumbosacral (common site for sacroiliac joint pain)

Fascia offers an element of connection and support between different anatomical structures. Differing thicknesses, directions and planes of the various inter-fascial layers transmit tension between organs, muscles and other anatomical structures. Fascial restrictions can be treated with subcutaneous needling using a piston-like, fanning application, a technique which facilitates release and allows for deeper manual mobilisation or further active stretching exercises. Fascial needling should be aimed at the superficial interfacial layer and directed towards a local bony eminence, with appropriate care taken to avoid puncturing any underlying viscera.

Anatomical and biological studies of the pelvis and its connections with the lumbopelvic muscles (Vleeming et al, 1990a, b, 1995b, 1996; Snijders et al, 1993a) reveal highly specific firing of these muscles, which functions to maintain stability and integrity. The lack of this specific firing is associated with pelvic and lower back pain (Hides et al, 1994, 1996; Hodges et al, 1996; O'Sullivan, 2002; Hodges, 2003; Hodges et al, 2003). In order to manage CPPS, knowledge of the function of pelvic musculature is crucial; readers are directed to the work of Diane Lee (2007), as this is beyond the scope of this paper. The pelvic fascia is an essential component in the 'circle of integrity', which functions to maintain the stability of the lower back and pelvis. Loss of stability in the pelvic fascia caused by trauma, postural stress, anxiety and even pregnancy may cause microtrauma and subsequent pain.

Suggested peripheral causes of chronic pelvic pain

In order for practitioners to treat pelvic pain safely and effectively, it is essential that they are aware of the various possible pathomechanisms involved and thus the various potential causes of pain - which may or may not have a myofascial component. These are discussed as follows:

Visceral pain

The reproductive organs are innervated by the sympathetic and parasympathetic branches of the autonomic nervous system (ANS), with contributions from the somatic sensory nervous system (Cervero et al, 1986; Kumazawa, 1990; Wesselmann, 2001). Afferent pathways receive innervation from the cell bodies of the nerves of the tenth thoracic to the third lumbar vertebrae, and pelvic parasympathetic output from the second to the fourth sacral segments, which innervates the fascia, muscles, peritoneum, external genitalia, anus and urethra. Visceral pain is often difficult for a practitioner to locate, and is frequently associated with various autonomic reflexes such as restlessness, nausea, vomiting and diaphoresis (Procacci et al, 1999). It is characterised by referral of the pain into the same dermatome or spinal cord segment receiving the visceral stimulus and may be associated with an acute inflammatory presentation. Visceral pain induces sensitisation of the central nervous system (CNS) with resulting hypersensitivity at the level of visceral innervation (Gerwin, 2002). Visceral pain is the most common cause of disease-induced pain and occurs in pathological problems such as cardiac infarct, as well as non-pathological conditions such as bowel or bladder distension. Tissue injury is not necessarily present with a history of visceral pain; abnormal contraction or prolonged distension of hollow organs, traction, anoxia, and ischaemia may all contribute (Gerwin, 2002).

Chronic visceral pain syndromes are more common in women than in men, reflecting the influence of hormonal factors on algesic response, both peripherally and centrally (Gerwin, 2002). The direct effect of oestrogen, progesterone and testosterone on organ function and psychology cannot be underestimated (Heitkemper et al, 2003; Giamberardino et al, 2002). Acupuncture is often used and advocated as a preventative medical intervention in such cases; Akimoto et al (2003) studied the response of

immunological and endocrine markers of competing athletes to acupuncture treatment. The measured parameters included salivary secretory immunoglobin A (SIgA), cortisol, a subjective rating of physical well-being and a profile of mood status (POMS). The results showed that the exercise-induced decrease of salivary SIgA and increase in salivary cortisol was inhibited by acupuncture treatment, which supports the hypothesis that acupuncture facilitates physical and mental well-being. Acupuncture also improved subjective ratings of muscle tension and fatigue, as well as modulating the athletes' POMS scores.

Adhesions

Adhesions play a prominent role in CPP, and are found in 16 to 44 per cent of patients undergoing laparoscopy for CPP (Hughes et al, 1994). In a prospective non-randomised study, Steege et al (1991) revealed that the location of pain overlapped with the location of adhesions in 90 per cent of patients with bowel and intestinal adhesions. Deep but sensitive palpation is required to determine the presence of adhesions, combined with a detailed surgical history. Palpation of the abdomen should be undertaken with a flat hand (Fig 1.2), using the tips of the fingers to search for bands, nodules and scars that reproduce the patient's pain pattern on palpation.

Endometriosis

The incidence of endometriosis or 'endometrialgia' (Lundeberg, 2008) has been estimated at 10 per cent in the UK female population and as high as 15 to 25 per cent in infertile woman; it has seen a huge increase over the last ten years. It is found in 28 to 74 per cent of patients undergoing laparoscopy for CPP (Reese et al, 1996). Endometriosis is defined as the presence of endometrial glands and stroma outside the uterine cavity, ovaries, pelvic viscera and parietal peritoneum, probably involving a local disorder of immune modulation (D'Hooghe et al, 1996). The pain is highly sensitive to hormonal fluctuations, cyclical in nature and tends to reduce with menopause or pregnancy. Symptoms include:

- Dysmenorrhoea
- Dyspareunia
- Infertility
- Abnormal uterine bleeding
- Pelvic pain

Pelvic congestion

Emotional stress can lead to dysfunction in the ANS resulting in smooth muscle spasm and compression of the ovarian and uterine veins, with an associated increase in the amount of substance P found at the endothelium of pelvic veins, which is thought to increase vascular tone and pain (Stones et al, 1995). In terms of Chinese medicine, qi stagnation of any kind can lead to blood stasis and the development of pelvic obstruction, resulting in increased levels of musculoskeletal pain and heightened skin and muscle sensitivity. In TCM anger is said to affect the Liver, causing qi stagnation, which then impacts on blood circulation, causing sub-costal and pelvic pain. This causal factor should not be underestimated within the somato-visceral and viscero-somatic reflex response. Clinically, patients will demonstrate symptoms of:

- Dysmenorrhoea
- Dyspareunia
- Menorrhagia
- Bilateral pelvic pain
- Exacerbation of symptoms at menstruation.

Fig 1.2: Abdominal palpation technique

Symptoms overlap with irritable bowel syndrome (IBS), myofascial pain syndrome (MPS) and polycystic ovary syndrome (PCOS). A detailed examination must be taken in order to exclude any underlying pathology, including details of the menstrual cycle and extensive firm but sensitive palpation.

Primary dysmenorrhoea

Primary dysmenorrhoea involves cyclical pain and is a cause of up to 50 per cent of all gynaecological referrals. It involves no pelvic pathology and appears one or two years after menarche with the establishment of ovarian cycles, but may persist for more than 40 years. The pain presents with suprapubic cramping with pain radiating down the anterior thighs and into the lumbosacral region, and is accompanied by nausea, vomiting and (at times) diarrhoea. Pain occurs prior to or just after the onset of the menses and lasts for 48 to 72 hours (Rapkin, 2002).

Secondary dysmenorrhoea
Secondary dysmenorrhoea usually occurs after menarche and may occur with anovulatory cycles. It is commonly associated with endometriosis or associated pelvic pathology, and requires medical investigation.

Gastroenterological
Many patients have gastroenterological (GI) pathology (Reiter, 1990b; Walker et al, 1996); because the pelvic viscera share the same segmental innervation from the tenth thoracic to the first lumbar vertebrae, it is often difficult to distinguish whether pain has a gynaecological or GI component (Rapkin et al, 1993). GI pain is characteristically diffuse and poorly localised. Irritable bowel syndrome (IBS) is one of the most common causes of lower abdominal pain, accounting for as many as seven to 60 per cent of gynaecological referrals for CPP (Reiter, 1990b). IBS pain is intermittent, with cramping in the left lower quadrant as well as flatulence, bloating and alternating diarrhoea and constipation. Pain is often improved after a bowel movement and is typically worse after eating, during stress and anxiety, and during the premenstrual and menstrual phases of the cycle (Rapkin et al, 1993).

Diverticular disease involves between five to 40 per cent of people over the age of 40 (Reiter, 1990b), and results in severe acute left quadrant pain with associated fever and tenderness. Inflammatory bowel diseases such as ulcerative colitis do not usually present as CPP, as the presenting pain and symptoms tend to be acute, involving fever, vomiting and anorexia. Both diverticulitis and inflammatory bowel disease must be viewed as having a pathological origin, and therefore require medical referral in order to rule out more serious pathology.

Urological
Chronic pain of urological origin may present as CPP, but will be associated with bladder-related symptoms of urgency, frequency, hesitancy, incontinence, nocturia, dyspareunia and urinary tract problems. Urological conditions are the causative factor in five per cent of women with CPP (Reiter, 1990b; Summit, 1993). Urological dysfunction may be associated with a myofascial component; it is therefore advisable that, as well as bladder function tests, careful exclusion of possible myogenic sources is undertaken. For those with the appropriate training this is done by carefully palpating the pelvic floor to check for high or low tone, as well as checking the piriformis and obturator internus muscles.

Psychological factors
Studies of women with CPP have documented a high incidence of psychological disturbance (Mayer et al, 1993) and sexual abuse (Rapkin, 1990; Toomey et al, 1993). The role of unknown neurophysiological mechanisms within the enteric nervous system, spinal cord and supraspinal areas cannot be overestimated (Rapkin 1995). Chronic pelvic pain without (or even with) inflammatory, mechanical or visceral pathology is likely to involve all levels of the CNS. In such cases the therapeutic approach should be directed at the physical, emotional and systemic levels. Multidisciplinary pain management is therefore essential for CPP, utilising cognitive behavioural therapy (CBT), acupuncture and manual therapy in a simultaneous programme (Kames et al, 1990, Gambone et al, 1990, Wood et al, 1990, Peters et al, 1991, Reiter et al, 1991, Milburn et al, 1993).

Myofascial pain syndrome

Myofascial pain (MP) arises from hyperirritable foci in muscle or related fascia, which are referred to as myofascial trigger points (MTrPts). It occurs as a result of muscle injury, overuse, repetitive strain or somatic influences on the sympathetic nervous system. If pain persists without relief it is referred to as myofascial pain syndrome (MPS) (Travell et al, 1983; Simons, 2001; Borg-Stein et al, 2002). Active TrPts cause spontaneous pain associated with contraction of the dysfunctional muscle or fascial component, with an accompanying loss of active range of movement. Active MTrPts play a significant role in the symptoms of CPPS (Jarrell, 2004; Doggweiler-Wiygul, 2004; Anderson et al, 2006). Acupuncturists following a traditional Chinese approach will be familiar with TrPts as *ashi* points.

Reports of the prevalence of MP as a cause of CPPS vary; Reiter et al (1990b) found active TrPts in 15 per cent of patients experiencing somatic pathology, and this group represented 47 per cent of all patients referred to their pelvic pain clinic (Reiter, 1991). Slocumb (1984; 1990) noted TrPts in 89 per cent of women presenting with CPPS, irrespective of the underlying pelvic pathology. Myofascial pain is generally described as dull, aching and poorly localised; it may be affected by posture, stress and the menstrual cycle. It is generally eased with rest, warmth and the reduction of postural and emotional stress.

Any fascia or muscle innervated by the twelfth thoracic to the fourth lumbar spinal segments can refer pain to the lower abdomen, especially the iliopsoas, quadratus lumborum, piriformis and obturator muscles. Similarly, the tenth thoracic to the fourth sacral segments innervate the reproductive organs, abdominal wall, lower back, thighs and pelvic floor (Baker, 1993). On digital examination, the determatomes of the abdomen, vagina and lumbar spine are used to indicate the presence of active TrPts, a procedure which relies on the patient reporting pain propagation during palpation. For TCM acupuncturists this involves meticulous palpation of the lower back, abdominal and pelvic areas to identify the appropriate *ashi* points.

Clinical characteristics

Myofascial pain has specific clinical characteristics that assist the practitioner in making a diagnosis:

- Pain is a deep aching sensation.
- Muscle stiffness in the dysfunctional area.
- Aggravated by cold, stress and postural loading.
- Muscle weakness.
- Reduced work tolerance.
- Muscle fatigue.
- Sleep disturbance.

Because optimum functioning of the pelvis is dependent upon the precise timing of muscular activity, the possibility that the myogenic structures may be the source of pain should be considered before more formal invasive medical investigations are undertaken. Identification of the myogenic component of MPP, together with its tissue source, is paramount in achieving an effective needling response.

Myofascial pain is a myalgic pain syndrome characterised by local and referred pain originating from MTrPts (Gerwin, 2005). An active TrPt causes pain, and may often cause general motor dysfunction involving stiffness and restricted range of movement. A latent TrPt often causes motor dysfunction without pain. A MTrPt is defined by the presence of:

- A contractile knot.
- A taut band.
- Sensory nerve involvement.
- A dysfunctional motor-end-plate that contributes to and causes referred pain within the muscle and to mapped areas beyond the muscle (Travell et al, 1995).

For the successful management of MPS it is therefore essential to first to identify all active TrPts from which the pain is emanating and to deactivate these systematically, followed by the necessary measures to prevent reactivation. Whether the acupuncturist is using a Western approach - with the focus on TrPts and neurophysiology, or a TCM approach - using *ashi* points and channels, it is essential to needle these points appropriately in order to successfully resolve conditions involving myofascial pain.

Many studies have shown that acupuncture can be beneficial in this process; Travell et al (1952) reported that needling tender TrPts resulted in significant pain relief; Lewit (1979) found that dry needling of TrPts caused immediate analgesia in nearly 87 per cent of needle sites. A 2005 Cochrane review that assessed the effects of acupuncture for the treatment of non-specific lower back pain (LBP) and dry needling for CMPP in the lower back region, concluded that dry needling might be a useful adjunct to other therapies for chronic LBP; the authors did not find many high quality studies, however, and they called for more research of higher quality involving greater sample sizes.

Ceccherelli et al (2002) compared superficial to deep needling; 42 subjects were assigned to two groups, group one was treated with shallow needling to a depth of two millimetres at five predetermined traditional Chinese acupuncture points, while group two received intramuscular needling at four selected TrPts. The deeper needling technique resulted in greater analgesia than the superficial needling.

Shah et al (2005) reported the importance of eliciting a local twitch response when needling TrPts. After the researchers elicited the local twitch response at both active and latent trigger points, they found that concentrations of specific chemicals in the immediate vicinity of TrPts spontaneously reduced to normal levels. Travell et al (1999) found that the therapeutic effect of deep needling was of a mechanical disruption of the contractile knot of the TrPt, possibly accomplished by damaging, or even destroying, the motor end plates and causing axon denervation.

An accurately placed needle may also provide a localised stretch to the contracted cytoskeletal structures, allowing the involved sarcomeres to resume their resting length by reducing the overlap between actin and myosin filaments (Dommerholt et al, 2004). Recent studies by Langevin et al (2002) are of particular interest in this regard, even though they did not consider deep TrPt needling in their work. A common finding when using acupuncture needles is the phenomenon of "needle grasp". Langevin et al (2002) provided evidence that needle grasp is not necessarily due to muscle contraction, but that subcutaneous fascial tissue plays a crucial role, especially when the needle is manipulated. Needle rotation not only increased the force required to remove the needle, but also created measurable changes in connective tissue architecture, which spread some distance distal to the needle site.

Full examination of all myofascial components of the pelvis must include range of movement (ROM) tests of the lumbar spine, hips and sacroiliac joints in order to ascertain muscle length, tone and postural dysfunction. Any palpation of these muscles should be undertaken with utmost sensitivity. Needling must also be undertaken with respect for any underlying viscera as well as patient comfort (Fig 1.3). The abdominal wall should be held in a pinch grip, needling in an oblique direction along the muscle fibres, in order to avoid the abdominal viscera.

Breathing

Patients should be instructed in the practice of correct diaphragmatic breathing techniques while receiving manual therapy and acupuncture treatment. Recently the author has incorporated 'pranayama' breathing exercises (Pramanik et al, 2009) as a means of reducing stress (Brown, 2005; Bhattacharya et al, 2002), increasing the frequency and duration of inhibitory neural impulses by activating stretch receptors of the lungs above tidal volume inhalation (Jerath et al 2006), controlling systemic vascular resistance

Fig 1.3: Picture of needling the abdominal wall.

and heart rate (Schelegle et al, 2001), and regulating cardiopulmonary activity (Siegelbaum et al, 2001) and the CNS (Roberts et al, 2005). Pranayama breathing is thought to induce a parasympathetic response and initiate a state of relaxation (Newberg et al, 2003; Lutz et al, 2004). Patients report increased calmness, mild sleepiness and a sense of well-being, which suggests an increase in parasympathetic activity and balancing of the ANS (Pramanik et al, 2009). Hodges (2001) and Hodges et al (2007) found a clear correlation between respiratory function, pelvic floor function and sacroiliac stability, particularly in women. If the pelvic floor muscles are dysfunctional, spinal stability may be compromised resulting in increased activity of the abdominal oblique muscles, which may ultimately lead to urinary tract infections or dysfunction. Any hyperventilation will interrupt the postural and phasic functions of the diaphragm and motor activity of transversus abdominus, with resulting implications for spinal stability (Hodges et al, 2007).

Exercise and strengthening

A passive and active home stretching programme is an essential part of treatment to reinforce the effects of TrPt deactivation, and relies entirely on patient compliance. Passive stretching of the abdominal muscles (Fig 1.4 and 1.5) should be encouraged; in order to prevent rebound contraction or irritation, a simple controlled pelvic tilt should initially be held for 10 seconds and practised hourly. Lying prone whilst supported on the elbows should be encouraged, gradually moving towards active stretching by modified and eventually full push-ups with elbows extended and the abdomen and pelvis relaxed into the floor. The use of a Swiss ball (Fig 1.6) is particularly effective as a means of passive stretching and should be recommended for home exercise programmes. The deactivation of TrPts is entirely insufficient without a full stretching and strengthening regime.

Management of activity is an essential component of the TCM therapeutic model. Injuries to soft tissues are said to require restoration of the circulation of qi and blood in order to promote healing and prevent stasis and the subsequent loss of joint movement. In the acute phase a balance between the need for immobility, stability and mobility is essential. Movement and exercise must be painless and, for those trained in their use, stability can be augmented by the use of pelvic or lumbar supports. In the late or chronic stages, strengthening through increased core stability and co-ordination training is paramount, whilst removal of external supports is essential to facilitate muscle strengthening. The introduction of a staged pilates-based exercise programme is particularly effective for management of this condition, and will ultimately empower the patient's confidence at self-management. Attention to postural alignment and body control should be considered essential throughout the rehabilitation process.

Needling

There follows a presentation of the needling of specific muscles, along with their appropriate pain referral patterns, TrPt deactivation and stretching regimes. The main muscles likely to be affected by MTrPts are presented (see Tables 1.2 and 1.3), but these are by no means representative of all possible pelvic trigger points involved.

Needling is directed superficially across the muscle fibres with the muscle pinched to avoid underlying viscera (see Figs 1.7 and 1.8).

Needling the abdominal wall

The rectus abdominus (RA) muscle refers pain to the mid thoracolumbar area and may have bilateral TrPts referring across the thoracolumbar fascia. In the upper fibres of RA pain is referred to the xiphoid process in a tight band, with associated reflux, heartburn and nausea. Needling is directed superficially across the muscle fibres with the muscle pinched to avoid underlying viscera (see Figs 1.7 and 1.8).

The external abdominus oblique (EAO) refers pain superiorly to the costal margin and inferiorly to the inguinal line. It is palpated with the fingertips, in the direction of the muscle fibres, from the costal margin towards the symphysis pubis (see Figs 1.9 and 1.10).

Needling piriformis

Needling of the piriformis muscle should be directed from the sciatic notch posteriorly towards the

Fig 1.4: **Early abdominal stretch**

Fig 1.5: **Intermediate abdominal stretch**

Fig 1.6: **Advanced abdominal stretch with Swiss ball**

Table 1.2: **Abdominal muscles and pain referral pattern**

Muscles involved	Pain referral pattern
Rectus abdominus (upper)	Mid back, upper quadrant and epigastric.
Rectus abdominus (lower)	Sacroiliac, back, pubic symphysis and symptoms of Dysmenorrhoea.
Pyramidalis	Pubic symphysis and umbilicus.
External oblique (upper)	Epigastric, midline abdominal, both quadrants, symptoms associated with hiatus hernia.
External oblique (lower)	Groin, testicular and ipsilateral lower quadrant.

Table 1.3: **Myofascial pain patterns and associated research**

Muscle	Pain referral pattern	Common misdiagnosis
Upper rectus abdominus	Epigastric pain, Right or left quadrant pain on side of TrPt	Cholecystitis Gynaecological dysfunction (Suleiman et al, 2001), Peptic ulcer (Melnick, 1957)
Lower rectus abdominus	Lower pelvic pain, Sacroiliac joints, Detrusor spasm and urinary sphincter	Dysmenorrhoea (Schroeder et al, 1949) Acute appendicitis, Sacroiliac joint dysfunction, Renal colic, Diverticulitis, Stress incontinence
Pyramidalis	Pubic symphysis pain	Diastalsis, Groin strain, Hernia
Oblique external abdominus	Heartburn, Groin and testicular pain	Gilmore groin, Hernia Visceral disease, Appendicitis (Arendt-Nielsen et al, 2001)
Levator ani Coccygeus	Coccyx pain, Sacral pain, Genital pain	Coccydynia, Interstitial cystitis (Ryder et al, 2000)
Adductor Magnus	Groin pain below inguinal ligament, Antero-medial aspect of thigh, Internal pelvic pain	Osteitis pubis, Pubic symphysis dysfunction, Groin strain (Ekberg et al, 1996)
Piriformis	Low back pain, Perineal pain, Pain during defecation, Dyspareunia, Impotence	S1 nerve root compression, Sacroiliac joint dysfunction, Hamstring injury, Pudendal nerve entrapment (Pace et al, 1976)

Fig 1.7: Palpation of rectus abdominus

Fig 1.8: Needle application for rectus abdominus, directed superficially across the muscle fibres with the muscle pinched to avoid underlying viscera.

Fig 1.9: Palpation of the external abdominus oblique

Fig 1.10: Needle application for external abdominus oblique, needling superficially in a medial to lateral direction with the fingers used to lift the muscle.

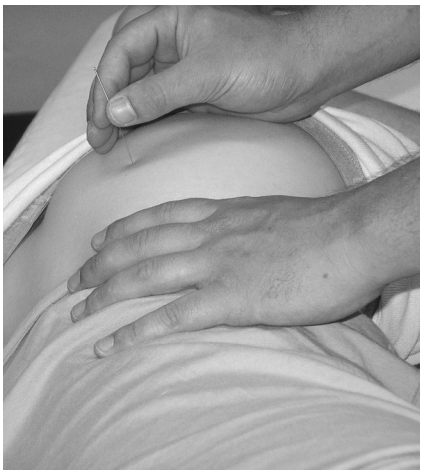

Fig 1.11: Needling piriformis - needling is directed towards the symphysis pubis within the sciatic notch.

Fig 1.12: Stretching piriformis in lying - right knee is bent to 90 degrees. Left hip in abduction and medial rotation.

Fig 1.13: Stretching piriformis in standing - right hip is laterally rotated, left hip is abducted. Body weight is over the left hip.

Fig 1.14: Needling adductor longus

Fig 1.15: Needling adductor brevis

symphysis pubis anteriorly, through the piriformis muscle bulk (Fig 1.11). Stretching of piriformis can be done in a lying position for those less mobile in the hip. Stretching involves the unaffected knee bent to 90 degrees of hip flexion whilst the affected hip is abducted and medially rotated (Fig 1.12). Stretching piriformis for the more mobile patient involves standing with the affected hip flexed and abducted on the couch. The standing leg is laterally rotated and the lumbar spine brought into full flexion on the couch (Fig 1.13).

Needling the adductors

To needle the adductor longus muscle, the muscle is held in a pinch-grip and the needle directed into the muscle bulk in an anterior/posterior direction (Fig 1.14). To needle adductor brevis, at the inguinal line of the hip joint the needle is directed antero-posteriorly towards the buttock crease (Fig 1.15).

Palpation of pectineus is directed between adductor longus and brevis in the floor of the adductor triangle and towards the pubic notch (Fig 1.16). Needling is directed along the same angle.

Psoas syndrome

For some patients, the iliopsoas may cause direct nerve entrapment due to a shortened psoas. The iliohypgastric, iliolinguinal, lateral cutaneous and femoral nerves all emerge from the lateral border of the psoas major muscle; the obturator nerve emerges from its medial border. Entrapment of the genitofemoral nerve caused by taut TrPts in the psoas can cause pain and paraesthesia in the groin, scrotum or labia and in the proximal anterior thigh (Ingber, 1983). If there are distal sensory changes in the thigh, or muscle weakness in the knee and hip, the practitioner should suspect specific nerve involvement (Gerwin, 2005). The psoas major and iliacus muscles originate in the retroperitoneal basin and thus cannot be needled. A major portion of both muscles lies in the retroperitoneal space and is known to stimulate a number of intra-abdominal pathological conditions such as appendicitis, gynaecological disorders and femoral or inguinal hernia.

Fig 1.16: Manual palpation of pectineus

Iliopsoas TrPts are usually associated with other muscle dysfunction, and rarely present as a single-muscle myofascial syndrome. Because the iliopsoas and quadratus lumborum muscles work together to stabilise the lumbar spine, both muscles should be examined and treated, followed by a progressive stretching and strengthening programme with the appropriate attention to postural alignment.

The pelvic floor

Examination of the intrapelvic muscles must be done per vagina or per rectum and should only be attempted by those qualified to do so. The intrapelvic muscles are divided into two areas:

- Perineal muscles
- Isciocavernosus
- Bulbocavernosus
- Superficial transverse peronei

- Pelvic diaphragm
- Levator ani
- Coccygeus

Levator ani and piriformis muscle pain is present in a significant proportion of women with CPP: A recent study designed to determine the prevalence of musculo-skeletal pain involved 987 women aged 14 to 79 years attending a chronic pain clinic. Twenty two percent of the women had active TrPt tenderness in the levator ani muscles and 14 per cent in the piriformis muscle, with a pain score of more than 30 out of 100 on the Visual Analogue Scale (VAS). This group had a higher total number of pain sites, more previous surgery for pelvic pain, worse Beck Depression Inventory scores, worse McGill Pain Inventory scores and experienced pain that worsened with bowel movements ($p>.05$) (Pepora et al, 1997). It is important to note that the cause of some CPP can be attributed to both high and low tone in the pelvic musculature and that appropriate intervention should be used depending upon the diagnosis. Deactivation of TrPts in a low-tone subject may cause additional dysfunction; in such cases, although the pain may be eased, deactivating the TrPts in the lax or stretched tissues may be achieved at the cost of stability. If this is the case, a pelvic band to support the recovering musculature should be supplied until sufficient muscle tone and stability is achieved. This support should be discarded once the muscle activity is of sufficient strength to provide the required level of stability, but should remain in place in the case of pregnancy, as during pregnancy the ligament structures are prone to further stretching due to the continued secretion of the hormone relaxin.

Subjects with active TrPts in the posterior aspect of the pelvic floor complain of pain in the area of the coccyx and lower part of the sacrum (Simons et al, 1983). The coccygeus muscle lies lateral to the sacrococcygeal joint; its action is to flex and abduct the coccyx and it is frequently dysfunctional with a diagnosis of coccygodynia (Travell et al, 1992). In the anterior aspect of the pelvic floor, pain is referred to the vagina and penis from levator ani and obturator internus. The use of Thiele (1963) massage can be used to treat the levator ani and coccygeus muscles via the rectum in order to alleviate high tone in the pelvic floor musculature. This is a technique in which the muscle fibres are 'stripped' using a continuous action from origin to insertion.

Oyama et al (2004) evaluated the effectiveness of transvaginal manual therapy in 21 symptomatic females with urinary frequency and high tone dysfunction. Both Thiele massage and manual intrapelvic TrPt deactivation were given twice weekly for five weeks, with subjects reporting significant improvement even after long-term follow up.

Myofascial pelvic pain in pregnancy

Western practitioners have been reluctant to use acupuncture with pregnant women in the past, owing to perceived risks such as causing premature labour or miscarriage. In recent years there has been increased research into this method of treatment, with positive results, which has led to a rise in the popularity of the use of acupuncture for musculoskeletal pain during pregnancy. Systematic reviews have indicated that acupuncture is safe and can be effective for both LBP and pelvic girdle pain (PGP) during pregnancy (Pennick et al, 2008; Smith et al 2008); this is supported by the British Medical Acupuncture Society (BMAS), who suggest that the concept of 'forbidden points' in pregnancy is not backed by reliable data (Cummings et al, 2004). That said, however, care and sensitivity are always required during pregnancy, and if there is any doubt as to the response of the patient, needling should be replaced with manual techniques.

LBP and PGP are common complaints during pregnancy, though the documented prevalence varies. Wu et al (2004) report prevalence as high as 89.9 per cent, with an average published prevalence of 45.3 per cent. Vleeming et al (2002) report specifically on PGP in pregnancy and document a prevalence of about 20 per cent. Although hormonal influences have traditionally been attributed as the cause of PGP (Hansen et al, 2003), more recent studies have suggested that asymmetrical laxity - and therefore mechanical dysfunction - are more likely the cause (Damen et al, 2001). Management for the treatment of PGP includes pacing advice (balancing exercise and relaxation), manual therapy, exercise, provision of a belt and/or crutches and acupuncture (ACPWH, 2007).

On reviewing the research covering acupuncture for the management of pregnancy-related pain, six studies were found which relate to the use of acupuncture in patients suffering from LBP or PGP, three of which are reviewed in this paper. The size of the studies ranged from 60 (Wedenberg et al, 2000) to 386 patients (Elden et al, 2005), with all but one study treating patients in the second and third trimesters only. There was a large range in the number of treatment sessions, from two (Kvorning et al, 2001) to 12 (Guerreiro da Silva et al, 2004; Elden et al, 2005), and also variation in the number and location of points used. Studies by Wedenberg et al (2000) and Kvorning et al (2004) used ear acupuncture and periosteal stimulation respectively. A summary of all the studies can be found in Appendix One.

The largest study was by Elden et al (2005), a single blind controlled trial involving 386 women experiencing PGP during pregnancy. All the participants were subjected to a standard treatment that consisted of advice, a stability belt and a home exercise programme incorporating abdominal and gluteal exercises. The women were allocated using an adequate method of randomisation to the standard treatment alone, standard treatment plus acupuncture or standard treatment plus stabilising exercises for transversus abdominus and multifidus with stretching. The authors reported clear inclusion and exclusion criteria and treated women between 12 and 31 weeks pregnancy,

with singleton pregnancy and well-defined PGP diagnosed using validated pain provocation tests. The authors used a power calculation of 90 per cent, a statistically significant p value ($p<0.05$) and reported a low dropout rate. The selection of acupuncture points was made by palpating to assess sensitivity and a total of 10 segmental points and seven extrasegmental points were used, including Baihui DU-20, Hegu L.I.-4, Guanyuanshu BL-26, Ciliao BL-32, Zhongliao BL-33, Zhibian BL-54, Henggu KID-11, Kunlun BL-60, Yaoyan M-BW-24 (referred to in this trial as Extra Channel point 21), Huantiao GB-30, Chongmen SP-12 and Zusanli ST-36. Treatment lasted 30 minutes, during which *deqi* was elicited by stimulating the needles every 10 minutes. Treatment was given twice a week for six weeks. Monitoring of the foetal heart rate, maternal heart rate and blood pressure revealed no serious complications, either during treatment or during the follow-up period. Acupuncture was shown to improve PGP when compared to both standard treatment and the stabilising group (although to a lesser extent). Unfortunately for the external validity of this study, the authors did not report how many - and specifically which - points were used on each individual. The methodology of this study might also be criticised as the physiotherapy intervention did not appear to address any asymmetry of the pelvis, which may have been responsive to manual therapy and less responsive to acupuncture.

Kvorning et al (2001) studied a cohort of 167 pregnant women in a retrospective observational study, and reported a total analgesic effect of good or very good in 72 per cent of subjects. This study also acknowledged a relatively high percentage of adverse effects (21 per cent), and one episode of transient premature labour observed during the fourth treatment. Of possible significance was the fact that, as in the Elden et al (2005) study, the point Hegu L.I.-4 was used, a point that Betts (2007) advises should be used with extreme caution and is indicated only for difficult or delayed labour. The methodological quality of this study was negatively affected because the authors did not address dropout rate or report on power calculation. Length of treatment sessions was also longer than may be realistic in an NHS setting (45 minutes), possibly affecting the external validity of this study.

Guerreiro da Silva et al (2004) compared a small population of women (n=61) receiving conventional analgesic medicine to those receiving analgesia and acupuncture. All patients completed the study and were treated by needling an average of 12 acupuncture points for 25 minutes. Unfortunately intervention was inconsistent, however, ranging from once to twice weekly, which may influence the internal and external validity of this trial. In addition, the authors did not use a thorough randomisation procedure. The study considered both LBP and PGP, with the majority of women (77.2 per cent) complaining of both. The inclusion criteria were similar to Elden et al (2005) and the patients' treatment started between 15 to 30 weeks of pregnancy. In contrast to Elden at al (2005), however, patients did not receive any physiotherapeutic intervention. The authors concluded that acupuncture had a positive effect on pain and the capacity to perform physical activity, as well as reducing the need for drugs. Neither of the latter studies used any additional physiotherapeutic intervention, in contrast to Elden et al (2005).

The positive reports of these studies have been reinforced by reviews by both Pennick et al (2008) and Smith et al (2008), who concluded that acupuncture seemed more effective than physiotherapy for the treatment of pelvic and back pain during pregnancy (Pennick et al, 2008) and that there is evidence, although limited, supporting the use of acupuncture for the treatment of pregnancy-related pelvic and back pain (Smith et al, 2008).

Conclusion

The successful management of CMPP is complex, and relies on practitioners gaining a clear understanding of pelvic anatomy, pain mechanisms, physiological function and dysfunction, muscle physiology as well as developing meticulous palpation skills… and patience. Patients experiencing CMPP tend to present with widely varying clinical histories and patterns of symptoms. Interdisciplinary pain management cannot necessarily offer a cure, but can give an opportunity to modify and manage the condition, improving the quality of patients' life whilst also offering a potential route to eventual recovery. The path to successful treatment lies in patient engagement, active patient participation, biopsychosocial management techniques and competent practitioners. It is almost impossible to summarise a topic as complicated as CMPP, but it is hoped that this paper has given a simple but useful overview to this complex subject. ■

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Appendixes and references overleaf >

Appendix 1

Table 1.4: **Muscle involvement and pain referral patterns**

Muscle	Pain referral pattern
Iliopsoas syndrome	Pain in lower back, lower abdominal quadrant unilaterally or bilaterally, groin, anterior thigh
Adductor longus & brevis	Pain in groin, anterior knee, medial thigh,intrapelvic pain
Pectineus	Pain in groin distal to inguinal ligament, antero-medial aspect of thigh
Piriformis	Complex myofascial pain, sacroiliac joint, proximal two thirds of thigh, sciatic radiation, inguinal and intrapelvic cavity

Table 1.5: **Evidence for the use of myofascial trigger point deactivation**

Trial	Diagnosis	Numbers	Intervention	Outcome
Weiss, 2001	Urinary incontinence (IC)	45 women 7 men	Manual myofascial release (MMR) 8-12 weeks	Patient reported symptom scores: 25-50% mild improvement 51-75% moderate 76-99% marked
Anderson et al, 2005	Chronic prostatitis (CP) Sacroiliac joint dysfunction (SIJ)	138 men	MMR	69% improvement overall 80% improvement in urinary output
Lukban et al. 2001	Dyspareunia SIJ dysfunction	16	MMR Re-education Home exercise programme	94% improvement in quality of urination 9 out of 16 returned to pain-free intercourse.
Oyama et al, 2004	IC and high tone dysfunction of pelvic floor	21 females	Theile massage 2x weekly for 5 weeks TrPt deactivation	Long term follow up described as significantly improved
Riot et al, 2005	Irritable bowel syndrome (IBS), Levator ani syndrome (LVAS), SIJ dysfunction	101 subjects 76 female 25 male over 1 year	Trigger point deactivation to coccygeus	69 % free of all LVAS symptoms 10% symptoms remained At 12 months 62 % symptom free 10% improved 53% IBS group symptom free 78% at 6 months 72% at 12 months
Frank et al, 2008	CPP	19 women with CPPP 20 healthy controls		Women with CPPP demonstrated myofascial findings: 61% demonstrated asymmetric iliac crests 50% demonstrated asymmetric pubic symphysis height 37% demonstrated positive posterior pelvic provocation testing VAS 3/24 vs. 0/24; (P<. 05) pelvic tenderness Pelvic floor control 78% vs. 20% (P<. 001)

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