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Zhang Zhenyu Treating Greater Trochanteric Pain Syndrome with Tuina Therapy of "Four-Step Linkage Method"

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Abstract: Greater Trochanteric Pain Syndrome (GTPS) is a common clinical disorder, mainly presenting with lateral hip pain and potentially leading to walking difficulties. Based on the theories of myofascial chains and precision mechanics, Professor Zhang Zhenyu argues that localized hip pain in this condition can be alleviated through targeted manual manipulation, with the gluteus medius, gluteus minimus, and tensor fasciae latae serving as the primary target areas for treatment. However, to restore the stability of the hip, gluteal region, and pelvis while comprehensively improving symptoms, a holistic approach is essential. This approach adheres to the principle of "strengthening tendons to stabilize bones, regulating the abdomen to treat the hip, loosening tendons to resolve adhesions, and restoring knee-ankle alignment", and implements the Four-Part Coordinated Regulation targeting the lumbar region, abdomen, knee, and ankle. Combined with self-directed functional exercises, this intervention achieves simultaneous improvement in pain relief and functional recovery and has demonstrated significant clinical efficacy.

Keywords: Greater Trochanteric Pain Syndrome; Myofascial chain; Precision biomechanics; Zhang Zhenyu; Tuina

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1. Introduction

Greater Trochanteric Pain Syndrome (GTPS) is a lateral hip disorder characterized primarily by pain in the greater trochanter region, often accompanied by buttock and thigh pain as well as walking difficulties. It is caused by soft tissue injury or pathological changes around the greater trochanter of the femur [1]. Its etiologies include trochanteric bursitis, iliotibial band friction syndrome, abductor tendinopathy, etc., and clinically, two or more pathological changes are common. Bicket et al. reported that the annual incidence rate of GTPS is as high as 3.29‰, which is

more common in women aged 40–60 years, seriously affecting patients' quality of life [2]. Treatment options for GTPS include surgery, local corticosteroid injection, extracorporeal shock wave, platelet-rich plasma injection, etc., but they have shortcomings such as large trauma and unstable curative effects [3]. With in-depth research, it has been found that GTPS is more often caused by gluteal tendinopathy, so methods such as tuina and home exercises may be more effective and acceptable, but how to improve the clinical efficacy of tuina needs further exploration [4].

Professor Zhang Zhenyu, a Famous Traditional Chinese Medicine (TCM) doctor of the Capital, serves as a mentor for the Academic Experience Inheritance Program for the 6th Batch of Beijing Municipal-Level TCM Experts. With over 30 years of experience in clinical practice, teaching, and research on TCM Tuina manipulation, he has developed a unique academic system for diagnosing and treating musculoskeletal disorders —including neck, shoulder, low back, and leg pain [5]. In recent years, focusing on the conservative treatment of GTPS, he found that GTPS not only presents as local tissue lesions but also is accompanied by compensatory changes in the abdominal-lumbar-lower limb kinetic chain. Based on this pathological feature, as well as the theories of myofascial chains and precision biomechanics, Professor Zhang applies the "Four-Part Coordinated Method" in Tuina to adjust abnormal myofascial meridians and inactivate Myofascial Trigger Points (MTrPs) [6–8]. Significant results have been achieved in reconstructing hip joint function and relieving pain. The diagnosis and treatment experience is summarized as follows.

2. Focus on tendons for accurate diagnosis

The greater trochanter, as a crucial bony landmark of the hip, features a rough surface that serves as the attachment point for powerful muscle groups such as the gluteus maximus, medius, and minimus, piriformis, obturator internus, superior and inferior gemelli, and quadratus femoris. These muscles collectively maintain hip stability and the biomechanical structure of the lower limb. Consequently, the pain associated with GTPS often manifests locally as a result of imbalanced overall force distribution due to abnormal mechanical traction on soft tissues such as tendons and bursae. The clinical presentation of GTPS is not homogeneous; it is frequently accompanied by conditions such as hip osteoarthritis and lumbar spine disorders. Differential diagnosis should consider conditions like piriformis syndrome and hamstring syndrome [9–10]. Professor Zhang emphasized that, in order to effectively avoid the diagnostic pitfall of "treating symptoms as the disease", it is essential to establish a systematic clinical approach. First and foremost, a detailed medical history should be obtained, as GTPS commonly occurs in individuals engaged in repetitive hip abduction movements, those who are obese, and female patients [11]. Secondly, a thorough physical examination should be conducted to assess the location of pain and the range of motion of the hip joint, including tests such as the resisted hip flexion test, Trendelenburg test, and single-leg stance test [12]. Then, the myofascial pain trigger point palpation technique is used to locate areas with abnormal fascial tension [13]. Referring to the diagnostic criteria in the "2020 Guidelines for the Diagnosis and Treatment of Pain Diseases in China", a comprehensive and coordinated approach is required to accurately identify the condition, thereby preventing inappropriate manual interventions that could exacerbate compensatory damage and pain around the hip due to misdiagnosis [14].

In Traditional Chinese Medicine, GTPS belongs to the categories of "tendon bi" and "hip bi." The core pathology lies in the imbalance of the sinew channels and the contraction and discomfort of tendons resulting from the formation of "tendon nodules." As stated in Lingshu·Jingjin (The Spiritual Pivot, Chapter on Sinew Channels): "When the disease occurs along its pathway, it causes branch pain and cramping." This condition often arises from excessive strain on the muscles, tendons, and bones due to "reckless overexertion" or from the invasion of external pathogens leading to obstruction of the collaterals, thereby forming palpable cord-like tendon nodules that impair hip abduction function. In response to this pathological mechanism, Professor Zhang's treatment approach does

not merely focus on pain relief. Instead, he emphasizes “loosening as the method and regulation as the goal.” Here, “loosening” serves as the therapeutic means, aiming to precisely release tendon nodules and improve the stagnation of qi and blood. “Regulation” represents the therapeutic objective, which is to restore the normal force transmission along the lumbar, hip, abdominal, and knee regions.

3. Adhere to pathogenesis and classify responsibilities

3.1. Imbalance of meridian tendons, root deficiency, and branch excess

“Lingshu·Zhoubi (Spiritual Pivot·Peripheral Bi)” states: “Body fluids converge when cold, and the converged fluids separate the muscles and tendons, leading to pain.” Wind, cold, and damp pathogens cause muscle contraction, slow blood circulation, accumulation of metabolic waste, and reduction of synovial fluid, which aggravate or induce pain. “Dantai Yu’an (Jade Case of the Red Platform)” says: “The thigh is located at the lower part of the body, where all yin meridians converge, and the pain is caused by diseases of the three meridians.” Deficiency of the liver, spleen, and kidney leads to insufficient nourishment of tendons and collaterals, resulting in flaccidity and weakness of meridians and tendons, and unfavorable flexion and extension of the hip joint. Professor Zhang believes that the pathogenesis is a deficiency of the liver and kidney, insufficient nourishment of meridians and tendons, leading to pain due to malnutrition; or strain of the hip, invasion of external pathogens, obstruction of collaterals by blood stasis, leading to pain due to blockage. The disease is mainly located in the tendons, with the pathogenesis combining deficiency and stasis. The area where bones are connected to tendons is called “jinjin” (tendon termination), where the tendon insertion is the site with the most concentrated stress during muscle contraction and traction, which is prone to injury due to torsion and excessive load during strenuous exercise or long-term repetitive movement. The key lesion points in GTPS patients are the myofascial attachment sites on the outer surface of the iliac wing of the pelvis and the outer edge of the sacrococcygeal bone, as well as the myotendinous junction and myofascial junction near the insertion of the gluteal muscles at the posterior and upper parts of the greater trochanter. Restoring muscle strength here is crucial. Studies have shown that the state of “imbalance of meridians and tendons” is more likely to be stimulated and cause lesions, leading to the accumulation of inflammatory factors and endogenous pain-causing substances, resulting in pain and even hip joint degeneration [15]. The three yang meridians of the foot all pass through the lateral hip, lumbosacral region, abdomen, buttocks, knees, ankles, and other parts. If the gluteal muscles around the hip are injured, leading to pathological changes of the meridians and tendons, a series of pain symptoms in the waist, abdomen, and lower limbs will occur.

3.2. Muscle group instability and dynamic imbalance

“Lingshu·Jingmai (Spiritual Pivot·Meridians)” points out: “Bones are the trunks, tendons are the firmness, and muscles are the walls.” Tendons are the exogenous dynamic system maintaining the stability of bones and joints, and their balance depends on the functional coordination of muscles, tendons, etc., attached to the bones. The occurrence of GTPS is closely related to the functional imbalance of the lateral hip dynamic stability system, which consists of core muscles such as the tensor fasciae latae, iliotibial band, gluteus medius, and gluteus minimus from superficial to deep [16]. It plays a crucial role in various positions involved in the body’s force line, such as standing, walking, etc. Once the hip abductor muscles are tense or injured, the sacroiliac joint tilts forward and backward in the sagittal plane. When the gluteal muscles are weak, the iliotibial band becomes excessively tense to maintain hip joint stability, and its proximal part rubs repeatedly, which not only further increases the load on the greater trochanter but also aggravates the injury, leading to thickening of the posterior edge of the iliotibial band and ultimately resulting in

pelvic instability [16]. A prospective study showed that the incidence of GTPS in people with high-intensity exercise is significantly higher than that in ordinary people, indicating that its mechanism may be related to cumulative microtrauma and biomechanical changes caused by repeated stress load on the hip abductor muscles during exercise [17]. Tian Na et al. analyzed the morphological characteristics of the gluteal muscles in GTPS patients and found that the cross-sectional area of the gluteal muscles was significantly reduced compared with healthy people, indicating that GTPS patients have extensive abductor muscle atrophy [18]. Therefore, Professor Zhang believes that restoring the muscle strength and morphological abundance of the gluteus medius, gluteus minimus, and other muscle groups is the key to breaking the pathological cycle of tendon degeneration, muscle group instability, and dynamic imbalance.

3.3. Widespread tendon nodules affecting the whole body

Under normal circumstances, during the movement of the hip joint, soft tissues such as muscles and fascia cooperate to disperse mechanical load and maintain stability [19]. Once the soft tissues in a certain part of the myofascial chain spasm or are injured, it will "pull one hair and move the whole body", causing a series of changes and compensatory behaviors. As recorded in "Zhenjiu Jiayi Jing (Systematized Identification of Acupuncture and Moxibustion)": "Hip pain radiating to the lateral side of the knee, numbness, and muscle spasm", and "Taiping Shenghui Fang (Taiping Holy Benevolence Formula)": "Pain in the waist, crotch, and legs, unbearable day and night." Many studies have shown that the course of the three yang meridians of the foot mostly coincides with the lateral line and anterior superficial line of the body, passing through the infrapatellar ligament, rectus femoris, iliotibial band, anterior superior iliac spine, abdominal muscles, etc., along this line. Tension or atrophy of the abductor muscles around the hip may cause imbalance of the physical force line, leading to tendon accumulation and nodules in the waist, abdomen, and knee joints. Through careful palpation, MTrPs are often found in these tendon nodule areas, mostly caused by repetitive movements, excessive muscle activation, or accumulation of chronic inflammation [20–21]. Long-term existing MTrPs can lead to fascial adhesion and bursitis, which are important factors for pain and movement disorders in GTPS. Activation of MTrPs is likely to cause abnormal gluteal muscle tension, aggravate friction in the greater trochanter area, and lead to bursitis or snapping hip, which are significant factors contributing to pain and movement disorders in GTPS [22]. Therefore, targeting MTrPs is an effective approach in treating GTPS.

4. Treatment ideas

4.1. Strengthen tendons and stabilize bones, regulate balance, and restore strength

The focus of hip regulation lies in "one bursa and four muscles", namely the trochanteric bursa, gluteus medius, gluteus minimus, tensor fasciae latae, and iliotibial band [23]. The myofascial attachment sites on the iliac wing and the outer edge of the sacrococcygeal bone are the core of meridian and tendon lesions around the hip. The greater trochanteric bursa is located along the course of the gallbladder meridian of the foot shaoyang, responsible for the smooth movement of the hip. If qi and blood stagnation in the bursa are caused by prolonged walking, standing, or incorrect posture, point-pressing the surrounding acupoints can promote the circulation of qi and blood and restore synovial fluid. As important structures for hip abduction, the gluteus medius and gluteus minimus have their tendons attached to the lateral side of the greater trochanter. During repetitive high-load exercises, tendon tears accompanied by inflammatory factor infiltration are prone to occur, especially at the junction of the gluteus medius and gluteus minimus, where tendon nodules are likely to form. The key is to relieve the anterior bundle of the gluteus medius, the insertion of the gluteus minimus, and the iliotibial band with tendon-regulating manipulation. In the early stage of hip pain, pathogens stagnate in the muscle surface, and the qi of tendons is disharmonious, with palpable tendon

nodules and cords. Precise tuina manipulation can relieve local MTrPs, dispel superficial pathogens, and regulate qi and blood. In the middle stage, tendons and collaterals are obstructed, and the flexible use of precise tendon-relaxing manipulation combined with exercise traction can make muscles and bones orderly. In the later stage, muscles and bones are insufficiently nourished, so attention should be paid to supporting healthy qi during tuina combined with patients' self-exercise, so as to restore the function of meridians and tendons to "stabilize bones and facilitate joints."

4.2. Draw yang from yin, regulate the abdomen to treat the hip

Zhang Jingyue said: "Seeking yang from yin enables yang to be assisted by yin and generate endlessly." Combined tuina of the abdomen and hip, following the principle of "drawing yang from yin and drawing yin from yang", can help relax the muscles around the hip. The abdomen is the course of the stomach meridian, liver meridian, and kidney meridian, corresponding to the bladder meridian and gallbladder meridian around the hip in yin and yang. The gluteus medius is connected to the three flat abdominal muscles, and a gluteal muscle tear or thickening can cause stress changes in the abdominal muscles. At the same time, there are ilioinguinal nerves, etc., in the posterior abdominal wall. Muscle tension can lead to traumatic lesions of the epineurium, resulting in acute and chronic hip and leg pain [24]. Acting on abdominal muscles such as the transverse abdominis, obliques, and iliopsoas can regulate intra-abdominal pressure, stabilize the core, directly affect the force line environment of the hip joint, and improve or eliminate pressure or adhesion in the course of meridians and tendons. Professor Zhang's abdominal massage, combined with point-pressing Guanyuan (CV4), Zhongwan (CV12), etc., can stimulate the qi of the three yin meridians of the foot, guide qi and blood to descend to nourish the hip circumference. Therefore, abdominal tuina can have a direct effect on the muscle groups of GTPS patients, relieve pain, and improve clinical efficacy by locally reducing abdominal pressure and tonifying the liver and kidney.

4.3. Treat the hip and leg simultaneously, regulate qi and blood circulation

Wang Huaiyin in the Song Dynasty recorded in "Taiping Shenghui Fang (Taiping Holy Benevolence Formula)": "Pain in the waist and crotch", "Pain in the waist and crotch, unfavorable flexion and extension of the thigh, and difficulty in squatting." Meridians and tendons "connect limbs and joints, penetrate all bones", which reflects TCM's understanding of overall movement. "Suwen·Mai Yao Jing Wei Lun (Plain Questions·Treatise on the Essentials of Pulse Diagnosis)" further points out: "The knee is the residence of tendons", emphasizing the importance of the knee joint as a convergence of tendons and collaterals for coordinated movement. Modern studies have confirmed that the iliotibial band is connected to the tibia below, and injury to the muscles around the hip can lead to abnormal lower limb movement [25]. Professor Zhang believes that, as the core joint connecting the upper and lower parts of the human body, hip joint dysfunction can cause abnormal knee joint movement. When pressing the gluteus medius in the direction of the greater trochanter, pain can radiate to the knee joint along the iliotibial band, and even to the lower leg. Mcmanus conducted intensive training on the hip abductor muscles and found that it can effectively improve the lower limb force line and enhance the synergistic contraction ability of the quadriceps, thereby relieving the burden on the knee joint [26]. This mechanism suggests that treatment should take into account both local and overall conditions, identify the location of the lesion, and focus on regulating and smoothing tendons with manipulation to restore the physiological state of "bone alignment and tendon flexibility" of the hip joint.

4.4. Coordinate the waist and hip, release tendons, and unblock nodules

"Suwen·Weilun (Plain Questions·Treatise on Atrophy)" states: "The waist and spine are the major joints of the body." As the mechanical hub between the trunk and lower limbs, the stress distribution of the waist is profoundly

affected by the stability around the hip. The waist and hip are the core of the middle joints of the human body. A strong waist, flexible and stable hip joint, a stable lower body, and a steady center of gravity. The erector spinae and quadratus lumborum form a myofascial chain with the gluteus medius through the thoracolumbar fascia. When the gluteal muscles are tense, the soft tissues of the waist become tense. Further stiffness of the gluteal muscles will force the lumbar ligaments, facet joints, and deep lumbar stabilizing muscles to overcompensate for hip joint activities, aggravate local inflammatory exudation, and increase low back pain. The gluteal muscles are innervated by the superior gluteal nerve of the sacral plexus. By releasing the T12/L1 and L1/L2 facet joint areas, nerve root compression can be relieved, and the nerve innervation function of the gluteal muscles can be restored. Activating the lumbar multifidus can enhance pelvic core stability, reduce the load of the gluteus minimus in maintaining hip joint stability, and fundamentally break the pathological cycle of mutual damage between the waist and hip.

5. Tuina treatment

Professor Zhang proposed the “precision biomechanics” tuina manipulation, integrating the modern theory of myofascial chains, biomechanics, and the traditional Chinese medicine concept of sinew channels. with force, size, and direction as the core regulatory factors. It emphasizes achieving self-repair of the body by simulating the “creep” mechanism of tissues. When applying this manipulation in the hip lesion area, it adopts suction-fixation contact combined with small-amplitude work to promote inflammation absorption. Kneading along the meridians and tendons of the abdomen, waist, and lower limbs improves mechanical conduction, regulates the balance of the abdominal-lumbar-lower limb kinetic chain, and achieves the clinical effect of “replacing strength with skill and subduing movement with stillness.”

5.1. Hip tuina

The patient takes a side-lying position with the affected side upward, exposing the lateral hip area. The key is to press the myofascial attachment points of the buttocks with tendon-relaxing manipulation, which is commonly found at the myofascial attachment points on the outer surface of the iliac wing of the pelvis and the outer edge of the sacrum (myotendinous junction). Focus on releasing the anterior edge of the gluteus medius, the transition of the tensor fasciae latae, and the iliotibial band. When kneading the injured gluteus medius, there can be a sore and distended deqi sensation, which can be perceived by comparison between the two sides. Massaging the upper part of the gluteus medius near the origin of the iliac wing, the anterior bundle of the gluteus medius has a stronger deqi sensation. The force is gradually increased from light to heavy, based on the patient’s tolerance, to reduce the tension of the gluteal muscles and iliotibial band, improve local microcirculation, and relieve compensatory spasm, usually kneading for 5 minutes. Using the shoulder joint as a fulcrum, skillfully use the weight of the upper body to slowly press deeply. When pressing to a certain depth, press and retain, with the force penetrating into the deep layer of the myofascia, stimulating the gluteus minimus and the tissues around the hip joint capsule. Pluck the cords or nodules at the insertion of the gluteus medius (posterolateral to the greater trochanter) and the proximal iliotibial band with the thumb perpendicular to the direction of the muscle fibers, with the force based on the patient’s “soreness and distension” sensation, plucking 10–15 times at each point. Then use both hands to point-press the Ashi points around the hip, Huantiao (GB30), Julu (GB29), Fengshi (GB31), etc., keeping each point for 3–5 seconds, pressing and moving slowly, operating for 3-5 minutes. The deqi sensation is very strong, often with a radiating warm sensation to the lower limbs, which is sore, distended, and comfortable.

5.2. Lower limb tuina

The core of lower limb tuina is to unblock collaterals along meridians and arrange meridians and tendons. Focus on pushing and rubbing along the liver meridian of the foot jueyin, kidney meridian of the foot shaoyin, gallbladder meridian of the foot shaoyang, and bladder meridian of the foot taiyang (tensor fasciae latae, iliotibial band, quadriceps, biceps femoris) from bottom to top 5–6 times until the local area is flushed and warm, aiming to promote qi and blood circulation and restore the balance of the lower limb force line. Focus on point-pressing Yanglingquan (GB34), Xuanzhong (GB39), and Weizhong (BL40) to relieve ankle and knee pain. At the same time, pluck the posterior part of the fibular head in the Yanglingquan area to release the distal attachment of the iliotibial band and the branches of the common peroneal nerve, improving the imbalance of lateral knee fascial tension. On this basis, push and knead along the course of the gallbladder meridian of the foot shaoyang from Fengshi (GB31) to Yanglingquan (GB34), combined with point-pressing Zusanli (ST36) to regulate the quadriceps and patellar tendon complex muscle groups. In the later stage of treatment, combined with passive movement intervention, the patient takes a prone position. The physician holds the patient's knee joint with one hand and the lower end of the lower leg with the other hand, flexes the hip joint, coordinates with both hands, and makes the hip joint perform passive clockwise and counterclockwise rotation, rotating 8–12 cycles on each side. Then instruct the patient to cooperate with force to quickly kick the leg upward, and the physician pulls the affected limb upward along the direction of the kick 6-8 times. Finally, use brisk tendon-regulating manipulations such as kneading, rubbing, wiping, and pressing to relax the lower limb muscles along the meridians, thereby systematically improving the biomechanical coordination of the hip-knee-ankle kinetic chain.

5.3. Abdominal tuina

Based on "drawing yang from yin", combined with deep and shallow layer release and qi-regulating manipulation to adjust intra-abdominal pressure, achieve the curative effect of "regulating the abdomen to treat the hip" for both root and branch causes. The patient takes a supine position and fully exposes the abdomen. The operator first pushes and presses along the course of the kidney meridian of the foot shaoyin on both sides of the abdomen from the inguinal region to the hypochondrium 5–8 times with the pulp of the thumbs of both hands to unblock the meridians and qi and blood, regulate the qi of the lower limbs, and relieve hip pain. Then press Tianshu (ST25) vertically with the pulp of the middle finger, kneading from light to heavy for 2–3 minutes to stimulate the functional qi of the zang-fu organs and improve the overall qi and blood state. During the operation, perform deep and shallow layer manipulation: in the superficial layer, first locate the tense area of the abdominal soft tissues by palpation, and targetedly release the myofascial adhesion in the medial costal margin, above the pubic symphysis, etc. Then use the finger tips of both palms to perform "slow insertion and slow withdrawal" deep release on the tense area of the retroperitoneal space in coordination with the patient's breathing rhythm. Then knead Guanyuan (CV4), Qihai (CV6), Zhongwan (CV12), and Tianshu (ST25) for 5 minutes each to tonify primordial qi. At the same time, perform abdominal pushing and qi-regulating manipulation from Juque (CV14) to Shenque (CV8) to balance intra-abdominal pressure by regulating the qi linkage of the Conception Vessel and the three yin meridians of the foot.

5.4. Lumbar tuina

During the operation, the patient takes a prone position and fully exposes the lumbosacral region. On the basis of conventional lumbar tuina, strengthen the treatment of the gluteal muscles. First, stack the palms and knead synchronously on both sides along the course of the bladder meridian of the foot taiyang from top to bottom, focusing on releasing the myofascial belly of the erector spinae and quadratus lumborum. Then explore and treat the

tender points, palpate the lumbosacral region to find cord-like indurations and mMTrPs, and simultaneously palpate the insertion of the gluteus medius. Most patients present with MTrPs located posterior and superior to the greater trochanter. Use the alternate plucking method with both thumbs to release the abnormal tension points, combined with point-pressing Shenshu (BL23), Mingmen (GV4), etc., with moderate soreness and distension as the effective stimulation standard. Use the elbow tip to press progressively deeply along the paraspinal line extending to the iliac crest, with the force reaching the multifidus layer, based on the patient's comfort. Finally, wipe the lumbosacral region, covering the sacroiliac joint to the greater trochanter area, to promote local microcirculation.

6. Self-exercise

Lower limb function strengthening training program: mainly includes side-lying resisted hip abduction and modified glute bridge to exercise the hip abductors and their extended muscle groups. Side-lying resisted hip abduction: lie on the side with the affected side upward, keep the head and neck in a neutral position with the spine, flex the lower limb on the unaffected side at 30° at the hip and knee to stabilize the pelvis, slowly abduct the hip joint to 15–30°, maintain isometric contraction at the end for 3 seconds, focusing on activating the posterior bundle fibers of the gluteus medius. Modified glute bridge: lie supine with knees flexed at 90°, keep the lumbar spine in a natural lordosis, contract the abdominal muscles when exhaling, lift the buttocks, waist, and lower limbs in sequence, maintain at the position of 20° hip extension for 5 seconds, emphasizing the eccentric control of the gluteal muscles to strengthen the lumbar muscle groups. Start with low resistance and gradually increase, 3 sets × 10 times, 3–4 times a week to improve tendon tolerance. Pay attention to the gluteal muscles exerting force, avoiding the hamstrings dominating the movement. All movements should maintain uniform breathing, avoiding holding breath. If pain or discomfort occurs, stop immediately and adjust the posture. It is recommended to start with low intensity for initial practice and gradually increase the range and duration of movements.

7. Case example

A 62-year-old male patient presented for his first consultation on September 15, 2024, with a chief complaint of persistent pain in the lateral aspect of the right hip accompanied by restricted mobility for 3 years, which had aggravated over the past 2 weeks; three years prior, he had developed dull pain in the lateral right hip after long-term mountain climbing, with fluctuating symptoms that were not managed with standardized treatment, and the pain worsened 2 weeks ago following long-distance running, leading to difficulty turning over at night and prominent pain when standing after climbing stairs. At the time of consultation, he exhibited persistent right lateral hip pain exacerbated on rainy days, at night, and after prolonged walking or standing, without lower limb numbness, and he also reported regular cold extremities, lethargy, and fatigue; TCM examination revealed a pale-dark tongue with thin white coating, tortuous sublingual collaterals, and a deep, thready, and astringent pulse. Physical examination showed obvious tenderness over the right greater trochanter, positive Gluteus Medius Compression Test and Hip Abduction Resistance Test, negative Patrick's Test (Fabere Test), and palpable cord-like nodules in the gluteus medius and tensor fasciae latae; hip X-ray revealed no abnormalities, while MRI demonstrated locally increased signal intensity in the gluteus medius. He was diagnosed with Greater Trochanteric Pain Syndrome (GTPS, with gluteus medius tendinitis) in Western medicine and Hip Bi Syndrome (syndrome of Liver-Kidney Deficiency with Cold Coagulation and Blood Stasis) in Traditional Chinese Medicine (TCM), with the treatment principle of warming and tonifying the liver and kidney, promoting blood circulation,

and relieving tendon stiffness, and the intervention adopted the "Four-Part Coordinated Method" in Tuina combined with infrared irradiation, administered 3 sessions per week.

Second visit on September 22, 2024: The pain range narrowed, and the pain when turning over at night was relieved, but the patient still complained of discomfort after prolonged walking. Adjust the manipulation to focus on releasing the myofascial attachment points on the iliac wing and the outer edge of the sacrum, and add moxibustion at Guanyuan (CV4) to warm the kidney.

Third visit on October 6, 2024: Tenderness in the greater trochanter area basically disappeared, and he could walk continuously for 30 minutes without discomfort. Continue treatment twice to consolidate the curative effect, and no recurrence was found during 3 months of follow-up.

8. Discussion

Professor Zhang integrates the myofascial chain theory with Tuina manipulation techniques, arguing that the pain and dysfunction caused by Greater Trochanteric Pain Syndrome (GTPS) are not merely local periacetabular issues but are closely associated with the stability of adjacent anatomical structures. The quadratus lumborum and erector spinae muscles are connected to the gluteal muscles via fascia; decreased lumbar stability can induce compensatory hip joint dysfunction, and conversely, weakness of the hip abductor muscles may lead to compensatory lumbar scoliosis. As an integral component of the core stability system, the transverse abdominis and internal oblique muscles play a crucial role—insufficient abdominal muscle strength can result in pelvic anteversion, altering the relative positional relationship between the greater trochanter and the iliotibial band, thereby increasing the risk of frictional irritation. The iliotibial band attaches superiorly to the tensor fasciae latae and gluteus maximus and inferiorly to the lateral condyle of the tibia; in cases of knee valgus or arch collapse, the tension of the iliotibial band increases, and the upward traction force exacerbates frictional stress in the greater trochanter region, forming a "bottom-up" pathogenic mechanism. Based on this comprehensive pathological understanding, the authors have developed the "Four-Part Coordinated Tuina Method" for the treatment of GTPS [27–29].

MTrPs are the focal points of our diagnosis and treatment, which necessitates precise localization. These include key sites along the myofascial chain and pivotal points in force transmission pathways, such as the origin of the gluteus medius at the iliac crest, its insertion at the greater trochanter, and the transition point where the tensor fasciae latae merges into the iliotibial band. Accurate palpation and localization of these points are prerequisites for effective intervention. Beyond precise localization, the core technical elements of manual manipulation play a crucial role in treating this condition. First, the applied force must be deep, penetrating, and controllable. Instead of relying on crude or excessive force, the goal is to deliver the force precisely to the pathological site. By adjusting the practitioner's body weight and center of gravity, the force can be regulated to penetrate slowly from the superficial layers to the deeper tissues, tailored to the depth of the lesion. Second, the amplitude of manipulation should be small yet impactful. Techniques applied to these "precision points" require minimal amplitude—such as transverse displacement in plucking or longitudinal depth in pressing. However, through sustained or intermittent stimulation with "fixed-point and directional" control, the resulting mechanical effects can propagate distally along the myofascial chain. For example, pressing an MTrP in the gluteus medius may elicit a sensation radiating to the lateral knee, achieving a "small amplitude, large effect." Third, the direction of force application should follow anatomical and biomechanical principles. For instance, when releasing the iliotibial band, plucking should be performed

perpendicular to the fiber orientation to separate adhesions; when applying meridian-based stroking, the direction should follow the pathway of the Gallbladder Meridian of Foot-Shaoyang to regulate qi and blood; and when adjusting joints, movement should align with their physiological range to restore natural motion trajectories.

In the clinical treatment of GTPS, this theory-guided Tuina approach not only targets local "precision points" around the hip but also emphasizes addressing other compensatory or weak points within the linked force lines of the lumbar, abdominal, knee, and ankle regions—thereby systematically restoring the stability of the pelvic-lower limb kinetic chain. The core strategy prioritizes regulating the hip, relaxing tendons, and strengthening bones, supplemented by regulating the abdomen to treat the hip, loosening tendons to unblock adhesions, and restoring knee-ankle alignment, which ultimately achieves simultaneous improvement in pain and function. Compared with conventional Tuina methods featuring generalized release or large-area kneading, this method concentrates mechanical intervention on limited key points that directly induce symptoms and functional disorders. This not only avoids unnecessary soft tissue damage but also enhances treatment efficiency and safety, providing a novel perspective for the management of chronic pain.

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Disclosure statement

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