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Clinical observation on the treatment of lumbar buttocks myofascial pain syndrome with edge acupuncture under ultrasound guidance

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Abstract: To observe the clinical effect of ultrasound-guided blade acupuncture in the treatment of myofascial pain syndrome (MPS) in the lumbar buttocks. We selected 60 patients with lumbar buttocks myofascial pain syndrome in the Department of Orthopaedic Spine Diseases, Xi'an Hospital of Traditional Chinese Medicine, and randomly divided them into a treatment group and a control group, with 30 cases in each group. The treatment group was treated with ultrasound-guided lower edge acupuncture for MTrPs, and the control group was treated with ordinary acupuncture. The VAS scores, Young's modulus (E) at MTrPs, and MTrPs were observed before treatment, after the first treatment and after the end of the course of treatment. The strain ratio (SR) of normal tissue at the same level. Resultly, the comparison between the two groups of patients before and after VAS treatment had significant statistical differences, $P<0.05$; the Young's modulus at MTrPs had significant statistical differences before treatment, the first treatment and after treatment, $P<0.05$, and the control group before treatment , There was significant statistical difference between the first treatment and after the course of treatment. Ridit analysis was used to compare the two groups, $P<0.05$, there was a statistical difference, the treatment group was better than the control group; MTrPs and the same level of muscle tissue strain ratio (SR), the treatment group Before treatment, compared with the first treatment and after the course of treatment, there was a statistical difference, $P<0.05$, and the comparison between the two groups after treatment, $P<0.05$, there was a statistical difference. It shows that the two groups can improve the elasticity and change the local deformation, but the curative effect of the treatment group is better than that of the control group. In conclusion, ultrasound-guided blade needle acupuncture at the trigger point for myofascial pain in the treatment of lumbar and gluteal myofascial pain syndrome can significantly improve patient symptoms, has good clinical efficacy, and promote local muscle tissue elasticity recovery, improve local tissue deformation ability and degree.

1. Introduction

Myofascial Pain Syndrome(MPS) [1-3], it is a Chronic pain Syndrome characterized by pain, sensitivity, motor dysfunction, etc.and is mostly characterized by myofascial pain trigger points. Lumbar and gluteal myofascial pain syndrome is caused by patients experiencing pain and discomfort in the lower back and buttocks under the same or multiple stimuli, which can even affect limb activity. Physical examination revealed pain conduction in the lower back and buttocks, as well as in the posterolateral lower limbs on the same side, with occasional obvious tenderness points. Clinical methods such as acupuncture oral medication, and local injection are generally used to promote the metabolism of inflammatory substances, improve blood flow, and alleviate pain. After muscle bone ultrasound examination, The patient's pain area shows single or scattered hypoechoic areas, The internal blood flow velocity decreases and the continuity of the original muscle texture disappears. The research team has the advantage of real-time monitoring of changes in the anatomical structure of the muscles and bones in the affected area through the use of muscle bone ultrasound guided blade needle therapy for the treatment of lumbar and gluteal myofascial pain syndrome. By grasping the strength and direction during surgery, it can avoid neurovascular damage. We have conducted clinical observations on this therapy and confirmed that it can alleviate patient symptoms, improve the elastic deformation ability and degree of deformation of local muscle tissue. The following is the report.

2. Information

2.1. General information

The data of 60 patients with lumbar and buttock MPS were all from June 2020 to July 2020 at the Spinal Disease Clinic of the Orthopedics and Traumatology Department of Xi'an Traditional Chinese Medicine Hospital. They were randomly divided into a treatment group (n=30) and a control group (n=30) using a random number table method. There were 17 males and 13 females in the treatment group, aged 21-62 years old; There were 16 males and 14 females in the control group, aged 19-59 years old. There was no statistical difference in the general data of the two groups by Chi-squared test (P>0.05), which was comparable. Please refer to Table 1 for details. The research plan has been reviewed and approved by the Ethics Committee of our hospital.

Table 1: Comparison of general information between 2 groups of patients

Group	Quantity	Gender		Age ($\bar{x}$ ±s)
		Male	Female	
Treatment group	30	15	15	40.63±11.37
control group	30	16	14	37.20±11.94
statistics		X2=0.076		t=1.162
P		0.795		0.255

2.2. Diagnostic Criteria

According to Simoms's "Myofascial Pain and Dysfunction - Myofascial trigger point Manual" [4], the diagnostic criteria for MPS are drawn up:

(1) The muscle surface tenderness area can touch strip like tension zones or elliptical contractile nodules;

(2) Forced vertical stimulation of Myofascial trigger point causes specific reference pain;

(3) Rapid pressure release and needle stimulation of the pain point in vivo can induce tremor

response in some lower limbs;

(4) No obvious abnormalities were found through DR examination or CT examination.

2.3. Inclusion Criteria

(1) The patient meets the diagnostic criteria of the "Muscle Fascia Pain and Dysfunction - Pain Points Manual"

(2) The age of the patient is between 18 and 60 years old, and an informed consent form is signed;

(3) The patient has no previous history of tumor, tuberculosis or other metastatic diseases;

(4) The superficial tissue of the patient's waist and buttocks during surgery shows no signs of skin diseases such as scars or rashes;

(5) The patient has not taken any relevant medication or received any other physical intervention treatment within the past month;

(6) Patients who can understand the treatment plan and cooperate in completing the treatment process.

2.4. Exclusion Criteria

(1) The patient has serious medical diseases such as hypertension, diabetes, heart disease, mental illness, etc;

(2) Female patients during pregnancy, preparation period, or lactation period;

(3) The patient has a history of lumbar related diseases, such as lumbar disc herniation, lumbar spondylolisthesis, or surgery due to other organic lesions;

2.5. Detachment Standard

(1) Patients who cannot complete treatment as required and have poor compliance should be excluded

(2) Patients who experience serious adverse reactions during treatment and are unable to continue treatment should be excluded;

(3) Patients who undergo other treatments or take other medications during the treatment period that affect the experimental results should be excluded;

(4) Patient lost during midway visit, incomplete information should be excluded;

3. Methods

3.1. Therapeutic Method

Treatment group: Acupuncture of myofascial pain trigger points under ultrasound guidance is used for treatment. Firstly, the doctor conducts a palpation examination of the patient's pain area and marks the surface projection area with obvious tenderness points using a special paint pen. In the subsequent ultrasound exploration, the doctor focused on observing the marked points. The ultrasound doctor records the abnormal morphological changes of muscle texture under ultrasound, which are located in the low echo area of the patient's lower back muscles, and can see that the CDFI blood flow signal weakens or disappears. The corrected position and depth are recorded, which is the trigger point for myofascial pain. During treatment, the treating doctor conducts an examination sequence from top to bottom, and from inside to outside. Before each trigger point examination, the ultrasound probe and the skin surface are disinfected with amlodine. The treating doctor holds a probe in his left hand and a blade needle (75mm * 0.35mm) in his right hand. The doctor observes and selects the optimal

position of the trigger point image, stabilizes the probe, and stabs the blade needle along the midpoint of the probe side perpendicular to the trigger point into the skin, striving to reach the target point in one go. It is effective to treat patients with acid bloating, slight numbness, or slight swelling and pain, and local tissue convulsions can also be observed. The doctor slowly pulled out the needle body to the dermis, then quickly pulled out the blade needle tip, and pressed the cotton swab for a few seconds to prevent bleeding. Rest for 10 minutes after the overall treatment to prevent delayed dizziness. The entire treatment is performed every 5 days, with 3 sessions being a course of treatment for a total of 15 days.

(75mm*0.35mm).Observe and select the optimal position of the trigger point image, stabilize the probe, and insert the blade needle along the midpoint of the probe side perpendicular to the trigger point into the skin, striving to reach the target point at once. It is effective to treat patients with acid bloating, slight numbness, or slight swelling and pain, and local tissue convulsions can also be observed. Slowly pull out the needle body to the dermis, then quickly pull out the blade needle tip, and press the cotton swab for a few seconds to prevent bleeding. Rest for 10 minutes after the overall treatment to prevent delayed dizziness. The treatment is given every 5 days, with 3 sessions being a course of treatment for a total of 15 days.

Control group: Use ordinary acupuncture therapy. The palpation method conducts a physical examination of the patient's waist and buttocks, and marks the areas of tenderness and pain involved. The posterior part of the skin was sterilized with An'er iodine, and acupuncture and moxibustion needles were taken (75mm*0.35mm). Insert the needle at the marked point, vertically penetrate the skin, reach the depth marked by ultrasound, repeatedly lift and insert, elicit convulsive reactions, pull out the needle body, and press with a cotton swab. The number of treatments and course of treatment are the same as those in the treatment group.

3.2. Outcome measures

VAS The severity of pain is evaluated based on different facial expressions obtained through visual perception. A score of 0 indicates that the patient is painless, while a score of 10 indicates that the pain is completely unbearable. The patient states the status and the assistant records the rating level.

Young's Modulus (E) Strain Ratio(SR) Ultrasound examination and guidance using Siemens ACUSONOxana3 desktop ultrasound diagnostic instrument,Linear array probe14L5,frequency5-14MHz.The Young's modulus reflects changes in the elasticity of the trigger points for myofascial pain in patients.Strain ratio: Record the trigger point strain value of the patient under ultrasound as the numerator, and the strain value of the same muscle group near the normal area as the denominator. The larger the ratio, the more it indicates that the organizational structure and degree of deformation in the two regions are similar. The smaller the difference, the greater the difference. All Ultrasonic testing and guidance are performed by the same doctor.

3.3. Statistics

The collected data was statistically analyzed using SPSS 26.0 software, and the measurement data was represented by ($x \pm s$). X2 test was used for comparison of sample differences between groups, t-test was used for comparison before and after treatment. Ridit analysis was used for comparison between groups with statistical differences after treatment. Rank sum test was used for rank data, and P<0.05 was used for statistical significance in all tests.

4. Results

There was a significant difference in VAS scores between the two groups of patients before and

after treatment (P<0.05, the difference was statistically significant); The young's modulus of Myofascial trigger point in the treatment group was significantly different before and after treatment (P<0.05, the difference was statistically significant); There is a significant statistical difference between the control group before and after treatment, indicating that both treatment methods can improve local elasticity and tighten muscles for relaxation. The comparison of data between the two groups after treatment was conducted using Ridit analysis, with a statistical difference of P&<0.05, indicating that the treatment group was superior to the control group; MTrPs and tissue strain ratio (SR) at the same level showed a statistically significant difference before and after treatment in the treatment group (P<0.05), while there was a statistically significant difference before and after treatment in the control group (P<0.05), indicating that both treatment methods could improve local tissue deformation. The data comparison between the two groups after treatment was conducted using Ridit analysis (P<0.05), indicating that the treatment group was superior to the control group. (See Table 2, Table 3, Table 4)

Table 2: VAS score of 2 groups of patients before and after treatment

Group	n	Before	After the first treatment	After the treatment period ends
Treatment group	30	5.40±0.97△	2.30±1.18☆	1.00±1.01☆*
control group	30	5.37±1.00△	2.70±0.99☆	1.60±1.00☆*
t		0.254	9.023	14.966
P		0.801	0.000	0.000

Note: △There is no significant difference between the two groups before treatment,☆There is a significant difference between the two groups before and after treatment,*Significant differences between groups after treatment.

Table 3: Comparison of Young's modulus (E) values between two groups of patients before and after treatment

Group	n	Before	After the first treatment	After the treatment period ends
Treatment group	30	14.08±4.27△	10.24±4.03☆*	9.20±3.75*
control group	30	14.14±4.01△	11.55±4.48☆*	9.95±4.47*
t		0.051	3.244	4.201
P		0.959	0.003	0.000

Note: △There is no significant difference between the two groups before treatment,☆There is a significant difference between the two groups before and after treatment,*Significant differences between groups after treatment.

Table 4: Comparison of strain ratio (SR) between two groups of patients before and after treatment

Group	n	Before	After the first treatment	After the treatment period ends
Treatment group	30	1.47±0.40△	1.30±0.35☆*	1.09±0.11*
control group	30	1.49±0.36△	1.37±0.34☆*	1.16±0.27*
t		0.191	6.789	5.089
P		0.850	0.000	0.000

Note: △There is no significant difference between the two groups before treatment,☆There is a significant difference between the two groups before and after treatment,*Significant differences between groups after treatment.

4. Discussions

The reason for the occurrence of lumbar and buttock myofascial pain syndrome is often due to prolonged sitting, which causes sustained strain of the lower back and buttock muscles, damage to the superficial and deep myofascial structures, and insufficient time to recover. The leakage of cell matrix such as hyaluronic acid leads to a vicious cycle of excessive release of acetylcholine from the motor endplate, further deepening tissue hypoxia, and leading to the occurrence of pain [5]. At present, there is widespread agreement on the mechanism of strain induced pain.Studies have shown that [6] Trauma, sustained strain and other factors can cause pathological changes in the muscle fascia repair mechanism, abnormal thickening of the muscle fascia, accumulation of inflammatory factors, accompanied by neural synapses entering the edema area and other pathological changes, thus inducing muscle stretch, spasm and pain.Some studies [7] based on the "unity" of human musculoskeletal system, draw a conclusion that the muscle balance is broken due to the long-term use of a certain point in the musculoskeletal system of the body, and the recessive Myofascial trigger point are activated through balance compensation to cause pain.The trigger point of fixed myofascial pain [8] is precisely the pain caused by muscle stretch and spasm, and the causes of lumbar muscle strain, lumbar disc herniation and other diseases commonly seen in the spine department are inseparable from trauma and strain. In addition, studies have shown that [9] an increase in muscle hardness is positively correlated with the degree of pain. The Erector spinae muscles, Psoas major muscle, Quadratus lumborum muscle, gluteus medius, piriformis, and other related muscle groups of the waist and buttocks, due to the nature of life and work, and other reasons, sitting for a long time causes sustained strain of muscle fibers in the waist, back, and buttocks, which is clinically manifested as spontaneous dull pain and soreness. The site of occurrence is mostly located in the muscle strain area of the waist and buttocks.

Muscle fibers can display their physical state in real-time under muscle bone ultrasound. Especially for the trigger points of myofascial pain, due to the low-density structure of the tissue after experiencing the lesion compared to the same type of tissue, it is displayed as a local echo reduction area, where the original muscle fiber image disappears, and the blood flow signal in the area also disappears. This is consistent with the research results of scholars such as Sikdar [10]. Some studies [11] have shown that, the Myofascial trigger point appears approximately circular or water drop type under the optical microscope, and the morphology of muscle fibers changes significantly.Due to the increased tension of muscle fibers [12], the frequency of irregular contraction of muscle fibers in an involuntary state increases, and the stimulation of adjacent blood vessels and nerves increases, promoting the leakage of inflammatory substances and promoting the occurrence of aseptic inflammation.The hypoechoic signal under ultrasound is mostly due to the increase of local fluid content [13]. The destruction of the microvascular system of tissue hematoma, especially muscle fibers, and the thickening of Free nerve ending are often related to the hypoechoic signal.Although there is a lack of unified understanding of the images of myofascial pain trigger points seen under ultrasound, most studies tend to admit that the Myofascial trigger point under ultrasound are low echo droplets or oval images, but there are also reports of high echo [14]. Our team has a high degree of consistency in the pathological and imaging research results of ultrasound induced echo reduction area images and existing myofascial pain trigger points. There is no clinical record of hyperechoic Myofascial trigger point in this clinical observation.

It is well known that through shear wave elastic imaging technology, we can measure the Young's modulus. The larger the Young's modulus, the greater the rigidity, and the smaller the elasticity, the less prone to deformation. In our research, we found that the value of the Myofascial trigger point area is greater than that of the normal muscle texture tissue area at the same level. This indicates that the elasticity of muscle tissue in the Myofascial trigger point area is less than that in the normal muscle

texture tissue area at the same level, and this index reflects the local deformation ability; In addition, in this study, it can be measured that the strain values of the Myofascial trigger point area and the normal muscle texture tissue area at the same level are positive. Compared with the strain values of the Myofascial trigger point area and the normal muscle texture tissue area at the same level, the strain ratio can be obtained, and the strain ratio is greater than 1, indicating that the muscle fibers in the Myofascial trigger point area are lengthened or thickened, and the degree of deformation is greater than that of the normal muscle texture tissue area at the same level. This indicator reflects the degree of local deformation.

The trigger point of myofascial pain is very similar to the "Ashi point" in traditional Chinese medicine, and acupuncture has good clinical efficacy in treating this disease, which has also been recognized by the industry.Some studies have found that [15] after acupuncture, the connection signal intensity of the relevant areas of the brain responsible for pain transmission, such as the hippocampus, cingulate cortex and cerebral cortex, has decreased, thus reducing pain transmission.Wei and other studies also confirmed that after acupuncture, the release of Endorphins and enkephalin in the surrounding muscle tissue increased [3,16], increasing the pain threshold, reducing muscle tension, while promoting the balance of pain related chemicals such as Bradykinin and Calcitonin gene related peptide, enhancing central sensitization, and thus reducing pain.The invasion of the six exogenous qi, including trauma, sprain, strain, and external sensations, can lead to poor circulation of qi and weak blood circulation. Blood stasis naturally forms in the lumbar meridians, which is known as "pain due to obstruction". The waist and buttock meridians are dense, and the connection is affected by the genus. The three yin and three yang meridians starting from the foot, as well as some odd points outside the meridians and the eight odd meridians contained in the Internal Classic, are related to the waist and buttocks [17]. In the theory of traditional Chinese medicine, Myofascial trigger point can be found in the meridians and acupoints regardless of the debate between deficiency and excess.

Acupuncture can play a role in relieving wind, warming yang, promoting dampness, removing blood stasis, and relieving pain in the treatment of different pathogenic factors [18]. In this study, we used a 75mm * 0.35mm blade needle, which is a type of needle knife. The needle tip is a flat blade and its length can meet the puncture conditions under ultrasound guidance. There are three purposes for using this kind of needle: first, its thickness is the same as that of acupuncture and moxibustion needle, which is more acceptable to patients and reduces the risk of infection. Secondly, its sharp tip can release the trigger points of myofascial pain, reduce muscle tension, improve the elasticity of local muscle tissue, and change its deformation ability and degree. Third, clinical practice has proved that this kind of needle is easier to adjust the direction of puncture operation under ultrasound guidance than acupuncture and moxibustion needles.

In this study, we used the trigger point of myofascial pain as the target and performed ultrasound-guided blade needle therapy on it. After treatment, the VAS score of the patient was significantly improved, and the clinical symptoms of the patient were significantly alleviated. Through ultrasonic examination, it was found that the echo area of the Myofascial trigger point after treatment was significantly reduced compared with that before treatment, and the elasticity of muscle fibers was increased, that is, the Young's modulus, muscle tension and hardness were decreased. Although some patients reported that they had no pain symptoms and their functional movements were not affected. Although the strain ratio values of the Myofascial trigger point and the normal tissues of the same muscle group were compared, it was found that their deformation function had almost no difference, but they could still be clearly distinguished from the normal tissues in ultrasonic exploration. Therefore, there is still significant room for exploration in promoting the restoration of organizational form. These two indicators objectively indicate that acupuncture at the trigger point of myofascial pain can effectively change the hardness and elasticity of muscles, improve the deformation ability and degree of local tissues. Under the guidance of ultrasound, the treatment of lumbar and gluteal

myofascial pain syndrome with blade acupuncture has significantly improved both immediate and comprehensive efficacy in objective indicators. Moreover, through ultrasound guidance, important blood vessels, nerves, etc. can be avoided, reducing damage to native tissues. The limitation of this study is that our team will further investigate the correlation between the trigger points of myofascial pain and the Ashi acupoint. Among the subjects, we excluded patients with skin diseases, but in the treatment of traditional Chinese medicine dermatology, blade needle therapy is also widely involved, and there can be significant research in the treatment of various skin diseases under ultrasound guidance [19-22]. We also welcome colleagues in the industry to discuss with us.

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