

BI SYNDROME OF THE KNEE TREATED WITH ACUPUNCTURE WITH PATELLOFEMORAL PAIN SYNDROME AS A CASE

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Musculoskeletal problems are some of the most frequent seen health problems in acupuncture clinics. Pain seems to be the main complaint in addition to reduced function. According to Traditional Chinese Medicine (TCM) obstruction of qi and/or blood lead to pain. Soreness, swelling, and stiffness in muscles and joints develop if the obstruction is not cleared, and the normal function of the whole body can be affected. As a result, daily life, recreational activities and participation in sports suffer. Reduced ability to work may put a strain on private and community economy.

Reduced function due to obstruction of qi or blood in the knees may affect all ages, both sexes, athletes and those with sedentary lifestyles. The patients experience pain in the knee on activity and/or at rest. It is claimed to affect as many as one in four of us, and as many as 15% of young men attending military service^{1,2}. Adolescents participating in sports seem to be particularly vulnerable to knee problems³, and anterior knee pain is one of the main diagnoses at sports medicine centres⁴.

In western medicine various terminology has been applied to this problem, such as chondromalacia patellae, anterior knee pain, or knee arthralgia. The current terminology is "Patellofemoral Pain Syndrome"⁵. Symptoms include chronic knee pain of insidious onset aggravated by walking uphill or downhill, squatting, kneeling, or prolonged sitting with flexed knees⁵. Excluded are those cases of anterior knee pain that occur secondary to trauma and/or dislocation of the patella.

Numerous theories have been proposed regarding the aetiology of Patellofemoral Pain Syndrome. These include extensor mechanism misalignment in the leg, quadriceps muscle insufficiency, patellar subluxation, quadriceps muscle tightness and chondral defects. The mechanism, by which these causes produce pain is not understood. Some observations imply that peripheral local nerve injury and central sensitisation in the nervous system can lead to Patellofemoral Pain Syndrome⁶.

There are few published controlled trials evaluating the effect of any treatment on Patellofemoral Pain Syndrome⁵. No treatment modalities have proven to be effective. It is

generally accepted that appropriate use of rest, strengthening of the quadriceps and stretching of the muscles and soft tissues around the patella is beneficial. The mechanism by which these treatments have a positive effects is not clear.

According to TCM, local pain at the knee without any other condition will normally be diagnosed as "obstruction" or "bi" syndrome. The obstruction of qi and or blood will give rise to pain and soreness as the main symptoms. Reduced function of weight bearing activities and knee stiffness are often reported. If the painful obstruction in this condition is not treated it can lead to long-lasting chronic pain, motor impairment, and even mental depression as normal functions of the body may be affected. There are internal or external causes for this condition. Overuse, exposure to cold weather, wind, dampness or local trauma can lead to obstruction of qi or blood. Internal causes which weaken the function of the Spleen and Liver can lead to a weakened wei-qi (defensive-qi) resulting in local obstruction of qi and blood from external causes.

Many acupuncturists report good results when treating musculoskeletal problems. Acupuncture has been shown to give promising results in the treatment of gonarthrosis^{7,8,9,10}. In the absence of a documented effect for any other treatment, it became interesting to evaluate the effect of acupuncture on this condition. In a recent study we evaluated the effect of acupuncture on the Patellofemoral Pain Syndrome, diagnosed as "bi syndrome of the knee" in TCM.

The results of this study were originally presented in the *Journal of Alternative and Complementary Medicine*, in December 1999¹¹. The study was a controlled clinical trial where individualised acupuncture treatment was compared to no treatment. 70 patients aged between 18 and 45 years of age (mean 31 years), were found to suffer from Patellofemoral Pain Syndrome, and were included in the study. 41 of the 70 patients were females. The level of knee function and pain was measured with the Cincinnati Knee Rating System. This scale is numerical, and evaluates pain, swelling, feeling of giving-way and function (walking, climbing stairs, running and jumping/twisting)¹². Patients were further tested by the "Stairs Hopple test"¹³. In this test the patients

jumped on one leg up and down 12 steps (each step 17 cm high). The best leg was tested first. Time was measured in tenths of seconds. After the Stairs Hopple test the level of pain in the knees was registered on a visual analogue scale (VAS).

In accordance with theories of TCM, Patellofemoral Pain Syndrome was classified into four diagnostic types according to the predominant symptoms and signs. The differentiation thus consisted of "cold-bi" (painful bi), "damp-bi" (fixed bi), "wind-bi" (wandering bi) and "heat-bi" (febrile bi)¹⁴. Cold-bi was diagnosed when patients complained of intense pain, often accompanied by a cold sensation. The pain is localised and may worsen with exposure to cold and diminish with warmth. There may be a white tongue coating and a tense, wiry pulse. Damp-bi was identified when local soreness or pain and a feeling of heaviness of the whole limb or the whole body were present. This may be induced or aggravated by cloudy, windy, cold or rainy weather. Other symptoms and signs include numbness and slight swelling of muscle and skin. The tongue may have a white and sticky coating and the pulse may be soft. Wind-bi was diagnosed when local pain moved from one area of the knee or limb to another. Sometimes the pain could radiate up or down the leg from the knee. The pulse is often superficial and wiry, and the tongue coating can be yellow or light yellow and thin. Heat-bi can be the result of pathogenic wind-damp transforming to heat. Clinical manifestations include pain, redness, swelling, and a burning sensation in the joints and tenderness on contact. This condition is found in some longstanding chronic conditions and corresponds generally to rheumatic diseases like rheumatoid arthritis, osteoarthritis and gout in western medicine and is not expected among patients with Patellofemoral Pain Syndrome. Kidney deficiencies giving rise to knee pain are also not expected to be found in this syndrome.

Treatment

Patients were randomised to either acupuncture treatment or no treatment. None of the patients used other types of treatment. The acupuncture treatment was based on an individual acupuncture diagnosis according to the above differentiation. All the treated patients were needled locally at Liangqiu ST-34 and Xuehai SP-10, and either medial Xiyuan (MN-LE-16) and Dubi ST-35, or Yinlingquan SP-9 and Zusanli ST-36. Other points used according to the differentiation were Geshu BL-17, Ganshu BL-18 and Hegu L.I.-4 for wind-bi, Pishu BL-20 and Sanyinjiao SP-6 for damp-bi, and Shenshu BL-23, Hegu L.I.-4 and Guanyuan REN-4 for cold-bi¹⁴. Each session lasted 20-30 minutes, and the needles were initially manipulated until deqi (needle sensation) was obtained. For cold and damp bi the insertion was deeper and the needles were stimulated more strongly and for a longer time. Five patients diagnosed as cold-bi with intense local knee pain received electroacupuncture. Moxa stimulation was not used for practical reasons. The acupuncture treatment was repeated twice weekly for four weeks.

Results of the treatment

The treated group had improved both on subjective (CKRS, and VAS) and objective (Stairs Hopple test) tests at the end of the treatment. Five months after treatment both the untreated and treated patients had improved significantly from baseline, however the treated patients had improved more. One year after treatment this trend continued, and both groups had improved significantly in function and pain. The patients treated with acupuncture scored, however, significantly better than the controls. In all more than half (55%) of the patients treated with acupuncture had "no or slight limitations to activity" compared to a quarter (24%) of the untreated group. Likewise almost half (44%) of the treated patients had no or occasional pain after strenuous efforts in their knees, compared to only a tenth (10%) of the untreated. The acupuncture group also reported significantly less pain than the controls after the physical strain involved in the Stairs Hopple test. The changes of the dynamic strength, tested in the Stairs Hopple test, showed greater improvement in the treated group. The differences were, however, not significant. Only the results of the worst knee at inclusion were included in the results.

Efficacy of acupuncture treatment

The treatment efficacy was calculated as Number Necessary to Treat (NNT)¹⁵. NNT denotes how many patients must be treated so that one patient will be cured, strictly because of the treatment given. In our material, individualised acupuncture treatment had a NNT = 3.2 with regards to achieving resolution of all pain, and a NNT = 3.7 with regards to achieving resolution of limitation to function one year after treatment.

Differentiation

The patients were diagnosed at the start of the study as damp-bi, 34/70 (49%), cold-bi 29/70 (41%) or wandering bi, 7/70 (10%). None were diagnosed as heat bi. Both treatment and control groups had equal representation of the different TCM syndromes. Few patients changed TCM diagnoses during the year. There were no significant differences in treatment effect between the TCM differentiation groups. The number of patients in each group was too small to estimate significant difference.

The main localisation of pain was reported to be diffusely around the knee (70%) or under and behind the patella (55%). Most described the pain as an aching soreness (60%) or stabbing and intense (30%). Activities most likely to give rise to pain were stair walking (67%) or kneeling (66%). The typical patient thus complained of a chronic aching pain diffusely in the knee, which got worse with stair walking or kneeling.

Discussion

The study was conducted with blinded result evaluation. We had no placebo groups as there is no fully satisfying way of designing an acupuncture placebo group. This is espe-

cially true when using acupuncture in the treatment of a painful condition, as almost any needling of the skin may affect the body. It was also not possible to find a documented effective type of treatment of this condition which could be used as a comparison treatment group. We therefore decided to use an untreated group as control. Hence, we may not have evaluated the effect of acupuncture *per se*, but only the effect of going to acupuncture treatment. Methodical requirements for conducting a scientific study limit the normal practice of acupuncture. For example in this study the same acupuncture points chosen at baseline were used throughout the study, and all patients were treated 8 times over 4 weeks, whilst in a normal clinical situation some patients need more than 8 treatments to achieve an effect, and if a patient shows a negative response, further treatment will normally be altered or stopped. Furthermore in normal practice, the therapist would choose who to treat and who not to treat. The randomisation of a study such as this one may therefore give a clinically unrepresentative group for treatment. It is a paradox that high quality methodical studies will result in abnormal clinical settings. This seems to especially effect the result of studies on acupuncture in a negative way. A more pragmatic design must be used in controlled trials to imitate a more normal clinical setting.

In this study one of three treated patients experienced a 100% reduction in pain because of the acupuncture treatment. Tricyclic antidepressives are recommended as the standard medical treatment for neuropathic pain. These drugs have only been documented to give a 50% reduction in pain in one of three treated patients¹⁷.

We consider the test methods used to evaluate changes in the treated condition to be valid. Barber-Westin et al¹⁸ also found the CKRS to be a useful parameter in assessing Patellofemoral Pain Syndrome. Pain from stairwalking was found to be a typical problem amongst the patients in this study. The significant reduction in pain in the acupuncture group after performing the Stairs Hopple test we also therefore regard as a valid sign of improvement.

An increased level of endorphins and stimulation of the Diffuse Noxious Inhibitory Controls (DNIC) systems are the explanation used in modern medicine for the effect of acupuncture in the treatment of pain^{19, 20}. We have chosen, however, not to give neurophysiological explanations to the registered effect in this article, nor have psychological aspects of the treatment been considered in the study.

According to TCM, chronic knee pain can present due to several causes. Internal causes are mainly considered to be disturbance of the function of the Liver or Spleen. Kidney problems will seldom give rise to this kind of localised knee pain, as the patients are typically young, active and otherwise healthy individuals. External pathogenic causes and trauma often affect the joints, muscles, tendons or bones. Excess cold, damp, wind or a combination of these influences can impair the circulation of qi and blood when the superficial defensive qi is weakened. The body protects

itself by dispersing this harmful influence to less vital parts of the body such as muscles, joints and bone, before the pathogen enters deeply into the body via the channels. The aim of the treatment is to clear the local obstruction by stimulating the circulation of qi and blood, and to expel the pathogenic influence. If internal causes are present one must also consider treating these to get a good lasting result. In this study the TCM differentiation and treatment were adapted to meet methodological demands. The effect of the treatment may suffer as a consequence. Patients with cold-bi suffered by not being offered moxa stimulation. In a real clinical setting one might therefore expect improved results compared to the results of this study.

There is no documented treatment of choice for this pain syndrome in western medicine. Most experts agree that strengthening the extensor muscles in the leg is beneficial to both reduction in pain and improved function²¹. Less pain may inspire patients to increase their level of physical activity, which will further improve the circulation of qi and blood. Most patients are believed to profit from doing specific exercises to improve the strength of the thigh muscles.

Conclusion

We know of no other study that has evaluated the effect of acupuncture treatment in this pain syndrome, indeed there is limited evidence of effect from any specific treatment⁵. This study showed that one in three patients became free of pain and one in four patients had no limitation to activity one year later due to the effect of 8 acupuncture sessions. Normally, one of three patients is expected to get only a 50% reduction in pain in the recommended standard medical treatment of pain from nerve injuries. The results from acupuncture treatment in this study are far better than the effect from other accepted standard medical treatments for pain.

The good results in this study confirm the clinical experience of many acupuncturists, and we highly recommend that acupuncture should be used in the treatment of bi syndrome of the knees.

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