Acupuncture in Pain Management

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Introduction

Acupuncture is one of the oldest and most widely used medical procedures in the world. It originated in China more than 2000 years ago, but only in the last 35 years has it become popular in the United States. In 1971, James Reston, a reporter traveling with President Nixon in his historic visit to China, wrote an article in the *New York Times* about the use of acupuncture to relieve his abdominal pain after emergency surgery. This article has stimulated interest and research in this ancient healing modality. A 1998 survey estimated that Americans made more than five million visits to acupuncturists yearly.[1]

This article will review acupuncture theory from the Chinese and biomedical perspectives and review the literature on the use of acupuncture in pain management for osteoarthritis, headache and back pain.

Acupuncture Theory

According to Chinese acupuncture theory, there are over 300 acupuncture points on the body that connect to 12 principal and 8 secondary pathways called meridians.[2] These pathways are thought to conduct Qi, (translated as energy or life force) throughout the entire body. Health is maintained by the unobstructed flow of Qi that regulates the physical, mental and spiritual balance. In addition, the opposing forces of yin and yang regulate all organs. When the entire system is in balance, optimal health occurs. Disease occurs when there are obstructions to the flow of Qi, deficient or excessive Qi, or when there is an imbalance of yin and yang. By placing needles in strategic acupuncture points, acupuncture relieves obstructions to the flow of Qi, balances yin and yang and restores general balance. Acupuncture treatments are individualized, based on the individual's unique characteristics. For example, patients with low back pain might receive different treatments even though they might all have common complaints.

Although the above explanation may seem magical to western trained physicians, acupuncture has been shown to have measurable physiologic effects that may explain the mechanism of pain relief by acupuncture. When needles are inserted into acupuncture points, regional increases in blood flow occur (measured by skin temperature recordings and laser Doppler flow values and electromagnetic impulses increase.[3] The nerve stimulation sends messages to the spinal cord, brain stem and hypothalamus. These stimulate the release of endogenous opioids such as beta- endorphins, met-enkepalins, and dynorphin.[4] In addition, acupuncture affects the release of neurotransmitters and neuropeptides such as serotonin and melatonin.[5] These may explain the relaxing effects seen after acupuncture. Enhanced immune function also occurs. For example, patients with asthma who receive acupuncture have increased CD3+ and CD4+ cells and decreased IL-6 and Il 10 and eosinophils after acupuncture treatment.[6] There also may be inhibition of the nociceptive pathways involved in pain processing.[7] Recent studies using functional MRI have demonstrated that acupuncture has quantifiable effects on the central nervous system.[8]

The modern practice of acupuncture draws on traditions from China, Japan, Korea, France and other countries. Specialized forms of acupuncture have been developed for the ears, hands and scalp. Recently, biomedically trained physicians have incorporated approaches based on the knowledge of neuroanatomy, physiology and trigger points.

Acupuncture has been used in virtually any medical condition, but most Americans go to acupuncturists for pain control. This review focuses on the treatment for the common pain conditions of osteoarthritis, headache and back pain. Typically, acupuncture is a series of biweekly or weekly treatments. A typical session involves 5-15 needles and a treatment lasts from 20-60 minutes. Usually there is a clinical response within 10 treatments. Maintenance treatments are usually necessary.

Osteoarthritis

Osteoarthritis is the most common form of arthritis and accounts for much disability, impaired quality of life, and increased health care utilization and costs, especially in the elderly. No curative therapies exist. The current controversy surrounding the adverse cardiovascular effects of all NSAIDS has stimulated interest in other treatments. Other therapies such as intra-articular steroid injections, hyaluronate injections, opioids, physical therapy, weight loss and exercise have variable effectiveness and some have potential toxicities.

Recently, there has been an interest in acupuncture as a treatment for osteoarthritis. A review of seven randomized, controlled trials suggested that acupuncture resulted in improved knee pain and function.[9] These studies, however, have methodological shortcomings such as inadequate sample sizes, inadequate control groups and short follow-ups. A recent well designed study funded by the Center for Complementary and Alternative Medicine has been published that has shown the effectiveness of acupuncture.[10] Berman studied 570 patients

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with osteoarthritis of the knee in a randomized controlled trial. Patients were randomized to the true acupuncture group that received 23 acupuncture treatments over 26 weeks, the sham acupuncture group with the same number of treatments or to an education control group. The primary outcomes of pain and function were measured at 4, 8, 14, and 26 weeks by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Patients were allowed to continue all medications.

Pain decreased and function increased to clinically significant degrees in the true acupuncture group only. Pain decreased in the true acupuncture group at all assessments, but did not reach statistical significance until week 14. The WOMAC pain score decreased 3.6 units (40% decline) in the true acupuncture group compared with 2.7 units in the sham acupuncture group. Statistical improvement in function occurred by the 8th week. Function improved more than 12 units, corresponding to a 40% improvement. Patient assessment of global function, the time to walk 6 minutes, quality of life measures and medication usage did not differ between the groups. Side effects were minor and not significant.

In conclusion, acupuncture resulted in improved pain and function in knee osteoarthritis with a minimum of side effects. Scattered reports suggest that acupuncture may be effective in osteoarthritis of other large joints, but no well-designed studies have been completed. Acupuncture is likely to play an increasing role in osteoarthritis, regardless of location.

Headache

Headaches are a major source of morbidity and are responsible for substantial health care costs. Although many new pharmaceutical agents have been developed to treat headaches, substantial numbers of patients continue to have pain, despite medications. This has led many to try non-drug approaches to headache, especially acupuncture. A meta-analysis of 26 trials that lumped all types of headaches together (16 with migraine, 6 with tension and 4 with mixed headaches) involving 1151 patients has recently been reported.[11] Sixteen trials compared true acupuncture and sham acupuncture. True acupuncture was deemed to be superior in 8, there was a trend in favor of true acupuncture in 4, there was no difference in 2, and 2 had uninterpretable results. Many studies were poorly designed. The conclusion, limited by the poor quality of studies, was that acupuncture could be beneficial for headaches.

A more recent study, published subsequent to the above meta-analysis further supports the role of acupuncture in treating chronic headaches.[12] Vickers randomized 401 patients with chronic headache (predominantly migraine) to acupuncture (12 treatments over 12 weeks) or to usual care. There was no sham acupuncture group. All patients continued their usual medications. There was a 34% reduction in headache scores in the acupuncture group compared with 16% reduction in the control (p=0.0002). Pain free headache days were reduced in the acupuncture group by 1.8 days/28 days. There was also improvement in 3/9 variables in quality of life as measured in the SF-36 including physical functioning, energy and health change. Visits to physicians, sick days and use of medications were reduced, but did not reach statistical significance.

In conclusion, preliminary studies support the use of acupuncture in headaches, especially migraine headaches.

Back Pain

Back pain affects 65-80% of the population at some time in their lives. It is responsible for much disability and health care expenditure. People with chronic neck and back pain often do not respond to or develop side effects from conventional treatments such as injections, medications, physical therapy, manipulation and surgery. Consequently, there has been much interest in the use of acupuncture for low back pain and mechanical neck pain. A recent meta-analysis of the use of acupuncture in low back pain identified 11 studies.[13] In general, the methodological quality of the studies was low and the results were conflicting. Eight studies did not show significant differences compared with controls. In two studies, acupuncture was comparable to trigger point injection or to transcutaneous electrical nerve stimulation (TENS).

A recent report studied acupuncture in chronic low back pain in older subjects and was not included in the above meta-analysis.[14] In this study 55 patients older than 60 years were randomized to acupuncture treatments (twice weekly for 5 weeks) or control (usual care). Patients undergoing acupuncture treatment had a statistically and clinically significant decrease in the Roland Disability Questionnaire of 4.1 $\pm$3.9 at week six compared with 0.7 $\pm$ 2.8 in the control group. There were no changes in pain, as measured by the Visual Analogue Scale, between the two groups at six weeks. Although there were statistically significant differences between the groups at 9 weeks (0.7 units $\pm$ 2.2), t he clinical significance is questioned. After completing the study, patients in the control group were crossed over to receive acupuncture. Scores in the group showed similar decreases to those originally randomized to acupuncture.

Another study randomized 60 patients with low back pain to acupuncture or to placebo transcutaneous electrical nerve stimulation. There were no significant differences between the two groups of any outcome measure.[15] At this point, there is a suggestion that acupuncture may aid low back pain. More research is needed to form definitive conclusions.

A recent, well-designed study of acupuncture and neck pain has recently been published.[16] In this trial, 135 patients with chronic neck pain were randomized to receive acupuncture (8 treatments over 4 weeks) or to a control group (mock TENS). A statistically significant 12% difference in the visual analogue pain score was observed in the acupuncture group (p=0.01). However, this difference may not be clinically significant.

Other Painful Conditions

Many pain conditions have demonstrated improvement with acupuncture. A partial list includes: lateral epicondylitis [17], peripheral neuropathy [18], temporomandibular disorders [19], phantom limb pain [20], chronic pelvic pain [21], irritable bowel syndrome and other functional gastrointestinal disorders [22] and Crohn's disease. [23] These studies have generally included small sample sizes.

Adverse Effects

The risk of serious events associated with acupuncture treatments is quite low and is estimated at 0.5 per 10,000 treatments. [24] Almost all practitioners use single use, disposable needles. The needles are thin (less than 30 gauge), flexible and solid. The most common side effects are minor ecchymoses and forgotten needles. Acupuncture can safely be performed on patients taking antiplatelet drugs and warfarin. Infections are rare, but have been reported. Vasovagal reactions have also been reported. Sporadic cases of organ puncture include pneumothorax and cardiac tamponade.

Practical Considerations

Physicians interested in learning acupuncture can attend continuing medical education courses that are usually at least 300 hours. The American Academy of Medical Acupuncture is an organization of physicians who have completed acupuncture training. A board certification exam is now available. Non-physicians can perform acupuncture by completing a 3-4 year curriculum and passing a certification exam. Many insurance plans such as Medicare and Medicaid and most HMOs do not cover acupuncture. Some plans do cover acupuncture, and patients are urged to consult with their plan prior to initiating treatment. Most patients pay out-of-pocket.

Conclusions

In the last decade there has been increasing interest in the use of acupuncture in pain management. Although high quality studies are scanty, preliminary research supports its use in osteoarthritis, headache and back pain. Numerous research studies are underway that will clarify its role in pain management and its mechanisms of action. NFM

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