Chapter 16
Acupuncture in the Management of Head and Neck Pain: An Introduction

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Introduction

The treatment of medical disorders with the insertion of needles into various parts of the body originated thousands of years ago. The earliest acupuncture needles, small shards of stone, date to Neolithic times (8000–3500 BC). An ice age mummy discovered in Southern Tyrol in 1988, and estimated to have lived around 3200 BC, was found to bear numerous tattoo scars, many corresponding to known acupuncture points [1] . By contrast, the earliest Western medical document, the Edwin Smith Papyrus from Egypt, dates to 1600 BC, and the works attributed to Hippocrates were written even more recently, around 470–360 BC.

Given the current emphasis on evidence-based medicine, it is interesting to consider that acupuncture may well be the oldest outcome-based therapeutic modality. Based on thousands of years of careful observation and detailed documentation, acupuncture began at a time when scientific methods and instruments, and the resultant body of knowledge pertaining to human anatomy, physiology, and pathology, did not exist.

Although practically based, acupuncture later became incorporated into a theoretical construct, which helped not only to organize and explain clinical findings but also to direct therapy and predict results. These features are of course the features of any useful medical hypothesis. Hypotheses are the grasping tools of knowledge, and their value derives from the ability to explain, organize, and predict clinical effects. In the case of acupuncture, the theoretical framework was that of Taoism, a philosophy originating around the fourth or third century BC with the Chinese sage Lao-Tze. While Taoist concepts continue to organize and even guide Traditional Chinese Medicine (TCM), it is important to realize that the practice of acupuncture preceded Taoism by centuries.

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With the application of Western scientific methods, acupuncture continues to develop—new points are identified, clinical effects are validated, and new effects of established points are established. Acupuncture today is a vital and contemporary treatment modality which is increasingly becoming a part of Western medical therapy.

Basic Concepts of Chinese Medicine

The Chinese and Western approaches to health and disease are fundamentally different. Chinese medicine rejects the mind/body dualism of Western medicine and considers seeming opposites, such as structure and function, as both manifestations of the same energy. This concept, of Yin and Yang, pairs apparently contrasting phenomena and unifies them through the ceaseless flow of energy, one seamlessly becoming the other. Yin and Yang are not absolute designations, but relative and interdefining, referring more to their comparative nature and behavior than absolute physical characteristics. As an example, the ventral surface of the body is considered Yin when compared to the back (dorsal being Yang and ventral Yin) but Yang when compared to the abdominal contents (superficial is Yang and internal is Yin). Also, since phenomena are in a constant state of transition, they typically contain elements of both Yin and Yang, as illustrated by the familiar Tao symbol (Fig. 16.1). This applies not only of the human body but also to the physical world around us. So, while noontime is considered Yang and midnight as Yin, dawn is "Yang in Yin" (day entering night), while dusk is "Yin in Yang" (night entering day).

A ceaseless flow of energy, called *qi* (chee), animates every aspect of life regardless of its momentary manifestation and exists as a continuous process of transformation between apparent opposites such as structure and function. Health is the result of this constant and unimpeded flow of energy.

While Western medicine is historically based on structure (anatomy), in Chinese medicine, the organs of the body are defined primarily in terms of their function. For example, the Chinese concept of the functional "kidney" is not just an excretory organ but also includes the adrenal and reproductive glands and is therefore considered a storehouse of energy. Chinese medicine recognizes that while structure (Yin) gives rise to function (Yang), function also determines structure and emphasizes the incessant process of energy interchange between these two states. The only thing constant, in fact, is change.

Further, Chinese medicine considers that health results not only from an unimpeded and healthy flow of energy within the body but also within the larger context of our natural environment, including the weather, the seasons, and our diet. Environmental influences, such as cold, damp, or wind, are often identified as pathogenic factors with a potential to "invade" the body, and the body's defenses against such "external ills" need to be shored up and maintained. Internal noxious factors are also identified and then rectified by adjusting the flow of energy. Chinese diagnosis typically does not end with a specific disease but is couched in terms of the noxious agent (external and internal) and the body's response patterns. For example, vertigo may be found to be due to insufficient kidney energy or excessive

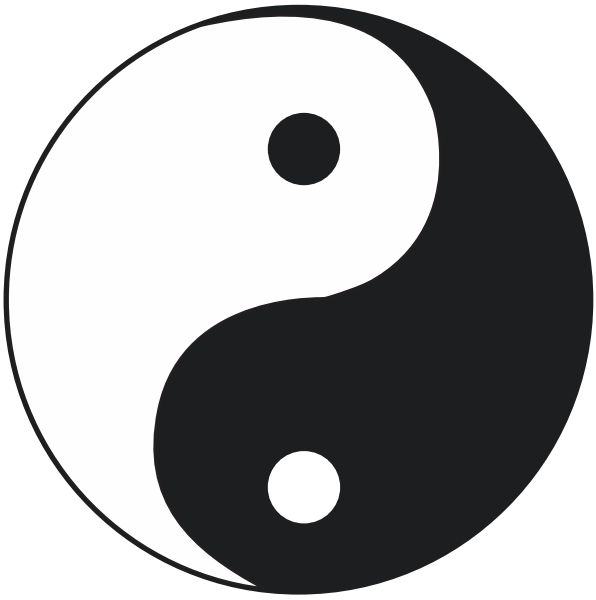

Fig. 16.1 The traditional symbol of Tao, illustrating the interrelationship of opposites, Yin (white) and Yang (black). The symbol conveys the constant movement of energy and the gradual and ceaseless transition of apparent opposites, whether light and dark, hot and cold, or structure and function. The small circular inserts suggest that even in complete Yin there is always some Yang and vice versa

liver "wind," depending on other clinical manifestations. It is of interest in this regard to note the gradual redefinition of our Western concepts of pathogenesis, which is no longer focused just on a pathogenic microbe but also considers the body's immune response and reserves, as well as its resident microbiome.

Disease then is the result of unbalanced energy flow in the body, a flow that is either deficient, excessive, or impeded. The purpose of acupuncture (and other modalities of traditional Chinese medicine) is to optimize this flow of energy and to allow the body to heal itself by optimizing the flow of qi energy. This is achieved by increasing deficient flow and decreasing excessive flow, as well as by opening up blocked energy pathways in the body.

At the risk of oversimplifying, we might sum up the difference between Chinese and Western thinking by saying that Western medicine considers health to be the absence of disease, while Chinese medicine considers disease to be the absence of health.

Meridians

Qi energy circulates through the body along specific pathways, called meridians. Meridians form a three-dimensional network which connects the entire body, both the surface and the organs, and they also interconnect with one another. The main meridians are named after the internal organ where they terminate. The needling of discrete acupoints along the meridians has been found to be effective for treatment of disorders which are often distant from the area of needle insertion. For example, inserting a needle into the hypothenar eminence of the hand (Small Intestine 3) can effectively relieve a neck spasm, since the lateral neck is in the territory of the small

intestine meridian. Similarly, a needle in the thenar eminence (Lung 10) can markedly reduce pain from pharyngitis or tonsillitis.

In the context of this book, it should be pointed out that many meridians traversing the body extend to the head and neck, accounting for the observation that distal stimulation of the limbs or torso can bring about therapeutic effects in the head, neck, and face (Fig. 16.2). Further, not only are distant points effective, but they are often more potent in the treatment than local stimulation, suggesting that, by recruit-

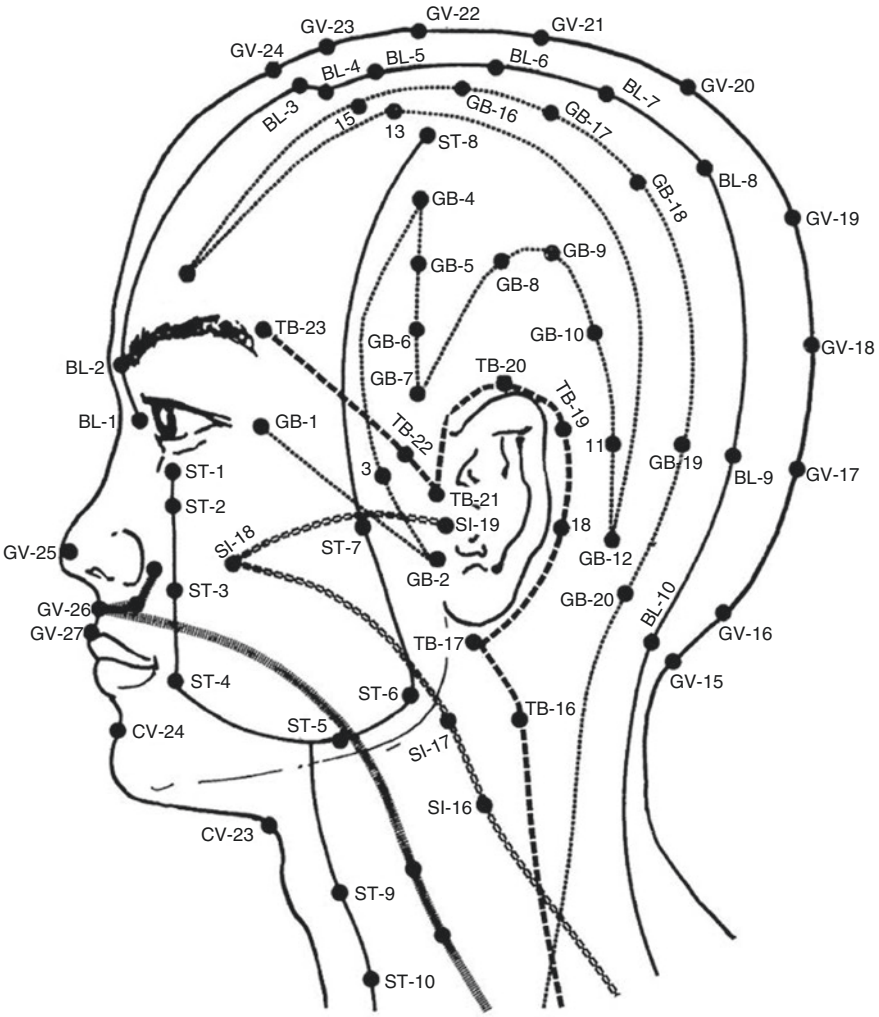

Fig. 16.2 Lateral view of the head and neck, showing the pathways of meridians traversing this area. Note particularly that the gallbladder (GB) and urinary bladder (BL) meridians cover specific areas, accounting for their effectiveness in the treatment of headaches (Reprinted, with permission, from Ellis, A., Wiseman, N., and Boss, K: Fundamentals of Chinese Acupuncture. Revised Edition, **1991**. Paradigm Publications)

ing and marshalling qi from more distant areas, a greater amount of energy flow might arrive at the treated area.

It appears most likely that acupuncture involves bioelectricity. It is known that the skin layer is an electric dipole, exhibiting a potential difference between its surface and deep layer. It has also been shown that at least some active acupoints show decreased electrical resistance. These sharply demarcated loci, measuring 1–2 mm in diameter, demonstrate resistances as low as 10 kilo-ohms, compared to 3 mega-ohms in the surrounding skin [2]. Piercing the skin in effect shorts this "battery" and creates a localized flow of electricity, known as a "current of injury." The current of injury has been implicated in healing and may be the triggering electrical event in acupuncture treatment. The intensity of this effect can be increased by the use of electric current applied through the acupuncture needle. By increasing the duration and intensity of electric stimulation over time, remarkable degrees of analgesia can be attained.

Despite several interesting and suggestive studies, the structural correlates of acupoints and especially of meridians are not clear. Some acupoints correspond to areas where neurovascular bundles penetrate the deep fascia. Others have shown decreased electrical resistance at point of insertion into the skin. Some dye studies have identified meridians, but a comprehensive explanation for meridians and acupoints is still lacking.

One intriguing proposal, by Dr. Daniel Keown [2], is that the collagen in connective tissue might be the common pathway by which acupuncture impulses propagate. Collagen is ubiquitous in the body and is found not only in the fascia, vessels, tendons, and bones but also in the internal framework and parenchymatous capsules of organs (e.g., pericardium, Glisson's capsule, Gerota's fascia) as well as in structures as diverse as the dura and the sclera. Collagen is electroconductive and also has piezoelectric properties [2], a phenomenon which has been extensively studied for its role in bone healing. Deformation of collagen, either from pathology or from needle insertion, can alter the local electric field, modifying cellular resonance, with distant consequences. Keown suggests that "the connective fabric of our body, the tissue that wraps and joins our entire body, is in effect an interconnected, living electrical web."

But narrowly focusing on specific structural pathways overlooks the constant and complex extra-neuronal electric activity which occurs within and around every cell of the body. It has been suggested [3] that every cell undergoes, on average, 100,000 chemical reactions per second, many involving exchange of ions and the generation of micro-electric currents. In fact, electric flow on the ionic level is how cells communicate, grow, differentiate, and organize. In the central nervous system, complex and synchronized activities such as pattern recognition occur faster and over larger areas of the brain than neuronal-synaptic transmission would permit and have been attributed not to the generation of electrical impulses but rather modulation of a constant baseline bioelectric activity.

The apparent absence of anatomically identifiable meridians is puzzling, but it should not lead to skepticism. Our inability to satisfactorily explain clinically observed phenomena does not negate their reality and may reflect nothing more

than current methodological limitations. In the case of acupuncture, our state of uncertainty may be due in part to our inability to measure and experimentally model bioelectric activity on the molecular and cellular level and should not prevent the acceptance of the effectiveness of acupuncture therapy. A large and growing Western literature suggests that acupuncture is effective and should be integrated into our management of patients.

Acupuncture Analgesia

The nature of acupuncture analgesia (AA) is an area of extensive basic and clinical research. The interested reader is referred to a more detailed overview by Dr. Bruce Pomeranz, whose work has been synopsized for this section [4]. Pomeranz has found that the stimulation of small diameter nerves in muscles sends impulses to the spinal cord, and then three centers (spinal cord, midbrain, and pituitary) are activated to release endorphins and monoamines, which block pain messages.

An injury to the skin activates the sensory receptors of small afferent nerve fibers in underlying muscle. Depending on the type of neuron, the sensory fibers synapse either onto the spinothalamic tract in the spinal cord or directly onto the thalamus. From the thalamus, the impulse is carried to the primary somatosensory cortex. If there is no muscle at the site of needle insertion, an alternative pathway of afferent impulse propagation is proposed, involving a synapse onto the anterolateral tract of the spinal cord, which projects onto the spinal cord, the midbrain, and the pituitary-hypothalamic complex. The anterolateral tract of the spinal cord contains endorphinogenic cells, which release either enkephalin or dymorphin. These spinal cord endorphins block the proximal transmission of nerve signals for pain. Serotonin and norepinephrine, released by the midbrain, are also possibly implicated in the mechanism of AA, since the experimental ablation of this area blocks the analgesic effects of acupuncture.

Projections of peripheral nerve signals directly onto the hypothalamus-pituitary complex trigger the release of beta-endorphin into the blood and the CSF. It is of interest in this regard that naloxone, a morphine antagonist, will block analgesia induced by acupuncture, but will not block analgesia or hypalgesia induced by hypnosis [5]. Acupuncture non-responders, Pomeranz suggests, may be genetically deficient in opiate receptors.

The release of beta-endorphin from the pituitary is accompanied by an equimolar release of ACTH, triggering the release of adrenal corticosteroids, which can be measured peripherally as elevations in serum cortisol. This dual release may account for the combined analgesic and anti-inflammatory effect of acupuncture on conditions such as arthritis. Sham acupuncture (the stimulation of random, non-active skin points) appears to have no effect on serum cortisol. It is of interest that in ear acupuncture the main analgesia point (thalamus point) and the ACTH- releasing point have been found to be immediately adjacent to each other, in the floor of the concha, a clinical finding that seems to be explained by the experimental work cited above.

Chinese Diagnosis

Chinese diagnosis does not look for specific illnesses but rather syndromic patterns which identify pathogenic influences and reflect either excessive or insufficient energy flow along certain meridians. Since the meridians are named after the internal organs where they terminate, diagnoses such as "spleen deficiency" or "excessive liver heat" may be made. Different phases of a disease may be dominated by different noxious influences. For example, herpes zoster is associated with the liver and gallbladder meridians. The acute phase of herpes zoster is interpreted as wind-heat, the appearance of purulent vesicles as damp-heat, while postherpetic neuralgia is considered to be due to residual heat with wind [6].

The utility of such diagnoses is that they implicate not only the organ but also suggest the treatment. Excessive heat (or wind) in the liver, one cause of headache, might be treated either by reducing the energy flow in that channel or by reinforcing the flow of inhibiting energy from another meridian (in this case, lung), which controls the liver. The pattern of reinforcing and inhibiting influences among the meridians is known as Five Element theory and is beyond the scope of this chapter.

Clinical evaluation involves the usual Western paradigm of detailed history, followed by physical examination. In addition, the TCM physician also examines the tongue and palpates the radial pulse. The appearance of the tongue, its color, state of hydration, and surface, points to specific syndromes. For example, the presence of dentate impressions along the tongue margin suggests "deficiency in the spleen." Pulse diagnosis is more complex and involves palpating the left and right radial pulse separately, using three fingers laid along each pulse. The palpating fingers then compress the radial artery at three levels, superficially, at the midpoint, and then deeply, compressing the artery against the radius. The strength and quality of the pulse at each measurement is noted and again points to specific syndromic deficiencies and excesses.

For those practitioners who don't have the training or experience to make a Chinese diagnosis, acupuncture can still be used in a more limited but effective fashion. Even a simple understanding of the meridians, along with learning the specific effect of stimulating different acupoints, can lead to positive results in the treatment of many conditions, including pain.

Pain Syndromes and Their Treatment

While the optimal use of acupuncture requires years of study, Western practitioners with even limited knowledge can make use of this modality to augment conventional pain management methods. Once the appropriate points are identified, they can also be stimulated with local pressure (acupressure), transcutaneous electric nerve stimulation (TENS), and conventional acupuncture or by applying electric current to the inserted needle (electroacupuncture), to produce increasing levels of analgesia.

For head and neck pain, one universally applicable point is Hegu (Large Intestine 4), with the needle inserted into the first interosseous muscle of the hand, between the first and second metacarpal. Stimulation of this point has an analgesic effect on most kinds of head and neck pain, from headache to dental pain. Another generally effective pain point is Neiting (Stomach 44), located between the second and third metatarsal of the foot.

A general principle of acupuncture treatment is to needle points on the meridian which supplies the area of pain. While inserting needles at the site of the pain is helpful, the use of distant points appears to be more effective, so a knowledge of the location and distribution of meridians is important. Additional benefit can be derived by needling meridians and points that have a secondary effect on the affected meridians, as well as points that have generally tonifying or sedating effects.

Since pain is usually attributed to a blockage of energy flow along specific meridians, the treatment of headache often involves opening and energizing the channels which connect to specific areas of the head. For example, headache at the base of the head and above the eyebrows (Shao-Yang type) corresponds to the territory of the gallbladder meridian and is treated by needling points along this meridian, which is located along the lateral side of the body, beginning at the outer canthus of the eye and ending between the fourth and fifth toe. Temporal headache (Yang-Ming type) is in the territory of the stomach meridian, which begins above the infraorbital foramen and runs down along the ventral surface of the body to terminate between the second and third metatarsal of the foot. The long path of this meridian explains why needling the foot at this point (Stomach 44) can relieve headache and toothache. Similarly, headache in the territory of other meridians can be treated by needling distant points on that meridian, on the torso, or on the extremities.

Acupuncture has been especially successful for musculoskeletal pain in the head and neck area, such as temporomandibular dysfunction and neck pain due to cervical spine disease. It is also useful for pain related to infections, dental analgesia, as well as cancer pain. It has also been applied in the management of postoperative pain, as well as neuropathic pain, such as trigeminal neuralgia and postherpetic neuralgia. Specific discussion of these and other pain syndromes is available in the literature but beyond the scope of this introductory chapter.

Microsystem Acupuncture

Conventional acupuncture treats points all over the surface of the body. Additionally, it has been determined that points representing the entire body can be found in just one area, such as the hand, the foot, the ear, the scalp, or even the nose, and that needling points just in the one specific area can have a beneficial effect over the entire body. For Western physicians already struggling to make sense of how acupuncture works, this concept seems to defy all conventional explanation.

The most widely used microsystem involves the ear. The auricle has active points that correspond to every part of the body, and auricular acupuncture has been suc-

cessfully used to treat not only pain but also other somatic disorders, as well as psychologic problems. The distinguishing advantages of auricular acupuncture for the Western physician are several. First, active points (usually demonstrating increased tenderness) develop, which are diagnostic, in that they signal which part of the body is dysfunctional. Second, there is no need to make a syndromic diagnosis. Third, the improvement occurs within minutes and may not require repeated treatments for a cumulative effect. Finally, auricular acupuncture is relatively easy to learn and can be easily incorporated into an office visit, with the patient fully dressed and sitting.

Placebo Effect in Acupuncture

Placebo is a significant component of any form of therapy and can be triggered by factors as innocuous as a white coat. It is more significant when the treatment is unpleasant (such as a bitter red-colored sugar pill or an injection) and may account for up to 50% of perceived improvement. Since acupuncture constitutes a noxious stimulus, there is a significant placebo benefit associated with needling [7]. The placebo effect has made it difficult to isolate the actual benefit of acupuncture; however studies comparing active acupuncture points with other acupoints not active for that condition or even random skin points which are not located on any meridian (sham points) suggest that there is a definite benefit to acupuncture beyond placebo [8]. Furthermore, the subjective nature of perceived pain reduction has made quantification of benefits difficult. This may account for the fact that many Western studies on the acupuncture treatment of pain have been inconclusive.

Incorporating Acupuncture into Pain Management

The purpose of this chapter has been to introduce physicians to some of the basic concepts of acupuncture therapy. It is necessarily limited: the mastery of acupuncture, like the mastery of Western medicine, is a complex and lifelong journey. Hopefully, the reader will come away with enough information to consider adding acupuncture to the current armamentarium of pain management for head and neck disorders. It is suggested that acupuncture, like other non-conventional treatment modalities, should be considered not as alternative but as complementary. Unlike pharmaceuticals, acupuncture is inexpensive, often effective, and has no significant side effects, such as habituation. Including an experienced acupuncturist in the management of difficult pain syndromes will bring a more comprehensive approach to these conditions which may enhance the ultimate outcome.

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