Acupuncture: Probing its way into dentistry—Part I
An introduction to acupuncture and its practical applications in contemporary dental practice

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The history of traditional Chinese medicine (TCM) can be traced back to the Warring States and the Qin and Han dynasties more than 2,000 years ago. The Huangdi's Inner Classic of Medicine, of comparable importance to the Hippocratic corpus in Greek medicine, is a scholarly collection of medical doctrines and philosophies accumulated over the years. To date, it still provides a theoretical guide and basis for the development of contemporary TCM. It consists of two parts, Suwen [plain questions], which mainly addresses the theoretical aspects and diagnostic methods, and Lingshu [spiritual pivot], which covers the practice of acupuncture.

Acupuncture, according to the definition of the TCM Practitioners Act in Singapore, means "the stimulation of a certain point or points on or near the surface of the human body through any technique of point stimulation (with or without the insertion of needles), including through the use of electrical, magnetic, light and sound energy, cupping and moxibustion, to normalise physiological functions or to treat ailments or conditions of the human body". In order to understand the role of acupuncture therapy in TCM, we must first appreciate the fundamental treatment philosophies in TCM.

TCM is premised on the concept of holism, according to which the human body is seen as an organic whole, all the constituent parts are interconnected and they coordinate and interact with one another functionally. There is also recognition of human interaction with the external environment and its effect on the human body. The state of the constitution of the human body, at the point of challenge by pathogenic factors (both internal and external), will determine the occurrence and progression of disease. The constitution of the body can be regulated by maintaining the yin-yang and qi-blood balance. The vital qi, or life force, is viewed as keeping the entire body system going. It circulates all over the body along designated pathways called "meridians". To put it simply, acupuncture therapy involves the stimulation of certain points along the meridians to allow the free flow of qi to maintain yin-yang and qi-blood balance. The pathogenesis of disease based on TCM philosophy is summarised in Figure 1.

This concept of host-pathogen interaction, according to which the manifestation of disease presentation depends on both the virulence of the invading pathogens and the host response, has parallels with some of the modern concepts of disease progression in Western medicine, for example the pathogenesis of periodontitis (Fig. 2)—an inflammatory disease initiated by oral micro-organisms, resulting in the loss of the supporting structures around the dentition.

The story of New York Times editor James Reston, whose post-appendicectomy pain was relieved by acupuncture, and the visit of US President Richard Nixon to China in 1971 brought acupuncture into the limelight and created much interest in the Western medical field.

In 1979, the World Health Organisation (WHO) endorsed the use of acupuncture for treating 43 symptoms. In 1996, WHO's endorsement of acupuncture was extended to 64 indications. In the Geneva 2003 WHO report, pain in dentistry (including dental pain and temporomandibular joint dysfunction syndrome), facial pain and postoperative pain were listed among the conditions for which acupuncture had been proven, through controlled trials, to be an effective treatment.

Scientific basis of acupuncture
Acupuncture treatment involves the excitation of qi or "de qi", which is the transmission of needle sensation along the meridians, often described by patients as soreness, numbness, ache, fullness or a warm sensation as a result of needle manipulation. This is also perceived by the acupuncture as a needle grasp sensation, which is key in achieving therapeutic efficacy. Recent historical evidence using rat models suggests that needle grasp sensation is the result of collagen and elastic fibres tightening around the needle during needle manipulation. The authors went further to postulate that this mechanical coupling between the needle and soft tissue is responsible for transducing mechanical signals to fibroblasts and other cells, with resultant therapeutic downstream effects.

How acupuncture can relieve pain can be explained by the gate control theory of pain. It proposes that the activation of alpha delta and C afferent nerve fibres through acupuncture point stimulation sends signals to the spinal cord, with local release of dynorphins and enkephalins. Upon reaching the midbrain, both excitatory and inhibitory mediators are activated in the spinal cord. Neurotransmitters, like serotonin, dopamine and norepinephrine, are produced, causing pre- and postsynaptic inhibition of pain transmission.
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When the signals reach the hypothalamus and pituitary gland, adrenocorticotropic hormones and endorphins may be produced. This forms the basis of our current understanding of the analgesic effect of acupuncture in Western medicine, although other therapeutically effective points, such as in the treatment of nausea, gastritis, asthma, and dysmenorrhea, are yet to be fully explained. In the case of asthma, one of the therapeutic acupuncture points, BL23 (fenshu), lies approximately 1.5 in (38.1 mm) lateral to the level of the spinous process of vertebra T3. It has been hypothesised that the location of BL23 (fenshu) corresponds roughly to the sympathetic ganglion at the level of T3, which sends postganglionic fibres to the pulmonary plexus and cardiac plexus.7

### Dental application of acupuncture

**Managing dental pain, analgesic effect and postoperative pain relief**

According to TCM theory, local acupuncture points on the facial regions, like ST6 (jiahe) and ST7 (xiaguan), and distant points, like LI4 ( Hegu), can be used to treat dental pain. They are part of the stomach and large intestine meridians, which converge at the facial region and link up with the maxillary and mandibular teeth, respectively. Western medical literature has proposed that acupuncture can produce an analgesic effect at a distant site by diffusing non-steroidal inhibitory control.8 This provides a possible explanation as to how the acupuncture point LI4 ( Hegu), which is located on the radial side of the second metacarpal bone on the dorsum of the hand, can elicit an analgesic effect in the orofacial region.

The role of acupuncture in contemporary dentistry may not be as much the removal of the etiology of dental pain, but rather as an adjunct in achieving anesthesia during dental procedures and providing postoperative pain relief. A pilot study was conducted to investigate whether the induction time of local anaesthesia can be reduced if acupuncture is given before injection.9 The results showed that, in the group which used local acupuncture points SI29 (tinggong), ST5 (daying) and ST6 (jiahe)—within the innervations of the mandibular branch of the trigeminal nerve—were stimulated before an inferior alveolar nerve block was given using procaine hydrochloride, the induction time was 62 seconds, versus 199 seconds in the control group, in which only the nerve block was given. Findings from this study suggest that regional acupuncture can accelerate the induction time after an inferior alveolar nerve block. The results of another study indicate that acupuncture before inferior alveolar nerve block may increase its effectiveness in endodontic treatment of mandibular molars with symptomatic irreversible pulps.10

Several studies have shown that acupuncture can reduce postoperative pain. A systematic review of 16 studies found that acupuncture therapy can help to alleviate postoperative pain, although heterogeneity in terms of methodological details among the studies reviewed may limit the conclusions that can be drawn.11 The practical implication of acupuncture therapy in alleviating postoperative pain may be helping to reduce the patients’ dependence on systemic analgesic medications. It is well documented that the use of non-steroidal anti-inflammatory drugs for pain control is associated with increased risk of gastrointestinal complications, such as ulceration and bleeding. A randomised placebo-controlled trial was conducted to evaluate the efficacy of acupuncture in treating postoperative oral surgery pain.12 The treatment group that received real acupuncture treatment immediately after the surgical removal of impacted lower third molars had a significantly longer pain-free postoperative period (372.9 minutes) compared with the placebo group (193.8 minutes). More importantly, the treatment group took a significantly longer time (241.1 minutes) to request analgesic medication compared with the placebo group (166.2 minutes). They also took significantly less medication (1 tab (240 mg acetylsalicylic acid) and 1 tab (600 mg acetaminophen with 60 mg codeine) compared with the placebo group (1.65 tablets); this difference was still evident at the seven-day follow-up (77 tablets versus 113 tablets). More randomised controlled clinical trials to verify the role of acupuncture therapy in dental pain management, particularly in postoperative pain, may be warranted.

**Management of temporomandibular joint dysfunction syndrome and orofacial pain**

Temporomandibular joint dysfunction syndrome (TMD) is a term that includes a group of conditions that affect the temporomandibular joint (TMJ), the muscles of mastication, and the associated head and neck musculoskeletal structures. The clinical diagnostic criteria for TMD classify the most common forms of TMD into the main subgroups of masticatory muscle disorder, TMJ internal derangement and TMJ degenerative joint disease.13

The treatment of TMD depends on the aetiologies of the conditions. While acupuncture therapy may not be useful in eliminating the cause if it is due to structural anomalies, like capsulitis and degenerative changes, it may help to relieve the pain and discomfort associated with the conditions, especially if it is muscular in nature. It has been documented that acupuncture can help in muscle relaxation and reduce muscle spasm. Relaxing the lateral pterygoid muscles can reduce the anterior displacing force on the meniscus of the TMJ and help to minimise TMJ clilking.

A systematic review of 19 randomised controlled trials was conducted to assess the effectiveness of acupuncture for symptomatic treatment of TMD.14 The study findings suggest moderate evidence for acupuncture as an effective intervention for the reduction of TMD symptoms, although more studies of larger sample sizes are needed to investigate the long-term effectiveness of acupuncture.

Trigeminal neuralgia is a sudden, unilateral, brief, stabbing, recurrent pain in the distribution of one or more branches of the trigeminal nerve. Carbamazepine is often the first-line treatment for this condition and is considered the gold standard, but it also has various side-effects, including drowsiness, dizziness and constipation. There are several case reports and case series in the Chinese literature on the success of acupuncture treatment on patients with trigeminal neuralgia. Acupuncture points GB34 (yangbai) and EX-HN5 (taiyang) are used if the ophthalmic branch is affected, ST12 (baihui) and ST7 (jiajun) if the maxillary branch is affected, and ST6 (jiahe) and ST7 (xiaguan) if the mandibular branch is affected. The choice of acupuncture points coincides with the distribution of the nerve branches. There is however, a paucity of reports in the Western literature and a lack of randomised controlled trials to verify its effectiveness in treating trigeminal neuralgia.

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**Clinical posting module in graduate diploma in acupuncture course.**

A patient receiving acupuncture treatment (left). —Modern prepacked, sterilised acupuncture needles used for treatment (right).

**Fig. 2:** Pathogenesis of periodontal disease.15

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**Environmental, acquired and genetic risk factors**

- Specific pathogenic bacteria
- Host immune-inflammatory response
- Connective tissue and bone metabolism
- Clinical expression of disease initiation and progression

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