

## Acupuncture-Assisted Anesthesia

Acupuncture involves the insertion of thin, sterile needles into precise anatomical locations on the body associated with neural and vascular structures.<sup>1 2</sup> Stimulation of these structures then influences various neurophysiologic processes in the direction toward healing. In terms of pain control, acupuncture treatment encourages the production and liberation of various neuroendocrine and neurochemical substances which then activate endogenous pain control systems, often providing an effective, non-pharmacologic means to control pain.<sup>3</sup> In fact, the analgesia afforded by acupuncture, especially electro-acupuncture,<sup>4</sup> can be so profound that it has at times been used as the sole pain-relieving measure during surgery.

In 1975, the Chinese government created a set of four stamps to commemorate the successful integration of Chinese medicine with modern biomedicine.<sup>5</sup> One was an 8 cent stamp depicting a 15 year old girl with a congenital ventricular septal defect undergoing open heart surgery, with a Chinese inscription which translates as “acupuncture anesthesia”. (The term “acupuncture anesthesia” is actually a misnomer, since patients are fully conscious during the surgical procedures. The correct term should actually be either “acupuncture analgesia” or “acupuncture-assisted anesthesia”.) The image on the stamp shows a Chinese-made disc oxygenator for total cardiopulmonary bypass to the right side of the patient; at the head of the operating table sat the anesthetist, who had inserted needles in both wrists and in the subclavicular region.

While acupuncture has existed for at least 2000 years, the application of acupuncture as the sole anesthetic aid began relatively recently, i.e., in 1958.<sup>6</sup> The first surgical procedure performed under “acupuncture anesthesia” was a tonsillectomy. Soon thereafter, as a result of political pressure from Mao Tse Tung, nearly all major and minor surgical procedures took place with acupuncture alone providing the anesthesia. In China currently, however, anesthesiologists limit the use of acupuncture for surgical analgesia predominantly to head and neck surgery, and for selected patients undergoing neurosurgery or cardiothoracic surgery.<sup>7</sup> Patients facing cardiothoracic surgery

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<sup>1</sup> Shaozong C. Modern acupuncture theory and its clinical application. (Chapter 5 The Morphological Relationship between Points and Nerves). *International Journal of Clinical Acupuncture*. 2001; 12(2):149-158.

<sup>2</sup> Kendall DE. Chapter 1: “In Search of the Dao”, in *Dao of Chinese Medicine*. Oxford: Oxford University Press, 2002. Pp. 1-15.

<sup>3</sup> Pomeranz B. Scientific research into acupuncture for the relief of pain. *The Journal of Alternative and Complementary Medicine*. 1996; 2(1):53-60.

<sup>4</sup> Xiao-Hong C et al. Optimal conditions for eliciting maximal electroacupuncture analgesia with dense-and-disperse mode stimulation. *American Journal of Acupuncture* 1994;22(1):47-53.

<sup>5</sup> Cheng TO. Acupuncture anaesthesia for open heart surgery. *Heart* 2000; 83(3):256.

<sup>6</sup> Op. cit., Wong CJM, 1993.

<sup>7</sup> Op. cit., Wong CKM, 1993.

with acupuncture analgesia must undergo substantial training preoperatively in order to master the slow, deep breathing required during surgery to overcome positive atmospheric pressure if/when the surgeon enters the pleural cavity.<sup>8</sup>

Most often, when anesthesiologists do incorporate acupuncture into the anesthetic procedure, they enhance the sedative and analgesic effects with pharmaceuticals.<sup>9</sup> This is especially important to consider in veterinary medicine. That is, there is no true “acupuncture anesthesia” -- only analgesia. Animals remain conscious and may become alarmed during the procedure, necessitating tight restraint during surgery. Furthermore, although acupuncture blunts or removes the awareness of pain, they still experience other sensations that may be aversive or frightening. One cannot guarantee complete pain control during surgery with acupuncture alone in every patient, as would be available with gas anesthetics: in one study on acupuncture in dogs, acupuncture induced an acceptable level of analgesia sufficiently in 89% of dogs undergoing laparotomy.<sup>10</sup> This number, while high, would nonetheless be unacceptable in practice. Pre-operative acupuncture requires more time; the acupuncture must begin at least twenty to thirty minutes before surgery, in order to provide enough time for analgesia to become maximally effective.

Nevertheless, acupuncture can play an important role in the peri-operative and recovery periods, reducing gas and injectable anesthetic requirements, easing emergence from anesthesia, and facilitating recovery following the procedure.<sup>11</sup> In addition, acupuncture needles placed in the ear (i.e., auricular acupuncture -- see below) can reduce pre-operative anxiety.<sup>12</sup>

Acupuncture-assisted anesthesia works for a wide range of conditions. For example, a 1999 study reported in *Human Reproduction* demonstrated that, when either electroacupuncture or alfentanil were combined with a paracervical block, electroacupuncture was as good an anesthetic method as intravenous alfentanil (a narcotic analgesic) during oocyte aspiration in in-vitro fertilization procedures.<sup>13</sup> This prospective, randomized, multi-center trial studied 150 women undergoing in-vitro fertilization and embryo transfer. The women rated their pain using a visual analogue scale during oocyte aspiration, and no differences were found between the two groups in any of the following measures:

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<sup>8</sup> Op. cit., Cheng, 2000.

<sup>9</sup> Wong CKM. Acupuncture induced anaesthesia: fiction or fact? *Acupuncture in Medicine* 1993; 11(2):55-60.

<sup>10</sup> Wright M and McGrath CJ. Physiologic and analgesic effects of acupuncture in the dog. *Journal of the American Veterinary Medical Association*. 1981;178(5):502-507.

<sup>11</sup> Mok YP. Perioperative Acupuncture. *2002 Symposium of the American Academy of Medical Acupuncture, Handbook of Faculty Syllabus Materials*. 2002; pp.39-51.

<sup>12</sup> Wang Shu-Ming. The use of auricular acupuncture to reduce preoperative anxiety. *Anesthesia Analgesia*. 2001; 93:1178-1180.

<sup>13</sup> Stener-Victorin E et al. A prospective randomized study of electro-acupuncture versus alfentanil as anaesthesia during oocyte aspiration in in-vitro fertilization. *Human Reproduction* 1999; 14(10):2480-2484.

pain directly related to oocyte aspiration, adequacy of anesthesia during oocyte aspiration, abdominal pain, and nausea. Interestingly, the electroacupuncture group had a significantly higher implantation rate ( $p < 0.05$ ), pregnancy rate ( $p < 0.05$ ) and "take home baby rate" ( $p < 0.05$ ) per embryo transfer.

Another study evaluated the efficacy of acupuncture for pain control after oral surgery with a randomized, double-blind, placebo-controlled trial.<sup>14</sup> Results showed that the pain-free post-operative time period was significantly longer in the acupuncture group than in the placebo group ( $p = 0.01$ ), and that pain medication consumption was significantly less in the treatment group than in the placebo group ( $p = 0.05$ ). Expectation of a positive benefit from acupuncture was eliminated by using a validated placebo method. That is, almost half of the patients were uncertain of or incorrect about whether or not they had received real or placebo acupuncture.

Acupuncture can potentially relieve pain and stress in individuals of all ages, including children and premature infants.<sup>15 16</sup> Premature infants resemble veterinary patients in their inability to verbally communicate their experience of pain. Risks of cardiovascular or respiratory depression limit the amount of pharmacologic analgesia and sedation allowed. Thus, if a method such as electrical stimulation of acupuncture points could be shown to safely and reliably provide analgesia and stress relief, quality of life and survivability may be enhanced. A study presented at the Pediatric Anesthesiology Meeting in 1998 looked at the effect of such stimulation on the level of salivary cortisol in premature infants. Salivary cortisol is a physiologic marker that objectively quantifies the stress experienced by the infants, corresponding to output from the hypothalamic-pituitary-adrenocortical (HPA) axis. Premature infants endure a number of intrusive and stressful procedures, including venipuncture, and ophthalmologic examinations for retinopathy of prematurity (ROP). The ROP examination requires immobilization, handling, administration of dilating eye medication, retractor insertion, extremely bright lights directed to all areas of the retina, and prolonged evaluations, especially in teaching institutions. The stress may be so severe that physiologic instability may ensue, including abnormal cardiovascular, respiratory, and metabolic responses. While the sample size in this study was small (13 infants), the study did serve to demonstrate that salivary cortisol is a useful marker of stress in response to the ROP examination in premature infants, and that low-level electrical stimulation of acupuncture points blunted the stress response.

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<sup>14</sup> Lao L et al. Evaluation of acupuncture for pain control after oral surgery, a placebo-controlled trial. *Arch Otolaryngol Head Neck Surg.* 1999; 125:567-572.

<sup>15</sup> Kemper KJ et al. On pins and needles? Pediatric pain patients' experience with acupuncture. *Pediatrics* 2000; 105(4):941-947.

<sup>16</sup> Schwartz L et al. Salivary cortisol as an indicator of stress in premature infants: the effect of electrical stimulation of acupuncture meridians in blunting this response. *Medical Acupuncture* 1998/1999;10(2): 27-30.

Extrapolating results from human studies to veterinary practice must be done cautiously, and studies are currently underway at Colorado State University, evaluating applications of peri-operative acupuncture and acupuncture-assisted anesthesia in dogs. Obviously, more research comparing various acupuncture and electrical stimulation approaches across several species must be done, and to accomplish this, the veterinary profession needs to train highly-skilled, research-oriented veterinary acupuncturists to supply this information.