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The miracle of Lidocaine: Second look with cellular and molecular perspectives

The pain phenomena as a disabling state but normal fact in human has been noticed to alarm and concern to the tissue injury and damage. Pain management is one the most worldwide clinical challenges in general population that is associated with considerable health care expenses, decreased productive time and impression on the quality of life. Numerous studies have been done to identify its pathophysiology and effective therapeutic agents. Attention to pain etiology, the relationship of inflammatory pathways, the molecular mechanisms and involved transmitters have given insights to novel approaches with more effective pain relief agents. In addition to over the counter analgesic and prescription medicine (NSAIDs, opioids, COX-2 inhibitors), there is no consensus about the analgesic role of herbal medicines. Cochrane library reviewed the place of herbal medicine in low back pain. They showed although the RCTs were not large trials and well-designed but herbal medicine could reduce pain more than placebo in short term without significant side effects (1).

Lidocaine as local/regional anesthetic agent has been introduced to reduce acute postoperative pain, the chronic pain conditions, myofascial pain, refractory neuropathic pain and neuralgia. In cancer pain patients with refractory to opioid agents, lidocaine infusion could achieve adequate analgesic state (2). Review of literature shows the recovery improvement by lidocaine infusion depends to the type of surgery. There is strong evidence to decrease pain scores in abdominal surgeries (both open and laparoscopy). In prostate, breast, thoracic and spine operations, the evidence is moderate with small benefit. In cardiac surgery, lidocaine infusion would decrease postoperative cognitive disorder with no analgesic effect (3).

Lidocaine acts predominantly through blocking sodium channels. These channels in cell membrane would be upregulated and more excitable in neuropathic pain. Moreover lidocaine potentiates the ATP production and release of endogenous opioids. It has anti-inflammatory properties, reduces the level of circulating inflammatory cytokines and inhibits the stimulatory amino acids and thromboxane A2. The lidocaine metabolite attenuates nociceptive effect by increasing glycine level. Intravenous infusion of Lidocaine at the time of operation had been proved to be analgesic immediately after surgery until 24h later with recovery improvement. The low plasma level (0.5- 5 µg/ml) is adequate for pain relief with reasonable safety profile. Different treatment regimens have been described: low vs, high dose (< or > 2mg/kg/h) and diversity in infusion time (until the end of surgery vs, prolonged infusion). Although it is short acting but prolonged anesthetic effect has been reported even after single treatment. Its analgesic effect may be constant for more than 6h and reduced pain level for several days. With consideration of short biologic half-life it couldn't be interpreted. The analgesic effect is more pronounce in elderly patients than young and it is more efficient in more severe pain vs. lower intensity pain. The most frequent reported adverse effects during lidocaine infusion are: nausea, vomiting, lightheadedness, tinnitus, muscle spasm, perioral paresthesia and cardiac dysrhythmias. All of them would respond to dose reduction. It is inexpensive, comparable and as effective as epidural catheter without related neurologic complications. Although there is no consensus in dosing and infusion time, but is suggested to be part of treatment in opioid dependent persons (2-6).

In this issue two pain related articles would be discussed:" Potential role of herbal medicine in alleviating pain and inflammation in osteoarthritis: A review", and "Effect of intravenous infusion of Lidocaine on pain reduction after caesarean section under general anesthesia (7, 8).

There are well defined strategies to control pain, reduce postoperative bleeding and homeostasis maintenance. Balancing the homeostasis, correction of acid base irregularity, pain management, bleeding control and reduction of blood loss during surgery are part of the main skills of anesthesiologists. Today attention to cellular and molecular aspects of mentioned items are the more interesting topics. Consideration of molecular basis of these items are the main aim of the *Journal of Cellular and Molecular Anesthesia*.

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