

Potential Utility of Local Anesthetics as Analgesics for Management of Postoperative Pain and Concerns about Adverse Effects on Developing Brain

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Pain is a challenging health dilemma and has gained a great focus in clinico-pathological conditions correlated with post-operative, neuropathic and cancer pain. While perioperative administration of analgesics to mitigate the postoperative pain has been well established in the literature (termed preventive analgesia), preemptive analgesia or effects of any drug (such as anesthetics) prior to operation has been less highlighted [1]. It is important to note that adequate management of the pain either postoperative or neuropathic facilitates functional recovery, decreases financial burden (such as therapeutic costs), diminishes morbidity and improves quality of life of the patients. In this regard, there are emerging lines of evidences indicating that the use of local anesthetics not only potentiate the effects of analgesics but per se, exerts protective effects against the painful conditions [1-2]. Interestingly, while general anesthetics have been reported to render the pain potentiation and inflammation, local anesthetics conversely have potent anti-inflammatory properties, a unique characteristic which plays a critical role in the management of postoperative and neuropathic pain [3-4]. To support the advantageous utilization of local anesthetics in controlling the pain, clinical and preclinical studies have demonstrated the efficacy of these compounds in modulation of painful outcomes of spinal pain, and pain related to hip and knee arthroplasty, foot and ankle surgery, arthroscopic and open shoulder surgery [1-2]. These effects of local anesthetics have been attributed to blocking of the peripheral nerves and prevention of the nerve injury by inhibiting the microglial activation [5-6]. Recently, animal research has demonstrated the functional and structural abnormalities following exposure to general anesthetics in early life. Millions of infants and children experience surgical operations and undergo painful interventions each year. Similarly, epidemiological reports elucidated that exposure to anesthetics in the early child-hood correlated with subsequent neurobehavioral difficulties [7-8]. Collectively, these reports have raised serious concerns that

anesthetics may disrupt the normal development of the brain in humans. On the other hand, the fact is that anesthetics also have protective properties against deleterious effects of stress, pain, and ischemia in the immature brain [8]. However, despite the multiple potential benefits of local anesthetics, possible effects of these compounds on the developing brain are elusive.

This review calls for epidemiological and preclinical investigations in order to determine if common medications used as local anesthetics may result in the neurobehavioral and neurochemical abnormalities. Considering that using humans for such experiments is practically impossible due to ethical and subjective matters, experimental animal models are widely applied in laboratories. There are questions as to whether exposure to local anesthetics as analgesics in early life may induce behavioral, structural and functional changes in the adulthood and more importantly is the possibility of altered response to analgesics in later life. Although this finding that analgesic effects of local anesthetics have opened new avenues for better management of pain, but this perspective of the possible adverse effects of local anesthetics on developing brain has largely been omitted in the field of research. Apparently, it is important to know that if epidural or systemic administration of local anesthetics is able to induce any harm to the developing brain, their use in the clinics may result in irrecoverable outcomes with huge financial and social burden and negatively affect the children and their families later. Thus, we considered these issues in this review that investigations in this field not only prevent the possible malicious consequences of local anesthetics but at the same time assist the experts in the field in proper utilization of these medications.

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