

LIDOCAINE INFUSION FOR TREATMENT OF CHRONIC INTRACTABLE POST-TRAUMATIC HEADACHE

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INTRODUCTION

- Lidocaine works by attenuating peripheral nociceptor sensitization and central hyperexcitability through its Na⁺ channel blocking action.
- IV lidocaine is used in combination with other drugs to improve pain control, reduce nausea, and reduce opioid requirements.
- Lidocaine was first used to treat neuropathic pain due to burns. Since then, it has been trialed in diabetic neuropathy and CPRS.
- Lidocaine, when given in low dose IV infusion, has successfully provided pain relief in chronic painful conditions that have failed other modalities and has been used to effectively treat SUNCT/SUNA headaches as well as medication overuse headaches.

CASE REPORT

67-year-old male with a constant, diffuse, pressure-like headache from the top of his head radiating down his neck for over 30 years since MVA in 1989, which resulted in multiple injuries requiring splenectomy and fusion of C3-C5 and C5-C7.

- Trialed over 60 medications including opioids, muscle relaxants, SSRIs, and carisoprodol 350 mg, with only mild relief
- Tried lifestyle modifications and occipital nerve blocks in the past with only mild relief
- Patient presented to pain clinic with chronic intractable headaches and debilitating nausea 2-3x/month

Patient received monthly lidocaine IV infusions, bilateral neck trigger point injections, and right great occipital nerve blocks with significant improvement in pain.

- During sessions, providers were present for 1:1 monitoring and care

INFUSION PROTOCOL

- We used an IV lidocaine infusion mixture in combination with adjuvant drugs to alter the patient’s pain response.
- The mixture optimized after several visits to include the following drugs in 1000 ml LR: ketamine (.5-1mg/kg), lidocaine (1-2mg/kg), midazolam (0.2-0.5mg/kg), ondansetron (4-8mg), dexamethasone (4-8mg)
- After careful preparation, the 1000 ml solution is infused over 90 minutes through a peripheral IV.
- Throughout the procedure, there is continuous vitals monitoring by a healthcare professional, frequent mental status checks, and checking for patient reported adverse effects such as nausea, vomiting, dizziness, or LAST.
- Patient is monitored for an additional 30 minutes after completion of infusion prior to sending them home.

	Visit 1	Visit 2	Visit 3	Visit 4-6	Visit 7	Visit 8	Visit 9-10
Lidocaine	100 mg	100 mg	140 mg	140 mg	140 mg	100 mg	120 mg
Ketamine	-	30 mg	40 mg	50 mg	50 mg	-	-
Ondansetron	8 mg	8 mg	8 mg	8 mg	-	4 mg	8 mg
Midazolam	-	2 mg	2 mg	2 mg	-	-	-
Dexamethasone	4 mg	-	-	4 mg	8 mg	8 mg	8 mg
Ketorolac	30 mg	-	-	-	30 mg	30 mg	30 mg

- Patient requested to remove ketamine after 7th visit due to dysphoria but noted “less bothersome” headaches
- Pain scores recorded for some but not all visits:
 - Visit 1 → Started with a score of 8
 - Visit 2 → Started at 8 and ended at 4
 - Visit 3 → Started at 8 and ended at 0
 - Visit 7 → Started at 5

CONCLUSIONS

Candidates for IV lidocaine infusion therapy exhibit chronic pain secondary to prolonged opioid treatment resulting in long term alteration of opioid receptors.

Our treatment aims to reconfigure our patients’ response to opioid therapy with decreased tolerance and dependance on the drug post infusion therapy.

DISCUSSION

Lidocaine

- Na⁺ channel blocker that prevents depolarization of neurons and spontaneous firing of Na⁺ channels in damaged tissue.
- The diminished capacity to send pain signals is an important mechanism by which lidocaine modulates our pain response and prevents hyper sensitization.
- Lidocaine is anti-inflammatory and reduces cytokines thus preventing central sensitization and hyperalgesia.
- Patients receiving IV lidocaine have reported better and faster pain relief, less opioid consumption, and less postoperative complications related to nausea, vomiting, bowel function, and locomotion/daily activities of life.
- There is a risk of local anesthetic systemic toxicity (LAST).

Ketamine

- Acts as a noncompetitive antagonist to the NMDA receptor in the brain and spinal cord to modulate the pain response.
- NMDA receptors are important in our interpretation of pain, and ketamine acts to block the CNS processing of nociceptive afferent nerve fibers, diminishing the sensation of pain, and plays a role in the development of central sensitization and opioid tolerance.
- Ketamine modulates a variety of neurological functions such as breathing, learning, memory formation, locomotion, and neuroplasticity.
- This has a profound benefit for chronic pain patients who require higher opioid doses or who have developed significant tolerance.
- Cross-over trials from the Cochrane Review have found that ketamine reduced pain intensity and opioids requirements in chronic pain patients
- Despite the beneficial effects of ketamine, there are adverse effects that can occur with high doses such as hallucinations, tachycardia, high blood pressure, nausea, vomiting, and severe psychotropic symptoms.

Ketamine-Lidocaine Combination

- In contrast to local analgesic blocks, which has the risk of LAST, a combination infusion therapy with ketamine decreases our requirement of lidocaine and its derivatives which minimizes our risk, making it a safer approach.

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