Intravenous lidocaine decrease isoflurane requirements during posterior lumbotomy as monitored by bispectral index

Nakhli M.S., Kahloul M., Harrathi A., Chebbi N., Naija W., Mhamdi S.
Sahloul Hospital, Dept of Anaesthesiology & Intensive Care, Sousse, Tunisia

Introduction:

Peri operative effects of intravenous lidocaine infusion were evaluated on pain relief, cytokine responses, recovery and length of hospital stay particularly in intra abdominal surgery. Our hypothesis is to verify whether intravenous lidocaine infusion can decrease the minimum alveolar concentration isoflurane required to keep Bispectral Index between 40 and 60 during anesthesia for lumbotomy.

Methodology:

Fifty ASA physical status 1 and 2 patients, aged 18 – 80 years were scheduled for elective lumbotomy during general anesthesia with propofol, remifentanyl and cisatracurium. Exclusion criteria were: history of hepatic, renal or cardiac failure, allergy to local anesthetics, nephrectomy for renal transplantation. Patients with history of psychiatric disorder, arrhythmia or seizures were also excluded. Patients were randomized to receive either intra operative systemic lidocaine infusion (group L): 1.5 mg/kg before skin incision then perfusion of 1 mg/kg/hr or normal saline infusion (group C). BIS was maintained between 40-60. Primary endpoint was the Et-Iso concentration and MAC-Iso. Secondary endpoint was the consumption of remifentanyl and the delay to extubation.

Results:

The two groups were comparable in terms of demographic characteristics, surgical data and hemodynamic parameters (table 1).

Table 1: Demographic and surgical data

	GROUP (L) n=25	GROUP (C) n=25	p
AGE	59 ± 15	54 ± 15	0.32
GENDER (M/F)	14/11	13/12	0.77
ASA (1/2)	14/11	17/8	0.38
BMI	25.30 ± 4	27.34 ± 5	0.12
TYPE OF SURGERY • Pyelotomy • Nephrectomy	20 5	16 9	0.34
ANESTHESIA DURATION (Min)	99.6 ± 27	94.36 ± 30	0.52
SURGERY DURATION (Min)	81.72 ± 27	76.70 ± 29	0.49

The MAC-Iso and Et-Iso fraction during the surgical procedure were less important in the group (L) with a statistically significant difference (Fig. 1).

Figure 1: Et-Iso average during anesthesia

The average consumption of remifentanyl was less in the group (L) and time to extubation was shorter in this group (table 2).

Table 2: Remifentanyl consumption and time to extubation

	GROUP (L)	GROUP (C)	p
REMIFENTANIL CONSUMPTION (Mg/kg/Min)	0.12 ± 0.04	0.19 ± 0.05	0.01
TIME TO EXTUBATION (Min)	5.6 ± 1.8	8 ± 2	0.01

Discussion:

This study showed that continuous infusion of intravenous lidocaine reduces requirement of isoflurane and remifentanyl during the surgical procedure for lumbotomy. It also shortens the time to extubation. In humans, the role of intraoperative systemic lidocaine infusion was evaluated on pain relief, cytokine responses, bowel function recovery, post operative nausea and vomiting and length of hospital stay particularly in abdominal surgery. Butterworth et al. suggested inhibition of brain cell excitability as a mechanism for analgesia from infused lidocaine. This may underlie the analgesia and supplementation of general anesthesia produced by systemic lidocaine infusion [1]. Lidocaine action on peripheral and central nervous system include sodium channels blockade [2]. So both inhalant anesthetics and lidocaine act on voltage-gated sodium channels and thus their effects during general anesthesia could be additive. The effect of i.v lidocaine infusion on the reduction of volatile agents seems more evident in the literature. Sevoflurane requirement was significantly reduced during abdominal surgery as monitored by BIS at all intraoperative time points [3]. The same result was found in different type of surgeries using sevoflurane [4, 5] and desflurane.

Conclusion:

We demonstrate that systemic lidocaine administration during renal surgery in lumbotomy position improves analgesia by decreasing remifentanyl dosage. It has a synergistic effect on narcosis by sparing isoflurane requirement in adults as monitored by bispectral index. The low cost of lidocaine could provide effective strategy to limit intra operative opioids and volatile agents requirements especially in poor countries.

References:

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