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The Effect of Intravenous Lignocaine Infusion on Analgesic Requirement During Intra Operative and Post Operative Period in Patients Undergoing Major Surgery Under General Anaesthesia

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ABSTRACT

In patients undergoing major surgery under General anaesthesia, adequate analgesia during intra operative and postoperative period is essential for ensuring patient's comfort and recovery after surgery. This study is sought to determine the effect of intravenous Lignocaine on analgesic requirement during Intra operative and Postoperative period in patients undergoing major surgery under General anaesthesia. The current Prospective Observational study was carried out in 100 patients. Each group had 50 patients. Patients in Group L received Intra operatively: Inj. Lignocaine 2mg/kg (diluted in 10 ml NS) bolus followed by infusion Inj Lignocaine 2mg/kg/hr and continued for 24 hours postoperatively. Inj. Fentanyl 1mcg/kg as bolus dosage as and when required intra operatively (Increase in MAP/Heart rate >20% of baseline). Post operatively: Inj. Tramadol 100 mg IV as and when patient complains of pain or VAS score >4. Patients in Group C received Intra operatively: bolus dose of IV Normal saline 10 ml followed by infusion for post operatively 24 hours. Inj. fentanyl 1mcg/kg as needed during surgery(Increase in MAP/Heart rate >20% of baseline). Post operatively: Inj. Tramadol 1mg/kg IV +Inj. Ondansetron 0.15mg/kg as and when a patient complains of pain or VAS score >4. Postoperative pain levels were assessed at 1, 2, 4, 8, 12 and 24 hours. The visual analogue scale (VAS) was used to assess postoperative analgesia. Total consumption of fentanyl intra operativelyApril 23, was significantly lessened in Group L. VAS scores at postoperative 1, 2, 4, 8, 12 and 24 hours were statistically significantly lower in Group L than in Group C (p = 0.05) and total intravenous Tramadol consumption in Group L was significantly less than Group C. Intra operative lignocaine infusion decreases overall opioid requirement and postoperative pain intensity in patients undergoing major surgery under General anaesthesia. There was a low incidence of PONV and better patient satisfaction with the lignocaine group. There were no postoperative complications such as light headedness, tinnitus, peri oral numbness and arrhythmia.

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Key Words
Fentanyl, lignocaine, general anaesthesia, tramadol

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INTRODUCTION

In patients undergoing major surgery under General anaesthesia adequate analgesia during intra operative and post operative period is essential for ensuring patients comfort , early recovery and rehabilitation after surgery. Opioids are widely used analgesics. However, due to its limited availability and associated side effects such as postoperative nausea, vomiting, constipation, dizziness, sedation , respiratory depression, delayed recovery from anaesthesia and development of tolerance to analgesia limits its use. Therefore multimodal analgesia regimen is recommended in perioperative period as it provides superior analgesia and reduces opioid requirement. Drugs like intravenous Lignocaine , Acetaminophen, Non steroidal anti inflammatory drugs like Diclofenac, Alpha 2 agonist like Clonidine and Dexmedetomidine and many other drugs can also be used as analgesic in peri operative period. Intravenous lignocaine is a widely studied drug for multimodal analgesia.

Lignocaine, was initially synthesized in under the brand name Xylocaine and was licenced for use in Sweden in. Lignocaine is used in a variety of modes of administration (epidural, subarachnoid, intrapleural, intravenous, intramuscular, intraa rticular and topical). However, Intravenous Lignocaine by blocking voltage gated sodium channels and inhibiting inflammatory mediators signalling , suppress the spontaneous impulses generated from injured nerve fibres and proximal dorsal root ganglion. It inhibits migration of granulocytes and release of lysosomal enzymes leading to decreased release of pro and anti-inflammatory cytokines. The anti Hyperalgesic property of lignocaine is due to suppression of central and peripheral sensitization[1-4].It produces analgesia when used in continuous low dose infusion between 1.5-3mg/kg/hour to maintain plasma concentration of 1-2mcg/ml , decreases the severity of perioperative pain and decreases the requirement for opioids without producing systemic toxicity[22]. This study will provide valuable information on the use of intravenous lignocaine as an analgesic in peri operative period for patients undergoing major surgery.

Aims:

- To study the effect of intravenous lignocaine infusion on analgesic requirement during peri operative period in patients undergoing major surgery under General anaesthesia
- To study total consumption of Intravenous fentanyl intra operatively
- To study total consumption of Intravenous tramadol post operatively
- Incidence of postoperative nausea-vomiting
- Incidence of adverse effects related to IV Lignocaine infusion
- Patient satisfaction

MATERIALS AND METHODS

The current Prospective observational study was carried out for a period of 3 months at the Department of Anaesthesia, Tertiary Care Teaching Institute of India. The institutional ethical committee provided ethical approval and all participants provided signed informed consent. All collected data was kept anonymous and was only used for scientific research.

Inclusion Criteria:

- Patients with ASA grade I and II
- Patients of 18-50 years of age
- Duration of surgery 3-4 hours

Exclusion Criteria:

- Patients allergic to Local anaesthetic
- Patients who are unable to express pain score
- Patients on pain medications
- Patients on Anti arrhythmic drugs
- Patients refusal
- Pregnant and lactating mother
- Patients with history of convulsions

Intravenous access was secured. Standard non-invasive monitoring of Pulse , Blood pressure. SPO2 , ECG were initiated and baseline Hemodynamic parameters were noted upon arrival in OT. Continuous electrocardiography, pulse oximetry and intermittent non-invasive blood pressure measures every 5 minutes were used to monitor the patients. As a premeditation, Inj. Glycopyrrolate 0.004mg/kg IV Inj. Fentanyl 1.5 mcg/kg IV was given. General anaesthesia was given with Inj. Propofol 2.5mg/kg+Inj. Vecuronium Bromide 0.1mg/kg. All patients were intubated with the appropriate size of Oral Portex Cuffed endotracheal tube. Maintenance of Anaesthesia with O2+N20+ sevoflurane at MAC 1 with controlled ventilation on closed circuit.+Inj. Vecuronium Bromide 0.01mg/kg IV bolus dose. Patients were divided into two groups. Each group had 50 patients.

Group L: received Inj. Lignocaine 2mg/kg (diluted in 10 ml NS) bolus followed by infusion Inj Lignocaine 2 mg/kg/hr for 24 hours post operatively, as well as Inj. Fentanyl 1mcg/kg as bolus dosage as and when required intra operatively.(Increase in MAP/Heart rate >20% of baseline)

Group C: includes patients who received Inj. normal saline 10 ml as a bolus dose followed by IV infusion of normal saline. Inj. fentanyl 1mcg/kg as and when needed during surgery. (Increase in MAP/Heart rate >20% of baseline) Before exudation, all patients received an injection of paracetamol 15mg/kg IV at the point of skin closure. At the end of the surgery, all patients were administered Inj. Glycopyrrolate

Table 1: Patients demographic data

Variable	Group L (n = 50) Group F (n = 50)	p-value
Gender (M/F)	26/24 23/27	0.09
Age (year)	46.1±9.20 48.9±10.35	0.23
Height (cm)	165.2±6.40 164.05±4.22	0.54
Weight (kg	74.1±8.222 73.2±8.10	0.75

Statistically significant at p = 0.05

Table 2: Total dose of intraoperative fentanyl (1mcg/kg) (Mean)

Duration of Surgery	Group L(n = 50)	Group C p-value(n = 50)
2-3 hours	70±10	120±10 <0.05 Significant
>3, <4	100±10	140±20 <0.05 Significant

Statistically significant p=0.05

Table 3: Total dose of postoperative tramadol (1mg/kg) (Mean)

Group L(n = 50)	Group C (n = 50)	p-value
120±10	200±10	<0.05Significant

Statistically significant p=0.05

Table 4: Post operative complications

Variable	Group L(n = 50)	Group C p-value(n = 50)	p-value
Nausea	6	14	<0.05 Significant
Tinnitus	0	0	>0.05 Non Significant
Peri oral Numbness	0	0	>0.05 Non Significant
Arrhythmias	0	0	>0.05 Non Significant

Statistically significant p = 0.05

Table 5: Patient satisfaction score

Variable	Group L (n = 50)	Group C (n = 50)
Not at all satisfied	0	0
Slightly satisfied	1	8
Neutral	7	24
Very satisfied	24	18
Extremely satisfied	18	0

0.008mg/kg IV+Inj. Neostigmine 0.05mg/kg as reversal. Postoperative pain levels were assessed at[1], [2,8,4,12]upto 24 hours and as and when complained by the patient. The visual analogue scale (VAS) was used to quantify postoperative analgesia (VAS 0 = no pain, VAS 10 = the most severe pain that may be felt).
Inj. Tramadol 1 mg/kg + Inj. Ondansetron 0.15mg/kg IV was administered when VAS
score >4. Incidence of PONV was noted till 1st dose of Tramadol. Patients were observed
for adverse effects of intravenous Lignocaine such as lightheadedness, tinnitus, perioral
numbness and arrhythmia. Patient Satisfaction Score was assessed after
post operative 24 hours.

RESULTS AND DISCUSSIONS

Demographic data such as age (years), sex, height (cm), body weight (kg), and body mass index (BMI, kg/m²) are shown in (Table 1). Data collected for comparison were based on: 1) Intra operative requirement of total dose of fentanyl 2) Post operative requirement of total dose of tramadol 3) Incidence of

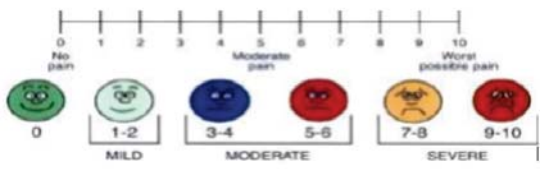

Fig. 1: Patients's conditions during surgery treatment.

Fig. 2: Patient satisfaction score was assessed operative 24 hours

PONV 4) Incidence of lignocaine toxicity perioperatively[5-7]. Patient satisfaction score. Intra operatively in Group L total fentanyl consumption was significantly reduced than Group C (Table 2). VAS scores at postoperative[1,2,4,8,12]and 24 hours were statistically significantly lower in Group L than in Group C (p<0.05) (Table 3) Group L had considerably lower additional analgesic requirements (tramadol 1mg/kg) postoperatively than Group C (p<0.05). A comparison of the two groups in terms of total tramadol consumption in the first 24 hours postoperatively found that the Lignocaine group had a significantly lower total analgesic demand than the control group p = 0.05 Those who received Lignocaine had better patient satisfaction with postoperative pain reduction. There were no signs or symptoms of Lignocaine toxicity identified. Present study evaluated the effect of Intravenous Lignocaine infusion on analgesic requirement during intra operative and postoperative period in patients undergoing major surgery of 3-4

hours duration under General anaesthesia. The potent anti-inflammatory effects of IV lignocaine are mediated by inhibition of N-methyl-d-aspartate receptors and by reduction of cytokine production through inhibition of neutrophil activation. Among the cellular targets that have been examined are membrane receptors, modulation of K+and Ca2+channels, N-methyl-d-aspartate (NMDA) receptors, a-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptors and GTP-binding protein coupling receptors(8-12) Kurabe *et al.*[9,10] proposed a glutamate-inhibition effect of intravenous lignocaine at the presynaptic terminals that results in a membrane potential shift and a postsynaptic hyper polarization.

In our study, the data revealed that all patients undergoing major surgery , required less supplemental dose of fentanyl in the Lignocaine group than control. VAS values at rest were statistically higher at [1,4,8,11,12] and 24 hours postoperatively in the Group C. Data of this study is consistent with other studies in which IV lignocaine was found to improve the early postoperative analgesia in different types of surgery, including complex spine surgery, paediatric fusion surgery, subtotal gastrectomy, laparoscopic abdominal gynecologic surgery, outpatient laparoscopy, inguinal herniorrhaphy and upper abdominal surgery.

Yardeni *et al*.[13-19] performed a randomized, placebo-controlled study and showed that intravenous lignocaine could minimize postoperative opioid consumption and was associated with an attenuated suppression of a lymphocyte proliferative response and attenuated production of both proinflammatory and anti-inflammatory cytokines which provided improved pain control. Koppert *et al.*[23] assumed that the main therapeutic effect of intravenous lidocaine after abdominal surgery with extended tissue damage can be attributed to a central antihyperalgesic effect mediated by mechanosensitive nociceptors, thus decreasing postoperative narcotic consumption. Our study showed significantly less total postoperative analgesic (tramadol) requirement in the lignocaine group than in the control group. Lignocaine's analgesic property can persist even after the decreasing of its plasmatic levels, which corroborates the nerve conduction blockage theory[20-27].

CONCLUSION

Intra operative lignocaine infusion decreases overall opioid requirement and postoperative pain in patients undergoing major surgery. Lignocaine was highly effective in maintaining peri operative analgesia after complex surgeries in terms of pain scores following surgery, total intra operative and postoperative analgesic intake without any postoperative complications such as light headedness, tinnitus , perioral numbness and arrhythmia. There was a low incidence of PONV with better patient's satisfaction. The lignocaine infusion is safe and easy to administer with no requirement of any complex equipment and may prove to be a highly effective strategy to improve analgesia and patient satisfaction after major surgery under General anaesthesia.

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