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LOW DOSE INTRAVENOUS INFUSION OF LIGNOCAINE IN POST OPERATIVE PAIN

Dr. Venuturumilli Ravi Sankar*[1], Dr. V. Lakshmi Kameswari[2], Dr. T.V. Subba Rao[3]

[1]Consultant cardiac Anesthesiologist, Apollo Hospitals, Secunderabad, Telangana State

[2]Associate Professor, Pharmacology, Osmania Medical College, Hyderabad, Telangana State

[3]Former Professor & H.O.D., Anesthesiology, Guntur Government Hospital, Guntur, Andhra Pradesh

Abstract:

In spite of spectacular advances in pain relief during surgery, relief of pain in post operative period still remains a problem. The most important is that the deficiencies of current routine methods of pain relief are being increasingly exposed. The present study has been taken up with the intention of evaluating the postoperative analgesic effect of continuous lignocaine infusion in low doses as used for cardiac arrhythmias. Lignocaine is extensively studied regarding its pharmacology and pharmacokinetics in comparison with narcotic analgesics viz., free from respiratory depression and addiction liability. The primary action of the local anesthetic is on the cell membrane of the axon on which it produces electrical stabilization. The large transient increase in permeability to sodium ions necessary for propagation of the impulse is prevented thus the resting potential is maintained and depolarization in response to stimulation is inhibited. Patients were randomly grouped in to two groups of 50 in each. Group A given Lignocaine intravenously and Group B given saline intravenously post operatively for a period of 24 hrs. Patients were monitored by measurement of pulse rate, systolic blood pressure, continuous ECG monitoring. Post operative instructions included a note to give narcotic or sedative, if in severe pain after informing the author. Pain during 24hrs after surgery was assessed by "linear analogue" scale ranging from 0 to 100 as per Bond and Pilowsky. The study was prospective controlled and randomized. Data were expressed as mean±S.E.M. Single tailed student't' test was used to express the difference of the means of two samples. The results showed that continuous intravenous lignocaine decreased the postoperative pain persistently and reduced the narcotic analgesic dose significantly and did not cause any significant adverse effects.

"Divine is the task to relieve pain"-Hippocrates

"For all the happiness mankind can gain, is not in pleasure, but in rest from pain"-John Dryden (1631-1701)

Key Words: *Lignocaine, Pethidine, Linear analogue scale, Infusion, Narcotic*

Corresponding author:

Dr. Ravi Sankar Venuturumilli, M.D.,
Consultant Cardiac Anesthesiologist,
Apollo Heart institute, Apollo Hospitals,
Jubilee Hills, Hyderabad-500096
Email: venuturu@hotmail.com

QR code

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INTRODUCTION:

Postoperative pain has got particular importance not only because of frequency but also because of its psychological influence on the patient. Its complex nature forms a firm bond between anesthesiologist, surgeon and the patient. Incidence of post operative pain differs like thoracic and upper abdominal surgeries leading followed by those on the lower abdomen (Table 1) [1].

Table: 1. Incidence of Post Operative Pain in abdominal, non abdominal and Thoracic regions.

Abdominal	Non abdominal	Thoracic
Upper 63.2%	Limbs26.9%	Cardiac 72.5%
Lower 51.3%	Perineal 24.3%	Noncardiac 74.6%
Inguinal 22.7%	Body wall 20.0% Neck 11.7%	

Personality variations contribute to pain perception, like elderly and the very young require less analgesic requirement, Stable patients with low neuroticism may be expected to suffer less than neurotic patients [2]. The fact that placebos may relieve pain in 35% of patients and that this action will vary with the presence of anxiety further emphasizes that emotion may alter the severity of pain experienced [3]. Pain is conducted by two types of pain fibres in the periphery A, delta and C fibres. Peripheral sensory nerves have their cell bodies in the dorsal root ganglion and central projection of A delta and C fibre neurons enter the dorsal horn in the lateral division of the dorsal root. Thalamus is involved in the experience of Pain, Post central gyrus is necessary for its accurate localization and prefrontal cortex for the unpleasant affective reaction to it.

The gate control theory proposed by Melzack and Wall in 1965, stressed the role of dorsal horn of the spinal cord, which is influenced by impulses from brain. Prostaglandins of E and I series sensitize pain receptors and PGE are believed to be involved in the amplification of pain, followed by bradykinin, histamine, acetylcholine, 5-hydroxytryptamine and inorganic ions like H and K may also be involved in mediation of pain. Stimulationof A and C fibres release substance P which excites 100% HT neurons and 14% of LT neurons. Opiate group of drugs when administered systemically shown to depress release of Substance P in substantia gelatinosa, which can be reversed by Naloxone, an opiate antagonist. µ, opiod receptors are responsible for supraspinal analgesia, euphoria, dependence, dysphoria, spinal analgesia respectively.

Classical local anesthetics [4] block sodium conductance probably by a dual action on the cell membrane action on the receptor within the sodium channels and membrane expansion. Action on the receptor accounts for 90% nerve blocking effect of Lignocaine and appears to be shared by both quaternary analogues of Lignocaine and by amide [5,6] local anesthetics acting in the cationic form. Membrane expansion is a nonspecific reaction, analogues to electrical stabilization produced by non polar lipid soluble barbiturates, benzocaine and general anesthetics. A thick fibre is less readily blocked by local anesthetic than a thin one. In other words the thicker the nerve fibre greater the concentration of local anesthetic required to block the conduction. Amide local anesthetics, bupivacaine, etidocaine have more protein binding, so are 2, 3 times longer acting than their homologues mepivacaine, lignocaine amide anesthetics [7,8 and 9]. The Paraben preservative has a tendency for hypersensitivity reactions.

MATERIALS AND METHODS:

The study was under taken in one hundred patients of either sex scheduled for abdominal or chest surgeries at Government General Hospital Guntur from (December 1985 to December 1986) for a period of 1 year. Age of the patients ranged from 22 to 62 years. Informed consent from each patient was taken for inclusion to the study and the protocol was approved by the Head of the department of Anesthesiology and Superintendent, Government General Hospital, Guntur. The patients were classified according to American Society of Anesthesiologists Classification of physical status, ASA Grade – 1(normal healthy patient) and Grade- 2 (patient with mild systemic disease) were selected for the study.

Preanaesthetic medication with 0.65 mg atropine sulphate intramuscularly and 5mg diazepam intravenously 30 minutes before induction. Anaesthesia was induced with 4 mg/kg thiopentone sodium. After administration of 0.1mg/kg Pancuronium intravenously and ventilating the patient with oxygen and nitrous oxide mixture 50:50 for 2 minutes endotracheal intubation was performed with suitable cuffed endotracheal tube. Anaesthesia was maintained with oxygen, Nitrous oxide and 0.5% Halothane. Relaxation was maintained with additional doses of 1 mg Pancuronium as indicated in surgery. 1.2 mg Atropine followed by 2.5mg of Neostigmine was administered to reverse the neuromuscular blockade.

Patients were divided randomly into two groups, Group A received Lignocaine 2mg/min and Group B Saline intravenously. Half an hour before skin

incision group A also received bolus dose of lignocaine[8] in 0.6% saline (100mg : 20mg/ml),followed by 2mg/min(2.5gm lignocaine in 540ml physiologic saline i.e., continued 24th post operative hour. Group B received infusion of normal saline. Patients were monitored by measurement of pulse rate, systolic blood pressure as well as continuous monitoring of ECG where ever possible throughout the period of lignocaine/saline infusion [10]. Postoperative instructions included a note to give narcotic or sedative only when patient is in severe pain after informing the observer.

RESULTS AND DISCUSSION:

Pain Assessment: Pain during the initial 24 hours after surgery was assessed using a 'linear analogue' scale ranging from 0(no pain) to 100(pain as bad as it could be). Each patient scored his pain at 2 hr intervals starting 1hour after the return from operating theatre (when patients were fully conscious). Each patient's requirement of Injections of 50mg Pethidine was recorded for 72 hours post operatory (Figure 1). Sleep pattern on 1st post operatory day was recorded. The observer's impression based on duration of analgesia, consistency of analgesia, side effects profile and supplementation of narcotic analgesics were recorded. Questions concerning postoperative vomiting, adverse reactions to lignocaine, like lightheadedness, tinnitus, peri-oral numbness, drowsiness, slurred speech, were put to the patient on the morning of the first postoperative day and responses were recorded by the observer.

The study was prospective, controlled, and randomized. Mean Pain scores were calculated for each patient by summing up the pain scores during first 24 hours after surgery (Table 2 and Figure 2). The mean requirements of pethidine for 72 hours after surgery were calculated. Data was expressed as Mean ± S.E.M. Single tailed student't' test which is accurate measure of deciding whether the difference between two means of samples is significant or not, was used for comparison of quantitative variables i.e. significant difference between means. 't' is the ratio of observed difference between two samples and standard error of difference between two sample values (Figure 3 and Figure 4).

$$T= X1-X2/ S.E (X1-X2)$$

In this analysis of comparing two means of a chosen chance of being wrong α is considered as 5% i.e., 95% confidence.

Table 2: Accumulated Pain Scores at the first pain assessment 1hr i.e., before giving pethidine

Groups	Mean accumulated pain Scores ± S.E.M
A (Lignocaine)	9.5±0.5
B (Saline)	29.05±0.4

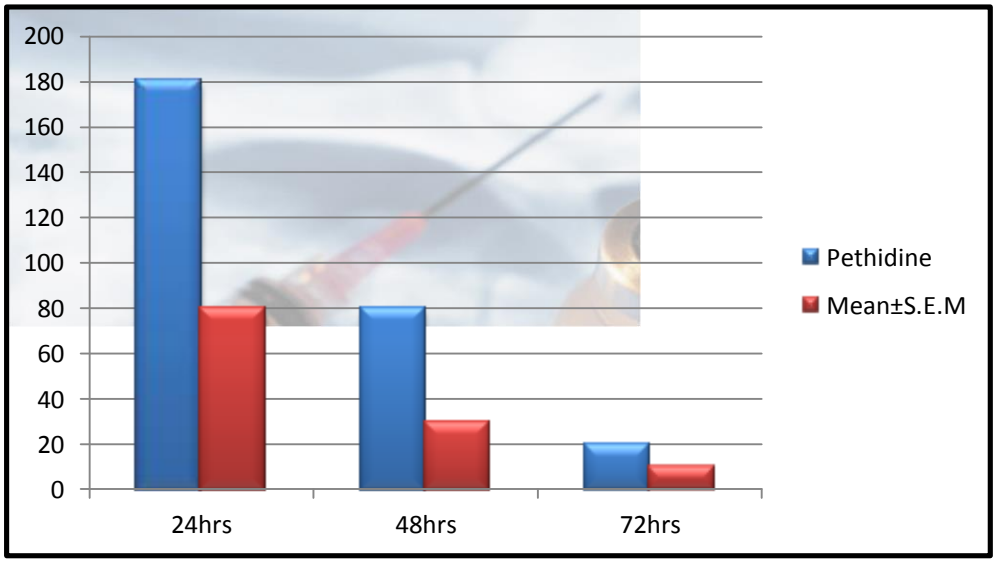

Fig 1: Pethidine requirements during the first, second and third postoperative days

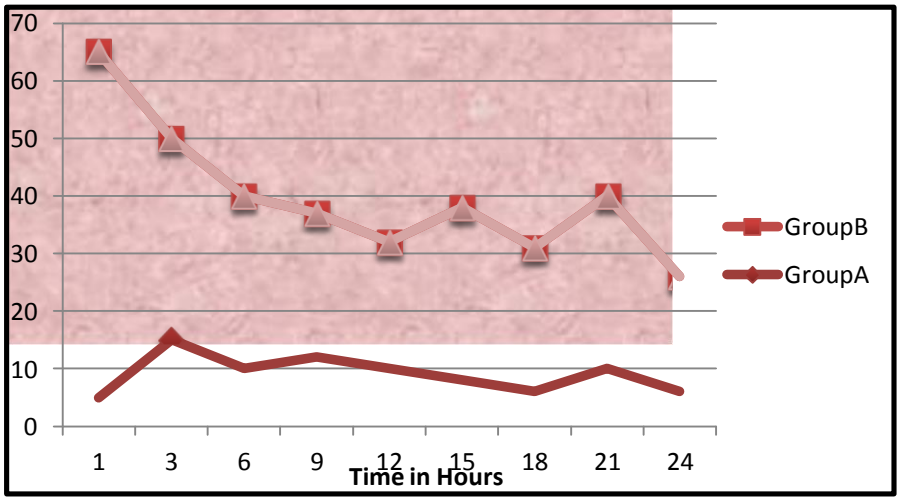

Fig 2: Pain Scores during initial 24 hours after Surgery

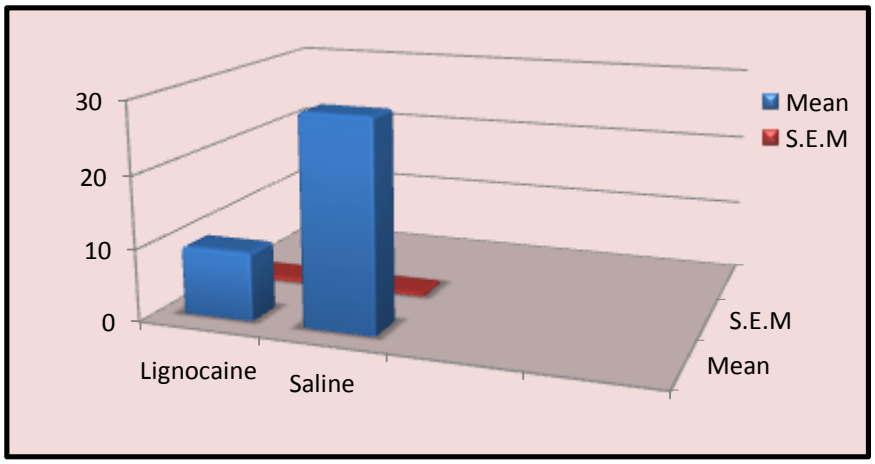

Fig 3:Comparison of Systolic B.P s between Groups A and B during initial 24 hrs after Surgery P value was<0.001

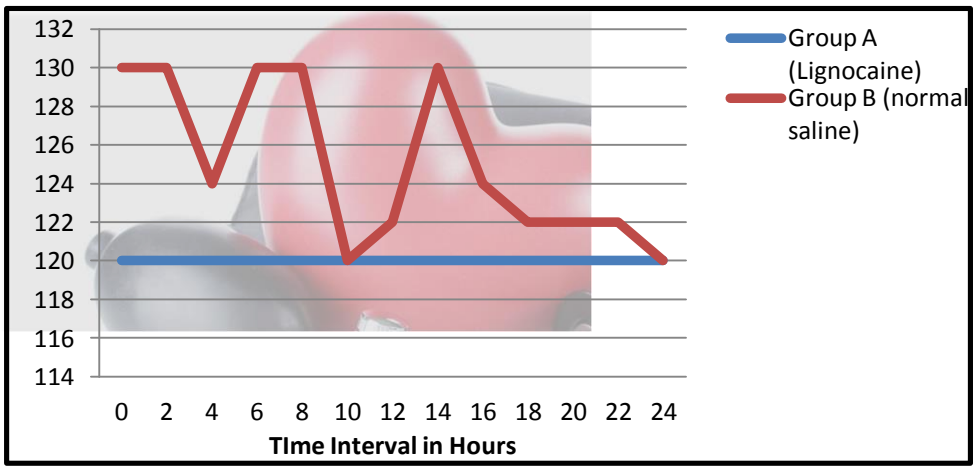

Fig 4: Systolic B.P s between Groups A and B during initial 24 hrs after Surgery P value was<0.001

CONCLUSION:

The efficacy of continuous low dose (2mg/min) intravenous infusion of Lignocaine on post operative pain in a controlled, randomized trial in one hundred patients after elective abdominal and thoracic surgeries was studied. Lignocaine infusion was started 30 minutes before operation after giving a bolus dose of 100mg Lignocaine and continued for 24 hours after surgery in 50 patients. Saline was infused in other group of 50 patients and if pain reported Pethidine injections were given to this group. Lignocaine treated patients had lower pain scores [11] ($P<0.001$) as compared to the control group. Lignocaine treated group required less pethidine [12] during first ($P<0.001$), second ($P<0.001$) and third ($P<0.02$) post operative days. Control group had higher pain scores (29.05 ± 0.4) and required more pethidine injections. Lignocaine treated patients did not show any significant side effects. Lignocaine maintained heart rate and blood pressure in a steady state, provided good sleep, free from respiratory depression. Finally this new technique though needs continuous monitoring of the heart rate and blood pressure, has a good margin of safety with the doses used. It also reduced the usage of narcotic analgesics which produce considerable side effects like respiratory depression. With its proven antiarrhythmic effect this new technique can be used to the anesthesiologists in all surgical cases postoperatively particularly associated with cardiac rhythm irregularities.

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