
Original Article
Experience with Lignocaine 0.1% With Adrenaline 1:1,000,000 In 328 General Surgery Patients.
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Background: There is little published in the English literature on the use of very dilute solutions of lignocaine and adrenaline in general surgery.

Methods: The author used 0.1 per cent lignocaine with 1:1,000,000 adrenaline in 328 patients following premedication with pethidine, chlorpromazine and diazepam. The response to surgery was evaluated using six categories.

Results: Ninety three per cent of patients were categorized in the top three categories of perfect, excellent and very good. Good and fair categories were seen in seven patients. The “poor” category which meant conversion to endotracheal general anaesthesia was not recorded. The discussion section deals with the method of preparing the solution, technical considerations, relative contraindications, complications in 2 common operations, drawbacks of the technique and its advantages.

Conclusion: Lignocaine 0.1% With Adrenaline 1:1,000,000 solution is effective, inexpensive and safe.

Introduction

The use of very dilute solutions of local anaesthetic drugs has been described in the literature^{1,2,3,4}. In Dermatological Surgery lignocaine 0.1 per cent and 0.05 per cent concentrations have been used to perform liposuction⁴. There is however, little published in the English language surgical literature on the use of dilute preparations in general surgery^{1,2,3}.

This is a report of 328 general surgical operations, all of which were performed by one operator with the use of 0.1 per cent lignocaine, 1:1,000,000 adrenaline and premedication consisting of pethidine, chlorpromazine and diazepam⁵. The author’s earlier experience in which 0.1 per cent lignocaine with 1:1,000,000 adrenaline was used for various operations was published in 1991 and 1993. These studies had limitations in terms of numbers, the quality of the adrenaline and lignocaine used and standardization of medication, materials and technique^{1,2}. These confounding factors were addressed in the present study. The effectiveness of this dilute solution was confirmed in this larger updated report and is presented herewith.

Patients and Methods

The author had by 2001 inclusive operated upon over 2100 patients using local analgesia.

Different techniques were employed including local or regional, infiltration, and less frequently various other blocks^{6,7,8}. Prior to 1991, infiltration analgesia was performed using 0.2, 0.4, or 0.5 per cent lignocaine with or without adrenaline^{1,6,9}. To limit confounding variables these operations were not included in this study. Similarly patients who had incomplete data in their records, those who had other techniques employed such as nerve blocks, patients who received on table preoperative medication and those who received no medication were excluded. For comparison however, this last group were included in the form of a table in the results section. Inclusion criteria for the study included patients who underwent surgery with the use of 0.1 per cent lignocaine with 1:1,000,000 Adrenaline and had received standardized premedication. These criteria were fulfilled by 328 patients who formed the basis of this study.

Premedication in the otherwise healthy adult consisted of intramuscular pethidine 50 to 100 mg, chlorpromazine 50 mg and diazepam 10 mg both orally one hour preoperatively. Lower dosages were used in the elderly and the 3.6% of patients who were children between the ages of 11 – 14 years. The reasons for choosing a combination of these three drugs, their indications, and potential side effects are detailed elsewhere⁵.

The following categories were used to evaluate patient response to the technique used: Perfect, Excellent, Very Good, Good, Fair and Poor (Table 1). The optimum categories were considered to be the top three. "Poor" was meant to indicate failure of the local technique requiring conversion to general anaesthesia. General Anaesthesia was defined as the administration of thiopentone, muscle relaxant, intubation and administration of oxygen/halothane. Such a conversion was not recorded in this series; therefore a "Poor" category is not shown in the results.

All patients had venous access established. Restraints were used routinely. Careful observation of the patient by a non-operating member of the team, a clinical officer or an anaesthetist was established practice.

PREPARATION OF THE SOLUTION

A commercially manufactured one litre bag of Ringer's lactate or 0.9 percent saline was the carrier fluids used. A size 18 FG intravenous

cannula was introduced into the rubber portal; the needle was removed and retained for use on the first patient. The outer plastic sheath was left in situ at the portal in order to add the adrenaline/lignocaine and to withdraw the prepared solution later for injections.

From the one litre bag 51 mls of carrier fluid was removed and an equivalent volume of 50 mls of 2% lignocaine and 1 ml of 1:1000 (1 milligram) adrenaline replaced. If necessary, fractions of these amounts of lignocaine and adrenaline were used to prepare the same dilution in smaller bags. A 200 or 250 mls bag was more appropriate if the operating list for the morning had one local analgesia case. Table 1 shows the categories of patients' response to surgery ranging from poor to perfect.

Results

Table 2 shows the results obtained in this study with regard to patient response during surgery. The outcome was perfect in 36% and excellent or very good in 35.1% and 22.5% respectively.

Table 1. Categories of Patients' Response to Surgery

Response	Features
Perfect	Patient drowsy or sleep but rousable
Excellent	Awake. No sign of pain
Very Good	Grunts or moves at some stage during surgery in response to painful stimulus
Good	As above, but requires further Intraoperative infiltration
Fair	As above, but requires intravenous medication such as pethidine, diazepam or ketamine (analgesic dose)
Poor	Conversion To Endotracheal General Anaesthesia.

Table 2. Evaluation of Patient Response during Surgery.

Results	No of Patients	Percentage
Perfect	118	36.0
Excellent	115	35.1
Very Good	74	22.5
Good	18	5.5
Fair	3	0.9
Total	328	100

Table 3. Evaluation of Patient Response during Surgery. No Medication Used.

Results	No. Of Patients
Perfect	5
Excellent	23
Very Good	9
Good	4
Total	41

Table 4. Some Selected Operations

Operation	Number
Herniorrhaphy	100
Other Breast Operations	57
Mastectomy	42
Tracheostomy	18
Thyroidectomy	15

Discussion

In the author's previous publications commercially prepared adrenaline/ lignocaine mixtures were also used. Some of these preparations were imported into the country. A long storage life¹⁰, high temperatures¹¹ and sunlight¹² are said to alter the stability of the adrenaline, there is consequently loss of effectiveness of these mixtures¹⁰. Furthermore such mixtures are more acidic⁴, and therefore more painful when injected⁴. For the aforementioned reasons commercially produced mixtures were not used in the study.

A certain proportion of patients has a low pain threshold, or can be unduly anxious or uncooperative. These patients do not tolerate local analgesia well⁷. The "Good" and the "Fair" categories in this report perhaps are a reflection of such patients. For this reason the anaesthetic trolley must have drugs such as diazepam, pethidine and ketamine available for use intraoperatively. Small intravenous doses of pethidine and intravenous analgesic doses of ketamine were found to be effective for these patients. The author has no experience in the use of the short acting midazolam, which was not available during the study period.

For conventional nerve blocks the author has used this solution in combination with more concentrated lignocaine or bupivacaine. This group has not been included in this study. Lengthy intrathoracic or intra-abdominal

operations which are expected to last more than 1½ hours are best managed under general anaesthesia. An alternative would be to use the intraoperative (inject and cut) technique described in greater detail elsewhere³. Chronically indurated, thickened tissues and malignant fixation to tissues are a relative contraindication to infiltration or compartment block. Instead, regional blocks may have to be used or a combination of both with neuroleptanalgesia.

Technique

The local injections were given before the patient was placed on the operating table. The actual injection technique was somewhat different from the usual description for infiltrating tissues. Instead, a compartment block was the main objective with subsequent intraoperative infiltration when necessary⁷. The key to a successful outcome of the technique was to inject large volumes into various fascial compartments adjacent to the site of operation.

The average volume of local solution injected per patient was 195 mls with a range of 20 – 650 mls. The amount given depended on the type of operation; for example 20 mls was sufficient for a small ranula, whereas up to 650 mls was used in one patient who underwent mastectomy and axillary dissection. Six hundred and fifty mls is just above the theoretical maximum for this dilute solution. In practice however, amounts well above this figure have been used by other workers with no untoward effects^{3,9}.

In order not to obscure superficial landmarks the author's approach was to start an injection in the deepest compartment deep to deep fascia. Superficial injection then followed and was manifested by tissue tumescence⁴ with formation of peau d'orange and skin blanching. The skin incision was placed in these areas.

A large variety of operations were performed with this solution. A selection of these operations can be seen in Table 4. Herniorrhaphy and unreconstructed breast surgery formed 60 per cent of the total number of operations performed with this solution. Surgical morbidity in these two operations was 10 per cent for herniorrhaphy and 16 per cent for breast surgery which included infected ulcerated breast malignancies. These figures are comparable to the results of a recent study in the

U.K. which had indicated that complications for clean common operations on hernias, varicose veins and breasts were under-reported¹³. The authors stated that clean breast surgery had the highest complication rate at over 15 per cent. A

Herniorrhaphy study from Spain gave figures of seroma 7%, haematoma 5.6% and infection in 7%¹⁴, which when added meant less than 20% complication rate; local infiltration was not used in this study. In another recent study from Germany the complication rate for herniorrhaphy done under local analgesia was 13.2%¹⁵.

The disadvantages of the technique

Injections can be painful. For this reason it is recommended to routinely give premedication^{4,5}. Such medication also offers optimum operating conditions during surgery. If possible the solution should be warm¹⁶ and the injections should not be given too rapidly⁴. A finer caliber needle is said to be less painful for injections⁴. However, such fine needles prolong injection time; for this reason the author prefers to use a size FG 18, 60 millimeter needle. These needles seem to be tolerated well in the premedicated patient. The addition of sodium bicarbonate to the solution is said to attenuate pain associated with injections¹⁷. Such a combination was not used in this study.

The preoperative injections can be a lengthy process. This time factor can be overcome by ensuring the solution is prepared early in the morning before the list starts and by giving injections to patients between cases while the operating room is being vacated and prepared for the next case.

Advantages of the technique

A wide variety of common operations were performed with the use of this solution. The administration of the solution was achieved with ease and no toxic reactions were observed. Most common operations were accomplished with 200 or 300 mls of the solution which is well within the theoretical therapeutic limit for both lignocaine⁹ and adrenaline⁴. The extent of surgery performed was therefore not restricted because of toxicity considerations. The premedication drugs and other consumables are easy to procure in most hospitals, even at the

district level and are affordable by the hospital or the patient. It is less costly than general anaesthesia and no special equipment is required. There was no morbidity related to the use of this solution.

Conclusion

Lignocaine 0.1 per cent with adrenaline 1:1000 000 is an effective solution for use in general surgery. It is simple to prepare, easy to administer, and is affordable in a cost-conscious world. The solution has a wide margin of safety.

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