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EFFECT OF ALKANISATION AND WARMING OF LIDOCAINE FOR PAIN REDUCTION IN PERIBULBAR ANAESTHESIA

Anaesthesiology

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ABSTRACT

Objective : To study the effect of alkanisation and warming of lidocaine for pain reduction in peribulbar anaesthesia. **Methods :** 100 patients were divided into 4 groups of 25 patients each to receive peribulbar injection. Group Co (Control) received 10 ml of plain 2% lidocaine solution at room temperature 18°C, Group W received 10 ml of 2% lidocaine solution at 37°C, Group BO received 10 ml of 2% lidocaine solution buffered to an estimated pH of 7.09 ± 0.10 and Group WBO received 10 ml of 2% lidocaine solution at 37°C buffered to an estimated pH of 6.92. Patients were explained about visual analogue scale to assess the pain received by them. **Results :** Mean pain score obtained was 2.72, 1.70, 1.15 and 1.12 in Group Co, Group W, Group BO and Group WBO respectively. **Conclusion :** Alkanized lidocaine with or without warming produces less pain than lidocaine injected at room temperature. Also, alkanization does not have a synergestic effect on warming for pain reduction in peribulbar anaesthesia. **Aims and Objectives:** To study the effect of alkanisation and warming of lidocaine for pain reduction in peribulbar anaesthesia

KEYWORDS

Alkanized lidocaine, Peribulbar Anaesthesia, Visual Analogue Scale

INTRODUCTION

Cataract surgery is almost exclusively performed in local anaesthesia. Regional anaesthesia for eye surgery has traditionally consisted of retro bulbar block, peribulbar block, a facial nerve block and intravenous sedation. Various local anesthetic techniques have evolved since then including both akinetic (needle-/cannula-based technique) and non-akinetic (topical anaesthesia) techniques. 1-3. Topical anaesthesia does have its own limitations. It needs patient co-operation in addition to the surgeon's skills on the table. 4 General anaesthesia with endotracheal intubation is likely to be associated with postoperative nausea.. The effectiveness of regional block for cataract surgery has traditionally been assessed by describing the completeness and adequacy of globe akinesia (prevention of eye movement) and pain control. Advantages of the peribulbar technique include minimum risk of globe, optic nerve and artery penetration, and less pain on injection. The pain often experienced during peribulbar injection for local anaesthesia is partly related to the needle prick and partly to the solution injected and it's PH (true for solutions with adrenaline). The Visual Analogue Scale (VAS) was used to grade the intensity of pain or how much pain the patient was feeling. VAS is a straight line marked from 0 to 10, with the left end of the line '0' representing no pain and the right end of the line '10' representing the worst pain. Patients are asked to mark on the line where they think their pain is. 5 The globe is situated in the anterior part of the orbital cavity closer to the roof than the floor and nearer the lateral wall than the medial wall. Axial length of 26 mm or more denotes a myopic eye and they carry risk of one perforation for every 140 needle blocks performed. 6 Extraocular muscles Globe movements are controlled by the rectus muscles (inferior, lateral, medial and superior) and the oblique muscles (superior and inferior).pain during injection of local anesthetic solution is very common and is explained by tissue irritation due to acidic solution of lidocaine(7).the nociceptive receptors are also less sensitive to non ionized form of drug.(8)therefore pain perceived is also less with warmed or alkanized solution.(9,10,11,12,13,14)

MATERIALAND METHOD

This is a prospective single blinded control study.100 patients were taken divided into 4 grpups of 25 patients each to receive a peribulbar injection from any one of the following solutions:

Group (Gr) Co: 10 ml of plain 2% lidocaine solution at room temperature, 18°C (Control group)
Gr Wo: 10 ml of 2% lidocaine solution at 37°C
Gr Bo: 10 ml of 2% lidocaine solution buffered to an estimated pH of 7.09 ± 0.10
Gr WBo: 10 ml of 2% lidocaine solution at 37°C buffered to an estimated pH of 6.92

The mean pH of 2% lidocaine solution with Hyaluronidase 50 IU/ml was found to be 6.52 . pH was measured using a digital pH meter. For alkalizing the above solution, 0.5 ml of preservative-free 7.5% sodium bicarbonate was required. The mean pH ± of the alkalinized lidocaine solution , was 7.09 ± 0.10 . The mean time interval needed for warming 2% lidocaine solution to a temperature of 40°C was 6 min 50 sec . For standardization, lidocaine vials were kept in a water bath set at 40°C for 10 min. The mean time interval recorded for lidocaine solution to attain a temperature of 37°C from 40° was 110sec. Hence to ensure that the temperature of the solution is around 37°C during injection into the peribulbar space, the warmed solution had to be injected within 2 min from the removal of the solution from the water bath. For alkalizing warmed lidocaine solution, 0.25 ml of 7.5% sodium bicarbonate was needed and used. The mean pH ± SD of warmed and alkalinized lidocaine solution was 6.92.

Patients were explained about the visual analogue scale to evaluate the pain perceived by them.
Techniques of peribulbar block

- The peribulbar block is performed with the patient supine and looking directly ahead. After topical anaesthesia of conjunctiva an inferotemporal injection is given half way between the lateral canthus and the lateral limbus.
- The needle is advanced under the globe parallel to the orbital floor and when it passes the equator of the eye it is directed slightly medial (20 degree) and cephalad (10 degree), injecting 5ml local anaesthetic
- In peribulbar block the needle does not penetrate the cone formed by extra-ocular muscles, as in retro bulbar block.

Immediately after the injection the VAS was shown to the subject so that they mark the pain perceived by them,zero representing no pain and 10 cm representing the most severe pain.

RESULTS

Mean pain score obtained:-
Group Co--2.72
Group W---1.70
Group BO---1.15
Group-group WBO—1.12

DISCUSSION

Cataract surgery is almost exclusively performed as an out-patient in local anaesthesia. The use of local anaesthesia has risen from around 20% in 1991 to over 75% in 1996 and 86% in 1997 and the use of sedation with local anaesthesia has fallen from 45% in 1991 to 6% in 1996.(15) The peribulbar block is performed with the patient supine and looking directly ahead. In peribulbar block the needle does not penetrate the cone formed by extra-ocular muscles, as in retro bulbar block. Both the techniques achieve akinesia of the eye quite well. Advantages of the peribulbar technique include minimum risk of globe, optic nerve and artery penetration, and less pain on injection. Disadvantages include a slower onset and an increased likelihood of

ecchymosis. (16). Local anaesthetic used for nerve block must cross perineural sheath and nerve membrane. These structures are permeable to these agents only in non ionized form.Alkalinisation of anaesthetic agent also contributes to the reduction of pain in peribulbar injection due to many reasons. Firstly adjustment of pH towards 7.0 7.4 reduces direct tissue irritation caused by injection of acidic solution. Secondly, the increased relative concentration of non ionised form allows for a more rapid diffusion

Local anesthetics are weak bases. To improve their stability they are supplied in acidic solution Lidocaine hydrochloride (L-HCL).[17]

The pKa value is also temperature dependent. Hence as local anesthetic is warmed, the pKa value decreases (pKa for lidocaine is 7.57 at 40°C)[18] and the proportion of uncharged drug available for action increases.[19-21] This non-ionized lipophilic form of the drug helps in reducing the amount of pain perceived by patients during injection.[8]

CONCLUSION

Alkanized lidocaine with or without warming warming produces less pain than lidocaine injected at room temperature. It was also found out that alkanization does not have a synergestic effect on warming for pain reduction in peribulbar anaesthesia, so alkanization of lidocaine in peribulbar anesthesia for cataract surgery should be promoted.

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