



A Study on Preoperative Xylocaine Sensitivity Test in Patients Undergoing Ocular Surgeries

Faraaz Hussain^{a++}, Yogya Reddy^{a#} and Aesha Hastak^{a#*}

^a Department of Ophthalmology, MGM Institute of Health Sciences, Navi Mumbai, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/95768>

Original Research Article

Received: 25/10/2022

Accepted: 29/12/2022

Published: 09/01/2023

ABSTRACT

Purpose: Xylocaine sensitivity testing is being practiced preoperatively in all patients undergoing ocular surgery under LA to prevent hypersensitivity reactions. With the current volume of ocular surgeries and the expected increase in the future, it becomes critical to optimize the safety of Preoperative xylocaine sensitivity testing.

Methods: The study comprised 400 patients (204 females & 196 males) aged 18 and above. The injection site was examined for all patients for wheal/erythema and itching, no reaction was seen after 10 min, 30 min, and 24 hours.

Results: After pre-operative xylocaine sensitivity test the patients are examined for wheal, flare, itching or any other reaction locally. Intraoperatively, Patients are assessed for systemic and local reactions to Peribulbar and retrobulbar block. XST was performed for all 400 patients included in the group and the reaction was recorded based on local reaction at the injection site. However, none of the patients showed any reaction to XST.

Conclusions: It has been recommended for decades that sensitivity testing before cataract surgery under LA should be undertaken as a routine precautionary measure. With changing paradigms in

⁺⁺ Assistant Professor;

[#] Junior Resident;

*Corresponding author: E-mail: hastakaesha@gmail.com;

the type of anesthesia (topical becoming prevalent in advanced nations as well as urban centers in the developing world), there is a need to review the established protocols. Hence this study highlights the possibility of avoiding such tests in all patients before routine cataract surgery under LA.

With due precautions and resuscitation measures available on standby, it is theorized that routine testing for LA sensitivity may be skipped.

Keywords: Cataract surgeries; anaesthesia; ocular surgeries; retrobulbar.

1. INTRODUCTION

The usage of local anesthesia in modern ophthalmology dates back to the 18th century, when Cocaine was introduced by Koller in 1884. Various techniques like the usage of sleep sponges, cold and pressure and even hypnosis were in practice until the usage of cocaine as a local anesthetic started. The evolution of local or instillation anesthesia progressed with the later discovery of phenocaine, butacaine, tetracaine and procaine. Lidocaine is a synthetic amide-type local anaesthetic that was synthesized in 1943 that has been one of most commonly used ever since [1].

Cataract surgeries and other ocular surgeries are practiced widely and substantial resources are committed to an increasing ocular surgery rate in developing countries. Even though cataract surgery can be performed under topical anaesthesia, most surgeons prefer regional blocks with either peribulbar or retrobulbar anesthesia [2]. Peribulbar anesthesia is comparatively safer than retrobulbar block as there is a lesser chance of globe perforation and diffusion of anesthetic agents into the central nervous system [3].

With the current volume of ocular surgeries and the expected increase in the future, it becomes critical to optimize the safety of the procedure.

Likely, routine preoperative medical testing, physical examination and routine testing will detect medical conditions, but it is questionable whether these conditions should preclude individuals from ocular surgery or change their perioperative management [4].

Xylocaine (lidocaine HCl) Injection is an anesthetic agent of amino amide-type used for ocular and local or regional anesthesia. Allergic reactions to lignocaine are very rare, it has been estimated that true allergic reactions to local anaesthetics account for less than 1% of all adverse reactions to local anesthetics [4,5].

Only a few cases of type I immediate hypersensitivity reaction [6] and type IV delayed hypersensitivity [7,8] to lignocaine have been reported to date. Hyaluronidase is an enzyme used in the peribulbar block as an adjuvant to 2% Lidocaine to increase the spread of anesthetic agents [9]. Hyaluronidase as well is reported to cause allergic reactions rarely. Xylocaine sensitivity testing is being practiced preoperatively in all patients undergoing ocular surgery under local anesthesia in order to prevent hypersensitivity reactions. All the patients included in the study were given an intradermal injection of 0.5 ml of 2% xylocaine preoperatively, and are monitored for local skin reaction after 5 mins according to the hospital protocol of XST. The intraoperative and post-operative reactions are correlated with the XST reaction to understand its effects on the procedure.

On a thorough review of the literature, no clear evidence was available showing that XST is mandatory preoperatively. Hence the current study is taken up to understand the significance of doing XST routinely in all preoperative patients.

2. MATERIALS AND METHODS

400 patients who underwent ocular surgeries under local anesthesia were included in this retrospective study over 2 years from May 2019 to May 2021. Funding was not required for this study. All patients were aged 18. Patients who previously documented allergic reactions to Xylocaine and Patients whose data was lacking in the MRD were excluded from the study. Reaction to lignocaine preoperative and intraoperative was studied in all the patients. Preoperatively Inj. XST 0.5 ml intradermal injection was given to all patients according to the hospital protocol and the site of injection was marked with a 1 cm circle. The injection site was examined for erythema/wheal and itching after 10 min, 30 min and 24 hours which were graded (Table 1).

Table 1. Reaction to preoperative XST

Patient no.	Previous history of allergic reaction to local anesthetic	Reaction at 10 min	Reaction at 30 min	Reaction after 24 hrs	Other findings:

Table 2. Immediate reaction after peribulbar block

Patient no.	Breathlessness	Itching	Wheeze	BP	Oxygen saturation	Type of allergic reaction
Patient no.	Oedema of eyelids	Pain in ocular movements	Diplopia	Prop tosis	Restriction of ocular movements	Type of reaction

Intraoperatively reaction to local anesthesia was observed and graded as follows following peribulbar/retrobulbar block given with 8-10 ml injection of 6:4 combinations of lignocaine and bupivacaine with hyaluronidase (Table 2).

The pre-operative and intraoperative reactions were compared in all the patients included in the study.

3. RESULTS

In this study, 400 patients who were about to undergo ocular surgery were studied retrospectively for any specific adverse reaction

to preoperative xylocaine sensitivity testing. The mean age of the study group was 61.5 years. The total percentage of female patients was 204. The total percentage of male patients was 196. The total number of patients with a history of bronchial asthma was-24. The total number of patients with a history of delayed hypersensitivity reactions to drugs other than LAs was 36. This is significant to rule out any correlation between asthma, hypersensitivity reaction to other drugs, and XST reaction.

The injection site was examined for all patients for wheal/erythema and itching, no reaction was seen after 10 min, 30 min, and 24 hours.

Table 3. Showing the local reaction at the end of 10, 20, and 30 minutes

A total number of patients.	Previous history of allergic reaction to local anesthetic	Reaction at 10 min	Reaction at 30 min	Reaction after 24 hrs	Other findings:
400	0	0	0	0	0

Table 4. Showing Immediate systemic reaction after peribulbar or retrobulbar block

Total number of Patient	Patients who showed immediate Breathlessness	Patients who showed generalized Itching	Patients who had Wheeze	Patients with immediate BP fluctuations	Oxygen saturation drop	Type of allergic reaction
400	0	0	0	0	0	0
Total number of Patients	Oedema of eyelids	Pain in ocular movements	Diplopia	Proptosis	Restriction of ocular movement	Type of reaction
400	0	0	0	0	0	0

Table 5. Showing reaction in patients with bronchial asthma

Total number of patients with history of bronchial asthma	Number of bronchial asthma patients with reaction to XST	Number of bronchial asthma patients with intraoperative reaction to peribulbar block
24	0	0

Table 6. Showing reaction in patients with known reactions to other drugs

Total number of patients with a history of DHR to other drugs	Number of patients showing XST reaction	Number of patients showing intraoperative reaction to peribulbar block
36	0	0

Out of the 400 patients, none had any intraoperative reaction to local anesthesia.

After pre-operative XST the patients are examined for wheal, flare, itching, or any other reaction locally and the results are recorded as shown in the following table.

Intraoperatively, Patients are assessed for systemic and local reactions to Peribulbar and retrobulbar block and results are observed to be as follows (Table 4).

We initiated the study to monitor the reaction to pre-operative XST, to monitor intra-operative reactions to local anesthesia and to assess any possible correlation between the two.

However, we found no such reactions or correlation after monitoring 400 patients over 2 years.

4. DISCUSSION

Eliciting LA allergy has become a routine practice before almost all surgeries, even though local anesthetic allergy is rarely observed. However, few reported cases in literature had an extreme anaphylactic reaction after LA.

David W. Canfield et al proposed guidelines for local anesthetic allergy testing in their paper. They included patient evaluation, patient preparation and management, preparation of test solutions, injection procedure, and evaluation of results including post-procedure monitoring [10]. They recommended testing with appropriate specialists and with standby practitioners available for resuscitation if needed.

In our study XST was performed for all 400 patients included in the group and the reaction was recorded based on local reaction at the injection site, with similar protocols in place.

It has been stated that the amide group of local anesthetics including lignocaine, bupivacaine and mepivacaine are less allergic than the ester group drugs [11].

Andreas et al reported a case of lidocaine sensitivity with cross-reactivity of the other amide

group local anesthetics where the patient had recurrent contact dermatitis episodes immediately following local anaesthetic instillation [12].

A similar case reported by Takahama et al also had fixed drug eruption with cross reactivity among the amide group of local anesthetics [13].

Similar drug eruptions are reported by other authors also in individual case reports [14-16]. But inconsistent results with skin testing were also reported [17].

In a study conducted by DorotaJenerowicz et al on a comparison of skin testing with a positive history of drug allergy, only 1 of the 5 patients had a positive intradermal test [18].

An association has been noticed between delayed hypersensitivity and topical application of the drug usually presenting as contact dermatitis.

Even though IgE-mediated hypersensitivity reaction to the amide group is believed to be very uncommon, cases are reported where patients had adverse reactions to LA, suggesting type I hypersensitivity, where signs and symptoms tend to occur within minutes of drug injection and include urticaria, episodes of angioneurotic edema, wheezing, sneezing, pruritus or even anaphylactic shock [19,20].

In a large group study done by Mackley CL et al on 183 patients, with contact dermatitis, only 4 patients had a positive reaction to lignocaine [21].

Less than 1% of reported allergic reactions to local anesthetic drugs are said to be immune system mediated [22]. It has been theorized, many times the reactions are assumed to be allergic when they might truly be a pharmacological toxic or pseudoallergic. In a recent study by Yilmaz et al, 228 patients were referred for allergy testing with the most common reason being, hypersensitivity to drugs other than LAs, the second most common reason was hypersensitivity to unknown LA and the third reason for referral was asthma. They observed

that out of 10 positive patients, 9 had a history of DHR to drugs other than LAs, 6 had multiple DHRs, 5 had history of hypersensitivity to unknown LAs, and none had a history of asthma [23].

They stated that it is important to test for hypersensitivity in patients with previous allergy to LAs and other drugs and testing for allergy to LAs in asthma patients is unnecessary.

Sudhakar et al. reported 2 patients to have developed type I hypersensitivity reaction and 1 patient with type IV hypersensitivity to hyaluronidase in a study conducted on 2904 patients who underwent cataract surgery under the peribulbar block [24].

They proposed a sensitivity test with hyaluronidase and lignocaine to prevent such adverse effects.

Supporting this case of the severe inflammatory orbital syndrome was also reported secondary to hyaluronidase [25].

In our study in a group of 400 patients, 24 were asthmatic, none of them showing a reaction to XST or LA. Neither did patients with DHR to other drugs showed any reaction.

However, no clear literature could be found in English correlating the XST and intraoperative reaction to peribulbar or retrobulbar block.

5. CONCLUSIONS

It has been recommended for decades that sensitivity testing before cataract surgery under LA should be undertaken as a routine precautionary measure. With changing paradigms in the type of anesthesia (topical becoming prevalent in advanced nations as well as urban centers in the developing world) there is a need to review the established protocols.

This is even more relevant in resource-limited setting of developing nations where the bulk of preventable blindness continues to be neglected cataracts in old age.

Our study highlights the possibility of avoiding such tests in all patients before routine cataract surgery under LA.

With due precautions and resuscitation measures available on standby, it is theorized

that routine testing for LA sensitivity may be skipped.

However, a larger number of studies looking at higher-risk patients would be needed to confirm the same.

CONSENT

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

MGM Medical College, Institutional ethics committee(IEC), Navi Mumbai approval was obtained and permission from the medical records department was obtained before collecting the sample.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Atkinson WS. Local anesthesia in ophthalmology. *Am J Ophthalmol.* 1948;31(12):1607-18. PMID: 16692936
2. Larsen WG, Maibach HI. Allergic contact dermatitis. In: Moschella SL, Hurley HJ, eds. *Dermatology.* Philadelphia, Pa: W.B. Saunders. 1992;391-417.
3. Cuesta-Herranz J, De las Herranz M, Fernandez M, et al. Allergic reaction caused by local anaesthetic agents belonging to the amide group. *J Allergy Clin Immunol* 1997;99:427-8.
4. Bhole MV, Manson AL, Seneviratne SL, et al, IgE-mediated allergy to local anaesthetics: separating fact from perception: a UK perspective *Br J Anaesth*; 2012. DOI: 10.1093/bja/aes162
5. Ball IA, Allergic reactions to lignocaine *Br Dent J.* 1999;186:224-26.
6. Noormalin A, Shahnaz M, Rosmilah M, et al, IgE-mediated hypersensitivity reaction to lignocaine – a case report *Trop Biomed.* 2005;22:179-83.
7. Evans LA, Pointing J, Wills EJ, et al, Recurrent facial swelling following dental procedures *Med J Aust.* 2002;177:522
8. Mackley CL, Marks JG Jr, Anderson BE, Delayed-type Hypersensitivity to lidocaine

- Archives of Dermatology. 2003;139:343-46.
9. Delaere L, Zeyen T, Foets B. Allergic reaction to Hyaluronidase after retrobulbar anaesthesia : a case series and review. *Int. Ophthalmol.* 2009;29:521 – 528.
 10. Canfield DW, Gage TW. A guideline to local anesthetic allergy testing. *AnesthProg.* 1987;34(5):157-163.
 11. Klein CE, Gall H. Type IV allergy to amide-type local anesthetics. *Contact Dermatitis.* 1991;25:45–8.
 12. Jacobsen RB, Borch JE, Bindslev-Jensen C. Hypersensitivity to local anaesthetics. *Allergy.* 2005;60:262-4.
 13. Bircher AJ, Messmer SL. et al. Delayed-type hypersensitivity to subcutaneous lidocaine with tolerance to articaine: confirmation by in vivo and in vitro tests. *Contact Dermatitis.* 1996;34: 387-
 14. Takahama H. A fixed drug eruption that developed cross-sensitivity among amide local anaesthetics, including mepivacaine hydrochloride, lidocaine hydrochloride and propitocaine hydrochloride, *J Eur Acad Dermatol Venereol.* 2008;22(11):1400-1 Epub 2008 Mar 7. PMID: 18331309.
 15. Kawada A, Noguchi H, Hiruma M, et al. Fixed drug eruption induced by lidocaine. *Contact Dermatitis.* 1996;35:375.
 16. Klein CE, Gall H. Type IV allergy to amide-type local anesthetics. *Contact Dermatitis.* 1991;25:45–8.
 17. Sanchez-Morillas L, Martinez JJL, Martos MR, et al. Delayed-type hypersensitivity to mepivacaine with cross-reaction to lidocaine. *Contact Dermatitis.* 2005; 53:352–3.
 18. Kanerva L, Alanko K, Estlander T, et al. Inconsistent intracutaneous and patch test results in a patient allergic to mepivacaine and prilocaine. *Contact Dermatitis.* 1997;39:197–9.
 19. Jenerowicz D, Polańska A, Glińska O et al. Allergy to lidocaine injections: comparison of patient history with skin testing in five patients. *Postepy Dermatologii i Alergologii.* 2014;31(3).
 20. Wildsmith JA. Hypersensitivity to local anaesthetics: a direct challenge test with lignocaine for definitive diagnosis. *Br Med J (Clin Res Ed).* 1982;284(6330):1708.
 21. Mackley CL, Marks JG, Anderson BE. Delayed-Type Hypersensitivity to Lidocaine. *Arch Dermatol.* 2003;139(3):343–346.
 22. Wilson AW, Deacock S, Downie IP, et al. Allergy to local anaesthetic: the importance of thorough investigation. *Br Dental J.* 2000;188:120–2.
 23. Yilmaz I, Özdemir SK, Aydın Ö, et al. Local anesthetics allergy: who should be tested? *Eur Ann Allergy Clin Immunol.* 2018;50(2):66-71. Epub 2017 Nov 22. PMID: 29384109.
 24. Sudhakar SK, Kulasekar A, Shankar C et al. Hypersensitivity to injection Drugs in peribulbar block - a clinical study. *Int J Health Sci Res.* 2014;4(11):40-44.
 25. Leibovitch I, Tamblyn D, Casson R, et al. Allergic reaction to hyaluronidase: a rare cause of orbital inflammation after cataract surgery. *Graefes Arch Clin Exp Ophthalmol.* 2006;244(8):944-9. Epub 2005 Dec 17. PMID: 16362314.

© 2023 Hussain et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/95768>