ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

POST-PERIBULBAR BLOCK: UNDERSTANDING AKINESIA AND ANAESTHESIA IN INTRAOCULAR SURGERY

Prajwalli Reddy[1], Swathy S[2]

[1] Associate Professor, Department of Ophthalmology, M R Medical College,

Kalaburagi, Karnataka, India.

[2] Resident, Department of Ophthalmology, M R Medical College,

Kalaburagi, Karnataka, India.

Abstract

Intraocular procedures are performed under local anaesthesia with the use of topical anaesthetic eye drops or injections of local anaesthetic drugs into a subtenon, retrobulbar, or peribulbar blocks. A prospective analysis of peribulbar block anaesthesia using a 25 millimeter, 23 gauge needle for 150 patients undergoing intraocular surgery was taken into consideration because the goal of this study is to demonstrate the safety and effectiveness of this needle in peribulbar block anaesthesia for intraocular surgeries. The amount of anaesthetic agent required, the number of injections required to generate sufficient anaesthesia, the duration and beginning of the anaesthetic drug's effect, and the technique's problems were all examined. Intraocular surgeries included primary cataract extraction using phacoemulsification/manual small incision sutureless cataract extraction with placement of posterior chamber intraocular lens implantation, secondary intraocular lens implantation with scleral fixation intraocular lens/iris claw lens, evisceration of the eye with artificial prosthetic implants.

Keywords: Intraocular surgery, Peribulbar anaesthesia, 25 millimeter long, 23 gauge needle.

Introduction

The techniques of ocular local anaesthesia for performing various intraocular surgeries include retrobulbar block, peribulbar block, sub-tenon’s anaesthesia, sub-conjunctival injections and topical anaesthesia with or without additional sedation.[(1-4)]The first two techniques mentioned above are the most commonly used ones, giving good operative comfort for both the surgeon and patient. It is common to use a 24 or 25 millimeter (mm) long needle to administer the peribulbar block. This unintentional injection would risk the potentially serious side effects that those using the peribulbar technique seek to avoid. The safety and effective use of 16 mm, 25 or 27 gauges (G) needle has been previously described.[(5)] There are many studies on many sizes and gauge of needles which are tried to find out an ideal needle for the best results of peribulbar anaesthesia.[(5-7)] The aim and purpose of this study is to demonstrate the safety and the efficacy of a 25 mm, 23 G needles in performing peribulbar block anaesthesia for intraocular surgeries. So, in peribulbar block

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

anaesthesia, local anaesthetic agents are injected within the orbit but do not enter the muscle cone. The mechanism of the block was explained by Koornneef, who demonstrated that the inter muscular septum between the recti muscles were incomplete and hence permitted the local anaesthetic agents injected outside the muscle cone but within the orbit, to spread centrally.

Materials and Methods

There were 61 male and 89 female patients who underwent the intraocular surgery under peribulbar block anaesthesia during the study period of 3 months in the Department of Ophthalmology, Basaveshwara Teaching and General Hospital, Kalaburagi. Among this there were 78 right eyes and 72 left eyes which underwent the procedure. 129 eyes of 129 patients underwent primary cataract extraction with posterior chamber intraocular lens implantation, 13 eyes of 13 patients underwent secondary intraocular surgery for sclera fixation of posterior chamber intraocular lens or iris claw lens implantation, and 8 eyes of 8 patients underwent evisceration with orbital implants.

Injection Mixture: A mixture of 2% lignocaine hydrochloride with adrenaline bitartrate (0.005 mg/ml) along with 0.5% bupivacaine and 50 units of hyaluronidase per ml were used in all patients. A 25 mm long 23 G needle was attached to a 10 ml plastic syringe and 6 millilitre (ml) of the local anaesthetic mixture was used to administer the peribulbar block in all the patients in the study. The injection was given in the infero-temporal quadrant through the skin approach with the patient looking straight ahead. Informed consent was taken for the administration of the anaesthetic mixture and the intraocular surgery from all the patients in the study. The eyes of the patients undergoing cataract extraction with intraocular lens (IOL) implantation were dilated with eye drops containing tropicamide 0.8% and phenylephrine 5% one hour prior to surgery. The needle was inserted transcutaneously at the junction of medial 2/3rd and lateral 1/3rd of the infra orbital bony rim and the needle is advanced between the globe and the infra orbital bony rim.The same has been done through subconjunctival approach by few authors.[8] There are studies to support the site of these injections comparing inferomedial and inferotemporal.[9] The block is given with the patient lying on the operating table with the globe in primary position by asking the patient to look straight at the ceiling above. After negative aspiration, digital pressure is applied with thumb and index finger at the needle hub while injecting the mixture.

All patients were given 6 ml of the mixture at first slowly and the patient's eye was closed. The time taken to inject was roughly 1 minute. The time varied for each patient and was well within 30 seconds. An eye pad is placed and a firm intermittent ocular massage is started after the injection. After every 3 minutes the degree of ocular akinesia is assessed till the attainment of the required anaesthesia. A second injection of 2 ml of the drug mixture was repeated at the same site if the desired anaesthesia was not noticed at the end of 6 minutes. A third injection of 2 ml of the drug mixture was given at the end of 9 minutes if still the desired anaesthesia was not observed at the same site. There are various studies showing the effectiveness of a single peribulbar injection with low volume of the anaesthetic drug mixture required to attain the desired effect for a comfortable surgical procedure versus a routine double injection with a large volume of the drug.[10-12]

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

Results and Discussion

There are lots of literature to support that peribulbar anaesthesia is better and safer when compared to retrobulbar anaesthesia for intraocular surgeries like cataract surgery, trabeculectomy and other eye surgeries.[13-17] It has been found that peribulbar anaesthesia is as efficacious as retrobulbar anaesthesia without the associated complications. It also avoids the need for a facial block used to supplement a retrobulbar block, thus markedly reducing the post-operative patient discomfort as well as the total volume of anaesthetic used. It was observed that the eyes which were smaller achieved the required ocular akinesia within 6 minutes with a single injection of 6ml of the local anaesthetic. Local anaesthesia is commonly used for ophthalmic surgery but the techniques and choices vary. Akinetic ophthalmic regional blocks such as intraconal and extraconal blocks with needles are generally safe, but although rare, serious sight and life-threatening complications continue to occur. At present, there is no absolutely safe ophthalmic regional block. It is imperative therefore to have a basic knowledge of anatomy and technique which reduce complications.[18] There were 8 patients who weighed less than 50kgs, 90 patients weighing between 51-60 kgs, 37 patients weighing between 61-70 kgs, 12 patients weighing between 71-80 kgs and 3 patients weighing more than 80 kgs. It was observed that 100% of patients who weighed less than 60 Kgs and 32.43% of patients weighing between 61-70 Kgs needed only 6 ml of the mixture (1 injection) while 67.56% of patients weighing between 61-70 Kgs and 75% of them weighing between 71-80 Kgs needed 8 ml of the mixture (2 injections). 100% of patients who weighed more than 80 Kgs and 25% of them between 71-80 Kgs needed 10 ml of the mixture (3 injections). The no of eyes that required just 1 injection (6 ml) was 110 (73%) and that required 2 injections (8 ml) was 34 (22.66%) and the no of eyes that required 3 injections (10 ml) was 6 (4%). There were no instances where more than 3 injections were needed for the attainment of the desired anaesthesia. All the eyes recovered from the effect of the local anaesthesia by 60 minutes before which the planned surgery was completed. The end point of anaesthesia was the appearance of ocular and or eyelid movements.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

Conclusion

The study demonstrates that patients with smaller eyes and lower body weight required less time and medication (p value < 0.01) to achieve complete ocular akinesia. To produce complete ocular akinesia, 110 individuals (73%) required only 6 minutes and a single injection of 6 ml of the medication. Up to one hour after the block, 74% of patients still experienced the drug's effects. 13.3% of patients experienced self-limiting problems that were neither life-threatening nor vision-related. This method is proven to be particularly efficient at producing ocular akinesia for intraocular procedures while also being quick, safe, and successful. This study demonstrates the safety and efficacy of using a 23 G needle but it cannot definitively state that this needle is the best for peribulbar blocks because it hasn't been compared to other needles that are frequently used for the procedure.

For the grading of ocular akinesia the following 3 parameters were observed 1. Total restriction of abduction, adduction, elevation, depression. 2. Inability to close the eyelids against resistance. 3. Absence of spontaneous eye opening. Presence of all 3 of the above was graded as Complete/Grade 3 ocular akinesia. Presence of any 2 of the above was graded as Incomplete/Grade 2 ocular akinesia. Presence of only any one of the above was graded as Inadequate/Grade 1 ocular akinesia.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

Table 1: Grading of the ocular akinesia

Grade of ocular Akinesia	Observation
Grade 3	Complete
Grade 2	Incomplete
Grade 1	Inadequate

Table 2: Time to required akinesia after the block

S.No	Time to Akinesia in minutes	No. of eyes (%)
1	At the end of 3 minute	13 (8.66%)
2	Between 3 minutes & 6 minutes	97 (64.66%)
3	Between 6 minutes & 9 minutes	34 (22.66%)
4	Between 9 minutes & 12 minutes	6 (4%)

Table 3: Complications of the block

S.No	Complications following the peribulbar block	No. of eyes (%)
1	Conjunctival chemosis in the 1st post operative day	3 (2%)
2	Sub-conjunctival haemorrhage after the injection	14 (9.33%)
3	Retro bulbar haemorrhage after the injection	1 (0.66%)
4	Severe intra operative positive pressure	2 (1.33%)

Table 4: Volume of the drug mixture needed for akinesia

S.No	Volume of drug delivered in millilitres (ml)	No. of eyes (%)
1	6 ml	110 (73%)
2	8 ml	34 (23%)
3	10 ml	6 (4%)

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

Table 5: Duration of action of the drug effect

S.No	Duration of action of the drug in minutes	Duration of action of the drug in minutes
1	20 - 30 minutes	9 (6%)
2	30 - 40 minutes	30 (20%)
3	> 40 minutes < 60 minutes	111 (74%)

Table 6: Comparing axial length and time needed for akinesia

S.No	Axial length of eyeball (in mm)	No. of eyes	%	Time required for complete ocular akinesia (in minutes)
1	Less than or equal to 19.00	10	100	3
2	19.01-21.00	3	13.63	3
		19	86.36	6
3	21.01-23.00	67	100	6
4	23.01-25.00	11	23.40	6
		25	53.19	9
		11	23.40	12
5	More than 25.00	4	100	12

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

Table 7: Weight of the patient and the volume of the drug needed for akinesia

S.No	Weight of the patient (in Kg)	No. of eyes	%	Volume of the drug in ml	No. of injections required
1	Less than 60	98	100	6ml	1
2	61-70	23	62.16	6ml	1
		14	37.83	8ml	2
3	71-80	9	75	8ml	2
		3	25	10ml	3
4	More than 80	3	100	10ml	3

References

1. Hamilton R C. Technique of ocular regional anaesthesia: CahAnesthesiol 1992; 40(7):463-8 (cahiers d' anesthesiologie).

2. Troll GF. Regional ophthalmic anesthesia: safe techniques and avoidance of complications. J ClinAnesth. 1995 Mar;7(2):163-72.

3. Bellucci R. Anesthesia for cataract surgery. CurrOpinOphthalmol. 1999 Feb;10(1):36-41

4. Naor J, Slomovic AR. Anesthesia modalities for cataract surgery. CurrOpinOphthalmol. 2000 Feb;11(1):7-11.

5. Van den Berg AA. An audit of peribulbar blockade using 15mm, 25mm and 37.5mm needles, and sub-Tenon's injection: Anaesthesia 2004 Aug; 59(8):775-80.

6. Carneiro H M, Teixeira K I, de Avila M P, Alves Neto O, Hannouche R Z, Magacho L. A comparative study between 25*0.70 mm and 20*0.55 mm needles for retrobulbar block with small volume of anaesthetic for the treatment of cataracts by phacoemulsification: RevistaBrasileiraAnestesiologia 2008 Nov-Dec;58(6):569-81.

7. R A H Scott, C M Jakeman, S R Perry, P A, Acharya. Peribulbar anaesthesia and needle length: J R Soc Med1995;88:594-596.

8. McGrath LA, Bradshaw CP. Transconjunctival approach to peribulbar block. ClinOphthalmol. 2013;7:1073-6.

9. Mahdy RA, Ghanem MT. Comparison between singleinjectioninferomedial and inferotemporalperibulbar blockades before cataract surgery. Ophthalmologica. 2012;227(2):111-4.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

10. Ghali A M, Mahfouz A, Hafez A. Single injection percutaneous peribulbar anaesthesia with a short needle versus sub-Tenon's anaesthesia for cataract extraction: Saudi J Anaesth 2011 April;5(2):138-41.
11. Clausel H, Touffet L, Havaux M, Lamard M, Savean J, Cochener B. Peribulbar anaesthesia:Efficacy of a single injection with a limited local anaesthetic volume: J Fr Ophthalmol 2008 Oct;31(8):781-5. 12. Demirok A, Simşek S, Cinal A, Yaşar T. Peribulbaranesthesia: one versus two injections. Ophthalmic Surg Lasers. 1997 Dec;28(12):998-1001.
12. Demirok A, Simşek S, Cinal A, Yaşar T. Peribulbaranaesthesia: one versus two injections. Ophthalmic SurgLasers. 1997 Dec;28(12):998-1001.

13. Alhassan MB, Kyari F, Ejere HO. Peribulbar versus retrobulbar anaesthesia for cataract surgery. AnesthAnalg. 2008 Dec;107(6):2089.
14. Ripart J, Lefrant JY, de La Coussaye JE, Prat-Pradal D, Vivien B, Eledjam JJ. Peribulbar versus retrobulbar anesthesia for ophthalmic surgery: an anatomical comparison of extraconal and intraconal injections. Anesthesiology. 2001 Jan; 4(1):56-62.
15. Davis DB & Mandel MR, Posterior peribulbaranesthesia: an alternative to retrobulbar anesthesia. J Cataract Refract Surg. 1986 Mar;12(2):182-4.
16.Whitsett JC, Balyeat HD, McClure B, Comparison of one-injection-site peribulbaranesthesia and retrobulbar anesthesia. J Cataract Refract Surg. 1990 Mar;16(2):243- 5.
17. Athanikar NS, Agrawal VB, One point low volume peribulbar anaesthesia versus retrobulbar anaesthesia. A prospective clinical trial. Indian J Ophthalmol. 1991 AprJun;39(2):48-9.
18. Kumar C, Dowd T, Ophthalmic regional anaesthesia. CurrOpinAnaesthesiol 2008 Oct;21(5):632-7