

## Prospective analyses of peribulbar block anaesthesia in intraocular surgery using 13 mm long 26 gauge needle

Manoj Vasudevan<sup>1,\*</sup>, Mohanarangam. T<sup>2</sup>

<sup>1</sup>Consultant Eye Surgeon, <sup>2</sup>Assistant Professor, <sup>1</sup>Dept. of Ophthalmology, <sup>2</sup>Dept. of Anaesthesia, <sup>1</sup>Janu's Eye Clinic, <sup>2</sup>Chettinad Medical College

**\*Corresponding Author:**

Email: manojvasudevanms@gmail.com

### Abstract

Intraocular surgeries are usually done under local anaesthesia using either topical anaesthetic eye drops or using blocks like retrobulbar, peribulbar or a sub-tenon's injection of local anaesthetic agents. The aim of this study is to demonstrate the safety and efficacy of a 13 millimeter long, 26 gauge needle in peribulbar block anaesthesia for intra ocular surgeries, hence a prospective analysis of peribulbar block anaesthesia using 13 millimeter, 26 gauge needle for 350 patients undergoing intra ocular surgery was considered. All the blocks and surgeries were performed by the same surgeon. The number of injections needed to produce adequate anaesthesia, the volume of the anaesthetic agent needed, the onset and the duration of action of the anaesthetic drug and the complications with this technique were analyzed. Intraocular surgeries consisted of 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 in aphakic patients, combined cataract extraction with intraocular lens implantation with trabeculectomy and evisceration of the eye with artificial prosthetic implants for painful blind eyes.

**Keywords:** Intraocular surgery, Peribulbar anaesthesia, 13 millimeter long, 26 gauge needle.

### Introduction

The techniques of ocular local anaesthesia<sup>(1)</sup> 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.<sup>(2-4)</sup> 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. The possibility of inadvertently positioning such a needle into the retrobulbar space has been suggested. 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.<sup>(5)</sup> 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.<sup>(5-7)</sup> The aim and purpose of this study is to demonstrate the safety and the efficacy of a 13 mm, 26 G needles in performing peribulbar block anaesthesia for intraocular surgeries. So, in peribulbar block 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. He has also described about the anatomy of the fascial spaces around the globe.

### Materials and Methods

There were 149 male and 201 female patients who underwent the intraocular surgery under peribulbar block anaesthesia during the study period between 2010 and 2012. Among this there were 164 right eyes and 186 left eyes which underwent the procedure. 309 eyes of 309 patients underwent primary cataract extraction with posterior chamber intraocular lens implantation, 18 eyes of 18 patients underwent secondary intraocular surgery for sclera fixation of posterior chamber intraocular lens or iris claw lens implantation, 17 eyes of 17 patients underwent combined cataract extraction with intraocular lens implantation with trabeculectomy and 6 eyes of 6 patients underwent evisceration with orbital implants.

**Injection Mixture:** A mixture of 2% lignocaine hydrochloride with adrenaline bitartrate (0.005 mg/ml) and 50 units of hyaluronidase per ml were used in all patients. A 13 mm long 26 G needle was attached to a 10 ml plastic syringe and 6 milliliter (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 2/3<sup>rd</sup> and lateral 1/3<sup>rd</sup> 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 transconjunctival approach by some authors.<sup>(8)</sup> There are studies to support the site of these injections comparing infero-medial and infero-temporal.<sup>(9)</sup> 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 taken for injecting each patient was not documented so the mean duration for the injection time was not calculated. So 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.<sup>(10, 11, 12, 13)</sup>

## Results and Discussion



**Fig. 1: Pre-operative photographs of patients**



**Fig. 2: Technique of peribulbar block**

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.<sup>(15-19)</sup> 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.<sup>(20)</sup>

There were 7 patients who weighed less than 50kgs, 200 patients weighing between 51-60 kgs, 119 patients weighing between 61-70 kgs, 21 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 79% of patients weighing between 61-70 Kgs needed only 6 ml of the mixture (1 injection) while 21% of patients weighing between 61-70 Kgs and 76.19% 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 23.81% 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 301 (86%) and that required 2 injections (8 ml) was 41 (11.71%) and the no. of eyes that required 3 injections (10 ml) was 8 (2.29%). 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.

## Conclusion

The study proves the time & volume of the drug to achieve complete ocular akinesia was relatively lesser for patients with smaller eyes & lower body weight (p value < 0.01). 301 patients (86%) needed a single injection of 6 ml of the drug and only 6 minutes to achieve complete ocular akinesia. 82% retained the drug effect for up to 1 hour after the block. The complications were seen in 7.4% of patients which were neither sight nor life threatening and were self

limiting. This technique is found to be not only fast but also safe as well as very effective for achieving ocular akinesia for intra ocular surgeries. The limitation of this study is that the authors could have simultaneously compared the same using 24 G needle in a separate control group. So this study proves the effectiveness and safety of using 26 G needle as an alternative but cannot say for sure that the best for peribulbar blocks as it's not compared with other needles used commonly for the technique.

**Table 1: Grading of the ocular akinesia (based on Brahma et al grading of ocular akinesia<sup>(14)</sup>)**

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

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.

**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	17 (1.43%)
2	Between 3 minutes & 6 minutes	284 (63.43%)
3	Between 6 minutes & 9 minutes	41 (30.57%)
4	Between 9 minutes & 12 minutes	8 (3.43%)

**Table 3: Complications of the block**

S.No	Complications following the peribulbar block	No. of eyes (%)
1	Persistent Conjunctival Chemosis in the 1 <sup>st</sup> post-operative day	3 (0.86%)
2	Sub-conjunctival haemorrhage after the injection	18 (5.14%)
3	Retro bulbar haemorrhage after the injection	2 (0.57%)
4	Severe intra operative positive pressure	3 (0.86%)

**Table 4: Volume of the drug mixture needed for akinesia**

S.No	Volume of drug delivered in milliliters (ml)	No. of eyes (%)
1	6 ml	301 (86%)
2	8 ml	41 (11.71%)
3	10 ml	8 (2.29%)

**Table 5: Duration of action of the drug effect**

S.No	Duration of action of the drug in minutes	No. of eyes (%)
1	20 - 30 minutes	17 (4.86%)
2	30 - 40 minutes	49 (14%)
3	> 40 minutes < 60 minutes	284 (81.14%)

**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	13	100	3
2	19.01-21.00	4	9.31	3
		39	90.69	6
3	21.01-23.00	229	100	6
4	23.01-25.00	16	25.40	6
		41	65.07	9
		6	9.53	12
5	More than 25.00	2	100	12

**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	207	100	6ml	1
2	61-70	94	79	6ml	1
		25	21	8ml	2
3	71-80	16	76.19	8ml	2
		5	23.81	10ml	3
4	More than 80	3	100	10ml	3

## References

1. Hamilton R C. Technique of ocular regional anaesthesia: Cah Anesthesiol 1992; 40(7):463-8 (cahiers d'anesthesiologie).
2. Troll GF. Regional ophthalmic anesthesia: safe techniques and avoidance of complications. J Clin Anesth. 1995 Mar;7(2):163-72.
3. Bellucci R. Anesthesia for cataract surgery. Curr Opin Ophthalmol. 1999 Feb;10(1):36-41.

4. Naor J, Slomovic AR. Anesthesia modalities for cataract surgery. *Curr Opin Ophthalmol*. 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: *Revista Brasileira Anesthesiologia* 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 Med*1995;88:594-596.
8. McGrath LA, Bradshaw CP. Transconjunctival approach to peribulbar block. *Clin Ophthalmol*. 2013;7:1073-6.
9. Mahdy RA, Ghanem MT. Comparison between single-injection inferomedial and inferotemporal peribulbar blockades before cataract surgery. *Ophthalmologica*. 2012;227(2):111-4.
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. Peribulbar anaesthesia: one versus two injections. *Ophthalmic Surg Lasers*. 1997 Dec;28(12):998-1001.
13. Rizzo L, Marini M, Rosati C, Calamai I, Nesi M, Salvini R, Mazzini C, Campana F, Brizzi E. Peribulbar anaesthesia: a percutaneous single injection technique with a small volume of anaesthetic. *Anesth Analg*. 2005 Jan;100(1):94-6.
14. A.K. Brahma, C.J. Pemberton, M. Ayeko, L.H. Morgan. Single medial injection peribulbar anaesthesia using prilocaine. *Anaesthesia*. 1994, Nov; 49(11):1003-1005.
15. Alhassan MB, Kyari F, Ejere HO. Peribulbar versus retrobulbar anaesthesia for cataract surgery. *Anesth Analg*. 2008 Dec;107(6):2089.
16. Ripart J, Lefrant JY, de La Coussaye JE, Prat-Pradal D, Vivien B, Eledjam JJ. Peribulbar versus retrobulbar anaesthesia for ophthalmic surgery: an anatomical comparison of extraconal and intraconal injections. *Anesthesiology*. 2001 Jan; 4(1):56-62.
17. Davis DB & Mandel MR. Posterior peribulbar anaesthesia: an alternative to retrobulbar anaesthesia. *J Cataract Refract Surg*. 1986 Mar;12(2):182-4.
18. Whitsett JC, Balyeat HD, McClure B, Comparison of one-injection-site peribulbar anaesthesia and retrobulbar anaesthesia. *J Cataract Refract Surg*. 1990 Mar;16(2):243-5.
19. Athanikar NS, Agrawal VB, One point low volume peribulbar anaesthesia versus retrobulbar anaesthesia. A prospective clinical trial. *Indian J Ophthalmol*. 1991 Apr-Jun;39(2):48-9.
20. Kumar C, Dowd T, Ophthalmic regional anaesthesia. *Curr Opin Anaesthesiol* 2008 Oct;21(5):632-7.