

## A Comparative Study of the Efficacy and Safety of Peribulbar Anaesthesia with that of Retrobulbar Anaesthesia in Patients Undergoing Cataract Surgeries

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### Abstract

**Introduction:** The history of anesthesia for Cataract surgery; dates back, to over 2500 years. A study was conducted to compare advantages, disadvantages and suitability of retro bulbar and peribulbar techniques of local anesthesia for cataract surgery.

**Materials and Methods:** This was a prospective study, conducted in the department of anesthesiology and ophthalmology, Swatantra Multispeciality Hospitals, Rajahmundry. Study was conducted from June to June 2009 and the protocol was approved by the institutional ethics committee. Individuals of both gender, aged > 18 years, those submitted informed consent and who were selected for cataract extraction with or without intra-ocular lens implantation under regional block were included in this research. The study participants were randomly divided in to 3 groups. The first group were proceeded for retrobulbar (RB) anesthesia as per Atkinson. Peribulbar (PB) anesthesia was used for 2<sup>nd</sup> and 3<sup>rd</sup> groups, respectively. For the 2<sup>nd</sup> group, single quadrant PB anesthesia was given, named as PB 1 and double quadrant PB anesthesia was administered to the 3<sup>rd</sup> group, named as PB 2. For PB 1, the facial block was not administered and the participants under this group received an infero temporal quadrant injection to provide PB block.

**Results:** Total 75 members were included, 25 each respectively. Male female ratio was 0.78. Before anaesthesia, statistically there was no significant difference in the mean IOP readings. But there was significant difference immediately after anaesthesia. Group wise, highest number of repetitions was observed in RB followed by PB 1. Group wise, highest eye lid movement and extra ocular movements were observed in PB 2 and sensation time was observed in RB.

**Conclusion:** Safety of ocular anaesthesia for cataract surgery mainly depends on the preoperative preparation, proper selection of the drugs, size and length of the needle and type of block. The present prospective study confirms the fact.

**Keywords:** Cataract, Anesthesia, surgery

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### Introduction

The history of anesthesia for Cataract surgery; dates back, to over 2500 years. The earlier literature on this was by

Susruta, first described couching and outlined the use of inhalational anesthesia; also stressed the need for aseptic approach.

Later carotid compression was described which couching was performed [1].

The first wound closure was reported in 1867 [2]. Today, the cataract surgery is on fast track with the advent of instruments as well as technique. Complete patient cooperation is expected when an eye is selected for cataract surgery.

Till 18<sup>th</sup> century, there is no availability of authentic documentation on safe anesthesia; later Cocaine solution was documented for the eye surgery [3]. At present Lignocaine with Adrenaline and Hyaluronidase replaced Cocaine and the combination most commonly used; this combination provides total anesthesia just for an hour which is the major limitation.

Local anesthesia is the mainstay of cataract surgery around the globe, as majority are elders and conducted on day care basis. In this area, several techniques were reported. With this, a study was conducted to compare advantages, disadvantages and suitability of retro bulbar and peribulbar techniques of local anesthesia for cataract surgery.

### Materials and Methods

This was a prospective study, conducted in the department of anesthesiology and ophthalmology, Swatantra Multispeciality Hospitals, Rajahmundry. Study was conducted from June to June 2009 and the protocol was approved by the institutional ethics committee.

Individuals of both gender, aged > 18 years, those submitted informed consent and who were selected for cataract extraction with or without intra-ocular lens implantation under regional block were included in this research. Individuals aged < 18 years, who were non cooperative, those with intraocular pressure (IOP) > 25 mm Hg were not considered.

For anesthetic block, 2% Lignocaine with adrenaline 1:2, 00,000 commercial preparations, 0.5% Bupivacine and 1500 U Hyaluronidase were used. The study

participants were randomly divided in to 3 groups. The first group were proceeded for retrobulbar (RB) anesthesia as per Atkinson [4]. Peribulbar (PB) anesthesia was used for 2<sup>nd</sup> and 3<sup>rd</sup> groups, respectively. For the 2<sup>nd</sup> group, single quadrant PB anesthesia was given, named as PB 1 and double quadrant PB anesthesia was administered to the 3<sup>rd</sup> group, named as PB 2.

For PB 1, the facial block was not administered and the participants under this group received an infero temporal quadrant injection to provide PB block. The initial step and approach in PB 2 is as similar to that of PB 1 block. Here the initial volume of the injection was 4 and 5 ml and an additional 2 to 5 ml was given at a depth of 1.5 to 2 cms in the superonasal quadrant just lateral or medial to supratrochlear notch making sure that the needle was just below the rim of the orbit and remaining extraconal.

All the patients were screened at ophthalmology OPD of Swatantra Multi speciality hospital, Rajahmundry and admitted for cataract extraction. The patients were randomly distributed to undergo the cataract surgery under anyone of the three techniques of local anesthesia. All patients were subjected to the pre-operative recording of blood pressure, pulse general checkup. The IOP was recorded 24 hrs before the surgery is documented. The intraocular pressure of the eye were recorded just before the administration of local anesthesia and dilatation of pupils recorded after insulation of mydratic drops at regular intervals on the morning of surgery. After administration of local anesthesia, the patients were monitored and observed for changes in the intraocular pressure, size of pupils; complications are adverse reactions like retro bulbar hemorrhage. Attention was paid for patient compliance and comfort.

The surgeon proceeded with the surgery after assessing the globe and lid akinesia in

addition to corneal and sclera analgesia. The tension was recorded after the onset of surgery anymore. During the entire period of surgery, the patient was monitored for any intra operative related complication

and at the end of surgery for any immediate post-operative complication. After 24 hrs of the surgery, the operated eye was dressed and observed for any related complication.

## Results

**Table 1: Gender wise distribution of the study population; n (%)**

Group	Male	Female	Total
RB	11 (44)	14 (56)	25 (100)
PB 1	11 (44)	14 (56)	25 (100)
PB 2	7 (28)	18 (72)	25 (100)

**Table 2: Age distribution among the study population**

Group	Mean± SD	Range
RB	57.36 ±13.6	31 – 78
PB 1	58.84 ±10.2	40 – 75
PB 2	58.00 ±9.75	45 – 72

**Table 3: Group wise mean IOP readings among the study participants**

IOP reading	RB	PB 1	PB 2	Statistical analysis
Before anaesthesia	13.65± 2.6	15.28±1.94	13.68 ±1.75	F=2.243; P>0.05
Immediately after anaesthesia	19.36±7.95	26.80±5.37	26.04±3.59	F=12.605; P<0.05
Before surgery	8.76±1.59	8.04±0.95	7.88 ±1.42	F=11.57; P<0.05

**Table 4: Group wise incidence of anaesthesia repetition among the study participants; n (%)**

Group	Repetition			No repetition	Total
	Once	Twice	Total		
RB	9 (36)	1 (4)	10 (40)	15 (60)	25 (100)
PB 1	0	2 (8)	2 (8)	23 (92)	25 (100)
PB 2	0	0	0	25 (100)	25 (100)

**Table 5: Different anesthesia parameters among the study participants;**

Group	Eye lid movement	Extra ocular movement	Sensation time
RB	9.20±4.0	14.0±5	12.8± 4.10
PB 1	7.73±4.67	10.91±3.02	7.74±.67
PB 2	11.79±3.72	16.79±6.68	11.79±4.64

In this study total, 75 members were included; group wise, 25 each respectively in RB, PB 1 and PB 2. The male female ratio was 0.78 each in RB and PB 1, respectively and 0.38 in PB 2 (Table 1). Age was ranged between 31 – 78, 40 – 75 and 45 – 72 years, respectively in RB, PB 1 and PB 2 groups; statistically there was

no significant difference (F=1.772; P>0.05; Table 2)

Before anaesthesia, the mean IOP readings were 13.65± 2.6, 15.28±1.94 and 13.68 ±1.75, respectively in groups; statistically there was no significant difference. But there was significant difference in the mean IOP readings, immediately after anaesthesia there and before surgery (Table

3). In this research, group wise, highest number of repetitions were observed in RB (10; 40%) followed by PB 1 (2; 8%). No repetitions were observed in PB 2 (Table 4). Group wise, highest eye lid movement and extra ocular movements were observed in PB 2 and sensation time was observed in RB (Table 5).

### Discussion

Gender wise, in male the distribution was 11, 11 and 7 were RB, PB 1 and PB 2, respectively. Whereas in female it was 14, 14 and 18, respectively (Table 1). Murdoch IE *et al* [5] reported a prospective clinical trial comparing PB with RB anaesthesia is reported. Ninety-nine consecutive patients for cataract extraction under local anaesthesia were randomly allocated to a PB or RB technique. The effectiveness of the anaesthetic, the operative conditions, and the degree of patient discomfort were recorded. Vestal KP *et al* [6]. The authors report an unusual case of retinal detachment after cataract surgery in a 48-year-old man in which it appeared that the RB needle passed through the sclera and tracked beneath the retina before perforating the retina superior to the disc. The cause of the detachment was not clearly defined until a depigmented line was observed after reattachment of the retina.

Ninety-five PB blocks for cataract extraction with intraocular lens implantation were performed by an anaesthetist over a period of 6 months. The quality of the block was assessed by the ophthalmologist and the anaesthetist. No dangerous local or systemic complications were observed. PB anaesthesia is increasingly preferred to RB block on account of its easiness and safety [7]. The effectiveness of PB anaesthesia in 146 patients undergoing cataract surgery and intraocular lens implantation. The results revealed that the analgesic and akinetic effects obtained from PB anaesthesia are the same as or even better than that obtained

from RB anaesthesia. In the meantime, the use of PB injection can avoid or reduce the serious complications associated with the RB injection. In this report, the method of PB anaesthesia was introduced and its mechanisms and effectiveness were discussed. The pre- and post-anesthetic intraocular pressures were especially observed and compared. It is safe to perform the operation 10 minutes after the administration of the PB anaesthesia [8,9].

Although less discomfort/pain occurred during surgery with RBA, patients preferred STA and TA primarily because of the inconvenience or pain of the retrobulbar injection. Although medical sedation was not used in this study, the pain/discomfort ratio from surgery was not greater than in studies using intravenous sedation, indicating that the use of medical sedation should be re-evaluated [14].

Two rare cases of strabismus resulting from contracture of the extraocular rectus muscles after retrobulbar anaesthesia for cataract surgery are described. Clinical signs in both cases suggested that the development of the impaired function of the lateral and superior rectus muscles followed the same pattern: initial stimulation followed by parietic and restrictive stages. Abnormal enlargement of the muscles was identified by computed tomography (CT) and magnetic resonance imaging (MRI). The data indicate that the strabismus was the result of direct injection of anaesthetics into the rectus muscle [11].

Tsilimbaris MK *et al.* suggest that air aspiration or anaesthetic passage into the pharynx during retrobulbar anaesthesia should raise the suspicion of maxillary sinus entrance, even in patients without any history of facial trauma or surgery. The early recognition of sinus entrance can prevent RB block failure and reinjection of a second anaesthetic dose [12]. In this study they opined that the PB injection cause a very important increase of the IOP immediately after the injection: the RB

injection did not. An ocular compression of 10 minutes is effective in reversing this rise. The implications for clinical practice were discussed [13,14].

### Conclusion

Safety of ocular anaesthesia for cataract surgery mainly depends on the preoperative preparation, proper selection of the drugs, size and length of the needle and type of block. The present prospective study confirms the fact that (1) a combination of injection lignocaine 2% with adrenaline 1:200,000 and Bupivacaine 0.5% in the ratio of 3:2 respectively with Hyaluronidase 30 Units/ml is ideal for the purpose (2) the Double Quadrant PB anaesthesia technique provides almost an ideal ocular anaesthesia to proceed with cataract surgery safely.

### References

1. Carneiro HM, Oliveira B, Avila MP, Alves Neto O. Brainstem anesthesia after extraconal retrobulbar block: can it be avoided? Case report. *Rev Bras Anesthesiol.* 2007; 57(4): 391 – 400.
2. Gunja N, Varshney K. Brainstem anaesthesia after retrobulbar block: a rare cause of coma presenting to the emergency department. *Emerg Med Australas.* 2006; 18(1): 83 – 5.
3. Ashaye AO, Ubah JN, Sotumbi PT. Respiratory arrest after retrobulbar anaesthesia. *West Afr J Med.* 2002; 21(4): 343 – 4.
4. Atkins J, Murdoch IE. Peribulbar versus retrobulbar anaesthesia. *Eye (Lond).* 1990; 4 (3): 445 – 9.
5. Murdoch IE, Auli Ropo, Perti Nikki. Comparison of retrobulbar and peribulbar injections of lignocaine by computerized tomography. *Bri. J of Opth.* 1991; 75: 417 – 20.
6. Vestal KP, Meyers SM, Zegarra H. Retinal detachment as a complication of retrobulbar anesthesia. *Can J Ophthalmol.* 1991; 26(1): 32 – 3.
7. Badescu S. Perforation of the eyeball in retrobulbar anesthesia. Schipper I, Lüthi Moftalmologia. 1994; 38(2): 162 – 4.
8. Diplopia after retrobulbar anesthesia in cataract surgery--a case report]. *Klin Monbl Augenheilkd.* 1994; 204(3): 176 – 80.
9. Wong DHW, Khoerer E. A modified retrobulbar block for eye surgery. *Can J Anaesth* 1993; 40: 547 – 53.
10. Harrar N, Idali B, el Belhaji M, el Amraoui A, Benaguida M. Respiratory arrest after retrobulbar anesthesia. Apropos of 2 cases. [Article in French], *Cah Anesthesiol.* 1996; 44(4):355-6.
11. Ando K, Oohira A, Takao M. Restrictive strabismus after retrobulbar anesthesia. *J J Opth.* 1997; 41(1): 23 – 6.
12. Scott RA, Jakeman CM, Perry SR, Acharya PA. Peribulbar anaesthesia and needle length. *J R Soc Med.* 1995; 88(10): 594 – 6.
13. Haimeur C, Syah S, Driss N, Atmani M, Mabrouk E. Peri-bulbar anesthesia for cataract surgery. *Cah Anesthesiol.* 1995; 43(5): 505 – 7.
14. Yang W, Li S, Zhang Z. Peribulbar anesthesia and intraocular lens implantation. *Zhonghua Yan Ke Za Zhi.* 1995; 31(4): 271 – 3.