

# Single Injection versus Double Injection Peribulbar Anaesthesia in Eye Camp Surgery: a Comparative evaluation of Akinesia and Anaesthesia

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## Abstract

**Background:** Recent literature suggests that single injection peribulbar block is as effective as two injection block. Moreover, there are concerns for globe injury due to second injection during two injection technique. We compared the efficacy of two injection peribulbar block with single injection peribulbar block for globe and lid akinesia, globe anaesthesia and complications in eye camp surgery.

**Methods and patients:** A prospective single blinded study of 204 patients was done during eye camps organized by Red Cross Society of Jamshedpur. All the blocks were given by consultant anaesthetist and operating surgeons were unaware about the technique of peribulbar block. Data was collected for akinesia (globe & lid), anaesthesia and supplemental injections. Surgeon's satisfaction and pain during injection were also recorded.

**Results:** Ninety patients (88.29%) in group-1 and, 96(94.11%) patients in group-2 had adequate globe akinesia after respective peribulbar injection. Fourteen (13.72%) patients in group-1 and, 11 (10.8%) patients in group-2 required supplemental injections. Scores for globe akinesia and lid akinesia globe anaesthesia and supplemental blocks, pain on injection and surgeon's satisfaction were all comparable without any significant statistical difference.

**Conclusion:** In our study we found that single injection peribulbar block is as effective as standard two injection peribulbar block during eye camp surgery, and can be used instead of two injection technique to avoid possible globe injury which may occur due to second injection.

## INTRODUCTION

The eye camp surgery as compared to hospital based facilities is different and difficult due to lack of infrastructure and multidisciplinary support to handle the complications. Camp surgery thus requires an easy to perform anaesthetic technique with faster onset and higher safety profile. Peribulbar anaesthesia is therefore near ideal anaesthetic technique for cataract surgery in eye camp situation due to fewer propensities for serious complication<sup>1,2</sup>. Low volume two injection technique gives acceptable conditions for cataract operation in eye camps<sup>3</sup>. However, it is suggested that single injection is safer than two injections due to higher incidence of globe perforations<sup>4,5</sup>. We conducted a randomized single blind prospective study in eye surgery camps (organized by Red Cross Society, Jamshedpur) to evaluate and compare single injection peribulbar technique<sup>6</sup> (as suggested by Leonardo Rizzo) with our low volume two injection peribulbar

technique<sup>3</sup> for globe/ lid akinesia, globe anaesthesia, chemosis, block related complications, patient's discomfort and overall surgeons satisfaction with operating conditions and effectiveness of block.

## PATIENTS AND METHODS

After approval from local managing committee of Red Cross Society, Informed consent was obtained from the patients. Two hundred four consecutive adult patients scheduled for peribulbar block for cataract surgery with IOL during eye camps were included. Preoperative screening was done and patients who were having active infection or evidence of infection were not included. All the peribulbar blocks were performed by consultant anesthetist experienced in ophthalmic anaesthesia. Surgery was performed by either of two surgeons who were unaware about the anaesthesia technique. The patients were allocated into two groups according to the technique of block. Single injection group-1 (n=102) and two injection group-2 (n=102) patients. For

local anaesthesia a fixed 6ml. mixture containing 2 percent xylocaine with 1:200,000 adrenaline combined with 120 IU hyaluronidase was used for both techniques. The ocular block was performed as follows. In peribulbar anaesthesia by two injection technique, First injection containing 4ml local anaesthetic was given at junction of the lateral third and medial two thirds of the lower orbital margin and the second injection containing 2 ml was given just lateral to supratrochlear notch, both injections were given percutaneous. In single injection peribulbar block the injection site was percutaneous and limited superiorly from inferior lacrimal canaliculus, median from lateral margin of nose, laterally from imaginary perpendicular line that join inferior lacrimal papilla to inferior margin of orbit and inferiorly from inferior margin of orbit, 6 ml of similar solution was injected at one place as described by Leonardo Rizzo, et al. The injections were given with a 25-gauge, 25-mm cutting bevel disposable needle. Slight manual pressure with help of 4-6 layers of gauze piece was applied over eye immediately after injection. Patient data were collected on sex, age, weight, technique of block, and the need for a supplementary block and chemosis. Immediate complication due to block e.g. hematoma, echymosis, hardness of eye, retrobulbar hemorrhage etc. were also recorded. Patients discomfort due to injections was assessed on VAS scale of 0-10 points where (0= No pain and 10= Severe pain).

Assessment of eye movements was done after 10 minutes for all patients because it is the maximum fixation time for the mixture of local anesthesia used. A simple akinesia score originally described by Crawford is used for assessment of the block<sup>7</sup>. Eye movement in four directions is assessed – inferior, superior, medial and lateral. Normal movement is scored at 2 and reduced movement at 1 and flickering movement or akinesia is scored at zero. Globe anaesthesia was assessed on 0-2 scale where 0= no anaesthesia, 1= partial but acceptable anaesthesia, 2= complete anaesthesia.. Initial assessment of block was graded by surgeon as poor, fair or good. Supplemental blocks were given by surgeon when akinesia and anaesthesia were inadequate. The sites of supplementary injections are supero-medial for superior or medial movement and infero-temporal for inferior or lateral movement. All supplements were given by the same type of needle which was used for the primary injection. All the surgery was manual small incision cataract surgery with intraocular lens implantation. After completion of surgery, the surgeon subjectively scored the anesthesia quality from 0 to 5.

The results of two study groups were compared using student t test or chi-square test analysis using Computer Software AcaStat version 5.3.1. P values <0.05 were considered statistically significant.

## RESULTS

The patients' mean age and weight, male female ratio and frequency of operation on right or left eye were similar in two groups (Table 1).

**Figure 1**

Table 1: Demographic data

	Group-1 N=102	Group-2 N=102
Mean Age (± SD)	62.27 (11.54)	61.92 (11.72)
M:F	60:42	58:44
Weight	57.81(11.21)	59.20(9.77)
R:L eye	66:36	60:42

p>0.05 (not significant)

Ninety patients (88.29%) in group-1 and, 96(94.11%) patients in group-2 had adequate globe akinesia after respective peribulbar injection. Fourteen (13.72%) patients in group-1 and, 11 (10.8%) patients in group-2 required supplemental injections. Globe anaesthesia and supplemental blocks were comparable in two groups (Table-2).

**Figure 2**

Table 2: Globe anaesthesia and supplemental blocks

	Globe Anaesthesia Mean Score (SD)	Complete/ Acceptable Globe Anaesthesia with initial block	Supplemental Block
Group-1	4.2 (1.1)	90 (88%)	14 (13.7%)
Group-2	4.3 (1.08)*	96* (94%)	11* (10.8%)

\*p>0.05

Globe akinesia and lid akinesia were better in group-2 than group-1, 91(89.2%) vs. 88 (86.2%) for globe akinesia and 85(83.3%) vs. 78(76.4%) for lid akinesia respectively. Mean score for globe akinesia 2.24 (1.59) vs. 1.93(1.57), lid akinesia 1.17(0.60) vs. 0.94(0.62) were comparable without significant difference (Table-3).

**Figure 3**

Table 3: Globe and Lid akinesia score

	Globe Akinesia		Lid Akinesia	
	Group-1 N=102	Group-2 N=102	Group-1 N=102	Group-2 N=102
Complete/ Acceptable	88 (86.2%)	91 (89.2%)	78 (76.4%)	85 (83.3%)
Scores Mean $\pm$ SD	2.24 (1.59)	1.93 (1.57*)	1.17 (0.60)	0.94 (0.62)**

\*p=0.44

\*\*p=0.3

More than two quadrants chemosis occurred in 24.5% patients in group-1 and 17.64% of patients in group-2. Sub-conjunctival hematoma occurred in 2 patients (1.96%), and hardness of eye in 3 (2.94%) patients in group-2. Lower lid hematoma occurred in one patients of group-1. Block related complications were similar in both the groups (Table-4).

**Figure 4**

Table 4: Block Related Complications

Complications	Group-1(N=102)	Group-2 (N=102)
Chemosis (More than two quadrants)	18 (17.64%)	25 (24.5%)
Sub-conjunctival hemorrhage	2 (1.96%)	0
Lower Lid Hematoma	0	1 (0.098%)
Hard Eye	3 (2.94%)	2 (1.96%)

p>0.05 (not significant)

Mean score for injection pain in group-1 was 2.62(2.31) and 2.83(2.62)in group-2, the difference was statistically not significant (p=0.103). Surgeons satisfaction scores were also comparable 4.4(0.62) in group-1 and 4.6(0.65) in group-2.

**Figure 5**

Table 5: Patients discomfort and surgeons satisfaction

Pain scores during initial injection		Surgeons' satisfaction	
Group-1 Mean (SD)	Group-2 Mean (SD)	Group-1 Mean (SD)	Group-2 Mean (SD)
2.62(2.31)	2.83(2.62)*	4.4(0.62)	4.6(0.65)**

\*p= 0.103 (not significant)

\*\*p= 0.31 (not significant),

MSICS (manual small incision cataract surgery) with implantation of the lens to the posterior chamber was performed in 97 % of the cataract patients (IOL was not inserted in one patient of group-1 and 2 patients of group-2 due to technical reasons). Two patients of group-1 developed sub-conjunctival hemorrhage due to needle injury to conjunctival veins. Hard eye was noticed in three patient of group-1 and 2patients of group-2, they required gentle eye massage before operation. No operation had to be canceled because of a problem with the regional anesthetic block, and none of the study patients needed general anesthesia.

## DISCUSSION

In eye camp surgery peribulbar is equally effective as retrobulbar blocks<sup>8,9</sup>. Peribulbar anaesthesia is achieved by bulk spread of local anaesthesia. The block is often established using a single or double injection technique<sup>10</sup>. However, the choice between single or double injection techniques is based on the volume of the orbit, degree of akinesia required, experience of the ophthalmologist and preference of the anesthesiologist<sup>11</sup>. For dual injection technique; the most popular site for the first injection is the infero-temporal site, the classical site for the second injection is supero-medial<sup>12</sup>. In present study we have used similar technique as in our past experience of more than 10 years; we have found that this two needle technique gives reasonably safe and dependable operating conditions in eye camp surgery<sup>3</sup>. We used 25mm needle for peribulbar block because, needle length is an important consideration in the safe conduct of ophthalmic blocks. Although different needle lengths (27.5mm 35mm) have been described by different authors, it is now common practice to use 25mm needles to administer peribulbar block<sup>12,13,14</sup>. In present study

result showed that globe akinesia (86.2% vs. 89.2%), lid akinesia (76.4% vs. 83.2%), and globe anaesthesia (88% vs. 94%) were better in group-2. However, they were not statistically significant. The supplemental injection was required in 13.7% patients in group-1 and 10.8% patients in group-2 which resulted in satisfactory painless operating conditions. Supplemental block in peribulbar anaesthesia remains the major constrain of the technique. The reported incidence is between 5-63% in various studies<sup>1,3,15</sup>, our results were 10.8-13.7%, however 10% is reasonable to accept for its safety. We did not find any significant difference for supplemental injections among two techniques we used in our study. Our results are similar to earlier reports<sup>16,17</sup> compared the single injection with two injection techniques. The minor complications, scores for pain on injections, and surgeon's satisfaction scores were similar in both the groups. No patient had globe injury in both the groups, probably due to lower total volume of local anaesthetic was used during first injection of two needle technique and use of hyaluronidase might have helped in diffusion of solution around globe<sup>5,18</sup>. We agree with Ball J L et al<sup>5</sup> that, an adequate block can be achieved with a single peribulbar injection placed either inferotemporally<sup>1,19</sup> or medially<sup>16</sup>, and there is no evidence that a second primary injection decreases the rate of supplemental injection required. We also therefore propose that a second primary peribulbar injection is unnecessary and may carry an increased risk of globe perforation.

## CONCLUSION

In our study we found that single injection peribulbar block is as effective as standard two injection peribulbar block during eye camp surgery, and can be used instead of two injection technique to avoid possible globe injury which may occur due to second injection.

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