

## Original Article

# Percaruncular single injection peribulbar anaesthesia in patients with axial myopia for phacoemulsification

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## Abstract

**Background:** Myopia has been identified as a risk factor for globe perforation during regional anaesthesia for cataract surgery. We conducted this study to evaluate efficacy of single injection percaruncular peribulbar anaesthesia for phacoemulsification in patients with axial myopia.

**Methods:** Eighty patients with axial myopia received percaruncular peribulbar anaesthesia and were evaluated for incidence of major or minor complications. Also surgeon and patients' satisfaction and their comment on operative conditions were noted.

**Results:** Of the 80 patients 51 patients had posterior staphylomas. About three quarters of the patients developed adequate akinesia in 10 min. Remaining 25% received second injection with the same technique but with less volume after which the percent of patients with adequate akinesia rose to 91%. Adequate analgesia developed in almost all patients and only in one patient, intravenous analgesia was necessary to complete the operation. All operations were completed uneventfully. No perforations or penetrations were recorded and no other major complications were encountered. About 97% of the surgeons and 96% of the patients found the operative conditions satisfactory.

**Conclusion:** Using single injection percaruncular peribulbar local anaesthesia for phacoemulsification in patients with axial myopia is an effective technique.

**Keywords:** Peribulbar, Axial myopia, Percaruncular, Anesthesia, Phacoemulsification

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## Introduction

Most patients presenting for ophthalmic surgery are elderly and have pre-existing medical problems. Local anaesthesia, unless contraindicated, is the technique of choice as it is associated with the least morbidity and least disruption of the patient's daily routine. Day care intraocular surgery under local anaesthesia is safe and has powerful economic benefits and is generally the option of choice<sup>1</sup>

Each surgical procedure places unique demands on the anaesthesiologist to create surgical anaesthesia with minimal physiologic trespass on the patient as well as the surgical re-

pair. During surgery of the eye, the quest for an anaesthetic that does not harm the eye or the patient can be a challenge.<sup>2</sup>

Patients with axial myopia with axial length more than 26 mm. are at a greater risk of globe perforation.<sup>3,4</sup> Myopic eyes have thin sclera and limited space between globe and orbit available for peribulbar technique. Moreover these patients with myopia may have staphylomas which increases the risk of perforation.<sup>5</sup> According to Duker et al.,<sup>6</sup> 45% of globe perforations occurred in patients who had an axial length of  $\geq 26$  mm. They calculated that myopic patients have a 30 fold increased risk of perforation.

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In a study conducted by Vohra and Good,<sup>7</sup> while studying altered globe dimensions of axial myopia as risk factors for penetrating ocular injury during peribulbar anaesthesia they interestingly found that the increase in the axial length (AL) in an axially myopic eye is associated with an increase in the equatorial horizontal width (EHW). However, this increase in the mean EHW is relatively small (2.3 mm) compared with the increase in the mean AL (8.2 mm) across the entire range. The ratio of EHW/AL decreased with an increase in the mean AL. Therefore, the increase in EHW in an axially myopic eye is unlikely to be a significant risk factor for inadvertent ocular injury for peribulbar injections if a careful single medial canthal approach is used. There was high incidence of staphylomas in the eyes with AL >29 mm, most were inferior to the posterior pole of the globe and there were none at the equator.

Several studies evaluated the efficacy of single medial canthal peribulbar injection as a regional anaesthetic technique for cataract surgery and they found it to be effective and comparable to conventional two injection peribulbar technique.<sup>8,9,10</sup>

Based on the findings stated by Vohra and Good we designed this study to evaluate clinically the efficacy and safety of percaruncular single injection peribulbar anaesthesia in patients with axial myopia.

Although general anaesthesia may be preferred for cataract surgery in myopes yet the population liable for cataract operations may have some medical derangements that mandate the use of LA and if there is a safe LA technique that can be applied for high myopes then it may prove to be beneficial when GA is contraindicated.

## Patients and methods

After written informed consent, eighty patients with axial myopia (axial length more than 26 mm.) scheduled for cataract surgery by phacoemulsification were included in our study. Axial length measured by ultrasound biometry and the presence of staphyloma was detected by B-scan. Apart from high axial length, there were no other contraindications for regional anaesthesia. Unless the patient was very apprehensive, no sedation was given. Anxious patients were given intravenously either midazolam (up to 2 mg) or fentanyl (up to 30 µg) or both. Standard monitors were attached. Local anaesthetic eye drops (benoxinate 0.4%) were instilled in the eye to be operated upon three times separated by one minute. The patient lies in a supine position and is asked to look directly ahead focusing on a fixed point on the ceiling, so that the eyes are in the neutral position. A medial canthal injection was given using a 25G 3/4" needle. The needle insertion point was just medial to the caruncle with the needle passing directly perpendicular to the face and parallel to the medial orbital wall. After negative aspiration an initial dose of 6 ml of a mixture of lidocaine 2%/bupivacaine 0.5% with hyaluronidase 15 units/ml. was injected slowly. During injection, the globe was palpated with one finger and tension in the lids was tested frequently, if the lids became tense or if the tension was felt to rise in the globe, the injection was stopped. After injection, a gentle intermittent pressure on the eye with the fingers of one hand (but no massage) was applied. Akinesia was assessed using ocular and eye lid movement scores every 2 min as follows:

### Ocular movement scores

Ocular movement assessed in four directions; medially, up, down and laterally and the movement in each direction is given a score from 0 to 2 as follows:

More than 2 mm:	2
1–2 mm:	1
No movement:	0

A total Score of 2 or less is thought to be adequate for surgery

### Eye lid movement scores

Eye lid movement was given a score as follows:

Full movement:	2
Flickering:	1
No movement:	0

If, after 10 min the block is inadequate a supplementary injection of 3–4 ml of the anaesthetic mixture was injected with the same technique. Time to adequate surgical anaesthesia was noted in addition to the need for supplementary anaesthesia.

Pain was assessed by direct questioning using a 3 point scoring system (no pain = 0, discomfort = 1, pain = 2) throughout the operation especially at painful points e.g. corneal incision, hydrodissection, hydrodelineation, phacoemulsification, irrigation, aspiration and at IOL insertion, also, just postoperatively (during subconjunctival injection of steroids and antibiotics if used).

Incidence of minor complications was noted & recorded (e.g. coughing, vomiting, hypotension, hypertension, bradycardia, tachycardia, arrhythmia, chemosis, proptosis, subconjunctival haemorrhage). Incidence of major complications, such as globe perforation or penetration or retrobulbar haemorrhage was also noted and, if any, anaesthesia should be aborted and the operation postponed.

Comments on the surgical condition by the surgeon and the patient were also noted. Their opinions were taken as either "excellent", "good" or "bad". "Excellent" and "good" are considered to be adequate surgical conditions.

### Statistical methods

Numerical data are presented as percentage. There is no doubt that using larger sample sizes generally lead to increased precision while estimating unknown parameters. Eighty patients were included in our study as this was the number of myopic patients referred to us since the time we planned to run this study and accepted to undergo the technique after knowing of possible risks.

### Results

A group of 80 patients with axial myopia (axial length 26.13–34.44) of a wide range of ages (22–72 years old) underwent phacoemulsification using the standard "stop and

chop" technique under regional anaesthesia using only the percaruncular route. Of these patients, 63.75% (51/80) had posterior staphyloma. No sedation was needed except in two cases with coronary artery disease.

Peribulbar block was given as described before. At 10 min 76.25% (61/80) satisfactory ocular movement score was achieved (score of 2 or less). Only 23.75% (19/80) of patients required a supplemental injection. After supplemental injection 91% (73/80) of the ocular patients achieved adequate ocular movement scores (Table 1).

In the seven cases with ocular movement scores more than 2 at 15 min (in one case score was 6, in another, the case score was 5, in a third case the score was 3, remaining 4 cases had a score of 4), .The surgeon claimed that he could continue the operation under these conditions. In all these seven cases, as in all other cases, operations finished uneventfully but in one case, of these seven cases the patient felt considerable pain intraoperatively and the eye was moving so that the surgeon and patient found operative conditions not satisfactory. Local anaesthesia was supplemented with intravenous fentanyl and no complications occurred. In the other case, though the ocular movement scores were 5 and akinesia seemed to be inadequate the surgeon commented that it is "similar to topical", yet the operation finished uneventfully with no intraoperative pain and both the doctor and patient were satisfied with operative conditions.

Eye lid movement scores were satisfactory in all patients after the first injection.

Five cases experienced pain intraoperatively, (Table 2) either during intraocular phacoemulsification or lens implantation (6.25%). The pain was mild and required only reassurance in 3 cases or supplementation with IV opioid in the other 2 cases. But the pain did not interfere with the surgical technique nor did it affect the outcome, yet it affected the patient and doctor satisfaction about operative conditions.

There were no major complications, only minor complications (Table 2) in the form of spotting subconjunctival haemorrhage in two cases and chemosis in three cases.

The surgeon found the operative conditions adequate (either good in 20% (16/80) or excellent in 77.5% (62/80)) in 97.5% (78/80) of patients (Table 3).

**Table 1.** Akinesia scores after initial and supplementary injections.

	No. of patients	Percent (%)
Satisfactory ocular movement score at 10 min	61	76.25
Satisfactory eye lid movement score at 10 min	80	100
Patients needed supplementary injections	19	23.75
Satisfactory scores after supplementary injections	73	91
Akinesia scores not satisfactory	7	9

**Table 2.** Incidence of pain and minor complications.

	No. of patients	Percent (%)
Intraoperative pain	5	6.25
Minor complications	5	6.25
• Spotting subconjunctival haemorrhage	3	3.75
• Chemosis	2	2.5

**Table 3.** Surgeon and patient satisfaction.

	Adequate			
	Excellent	Good	Sum	Bad
Surgeon satisfaction (No.)	62	16	78	2
Percent (%)	77.5	20	97.5	2.5
Patient satisfaction (No.)	55	22	77	3
Percent (%)	68.75	27.5	96.25	3.75

On the other hand 96.25% of patients found operative conditions adequate (either excellent 68.75% (55/80) or good 27.5% (22/80)). Only 3.75% (3/80) found the operative conditions bad (Table 3).

Despite some doctors and patients finding surgical conditions bad, all operations ended uneventfully and no major complications or bad outcomes occurred.

## Discussion

Axial Myopia has been identified as a significant risk factor for globe perforation during local anaesthesia in ophthalmic surgery.<sup>3,6</sup> Because of that, general anaesthesia used to be the preferred technique in myopic patients but this has limitations. Most patients scheduled for cataract surgery are elderly and most of them have a coexisting systemic disease that causes functional limitation and that is why local anaesthetic technique is the preferred technique for most of the ophthalmic operations and was associated with better outcome than general anaesthesia. In our study two young patients refused general anaesthesia. One because of valvular heart disease (double aortic valve disease), the other one is an asthmatic female with past history of caesarean section under general anaesthesia three months ago with severe postoperative respiratory distress that made her refuse general anaesthesia absolutely.

Topical anaesthesia is becoming more accepted worldwide as an anaesthetic technique for cataract surgery amongst doctors but is still not gaining adequate acceptance by patients.<sup>4,11,12,13</sup> However, topical anaesthesia is not and cannot be suitable for all patients.<sup>11,14,15</sup> Peribulbar anaesthesia is the local anaesthesia of choice in complex cataract cases that need total akinesia or iris manipulation and it provides superior akinesia and anaesthesia.<sup>16</sup> Using proper local or general anaesthesia provides a more comfortable situation for the patient and more secure circumstances for the surgeon, minimising the risk of surgical complications.<sup>5</sup> In our country topical anaesthesia is still not an accepted technique by most of the ophthalmologists for cataract surgery. Also preservative free local anaesthetics are not available for supplementation of topical anaesthesia with intracameral injection which is usually needed during topical anaesthesia to decrease intraoperative pain perception.<sup>17</sup>

Although 63.75% of patients had staphylomas, they were all posterior and none of them was medial. This goes with the study of Vohra and Good in which they found no staphylomas at the equator.<sup>7</sup>

More than three quarters of the patients developed adequate akinesia after single percaruncular injection. The remaining received a second injection after which about 92% of the patients developed adequate akinesia. Use of supplementary injections to supplement the initial injection is a common practice in regional anaesthesia of the eye.<sup>18</sup>

In our study the rate of supplementary injections was found to be comparable to the usual rate of supplementary injections in other studies.<sup>9</sup>

In the remaining 8% although akinesia was theoretically inadequate yet there was adequate analgesia that allowed all patients to have operations finished uneventfully. Even in regular peribulbar block, akinesia scores may be inadequate. In these instances reverting to general anaesthesia or supplementing local anaesthesia with intravenous analgesics or with topical or intracameral local anaesthetics provides an alternative to finish the operation successfully.

As most of our patients did not receive any sedation they could report their perception on the adequacy of anaesthesia. The overall patient experience of the operative conditions is adequate and even in patients who found operative conditions bad, pain perception was not so severe and was overcome by intravenous analgesia, so all operations were completed uneventfully and without any complications.

In this study we tried to evaluate the efficiency of single injection percaruncular peribulbar block in myopic patients if peribulbar block was planned. But this should be the technique of choice only if there is contraindication or refusal of other suitable techniques, such as topical anaesthesia or general anaesthesia and after explaining possible risks to the patients.

## Conclusion

Using single injection percaruncular peribulbar local anaesthesia for phacoemulsification in patients with axial myopia is an effective technique.

It should be noted that although a reasonable percent of patients require a supplementary injection yet the technique is effective and the incidence of minor complications is in the accepted range.

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