Original Article

Comparative Analysis Between Peribulbar Block and Subtenon Block in Manual Small Incision Cataract Surgery

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ABSTRACT

Background: Ocular anaesthesia is an important starting step for every ophthalmic procedure. Many anaesthetic techniques are in vogue, each with its advantages and disadvantages. Two most commonly used ophthalmic anaesthetic methods are peribulbar block and subtenon block. Peribulbar block places anaesthetic mixture into peribulbar space via a sharp needle whereas subtenon block places anaesthetic mixture into subtenon space via a blunt cannula. Our study aspires to compare these two anaesthetic blocks in terms of efficacy and safety.

Methods: This a randomised control study aimed to compare subtenon block versus peribulbar block in manual small incision cataract surgery. This study was done in Govt. Medical College, Anantnag & District Hospital Kupwara, Kashmir from August 2020 to August 2022. 814 patients were recruited into study. A subjective pain scale was used to assess pain while as akinesia was evaluated by objective numerical grading.

Results: Patients were divided into two groups: 407 in peribulbar (PB) group and 407 in subtenon (ST) group. The average score for pain during anaesthesia administration was 0.86 for the PB group and 0.29 for ST group. Mode for pain score in PB group was 1 and ST group was 0. Globe akinesia onset was faster in ST group (2.7 ± 1.2 minutes) as compared to PB group (7.1 ± 2.7 minutes). 335 PB group and 301 patients in ST group had good akinesia. 99 and 91 patients showed complications, especially subconjunctival hemorrhage, chemosis and lid edema, in peribulbar and subtenon group respectively.

Conclusion: Subtenon block is a safe, economical, effective and patient-friendly technique of ocular anaesthesia. It does away with sharp needle induced pain and complications of peribulbar block.

Keywords: Ocular anaesthesia, peribulbar block, subtenon block, kupwara.

INTRODUCTION

Cataract is a leading cause of visual impairment and preventable blindness in the world, with an estimated 52·6 million visual impairment cases and12·6 million blindness cases worldwide[1]. Cataract treatment is essentially a surgical one. In recent times, there have been major refinements in cataract surgical techniques. Nevertheless, Manual Small Incision Cataract Surgery (MSICS) continues to be a primary cataract surgery in most developing countries. With patient and surgeon comfort being prime, some form of anaesthesia is a must in MSICS surgery. Cataract patients, mostly being middle-aged or elderly, have multiple comorbidities. An utmost emphasis has to be placed on selecting the least invasive anaesthesia method while maximizing surgical success. Multiple anaesthetic methods are used for MSICS surgeries, ranging from general anaesthesia to "topical anaesthesia". [2]

General anaesthesia is preferred in few situations like in psychiatric patients, children, severe head tremors, allergy to local anaesthetics, highly apprehensive and uncooperative patients. Local anaesthesia is anaesthesia of choice in most routine cataracts. Local anaesthesia has many advantages including safety, preservation of consciousness with active cooperation from patient, low dependence on anaesthetic machinery, low cost, minimal cardiopulmonary stress, and early discharge of patients. Most commonly used local anaesthesia techniques are retrobulbar block and peribulbar (PB) block. [3-5]

Retrobulbar anaesthesia placed the anaesthetic agent directly in retrobulbar space. It was "gold standard" anaesthetic method in cataract surgery for almost a century, but gradually lost its premier place due to its vision and life-threatening complications.

Peribulbar anaesthesia is a relatively safer option with an adequate akinesia and good analgesia but requiring larger volume of anaesthetic agent and higher rate of supplementation. In this type of block, anaesthetic agent was directly injected into peribulbar space. Although complication rate was lower than retrobulbar block but local and systemic complications do occur even with this type of block.

In recent times, newer anaesthetic techniques have been employed to eliminate usage of sharp injection needles and attendant complications. These newer techniques include subtenon anaesthesia, topical anaesthesia and intracameral anaesthesia. Subtenon (ST) anaesthesia is gaining popularity due to its merits like quicker anaesthesia onset, adequate akinesia, better consistency,

higher patient compliance and lower rate of complications. In subtenon anaesthesia, drug is delivered into posterior subtenon space via a blunt curved cannula, hence doing away with pain from needle prick.

MATERIALS AND METHODS

This is a randomised control study aimed to compare subtenon block versus peribulbar block in MSICS with respect to analgesia, akinesia, intraoperative complication profile and visual recovery. This study was conducted in Govt. Medical College, Anantnag & District Hospital Kupwara, Kashmir from August 2020 to August 2022. Assuming 95 percent of power for hypothesis testing, anticipated incidence of primary outcome in 40 and 60 percent in two groups; and alpha of 0.05, a sample size of 350 in each group was calculated. Finally, a total of 814 patients were recruited taking into account any losses to follow up. All the patients admitted for elective cataract surgery, were asked to participate in the trial after a detailed explanation about surgery and the conduct of the study. Written informed consent was obtained separately for surgery and study from each consenting patient. Following exclusions were made: age < 30 or >80 years, allergy to local anaesthetic agents, myopes with axial length greater than 26mm, history of epilepsy or cardiac disorder or bleeding diathesis or dementia, any history of previous intraocular injury/inflammation/surgery and intumescent cataracts. Ethical clearance was obtained from institutional ethical committee. Both anaesthesia techniques i.e. peribulbar and subtenon block are acceptable standards of care for more than a decade. The consent form and information sheets for the patients were designed as per the Helsinki protocol guidelines and administered in local vernacular. A complete ophthalmic examination including best corrected visual acuity, tonometry, lacrimal apparatus evaluation, dilated fundus and slit lamp evaluation was done for all patients. Internist clearance for surgical procedure under local anaesthesia was taken for each patient. Patient was made to open an envelope on entry to theatre to decide about the type of anaesthesia he/she shall be receiving.

Procedure

Topical 2 percent lignocaine was instilled at start for both PB and ST group to check for allergy and have equitable surface anaesthesia for both groups. All anaesthetic injections were administered by 1st author who also assessed the immediate complications of the procedures. Pain intensity and globe akinesia were recorded by another independent assessor.

Peribulbar Block- Patient was informed about the procedure. After checking vitals, local betadine scrubbing was done. Whilst patient is in supine position and eye in primary gaze, anaesthetic injection is placed transcutaneously along lower orbit margin at the junction of medial two-thirds and lateral one-third, inserting needle parallel to floor of orbit. After negative aspiration for blood, 4ml of lignocaine 2% mixed with adrenaline 1:200,000 (5 µg/ml), and hyaluronidase 150 IU/ml was injected. 3ml of same anaesthetic mixture is given along upper orbit margin at the junction of medial one-third and lateral two-thirds, inserting needle vertically down till the needle hub junction reaches iris plane. Intermittent massage was done for 5 min.

Subtenon Block- Patient was informed and vitals checked. After local betadine scrubbing, a small nick was placed on conjunctivotenon layer in inferonasal quadrant 5 to 7 mm away from limbus with the help of a blunt wescott scissors. Gentle blunt dissection was done by closed tip of scissors. A subtenon cannula was passed along sclera following the contour of globe till needle hub touches the conjunctiva and 3ml of lignocaine 2% was injected. A light massage was done for 2 minutes.

Just after injection, whether subtenon or peribulbar, patients were asked to grade pain on a scale of 0-3, with following grades:

0 ....No Pain,

1….Mild,

2… Moderate,

3….Severe.

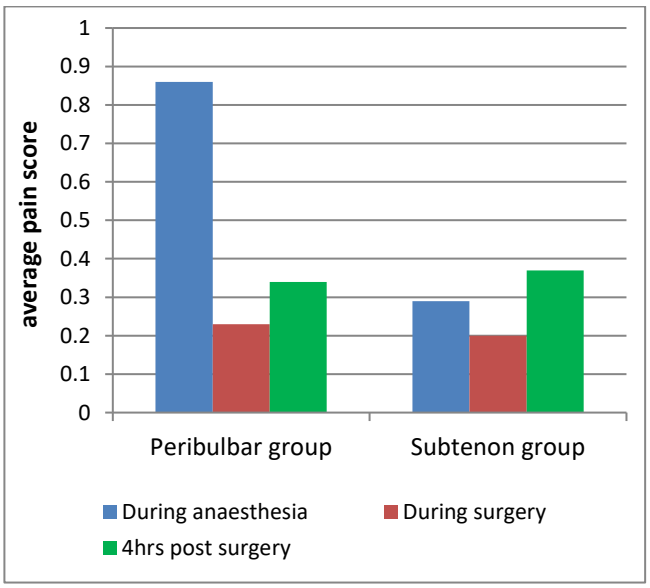
Pain assessment was also done at the end of surgery and 4hrs after surgery using same scale. Measurement of ocular movement in all four quadrants (inferior, superior, medial, and lateral) was performed using a transparent plastic rule with limbus of the appropriate quadrant as reference point. The zero mark of the rule was aligned with the limbus of the appropriate quadrant and patient instructed to look toward that quadrant. The extent of limbal excursion in that direction was read off from the rule. Excursion was scored as: 0- no movement, 1- movement of 2 mm and 2- movement of more than 2 mm. Overall akinesia score was obtained by combining the scores of these four directions of movement. This score ranged from 0 (no movement) to 8 (complete movement) and was categorized into three groups, good akinesia (score 0-2), poor akinesia (3-6) and no akinesia (score 7-8). The motility was assessed every 1 min until good akinesia was attained or up to 10 min after the injection of anaesthesia if otherwise. In case “no akinesia” was not achieved at 10 min, supplementary anaesthetic injection was given. Any anaesthetic or intraoperative surgical complication was noted. The patients were followed on the first postoperative day, first week, third week and sixth week after surgery. Pseudophakic refraction was done at 6 weeks follow-up.

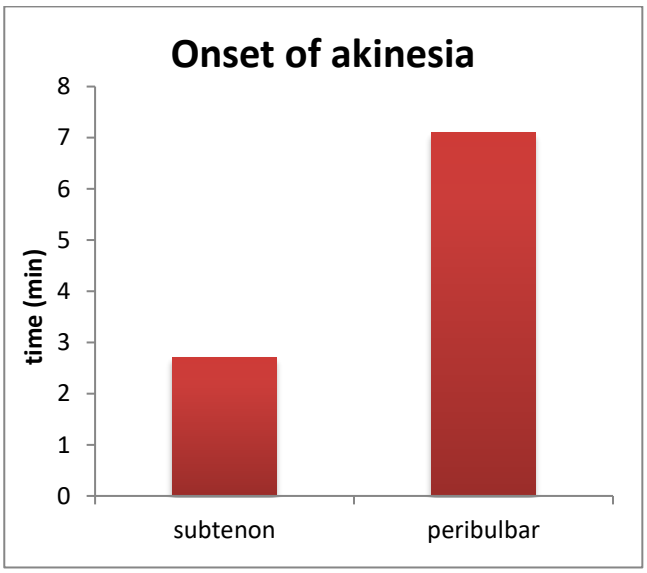
Data collected were entered into a Microsoft Excel spreadsheet and analyzed with Statistical Package for Social Sciences (SPSS) version 20 (SPSS Inc., Chicago, Illinois, USA). For analysis of descriptive statistics, tools like percentage, mean and standard deviation were used. Two sample t test was used to find the associations. Graphically the data was presented with bar diagrams. $P < 0.05$ was taken as statistically significant.

RESULTS

814 patients were recruited in study, with 434 males and 380 females. Age of participants ranged from 32-77 yrs with a mean of 54.36±8.14 yrs. Patients were divided into two groups: 407 in peribulbar group (PB group) and 407 in subtenon group (ST group) with equal gender distribution. 92 patients in PB group and 227 patients in subtenon ST group didn't feel any pain during anaesthesia injection. The average for pain during anaesthesia was 0.86 for the PB group and 0.29 for ST group. Mode for pain score in PB group was 1 and ST group was 0. 21 patients of PB group needed supplemental anaesthesia as opposed to 11 patients of ST group. Average for pain during surgery was 0.23 for PB group and 0.20 for ST group. 53 patients of PB group and 64 patients of ST group experienced pain more than grade 1 at 4 hrs after surgery.

Type of anaesthesia Pain score	Peribulbar group	Subtenon group	P value
During anaesthesia	0.86	0.29	0.002
During surgery	0.23	0.20	0.08
4hrs post-surgery	0.34	0.37	0.51

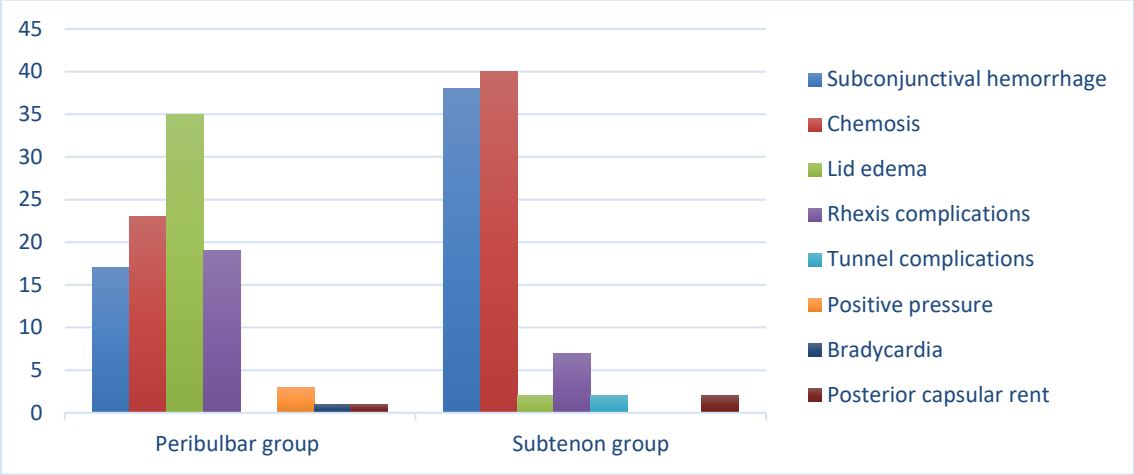




Globe akinesia onset was faster in ST group (2.7 ± 1.2 minutes) as compared to PB group (7.1 ± 2.7 minutes). This difference was statistically significant (P = 0.003). 335 PB group and 301 patients in ST group had good akinesia.

Subconjuntival hemorrhage was seen in 17 patients in PB group and 38 patients in ST group, while as chemosis was seen in 23 patients in PB group and 40 patients in ST group. Lid edema was seen in 35 patients in PB arm as compared to 2 patients in ST arm. Positive posterior pressure requiring mannitol infusion was seen in 3 patients in PB group and none in ST group. One patient had severe bradycardia during anaesthesia in PB block which was treated with intravenous atropine prior to surgery. Two patients in the subtenon group had premature entry during scleral tunnel creation. 19 patients in PB group and 7 patients in ST group had a rhexis extension to periphery. 1 patient in PB group and 2 patients in ST group had posterior capsular rent. No case of retrobulbar hemorrhage or globe perforation was observed in either group.

	Peribulbar group	Subtenon group
Subconjunctival hemorrhage	17	38
Chemosis	23	40
Lid edema	35	2
Rhexis complications	19	7
Tunnel complications	0	2
Positive pressure	3	0
Bradycardia	1	0
Posterior capsular rent	1	2
Total	99	91



Only 734 patients completed follow up which included 360 patients from PB group and 374 from ST group. There was no significant difference in both the groups with regards to best corrected visual acuity after 6 weeks postoperatively. 94.45% of patients in peribulbar group and 93.04% in subtenon group had postoperative best corrected visual acuity of ≥6/9.

DISCUSSION

Ocular anaesthesia ideally aims at providing globe anaesthesia and akinesia without any serious complications. Subtenon and peribulbar blocks are frontrunners in ocular anaesthesiology. Each of these techniques has its merits and demerits. However, subtenon block is gaining popularity owing to its high safety and reasonable efficacy. It differs from its predecessor blocks in that it is performed with blunt instrumentation under direct visualization. A lesser amount of the anaesthetic agent used for subtenon block translates into minimizing chances of adverse effects and maximizing economical efficiency.

Multiple studies showed that in subtenon anaesthesia significantly fewer patients experienced unacceptable levels of pain with patients preferring subtenon anaesthesia over peribulbar and retrobulbar block[3,4,5]. A similar finding was reported by many studies in past[6-10]. However, majority of research literature show that there is no difference in pain intensity between the two techniques during surgery and in the immediate postoperative period, suggesting that both techniques render a similar level of ease to the patients at each stage of the surgery. Concordantly, our study found statistically significant lower pain scores at the administration of anaesthesia in subtenon group as compared to peribulbar group. No difference was seen in pain scores intraoperatively and postoperatively.

Studies also reported that significantly higher number of patients who received peribulbar anaesthesia were given supplementary injection compared to subtenon group[6,11,12]. Concordantly, in our study supplementary anaesthesia was needed in twice the number of patients in PB group as compared to subtenon group.

In our study, the two anaesthetic techniques were comparable in providing globe akinesia for cataract surgery even though time of onset differed. This is in agreement with some authors[6,11, 13] who reported that subtenon block was comparable to peribulbar block in providing adequate globe akinesia and anaesthesia for cataract surgery. In line with the present finding a study by Jayachandran B et al., Ashok A et al. (2018) and Gajanan DC et al. (2014) reported no statistical difference between akinesia of peribulbar and subtenon block among their patients[5,7,14].

The incidence of chemosis was found to be significantly higher (P = 0.005) in the subtenon technique compared to the peribulbar group in a study[10]. Budd et al.[6] and Parkar et al.[11] however, found no difference in the incidence of chemosis between subtenon and peribulbar anaesthesia. Chances of chemosis and subconjunctival hemorrhage increases with injection into anterior subtenon space compared to posterior subtenon space. Studies differ in volume used for PB and ST block. This may account for differing chemosis rates.

It is likely that subtenon anaesthesia offers a significantly reduced risk of complication such as scleral perforation, retro bulbar hemorrhage, optic nerve injury and injection of anaesthetic solution into the subarachnoid space, as no sharp needle is passed into the orbit. Nevertheless, Subtenon block should, however, be used with caution in patients with compromised sclera[11].

None of life or sight-threatening complications e.g. globe injury, retrobulbar hemorrhage, CNS anaesthesia were recorded in our study. This is in accordance to findings in other studies[6,11-17].

This study shows that peribulbar and subtenon routes of administering anaesthetic substance are comparable in providing adequate akinesia and analgesia for cataract surgery. Both anaesthetic blocks caused mild pain during injection, but provided comparable good analgesia during surgery and in the immediate postoperative period. The occurrence of chemosis and subconjunctival hemorrhage though significantly higher in the subtenon group compared to peribulbar group did not call for cancellation of any surgery. There was no life- or sight-threatening complication recorded.

Limitations

Limitations of this study was subjective nature of the visual analog pain scales.

CONCLUSION

Both techniques of peribulbar block and subtenon block are effective and safe in routine small incision cataract surgery with subtenon block presenting ease of administration for the patient.

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