

Sub-Tenon Anaesthesia for Cataract Surgery

Bhaskar Dutt¹, Hariom Khandelwal², Anoop Singh Negi³, Nigar Bari⁴,
Manu Bhardwaj⁵, Nitish Kumar Parmar⁶

¹Assistant Professor, Department of Anaesthesiology and Critical Care, Shri Guru Ram Rai Institute of Medical and Health Science, Dehradun, India

²Associate Professor, Department of Anesthesiology and Critical Care, Shri Guru Ram Rai Institute of Medical and Health Science, Dehradun, India

³Associate Professor, Department of Anaesthesiology and Critical Care, Shri Guru Ram Rai Institute of Medical and Health Science Dehradun, Uttarakhand, India

⁴Assistant Professor, Department of Anaesthesiology and Critical Care, Shri Guru Ram Rai Institute of Medical and Health Science Dehradun, Uttarakhand, India

⁵Senior Consultant, Department of Ophthalmology, Synergy Institute of Medical Sciences, Dehradun, India

⁶Assistant Professor, Department of Anaesthesiology and Critical Care, Amrita School of Medicine, Faridabad, India

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Corresponding author: Dr. Nigar Bari

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Abstract

Introduction: Sub-Tenon block is nowadays most preferred technique for analgesia in many eye hospitals for cataract surgery. It has gained popularity as it has lesser chances of major complications, which were remarkably more with other conventional blocks like peribulbar and retrobulbar blocks. It has been seen that its use is much safer in patients on anticoagulants and antiplatelets drugs. Studies have shown that the incidence of minor sub-conjunctival hemorrhage is increased in patients on aspirin, clopidogrel, and warfarin, but there is no increase in major hemorrhages. According to recent research, more than 87.6% of members of the British Ophthalmic Anaesthesia Society employ this approach in their regular practice. This block has gained popularity in several nations, including the United Kingdom.

Aims and Objectives: To evaluate the efficacy of Sub-Tenon's anaesthesia in cataract surgery.

Methods: The study was conducted on 150 patients who underwent cataract surgery. After topical anaesthesia (0.5% proparacaine), a careful dissection in subtenon space in inferonasal quadrant was done 7-10 mm posterior to limbus and midway between the insertion of medial rectus muscle and the inferior rectus muscle. A blunt-tipped cannula was inserted and 2.5 ml of a 1:1 mixture of 2% lidocaine and bupivacaine 0.5% was injected into the posterior Sub-Tenon's space. The study analyzed presence of chemosis, sub-conjunctival haemorrhage, degree of akinesia, and pain score. The pain was evaluated at the time of administration of the Sub-Tenon block and during the time of surgery.

Results: The study found that while performing STB 59.33% of patients had no pain and around 36.7 % of patients had mild to moderate pain. Most patients developed subconjunctival haemorrhage (94.67%) and chemosis (89.33%). Chemosis and conjunctival haemorrhage were frequent but caused no perioperative problems.

Conclusion: The study concluded that Sub-Tenon block with Topical Anesthesia can be used safely as a sole Anesthesia technique in cataract surgery.

Keywords: Cataract, Sub-Tenon Block/Anaesthesia (STB), Lidocaine, Bupivacaine, Proparacaine.

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Introduction

Turnbull originally described Sub-Tenon block (STB) in 1884 [1], and Swan followed in 1956. [2] Several researchers, notably Hansen and Stevens [3], revisited it in the 1990s [4], and it has since gained more acclaim globally. In many nations, including New Zealand as well as the UK, it is presently the most regularly carried out regional orbital block. According to a nationwide study of current cataract surgical procedures conducted in the UK in 2003, STB was used in 43.5% of operations (up from 7.2% in 1996), peribulbar anaesthesia in 31.6%, and topical anaesthetic in 21.7% of cases. [5]

Cataract surgery and other procedures can be done under intraconal (retrobulbar), extraconal (peribulbar) blocks for complete akinesia. The risk of significant sight and life-threatening consequences from needle blocks are 2.5 times higher in comparison to STB, and as a result, their popularity has decreased. [6,7]

According to recent research, more than 87.6% of members of the British Ophthalmic Anaesthesia Society employ STB in their regular practice. Although doing a STB necessitates some dexterity when using surgical tools, most practitioners become proficient after performing roughly 60 blocks.

Although the method is thought to be generally safe, there have been case reports of mild as well as sight and life threatening issues. Due to the Sub-Tenon's space being widened and stretched, the administration of local anaesthesia may create a minor burning or tingling sensation as well as a feeling of pressure.

Good topical anaesthesia, careful cannula placement and gradual injection can help to lessen injecting pain. Warming the local anaesthetic solution before performing Sub-Tenon's block is a frequent procedure, however, it has not been proven to lessen pain. [8,9]

Materials and Methods

Research Design

The study was conducted on 150 patients who underwent cataract surgery in our hospital from October 2021 to October 2022. After topical anaesthesia (0.5% proparacaine), a careful dissection in subtenon space in the inferonasal quadrant was done 7-10 mm posterior to the limbus and midway between insertion of the medial rectus muscle and the inferior rectus muscle. A blunt-tipped cannula was inserted and 2.5 ml of a 1:1 mixture of 2% lidocaine and bupivacaine 0.5% was injected into the posterior sub-Tenon's space. The surgical procedure was performed immediately after the completion of the anaesthetic procedure and was done by the same surgeon, which lasted for about 15 minutes. The study analyzed the presence of chemosis, subconjunctival haemorrhage, degree of akinesia, and pain score. The pain was evaluated at the time of administration of the subtenon block and during the time of surgery. Akinesia was noted immediately after giving the block and at the end of the surgery. Any complications associated with the block such as chemosis or subconjunctival haemorrhage were also observed at the time of administration of the block.

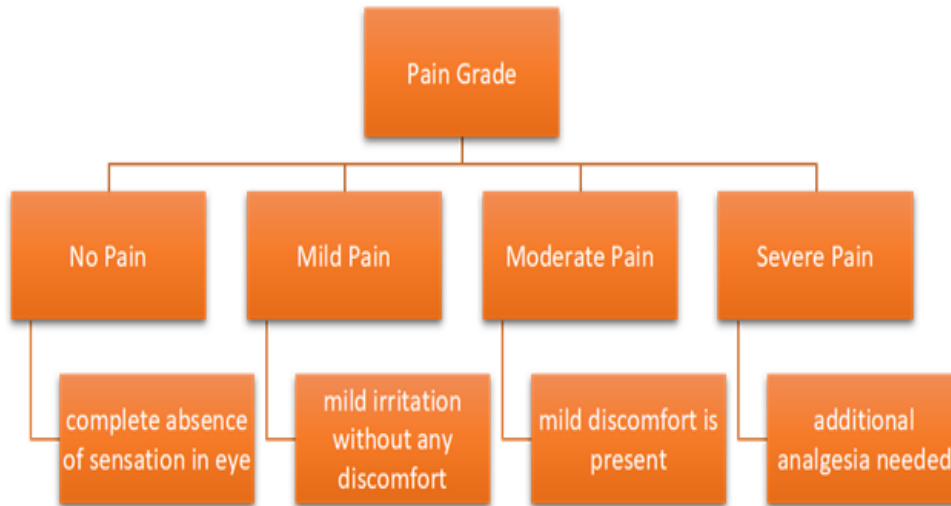


Figure 1: The grading of Pain as done in this study

Grading of Chemosis

GRADE 1	Chemosis in 1 quadrant
GRADE 2	Chemosis in 2 quadrant
GRADE 3	Chemosis in 3 quadrant
GRADE 4	Chemosis in 4 quadrant

Inclusion and Exclusion Criteria

Patients scheduled for cataract surgery who had given written informed consent were taken for the study. The excluded patients were who could not take Sub-Tenon's anaesthesia due to any reason.

Statistical Analysis

The study used MS Excel for effective analysis. The data is expressed as the number of patients and the respective percentages.

Ethical Approval

The authors explained the study process to the patients carefully and obtained written informed consent from each patient. The

study was conducted after approval from the Ethical Committee.

Results

The following results have been observed by the authors.

Pain while performing STB

It was found that while performing STB 59.33% of patients had no pain, around 36.7% of patients had mild to moderate pain. However, 2 patients experienced extensive pain and did not allow to proceed for injection for which additional topical anaesthesia was given and waited until patient felt better and allowed Sub-Tenon injection.

Table 1: Pain experienced by patients while performing STB

Grading of discomforts	No pain	Mild	Moderate	Severe	Extreme
Number of patients	89(59.33%)	47(31.33%)	8(5.3%)	4(2.67%)	2(1.33%)

Subconjunctival haemorrhage (SCH after injection)

Minor complications like subconjunctival hemorrhages and chemosis are more common in Sub-Tenon block. Most of our patients (94.67%) had sub-conjunctival hemorrhage (Table 2).

Table 2: Subconjunctival heamorrhage (SCH) after injection

SCH	No SCH	SCH in 1 quadrant	QuadrantSCH in 2 quadrants	SCH in 3 quadrants	SCH in 4 quadrants
Number of patients	8(5.3%)	110(73.33%)	32(21.33%)	0	0

Chemosis

We noted that 60 % of our patients had chemosis in 1 quadrant and 19.33% of patients had chemosis in 2 quadrants. There was no patient with grade 3 or grade 4 chemosis (Table 3).

Table 3: Chemosis after administration of injection

Chemosis (grade)	Number of patients; n (%)
Grade 1	90 (60%)
Grade 2	29 (19.33%)
Grade 3	0
Grade 4	0

Intraoperative analgesia

We found that 78.67 % of patients had complete intraoperative analgesia, 20% patients felt mild to moderate discomfort during surgery. 2 patients experienced

severe pain for which they were given additional 2.5 ml of anaesthetic solution {total 5 ml}, these 2 patients showed good akinesia after 5 minutes of injection.

Grading of pain	No pain	Mild	Moderate	Severe
No. of patients	118(78.67%)	29(19.33%)	1(0.67%)	2(1.33%)

Post-operative pain

Postoperative period was painless in most of the patients (82.67%), 16.67 % patients had mild discomfort, 1 patient had severe burning sensation and was given tablet Diclofenac 50 mg twice daily for 2 days postoperatively.

Grading of pain	No pain	Mild	Moderate	Severe
No. of patients	124(82.67%)	25(16.67%)	0	1(0.67%)

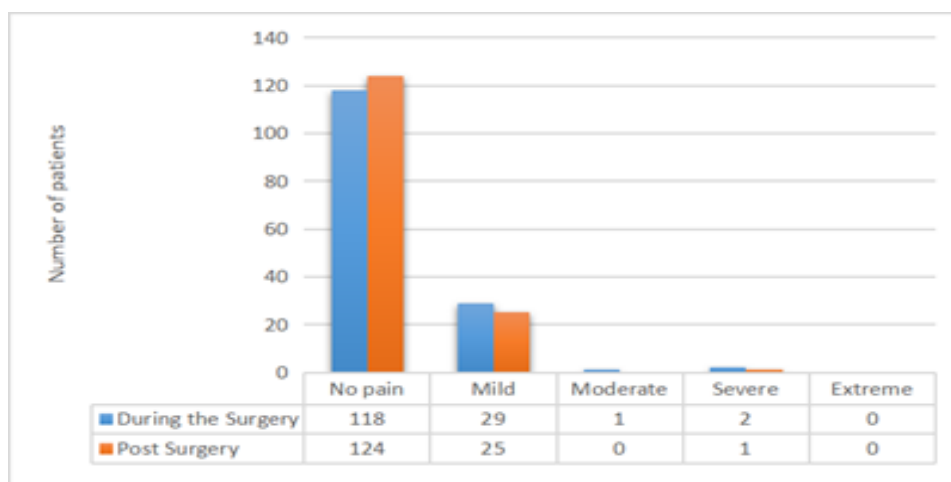


Figure 2: Number of patients during and after the surgery graded for pain

Akinesia

None of our patients had good akinesia. All patients who received 2.5 ml of anaesthetic solution showed full ocular movements at the start of surgery and mild restriction of ocular movements after completion of surgery. Patients who experienced severe pain were given additional 2.5 ml of anaesthetic solution (total 5 ml), showed good akinesia after 5 minutes of injection. We found that akinesia was not achieved in most of the patients. Although patients who received 2.5 ml top up block showed good akinesia after 5 minutes.

Discussion

Sub-Tenon and Topical anaesthesia are two most preferred options for local anaesthesia for cataract surgery nowadays. A study was conducted to evaluate the efficacy of Sub-Tenon's anaesthesia and topical anaesthesia in relieving pain during cataract surgery. It concluded that for cataract surgery, Sub-Tenon anaesthesia offers more effective pain reduction than topical anaesthesia.[10] A randomized control study was conducted to assess the safety and effectiveness of Peribulbar anaesthesia with Sub-Tenon anaesthesia during manual SICS. It concluded that administration of Sub-Tenon anaesthesia is more comfortable for the patient and is as safe and effective as Peribulbar anaesthesia.[11]

Although Peribulbar anaesthesia for cataract surgery was the most widely used method in the preceding ten years, it is not completely free from risks. Different anaesthesia techniques have been created to lessen the risks of damages to intra-orbital tissues. The use of smaller, self-sealing incisions and other advances in cataract surgery have reduced the time required for surgery, allowing for the use of short acting anaesthetics. [11]

Briggs et al did a study to compare Sub-Tenon and Peribulbar block in cataract surgery, they observed that Sub-Tenon's

group had considerably lower pain scores for anaesthesia administration than the Peribulbar approach. The Sub-Tenon's group also needed less anaesthetic solution and less time between administration and operation. [12] Similar to this we also observed that most of our patients experienced no or mild discomfort (90.67%) at the time of administration of block. It was also supported by a study done by Ashok et al, which concluded that Sub-Tenon's group experienced significantly less pain during the time of administration of anaesthesia when compared to peribulbar. [13] Parker et al also found that STB is also more comfortable to perform than peribulbar block.[14] Jung hee et al observed that Sub-Tenon block seems to be better than Retrobulbar block and Topical anesthesia in patient satisfaction, though adequate analgesia was achieved after retrobulbar block during cataract surgery under monitored anesthesia care. [15]

In our study we noted that 78.67 % of STB patients had complete intraoperative analgesia. A study conducted by Fukasaku H et al showed the comparison of the quality of analgesia between Topical, Retrobulbar, and Sub-Tenon's techniques found that 99% of Sub-Tenon's patients had complete intraoperative analgesia compared to 83% of Retrobulbar and 69% of Topical patients. [16] M Davidson et al noted that Sub-Tenon anaesthesia provides better pain relief than Topical anaesthesia for cataract surgery. More serious complication of posterior capsule tear and vitreous loss occurred twice as much in the Topical group than with Sub-Tenon anaesthesia (4.3% versus 2.1%). [17]

Reeja M Antony et al observed that Sub-Tenon's block is an effective and safer technique of ocular anesthesia for SICS. It can be considered as an alternative to the conventional peribulbar block for SICS.[18] In our study we noted that most of our patients (94.67%) had sub-conjunctival hemorrhage. Chemosis was

observed in 79.33 % of patients, which subsided at the end of surgery.

Similar findings were observed by Oyebola et al, who concluded that the use of Sub-Tenon block resulted in lower pain scores and higher patient's satisfaction than peribulbar block. However, sub-conjunctival hemorrhage and chemosis were more common with Sub-Tenon block.[19]

In our study we did not find any sight threatening or life-threatening complication, it could be due to low sample size. However, few other studies have reported these complications in low rate as compared to other techniques requiring sharp needle entry into the orbit.

Frieman and Friedberg reported an episode of globe perforation that occurred in a patient with scleral scarring resulting from previous retinal detachment surgery. [20] A recent large UK survey found a lower rate of serious complications with Sub-Tenon's block compared with Retrobulbar and Peribulbar techniques. [21] Although the reasons for some of the complications are not clear but most sight and life-threatening complications appear to be related to inappropriate or poor technique. In our study there was no major anaesthesia related complication. Although chemosis and sub-conjunctival haemorrhage were frequent but caused no intraoperative and post-operative problems.

Guisse PA et al also noted that Sub-Tenon blocks are associated with less frequent complication rate and can be accepted as a safer alternative. [23] Kumar CM et al noted that a shorter, less rigid or flexible cannula and lower volume of local anaesthetic agent can improve the safety profile of Sub-Tenon's block. [22]

Postoperative period was comfortable for most of our patients (82.67%), 16.67% patients had mild discomfort. Overall patients were very much satisfied specially those patients who had undergone other

eye cataract surgery previously under Peribulbar or Retrobulbar block. [24]

Conclusion

The study concluded that Combined Topical Anesthesia and Sub-Tenon's block can be safely used as sole Anaesthesia technique in many eye surgeries as it provides effective analgesia, limited kinesis, and very low risk of serious complications, with avoidance of sharp needle entry into the orbit of the eye. However, there is a need to conduct more studies with varied subjects and other properties should be studied. There is also a need to study the effect of Sub-Tenon's block in patients with prior abnormalities of the eye. Overall, this current study has brought forward an important finding regarding the role of Sub-Tenon's block as intra-operative Anaesthesia technique and its role in post-operative analgesia in Cataract Surgery.

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