

Anaesthesia in various anterior segment complications of sub-Tenon surgeries

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Abstract

Objective: The sub-Tenon's space is a potential space between the capsule and the sclera. This study evaluated complications from sub-Tenon's anaesthesia in different corneal and anterior chamber ophthalmic surgical procedures.

Methods: The prospective cross-sectional study was carried out at the Baqai Medical University, Karachi, from March 2010 to August 2011, and comprised 149 patients for various minor and major intraocular surgeries. All the patients were operated under sub-Tenon's anaesthesia, administered in the inferio-nasal quadrant with a 19G cannula. Their complications were noted on a specific proforma. Data was analysed for frequencies of complications. SPSS 13 was used for statistical analysis.

Results: There were 82 (55%) males and 67 (45%) females who underwent surgery. There were 89 (59.7%) right eyes and 60 (40%) left eyes. The commonest surgery was phaco-emulsification (n=79; 53%), followed by extracapsular cataract extraction with intraocular lens implantation (n=33; 22.1%). Subconjunctival haemorrhage (n=75; 50.3%) was the commonest complication, and the least common was pain during injection (n=9; 6%).

Conclusion: There was no incidence of life-threatening or sight-threatening complications. The procedure was almost pain free and can be simply, safely and effectively given by the beginners with due precautions.

Keywords: Sub-Tenon anaesthesia, Phacoemulsification, Karachi. (JPMA 63: 548; 2013)

Introduction

Akinetic blocks in ophthalmology, such as intraconal (retrobulbar), extraconal (peribulbar) and combined intraconal/extraconal (retro/peribulbar), are the commonest techniques practised around the world. The complications related to needle block, such as retrobulbar haemorrhage, globe perforation, retinal vascular obstruction, cardiorespiratory arrest and even death, although rare, have been reported.¹

Sub-Tenon's block is a simple, safe, effective and versatile alternative² to a sharp-needle block. This technique was first described by Turnbull in 1884³ and later by Swan in 1956.⁴ This block is also known as parabolbar block,⁵ pinpoint anaesthesia⁶ and episcleral block.⁷ Sub-Tenon's block involves obtaining surface anaesthesia, gaining access to the sub-Tenon's space, which is a potential space between the ocular capsule and the sclera., insertion of a cannula and subsequent administration of local anaesthetic agent.⁸

Sub-Tenon's block has been used for a large number of corneal and anterior chamber ophthalmic surgical procedures, including cataract surgeries, vitreoretinal surgeries,⁹ panretinal photocoagulation,¹⁰ strabismus

surgeries,¹¹ trabeculectomy,¹² optic nerve sheath fenestration,¹³ chronic pain management¹⁴ and therapeutic delivery of drugs.¹⁵ It does not need a large injectable volume and is found to achieve better success rate when compared to retrobulbar, peribulbar and topical anaesthesia.

The technique initially appears to be intimidating, but with practice it becomes easier to learn and perform. It eliminates the risks of sharp-needle techniques, provides reliable anaesthesia and has the potential for further supplementation for prolonged anaesthesia and post-operative pain relief.¹⁴ It can be safely used in patients, as shown in many published studies¹⁶ relating to this block.

The current study planned to evaluate its complication rates in various anterior segment surgeries at the particular institute.

Patients and Methods

The prospective cross-sectional study was carried out at Baqai Medical University, Karachi, from March 2010 to August 2011. An approval of the study design was taken from the Ethics Committee of the hospital. All patients signed an informed consent for this study and surgeries. Non-probability convenient sampling technique was used to select patients who had come for various minor and major intraocular surgeries. These surgeries included phacoemulsification, extracapsular cataract extraction (ECCE) with intraocular lens implantation,

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trabeculectomies, pterygium excision with conjunctival auto-grafting, iridectomy, anterior chamber (AC) wash, secondary intraocular lens (IOL) and iris reposition.

The sample size was estimated by using the World Health Organisation's software edited by S. Lawanga and S. Lemeshow¹⁷ where level of significance $\alpha=5$, $1-\beta=90$, test value of population proportion $P_o=0.48$, anticipated value of the population proportion $P_a=0.36$.

Against a calculated sample size of 144, the study recruited 149 to avoid the chances of type 2 error.

Patients who had contraindications to sub-Tenon anaesthesia, such as clotting abnormalities, impaired mental status and uncontrolled glaucoma, were excluded. Sub-Tenon anaesthesia was performed and all the findings were then documented on a pre-designed proforma. Statistical analysis was then done on SPSS version 13. Main outcome measures were types of surgeries and frequencies of complications. Chi square test was applied for the complications of phacoemulsification/ECCE with pterygium excision, A/C wash, iris reposition, secondary IOL, iridectomy and trabeculectomy in comparison with subconjunctival haemorrhage, chemosis and repeat injections and pain during injections for statistical significance.

Sub-Tenon Anaesthesia Procedure

At the time of surgery, patients were placed in the supine position. The conjunctiva was first anaesthetised with a topical anaesthetic solution proparacaine 0.5%. The anaesthetised conjunctiva was then cleaned by carefully placing a few drops of 5% povidone iodine beneath the lower eyelid. The rest of the orbital margins were cleaned with the remaining solution. An eyelid speculum was inserted to improve access and prevent blinking. The patient was asked to look up and out to expose the inferonasal quadrant. A small tent of conjunctiva (together with the underlying Tenon's capsule) was raised with a pair of blunt, non-toothed forceps approximately 5-10mm from the inferio-nasal limbus. A small incision was made in the tissue, using a pair of Westcott ophthalmic scissors, exposing the white 'marble' like sclera below. A blunt and curved cannula of 19G and 25mm in length was inserted, with the local anaesthetic of 3ml passed posteriorly, following the curvature of the globe, until its tip was perceived to have passed the equator. After the removal of the cannula, gentle pressure was applied to the globe for about one minute to assist in the spread of the local anaesthesia. The onset of analgesia was usually rapid, whereas maximal akinesia took upto 10 minutes to develop. Should the block not appear to be adequate after 5 minutes, as indicated by the absence of developing

akinesia, a further top-up was given through the pre-existing incision. We used a combination of xylocaine 2% with adrenaline (plain xylocaine where adrenaline was contraindicated) and bupivacaine (0.5%) in equal proportion, without the addition of hyaluronidase. Degrees of chemosis, subconjunctival haemorrhage or any other complication due to anaesthesia were noted.

Results

Of the total 149 subjects, there were 82 (55%) males and 67 (45%) females. There were 89 (59.7%) right eyes, and 60 (40%) left eyes. Phacoemulsification was the most commonly performed surgical operation (n=79; 53%) (Table-1).

The most frequent complication was subconjunctival

Table-1: Surgical techniques performed with Sub-Tenon's anaesthesia.

Type of Surgery	Frequency	Percentage
Phacoemulsification	79	53%
ECCE	33	22.1%
Pterygium excision with conjunctival autograft	21	14.1%
Trabeculectomy	7	4.7%
A/C Wash	2	1.3%
Iris reposition	3	2%
Secondary IOL	1	0.7%
Iridectomy	3	2%

ECCE: Extracapsular cataract extraction. A/C: Anterior chamber.

Table-2: Post-surgical complications.

Surgical Complication	Frequency	Percentage
Subconjunctival haemorrhage	75	50.3
Chemosis	23	15.4
Pain during injection	9	6
Repeat Injections	9	6

haemorrhage (n=75; 50.3%), followed by chemosis (n=23; 15.4%) (Table-2).

There was non-significant association between subconjunctival haemorrhage, chemosis and repeat injections and anterior chamber surgeries ($p > 0.05$).

On the other hand, there was significant association with pain during injection ($p < 0.05$). No serious life-threatening or sight-threatening complication was noted.

Discussion

Most of the cataract removed by phacoemulsification is performed under topical anaesthesia, but when cataracts removed by extracapsular surgeries are indicated or certain other anterior segment surgeries which require a

regional block, sub-Tenon anaesthesia has emerged as a safe and effective method for anterior segment intraocular surgeries.

An eye block technique would be ideal when it provides globe analgesia, akinesia, and absence of pressure on the globe, minimal injectable volume, without serious complications.¹⁸ The sub-Tenon's approach to ocular local anaesthesia differs from retrobulbar and peribulbar methods in that it is performed using blunt instrumentation with direct visualisation and, therefore, it is relatively safer.¹⁹ The delivery of sub-Tenon's anaesthetic is effective and reliable in producing both akinesia and anaesthesia.²⁰ Sub-Tenon's anaesthesia appears to be a more effective method of anaesthesia than the peribulbar method.²¹ Over the years, a large number of complications both minor and major have been reported.²² Minor complications such as pain during injection, chemosis, conjunctival haemorrhage and leakage of local anaesthetic are common.²³ Sub conjunctival haemorrhage was the commonest complication noted in our study, accounting for 50% of cases. The incidence of redness varies from 20-100% depending on the length of cannula used.²³ One of the reasons being shorter cannulae. It is usually due to tearing of small blood vessels during conjunctival or tenons capsule dissection. It is mostly limited to the area of dissection, but can spread to other quadrants. The incidence of conjunctival haemorrhage is higher in patients receiving an anti-coagulant, as aspirin and clopidogrel.²⁴ Greenbaum advised cauterisation of conjunctival blood vessels before making a buttonhole to lower the incidence of haemorrhage.⁵

Chemosis is one of the recognised side effects of sub-Tenon's anaesthesia, which was 15.4% in this study. Its incidence is lower compared to other results. It was 23% with posterior metal cannulae and could be up to 100% with shorter cannulae, but little practice is required to deliver the anaesthetic solution to posterior sub-Tenon's space and not to the anterior subconjunctival space.²³ Chemosis is unavoidable, but is more likely to occur if dissection of Tenon's capsule is not adequate or a large volume of local anaesthetic is injected. This is usually limited to the site of injection, but may spread to other quadrants of the globe.²³

Inadequate anaesthesia in our patients was 6% and we had to repeat injections. Akinesia is volume dependent. Superior oblique muscle and lid movements may also remain active in a significant number of patients.²²

Pain experienced by the patient was just 6% in our study and it could be because of good surface anaesthesia. The

incidence of pain during sub-Tenon's injection reported in various studies varies up to 44% of patients.^{2,8,18} Pre-operative explanation of the procedure, good surface anaesthesia, gentle technique, slow injection of warm local anaesthetic agent and reassurance are considered good practice and may reduce the discomfort and anxiety during the injection.²²

Reports include orbital and retrobulbar haemorrhage due to trauma to blood vessels, rectus muscle paresis by direct trauma from the blunt cannula (ptosis and diplopia), orbital swelling resulting from inflammation, allergy and excessive growth of orbital tissue. Serious life-threatening complications such as central nervous system spread of local anaesthetic causing death have occurred. Sight-threatening complications such as globe perforation, retinal and choroidal vascular occlusion and optic nerve damage (dilated pupils, loss of accommodation, and optic neuropathy) are all reported. Other complications include conjunctival inclusion cyst, intractable glaucoma and cutaneous hypopigmentation are also noted. Many of these complications may be related to inadequate technique or deep insertion of long posterior sub-Tenon's cannula, which enters the posterior part of the sub-Tenon's space.²⁵ Careful dissections and slow introduction of a posterior cannula without force is advised. If any resistance is met during insertion of a cannula, it should be withdrawn, re-positioned and re-introduced. The use of smaller and flexible cannulae may offer benefits, but the incidence of chemosis and conjunctival haemorrhage increases.²⁶

Conclusion

Sub-Tenon's block can be safely and effectively used in various anterior segment surgeries. Life-threatening and sight-threatening complications have occurred in reported cases. Knowledge about orbital anatomy and precautions can prevent minor and major complications. It is simple, safe and effective both for the beginners as well as the experts.

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