

Sub-Tenon Injection: A Local Anesthetic Technique for Cataract Surgery

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ABSTRACT

This study aimed to demonstrate safety and effectiveness of sub-Tenon injection in cataract surgery. In this retrospective descriptive case series study, data from 668 patients undergone cataract surgery during December 2005 and April 2007 were collected. Objective evaluation included all kinds of complications while the subjective evaluation was based on patient-reported pain level during surgery. It was found that number of male (n = 320) and female (n = 348) patients were somewhat equal. The results showed that all complications were minor ones including subconjunctival hemorrhage during cutting conjunctiva in all cases, conjunctival chemosis (17%) and ocular akinesia (65%). No major complications were found. Half of the patients reported no pain during surgery (52%), while one-third reported mild pain (33%) and 15% reported moderate pain. No patients reported severe pain. In conclusion, sub-tenon injection is a safe and effective anesthetic technique for cataract surgery.

Key words: cataract surgery, sub-Tenon injection, local anesthesia

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Introduction

Cataract surgery is a common operation in ophthalmology. Two methods for anesthesia in cataract surgery include the local and general ones. In most cataract surgeries, when not contra-indicated, anesthesia can be sufficiently provided by local anesthetics. Ophthalmologists usually perform local anesthetics themselves. Various common techniques for local anesthetics have been used. These include retrobulbar, peribulbar, topical, subconjunctival, and sub-Tenon injections. Issues surrounding the effectiveness and safety of sub-Tenon injection and other techniques may include how definite each technique is associated with a greater degree of patient comfort, pain control, ease of performing surgery, and freedom from anesthesia-related complications including brainstem anesthesia(5), retrobulbar hemorrhage and globe perforation.¹⁻⁴ Up to

date, evidence has been increasingly supporting that sub-Tenon injection can be an acceptable method of anesthetics for cataract surgery.

In a study by Waterman and colleagues (2002) where sub-tenon injection was used, akinesia was found inadequate in only 7.1% of cases.⁵ Out of 10, pain control was satisfactory with only 3 patients reporting a score of 3 or higher, where higher score indicated more intense pain. When assessed by the surgeons, pain relief was inadequate in only 8.1%. This resulted in a 5.3% of patients requiring a top up of anesthesia. With the patient's comments indicating acceptance of the service, they concluded that sub-Tenon local anesthesia was effective and safe.

The work of Tokuda et al (2000) also suggested that sub-Tenon injection of lidocaine offered a higher degree of pain control than did retrobulbar injection.⁶ In addition, AHRQ has summarized that it was considerably

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confident that sub-Tenon injection was less painful than retrobulbar injection during administration although not quite certain whether it was better than peribulbar block.⁷ During cataract surgery, it was fairly certain that sub-Tenon block was better than retrobulbar injection in pain control whereas it was clear that pain control by retrobulbar and peribulbar methods was equivalent.

With a somewhat supporting evidence for and increasing use of sub-Tenon technique in Thailand, this study aimed to demonstrate safety and effectiveness of sub-Tenon injection technique in cataract surgery on collective cases in a general hospital. The results could add to the existing evidence and the advocate of future use can be independently decided by clinicians.

Materials and Methods

This descriptive case series study was a retrospective investigation. The study was based on data of collective cases of patients undergone cataract surgery at Nakhonnayok Hospital, a general hospital in the province of Nakhonnayok, Thailand. Data of cataract surgeries during December 2005 and April 2007 were abstracted and examined. We included all cases of cataract surgery of male and female patients undergone cataract surgery either with phacoemulsification or extracapsular cataract extraction (ECCE) techniques. However, patients documented not cooperating with local anesthesia procedure were excluded from the data collection.

Anesthetic technique using sub-Tenon injection

In administering local anesthesia, the surgeon (the author) performed the following steps:

1. Identify the injection site (inferomedial part of the globe, 5 mm apart from limbus).
2. Locally infiltrate into conjunctiva with 0.1 mL of 2% lidocaine at the injection site.

3. Use Wescott to cut the infiltrated conjunctiva by 2 – 3 mm in length, about 5 mm apart from inferomedial limbus.
4. Separate sub-Tenon tissue to expose underlying sclera.
5. Put the syringe (filled with 3 mL of 2% lidocaine and capped with irrigated canula) beneath sub-Tenon (above sclera), curved along the globe posteriorly and medially.
6. Slowly inject 3 mL of 2% lidocaine beneath sub-Tenon, above adjacent sclera.
7. Wait for 1 minute then begin cataract surgery.

Outcomes evaluations

We examined the outcomes of sub-Tenon injection in two fashions, objective and subjective evaluations. In objective evaluation, the surgeon (the author) recorded all kinds of complications. These included but not limited to minor complications (subconjunctival hemorrhage during cutting conjunctiva, conjunctival chemosis, ocular kinesia) and major complications (retrobulbar hemorrhage, globe perforation).

In terms of subjective evaluation, at the end of the operation the surgeon asked the patients about pain during operation. This pain was graded into different levels from no pain, to mild, moderate and severe pain.

RESULTS

There were a total of 668 patients underwent cataract surgery during December 2005 and April 2007. The subjects' gender was somewhat equal in number, 320 men and 348 women. The average age was 62 years (48 - 81 years).

In terms of objective evaluations, it was found that all complications were minor ones including the common subconjunctival hemorrhage during cutting conjunctiva found in all cases, conjunctival chemosis (17%) and ocular kinesia (65%). No major complications (retrobulbar hemorrhage, globe perforation) were found in these patients.

Regarding subjective evaluations, about half of the patients stated no pain (52%), while one-third with mild pain (33%) and 15% with moderate pain. No patients reported severe pain.

Discussions

Retrobulbar block has been traditionally used in cataract surgery because it provides excellent ocular akinesia and anesthesia. Despite its wide use, various disadvantages of retrobulbar injection were reported. These include retrobulbar hemorrhage^{1,4}, globe perforation^{2,3}, optic nerve trauma, muscle damage, inadvertent intravenous injection associated with cardiac arrhythmias^{8,9}, inadvertent intradural injection associated with seizures, respiratory arrest, brain stem anesthesia¹⁰, diplopia (because of ocular akinesia) and retinal vascular obstruction¹¹.

Peribulbar block has anesthetic effect and some akinesia effect. It poses no risk of optic nerve injury and little risk of globe perforation. However this technique hardly provides a good block.¹² Topical anesthetics method possesses many advantages especially decreased risk of major complications. Unfortunately, it provides anesthesia without akinesia effect. Injection of local anesthetics into the sub-Tenon's space has become a popular method of local anesthetics in cataract surgery because of its anesthesia and some effects of mydriasis and akinesia, and almost no risk of globe perforation, retrobulbar hemorrhage, diplopia and optic nerve injury.¹³ Despite a rare occurrence of retrobulbar hemorrhage, surgeons should be aware of its odds.⁴

In our study, sub-Tenon injection was quite effective with an acceptable range of safety profile similar to the results from other studies.^{5-7,12} In conclusion, sub-Tenon injection technique has various advantages including a short learning curve and no special instrument required. Disadvantages of the technique including conjunctival chemosis, subconjunctival hemorrhage, ocular kinesis and pain during surgery have been found but within acceptable range.

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