Incidence and factors associated with complications after retrobulbar anesthesia in Thailand: results from King Chulalongkorn Memorial Hospital

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\textit{Background:} Retrobulbar anesthesia is a routine regional block for various ocular surgeries, but serious complications may occur. There have been no previous incidence reports and associating factors with these complications in Thailand.

\textit{Objective:} To study the incidence and factors associated with complications after retrobulbar anesthesia in Thailand.

\textit{Methods:} Samples were all consecutive cases undergoing retrobulbar anesthesia at King Chulalongkorn Memorial Hospital between June 2006 and May 2007. All subjects have given informed consent to participate in the study. The variables recorded included the subject baseline data, the retrobulbar block technique, and complications. Descriptive statistics and multiple logistic regression were used to analyze the data.

\textit{Results:} One thousand eighty eyes from 1072 patients were studied. Underlying systemic diseases were present in 48.1% of cases. Underlying ophthalmic diseases included glaucoma 3.5% and retinal diseases 3.5%. Thirty-four percent of the eyes underwent phacoemulsification and 24.1% underwent extracapsular cataract extraction. Pars plana vitrectomy was performed in 25.9% of the eyes. Other procedures included corneal surgery, strabismus correction, endoscopic cyclophotocoagulation, and evisceration. The majority of the retrobulbar block was performed by the first year residents (67.3%). All of the blocks were performed by dominant hands. Complications after retrobulbar block were seen in 4.7% (95% CI=3.5-6.0%) of the eyes. Lid swelling, chemosis, and ecchymosis were seen in 23 eyes (2.1%). Retrobulbar hemorrhage was detected in 24 eyes (2.2%). Optic nerve injection and subarachnoid injection were seen in four eyes (0.4%). Factors associated with severe complications were patient age of 60 years or more, and history of recent use of anticoagulants.

\textit{Conclusion:} The incidence of complications after retrobulbar block is 4.7% of the eyes. Severe complications occur more frequently in elderly patients and recent use of anticoagulants.

\textit{Keywords:} Anesthesia, associating factors, complications, incidence, retrobulbar.

Anesthesia for ocular surgery are usually either general anesthesia or regional anesthesia. General anesthesia is often used in young or poorly cooperative patients, emergency cases, or in operations with a long surgical time. Most elective operations require regional anesthesia due to short operative time, cooperative patients, and effective analgesia. The advantages of regional anesthesia over general anesthesia are shorter stay at hospital, earlier patient ambulation, and lower cost.

Retrobulbar anesthesia is one of the most effective techniques for ocular regional anesthesia [1], but serious complications may occur, e.g. retrobulbar hemorrhage [2], scleral perforation [3-5], extraocular muscle paresis [6], occlusion of retinal vessels [7-9],

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retinal detachment [9], optic nerve anesthesia leading to blindness [10], brain stem anesthesia [11, 12], and cardiopulmonary arrest [13].

Researchers from Saudi Arabia [2] and England [14] have reported the incidence of retrobulbar hemorrhage after retrobulbar block of 0.4% and 1.3%, respectively. Another report from Germany found a 0.8% incidence of periorbital hematoma as a result from retrobulbar anesthesia [15]. The previously reported incidence of scleral perforation varied from 0.007% [3] to 0.075% [5]. These unfortunate complications may lead to eventually disastrous consequences.

Despite the inadvertent complications related with the procedure, and an alternative method proven to be as effective as retrobulbar anesthesia in extracapsular cataract extraction [16], data from a survey in 2004 showed that ophthalmologists in Thailand still used this type of block in 30.3% of phacoemulsification, 62.7% of extracapsular cataract extraction, and 81.1% of intracapsular cataract extraction [17]. Therefore, this research was intended to study the incidence and associating factors of retrobulbar block complications, in order to identify the avoidable risk factors for developing severe complications and hopefully can prevent the incidents.

Methods

The study protocol was approved by the Ethics Committee of the Faculty of Medicine, Chulalongkorn University. A prospective cohort study was conducted. We included all patients who underwent retrobulbar anesthesia at the Department of Ophthalmology between June 2006 and May 2007. All patients were approached and asked for written informed consent before enrollment.

Data were collected from the patient interview and hospital records. Demographic data including patient age and gender, patient baseline characteristics, e.g. underlying diseases, past and concurrent use of medications, axial length, types of operations, anesthetic techniques, status of the anesthesia giver, facial nerve block, methods of orbital compression after anesthesia, and any complications from the anesthesia were recorded. The complications were recorded in the operating room and at the follow up period for at least three days. These complications were categorized into mild complications which is self-limited and not necessary to cancel the operation (such as eyelid swelling, eyelid bruising, subconjunctival hemorrhage, and chemosis), and severe complications which may lead to blindness and death (such as retrobulbar hemorrhage, scleral perforation, optic nerve anesthesia, brain stem anesthesia, injection of anesthetics into the subarachnoid space, and cardiopulmonary arrest). Descriptive statistics were used to display the findings. Multiple logistic regression was used to analyze for the associating factors.

Results

One thousand eighty eyes from 1072 patients were studied. Patient demographic data and baseline characteristics are shown in Table 1. Most patients underwent elective cataract surgeries (58.1%), which consisted of phacoemulsification in 33.9% and extracapsular cataract extraction in 24.1%. Other operations were pars plana vitrectomy (25.9%), corneal surgery (5.3%), strabismus correction (4.9%), endoscopic cyclophotocoagulation (2.4%), and evisceration (1.6%). The mean axial length, measured from 627 eyes, was 23.28 (SD:1.23) mm.

Of 1080 eyes, the retrobulbar anesthesia was performed by the first year residents in 67.3%, second and third year residents in 26.5%, fellows in 4.6%, and staff members in 1.6%. The anesthesia techniques showed some variations. The initial skin penetration of the needle was at the inferotemporal region in all cases, but the patients were asked to look straight in 99.4%, and to the superonasal side in 0.6%. Sixty-five percent of eyes were blocked only once, and 35.0% were blocked more than once. Facial nerve blocks were done in 99.3%.

All the anesthesia givers used their dominant hands to perform the blocks, in which 95% of them were right-handed. During the block, the patients lay down on the bed and the anesthesia giver approached them from above, using the same side of hand with the patient’s eye in 56.5%, and the opposite side of hand to the patient’s eye in 43.5%. Orbital compression after the primary block was done by manual compression in 58.2%, pinky ball application in 13.1%, manual compression plus pinky ball application in 28.2%, and Honan balloon in 0.5%.

Retrobulbar anesthesia complications were seen in 51 eyes of 51 patients out of 1080 eyes blocked, as detailed in Table 2. Severe complications (optic nerve anesthesia and/or subarachnoid injection of anesthetic) were found in four eyes of four cases. All cases were immediately treated and the operation were canceled. Fortunately, all of them recovered well.
The multiple logistic regression has shown that the factors associating with severe complications were patient age of 60 years old or more (OR=3.23, 95%CI=1.11-9.44, p=0.032), and history of recent anticoagulant use, even after an appropriate time of discontinuation before anesthesia (OR=3.39, 95%CI=1.32-8.70, p=0.011).

The factors for mild and fast-recovered complications without leaving sequel such as eyelid swelling and/or conjunctival swelling or subconjunctival hemorrhage showed no statistical significance. We also tested for the association between patient underlying diseases, status of the anesthesia giver, anesthetic techniques, and hands used to perform anesthesia with the overall complications. We could not demonstrate statistical significance in any of the factors tested.

**Discussion**

The incidence of retrobulbar block complication in this study was quite low (4.7%). Nearly half of the circumstances were mild, which might have hindered the surgical field but not the patients’ final visual outcome.

Retrobulbar hemorrhages were found in 2.2% (95%CI=1.3-3.1%) of the eyes blocked, which was slightly higher than those reported in Saudi Arabia (0.4%) [2] and England (1.3%) [14].

No case of scleral perforation was found. This type of complication was uncommon, as the reported incidence ranged from 0.007% [3] to 0.075% [5]. If the “Rule of Three” was applied to calculate for the upper level of 95% confidence interval [18], the incidence might be as high as 0.28% in our setting.

This study has shown that the patient history of recent anticoagulant use is associated with severe complications. However, a study of 1383 patients concluded that anticoagulant use did not predispose to periorcular hemorrhages after retrobulbar/peribulbar block [19]. The finding of the other associating factors (patient age of 60 years old or more) has never been reported.

The limitation of the study was that the study power might not be sufficient to detect some important associating factors because the incidence of the complications after retrobulbar block was rather low.
Conclusion

The complications of retrobulbar anesthesia were rather low. Almost half of them were mild and self-limited without permanent sequelae. Severe complications were associated with patient age of 60 years old or more, and patient history of anticoagulant use, even with an appropriate time interval of drug discontinuation before anesthesia. These findings may help the anesthesia giver to identify those patients at risk, and provide them with a safer care.

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References