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EDITORIAL BROAD

Vol. 15 Issue 1 **January-June 2020**

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Data and knowledge to empower healthcare in South East Asia and beyond

To our readers,

Welcome all readers to this new issue of EyeSEA journal. On behalf of the editor, I am very pleased to provide innovative and informative academic knowledge from over South East Asia cramping in this issue to your hand.

In era of COVID-19 pandemic, I believe that the mainstay of fighting this villain is the Up-to-date scientific knowledge and clinical researches. We continue our focus on publishing data that represents the South East Asian population in all domains of Ophthalmology. We offer a non-bias avenue for publication of ideas, original studies, case reports, educational articles and reviews to a broad-ranging readership. We trust that anyone with an interest in Ophthalmology will browse through our journal and discover something interest, significance and value.

Our continued growth of authorship and readership has been reflected in the great variety of articles compiled in this current release. This success would not be possible without dedication and encouragement from our authors, reviewers, and editorial team.

Our editorial team is committed to the constant improvement of publication standards, supported by your great contributions to literature. Thanks to our many readers who improve the quality of this journal by increasing its readership and interest to authors. We will continue its way to attain the highest level of international recognition and readership.

Warmest regards,

Associate Professor Sakchai Vongkittirux, MD
Head of Thammasat Eye Center,
Faculty of Medicine Thammasat University
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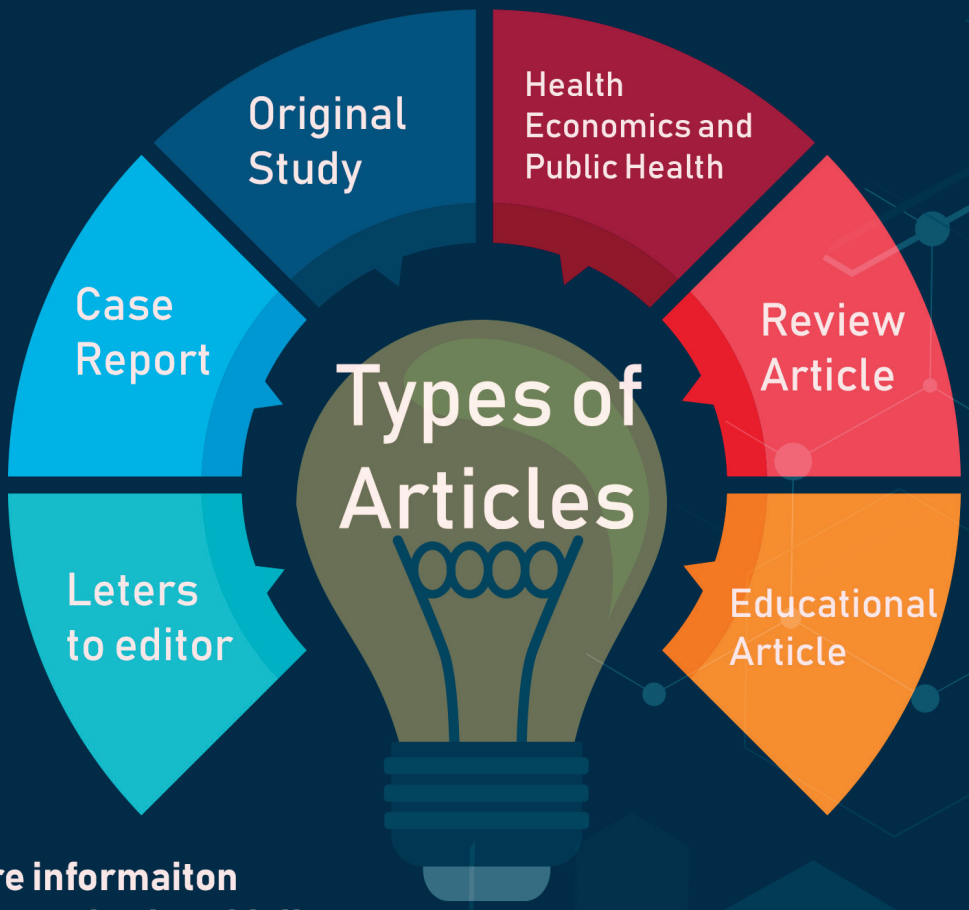

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Aims and Scope and Publication Policy

Aims and Scope

Eye South East Asia (EyeSEA) strives to promote the dissemination of regionally relevant academic publications and discourse in the field of Ophthalmology. The South East Asian population has a unique spectrum of eye diseases due to pathophysiologic, geographic, socioeconomic and cultural contexts – although often underrepresented in literature. EyeSEA supports the growing number of ophthalmic healthcare professionals in the region seeking to produce and disseminate academic publications, developing robust clinical methodology and quality of original publications in Ophthalmology from South East Asia to the world.

Publication Policy

Dates and Distribution

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Issue 1 : January - June , Author Submission Deadline: 31st of March

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Abstract

Word count: Minimum 150 words -Maximum 250 words including subheadings
Key Words: minimum 2, maximum 5
Your abstract must contain content for the following headings:

1.Title
2.Purpose ("Background" for case report)
3.Methods (Leave this section blank for case report)
4.Results ("Case report", summarise the case for case report, "Case series" summarise all cases for case series)
5.Conclusion
6.Conflicts of Interest
7.Keywords

Title

Titles should have capital letters only for names of places, institutions, individuals, companies, proprietary names, but not diseases, drug formula names. Titles must end with a full stop. '.'

Background

-This section should be the shortest part of the abstract and should very briefly outline the following information:
-What is already known about the subject, related to the paper in question
-What is not known about the subject and hence what the study intended to examine (or what the paper seeks to present)

Methods

-What was the research design? e.g. Diagnostic Study, Etiognostic Study, Prognostic Study, Therapeutic / Efficacy Study -in addition to the study method: Case report, Case Control, Cohort, Randomised Controlled Trial.
-What type of patients are recruited?
-What was the clinical setting of the study? (if relevant)
-How were the patients sampled
-What was the sample size of the patients? (whole/and or in different groups)
-What was the duration of the study?
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-What was the primary outcome measure and how was it defined?

Results

-The number of patients who completed the study; dropout rates in the different groups and their causes
-The results of the analysis of the primary objectives, mentioning statistical method, expressed in words and numbers along with P values in parenthesis
-The results of the analysis of the more important secondary objectives
-Numerical information about the above analysis such as in terms of means and standard deviations, response and remission rates. Wherever possible: effect sizes, relative risks, numbers needed to treat, and similar statistics should be provided along with confidence intervals for each.
-Important negative findings, if any should also be presented: that is, findings that fail to support the authors' hypothesis
-Data on important adverse events should be included in addition to the data on efficacy

Conclusion

-The primary take-home message
-The additional findings of importance
-The perspective

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Andrade C. How to write a good abstract for a scientific paper or conference presentation. Indian Journal of Psychiatry. 2011;53 (2):172.

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- Introduction
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgements and conflict of interest

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Carotid cavernous sinus fistula with central retinal artery occlusion: A case report

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Background: A carotid-cavernous sinus fistula (CCF) is an abnormal arteriovenous communication between the cavernous sinus and the internal carotid artery (ICA) and/or external carotid artery (ECA). Central retinal artery occlusion (CRAO) is a rare posterior segment complication occurring as result of traumatic CCF from an ocular hypoperfusion.

Case Report: We present a 58-year-old female complaining of acute visual loss, with redness and swelling of the right eye following a motor vehicle accident. Her visual acuity was light perception (PL) in the right eye and 20/40 in the left eye. The intraocular pressure (IOP) was 52 mm Hg in the right eye and normal in the left eye. Eye examinations revealed proptosis, ptosis, complete total ophthalmoplegia and a 5-mm fixed dilated right pupil with relative afferent pupillary defect (RAPD) positive in her right eye. The fundus examination showed CRAO in the right eye. Cerebral angiography revealed a high flow direct CCF Barrow's type A. Endovascular treatment was performed using balloon embolization. During the one-year follow-up, the patient had improvement of eye redness, proptosis, and ophthalmoplegia. However, the visual prognosis was poor due to optic atrophy and macular ischemia with the final visual acuity of PL.

Conclusion: A complete fundus examination found vision- threatening complications in patients who have traumatic CCFs. Early recognition of CRAO is important in the management of these patients.

Conflicts of interest: The authors report no confilcts of interest.

Keywords: carotid cavernous sinus fistula, central retinal artery occlusion, endovascular treatment

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DOI: https://doi.org/10.36281/2020010101

Background:

A carotid-cavernous sinus fistula (CCF) is an abnormal arteriovenous communication between the cavernous sinus and the internal carotid artery (ICA) and/or external carotid artery (ECA). Traumatic CCF is usually of a direct Barrow type A and has a high velocity of blood flow CCF, which can be formed by a traumatic tear in the cavernous portion of the ICA resulting in high blood flow direct shunts between the cavernous sinus and ICA.[1] Posterior segment complications may result from choroidal effusion, venous stasis retinopathy, or ocular hypoperfusion.[2] The authors report a rare case of central retinal artery occlusion (CRAO), which is a posterior segment complication occurring as result of traumatic CCF from an ocular hypoperfusion.

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Case report:

A 58-year-old female complained of acute visual loss, with redness and swelling of the right eye following a motor vehicle accident. On eye examination, the best corrected visual acuity (BCVA) was light perception (PL) in the right eye and 20/40 in the left eye. The intraocular pressure (IOP) was 52 mm Hg in the right eye and 13 mmHg in the left eye. She had complete ptosis in the right eye. Hertel's exophthalmometry showed a reading of 22 mm and 14 mm in the right and left eye, respectively with a base reading of 125 mm. The motility examination showed full duction in the left eye, but limited in all gaze directions in the right eye. The external

examination of eyes showed marked proptosis and conjunctival chemosis (Figure 1). The slit lamp examination showed clear corneas and nuclear cataract, and a severely congested right conjunctiva with corkscrew vessels. The pupil size was a 5 mm fixed dilated right pupil and 3 mm react to light left pupil with relative afferent pupillary defect (RAPD) positive in her right eye. The fundus examination of the right eye showed whitening retinal edema and a cherry red spot at the macula with attenuated retinal arteries. Carotid bruit was detected on the right side. Based on the clinical presentation, an initial diagnosis of direct CCF with central retinal artery occlusion (CRAO) was made. The initial computerized tomography (CT) scan from a regional hospital showed a subarachnoid hemorrhage with a skull base fracture and dilated right superior ophthalmic vein (Figure 2). An urgent neurosurgical consultation was done. Cerebral angiography revealed a high flow direct CCF Barrow's type A with early contrast enhancement of the right cavernous sinus and the dilatation and early enhancement of the right superior ophthalmic vein. Endovascular treatment with balloon embolization was performed, and further cerebral angiography showed right direct CCF exhibited almost complete coil embolization due to the failure of balloon embolization (Figure 3). Subsequently cerebral angiography showed complete occlusion of the fistula without ICA stenosis. During the follow-up at one month later, carotid bruit was not detected, and the external eye and slit lamp examination showed similar findings. Dilated fundus examination showed right optic atrophy with attenuated arteries and epiretinal membrane. Fundus fluorescein angiography (FFA) showed a delay in the filling of the retinal arteries, a delayed arteriovenous transit time, and enlargement of the foveal avascular zone (FAZ) (Figure 4). During the one-year follow-up, the patient had improvement of eye redness, proptosis, ophthalmoplegia and secondary glaucoma. The visual prognosis was poor due to optic atrophy and macular ischemia with the final BCVA of PL.

Discussion:

CRAO is most often caused by embolization or atherosclerosis-related thrombosis occurring at the level of the lamina cribrosa. Less common causes are hemorrhage under an atherosclerotic plaque, thrombosis, trauma, spasm, and a dissecting aneurysm within the central retinal artery.[3] The possible mechanisms of CRAO in CCF include (1) direct increased intraocular pressure, or secondary increased intraorbital venous pressure causing CRAO, (2) traumatic damage to the endothelium of the blood vessels can cause formation of thrombosis, with the thrombus acutely occluding the vessel, (3) local vasoconstriction influenced by the traumatic injury can contribute to subsequent vasospasm of the central retinal artery, and (4) ocular hypoperfusion pressure from the diversion of blood to the cerebral venous system (posterior cortical venous drainage).[4]

Pierre Filho Pde T, et al. reported a rare case of CRAO complicating traumatic CCF with spontaneous closure of the fistula.[5] They considered the possibility that blunt trauma, venous congestion and thrombosis of the fistula were the possible predisposing factors for CRAO. It is possible that when there is an elevation of pressure in the cavernous sinus, the pressure in the central retinal artery also increases, causing the obstruction of the retinal arterial circulation and this can explain for the progression from stasis retinopathy to CRAO.

In the present study, the patient had sudden severe visual loss and clinical features of direct CCF with CRAO. Posterior segment complications following CCF include CRVO from venous stasis retinopathy and CRAO. An increase in venous pressure can compromise retinal vein outflow and produces venous stasis retinopathy and CRVO.[6] Rarely, CCF may cause CRAO from a steal phenomenon in the cerebral vessels. In this case, cerebral angiography did not show significant decreased flow into the right middle cerebral artery territory. Therefore, the patient did not have a strong evidence of a steal phenomenon. It is possible that an elevation of intraorbital venous pressure and intraocular pressure can explain the mechanism of CRAO because the initial IOP is very high.

The patient requires surgical treatment because endovascular treatment is indicated when the patient has progressive visual loss or signs of posterior cortical venous drainage. The goal of endovascular treatment is the closure of the fistula with preservation of carotid artery patency. The neurosurgeon selected detachable balloons for initial therapeutic cerebral angiography due to the relatively high effectiveness to

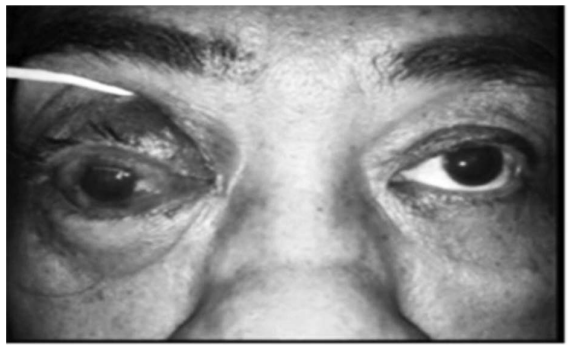

Figure 1 External examination of eyes shows marked proptosis and conjunctival chemosis in the right eye.

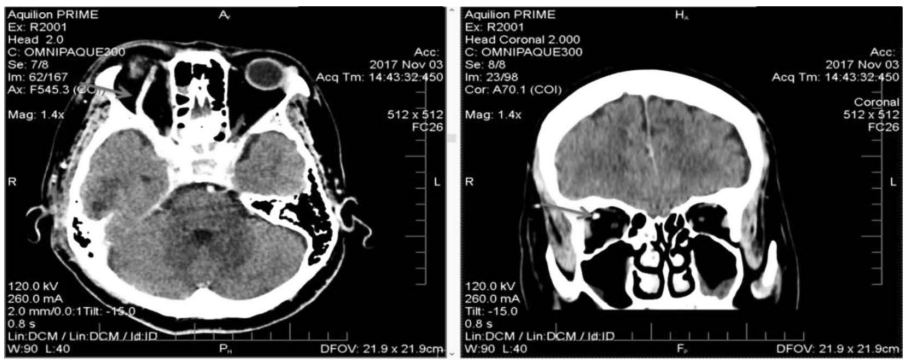

Figure 2 CT brain (a) axial view (b) coronal view show a dilatation of the right superior ophthalmic vein (red arrow).

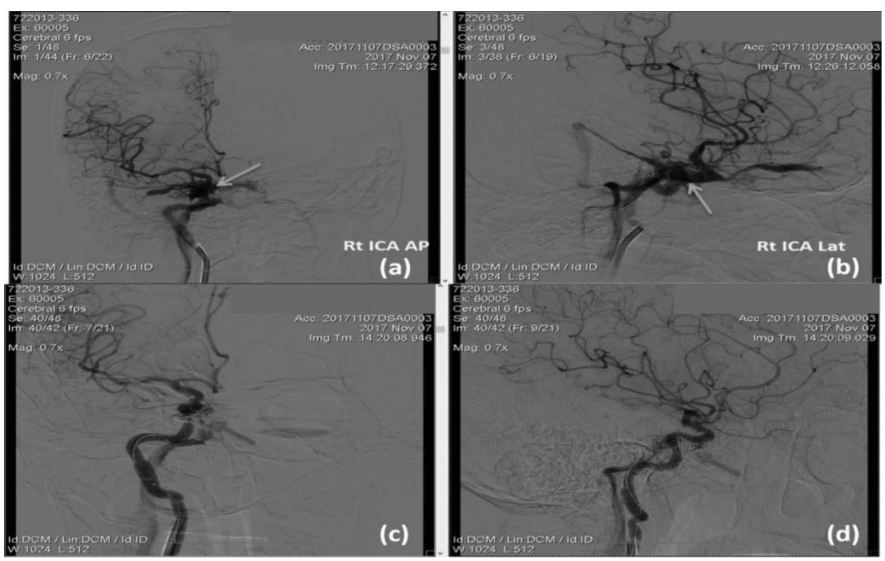

Figure 3 Cerebral angiography (a) anteroposterior (AP) view (b) lateral view showing a high flow direct CCF Barrow's type A with early contrast enhancement of the right cavernous sinus (green arrow) and the dilatation and early enhancement of the right superior ophthalmic vein (red arrow) (c) oblique view, and (d) lateral view showing nearly complete obliteration (blue arrow) of the right direct CCF post coil embolization.

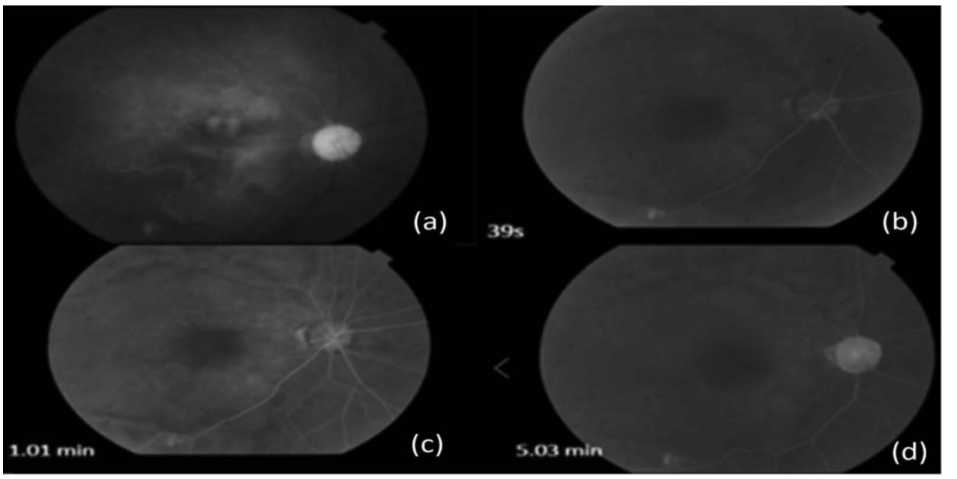

Figure 4 Fundus fluorescein angiogram (a) color fundus photograph (b) early phase (c) mid phase (d) late phase show a delay in the filling of the retinal arteries, a delayed arteriovenous transit time, and enlargement of FAZ.

directly occlude the fistula at low cost compared with the coil material.[7] Unfortunately, CCF are difficult to treat with balloons embolization techniques and a further second coil embolization was performed. Recurrence during the early deflation of the balloons may explain lack of success of the treatment. However, further cerebral angiography showed right direct CCF underwent complete embolization without ICA insufficiency.

Once a fistula is completely closed, the clinical improvement depends on the severity and duration time that the fistula was present. During the long-term follow-up, the patient had improvement of a preexisting bruit, Corkscrew vessels, proptosis, ophthalmoplegia, and secondary glaucoma. Even when the fistula is completely closed and the ICA retains patency, visual loss caused by CRAO is least likely to improve. The previous studies in nonhuman primates have suggested that possible irreversible damage to the sensory retina occurs after 90 minutes of complete arterial occlusion.[8,9] Fluorescein angiography images in our case reveal hypofluorescence of the retinal vessels and enlargement of the foveal avascular zone (FAZ) corresponding to an occlusion of the central retinal artery with macular ischemia. The latter results in poor visual prognosis and the patient's final visual acuity was light perception.

In summary, CRAO should be considered as a rare posterior segment complication in patients with traumatic CCF. Traumatic CCF often require endovascular treatment and early recognition of CRAO is of clinical importance.

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Paediatric neuromyelitis optica

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Objective: To report a case of paediatric Neuromyelitis Optica (NMO)

Method: Case report

A 14-year-old girl presented with blurring of vision in her right eye for 4 days, with associated acute bilateral lower limb weakness and urinary incontinence. At presentation, visual acuity for her right eye was counting fingers and 6/9 in her left eye, with positive right relative afferent pupillary defect. Light brightness and red saturation in her right eye were reduced to 50% as compared to the left eye with right central visual field defect. The anterior segments and fundoscopy of both eyes were normal.

On systemic examination, there were upper motor neuron signs and segmental sensory loss from T1-L2. Motor power for both upper and lower limbs were reduced with hyperreflexia. Blood investigation for Aquaporin 4 Ab was positive. Magnetic Resonance Imaging of the spine showed longitudinal extensive transverse myelitis.

She was given intravenous methylprednisolone 1gram daily for 5 days followed by a tapering dose of oral prednisolone. She completed 5 cycles of plasmapheresis. Subsequently, she had near complete recovery with normal lower limb power. Her right eye vision had improved significantly to 6/9. She completed 3 cycles of Rituximab infusion.

Conclusion: This case report highlights the importance of early diagnosis in paediatric neuromyelitis optica and prompt treatment which may improve the prognosis of the disease.

Conflicts of interest: The authors report no confilcts of interest.

Keyword: Paediatric, Neuromyelitis optica, Immunomodulatory, Plasmapheresis

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Introduction:

Paediatric onset of neuromyelitis optica (NMO) is found in approximately 4% of reported cases.[1] Early differentiation of NMO from other childhood demyelinating disorders is crucial for institution of appropriate therapy and proper counselling to family and patient.[2]

Here we describe a case of a young patient with Neuromyelitis Optica and to emphasize the early diagnosis and prompt treatment that may improve the prognosis of disease and prevent disability.

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Method: Case report

A 14 year old girl presented with acute onset of right eye blurring of vision for 4 days, which was associated with bilateral lower limb weakness and urinary incontinence. She had no fever, upper respiratory tract infection symptoms, loss of appetite or loss of weight.

At presentation, visual acuity on the right eye was counting fingers and left eye vision was 6/9 with positive relative afferent pupillary defect on the right eye. Light brightness and red saturation were reduced to 50% as compared to

the left eye with right central visual field defect. The anterior segments of both eyes were normal. Fundoscopy showed normal optic disc in both eyes with no optic disc swelling.

On systemic examination, there were upper motor neuron signs and segmental sensory loss from T1-L2. Muscle power for both upper and lower limbs were reduced 2-3/4 with presence of hyperreflexia. Babinski reflex was positive.

Magnetic Resonance Imaging of the spine showed long segment spinal cord hyperintensity with predominant central distribution from lower medulla to T11 with spinal cord edema at C2-C6 level consistent with a longitudinal extensive transverse myelitis (Figure 1). However, the author was unable to comment on the optic nerves due to metal artefacts from dental braces that obscured both orbits. No brainstem lesion seen. Blood investigations for Aquaporin 4 Ab was positive. CSF results show remarkably high immunoglobulin G (IgG) with no evidence of infection. Other autoimmune laboratory tests such as C3, C4 and rheumatoid factor (RF) were normal (107, 25, <11 respectively), anti-ds DNA was negative and antinuclear factor (ANF) was positive

She was given intravenous methylprednisolone 1 gram daily for 5 days followed with a tapering dose of oral prednisolone over two months duration. She completed 5 cycles of plasmapheresis. Plasmapheresis was done in this case in view of her extensive spinal cord involvement and not much improvement of her vision after 5 days of IV methylprednisolone. Subsequently, she had near complete recovery with return of lower limb power. Her right eye vision improved significantly to 6/9. She completed 3 cycles of Rituximab infusion. She had no relapse for the past 2 years and currently on tablet Gabapentin 600mg tds for her neuropathic pain. Repeated MRI spine 1 year after the diagnosis showed resolution of the long extensive transverse myelitis. (Figure 2)

Discussion:

Neuromyelitis optica (NMO), otherwise known as Devic Disease, is an uncommon clinical syndrome of central nervous system inflammatory demyelination, comprising of optic neuritis and transverse myelitis.[2] It is a rare disease with most reported cases were in adult. The median age of children diagnosed with NMO ranges from 10 to 14 years and the youngest reported being a 23-month-old boy[3]. Female preponderance is observed in both the adult and pediatric age groups.[3] It is important to differentiate NMO from other diseases such as multiple sclerosis (MS) and acute disseminated encephalomyelitis (ADEM) as there are differences in treatment and prognosis.

NMOSD is stratified into two types: NMOSD with AQP4-IgG (NMOSD-AQP4); and NMOSD without AQP4-IgG or with unknown AQP4-IgG status. According to the new diagnostic criteria, NMOSD-AQP4 refers to patients (1) who have at least one core clinical characteristics of NMOSD in either optic neuritis, acute myelitis or area postrema syndrome (2) who were tested positive for AQP4-IgG; and (3) in whom alternative diagnoses are excluded.[4]

In our case, the patient presented with unilateral retrobulbar optic neuritis and transverse myelitis. Positive serology for AQP4-IgG along with extensive transverse myelitis aided us in making the diagnosis. Typically, cases in children are preceded with infection but our patient did not show any sign and symptom of infection prior to her presentation. As compared to MS, NMO is more common in paediatric patient and may have more profound vision loss, myelitis and intractable nausea and hiccup due to association with area of postrema lesion.[5] While ADEM is typically an isolated event and can be the first manifestation of multiple sclerosis in children. Most children with ADEM initially present with fever, meningeal signs, and acute encephalopathy.[6] MRI findings also differ between these three entities. Cacciaguerra L et al proposed that fulfillment of at least 2 of the 5 of the following conditions identified NMOSD with 91% specificity and 82% sensitivity: absence of juxtacortical/cortical lesions, absence of periventricular lesions, absence of Dawson fingers, presence of LETM, and presence of periependymal lesions following the lining of the lateral ventricles.[7] In patients with such features, AQP4 serum testing should be used to help in diagnosis and to guide treatment.

The clinical course of NMO is variable. It may occur either as a severe monophasic illness or associated with varying degrees of recovery or polyphasic courses characterized by relapses and remissions[2] The mainstay of NMO therapy are immunomodulatory and immunosuppresive

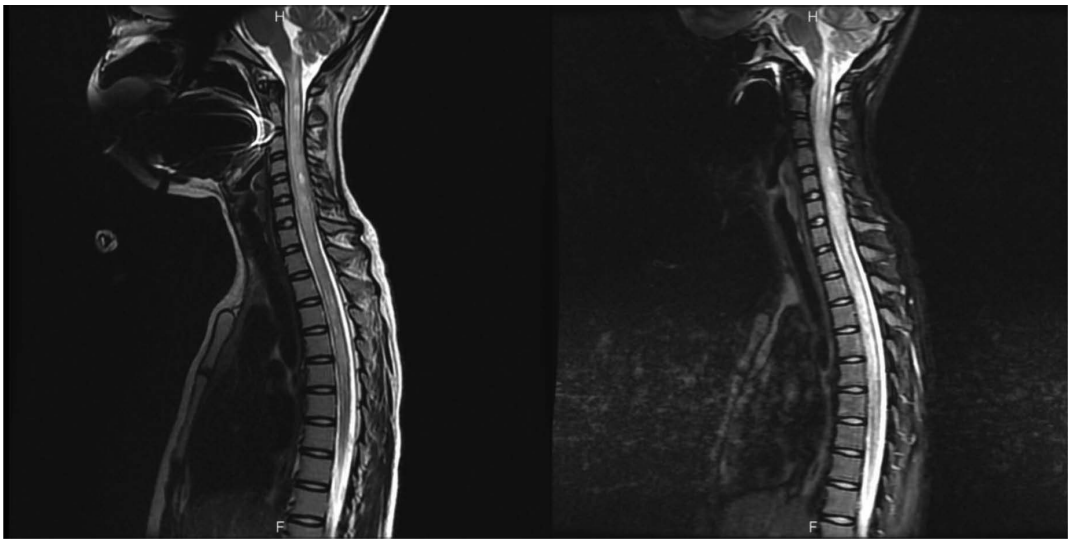

Figure 1: T1W and T2W Sagittal MRI shows diffuse long segment ill-defined patchy with high signal intensity within the spinal cord from lower medulla to T11 level and swollen spinal cord from C2 to C6 level.

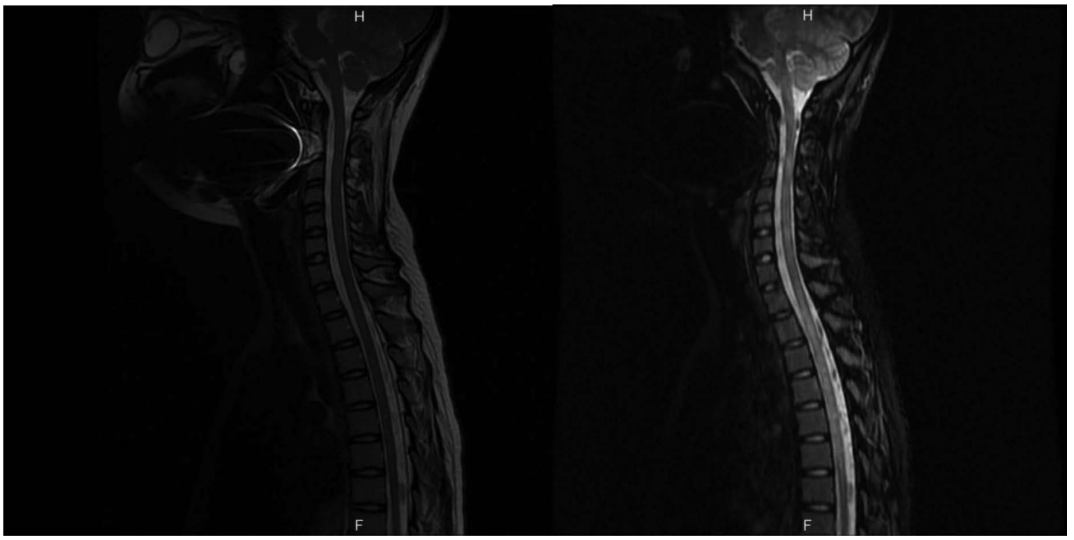

Figure 2: Previously seen patchy cord enhancement and T2W high intensity from C1 to T10 is no longer seen. Residual small hyperintense focus in anterior spinal cord at T11 and T12 is similar in appearance.

drugs to treat the acute attacks as well as prevention of neurological complications and rehabilitation. The first treatment typically given to a patient with NMO is high-dose IV methylprednisolone to reduce disease activity and further progression.

Plasmapheresis following IVMP therapy effectively removed anti-AQP4 antibodies and is accompanied by a substantial improvement in the neurological disability of patients with NMO. Study done by Su hyun Kim et al showed plasmapheresis resulted in marked reduction in serum anti-AQP4 antibody levels in patients with seropositive for anti-AQP4 antibodies.[8] Previous studies involving patients with CNS inflammatory disease found that starting plasmapheresis early (within 15 to 20 days) is the most important predictor of a favorable response to the procedure[9]

Immunomodulatory drug used in this case is Rituximab. Rituximab is a human monoclonal antibody directed against CD20 that induces B-cell depletion when administered in vivo. It selectively depletes the humoral component of the immune system making it more effective for treating NMO.[10]

Absoud M et al reported that AQP4 - Ab positivity is associate with early recurrence and visual impairment while physical disability in AQP4-Ab negative relapsing cases[11]. Thus, early AQP4-Ab testing may allow prompt immunomodulatory treatment to minimize disability.

Our patient is among the 10 -27 percent of patients with a monophasic course[12]. The 5-year survival rate is reported to be 90% for patients with a monophasic course of disease and 68% for relapsing patients[13]. She responded very well with treatment without any relapse in the last 24 months of diagnosis. She continued to show good vision and was free from any neurological symptoms 2 years after the initial presentation.

Conclusion:

This case report highlights the importance in early diagnosis of paediatric neuromyelitis optica and prompt treatment will ensure better prognosis of disease and prevent disability.

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Ocular gnathostomiasis in Myanmar: two cases and literature survey

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Background: To report two cases of indigenous ocular gnathostomiasis in Myanmar with the update of the current status of this disease in Myanmar by literature survey.
Results: Two middle-aged women, 55-year-old from Pan Ta Naw and 40-year-old living in Yangon, Myanmar, presented individually to two different hospitals with several weeks history of blurred vision. In both cases, a live worm of about 4-5 mm was found moving in the anterior chamber of the eye in association with inflammatory cell infiltration. The worm in the anterior chamber of each patient was successfully removed by microscopic surgery. The visual acuity of the patients returned to normal after removal of the worm. Literature survey revealed that, including two cases reported here, the number of cumulative cases of ocular gnathostomiasis in Myanmar exceeds 20 cases, the most number recorded in the world.
Conclusions: Since ocular gnathostomiasis is an extremely rare form of gnathostomiasis, thousands of cutaneous and/or visceral cases have been undiagnosed in Myanmar. Nationwide epidemiological surveys for gnathostomiasis of any form should be performed.

Conflicts of interest: The authors report no confilcts of interest.
Keywords: *Gnathostoma*, gnathostomiasis, ocular, hidden cases, Myanmar
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Introduction

Nematode parasites in the genus *Gnathostoma* are found in wild animals in various parts of the Americas, Eurasia, Oceania and Africa[1] and is known as the representative pathogen of fish-borne zoonotic helminthiases. In Asia[3], species namely *G. spinigerum*, *G. doloresi*, *G. hispidum* and *G. japonicum* are identified to infect humans, whereas *G. binucleatum* is a sole pathogen in the Americas. As for the human cases in Asia, Japan, the People's Republic of China and Thailand have long been known as the major endemic areas of human gnathostomiasis[2]. In addition, several Asian countries, such as Lao PDR[3], Vietnam[4] and India[5] have recently been proven as the gnathostomiasis endemic countries. Moreover, after an extensive local literature survey up to 2016[6], we have revealed that gnathostomiasis is endemic also in Myanmar.

Humans acquire gnathostomiasis mainly by ingesting uncooked or undercooked fish meat contaminated with the 3rd stage larvae (L3) of *Gnathostoma* species[1]. Although rare, infection after eating raw snake meat has been reported as an alternative route of infection[7]. After being ingested by humans, the third stage larvae (L3) of *Gnathostoma* preferentially migrate to subcutaneous connective tissues causing migratory erythema or serpiginous creeping eruption, and thus, gnathostomiasis is primarily known as a disease of the skin[1]. However, as a nature of zoonotic nematodiases, the larvae occasionally migrate into unexpected sites, such

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as the liver, lungs, brain[8] and eyes[5,9] to cause deleterious outcome[1].

In Myanmar, when an outbreak of gnathostomiasis had occurred among Korean residents in Yangon[10], all cases manifested cutaneous lesions. In contrast, in our recent extensive literature search on human gnathostomiasis in Myanmar up to 2016, the majority of indigenous gnathostomiasis cases (over 10 of about 15 estimated cases) were ocular cases[6]. Here we add two more cases of ocular gnathostomiasis we have recently experienced in Myanmar. In addition, 5 more indigenous ocular gnathostomiasis cases, which were reported in a poster in the local ophthalmology meeting, are added in the list and current status of ocular gnathostomiasis in Myanmar is discussed.

Case #1

A 55 year-old female from Pan Ta Naw Township, Ayeyarwadi Division, Myanmar, came to the out-patient ward of the Ophthalmology, North Okkalapa General/Teaching Hospital, Yangon, with the complaint of blurring vision and redness of her left eye for 2 weeks. The patient and her families sold freshwater and marine fish in the local market, where she often prepared and consumed undercooked/fermented fish (Burmese Name: Nga-Chin) with her family. Her visual acuity of the right eye was 6/36 (UA) and the left eye was hand motion. On slit lamp examination for the left eye, the conjunctiva was severely congested, cornea was hazy with massive cell infiltration. A live, actively moving worm of about 5 mm in length was seen in the anterior chamber of the left eye (Figure 1A). On the next day, the worm was removed under a surgical microscope and identified as a *Gnathostoma* L3 (Figure 1B), based on primarily the typical 4 rows of hooklets on the head bulb (Fig. 1B inset).

She was given an oral dose of 400 mg of albendazole for the precaution of the possible residual worms. After surgical extirpation of the worm, her visual acuity as well as ocular symptoms gradually improved and eventually normalized.

Case #2

One of the authors, Mya Mya Lwin, has received a short and thick nematode parasite of about 4-5 mm in length for the identification of the pathogen from a private hospital in Yangon, Myanmar. The worm was removed from the anterior chamber of an eye (affected side unknown) of a 40- year-old female patient who has visited a neuro-physician because of visual disturbance for several weeks. The patient was a housewife who often prepared and consumed freshwater fish dishes with catfish, snakehead fish and *Tilapia* species, etc., in particular, undercooked fermented fish (Nga-Chin). The worm was surgically removed from her eye (Fig. 2) which was about 4.0 x 0.5 mm (length x width), with a distinct head bulb equipped with 7-8 rows of hooklets (Fig. 2 inset).

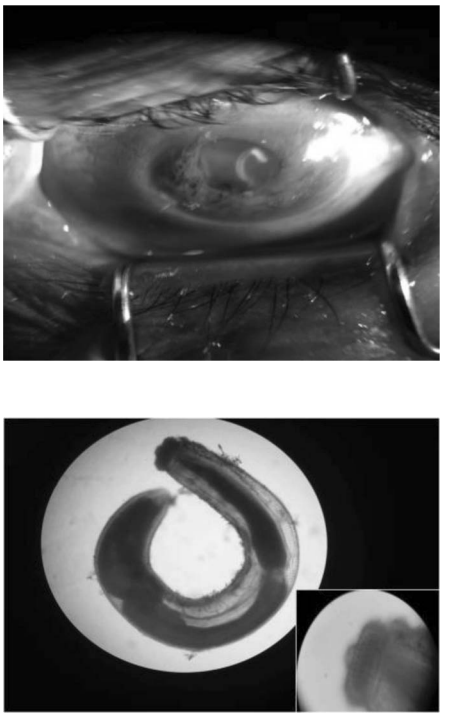

Figure 1: A worm floating in the anterior chamber of the left eye of the patient #1 (top) and the worm removed after surgery (bottom). Inset shows the close-up view of the head bulb showing 4 lines of hooklets.

The body is covered with fine cuticular spines and the inside contains reddish body fluid and dark-brown coloured intestine. Based on these features, the worm was identified as a young adult of *Gnathostoma spinigerum.* Visual acuity of the patient returned to normal after the surgery.

Figure 2: A surgically extirpated worm from the anterior chamber of the eye (side unknown) of the patient #2. Inset shows the close up view of the head bulb showing 8 lines of hooklets.

Discussion

While we have surveyed for gnathostomiasis cases in the proceedings and recent medical publications in Myanmar, we have found that Thi Thi Htoon et al. (2018) reported 12 ocular helminthiasis cases over a 9-year period (2009-2017) including 5 cases of ocular gnathostomiasis as a poster presentation at the 30th Myanmar Ophthalmological Conference 2018, held on the 15-16th October 2018, in Yangon, Myanmar. Thus, taking our two cases here and the 5 cases of Thi Thi Htoon (2018) together with the cases in our previous literature survey[6], a total of minimum 19, probably over 20, ocular gnathostomiasis cases so far were found in Myanmar (Table 1) since two classical cases[11,12] were reported in the 1960s.

As for the clinical manifestation of gnathostomiasis, cutaneous lesions, which can present as migratory oedema or serpiginous creeping eruptions, are the most common symptoms[1]. Although the frequency of ocular cases is far lower than that of cutaneous gnathostomiasis, high incidence of ocular gnathostomias (over 10 cases) has been reported in India, Japan, Mexico, and Thailand[5,9]. Now we may consider Myanmar as the country with the highest recorded incidence of ocular gnathostomiasis (Figure 3).

While Japan, Mexico and Thailand are known as highly endemic areas of gnathostomiasis, India and Myanmar are usually not listed in the high endemic countries. As is pointed out previously[5,9], it might be merely an ignorance of cutaneous and/or visceral cases. In fact, reports of cutaneous cases are recently emerging in India[13,14]. In Myanmar, collaboration of dermatologists is necessary if we are to elucidate an accurate situation of gnathostomiasis in general in Myanmar.

In the present study, the worm obtained from the patient #1 was morphologically a typical advanced third stage infective larva (AL3) of *G. spinigerum,* having 4 lines of hooklets on the head bulb and the whole body was covered with fine cuticular spines. In contrast, the worm recovered from the patient #2 has 8 lines of hooklets on the head bulb, a typical morphological feature of adult *Gnathostoma* worms. Generally, gnathostomiasis is known as a disease caused by the larval stage of *Gnathostoma* parasites. However, in Asia, *G. spinigerum* adult worms are occasionally found in the skin lesion of the human cases[15]. In the previous study, the worms recovered from the patients' eye are almost exclusively advanced 3rd stage infective larvae of *Gnathostoma*, our case suggests that *G. spinigerum* can develop into a young adult at least.

Although consuming raw fish and meat is not considered a traditional food habit in Myanmar[16], some Myanmar people lik our two present cases have a traditional custom of eating raw/undercooked fish. Previous study of Korean parasitologists showed high infection rate of freshwater fishes with *Gnathostoma* larvae sold in the markets in Myanmar[17,18]. Thus, at this occasion, one of the authors, Aung Phyo Wai, examined swamp eels sold in the market in Yangon and found high incidence of infection with significant seasonal variation (Table 2). Although this is a small scale survey, the results show that eating freshwater fish raw is a high risk of gnathostomiasis in this country.

Conclusion

We reported herewith two cases of ocular gnathostomiasis in Myanmar, together with 5 additional cases recently reported in the poster session of the local ophthalmology meeting. As shown in Table 1, over 20 cases of ocular gnathostomiasis have been accumulated in Myanmar. Therefore, not only ophthalmologists but also dermatologists, general physicians and home doctors in Myanmar should be aware of

the presence of this disease. Moreover, extensive epidemiological surveys not only of humans but also of intermediate fish/paratenic host animals is required to clarify the route of infection to humans and the maintenance of the parasite life cycle in this country to prevent the spreading of this disease.

Table 1: Indigenous ocular gnathostomiasis cases in Myanmar.

No.	Age (years)	Gender	Affected site	Year of infection	Reference
1	28	Male	Left eye	1958	Reported in ref. #6
2	48	Male	Left eye	1964	
3	N/A	Female	Left eye	1980?	
4-7	3-4 ocular cases during last 20 years			last 20 years	
8	ocular cases in National Health Laboratory			2005	
9-10	2 ocular cases (one worm each)			2007	
11	N/A	Male	Right eye	2001	
12	10	Male	Right eye	2013	
13	43	F	Anterior chamber	2010	Thi Thi Htoon (2018) Poster presentation
14	16	M	Anterior chamber	2012	
15	13	M	NA	2014	
16	41	F	Right eye	2016	
17	53	M	NA	2017	
18	55	F	Left eye (anterior chamber)	2018	
19	40	F	Side unknown, anterior chamber	2019	

N/A, not available.

Table 2: *Gnathostoma spinigerum* larvae in Asian swamp eels from local markets of Yangon, Myanmar

Year	Seasons	No. of eels Infected/examined	*Gnathostoma* L3 Total (per fish)	Highest No. of L3 per fish
2016	Rainy (Jun-July)	32/50 (64.0%)	185 (5.8)	69
	Cold (Nov-Dec)	27/65 (41.5%)	117 (4.3)	42
2017	Hot (Apr)	37/150 (24.7%)	85 (2.3)	8
2019	Cold (Jan – Feb)	61/150 (40.7%)	233 (3.8)	21
	Hot (Mar)	37/110 (33.6%)	76 (2.1)	14
	Rainy (Jun -Aug)	81/135 (60.0%)	452* (5.6)	52
Total		275/660 (41.7%)	1148 (4.2)	

*: both early and advanced 3rd larvae
Almost all *Gnathostoma* larvae were found in the liver of Asian swamp eels and only a few from the intestines of eels.

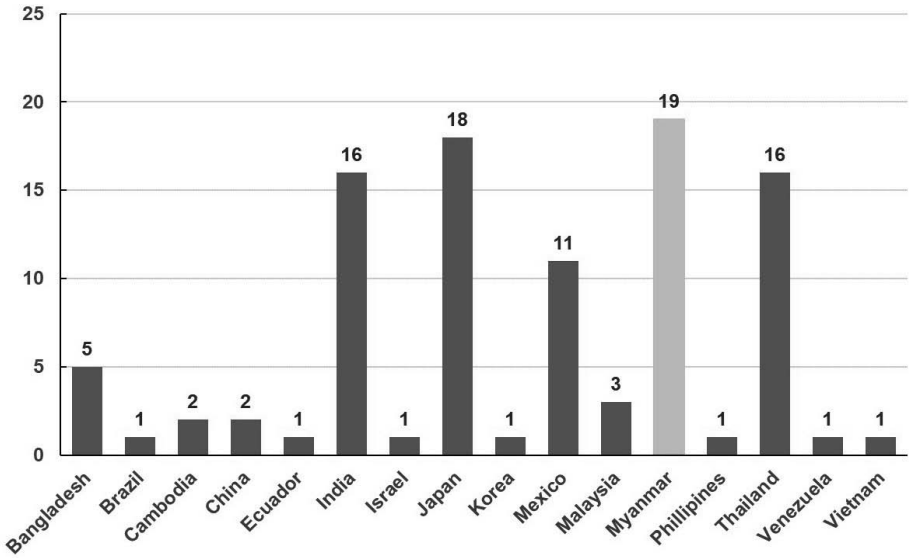

Figure 3: Cumulative distribution of ocular gnathostomiasis cases in each country. Modified from Fig. 1, Nawa et al. 2017 Am J Trop Med Hyg (Ref. #9) with permission.

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Clinical outcomes and preoperative predictive factors of success in single pneumatic retinopexy for primary rhegmatogenous retinal detachment at a tertiary care center

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Purpose: To evaluate the success rate of pneumatic retinopexy (PR) for treatment of primary rhegmatogenous retinal detachment (RRD) and to explore preoperative factors associated with the success rate of PR.

Methods: We conducted a retrospective study, having reviewed medical records of all patients diagnosed with primary RRD that underwent a single PR in Thammasat university hospital, Thailand, during 2016 to 2018. Preoperative ocular characteristics, postoperative anatomical and visual outcomes were collected.

Results: 68 eyes of 68 patients were enrolled. Success rate of a single PR was 42.6%. The significant predictors were location of lowest retinal breaks ($P < 0.001$) and extension of retinal detachment ($P < 0.002$). In multivariate logistic regression analysis for the group with successful outcome, the patients whose lowest retinal breaks were located within the superior 2 clock hours were found to be 13.55 times more likely to respond successfully to PR (OR=13.55, 95%Cl 3.82-48.01, $P<0.001$). The success rate of PR was 0.722 times when the extension of retinal detachment increased for 1 clock hour (OR=0.722, 95%Cl 0.535-0.974, P=0.033). Out of the 29 patients from the success group, 27 (93%) patients had improvement of BCVA. Postoperative complications included new or missed break (12%), subconjunctival gas (10%), raised IOP (4%), vitreous haemorrhage (3%) and subretinal gas (1%).

Conclusion: The success rate of a single PR in primary RRD was 42.6%. The location of lowest retinal breaks and extension of retinal detachment were significant preoperative predictors of success in single PR for RRD. Final BCVA was improved in most patients with successful PR.

Keywords: pneumatic retinopexy; rhegmatogenous retinal detachment; success; factors; complication

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Introduction

Rhegmatogenous retinal detachment (RRD) is a condition in which the neurosensory retina is separated from the retinal pigment epithelium. RRD is the sight threatening ocular disease as well as one of considerable causes of blindness in Thailand. Nowadays, there are several treatments of this condition, which have different strengths and weaknesses, for instance, scleral buckling, pars plana vitrectomy (PPV) and pneumatic retinopexy (PR).

PR is a minimally invasive, non-incisional procedure which comprises of 2 steps; The first step is injecting an expandable gas such as perfluoropropane (C_3F_8) or sulfur hexafluoride (SF_6) into vitreous cavity, then the second step is applying laser retinopexy or transconjunctival cryopexy to induce a chorioretinal adhesion around all retinal breaks. The benefits of this procedure, is that it is cost-effective, faster

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postoperative recovery and safe. It is effective for RRD with breaks at the superior clock-hours, which is the majority of RRD cases, without the need for a vitrectomy system. However, the reasons for underutilization are that this procedure does not relieve vitreoretinal traction, and also need for skillful ophthalmologist to take more preoperative time in order to find all retinal breaks. The most common complication of PR is redetachment secondary to missed break or new break. Moreover, The other complications are cataract formation, raised IOP, suprachoroidal gas, subconjunctival gas, subretinal gas, macular hole, cystoid macular edema.[1] Many studies reported the factors affecting the success rate of PR including pseudophakic/aphakic status, extension of retinal detachment, location of retinal break and vitreous hemorrhage.[2-4]

Currently, recent reports suggest a variety of success rates and predictive factors. The overall objective of this study was to evaluate the success rate of PR, in terms of anatomic and functional outcome, for treatment of primary RRD. The other purpose of this study was to define the preoperative factors which predict the success rate of PR. The complications related to this procedure were also analyzed.

Methods

Subjects

This retrospective analysis was approved by the Institutional Review Board of Thammasat University hospital in 2018. We reviewed the medical records of all patients who were diagnosed with primary RRD and underwent PR in Thammasat University Hospital, Thailand, during 2016 to 2018. The inclusion criteria were retinal breaks that are confined to the superior 8 clock-hours, a single retinal break or multiple breaks within 1–2 clock-hours, the absence of proliferative vitreoretinopathy (PVR) grade C or D, the cooperative patients who can maintain proper positioning and clear media. We excluded the patients who were diagnosed with glaucoma, history of previous retinal surgery, other ocular disease affecting visual function and the patients who lost follow-up before 6 months.

Surgical techniques

A similar PR technique was performed in all patients. The ophthalmologists examined and identified all the retinal breaks. The risk, benefit and complications were explained to the patients. The patients signed an informed consent. The PR was performed at operating room. Topical anesthesia (0.5%Tetracaine hydrochloride) was applied. Anterior chamber paracentesis was performed. Then, 0.3 ml of C_3F_8 was injected into vitreous cavity, in other words, 3.5 millimeters peripherally from limbus for pseudophakic/aphakic patients and 4 millimeters distant from limbus for phakic patients. We used C_3F_8 instead of SF_6, because C_3F_8 has a longer duration of action (30-45 days) and more expansile than SF6.[5] Zero-point-three ml of C_3F_8 was used, because the gas bubble will slowly expand over days to a volume of 1.2 ml allowing for slow equilibration of intraocular pressure. Afterwards, patients were assigned to position individually in order to apply gas on the detached retina. Lastly, laser retinopexy was performed on postoperative day 1 or day 2 if the retina around the retinal holes were considered sufficiently flat to perform an effective laser retinopexy.

Data collection

The data collected included age, gender, duration of symptoms, history of trauma, side of RRD. Clinical examination data were collected containing best corrected visual acuity (BCVA) by Snellen chart, intraocular pressure (IOP), lens status, number of retinal breaks, location of lowest retinal breaks, RRD extension, PVR grade, macular status. Postoperative data were collected including BCVA, IOP, area of retinal detachment and complications (such as raised IOP, new or missed break subconjunctival gas, subretinal gas, macular hole, cystoid macular edema, suprachoroidal gas and cataract progression) at 1 day, 7 days, 1 month, 3 months and 6 months. The definitions used in this study are as follows: 1) a single PR success was defined as the accomplishment of anatomically attached retina after a single PR. 2) VA improvement was defined as a gain of one or more lines or final VA equal 20/30 or better.

Statistical analysis

The data was collected in a standardized form, and stored in an electronic datasheet (Microsoft Excel). Descriptive statistics were shown as mean +/- standard deviation for continuous variables. Mann-Whitney U test was chosen for comparison. Furthermore, we

used frequency and percentage for categorical variables. Chi-square or Fisher's exact test was chosen for comparison. We performed multiple logistic regression analysis to determine the association between factors and success of PR. The significance level was set at P< 0.05. Statistical analysis was conducted using SPSS software version 22.

Result

Our study sample comprised of 68 eyes of 68 patients with primary RRD that met the inclusion criteria. Patient demographic features were summarized in Table 1. The mean age at presentation was 58.18 ± 8.79 years. The proportion of gender was not different (male 48.5%, female 51.5%). The retinal detachment was located in the right eye 51.7% of cases. The mean duration of symptoms was 19.01 ± 17.77 days. The majority of patients had no history of trauma (89.7%) and had a single retinal break (77.9%). All lowest retinal breaks were located in the superior half of the retina, while 39.7% of the lowest retinal breaks were located in the superior 2 clock hours (11-1 o' clock). The mean extension of retinal detachment was 5.18 ± 2.44 clock hours. Most patients had PVR grade B (88.2%) and phakic lens (89.7%).

The rate of a single PR success was 42.6%. Preoperative characteristics were analysed to determine if any were predictors of pneumatic retinopexy outcome (Table 2). From all of these characteristics, only location of lowest retinal breaks and extension of retinal detachment were statistically significant predictors of pneumatic retinopexy outcome. In success group, majority of retinal breaks were detected at superior 2 clock hours. (72.4% vs 15.4%, *P < 0.001*). The extension of retinal detachment in success group was less than that in failure group (4.21 vs 5.90, P <0.002). Most patients who were pseudophakic or aphakic group tended to fail (86%) for PR, however, it was not statistically significant (*P=0.225*).

In multivariate logistic regression analysis for the successful outcome group as shown in Table 3, these predictor variables maintained statistically significance (*P <0.05*). The patients whose lowest retinal breaks were located at superior 2 clock hour were found to be 13.55 times more likely respond successfully to PR (OR=13.55, 95%Cl 3.82-48.01, *P<0.001*). Moreover, the success rate of PR was 0.722 times when the extension of retinal detachment increased for 1 clock hour (OR=0.722, 95%Cl 0.535-0.974, *P=0.033*).

Mean BCVA at 6 months was logMAR 0.391 compared to preoperative BCVA, that was logMAR1.255 (Figure 1). Out of the 29 patients from the success group, 27 (93%) patients had improvement of BCVA. There are several postoperative complications, which are new or missed break (12%), subconjunctival gas (10%), raised IOP (4%), Vitreous haemorrhage (3%) and subretinal gas (1%).

Discussion

PR is the treatment of choice for primary RRD, because it is more cost-effective than scleral buckling procedure and PPV.[6] The success rate of PR is high, ranging from 43.75% to 93.55%.[7] In this study, the success rate for a single PR was 42.6% of the cases. The lower success percentage may be due to small sample size or lesser experience of the technique.

This study showed that patients with pseudophakic/aphakic eyes were not significantly associated with PR failure. This was different from a previous study[7-9] which demonstrated that PR was less successful in pseudophakic/aphakic eyes compared to phakic eye because of multiple tiny retinal break in periphery which may be missed.[5]

Regarding the location of the lowest retinal breaks, superior 2 clock hours (11-1 o' clock) tended to achieve success PR significantly according to the study.[3] It may be due to the postoperative positioning problem that patients with superior breaks can be easily postured than those with retinal breaks outside of 11-1 o' clock. Furthermore, the extension of retinal detachment was associated with success of PR. Larger extents of retinal detachment were more likely to result in failure of PR, consistent with previous literature.[2, 10]

In our study, mean BCVA at 6 months postoperative was logMAR 0.391 (Snellen equivalent ~20/50), which was consistent with literature[11], suggesting 80% of PR cases have 20/50 or better visual acuity. Several studies have discussed complications of PR. Some of them showed that cataracts was the most complication.[12] The present study found that the most complication was new or missed retinal breaks (12%), which was also suggested in

Table 1: Demographic Features

Demographic Features	n (%)
Mean age (years)	58.18 ± 8.79
Gender	
Male	33 (48.5%)
Female	35 (51.5%)
Side of eye	
Right	39 (57.4%)
Left	29 (42.6%)
Mean duration of symptoms (days)	19.01 ± 17.77
<7	6 (8.8%)
7-27	45 (66.2%)
≥ 28	17 (25.0%)
History of trauma	
Yes	7 (10.3%)
No	61 (89.7%)
Number of retinal breaks	
Single	53 (77.9%)
Multiple	15 (22.1%)
Location of lowest retinal breaks	
12,11,1	27 (39.7%)
10,2,9,3	41 (60.3%)
Mean RRD extension (clock-hour)	5.18 ± 2.44
PVR grade	
A	8 (11.8%)
B	60 (88.2%)
Macular status	
Macular on	21 (30.9%)
Macular off	47 (69.1%)
Lens status	
Phakic	61 (89.7%)
Pseudophakic/Aphakic	7 (10.3%)

Table 2: Ocular characteristics of successful versus failed cases

Characteristics	success (n=29)		failure (n=39)		*P-VALUE*
	n	%	n	%	
Age (y)					0.095
≤60	20	69.0%	19	48.7%	
>60	9	31.0%	20	51.3%	
Mean ± S.D.	55.83 ± 10.03		59.92 ± 7.40		0.101[M]
Gender					0.132
Male	11	37.9%	22	56.4%	
Female	18	62.1%	17	43.6%	
Side of eye					0.418
Right	15	51.7%	24	61.5%	
Left	14	48.3%	15	38.5%	
Mean duration of symptoms (days)					0.630[F]
<7	2	6.9%	4	10.3%	
7 - 27	18	62.1%	27	69.2%	
≥ 28	9	31.0%	8	20.5%	
History of trauma					0.721
Yes	2	6.9%	5	12.8%	
No	27	93.1%	34	87.2%	
Number of retinal breaks					<0.001*
Single	22	75.9%	31	79.5%	
multiple	7	24.1%	8	20.5%	
Location of lowest retinal breaks					
12,11,1	21	72.4%	6	15.4%	
10,2,9,3	8	27.6%	33	84.6%	
RRD extension (clock-hour)					
Mean ± S.D.	4.21 ± 2.01		5.90 ± 2.51		0.002*[M]
PVR grade					
A	4	13.8%	4	10.3%	
B	25	86.2%	35	89.7%	
Macular status					0.278
Macula on	11	37.9%	10	25.6%	
Macula off	18	62.1%	29	74.4%	
Lens status					0.225[F]
Phakic	28	96.6%	33	84.6%	
Pseudophakic/Aphakic	1	3.4%	6	15.4%	
Pre-op BCVA (log MAR)					
Mean ± S.D.	1.26 ± 1.01		1.62 ± 1.13		0.162[M]
Pre-op Tension					
Mean ± S.D.	11.28 ± 3.32		11.26 ± 4.09		0.896[M]

p-value from Chi-Square test, F = p-value from Fisher's Exact Test, M= p-value from Mann-Whitney U test, * Significant at the 0.05 level

Table 3: Multivariate logistic regression analysis for successful group

Characteristics	Adjusted Odds ratio	95%CI	*P-VALUE*
Location of the lowest retinal break		3.82- 48.01	<0.001*
12,11,1	13.55		
10,2,9,3	Reference		
RRD extension (clock hour)	0.722	0.535 -0.974	0.033*

Table 4: Correlation of visual outcome with risk factors

Characteristics	Success (n=29)		VA			
			Improved (n=27)		Not improved (n=2)	
	n	%	n	%	n	%
Age (y)						
≤60	20	69.0%	20	74.1%		
>60	9	31.0%	7	25.9%	2	100%
Mean ± S.D.	55.83	± 10.03	54.93	± 9.74	68.00	± 5.66
Gender						
Male	11	37.9%	9	33.3%	2	100%
Female	18	62.1%	18	66.7%		
Mean duration of symptoms (days)						
<7	2	6.9%	2	7.4%		
7 - 27	18	62.1%	17	63.0%	1	50.0%
≥ 28	9	31.0%	8	29.6%	1	50.0%
History of trauma						
Yes	2	6.9%	2	7.4%		
No	27	93.1%	25	92.6%	2	100%
Number of retinal breaks						
Single	22	75.9%	21	77.8%	1	50.0%
Multiple	7	24.1%	6	22.2%	1	50.0%
Location of lowest retinal breaks						
12,11,1	21	72.4%	19	70.4%	2	100%
10,2,9,3	8	27.6%	8	29.6%		
RRD extension (clock hour)						
Mean ± S.D.	4.21	± 2.01	4.00	± 1.33	7.00	± 7.07
PVR grade						
A	4	13.8%	3	11.1%	1	50.0%
B	25	86.2%	24	88.9%	1	50.0%
Macular status						
Macula on	11	37.9%	10	37.0%	1	50.0%
Macula off	18	62.1%	17	63.0%	1	50.0%

Lens status						
Phakic	28	96.6%	27	100%	1	50.0%
Aphakic	1	3.4%			1	50.0%
Preop BCVA (log MAR)						
Mean ± S.D.	1.26	± 1.01	1.24	± 0.96	1.50	± 2.12
Preop Tn						
Mean ± S.D.	11.28	± 3.32	11.67	± 3.04	6.00	± 2.83

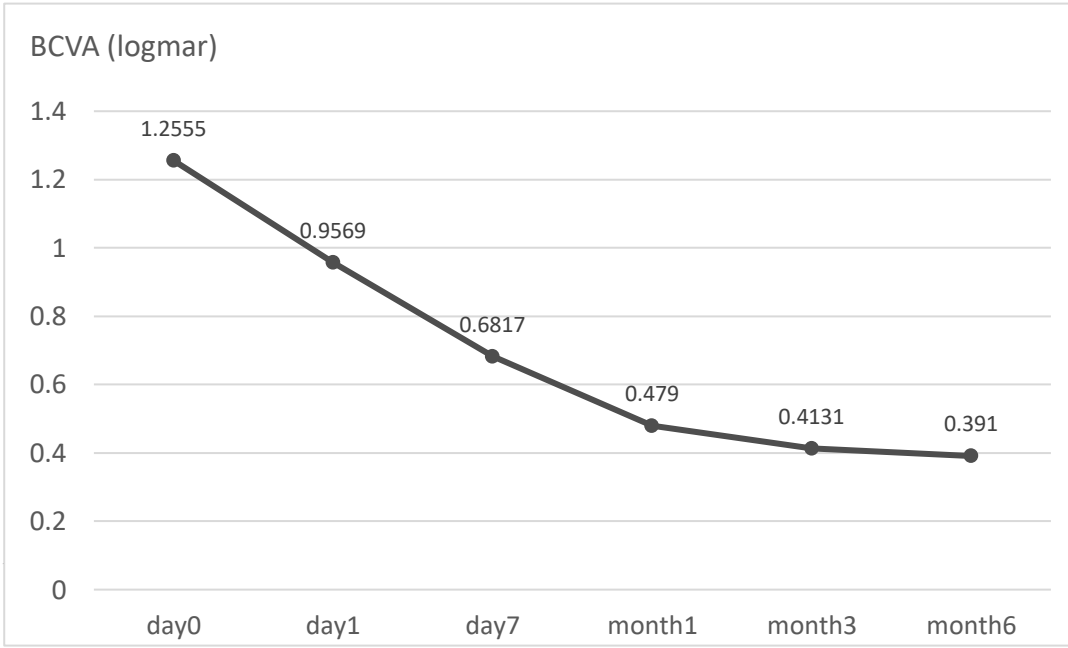

Figure 1: Functional outcomes of eyes in successful pneumatic retinopexy group

previous study.[7] They proposed that early new retinal breaks and RD developed due to traction on condensed vitreous distal to the sites of the original breaks following intraocular gas injections. Approximately 76% of new or missed breaks are located in the superior[8] clock hours of the retina, and 52% are found within 3 clock hours of the pre-existing causative breaks. Giant retinal tears rarely develop following pneumatic retinopexy.

Nonetheless, there were some limitations to our study. The retrospective design did not yield additional information which can influence the outcomes. The sample size was insufficient to define the associated factors between improved visual outcome and maintained visual outcome group. Moreover, different surgeons may have different levels of capabilities which may influence outcomes.

Conclusion

PR is a minimally invasive, low-cost and well tolerated treatment modality. PR offers distinct advantage for primary RRD over scleral buckling procedure and PPV, provided there is adequate patient selection. The rate of a single PR success in this study was 42.6% of patients. Our study results suggested that characteristics which were most likely to have benefit from PR were retinal breaks located in the superior 2 clock hours and smaller extensions of retinal detachment. Final BCVA was improved in most patients with successful PR.

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0.5%Timolol eye drop monotherapy as a first-line treatment for capillary hemangioma

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Purpose: To evaluate the efficacy and safety of 0.5% Timolol eye drop monotherapy as a first-line treatment for capillary hemangioma.

Methods: Retrospective, consecutive, clinical case series

Results: Medical records, including consequent photographs of children with capillary hemangioma treated consecutively with 0.5% timolol solution from October 1st, 2017 to July 31st, 2018 were reviewed.

11 cases of capillary hemangioma, age 0-8 months, were treated with 0.5% Timolol eye drops applied to the lesions twice a day as monotherapy for at least one month. General physical examination, included vital signs, respiratory rate, skin lesions, and eye examination before treatment were performed at every follow-up visit.

Eight of 11 cases showed improvement in size, thickness, and coloration of the lesions without any complications. All 8 cases showed clinical improvement within 2 months of treatment. One case had relapsed after treatment cessation and got better after re-treatment. One case was lost to follow up. One case failed the monotherapy and needed additive treatment with propranolol and vinblastine.

Conclusion: 0.5% Timolol eye drop monotherapy can be used safely as a first-line treatment for capillary hemangioma, especially uncomplicated cases.

Conflicts of interest: The authors report no confilcts of interest.

Keywords: Capillary hemangioma, 0.5% Timolol eye drop, Monotherapy, First-line treatment, Efficacy

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Introduction

Capillary hemangioma is the most common benign tumor in children. Despite their benign and self-limited nature, some hemangiomas can cause complications such as ulceration, infection, disfigurement, scarring, bleeding, vision impairment, and difficult breathing[1]. Since 2008, systemic beta-blockers such as oral propranolol have been used to treat capillary hemangiomas and has been proved superior to previous therapies[2]. Although the systemic use of beta-blockers may cause severe side effects, such as bradycardia and hypoglycemia. An intensive vital sign screening, serum glucose level should be monitored, and cardiologist consultation is needed[3]. Recently, a topical beta-blocker as 0.5% timolol maleate, a basic anti-glaucoma medication, both eye drop solution and eye gel[4,5,6], has been reported as an effective

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treatment for capillary hemangioma, especially superficial lesion without report of serious complications in many countries but no reported data from Thailand about the use of 0.5% Timolol eye drop applied topically on the lesion as monotherapy first-line treatment for capillary hemangioma.

Purpose

To evaluate efficacy and safety of 0.5% Timolol eye drop monotherapy as a first-line treatment for capillary hemangioma

Methods

The medical records of all capillary hemangioma cases from October 1st, 2017 to July 31st, 2018 were reviewed and included only cases who received 0.5% Timolol eye drop monotherapy topical application twice daily as a first-line treatment. The collected data included demographics, lesion location, size-color-thickness of the lesion with serial photographs of the lesion treated consecutively with 0.5% Timolol solution, treatment duration, treatment side effects, follow-up time, and disease regression (recorded as none, complete, or incomplete regression, graded as good or fair response).

Results

During the study period, we had 11 cases of capillary hemangioma, ages between 0-8 months, who were treated with 0.5% Timolol eye drop applied to the lesions twice a day as monotherapy for at least one month. General physical examination, including vital signs, respiratory rate, skin lesions, eye examination before treatment was performed at every follow-up visit. The parents of all 11 cases were informed about risks and benefits before starting the treatment and signed consent. The follow-up schedules were 1 – 3 months depending on parent availability with both pediatricians and ophthalmologists. None of the cases reported systemic or localized side effects during the treatment.

All 8 of 11 cases showed improvement in size, thickness, and coloration of the lesions, but had differences in treatment duration as shown in table 1. All 8 cases showed clinical improvement within 2 months treatment initiation. One case relapsed after treatment cessation and improved after re-treatment. One case failed to follow up. One case failed the monotherapy and needed additive treatment with propranolol and vinblastine. (Table1 and Figure 1-5) None had systemic or localized side effects.

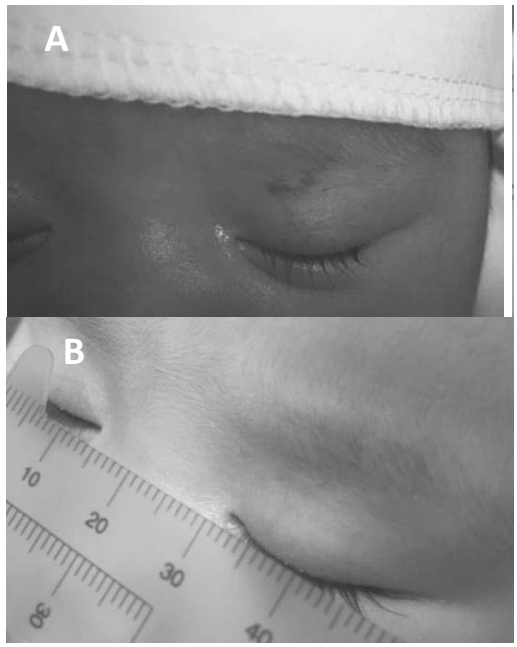


Figure 1 A 2-month-old girl with a capillary hemangioma on the left upper eyelid
(case 1 from table 1)

A. Before treatment

B. 2 months after topical 0.5% Timolol treatment

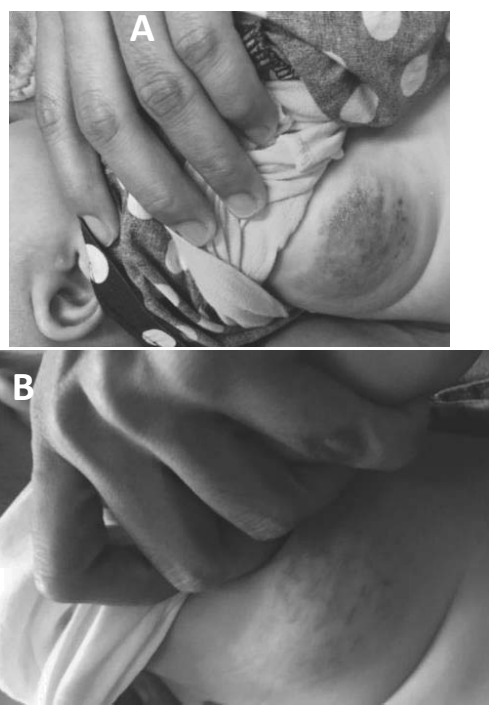


Table 1 Summary of treatment capillary hemangioma with 0.5% Timolol eye drop monotherapy

Patient No.	Sex	Age at Treatment	Lesion location	Treatment Duration (months)		Response	Side effects	Follow-up (months)	Other treatments
				improve	total				
1	F	2	Left upper eyelid	2	4	Complete regress	No	6	
2	F	4	Left tight	2	2	Fair	No	Loss F/U	
3	F	6	Sternum	2	4	Good	No	4	
4	M	3	Left upper eyelid	2	2	Good	No	2	
5	F	1	Left upper eyelid	2	2	Good	No	2	
6	F	8	Scalp	1	4	Good	No	4	
7	F	1	Midface (lip/lid/ forehead)	2	10	Complete regress	No	12	
8	F	4	Right axilla	2	2	Good	No	2	Terramycin (ulcerative hemangioma)
9	F	8	Right forearm	2	12	Good	No	12	
10	F	0	Left lower eyelid	1	1	No	No	2	Propranolol Vinblastine
11	M	8	Left chest	2	4	Good	No	4	

Figure 2 A 4-month-old girl with an ulcerative capillary hemangioma on the right axilla
(case 8 from table 1)
A. Before treatment
B. 2 months after topical 0.5% Timolol treatment together with terramycin

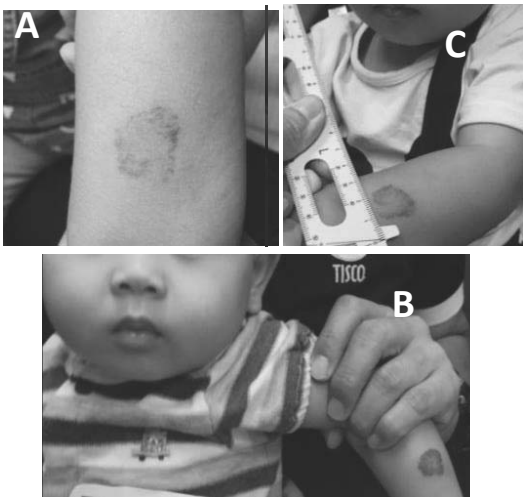
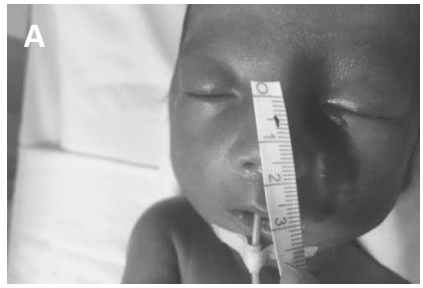


Figure 3 An 8-month-old girl with a capillary hemangioma on the right forearm
(case 9 from Table 1)
A. Before treatment
B. 2 months after topical 0.5% Timolol treatment
C. 2 months after topical 0.5% Timolol treatment



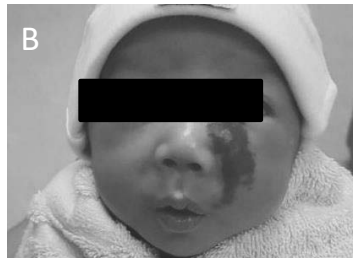


Figure 4 A newborn girl with a capillary hemangioma on the left lower eyelid (non-responsive case) (case 10 from table 1)
A. Before treatment
B. 2 months after topical 0.5% Timolol treatment combined with oral propranolol. The tumor did not respond to beta-blockers and Vinblastine was added to treat the lesion.

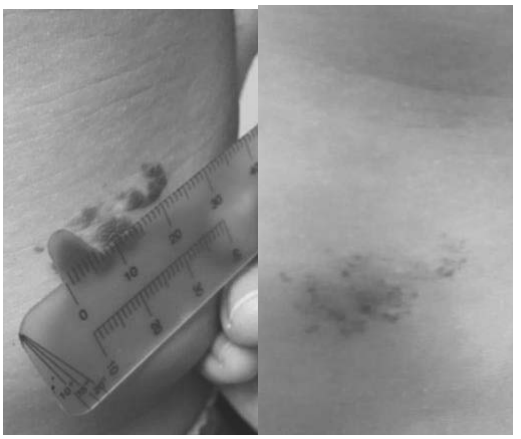


Figure 5 An 8-month-old boy with a capillary hemangioma on the left chest
(case 11 from table1)
A. Before treatment
B. 4 months after topical 0.5% Timolol treatment

Discussion

Timolol -an inexpensive generic drug that has a low side effect profile-could be beneficial for treating capillary hemangioma even in a newborn with stable vital signs as a first-line treatment in an outpatient setting with less monitoring required than systemic beta-blockers. Topical eye drops, applied over the entire lesion twice-daily , can used safely and effectively even in ulcerative hemangioma as in this study. Ng MSY et al.[7] revealed similar therapeutic efficacies for both 0.5% Timolol eye drop with 0.5%timolol ophthalmic gel-form. Although, not all cases have good responses. From this study, we found that responsive lesions started a regression in color and/ or thickness within 2 months.

In non-responsive cases, further investigations and management should be performed. The exact mechanism of action of beta-blockers for the treatment of capillary Hemangioma remains unknown. The possible explanation may include vasoconstriction due to decreased release of nitric oxide, which results in the early visible change in color and softening of the hemangioma.[9]

Growth arrest is attributable to the blocking of proangiogenic signals, including vascular endothelial growth factor, basic fibroblast growth factor, matrix metalloproteinases and endothelial nitric oxide synthase[10]. opical timolol was found to be systemically absorbed with low serum levels[8], thus before starting treating the lesions with topical beta-blocker medication, the parents should be informed of risks and benefits of the treatment and complications that may ensue and how to observe their children.

In conclusion, our data suggests that we can safely use 0.5% Timolol eye drop, an inexpensive generic drug, as a first-line monotherapy for capillary hemangioma cases in outpatient settings, although treatment providers need to discuss risk, benefits, and further management if the patient has a poor response to this treatment with the parents before initiating therapy. We can evaluate the treatment efficacy in two months. Non-responsive cases need other adjunctive treatments. This is the first study to report the use of 0.5% timolol eye drop topical application monotherapy as a first-line treatment for capillary hemangioma in Thailand even though it was limited by retrospective design, small sample size, and short observation period. Further prospective randomized controlled trials with larger sample sizes and longer observation periods are needed to confirm the efficacy and safety of topical timolol eye drop for the treatment of capillary hemangioma.

Conclusion

0.5% Timolol eye drop monotherapy can be used safely as a first-line treatment for capillary hemangioma, especially in uncomplicated cases.

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One year Outcome of Combined phacoemulsification and Endoscopic Cyclophotocoagulation vs. phacoemulsification Alone in Patients with Primary Glaucoma: The Malaysian experience

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Background: To compare the post-operative outcomes phaco-ECP with phaco alone in patients with primary glaucoma in terms of efficacy and safety.
Methods: Retrospective comparison case series of all patients undergoing phaco and phaco-ECP were done. Inclusion criteria were all eyes with primary glaucoma and at least on 2 antiglaucoma medications who underwent phaco-ECP and phaco alone. Mean IOP and number of topical antiglaucoma medications were assessed at 1 week, 1 months, 3 months, 6 months, and 1 year post-operatively.
Results: A number of 18 eyes from each group were recruited into the study (N=36). In phaco-ECP group, mean IOP reduction were seen at 1 week (p=0.021), 1 month (p=0.009), 3 months (p=0.034), and 6 months (p=0.0.34), but increased at 1 year post-operation (p=0.775). Phaco group showed either statistically non-significant reduction or increment of mean IOP throughout the study period. For mean number of topical antiglaucoma medication used, significant reduction were seen in the phaco-ECP group at each intervals (1 week; p=0.004, 1 month; p=0.001, 3 months; p=0.000, 6 months; p=0.002, 1 year; p=0.035), unlike the phaco group which showed no changes.
Conclusion: Significant reduction of IOP in the first 6 months post phaco-ECP was seen, as well as elimination of 1 topical antiglaucoma medication in this group during the first year of post-operation.
Conflict of Interest: There is no conflicting relationship exists for any author.
Keywords: ECP, phacoemulsification
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Introduction

Cataracts are common in patients with glaucoma due to aging process. Acceleration of cataract development are associated with treatment of glaucoma such as topical anti glaucoma medications, laser procedures and filtration surgery[1, 2]. As cataract causes reduced vision, compromised the aqueous outflow, affects the acquisition of optic nerve images and interpretation of visual field, timely removal of cataract is beneficial for visual rehabilitation and glaucoma management in patients with glaucoma.

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Endoscopic cyclophotocoagulation (ECP)

ECP is an emergent procedure in the management of glaucoma. It is a precise and titratable procedure which allows delivery of diode laser directly to the ciliary processes via a fibre optic viewer causing reduction of aqueous fluid production. Viewing the ciliary body directly gives the advantages of predicting

the outcomes of the procedure and deters over-or under-treated as well as minimizing complications such as phthisis and hypotony[3]. Furthermore, this procedure is relatively easy to perform with great safety profile[4] and considered as one of the minimal invasive glaucoma surgeries (MIGS).

Considering these properties, many investigators explored the efficacy of combining phacoemulsification and ECP (phaco-ECP) in cases of concurrent cataract and glaucoma to improve vision as well as lower the IOP and reduce the need for glaucoma medications in patients with glaucoma[5, 6].

We embarked on a study to compare one year outcomes of phaco-ECP and phacoemulsification alone (phaco) in primary glaucoma patients in terms of efficacy and safety. Our centre is the only centre in Malaysia which is equipped with ECP and serves as the referral centre for the whole country.

Methods

Medical records of all stable glaucoma patients who had underwent cataract surgery for at least 1 year in Hospital Cancelor Tuanku Muhriz (HCTM), Universiti Kebangsaan Malaysia Medical Centre (UKMMC) from 1st January 2012 until 30th September 2016 were identified through convenient sampling method. Patients who were treated with ECP alone, refractory glaucoma or data not available were excluded from this study. Patients were then divided into two groups; a) phaco-ECP group and b) phaco alone group for analysis purposes.

All ECP were performed by two different surgeons under subtenon anaesthesia. A single clear corneal incision was made with 2.75 mm keratome at 11-12 o'clock position. A high molecular weight viscoelastic (Healon GV, Advanced Medical Optics [AMO], Santa Ana, CA) was used to inflate the ciliary sulcus. Diode laser (Iridex OcuLight SL, Mountain View, California, USA) was delivered using the curved endoscopic probe (Endo Optiks, Little Silver, USA) starting at 150 mW in continuous mode. The ciliary processes and spaces between the processes were treated for at least 270 degrees. The endpoint of treatment was whitening and shrinkage of the processes. Viscoelastic was then removed using either automated or manual irrigation-aspiration (IA). At the end of the procedure, subconjunctival gentamicin 20 mg and dexamethasone 1% 2 mg was injected. All patients received standardised post-operative therapy: guttae ciprofloxacin 0.3% and guttae pred forte 1% every 2 hours tapering dose for 4-6 weeks depending on level of inflammation. Patients were also advised to continue their usual preoperative anti-glaucoma medications.

Data collected include age, race, gender, type of glaucoma, duration of glaucoma, number of topical anti-glaucoma medications, best corrected visual acuity, intraocular pressure (IOP), Mean Deviation (MD) and Pattern Standard Deviation (PSD) on Humphrey Visual Field (HVF) test and post-operative complications.

Data were collected from eyes that were operated. If both eyes in a patient met the inclusion criteria, data from both were collected.

Pre-operatively, the latest IOP measured prior to operation were taken as the baseline IOP. Similarly, nearest MD and PSD values of HVF towards the date of operation were collected.

Post-operative data were also assessed at post-operation date of 1 week, 1 months, 3 months, 6 months, and 1 year with special attention to the mean IOP and number of topical anti-glaucoma prescribed at each interval. Complications and further IOP lowering procedures or surgeries were documented as well.

However, patients who had undergone any other intraocular surgery or laser procedure of less than 6 months were excluded from the study. Additionally, performed combined operation of other than phaco-ECP or phaco alone such as penetrating keratoplasty or vitrectomy were also excluded.

Data were analysed using SPSS version 22, comparing between those two groups in terms of pre- and post-operative mean IOP and number of topical medications at each time point of assessment. Demographic data were analysed with descriptive analysis, and data comparing phaco-ECP and phaco alone group were analysed using t-test and Chi-Square. p value of less than 0.05 were considered significant.

Result

A total of 29 patients were recruited into this study, of which 5 of them having data from both eyes collected (n=34). Patients were grouped into phaco-ECP and phaco alone group, each having 17 subjects respectively.

Demographically, the mean age was 69.29 ± 18.11 and 71.94 ± 6.12 for phaco-ECP and phaco alone groups, respectively. Though female gender predominates the phaco-ECP group by 58.8%, male gender was vastly represented in the phaco alone group by 52.95%. Chinese ethnicity was the main race underwent both procedures, 52.9% for phaco-ECP group and 76.5% for phaco alone group. No statistically significant difference was found between these two groups upon comparing the subjects' demography.

The most frequent type of primary glaucoma encountered was Primary Open Angle Glaucoma (POAG), which represent 94% and 53% in phaco-ECP group and phaco alone group, respectively. The remainder of cases were Primary Angle Closure Glaucoma (PACG).

For the phaco-ECP group, significant visual improvement were seen at 6 months (p=0.024) and 1 year (p= 0.028) post-operatively with best corrected visual acuity of 6/12, as compared to 6/18 pre-operatively.

Although IOP were significantly improved particularly at 1 month (IOP 12.71 ± 2.64, p=0.009) as compared to pre-operation (IOP 17.59 ± 7.22), the effect was only sustainable until 6 months post-operation (IOP 13.00 ± 2.83, p=0.034). IOP was found to increase back to pre-operative level at 1 year post-operation (IOP 17.46 ± 7.40, p=0.775).

As for number of topical anti-glaucoma medications used in this group, patients in this group were on average 4 types of medications. A significant reduction was found during the first year of post-operation (2-3 anti-glaucoma, p= 0.00 – 0.035), which was best at 3 months (2.41 ± 1.18, p=0.000).

Meanwhile in the phaco alone group, similar improvement of visual acuity as the phaco-ECP group was shown post-operatively, with best corrected visual acuity of 6/12 at 1 year after operation (0.28 ± 0.14, p=0.001).

Furthermore, mean IOP in this group was found to have been constant or minimally reduced from pre-operative value throughout the first year of post-operation (post-operative 1 week (15.56 + 6.85 mmHg, p=0.571), 1 month (15.0 + 1.84 mmHg, p=0.309), 3 months (13.92 + 2.53 mmHg, p=0.391), 6 months (13.83 + 2.55 mmHg, p=0.489), and 1 year (14 + 1.83 mmHg, p=0.472)). Hence, there were no statistically significant changes seen, unlike the trend shown in the phaco-ECP group.

In regards to number of topical anti-glaucoma medications used, patients in this group used about 3 types of eye drops pre-operatively (3.00 ± 0.71) and continue to use relatively the same amount of medications throughout each time points (post-operative 1 week (3.00, p=0.333), 1 month (2.93, p=0.336), 3 months (2.87, p=0.334), 6 months (2.75, p=0.339), and 1 year (2.92, no changes in mean)). Thus, no statistically significant reduction in amount of eye drops used seen in this group over the period of post-operation.

The most frequent complication recorded was uncontrolled IOP (8.2%) which were documented mostly at one year post-operation. This is followed by post-operative inflammation (5.88%), which had occurred to at least one patient at each time point. There were two patients who underwent further IOP lowering procedures, one had repeated ECP at 3 months, and the other had trabeculectomy done at one year post-operation.

In summary, tremendous improvement of IOP and number of topical anti-glaucoma medications used showed by glaucoma subjects who underwent phaco-ECP procedure post-operatively, as compared to phaco alone group. These changes were significant particularly at 6 months period after operation (Table 1) (Figure 1).

Discussion

Traditionally, cycloablative procedures have been a last resort for eyes which have very poor visual potential

Attempts on lowering the IOP by acting on the ciliary body aiming to reduce the production of aqueuos humour has a long history with various techniques were performed, together with their reported complications[7]. Not until the mid-nineties, when endoscopic cyclophotocoagulation (ECP) was introduced by Martin Uram, citing a success in lowering the IOP with less adverse effects[8]. Of late, researchers were venturing to combine this cyclodestructive procedure with routine phacoemulsification in glaucoma patients with visually significant cataract[9].

Table 1: Data comparing phaco-ECP and phaco alone group

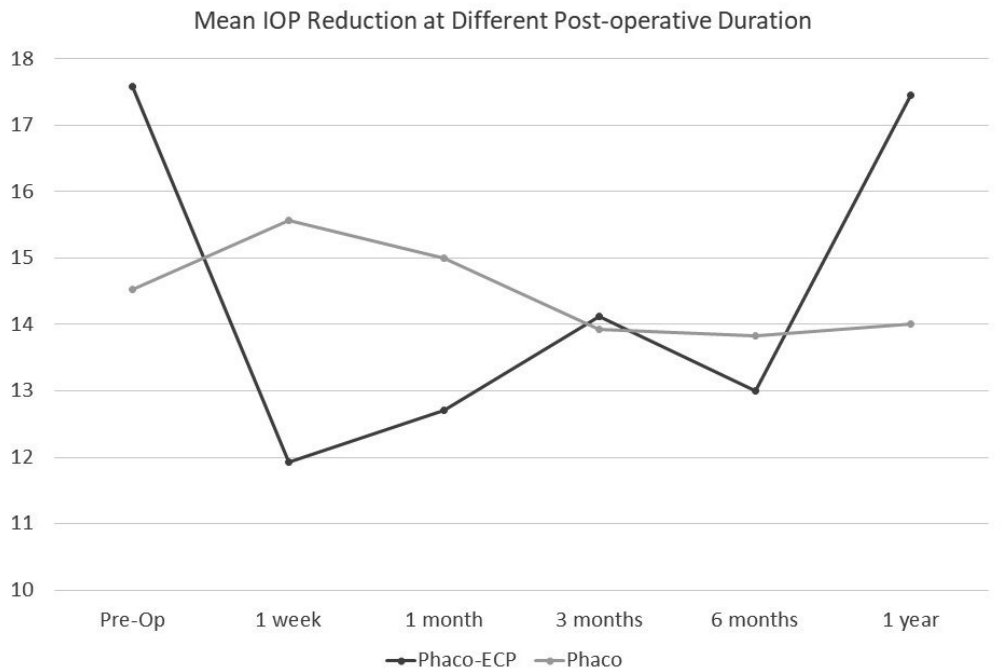
	phaco-ECP (n=17)	phaco (n=17)	*p* Value Between Groups*
Age (years)			
Mean ± SD	69.29 ± 18.11	71.94 ± 6.12	0.439
Gender (f, %)	Male 7 (41.2%) Female 10 (58.8%)	Male 9 (52.9%) Female 8 (47.1%)	0.492
Ethnicity (f, %)	Chinese 9(52.9%) Malay 8(47.1%) Indian 0(0%)	Chinese 9(52.9%) Malay 8(47.1%) Indian 0(0%)	0.135
Types of Primary Glaucoma (f, %)	POAG 16 (94%) PACG 1(6%)	POAG 9(53%) PACG 8(47%)	0.017
PreOp IOP (mm Hg) Mean ± SD	17.59 ± 7.22	14.53 ± 1.55	0.141
PostOp IOP at 1 week (mm Hg) Mean ± SD	11.93 ± 2.73	15.56 ± 6.85	0.051
PostOp IOP at 1 month (mm Hg) Mean ± SD	12.71 ± 3.88	15.00 ± 1.84	0.071
PostOp IOP at 3 month (mm Hg) Mean ± SD	14.12 ± 4.20	13.93 ± 2.53	0.324
PostOp IOP at 6 month (mm Hg) Mean ± SD	13.00 ± 2.83	13.83 ± 2.55	0.680
PostOp IOP at 1 year(mm Hg) Mean ± SD	17.46 ± 7.40	14.00 ± 1.83	0.695
PreOp Medications (n) Mean ± SD	3.59 ± 0.71	3.00 ± 0.71	0.022
PostOp Medications at 1 week (n) Mean ± SD	2.36 ± 1.34	3.00 ± 0.73	0.359
PostOp Medications at 1 month (n) Mean ± SD	2.29 ± 1.27	2.93 ± 0.83	0.294
PostOp Medications at 3 months (n) Mean ± SD	2.41 ± 1.18	2.87 ± 0.83	0.243

Table 1: Data comparing phaco-ECP and phaco alone group (Conts).

	phaco-ECP (n=17)	phaco (n=17)	*p* Value Between Groups*
PostOp Medications at 6 months (n) Mean ± SD	2.54 ± 1.13	2.75 ± 1.14	0.396
PostOp Medications at 1 year (n) Mean ± SD	2.77 ± 1.36	2.92 ± 0.76	0.223

**Pearson Chi-Square*

Figure 1: Mean IOP Reduction at Different Post-operative Duration



A retrospective review by Siegel et. al which compare phaco-ECP group against phaco alone group in 261 eyes for a period of 3 years revealed that 61.4% of patients in the phaco ECP group were able to have at least 20% IOP reduction with elimination of at least one anti glaucoma medication. These findings are consist ent with ours, but with a longer sustainability, possibly due to a larger area of ciliary body cy cloablation. However, Siegel's analysis had few issues with data variance since case-matching was not statistically significant, hence affecting the end result of power of study[10].

A prospective approach study comparing the same groups as those by Siegel's study was conducted by Francis et. al, by which it gave a statistically significant greater reduction of both IOP and number of anti-glaucoma medications in the phaco-ECP group, though the percentage of IOP reduction was 11%, lesser than Siegel's result. Furthermore, he found that phaco-ECP was superior than phaco alone in medically controlled glaucoma patients at each time interval with regards to its IOP lowering effect as well as number of anti-glaucoma elimination. This study was able to gather larger sample size, and also

a better control-matching among both groups, though it was a non-randomized trial. Hence, our results tallied with these data, thus would hopefully contribute to a better evidence-based practice[11].

Major published studies in ECP including comparative analysis between phaco-ECP against phaco alone, as well as phaco-ECP versus other modalities of glaucoma surgery were being scrutinized by Cohen et. al, quoting among others important studies by Siegel and Francis in regards to our focus. Cohen further concluded that ECP should be used with caution in cases of advanced glaucoma, due to the fact that this group of patients require greater IOP reduction. He later found that corroborated evidences failed to prove success rate of IOP less than[15], though 29% of patients were able to reduce the burden of medications to less than 3 eye drops. He also addressed the rare complication of ECP which was ocular hypotony, through which could lead to permanent visual impairment and phthisis, thus surgeon's prudence is necessary in using the ECP[12].

Nevertheless, this remark was argued by Lin et. al as he supported the use of ECP in refractory glaucoma cases with relatively sound vision, claiming that ECP has a favourable safety profile against other modality of procedures in lowering the IOP[13].

Another narrative review which looked into the efficacy of phaco-ECP by Rathi et. al concluded that the IOP reduction were sustainable up until 3 years post-operation, though the effects beyond that period was unknown. He also reiterated the importance of considering phaco-ECP as a primary procedure, given the simplicity of the combined procedure and also its minimal adverse effects[14].

A study published by Clement et. al revealed that greater reduction of IOP could be achieved by ECP in older patients as well as patients with higher baseline intraocular pressure. His cohort of subjects were followed-up for a period of one year, and mean IOP reduction at the end of the study was 24%, during which number of anti-glaucoma medications were also reduced by 1.2. These findings are consistent with our study, however we found out that the effect of improved IOP were only able to be sustained up until 6 months post-operation. Further study in the future need to be conducted to look at the variability of response with regards to the IOP, which were previously postulated by Lin et. al as the theory of ciliary vessels regeneration[15]. Clement further explained that as a patient gets older, the aqueous drainage apparatus will be functioning suboptimally eventhough its production is maintained, thus leading to higher IOP and greater response towards ECP[16].

Kaplowtiz et. al precisely analysed previous studies which focussed on usage of ECP for severe glaucoma and suggested that in view of ample evidences regarding its safety, ECP should be incorporated in managing glaucoma at an earlier stage. This is particularly true since the ciliary processes are directly visualized, hence over- or under-treatment are able to be controlled [17]. Apart from reducing the IOP and number of anti-glaucoma medications, ECP also has been reported to have very minimal complications following the procedure, citing Chen et. al's study which showed the occurrence of fibrin in the anterior chamber and cystoid macular edema among the highly reported complications with incidence of 22% and 10% respectively[18].

As regard to phaco alone, although level of evidence were relatively low in previous studies which looked into outcome of this surgery in patients with glaucoma, limited reduction of IOP by 20-30% were seen for both open- and closed-angle glaucoma. This effect was demonstrable by examining the anterior chamber angle, which widens after cataract extraction. While in the long run, IOP trend was noticed to increase, mostly requiring patients to take additional anti-glaucoma medications or going for glaucoma surgery at a variable period between 16 to 34 months[19].

Despite that, our study has several limitations. First, the sample size was relatively small, apart from a shorter duration of retrospective analysis. We noticed the volume of patients who went for the phaco-ECP procedure in our centre were not that enormous, thus limiting the available number of subjects. In spite of this, all enrolled subjects were able to be matched with control group with a statistically significant value.

Secondly, this study recruited patients with all levels of primary glaucoma, including normal tension glaucoma and closed-angle glaucoma which have distinct pathophysiology form high-tension open-angle glaucoma. Moreover, all

stages of primary glaucoma based on the Mean Deviation of Humphrey Visual Field Analyser were also included. Having said that, results of this study may be inaccurately represented due to the different types of primary glaucoma, wide range of IOP and also severity of glaucoma pre-operatively. Hence, subgroup analysis were not done to see which group performed better.

Conclusion

Phaco-ECP is definitely a better option for medically controlled glaucoma patients going for cataract surgery, in view of its superior efficacy as compared to phaco alone, as well as its eminent safety profile. A significant reduction of IOP and anti-glaucoma medications can be seen during the first year of post-operation, thus phaco-ECP should be considered as an early option for glaucoma patients with visually significant cataract. Future studies should be undertaken to qualitatively measure how significantly phaco-ECP outcome impacts patients' quality of life, and together analyse the cost-effectiveness of this procedure, with a larger sample size of a prospective study and standardized treatment protocol.

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Comparison of two techniques for the decrease of perfluoropropane gas volume in the management of retinal detachment in Thammasat hospital

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Purpose: To compare the residual gas volume of perfluoropropane C_3F_8 after two different methods of air gas exchange procedures, namely fixed-concentration and fixed-volume, used in rhegmatogenous retinal detachment surgery.

Methods: A prospective, randomized clinical trial in 56 patients whose eyes were diagnosed as rhegmatogenous retinal detachment and underwent 23-gauge pars plana vitrectomy combined with laser endophotocoagulation and air-perfluoropropane gas exchange. In 28 patients whose eyes were in fixed-concentration group, air-perfluoropropane gas exchange were performed using 20% C_3F_8 50 cc. replacing air within eye globe and the 28 eyes in fixed-volume group, 0.8 cc. of 100% C_3F_8 was injected into the eyes. We followed up at 1 day, 1 week, and 1 month postoperatively to measure outcomes including postoperative intraocular gas volume (in percent), anatomical retinal reattachment rate and post-operative complications such as ocular hypertension and endophthalmitis.

Results: A total of 56 eyes (56 patients) with 23-gauge pars plana vitrectomy combined with laser endophotocoagulation and air-perfluoropropane gas exchange were performed in this study. The patients consisted of 34 men (60.7%) and 22 women (39.3%). Patient ages were between 33-84 years with a mean of 59.84 ± 10.4 years. The mean postoperative residual intraocular gas volume for the fixed-volume method after 1 day, 1 week, and 1 month were 81.25 ± 8.57%, 62.14 ± 12.87%, and 31.25 ± 11.52% respectively. And the mean postoperative residual intraocular gas volume for the fixed-concentration method after 1 day, 1 week, and 1 month were also 85.36 ± 10.71%, 70.36 ± 17.74% and 38.93 ± 16.18% respectively. There was no significant difference in residual intraocular gas volume between the two groups in 1 day and 1 week postoperatively. After 1 month, there was a difference of mean postoperative residual intraocular gas volume between 2 groups; 31.25 ± 11.52% for the fixed-volume method and 38.93 ± 16.18% for the fixed-concentration method ($p<0.05$). The anatomical retinal reattachment rates were 85.7% and 89.3% for the fixed-volume method and fixed concentration method respectively. There was no significant difference in the rates of ocular hypertension between two groups, and none of the patients developed postoperative endophthalmitis.

Conclusions: Both techniques of air-perfluoropropane gas exchange in 23-gauge pars plana vitrectomy combined with laser endophotocoagulation were comparable when considering the anatomical retinal reattachment rate, though there was a smaller intraocular gas volume in fixed-volume technique when compared to fixed-concentration technique.

Conflicts of interest: The authors report no confilcts of interest.

Keywords: Perfluoropropane gas, C_3F_8, Residual gas volume, Air-gas exchange procedure, Rhegmatogenous retinal detachment surgery

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Introduction

Intraocular gas was first used by Ohm since 1911[1]. He injected air into the vitreous cavity to treat rhegmatogenous retinal detachment. Perfluoropropane gas (C_3F_8) was introduced in retinal detachment surgery by Lincoff et al. since 1980[2,3]. Perfluorocarbon gas is the most commonly used in retinal detachment surgery[4]. It was used to provide long-term internal retinal surface tamponade until chorioretinal adhesion from laser photocoagulation could be achieved. The 100% C_3F_8 bubble can expand to about 4 times of its original volume within 72 to 96 hours and persist in the vitreous cavity approximately 6 to 8 weeks [5,6]. Although the non-expansile concentration of C_3F_8 was theoretically 14% using in vitreo-retinal surgery, but Han DP. et al. found that the nonexpansile concentration of perfluoropropane could be between 12% and 20%. They found no significant difference in mean intraocular volume of C_3F_8 at 36 to 48 hours among these varieties of gas concentration[7,8]. A long-acting intraocular gas bubble is necessary in certain circumstances, but it should not be used indiscriminately because of the need for long period of head positioning and the possible chance of complications[9,10] such as ocular hypertension[11], cataract formation, corneal endothelial damage in aphakic eyes, intraocular inflammation and still include patient's activity such as restriction on air travel[12] and prolonged visual rehabilitation[13]. The standard technique to fill C_3F_8 into vitreous cavity after fluid-air exchange is air-gas exchange. First, we use a 50-ml. syringe connected with sterile 0.22 µm millipore filter and then infuse 100% C_3F_8 10 cc. into the syringe. Thereafter, we add filtered room air continually until the total volume is 50 ml. reaching a total of 20% concentration. The last step is the infusion of mixed gas into the air-filled vitreous cavity as exchange. This is called a fixed-concentration technique[14]. The other technique in this study iscalled afixed-volume technique. Firstly, 100% C_3F_8 0.8 cc. is injected into the air-filled vitreous cavity. Then the pure gas will be mixed with the air in vitreous cavity to reach 20% concentration same as the previous technique. According to the advantages of the fixed-volume technique which include time saving for preparing gas and secondary less gas volume consumption, we would like to study whether the fixed-volume technique differs from the fixed-concentration technique in the aspects of postoperative residual gas volume, anatomical reattachment rate and postoperative complication including ocular hypertension and endophthalmitis.

Patients and Methods

This study was approved for ethical research in human with the human research ethics committee of Thammasat university, Thailand (Research ID: MTU-EC-OP-0-244/61).

From June 2018 to August 2019, we recruited 56 eyes from 56 patients who were diagnosed with rhegmatogenous retinal detachment in the retina clinic, at the department of ophthalmology, Thammasat university hospital.

Patient selection

Inclusion criteria

1. Eyes diagnosed with rhegmatogenous retinal detachment and underwent 23-gauge pars plana vitrectomy combined with laser endophotocoagulation and air-gas exchange procedure.
2. Patients who are informed and consented to surgery.
3. Patients who are able to attend a follow-up of at least 1 month postoperatively.

Exclusion criteria

1. Patients with complicated rhegmatogenous retinal detachment such as proliferative vitreoretinopathy grade C, traumatic retinal detachment and pediatric retinal detachment.
2. Eyes with a history of prior retinal surgery.
3. Eyes with a history of pre-existing uveitis, cloudy ocular media or ocular hypertension.
4. Patients who are unable to adequately remain in prone position postoperatively.
5. Patients who are unable to consent for following the study protocol.

Surgical technique

All patients underwent 23-gauge pars plana vitrectomy combined with laser endophotocoagulation and air-gas exchange with 20% C_3F_8 under retrobulbar

anesthesia. After these operations were done, the patients were randomized into 2 groups: fixed-concentration group and fixed-volume group.

In the fixed-concentration group, the various steps were shown as follows

1. One of the sclerotomy ports was first closed without suture after pars plana vitrectomy combined with endophotocoagulation and air-fluid exchange.

2. A 50-ml syringe containing 20% C_3F_8 was prepared by mixing 10 ml. of 100% C_3F_8 with 40 ml. of filtered room air.

3. This prepared gas was slowly injected through the infusion cannula into the eye while intraocular air was expelled through the other unclosed sclerotomy. This allowed for exchange between intraocular air and 20% C_3F_8.

In the fixed-volume group, the various steps were shown as follows

1. All of the sclerotomy ports were closed after 23-gauge pars plana vitrectomy combined with endophotocoagulation and air-fluid exchange.

2. A bolus 0.8 ml. of 100% C_3F_8 was injected intravitreally.

Post-operative care and follow-up

The intraocular pressure was measured and recorded at 6 hours postoperatively. All eyes were prescribed both steroid and antibiotic eye drops for at least 4 weeks and all patients were followed up on the first day, first week, and first month postoperatively. In each visit of follow up, all eyes received complete eye examination and intraocular gas volume measurement were performed with slit-lamp biomicroscopy using diffuse illumination technique in the primary position of the patient's head. We estimated the intraocular gas volume by measuring the height of the gas-fluid interface level seen through the dilated pupil with the plane of the cornea perpendicular to the ground. Gas-fluid level in the eye could indicate gas volume. We reported the intraocular gas volume in percentage as shown in figure 1. Intraocular pressure was also measured by applanation tonometry in each visit. Also, all postoperative complications were recorded if detected.

Statistical analysis

SPSS version 14.0 was used for statistical analysis in this study. The data were collected and analyzed by using mean, standard deviation and percentage. Independent t-test and Chi-square test were used for comparing the data between two groups. P-value less than 0.05 was statistically significant.

Results

All of the demographic data of the patients were shown in table 1. There were 56 eyes of 56 patients including 34 men (60.7%) and 22 women (39.3%). The average age of patients was 59.84 ± 10.4 years old (between 33-84 years old). The site of affected eyes occurred was 31 (55.40%) on the right and 25 (44.60%) on the left. No significant difference of demographic data was found between two groups.

The mean residual intraocular gas volume and the mean difference between two techniques in 1 day, 1 week and 1 month postoperatively were shown in table 2. At 1 day postoperatively, the mean intraocular gas volume of fixed-volume group was 81.25 ± 8.57% (range, 70%-95%) and the mean intraocular gas volume of fixed-concentration group was 85.36 ± 10.71% (range, 70%-100%). At 1 week postoperatively, the mean intraocular gas volume of fixed-volume group was 62.14 ± 12.87% (range, 50%-90%) and the mean intraocular gas volume of fixed-concentration group was 70.36 ± 17.74% (range, 40%-100%). At 1 month postoperatively, the mean intraocular gas volume of fixed-volume group was 31.25 ± 11.52% (range, 20%-50%) and the mean intraocular gas volume of fixed-concentration group was 38.93 ± 16.18% (range, 10%-60%). The mean differences of post-operative intraocular gas volume between two groups in 1 day, 1 week, and 1 month postoperatively were 4.11% (95% CI, -1.09-9.30, p-value = 0.119), 8.21% (95% CI, -0.09-16.52, p-value = 0.052) and 7.68% (95% CI, 0.15-15.20, p-value = 0.046) respectively.

There were 24 eyes (85.7%) in the fixed-volume group reached successful anatomical retinal reattachment and there were also 25 eyes (89.3%) in the fixed-concentration group that reached the same result. In contrast, there were 4 eyes (14.3%) in the fixed-volume group and 3 eyes (10.7%) in the fixed-concentration group developed unsuccessful retinal attachment and

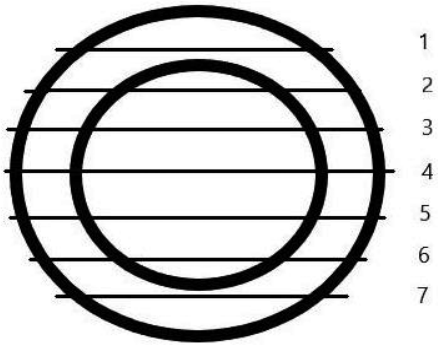

Figure 1. The intraocular gas volume was estimated clinically as the percentage by measuring the height of the gas-fluid interface seen through the dilated pupil with the plane of cornea perpendicular to the ground. There were 7 reference lines with the percentage of gas volume as below.
Line 1 represented 12.5% of gas volume, an approximate value as 10% was recorded.
Line 2 represented 25% of gas volume, an approximate value as 25% was recorded.
Line 3 represented 37.5% of gas volume, an approximate value as 35% was recorded.
Line 4 represented 50% of gas volume, an approximate value as 50% was recorded.
Line 5 represented 62.5% of gas volume, an approximate value as 60% was recorded.
Line 6 represented 75% of gas volume, an approximate value as 75% was recorded.
Line 7 represented 87.5% of gas volume, an approximate value as 85% was recorded.

Table 1. Descriptive statistics in demographic data of patients in this study.

	Fixed volume (n=28)	Fixed concentration (n=28)	p-value*
Age	60 ± 7.88	59.68 ± 12.91	0.911
Sex			
Female	9 (32.1%)	13 (46.4%)	0.274
Male	19 (67.9%)	15 (53.6%)	
Laterality			
LE	12 (42.9%)	13 (46.4%)	0.788
RE	16 (57.1%)	15 (53.6%)	

***Independent t-test and Chi-square test**

Table 2. Postoperative mean intraocular gas volume over time (%) and mean difference between fixed-volume group and fixed-concentration group.

	Fixed volume (n=28)	Fixed concentration (n=28)	Mean difference	95%CI	p-value*
Day 1	81.25 ± 8.57	85.36 ± 10.71	4.11	-1.09 to 9.30	0.119
Week 1	62.14 ± 12.87	70.36 ± 17.74	8.21	-0.09 to 16.52	0.052
Month 1	31.25 ± 11.52	38.93 ± 16.18	7.68	0.15 to 15.20	0.046

***Independent t-test**

underwent additional retinal surgery later. There were 12 eyes (42.9%) in the fixed-volume group and 8 eyes (28.6%) in the fixed-concentration group developed ocular hypertension after the surgery and which required anti-glaucoma drugs for controlling intraocular pressure. None of the eyes in both groups developed postoperative endophthalmitis.

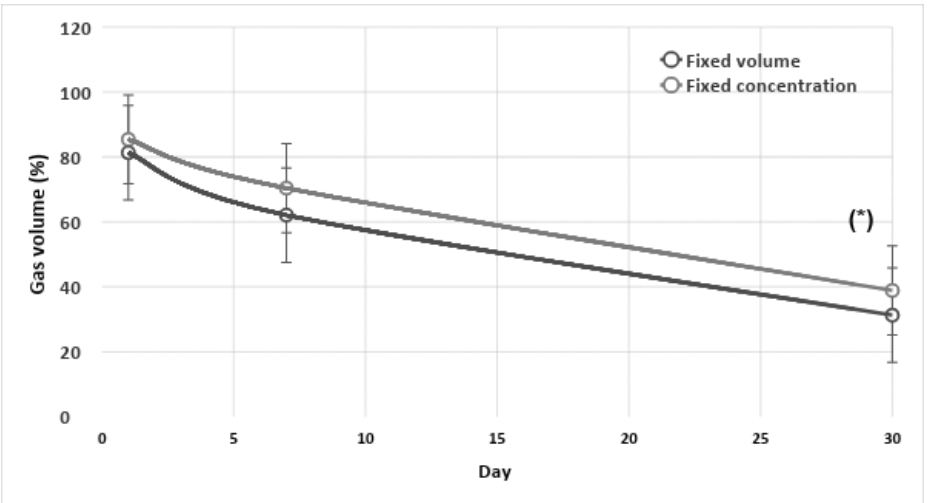

Figure 2. Mean intraocular gas volume over time (%) in fixed-volume group and fixed-concentration group.

Discussion

In this study, we performed two techniques of perfluoropropane injection after 23-gauge pars plana vitrectomy combined with laser endophotocoagulation in the management of rhegmatogenous retinal detachment. The first technique was fixed-concentration technique and the second technique was fixed-volume technique. The details of these techniques were mentioned in the surgical technique section. Although two techniques were different, the final gas concentrations were theoretically quite similar. There are apparent advantages and disadvantages of these two techniques. For instance, the fixed-concentration technique normally consumed more gas volume of C_3F_8 and the cost was higher than the fixed-volume technique. Underfilling of the gas in fixed-concentration technique might occur if there was any leakage at the sclerotomy port. Another advantage of the fixed-concentration technique was the lower risk of postoperative intraocular pressure rising due to non-expansile properties. For the fixed-volume technique, it consumed less amount of gas volume and less time was required for preparing gas. However, the disadvantage of this technique was the higher risk of in postoperative intraocular pressure rising, especially in smaller eyes.[15]

The outcome of this study showed that the mean residual intraocular gas volume of the two techniques revealed no significant difference at 1 day and 1 week postoperatively. However, there was a smaller volume of residual intraocular gas by fixed-volume technique in 1 month postoperatively, therefore there was a significant difference between the two techniques. Overall, there was a smaller intraocular gas volume in fixed-volume technique when compared with fixed-concentration technique at every point of time. To explain this difference, there might be some technical errors during gas preparation in the fixed-volume technique which could possibly underfill the gas into vitreous cavity. There was no significant difference when considered the residual gas volume between two groups. However, there were some limitations to our study. We did not define the globe size, especially in high myopia patients that are distributed among each group. Therefore, it could lead to the variation of the intraocular gas concentration in the fixed-volume group postoperatively. In the prior study, Harvey et al. found that fixed-concentration and fixed-volume technique of perfluoropropane gas exchange were comparable in terms of post-operative intraocular gas volume, intraocular pressure and anatomical retinal reattachment rates[15]. Our study also showed that there was no significant difference in post-operative intraocular pressure and anatomical retinal reattachment rates between both two groups. Cankurtaran et al. reported the success rate of anatomical reattachment after pars plana vitrectomy combined with gas tamponade which was approximately 81.2%[16]. The report was

Table 3. Rate of anatomical retinal reattachment, ocular hypertension and post-operative endophthalmitis in the fixed-volume group and the fixed-concentration group.

	Fixed-volume (n=28)	Fixed- concentration (n=28)	p-value*
Anatomical retinal reattachment	24 (85.7%)	25 (89.3%)	0.686
Ocular hypertension	12 (42.9%)	8 (28.6%)	0.265
Post-operative endophthalmitis	0 (0%)	0 (0%)	N/A

***Chi-square test**

similar to our study in the aspect of anatomical reattachment rate. The incidence of intraocular pressure rising after air-gas exchange had been estimated to range from 18% to 59%[17,18]. For the safety of these two techniques, there was no post-operative endophthalmitis found in both groups. The incidence of postoperative endophthalmitis had been reported in a myriad of studies.The incidence ranged between 0.03% and 0.14% for 20 G pars plana vitrectomy[19].

Conclusion

In conclusion, after comparing both techniques of air-perfluoropropane gas exchange in rhegmatogenous retinal detachment surgery, it was found that in terms of the decreased intraocular gas volume, there was some significant differences between the two groups. The intraocular gas volume in fixed-concentration technique at every point in time intended to be much more than in the fixed-volume technique. There might be a longer internal tamponade in the fixed-concentration group occasionally. However,when anatomical retinal attachment rate was considered, there was no significant difference between these two techniques. Therefore, the fixed-volume technique which consumed less amount of gas and less time consuming should be used as the standard air-gas exchange technique for rhegmatogenous retinal detachment surgery.

Ethics: This study was approved for ethical research in humans with the human research ethics committee of Thammasat university, Thailand (Research ID: MTU-EC-OP-0-244/61).

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Clinical Characteristics of Pediatric Uveitis at HO CHI Minh City Eye Hospital in 2017

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Purpose: To identify demographic and clinical characteristics, as well as treatment outcomes of pediatric uveitis at Ho Chi Minh city Eye Hospital in 2017.
Methods: Descriptive cross-sectional study. We enrolled 107 eyes from 94 patients <16 years of age, diagnosed with pediatric uveitis from January 1, 2017 to December 31, 2017 at the HCM City Eye Hospital. Medical records are included in the study if sufficient information is available.
Results: Most patients were 6-10 years o f age (42.6%), with no difference in gender. Main chief complaints were blurry vision (66%), pain (48.9%) and photophobia (19.1%), 30% of the patients had previous history of uveitis. Of all the patients, 52.1% were hospitalized for >7 days after the disease onset and 76.6% had no preliminary treatment. 86.2% of patients had unilateral uveitis, 51.4% had baseline visual acuity <20/70. Idiopathic causes accounted for 76.6%, while panuveitis accounted for 52.1%. The most common symptoms were blurry vision (66%), redness (50%) and pain (20.2%); the most common signs were vitreous opacity (57.9%), conjunctival injection (47.7%) and anterior chamber cells (37.4%). Regarding treatment characteristics, 90.4% used topical steroids, 70.2% used intraocular pressure lowering agents and 68.1% used topical NSAIDs; most of the patients did not gain improvement in visual acuity (63.6%). The most common complications were vitreous organization (31.7%), secondary cataract (22.4%) and band keratopathy (17.6%).
Conclusion: Pediatric uveitis is a serious disease with complicated progression, easy recurrence and may cause irreversible vision loss. Furthermore, pediatric uveitis requires a long period of treatment and patient compliance. Therefore, it is necessary to have a subclinical test to optimize the diagnosis and treatment. It is important to advocate the patients to have early admission and treatment to avoid sequelae of vision loss.
Conflicts of interest: The authors report no conflict of interest
Keywords: pediatric uveitis, uveitis, uveitis in children
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Introduction

Uveitis is the third frequent cause of blindness in the United States of America[1,2] with the prevalence in children around 2.2% to 33.1%. Among them, the prevalence of anterior, intermediate, posterior and pan uveitis is, in order, 30-40%, 10-20%, 40-50% and 5-10%[3]. Although the prevalence of uveitis in children is less frequent than that in adults, the prognosis of uveitis in children is usually worse than adults. The inflammation reaction

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in children is usually more aggressive than adults, and the children themselves may have difficulty complaining about the symptoms. Those factors result in late diagnosis and treatment, easy recurrence, and higher risk of complications which may lead to permanent vision loss. Considering the longer life span in children, vision loss can profoundly affect their quality of life, and result in a long-term disability for many decades. Therefore, a retrospective evaluation about clinical characteristics and treatment results of pediatric uveitis is essential to provide an overview about the disease and optimize the art of diagnosis and treatment in such patients.

Patients and Method

This was a descriptive cross-sectional study. In this study, we collected data from 107 eyes of 94 pediatric uveitis patients in Ho Chi Minh city Eye Hospital between January and December 2017. The inclusion criteria were patients younger than 16 years old, with diagnosis of uveitis and sufficient information in their medical records. Medical records with insufficient information, and those admitted outside of 2017 were excluded from this study.

Data collected from admitted patients included age, sex, chief complaint, duration of symptoms, treatment before hospital admission, cause, anatomical classification of uveitis following SUN classification, presenting visual acuity (VA) recorded by Snellen chart and intraocular pressure (IOP) before and after treatment, signs and symptoms, treatment procedures and complications.

Data was analysed by SPSS 20 software, with qualitative variables presented by percent, quantitative variables presented by mean ± 2SD and the relation between 2 qualitative variables confirmed by chi-square test. The difference was considered statistically significant with $p \leq 0.05$.

Results

Details about age, sex and history of disease were summarized in Table 1**.** In this study, the most frequent age group was 6-10 years old, while gender distribution was similar. Most of the patients underwent primary onset of disease, however, recurrent patients consisted of one-third of all cases (31.9%). The most frequent chief complaints were blurry vision (66%), redness (48.9%) and pain (19.1%). More than half of patients were admitted to hospital after a duration of symptoms of >7 days, while 76.6% of patients recieved no treatment before being admitted to hospital.

Table 1 Etiological characteristics and history of disease

Epidemiology characteristics	N (%)
Age group	
0-5	18 (19.1)
6-10	40 (42.6)
11-16	36 (38.3)
Sex	
Male	49 (52.1)
Female	45 (47.9)
History of disease	
Primary	64 (68.1)
Recurrent	30 (31.9)
Other ocular history	
Trauma	8 (8.5)
Surgery	1 (1.1)
Chief complaint	
Blurry vision	62 (66)
Redness	46 (48.9)
Pain	18 (19.1)
Photophobia	2 (2.1)
Other	2 (2.1)
Duration of symptoms	
1-3 day(s)	22 (23.4)
4-7 days	23 (24.5)
8 -14 days	12 (12.8)
>14 days	37 (39.3)
Primary treatment	
In a healthcare center	19 (20.2)
Self-treatment	3 (3.2)
None	72 (76.6)

Clinical characteristics, classification and causes of pediatric uveitis in this study were summarized in Table 2. Most of the patients had VA <20/70 (51.4%). With regards to the anatomical categorization of the diseases, pan-uveitis was

the most frequent (52.1%), with regards to the causes, idiopathic uveitis was the most frequent (76.6%) in this study. The most common symptoms were blurry vision (66%), redness (50%) and pain (20.2%). The most common signs were vitreous opacity (57.9%), conjunctival injection (47.7%) and anterior chamber cell (37.4%).

Table 2 Clinical characteristics of pediatric uveitis

Clinical characteristics	N (%)
Affected eye(s)	
1 eye	81 (86.2)
2 eyes	13 (13.8)
Pre-treatment VA	
>20/30	19 (17.8)
20/70-20/30	33 (30.8)
<20/70	55 (51.4)
Pre-treatment IOP	
High (>21mmHg)	8 (7.5)
Normal (16-21 mmHg)	89 (83.2)
Low (<16 mmHg)	10 (9.3)
Classification of uveitis	
Anterior uveitis	18 (19.1%)
Intermediate uveitis	3 (3.2%)
Posterior uveitis	24 (25.5%)
Pan-uveitis	49 (52.1%)
Causes	
Idiopathic	72 (76.6)
Trauma	11 (11.7)
Proximal infection (ear, tooth)	8 (8.5)
Vogt-Koyanagi-Harada syndrome	2 (2.1)
Surgery (cataract)	1 (1.1)
Symptoms	
Blurry vision	62 (66)
Redness	47 (50)
Pain	19 (20.2)
Photophobia	2 (2.1)
Other	7 7.5)
Signs	
Vitreous opacity	62 (57.9)
Conjunctival injection	51 (47.7)
Anterior chamber cell	40 (37.4)
Cataract	32 (29.9)
Posterior synechia	25 (23.4)
Poor pupillary reflex	24 (22.4)
Band keratopathy	19 (17.8)
Hypopyon	16 (15)
Optic disc edema	14 (13.1)
Keratic precipitates	7 (6.5)
Posterior pole retinal lesion	4 (3.7)

Treatment characteristics of pediatric uveitis were summarized in Table 3. The VA of most patients remained unchanged (63.6%) and the treatment period usually lasted more than 3 months (50%). Medical treatment was the main modality, with the most often used drug being corticosteroids (90.4%), IOP-lowering drugs (70.2%) and topical NSAIDs (68.1%). Complications appeared in 65/94 patients (69.2%) with the most common complications were in order, vitreous organization (31.7%), cataract (22.4%) and band keratopathy (17.6%).

Table 3 Treatment characteristics of pediatric uveitis

Treatment characteristics	N (%)
Post-treatment VA	
Increased	25 (23.4)
Decreased	14 (13.1)
Unchanged	68 (63.6)
Treatment period	
<1 month	28 (29.8)
1-2 month(s)	12 (12.8)
2-3 months	7 (7.4)
>3 months	47 (50)
Treatment process	
Topical steroids	85 (90.4)

Treatment characteristics	N (%)
IOP-lowering drugs	66 (70.2)
Topical NSAIDs	64 (68.1)
Topical antibiotics	20 (21.3)
Immunosuppressive agent	1 (1.1)
Surgery	5 (5.3)
Complications	
Vitreous organization	34 (31.7)
Cataract	24 (22.4)
Band keratopathy	19 (17.6)
Posterior synechiae	8 (7.5)
Increased IOP	6 (5.6)
Optic disc neovascularization	2 (1.9)
Retinal detachment	2 (1.9)
Foveal scar	1 (0.9)
Epi-retinal membrane	1 (0.9)

Discussion

In our study, children 6-10 years old were found to be the most common age group in pediatric uveitis. In this period of life, children may start to attend school and subsequently discovered symptoms of the disease. With regards to gender, the prevalence of male and female patients in our study were equivalent. Our result was similar to previous studies.[7,8,11,12]

We found that blurry vision, pain and photophobia were the most common chief complaints in pediatric uveitis, with the prevalence being, in order, 66%, 48.9% and 19.1%, similar to the study of Smith[12]. It is critical that the uveitis children admitted due to red eyes were easily misdiagnosed with conjunctivitis, especially in the early stage of disease. Nearly half of admitted cases had their eye(s) checked more than 7 days after the appearance of symptoms, while more than ¾ cases did not have preliminary treatment and only 20.2% of patients had preliminary treatment at a healthcare center. That could help explain the high prevalence of low VA and recurrence.

Pertaining to pathogenesis and classification details, our study found that the most common categories were pan-uveitis and posterior uveitis, different from the other authors who concluded that anterior uveitis was the most common form[3,6,7]. In fact, children patients with anterior uveitis were diagnosed and treated in an outpatient unit, with no document recorded in hospital; this may be the cause of the difference in categories of uveitis. Nearly 77% of uveitis patients are idiopathic, higher than that of other authors [3,4,6,8,10]. Maybe this result was due to the lack of laboratory and imaging tests in diagnosis and treatment. Vogt-Koyanagi-Harada syndrome took a low prevalence, similar to the other studies[6,8,10] while traumatic cause was quite high (11.7%) comparing to the other authors [2,9,12]. On the other hand, with recurrent patients taking around one-third of all cases, it could be concluded that pediatric uveitis was easily recurred, due to strong inflammation reaction in children.

Our study recorded that only 17.8% of patients had >20/30 VA, while 51.4% of patients had <20/30 VA. In the group with <20/30 VA, 5 eyes had no light perception VA and 25 eyes had VA from light perception to hand movement, which could be considered totally function loss. The proportion of patients presenting with <20/30 VA in our study was higher than previous studies[4,5], which could be explained by late admission to hospital and high recurrence rate. As discussed before, while redness was one of the most common symptoms and conjunctival was one of the most common signs, one uveitis patient could be easily misdiagnosed with conjunctivitis. Therefore, patients present with red eye should be carefully examined, especial when they have blurry vision, pain and no discharge.

With regards to treatment strategies, our study found a similar result with de Boer[6] and Smith[12] that topical corticosteroid was the most common treatment for 90.4% of patients. The proportion of immunosuppressive agents was surprisingly low compared to other authors (1.1%), which is thought to be the result of lacking the aid of internal specialists. Surgical treatment solving complications of pediatric uveitis was still limited; only 5 patients underwent cataract surgery (5.3%), no pars plana vitrectomy or surgical removal of calcified corneal epithelium was recorded in our study. Fifty percent of patients had treatment duration lasting longer than 3 months, while only 23.4% increased VA after treatment and most of patients had unchanged VA after treatment. Eventually 13.1% decreased VA after treatment due to complications.

The most common complications in our study were vitreous organization, cataract and

band keratopathy. Solving these complications was apparently not easy. Pars-plana vitrectomy to remove vitreous organization is a difficult process in our clinical setting, which requires anesthesia even with children close to 16 years old. Moreover, vitrectomy and cataract removal surgery may result in recurrence of uveitis itself, as the inflammation reaction in children is quite strong. Band keratopathy can be treated by removing the calcified epithelium by scalpel or excimer laser, however the recurrence rate is high.

Conclusion

Pediatric uveitis is a serious disease with complicated progress, easy recurrence and may cause irreversible vision loss while the treatment process prolongs and requires patient compliance. Therefore, it is necessary to have subclinical test to optimize the diagnosis and treatment. It is important to promote patients to have early admission therefore avoiding sequelae of vision loss.

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A comparison of pterygium surgery recurrence rates after amniotic membrane grafting by vicryl versus nylon fixating sutures

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Objective: To examine the recurrence rate after pterygium excision with amniotic membrane grafting surgery comparing between Vicryl 8/0 (fixation group) and Nylon 10/0 (non fixation group).
Design: Prospective randomized study
Methods: A prospective study in pterygium patients undergone surgery randomized into Vicryl 8/10 or Nylon 10/0 suture techniques performed at Thammasat hospital during July 2014 to April 2017. Pterygium grading was classified by modified from Tan's classification. Furthermore, The patient's age, gender and risk factors for recurrence (occupation, history of previous pterygium surgery, size of the pterygium) were recorded in preoperative period and followed up for signs of pterygium recurrence at 1, 3, 6 months and 12 months postoperatively. The results were analysed by paired t-test. Recurrence and complication were observed until April 2017 and analysed by Chi-square test.
Results: There were 132 eyes of 132 patients included in this study (67 females and 65 males; age range of 21-75 years, mean 56.136). 66 eyes were operated with Vicryl fixed technique and 66 eyes without Vicryl fixed technique. The recurrence rate was 19.69% in Nylon group (without vicryl fixed technique) and 28.78% in the Vicryl group. The vicryl group had a higher recurrence rate than the nylon group. There was a significant difference in pterygium recurrence between the fixation and non-fixation group at 3 months and 12 months follow up P=0.42 and 0.29 respectively. No serious complications were found in either group.
Conclusions: Fixation group (Vicryl technique) showed the recurrence rate of pterygium is significantly different compared with the non fixation group (Nylon technique) at 3 months (P=0.42) and 12 month (P=0.29). Age, gender and outdoor activity were not found to be significant factors affecting the recurrence of pterygium.
Keywords: Pterygium excision, amniotic membrane transplantation, Vicryl suture, Nylon suture, recurrence rate
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Introduction

Pterygium[1,2] an external eye disease is common worldwide but is particularly prevalent in tropical and subtropical areas. The prevalence rates range from 0.7 to 31% among different populations and are also influenced by age, race and exposure to solar radiation. Pterygium[3] appears as a fleshy vascular mass in interpalpabral area. The typical pterygium is triangular in shape. It is more frequently located nasally rather than temporally. The causes of pterygium mostly were from chronic conjunctival irritation, sunlight or ultraviolet radiation especially UV-A and UV-B (290-400nm) and wind exposure.

Various surgical techniques[3] have been described in literature in treating pterygium, which includes bare sclera techniques, beta irradiation, intra and postoperative mitomycin, conjunctival autograft, amniotic membrane transplant and some combination of the above

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mentioned procedures. However, the most common problem in all these procedures is recurrence.

The pterygium excision with bare sclera[4] has a high recurrence rate ranging from 24-89%. Kenyon et al[9] first described a conjunctival autograft in 1985; They reported a recurrence rate of 5.3% with less complications. The standard technique of pterygium excision[5,6] with amniotic membrane transplantation uses non-absorbable suture materials to fix the amniotic membrane graft after pterygium and beneath tenon tissue removal. The Vicryl or Polyglyconate lactide suture materials[7,8] are absorbable sutures which can provoke a heightened inflammatory response.

Material and Methods

A prospective study in pterygium patients who were operated with or without vicryl fixed technique by randomization in Thammasat hospital during July 2014 to April 2017. All procedures were performed by a single experienced ophthalmologist at a tertiary hospital. Patients with primary pterygium was included. Patients with pseudopterygium, history of ocular diseases predisposing to ulceration or poor wound healing such as autoimmune disease, collagen vascular disease, dry eye, ocular trauma and glaucoma were excluded in this study.

Patients were randomized into two groups. Group 1 (Combined Nylon and Vicryl fixed technique) and Group 2 (only Nylon suture technique) 132 eyes of 132 patients were included in the study. There were 65 male and 67 female patients. Age range was 21 to 75 years (mean 56.136) All patients underwent a complete ophthalmic examination. Preoperative data parameters included name, age, sex, visual acuity, extent and location of pterygium. Written informed consent was obtained from each patient. The patients were divided into two groups. The fixed group (n=66) underwent pterygium excision followed by using Vicryl 8-0 fixations 2 points at the excisional border at superior and inferior of conjunctiva. The nylon or non-fixation group (n=66) underwent pterygium excision with amniotic membrane transplantation using nylon 10-0 suture for fixation. Data regarding the influence of the patients's characteristics on the chosen suture techniques are compared for statistical significance using chi-square.All eyes were given topical anesthesia. The surgical procedure was as follows:

After cleaning the eye with Betadine paint, eyelids were retracted by a self-retaining eyelid retractor. Intralesional was injected by 1% lidocaine with adrenaline 2-3 ml. The head of the pterygium was separated from the cornea and 4-5 mm conjunctiva including the body of the pterygium was excised. Light cautery was applied to bleeding points for hemostasis. The size of the amniotic membrane graft was measured the pterygium and continuous with nylon suture with or without vicryl fixed technique. The vicryl fixed technique is a stitch fixation between the rim edge of conjunctival excisional area at superior and inferior to the sclera below the edge.

At the end of the surgery, eyes of all patients were patched after applying moxifloxacin eyedrops. Patients were asked to return on the first postoperative day and the eye dressings were removed. Post-operative medicine regimen was the same in both groups, consisting of topical antibiotic (Levofloxacin) and steroids drops (Fluorometholone) four times for 1 month postoperatively.

All patients were followed up on the first postoperative day then at 1 week, 1 month, 3 months, 6 months and then 1 year apart. All patients fixated with nylon had sutures removed within 1-2 weeks. On the contrary,vicryl don't. Follow-up examination included visual acuity assessment, intraocular pressure and slit lamp examination.

Signs of recurrent pterygium consisted of visible changes in the conjunctiva such as vascular congestion and thickening, fibrovascular proliferative tissue in the site of previous pterygium, pterygium invasion of the cornea (modified from Tan's classification). We defined the grading of pterygium recurrence as follows: grade I as fibrovascular tissue at conjunctiva with visible scleral vessels, grade II as thin fibrovascular tissue at conjunctiva without visible scleral vessels, and grade III as thick fibrovascular tissue at conjunctiva with invasion of the cornea (Table 1).

Upon detection of signs of pterygium recurerence, the surgeon considers management options such as intralesional 5-Fluorouracil (5-FU) or corticosteroid injection, using more intensive anti-inflammatory medication with corticosteroids eyedrops and lubricating the

ocular surface. The main outcome is rate of pterygium recurrence between two groups and analysed by paired t-test. Recurrence and complications were observed until April 2017. Other factors of recurrence were analysed by Fisher exact test and Chi-square test.

Results

There were 132 eyes of 132 patients in this study (67 females and 65 males; age range of 21-75 years, mean 56.136 ± 2(12.13) years in the fixation group and 55.106 ± 2(12.32) years in the non-fixation group). 66 eyes were operated with Vicryl fixed technique and 66 eyes belonged in the non-fixation group.

The fixation group had 36 females (53.7%) and 30 males (46.2%) while the non-fixation group had 31 females (46.3%) and 35 males (53.8%) (*P*=0.384). Age range between both groups were 21-77 years. Of the patients aged between 21 - 30 years were 3(100%) eyes in contrast to the non-fixation has no patient in this range. Of the patients aged 31-40 years, 6 eyes (33.3%) and 12 eyes (66.7%) belonged in the fixation and non-fixation groups respectively. Of the patients aged 41-50 years, 12 eyes (52.2%) and 11 eyes (47.8%) belonged in the fixation and non-fixation groups respectively. Of the patients aged 51-60 years, 13 eyes (43.3%) and 17 eyes (56.7%) belonged in the fixation and non-fixation groups respectively. Of the patients aged 61 years or older, 32 eyes (52.2%) and 26 eyes (44.8%) belonged in the fixation and non-fixation groups respectively and number of patient loss follow up at 12 month higher in non-fixation group 6 (4.54%) and fixation group 4 (3.03%).

The total recurrence of pterygium in both non-fixation and fixation group was 64 eyes (48.4%). This study showed recurrence in all grades of pterygium (Table 2). For Grade I, 20 eyes (57.14%) and 15 eyes (42.86%) belonged in the fixation and non-fixation groups respectively.

Grade II had 16 eyes (59.25%) and 11 eyes (40.75%) in fixation and non-fixation groups respectively. In contrast, grade III had recurrence in only 2 eyes in the fixation groups (*P*=0.428).

Table 1: Table define pterygium grading size and clinical feature

Pterygium grading	Characteristics	Extent of invadsion into the cornea (mm)
Grade I	fibrovascular tissue at conjuntiva, scleral vessels can be seen.	< 3.00
Grade II	Thin fibrovascular tissue at conjuntiva, scleral vessels cannot be seen.	3.00-6.00
Grade III	thick fibrovascular tissue at conjuntiva and invasion of the cornea.	>6.00

Regarding occupations, in the fixation group, 35 (50.7%) worked outdoors vs 31 (49.2%) worked indoors whereas in non-fixation group, 32 (50.8%) worked outdoors vs 34 (49.3%) work indoors. Comparing the size and number of pterygium in non fixation groups and vicryl fixed group, for pterygium size less than 3mm, 35 (48.6%) and 37 (51.4%) belonged in the fixation and non-fixation groups respectively. In eyes with pterygium sized between 3.00 - 6.00 mm, 28 (51.9%) and 26 (48.1%) belonged in fixation and non-fixation groups respectively. In pterygium larger than 6.00 mm, 2 (66.7%) and 1 (33.3%) belonged in the fixation and non-fixation groups respectively.

The recurrence rate of pterygium between fixation and non-fixation group is shown in table 3. The number of recurrent pterygium after excision at 1 month was 4 (6.1%) and 9 (13.6%) in the fixation and non-fixation groups respectively (X^2 Chi-square 2.133 : *P*=0.144) while the number of recurrent pterygium after excision at 3 months showed a significant increase when compared between the fixation group vs non-fixation group, 13 eyes (19.7%) vs 5 eyes (7.6%) respectively (X^2 Chi-square 4.177 : P=0.042). The number of recurrent pterygium after excision at 6 months was 13 eyes (18.2%) and 11 eyes

(16.7%) in the fixation vs non-fixation groups respectively (X^2 Chi-square 0.053 : P=0.819), in contrast to the number of recurrence rate in both groups where the decrease was significant after excision at 12 months (Table 3), with 7 eyes (10.6%) and 3 eyes (1.5%) in the fixation vs non-fixation groups respectively (X^2 Chi-square 4.970 : P=0.029)(figure 1).

The mean astigmatism of both groups at first visit was 2.77 in fixation groups and 2.43 in the non-fixation groups (Figure 2). Mean post operative astigmatism was found to be following during follow up results shown as fixation vs non-fixation groups : At 1 month 0.97 vs 0.82, at 3 month 1.02 vs 0.975 , at 6 month 1.25 vs 1.17 and at 12 month 1.33 vs 1.25 respectively.

The recurrence rate of pterygium in fixation and non-fixation group (Figure 3) throughout the follow up period comparing fixation vs non-fixation groups. Recurrent pterygium grade I were; at 1 month, 3 eyes (6%) vs 5 eyes (10%), at 3 months 5 eyes (8%) vs 2 eyes (4%), at 6 months 7 eyes (10%) vs 6 eyes (9%), at 12 months 5 eyes (5%) vs 2 eyes (4%) respectively. Recurrent pterygium grade II were; at 1 month 2 eyes (2%) vs 3 eyes (4%), at 3 months 6 eyes (10%) vs 3 eyes (6%), at 6 months 6 eyes (8%) vs 4 eyes (7%) and at 12 months 2 eyes (4%) vs 1 eye (2%) respectively. Recurrent pterygium grade III was only found at 3 months postoperatively in 2 eyes (4%).

Discussion

Pterygium is a common ocular surface disorder in Thailand. Various surgical techniques for pterygium excision has shown variable rates of pterygium recurrence. In this study, the recurrence rate was 21.9 % in Fixation group (vicryl technique) and 15.09 % in non fixation

Table 2 Demographic and clinical data of patients in fixation group and non-fixation group.

Characteristics		Suture Techniques		X^2 Chi-square	*P*-Value
		Fixation Group (N=66)	Non-fixation Group (N = 66)		
Gender	Female	36 (53.7%)	31 (46.3%)	.758	.384
	Male	30 (46.2%)	35 (53.8%)		
Age	21-30 years old	3 (100.0%)	0 (0.0%)	6.198	.185
	31-40 years old	6 (33.3%)	12 (66.7%)		
	41-50 years old	12 (52.2%)	11 (47.8%)		
	51-60 years old	13 (43.3%)	17 (56.7%)		
	Older than 61 years old	32 (55.2%)	26 (44.8%)		
	Mean/+-2SD	56.1364 +- 2 (12.13)	55.1061 +- 2 (12.32)		
Grade	Grade I	20 (57.14%)	15 (42.86%)	1.697	.428
	Grade II	16 (59.25%)	11 (40.75%)		
	Grade III	2 (100.0%)	0 (0.0%)		
Occupation	Indoor	35 (50.7%)	34 (49.3%)	.030	.862
	Outdoor	31 (49.2%)	32 (50.8%)		
Size	Less than 3.00 mm	35 (48.6%)	37 (51.4%)	.455	.796
	3.00 – 6.00 mm	28 (51.9%)	26 (48.1%)		
	Greater than 6.00 mm	2 (66.7%)	1 (33.3%)		

group (Nylon technique).

We defined pterygium grading into 3 categories by characteristic as size, thick or thin fibrovascular membrane, degree of scleral vessel obsecure and invade cornea : as Chen et al[17] showed that the severity of inflammation and the preoperative grade of pterygium are associated with pterygium recurrent.Tan et al[18] also explain that the pathophysiologic features and morphology have impact to success rate of pterygium surgery. In our study, we classified pterygium grading by modified from Tan's classification and base on severity of pterygium such as size less than 3 mm but thick fibrovascular tissue and invade cornea, in this case we will classified as grade III etc. As a result of study, Grade III pterygium have the highest number of people who were treated with fixation technique, 100.0 percent, followed by the patients with Grade I and Grade II pterygium,

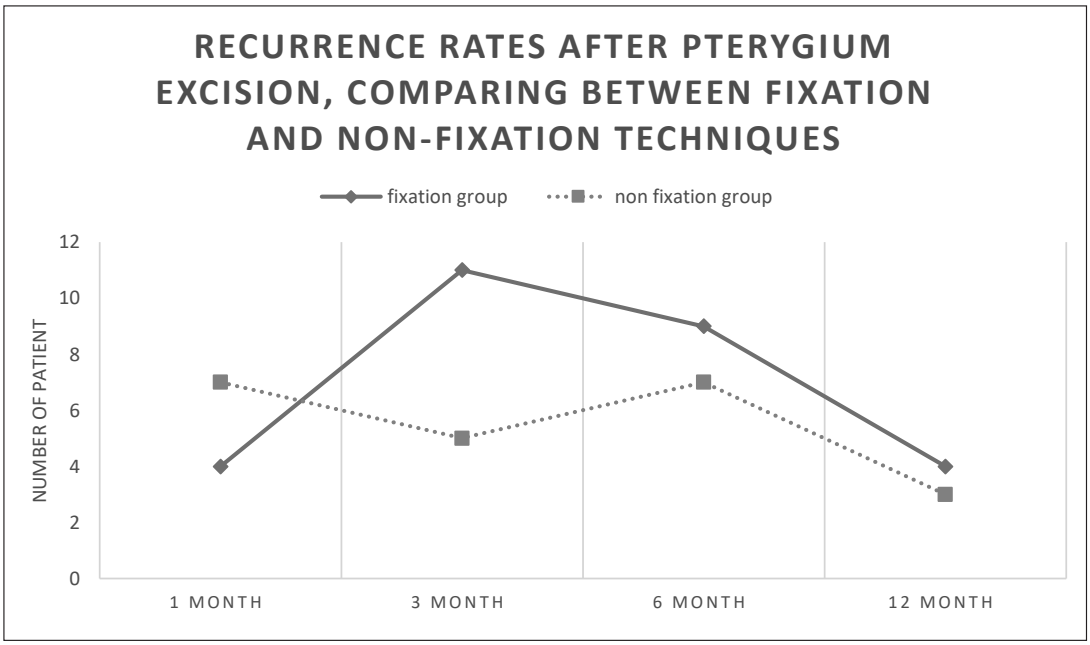

Figure 1: The cumulative frequency of pterygium recurrence

Table 3: comparison of pterygium recurrence in each suture technique in each follow up visit

Time after the pterygium surgery	Suture Technique	Recurrence		X^2 Chi-square	*P*-value
		Number of Recurrent Patients	Number of Non-recurrent Patients		
1 month	Fixation* group	4 (6.1%)	62 (93.9%)	2.133	.144
	Non fixation group**	9 (13.6%)	57 (86.4%)		
3 months	Fixation group	13 (19.7%)	53 (80.3%)	4.117	.042
	Non fixation group	5 (7.6%)	61 (92.4%)		
6 months	Fixation group	13 (18.2%)	54 (81.8%)	0.053	.819
	Non fixation group	10 (16.7%)	55 (83.3%)		
12 months	Fixation group	7 (10.6%)	59 (89.4%)	4.970	.029
	Non fixation group	3 (1.5%)	65 (98.5%)		

* Fixation group (Vicryl fixation technique)
**Non fixation group (Nylon technique)

having the percentage of 57.14 percent and 59.25 percent, respectively. However, the difference in pterygium grading does not lead to a significant difference in suture technique.

For the occupation, we known that sunlight exposure specifically UV-B can cause the progression of pterygium from transformation fibroblast and the working outdoor activity have more radiation expose causes mutations in the p53 tumor suppressor gene[14-16], thus facilitating the abnormal proliferation of limbal epithelium : according to the result found that number of recurrent pterygium higher in fixation group compaired with non-fixation group but the proportion of indoor activity patient much more than outdoor activity. However, the difference is not statistically significant so we conclude that outdoor activity have effect to recurrent pterygium but should be consider another factor also.

Pterygium size is the risk factor in recurrent pterygium : Nuzzi R et al[19] found that the more size of bigger the more rate of recurrent are higher also but depend on surgeon experience and surgical technique ; the higher rate of recurrent found in bare sclera technique more

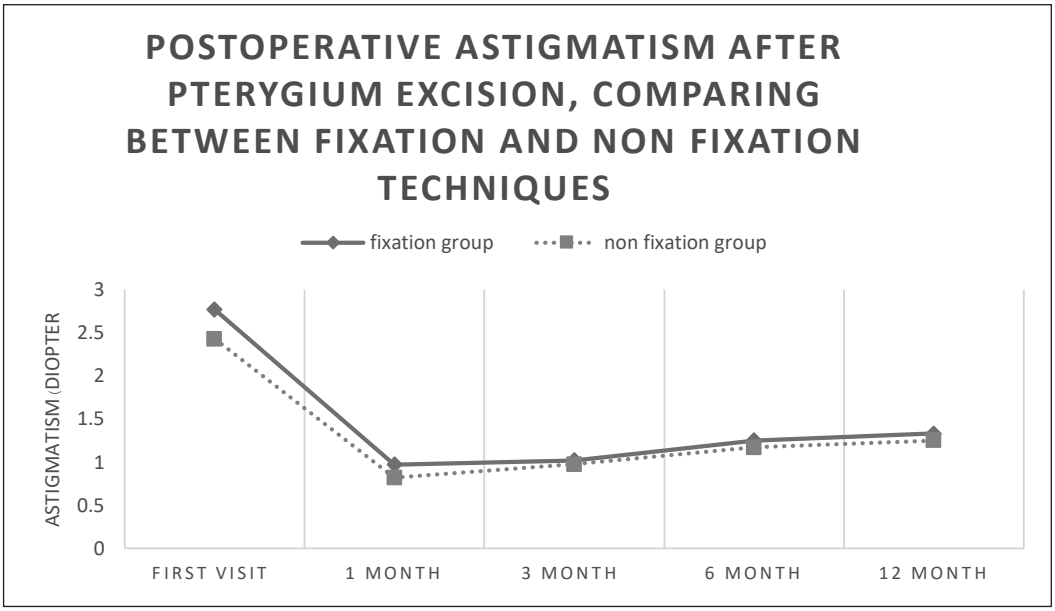

Figure 2: mean astigmatism after pterygium excision and follow up

than amniotic membrane and conjunctival autograft. From our result we found the patients with the pterygium sizes that are larger than 6.00 mm. have the highest percentage of the people who were treated with the fixation technique, comparing to those who have the pterygium sizes that are smaller than 3.00 mm and between 3.00 and 6.00. Even though the percentages are different, the distinction is insignificant.

Even though the there is a higher number of patients with the recurrent rate for the non-fixation group at 1 month after excision, this is insignificant.For the 3-month period after the operation, 19.7 percent of the patients who were treated with the Vicryl suture technique was found to have recurrent signs while compaired to only 7.6 percent of patients treated with the nylon only technique. For the 6-month period after the operation, 18.2 percent of the patients who were treated with Vicryl suture technique was found to have pterygium recurrence. Similarly, 16.7 percent of patients treated with non-fixation technique using only nylon suture was found to have signs of recurrence. For the 12-month period after the patients are treated, 10.6 percent of the patients who were treated with Vicryl suture technique was found to have pterygium sign. On the contrary, there is only 1.5 percent

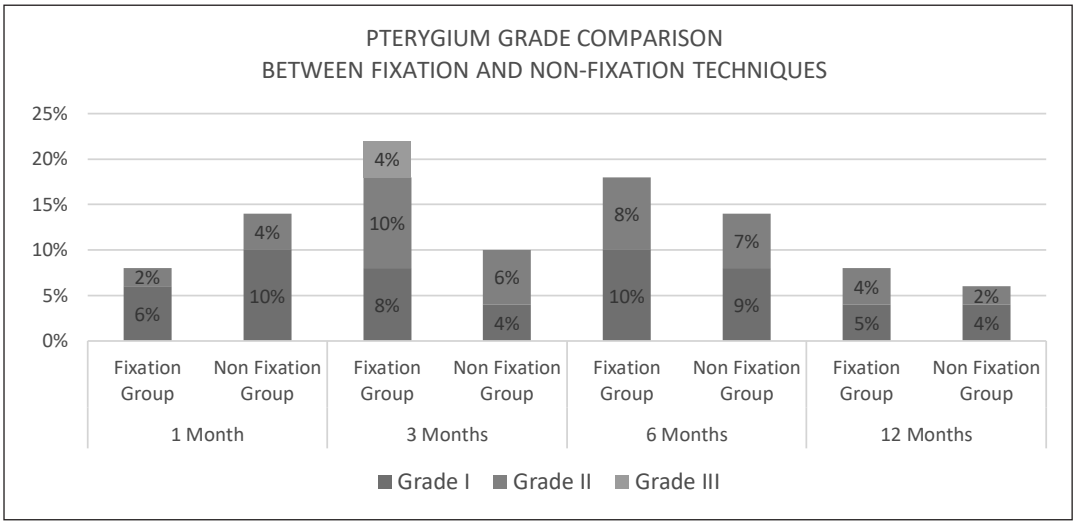

Figure 3: recurrence of pterygium in fixation and non-fixation techniques

of the patients who were treated with only nylon suture was found to have signs of recurrence.

According to vicryl suture material can have more inflammatory response and the mechanism of pterygium recurrence is inflammatory process: as A. Schrier et al. (2003)[13] reported the incidence of recurrence in patients who used Vicyl material was higher compaired to Nylon sutures for pterygium surgery. Carla et al.[12] evaluated the efficacy of pterygium excision with conjunctival autograft by using either nylon, vicryl and fibrin glue for conjunctival autograft suturing : reported a higher incidence of vicryl group more than nylon and fibrin glue respectively. In our results we found that number of recurrent rate was significantly between 2 group at 3 month and 12 month post-operative but complications such as granuloma or cicatricial symblepharon or limitations in ocular motility were not found.

In summary, although the nylon and vicryl was effective for suturing pterygium surgery, the recurrence rate in the fixation group (vicryl technique) was more than non-fixation group (nylon technique), especially in the 3 month and 12 month period after pterygium surgery. The fixation technique had higher recurrent rates propositionally due to the inflammatory nature of vicryl sutures left in place, whereas nylon sutures in both groups were removed within the first 2-3 weeks. Furthermore, the recurrence at 12 months in both groups in this study may be skewed by the unequal number of cases loss to follow up at 12 months. Nylon suture material in pterygium surgery with amniotic membrane autograft results in significantly lower rates of pterygium recurrence compaired with vicryl sutures.

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The causes of patients failing pre-operative cataract surgery assessment

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Background: To report the incidence and identify causes of postponement during pre-operative cataract surgery assessment in Hospital Selayang.
Methods: This is a retrospective study, which examined the number of visits to Eye Clinic, Hospital Selayang for pre-operative cataract surgery assessment every Thursday from November 2016 to October 2017. We analysed the total amount of patients, the amount of defaulters and reasons for failing pre-operative assessments resulting in multiple visits to the clinic.
Results: A total of 811 appointments were scheduled for pre-operative cataract surgery assessment during the analysed period. There were 146 defaulters (18.0%), 410 who passed the pre-operative assessment (50.5%) and 255 who failed and required more than 1 visit for further investigations (31.4%). The main reasons for patients failing pre-operative assessment were uncontrolled hypertension (35.8%), cardiac diseases (26.0%), ocular infections (16.7%) and uncontrolled diabetes mellitus (13.9%). Others factors include severe dry eyes, systemic infections and patient personal factors. There were 17 cases where patients had overlapping causes for postponement.
Conclusion: Nearly a third of cases listed for cataract surgery fail their pre-operative assessment. Apart from defaulters, uncontrolled medical conditions account for the majority of postponement of cataract cases. This highlights the importance of pre-operative assessment in elective surgery among the Malaysian population.
Conflicts of interest: Researchers have no financial interest in any products or instruments mentioned in this study.
Keywords: Pre-operative cataract surgery assessment, causes of postponement
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Introduction:

It is estimated that 1.3 billion people worldwide live with some form of vision impairment and up to 36 million are considered blind[1]. Cataract is the leading cause of blindness in the world[2]. Majority of this population are aged 50 years and above.

Similarly in Malaysia, based on the National Eye Survey (NES) 2014 population, cataract is the main cause of blindness (58%) and low vision (68%) in Malaysia[3]. The mean age of patients at the time of cataract surgery was 65.9 and 75.6% of patients had systemic co-morbidity. The most common systemic co-morbidity were hypertension (62.2%) and diabetes mellitus (44.2%)[4]. Likewise, a study conducted in India also noted hypertension and diabetes mellitus were the most common systemic co-morbidity in patients undergoing cataract surgery[5].

Being visually impaired not only affects quality of life but also carries a significant impact on society. It will become a financial

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burden on the economy as well due to the loss of productivity and increased medical expenses[6]. However, nearly 80% of all vision impairment globally is considered avoidable[1,7].

Cataract surgery is associated with improvements in quality of life, visual acuity, contrast sensitivity, depth perception, activity, anxiety, depression, confidence and reduction in falls[8]. Since most cataract surgeries are performed on older individuals with correspondingly high systemic comorbidities, preoperative evaluation is routinely done to identify difficult and high-risk cases to manage them appropriately.

However, repeated visits to the clinic for pre-operative assessment causes much distress for the patient and increases the burden on already stretched services. Furthermore, it also carries significant financial implications. A routine pre-operative assessment in our centre includes a consultation with the medical officer who examines the patient and explains regarding the surgery including the risks involved, followed by a counselling session with a nurse regarding pre and post-operative care.

Previous studies looked into the causes of postponement in cataract surgery but not during pre-operative assessment. The purpose of this study is to report the incidence and causes of postponement during pre-operative cataract surgery assessment in a tertiary referral hospital in Kuala Lumpur.

Methods:

This is a retrospective study. Data was obtained from the electronic medical records of patients attending pre-operative assessment for cataract surgery every Thursday from November 2016 to October 2017 in Selayang Hospital. Pre-operative surgery assessments scheduled on other days are mainly non-cataract cases. Only patients who were scheduled for cataract surgery under local anaesthesia were included in this study. Patients who were scheduled for cataract surgery under general anaesthesia or other ocular surgeries besides cataract surgery were excluded from this study.

Patients' age, gender, visual acuity (VA) at time of review and systemic comorbidities were recorded

Based on the International Classification of Diseases 11 (2018) distance vision impairment is classified as[1]:

- Mild – presenting visual acuity worse than 6/12
- Moderate – presenting visual acuity worse than 6/18
- Severe – presenting visual acuity worse than 6/60
- Blindness – presenting visual acuity worse than 3/60

Causes of postponement were divided as shown below:

A. Uncontrolled Diabetes Mellitus (Type I and Type II): Dextrose stick test >10 mmol/L

B. Uncontrolled Hypertension: BP > 150/80 mmHg

C. Cardiac diseases: Recent cardiovascular event within past 6 months or cardiac surgery. Underlying cardiac condition with no prior assessment by cardiology team.

D. Evidence of renal impairment on baseline blood tests with fluid overload symptoms.

E. Presence of active ocular infections: Conjunctivitis, keratitis, blepharitis, meibomitis

F. Others: Severe dry eyes, Systemic infections (such as upper respiratory tract infections, urinary tract infections, cellulitis), patient personal factors (financial issues, undecided, change of mind, refusal for surgery)

Results:

A total of 811 appointments were scheduled for pre-operative cataract surgery assessment during the analysed period. There were 146 defaulters (18.0%), 410 who passed the pre-operative assessment (50.5%) and 255 who failed and required more than 1 visit for further investigations (31.4%). 173 patients made up for the 255 appointments where the patient failed pre-operative assessment.

Regarding demographics, of the 173 patients who failed pre-operative assessment, 96 were females (55.5%) and 77 were males (44.5%) with 95.9% above 50 years old. The following Chart 1 and Chart 2 show the breakdown of age group and pre-operative VA of patients respectively.

The main reasons for patients failing pre-operative assessment are listed on Table 1. In the category 'Others', the majority was due to systemic infections. There were 17 cases where patients had overlapping causes for

postponement.

The duration in between visits ranged from 1-2 months. This resulted in an extra 82 clinic visits in total. Chart 3 shows the number of patients with the amount of times they were postponed.

Table 1 Causes of postponement during pre-operative cataract assessment

Causes	No. of Patients
Uncontrolled Hypertension	62
Cardiac diseases	45
Ocular infections	29
Others	29
Uncontrolled Diabetes Mellitus	24
Renal impairment with fluid overload symptoms	2

Discussion:

The number of cataract surgeries performed has been steadily increasing throughout the years with a total of 44534 cataract surgeries performed at Ministry of Health(MOH) Hospitals in Malaysia in 2015[4]. Furthermore, this number is predicted to increase in the coming years which are attributable to population growth and aging[7]. Primary healthcare clinics play an important role in detecting patients with cataract and promptly referring them to tertiary centres to receive treatment. With the rising healthcare cost, it is vital to identify and take necessary measures to avoid wastage, improve services, and drive continuous improvement in the management of actions.

Studies have shown that pre-operative assessment clinics reduce elective case cancellations[9,10]. Although regional anaesthesia may have both ocular and systemic complications, with proper identification of predisposing factors, most are avoidable[11].

From our study, the main causes for patients failing pre-operative assessment are due to their clinical conditions which were uncontrolled hypertension, cardiac diseases, and uncontrolled diabetes mellitus. This corresponds with data in the cataract surgery registry which noted that hypertension (61.3%), diabetes mellitus (44.4%) and ischemic heart disease (8.1%) were the most common systemic co-morbidity encountered in patients presenting for cataract surgery[4]. Previous National Health and Morbidity Surveys (NHMSs) carried out in 2006, 2011 and 2015 also show a worrying trend of increasing overweight and obesity prevalence among Malaysian adults[12,13].

Based on the recent NICE guidelines, hypertension plays an important role as a preventable cause of premature morbidity and mortality[14]. A blood pressure threshold of systolic 180 mm Hg and diastolic 110 mm Hg is considered harmful and is associated with target organ damage[15]. Although evidence regarding the effect of raised pre-operative blood pressure is limited, the risk of developing adverse medical events should not be taken lightly. Cardiovascular conditions, if not well optimized, can have serious implications during surgery due to reaction to stress and positioning. Patients under stress during surgery may develop ischaemic ECG changes and experience angina[11].

Patients with diabetes mellitus have altered immunity. In hyperglycemic state, increased apoptosis of polymorphonuclear leukocytes and decreased mobilization, chemotaxis, and phagocytic activity may occur[16]. Therefore, impairment of the cellular innate immunity will put diabetic patients at a higher risk of developing infections. Based on a study by Lecube et al. the extent of impairment of phagocytosis in patients with diabetes mellitus is directly related to glycemic control. With persistently poor diabetic control, affected individuals are predisposed to an increased incidence and severity of infection[17,18]. Hence, it is of utmost importance to keep their systemic blood glucose levels at an optimum level.

Besides systemic co-morbidities, this study showed that ocular infections accounts as one of the main factors for patients failing their pre-operative assessment. Patients with

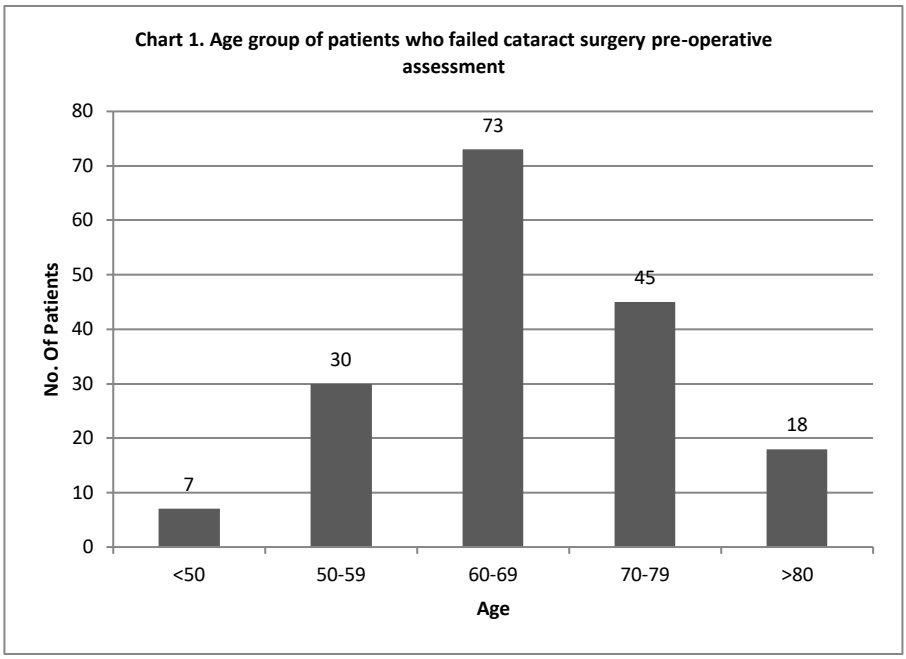


Chart 1. Age group of patients who failed cataract surgery pre-operative assessment
No. Of Patients
80
70
60
50
40
30
20
10
0
7
30
73
45
18
<50
50-59
60-69
70-79
>80
Age

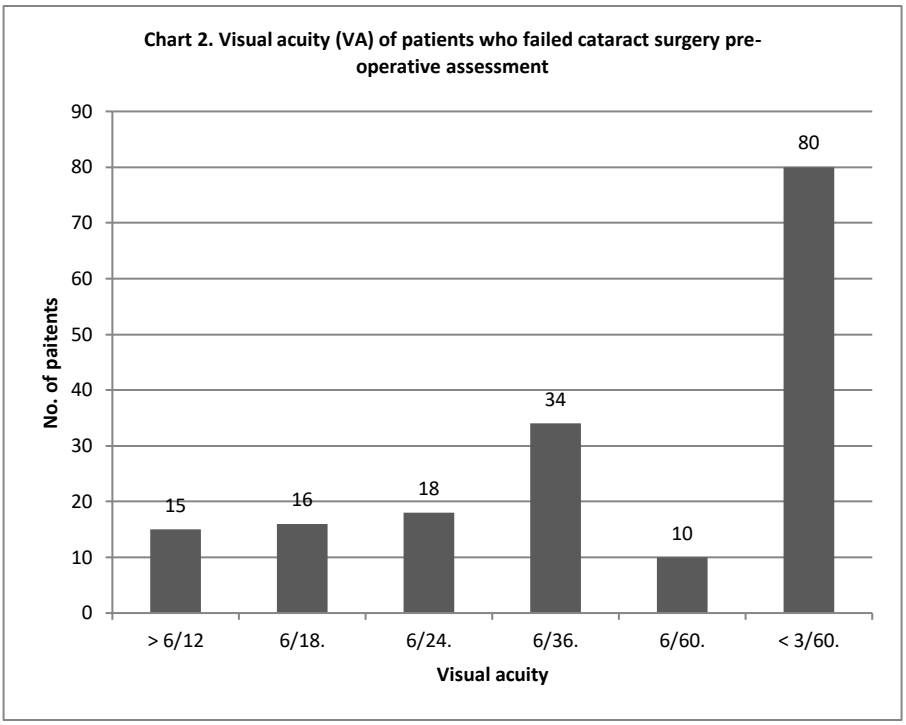
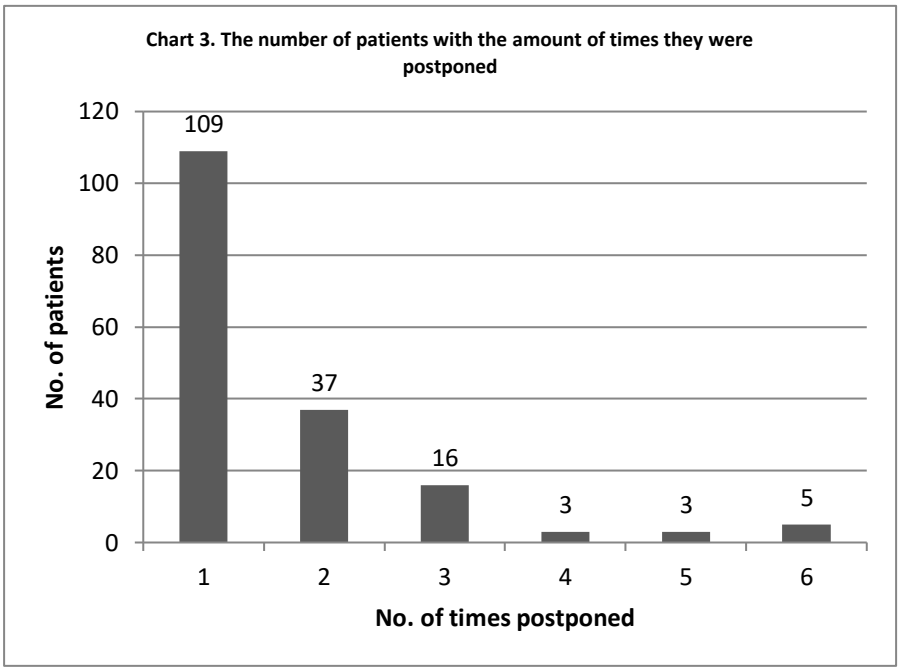


Chart 2. Visual acuity (VA) of patients who failed cataract surgery pre-operative assessment
No. of paitents
90
80
70
60
50
40
30
20
10
0
15
16
18
34
10
80
> 6/12
6/18.
6/24.
6/36.
6/60.
< 3/60.
Visual acuity



blepharitis may potentially face multiple issues such as irritated eyes, longer duration of inflammation, poorer visual acuity on the first postoperative day, and most dreaded of all, risk of postoperative endophthalmitis[19]. It is therefore essential to counsel patients on proper lid hygiene techniques as a simple practice can easily prevent a multitude of problems. A study conducted on the cancellation rates for cataract surgery due to blepharitis noted a significant decrease in cancellation rates once the patients were counselled about lid hygiene[20].

To ensure the primary goals of preoperative evaluation are achieved requires proper planning. Understanding aetiologies of patients failing pre-operative assessments is paramount to implementing systems-based strategies to prevent case attrition, patient inconvenience and maximize cost-effectiveness[10]. Patient education is equally important. They should be made aware of their own systemic diseases or bring their medical records during every clinic appointment to facilitate in decision making, as one reading of high BP or dextrose stick test might not reflect their actual long term control. Besides that, counselling regarding proper technique of lid hygiene is essential both pre and post-operatively.

A possible solution to reduce the number of times patients need to come for pre-operative assessment would be to liaise with the medical team for patients with poorly optimized systemic conditions to be reviewed early or on the same day as their ophthalmology clinic appointment. However, if optimization as an outpatient fails after multiple visits, admission for proper monitoring and co-management with other respective teams can be considered to reduce the time to surgery.

This study was done retrospectively in a single centre. Future prospective studies that include multiple centres can be conducted which assesses patients' education level and occupation as well to determine if it plays a role in the rate of defaulters and factors of postponement.

Conclusion:

The main causes for patients failing pre-operative assessment are due to their clinical conditions which were uncontrolled hypertension, cardiac diseases, and uncontrolled diabetes mellitus as well as ocular infections. In the category 'Others', the majority was due to systemic infections such as upper respiratory tract infections and cellulitis.

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Postoperative pain control of subtenon bupivacaine injection in adult strabismus surgery: a double-masked randomized trial

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Background: Pain from intraoperative retraction of extraocular muscles is the main cause of ocular discomfort after strabismus surgery. Injection of the long-acting local anesthetics can reduce ocular pain after strabismus surgery under general anesthesia.
Purpose: To evaluate the efficacy of subtenon bupivacaine injection on postoperative pain control
Methods: A prospective double-masked randomized trial was conducted in 18 eyes of 9 patients (age range 20-67 years) who underwent binocular strabismus surgery under general anesthesia at Thammasat hospital. Both eyes of each patient were randomized to receive subtenon injection with 0.5% bupivacaine 0.1 ml in one eye and sterile saline injection in the fellow eye at the end of surgery. Primary outcome measures were visual rating pain scores at 30 minutes, 1 hour, 4 hours and 6 hours postoperatively. Secondary outcome measures were adverse effects of bupivacaine injection. Oral acetaminophen was added as per patient pain requirement. The doses of this adjunctive analgesia were recorded.
Results: Average pain score between study group vs control group was 1.33 vs 2.66, 1.44 vs 2.77, 1 vs 1.66 and 0.3 vs 1.3 in the first 30 minutes, 1 hour, 4 hours and 6 hours, respectively. Pain scores at the first 6 hours postoperatively were significantly lower in the study group (P=0.001).
Discussion: Adjunctive subtenon bupivacaine injection had effects at the first 6 hours postoperatively in adults undergoing strabismus surgery with general anesthesia technique.
Conclusion: Subtenon injection of bupivacaine may reduce postoperative pain score in adult strabismus surgery.
Keywords: bupivacaine, subtenon injection, strabismus surgery
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Background:

In adult strabismus surgery, either regional anesthesia or general anesthesia can be used for providing anesthesia. Most steps in strabismus surgery are not painful procedures. The main cause of pain is produced by pulling on or against a restricted muscle or in cases with large angle of deviation which surgical exposure is difficult.[1] In cooperative patients, regional anesthesia is effective for control of the pain. In poor cooperative adults or patients undergoing binocular surgery, the patient cannot remain still for long periods, general anesthesia may be the usual method for providing anesthesia. However, postoperative pain still causes patients to have ocular discomfort after surgery. Injection of long-acting local anesthetics can reduce ocular pain after strabismus surgery under general anesthesia.

Subtenon block was first described by Turnbull in 1884 and later by Swan in 1956.[2,3] Then, in early 1990, sub-tenon's block was introduced into the clinical practice.[4,5] The sub-tenon's block is used for cataract surgery, vitreoretinal surgery, trabeculectomy, strabismus surgery and postoperative pain control.[6,7]

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Bupivacaine (Marcaine) has a slower onset of action (about 5-10 minutes after injection) but its effects last much longer, for about 4-8 hours. This injection is currently a procedure performed under regional anesthesia in cooperative adults, and has been used as an alternative procedure to decrease postoperative control.

In Thammasat hospital, when talking to the patients about the postoperative pain and choice of anesthesia, most patients are afraid of pain and would like to choose general anesthesia rather than local anesthesia. In the past, we performed adult strabismus surgery under general anesthesia in every case. The aim of the present study (primary outcome) was to compare the postoperative pain score in the first day after surgery. Secondary outcome was to compare adverse effects of subtenon bupivacaine injection.

Methods:

The study was approved by the Medical Ethics Committee of Thammasat University (MTU-EC-OP-1-167/60), Pathum thani, Thailand, and was conducted in accordance with the tenets of the Declaration of Helsinki. The study was conducted from 1st November, 2017 to 30th September 2018 in the Department of Ophthalmology, Thammasat Hospital. Subjects with comitant or incomitant strabismus were enrolled. The inclusion criteria included healthy subjects of either gender between the age of 20 to 70 years old, no previous strabismus surgery and no contraindication of general anesthesia. Subjects with a history of bupivacaine allergy, a history of drug use that have drug interaction with bupivacaine, female during pregnancy and lactation period, or subjects who do not communicate during pain score test were excluded.

Data collected consisted of age, gender, underlying disease, drug history, anesthetic history, best corrected visual acuity (BCVA) by Snellen chart, anterior segment, pupils, fundus examination, ocular motility, strabismus examination by alternate prism cover test, preoperative vital signs, dose of subtenon bupivacaine injection, postoperative vital signs, postoperative pain score at 30 minutes, 1 hour, 4 hours, 6 hours, 8 hours, 12 hours and 24 hours after surgery respectively. The study protocol was performed with informed consent and the protocol was explained to all subjects before undergoing general anesthesia.

Study protocol:

Both eyes of each patient were randomized into two groups to receive either subtenon bupivacaine injection (study group; n=9 eyes) or sterile saline injection (control group; n=9 eyes). A single surgeon performed the fornix technique on all patients. Neither the patient nor surgeon knew which treatment the patient was randomized to. In the study group, an injection of 0.5% bupivacaine 0.5 ml was performed using a curved blunt 19-gauge cannula into the subtenon space through the fornix conjunctival incision at the end of the surgery. Pain assessment was performed by the co-author blinded as to the treatment group. The technique to be used for each eye was revealed by a surgical nurse thereafter. If the patient complained of pain postoperatively (pain score > 5), oral acetaminophen 500 tablet 2 tabs every 6 hours was given as adjunctive analgesia. The dose of oral acetaminophen can be added up to the satisfaction of the patient and the doses were recorded. Pain scores using the visual rating scale (score 0-10; 0 = very satisfied, 10 = very dissatisfied) in Thammasat Hospital. Bupivacaine-induced adverse effects were considered to present if the patients have central nervous system (CNS) or cardiovascular adverse effects such as convulsions, coma, arrhythmia, myocardial depression, and respiratory arrest postoperatively. Adverse effects and data as described above were collected by the co-author.

Statistical analysis:

We analyzed the data with excel tables (Microsoft windows XP professional version 2002 service pack3) and the statistical analysis was performed with SPSS software version 14.0 (IBM Inc, Chicago, IL). Demographic data are described in terms of mean and range. The data were analyzed statistically by using paired t-test to compare the result in both groups and the p-values were obtained. A p-value of less than 0.05 indicates statistical significance.

Results:

Nineteen cases of adult horizontal strabismus were enrolled in the study period. Ten cases of patients having monocular surgery (recess-resect procedure) or previous strabismus surgery was excluded. Nine healthy subjects (18 eyes) were included in the study. They had a mean age of 30 years (range 20 to 67 years). Six were female and three were male. All surgeries were performed in the operating room by an anesthesiologist experienced in the general anesthetic technique. Average pain score was 1.33, 1.44, 1, 0.3, 0.44, 0.22 and 0 in the first 30 minutes, 1 hour, 4 hours, 6 hours, 8 hours, 12 hours and 24 hours in the study group, respectively. Average pain score was 2.66, 2.77, 1.66, 1.3, 1.11, 0.33 and 0 in the first 30 minutes, 1 hour, 4 hours, 6 hours, 8 hours, 12 hours and 24 hours in the control group, respectively. There were significant differences in pain scores at 30 minutes (p=0.002) and at 6 hours postoperatively (p=0.001). There were no significant differences in postoperative pain score at the other time intervals (Figure 1). However, all patients are generally satisfied with subtenon bupivacaine injection. None of the patients manifested bupivacaine-induced adverse effects. Postoperative adjunctive analgesia was not given because no patient had complained of having a pain score greater than 5.

Discussion:

Although it is a randomized controlled trial, the authors compared fellow eyes of each patient to account for each individual's difference in pain tolerance and subjective pain threshold. Therefore, the authors would like to minimize the differences, then study the patient with unilateral surgery compared with sham injection. Moreover, the same patient will receive the same amount of general anesthetic drug. The authors included only horizontal muscle surgeries in this study because patients with strabismus surgery on vertical or oblique muscle surgery need to hook the muscle further and the intraoperative pain is often intolerable. This study excluded vertical or oblique muscle surgery.

In 2015, Bakr et al. studied a randomized controlled double blinded trial in children strabismus surgery. Sixty children (age range 2-6 years) were randomized to receive either subtenon bupivacaine 0.5% or a saline injection before the beginning of surgery in a double-blind manner. He found that the pain scores were significantly lower in the subtenon bupivacaine group at 0 min ($p = 0.0056$) and at 30 min ($p = 0.013$). There was no significant difference between the two groups at the other time intervals. This study provided some evidence that a preoperative subtenon block with bupivacaine combined with general anesthesia allows efficient control of postoperative pain in young children undergoing strabismus surgery.[8]

In 2017, Talebnejad et al. studied a randomized controlled double blinded trial in children strabismus surgery. Fifty children (age range 8–17 years) were randomized to receive either subtenon bupivacaine 0.5% or a saline injection just prior to surgery in a double-blind manner. He found that the pain scores (using the Visual Analog Scale) were significantly lower in the subtenon bupivacaine group (mean score, 2.8 vs. 5.9 at 60 minutes after surgery; $P < 0.001$). This study provided some evidence that subtenon bupivacaine injection can also diminish postoperative pain in patients who underwent strabismus surgery.[9]

In the present study, we found that the average postoperative pain scores in patients in both groups were low and subtenon bupivacaine injection was associated with significant differences in pain score at 30 minutes and at 6 hours postoperatively. Similar results have been described in a previous study at 30 minutes.[8] Our findings can be attributed to the duration of local bupivacaine action up to 4-8 hours. However, we did not find significant differences in postoperative pain score at 60 minutes as the previous study and the other time intervals. In fact, the control eye in the present study did not represent the good control group as previous studies.[9] The limitations in the present study is a small amount of sample size due to a small number of adult patients, and some adult patients who have a history of previous strabismus surgery also had been excluded.

Conclusion:

In the present study, we evaluated the efficacy of subtenon bupivacaine injection on postoperative pain control and we found that this injection may reduce pain scores in adult strabismus surgery at early postoperative time intervals. Our results could help ophthalmologists

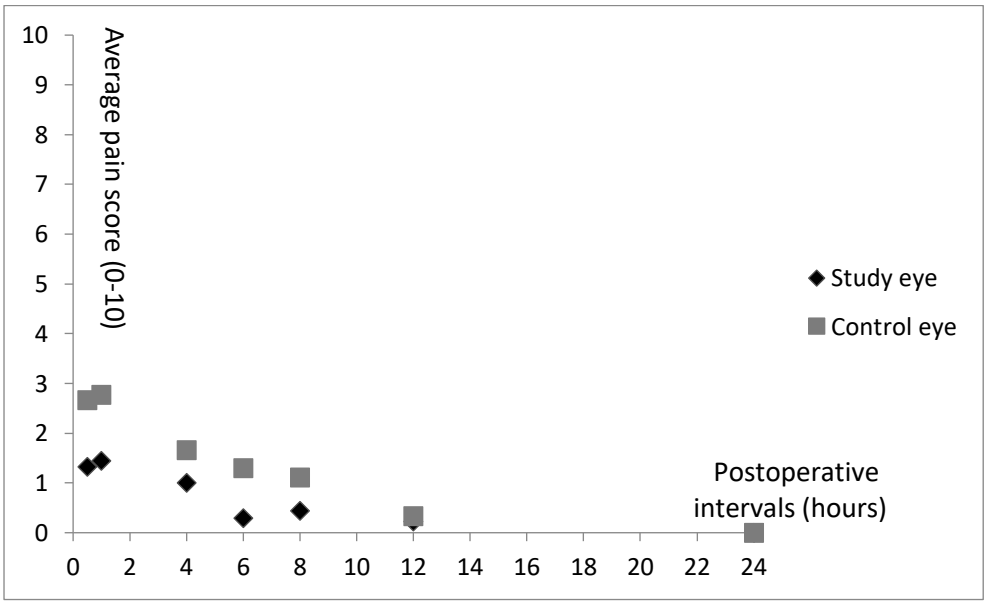

Figure 1 Average pain scores in the first day postoperatively

inform patients before making a decision regarding their choice of anesthesia.

Conflict of interest: no

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Prognostic Factors for Successful Surgical Outcome in Canaliculi Repairs

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Objective: To investigate the prognostic factors that contribute to successful surgical outcome in canaliculi repairs from accidents, in terms of anatomic and function of nasolacrimal duct, at Thammasat University Hospital.
Research design: Retrospective, descriptive study
Methodology: Retrospective medical records for patients presenting with canaliculi and lid tear, which received canaliculi repairs and lid repairs under general anesthesia during the duration of five years, from 2012 to 2017 at Thammasat University Hospital and follow-up for one year.
Results: Fifty-four patients canaliculi and lid tear and subsequently received canaliculi repairs and lid repairs with are annular intubation (Pigtail). However, only 39 patients had sufficient data to be included in the study. It was found that both the material used in the canaliculi (Vicryl) and lid repairs (Nylon) had a diameter of more than 0.7 mm, which is a significant important prognostic factor for successful surgical outcome ($p < 0.05$), where the ratio of Ml 20 (57.14) ($p=0.047$) and Ml 20 (58.82) ($p=0.020$), respectively. Furthermore, achieving canaliculi repairs in an anatomically correct position not only contributes to cosmetic effect, but is also a statistically significant important prognostic factor for successful surgical outcome ($p<0.05$). Qualified ophthalmologists directly performing the surgeries also contribute to a statistically significant better results when compared to residents ($p<0.05$).
Conclusion: The selection of materials for canaliculi and lid repairs with diameters larger than 0.7 mm(Vicryl 7/0 for pericanaliculi and nylon 7/0 for repair lid) is an important prognostic factor that contribute to successful surgical outcome in canaliculi repairs.
Keywords: Ml (large non-absorbable material), canaliculi repair, bi-canaliculi stent, lid repair
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Introduction

Eye injuries are oftentimes found and lead to both internal and external anatomical changes, which eventually result in eye complications and lid tear as they are soft tissues in areas that cover other important structures of the eye. Thus, in cases of lid tears, it is necessary to repair it back to its original position to enable functions of the punctum, sebaceous glands as well as the opening and closing of the eyes.

The canaliculi is an important feature within the eyelid, which can be found within both the upper and lower punctum. It transports lacrimal fluid to the common canaliculi, which is located approximately 8-10 mm from the punctum. Thereafter, the lacrimal fluid will be accumulated at the lacrimal sac, which is approximately 12-15 mm in length, before being carried towards the nasolacrimal duct, which is approximately 12-18 mm in length. It is apparent that lacrimal secretion is complex, even in normal conditions. Thus, in events of eye injuries, immediate repair is an obligatory step to prevent complications, such as epiphora, blepharitis , among others.

There are a number of studies on the eyelid and canaliculi repairs. The most popular are annular intubation (Pigtail), bicanalicular stent, monocanalicular stent. *Naing L Tint et al*[1] reported that a majority of lid and duct tears are caused by blunt trauma in the lower part, which can be reconstructed by bi-canalicular stenting produces satisfactory results without

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having to conduct posterior lacrimal crest fixation suture. Moreover, it restores the eyelid back to a favourable position and minimizes the obstruction of tear drainage. Similarly, *Tavakoli M et al*[2] reported reconstruction using monocanalicular silicone tube had an anatomical and functional success rate of 87% and 100%, respectively. Other factors, such as suitable surgical time and materials used also contribute to the successful surgical outcome.

Zhuang A et al[3] suggested that surgical canaliculi repairs of inpatients within 48 hours of the injury by bi-canalicular Crawford stenting had a 96% success rate. Furthermore, lateral tears contributed to the most successful outcome.

This study highlights importance of eyelid and canaliculi repairs in terms of the success rate and methodology used at Thammasat University Hospital to further contribute to known literature regarding treatment approaches.

Methodology

This retrospective descriptive study in patients involved in accidents with canaliculi and lid tear, which received reconstruction at Thammasat University Hospital. Patient data were accessed retrospectively using E-phis ICD9-0973 Program during 2012 to 2017 whose were diagnosed that canaliculi tear in zone 1 which not involve lacrimal sac and without facial bone fracture. 54 patients were enrolled according to the inclusion criteria, but 15 were excluded according to the exclusion criteria due to lack of follow up in 1 month, resulting in 39 patients for the study. The surgeon chose Pigtail annular intubation 39 patients. Data of patients with canaliculi repairs ICD9-0973 were reviewed from medical records, which had the accident history and information on age, gender, cause, location, position, length of time between injury and surgery, technique used, size of the injury and details on the surgery and subsequently analyzed.

Statistical analysis on the baseline characteristics of the patients, which included age, gender, cause, location, position, length of time between injury and surgery, technique used, size of the injury of each group were collected and analyzed in terms of mean and standard deviation (SD) using 95% CI ($P<0.05$) via STATA version 12 (Stata Corp, College Station, TX, USA) at power 80%, 5% confidence level ($p<0.05$), one-way side.

Results

Cases from the past five years showed that 54 patients were involved in accidents at canaliculi and lid tear and subsequently received canaliculi repairs using Pigtail Annular intubation. However, 39 patients met the inclusion criteria. Baseline characteristics, including age, location, length of time between injury and surgery, eyesight before and after the surgery showed no statistical difference at a confidence level of 5%.

The study evaluated the success rate prior to and following surgery by irrigation sac, where ophthalmologists conducts anatomical and functional evaluation of the tear duct at 1 month and 6 months following the surgery[5]. Findings revealed that the materials used for repair pericanaliculi tissue surgery with a diameter of more than 0.7 mm(vicryl 7/0) were shown as a statistically significant important prognostic factor for successful surgical outcome in canaliculi repairs ($p <0.05$) for Ml 20 (57.14) ($p=0.047$).

Like the Fang Bai, Hai Tao, Yan Zhang, Peng Wang, *et al* study, their use of silk 5/0 in skin suture is more provocative than in patients with tear canalicular involve eyelid. It may be one of reason that the surgery unsuccessful, therefore their chose to use bicanalicular stent intubation[6]. Similarly, materials used for eyelid surgery with a diameter of more than 0.7 mm (nylon 7/0) were shown as a statistically significant important prognostic factor for successful surgical outcome in canaliculi repairs for Ml 20 (58.82) ($p=0.020$) at a confidence level of 5%.

In addition, the lid repair and reconstruction to the original anatomically correct position not only contributes to cosmetic effect but is also a statistically significant important prognostic factor for successful surgical outcome ($p<0.05$). Correspondingly, ophthalmologists directly performing the surgeries also contribute to a statistically significant better results when compared to residents ($p<0.05$).

Complications arose from canaliculi repairs and lid repairs in patients with tear duct injuries included two cases of lagopthalmos, one case of angle recess, one case of ectropion and two cases of dry eye.

Discussion

The study selected Pigtail Annular intubation as a surgical technique, enabling the

Table 1 baseline characteristics of patients, comparing between success and failure outcome at 1 months post-operation

Parameter	Fail	Success	p-value
Male sex (n/%)	15 (48.39)	16 (51.61)	0.695
Age	44.6 +/- 11.55	19.26+/- 11.95	<0.001*
Time to Sx	9.15+/- 5.63	7.32 +/-4.56	0.137*
% of Good VA before surgery (n/%)	15 (75)	15 (16.67)	0.697
% of good VA after surgery (n/%)	19 (95)	17 (89.5)	0.605
Material canaliculi <7.0 vs >7.0	42.86	100.00	0.047
Material lid <7.0 vs >7.0	41.18	100.00	0.020
Surgeon trainee vs staff	37.93	80.00	0.031
Lid position favourable vs unfavourable	26.09	81.25	0.001

No symbol = Fisher's exact test
*: t-test

Table 2 baseline characteristics of patients, comparing between success and failure outcome at 6 months post-operation
N=39

Parameter	Fail	Success	p-value
Male sex (n/%)	16 (76.19)	15 (83.33)	0.695
Age	44.6 +/- 11.55	19.26+/- 11.95	<0.001*
Time to Sx	9.15+/- 5.63	7.32 +/-4.56	0.137*
% of Good VA before sx (n/%)	16 (76.19)	14 (82.35)	0.697
% of good VA after sx (n/%)	20 (95.24)	16 (88.89)	0.605
Material canaliculi <7.0 vs >7.0	42.86	100.00	0.047
Material lid <7.0 vs >7.0	41.18	100.00	0.020
Surgeon trainee vs staff	37.93	80.00	0.031
Lid position favourable vs unfavourable	26.09	81.25	0.001

No symbol = Fisher's exact test
*: t-test

possibility to equitably compare factors that contribute to the success of canaliculi repairs. The precedent technique is widely used, cheap and may be performed by residents and ophthalmologists.

The number of patients were collected from patients who undergone surgery for canaliculi repairs at Thammasat University Hospital in the past five years, which may not be as informative due to incomplete track record of treatment. However, this research may be used as a pilot study for future treatments.

An investigation in China conducted by Zhuang A et al[3,4] showed that canaliculi repairs for inpatients within 48 hours following the accident via bi-canalicular stenting had a success rate of 96%. Meanwhile, this particular study was achieved in a well-equipped medical school in terms of staff and facilities, thus patients received treatment within an average of 24 hours, resulting in no statistically significant time difference as elaborated by Zhuang A et al[3]

Findings suggested that materials used for pericanaliculi repairs with a diameter of more than 0.7 mm (Vicryl 7/0) and lid repairs with a diameter of more than 0.7 mm (Nylon 7/0) is an important prognostic factor that contribute to successful surgical outcome in canaliculi repairs by Pigtail Annular intubation.

However, most studies often include bicanaliculi stent, which will give better results. Material selection may not be the main factor in surgery. In addition, the experience of the surgeon is important. If you have surgery with an ophthalmologist, you will get a more successful outcome compared to a surgeon trainee, resulting in statistically significant.

Another factor is the position of the eyelids after repair. Found that if the suture is repaired, return to be close to the patient's original eyelid position. Will be result in successful surgery same as the study of Fang Bai, Hai Tao, Yan Zhang, Peng Wang, et al study[6]. Which describes the position of the eyelid after surgery as one of the key factors for successful surgical resection of the tear canaliculi. In this research, young patients are one of the key success factors in table 2. But the researcher views that, May not be able to make a decision because the number of patients attending the study is not enough.

This information may be used to consider purchasing equipment in operation rooms for hospitals with limited medical supplies. Furthermore, it may be used as a practice guideline for ophthalmologists and residents in choosing a suitable material in the future.

Conclusion

The selection of materials for pericanaliculi repairs with a diameter of more than 0.7 mm (Vicryl 7/0) and lid repairs with a diameter of more than 0.7 mm (Nylon 7/0) is an important prognostic factor that contribute to successful surgical outcome in canaliculi repairs by Pigtail Annular intubation. Furthermore, the position of the lid following the repairs as well as experience from ophthalmologists are also contributing factors for success.

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The Efficacy and Usefulness of Online Web Application Based Logbook for Ophthalmology Residents

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Background: Clinical logbooks are an important aspect of ophthalmology training. To overcome the inherent limitations of accessibility, adherence, lack of data validation and monitoring in physical logbooks. The authors developed an electronic logbook available for multiple platforms and tested its efficacy and usefulness.

Materials and Methods: The authors collaborated with professional mobile application developers to create an electronic logbook according to a pre-established set of goals of 1. Ensuring a standardized training program, 2. Permits supervisors monitoring of trainee's progress and performance throughout the duration of training, 3. Applicable to educational settings with multiple sites and 4. The development of the logbook incorporates the perspectives of all users and stakeholders, and is adequately integrated into the user's training program. The logbook was tested during October 2017-2018, then distributed for practical use between October 2018 – March 2019.

Results: Forty-two volunteer logbook users were enrolled in this study, of which, 28 users (66.7%) are residents and 11 users (26.2%) are ophthalmology staffs and 3 users (7.1%) are educational administrators. At the end of the designated testing time, all participants responded to a 12-component satisfaction questionnaire which was based on a checklist for successfully implementing logbooks into clinical training by K. Schuttpelz-Brauns et al.. The questionnaire were 5 grading scale from the most satisfaction (5) to the least satisfaction (1). All the results were shown in full paper, which the authors also included the overall satisfaction of the logbook where 13 participants (30.9%) satisfied logbook the most, 18 participants (42.8%) were quite satisfied, 10 participants (23.8%) were in between, and 1 participant (2.3%) had the least satisfied into the logbook.

Conclusion: A web application based logbook has the advantages of ease of access and usage, monitoring and data presentation and a communication platform between residents and educational supervisor. All of which supports a training program which is capable of constant career and personal improvement and development.

Keywords: logbook, web application, ophthalmology

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Introduction

The postgraduate education in the field of ophthalmology has a duration of 3 years in Thailand. Residents enrolled in the program are assigned to record procedures and clinical encounters throughout their training via logbooks as required by the Royal College of Ophthalmologists of Thailand (RCOPT).

In the past, physical logbooks were used with limitations of being lost, compliance issues or inadequately recorded as they were not always immediately accessible to residents. Which hindered a resident's capacity to self-assess, reflect and consolidate one's knowledge in addition to difficulties for educational supervisors to monitor the progress of residents. Hence the advent of the electronic logbook in the form

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of an electronic software available to mobile platforms connected to the internet to ensure the accessibility of the logbook to residents at any time and place.

Methods

The authors worked with the application development team to establish the following goals and applied concepts for the logbook that was produced:

1. The logbook ensures a standardized training program[3,4,8]

2. The logbook provides educational supervisors with the trainee's progress and performance throughout the duration of training[4,7]

3. The logbook's utility is enhanced in educational settings with multiple sites[2]

4. The development process of the logbook must incorporate the requirements and perspectives of all users and stakeholders, and is adequately integrated into the user's training program for maximum effectiveness[5,6,7].

Once the application of the logbook was developed – the authors evaluated and tested the product to improve the application during October 2017 – 2018. After which the logbook was then distributed to residents and consultants who volunteered to use the logbook in practice between October 2018 – 2019.

The logbook application is accessible viat he following IP address: 167.99.69.70/login volunteers will receive a username and password which may be personalized.

With regards to practical implementation, volunteer users are instructed by the authors prior to actual usage. Residents record procedural details in their logbook and sent the submitted information to their designated educational supervisor for evaluation. Volunteers who hold educational administrative positions monitor the resident's logbook usage and compliance, with statistical reports,

Once the application was adequately tested, the authors conduced satisfaction questionnaire for the target users and stakeholders, which was used for further implementation and improvement.

*Note: the IP address may be subject to change in the future.

Results

The authors have developed a web-based application logbook with the aforementioned specifications in the methods section. It can be accessed via any electronic platform connected to the internet. Information stored in the logbook can be accessed and analyzed in an individual basis.

Forty-two volunteer logbook users were enrolled in this study, of which, 28 patients (66.7%) are residents and 11 (26.2%) and 3 associated educational administrative staff (7.1%). All 42 participants used the logbook for the aforementioned duration. At the end of the designated testing time, all participants responded to a 12-component satisfaction questionnaire which was based on a checklist for successfully implementing logbooks into clinical training by K. Schuttpelz-Brauns et al.[1] (Table 1.)

For each component in the questionnaire, the response is split into 5 levels (from most satisfied to least satisfied, most agreed to least agreed.) Each component is aimed at assessing positive attributes to a successful logbook as seen in tables 2 - 4.

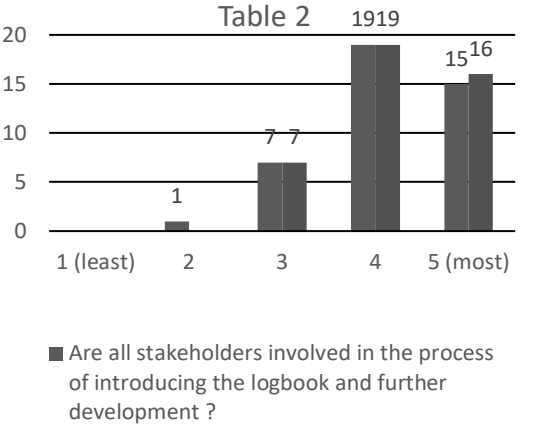


Table 2. Shows the satisfaction of all participantsin the involvement in the aspect of integration of views and perspectives of all stakeholders in the development and management of the logbook.

Table 1. Checklist for successfully implementing logbooks into clinical training

Tip 1 : Use all resources you can obtain and do not repeat work that has already been done	
- Does a logbook for your discipline and stage of education already exist?	❑
- Does it fulfil criteria of the tips 3-5?	❑
Tip 2 : Involve all stakeholders and embed the introduction of logbooks into a change management process	
- Are all stakeholders involved in the process of introducing the logbook and further development (supervising physicians, mentors, students)?	❑
- How do you ensure transparency of the whole process?	❑
Tip 3 : Keep it short, simple, and precise	
- Are all objectives listed in the logbook really important?	❑
- Are the basic skills and learning objectives exactly defined?	❑
- Is additional information included (such as frequently needed knowledge of the discipline or contact details of supervising physicians and mentors)?	❑
- Does the arrangement of data allow timely and easy analysis?	❑
Tip 4 : Mind legal issues	
- Do you take copyright/ownership of your country into account?	❑
- Do you take data security of patients into account?	❑
- Do you take data security of trainee into account?	❑
Tip 5 : Use a handy logbook format	
- If you use paper-based logbooks: is it pocket-size?	❑
- If you use electronic logbooks: do you have an appropriate IT?	❑
- Is the logbook of low cost?	❑
Tip 6 : Make the logbook an integral part of the curriculum	
- Are the learning objectives of the logbook part of the curriculum?	❑
- Are the learning objectives of the logbook part of the curriculum in lectures and seminars (Miller-Level 1 and 2)?	❑
- Are the basic skills and learning objectives of the logbook part of assessment?	❑
Tip 7 : Mentor and supervise learning objectives	
- Is there regular communication and supervision via logbook between doctors and students?	❑
- If in addition to the supervising physician, there is a mentor involved in the training process: is the logbook used to evaluate the learning process?	❑
Tip 8 : Provide time and space for teaching and learning	
- Do supervising physicians and mentors have enough time to supervise and to mentor?	❑
- Do trainees have enough time to read, to study and to work with the logbook?	❑
- Does the head of the department accept and support the logbook?	❑
Tip 9 : Establish an easy going workflow	
- Did you contact involved staff to find the best way to distribute, collect and evaluate the logbook?	❑
- Does your workflow involve following activities around the logbook: printing, storing, handing over, explaining, collecting, reviewing and updating?	❑

Tip 10 : implement an evaluation cycle to optimize logbook-location-fit - Is the evaluation used to improve the curriculum of the clinical setting? - Do you give timely feedback to the students? - Do you give timely feedback to faculty? - Do you give timely feedback to the supervising physicians? - Does the evaluation show the contribution of supervising physicians and mentors to the learning of the trainees?	 ❏ ❏ ❏ ❏ ❏
Tip 11 : Inform staff and trainees - Did you inform trainees about function and content of the logbook (best face to face)? - Did you inform concerned staff about function and content of the logbook (e.g. physicians, head of department, nurses)? - Do you plan regular information session for concerned staff?	 ❏ ❏ ❏
Tip 12 : Train supervising physicians and mentors - Do you inform about the structure, content and aim of the logbook? - Do you provide regular, short training of supervising physicians and mentors?	 ❏ ❏

Table 3. shows the satisfaction in the aspect of the ease of use, compact design and clarity of information presentation in the logbook

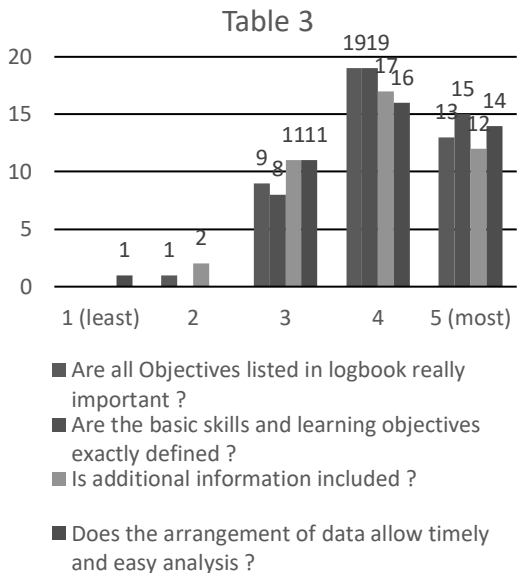
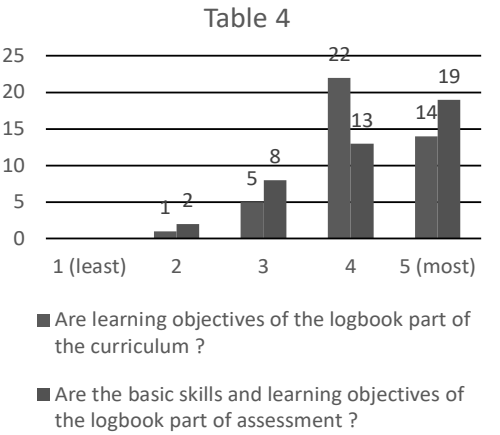


Table 4. shows the satisfaction of participants with regards to the clinical logbook's positive impact and effective integration into the clinical training program



Furthermore, the authors have evaluated the participant's impression of the logbook in other aspects that has not been illustrated in this study.

1) The logbook has been developed to be mobile based: 19 participants were most satisfied with the logbook (45.2%), 14 were very satisfied (33.3%), 7 were moderately satisfied (16.7%) and 2 were less satisfied (4.8%)

2) The communication between the program implements and participants and support was effective during the logbook implementation program trial period: 7 participants were most satisfied (16.7%). 19 were very satisfied (45.2%), 12 were moderately satisfied (9.5%) and 4 were least satisfied (9.5%)

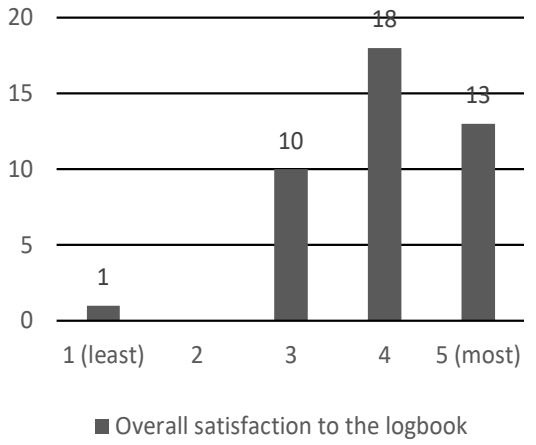
3) The assessment and monitoring of

residents enrolled in the training by educational supervisors were useful for further development and improvement of the clinical training program: 16 participants were most satisfied (38.1%), 16 were very satisfied (38.1%), 7 were moderately satisfied (16.7%) and 3 were less satisfied (7.1%)

4) The guidance provided by the program implements toward participants and support was effective during the logbook implementation program trial period: 9 participants (21.4%) was most satisfied, 16 was very satisfied (38.1%), 12 were moderately satisfied (28.6%) and 3 were less satisfied (7.1%) and 2 were least satisfied (4.8%)

The authors also surveyed the overall satisfaction of the participants as seen in in table 5.

Table 5. Overall satisfaction of the logbook



Discussion

The development of the web application based logbook was based on the research of K. Schuttpelz-Brauns et al. which revealed important aspects of what makes for a good logbook. This study demonstrates that the product logbook contains all of the aforementioned specified features which has been supported by the generally positive impression by the participating users. Which provides grounds for the authors to believe that the Web based application logbook can replace the traditional physical logbook that has been used in ophthalmology departments.

The positive characteristics of this developed logbook consists of its effectiveness, ease of access and usage, increased capacity in monitoring progress of residents, and provides a platform of sharing and communication between residents and educational supervisors about the trainees progress for career development and self evaluation purposes throughout their training duration.[2,3,5,6]

The author's findings indicate that the participants are satisfied with the logbook in its utility, its state of readiness for implementation in practical use, however there is room for constant improvement which will require more participants to provide further data for future development.

Conclusion

A web application based logbook was developed to replace the traditional paper-based logbook which that has been used in residency training in ophthalmology. With the advantages of ease of access and usage, monitoring and data presentation and a communication platform between resident and educational supervisor. All of which supports a training program which is capable of constant career and personal improvement and development.

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