Abstract

Introduction: Secondary capsular opacification is prevalent in children after cataract surgery, but for its treatment in children, few options exist. Poor cooperation precludes the use of neodymium yttrium-aluminium-garnet (Nd: YAG) capsulotomy in children. Surgery in the form of membranectomy is mostly resorted to, in case of a thick visually significant posterior capsular opacification (PCO). However, in case of thin PCO in the visual axis, Nd: YAG capsulotomy could act as a non-invasive alternative. Materials and Methods: Medical records of patients aged 1–16 years who underwent YAG capsulotomy under general anaesthesia between January 2007 and December 2016 were reviewed. Here, we present a case series of 18 eyes that underwent Nd: YAG capsulotomy under general anaesthesia at our centre. Eighteen eyes of 14 patients had undergone the laser procedure. All the patients were administered general anaesthesia in the laser room, and the procedure was performed in the sitting position on the slit-lamp laser delivery system. Results: The mean age at primary surgery for cataract was 2.15 ± 2.4 years. Of the 18 eyes, 1 (5.5%) was a traumatic cataract, all others being congenital cataracts. The mean age at Nd: YAG laser capsulotomy was 4.05 ± 2.38 years. The mean pre-procedural visual acuity was 0.654 ± 0.278 logMAR units and post-procedural visual acuity was significantly better at 0.502 ± 0.55 logMAR units, with P = 0.009. Conclusion: This, to our knowledge, is the largest reported series on patients who have undergone Nd: YAG laser capsulotomy under general anaesthesia. Although controversy exists on the positioning of patients during the procedure under general anaesthesia, we have successfully done 14 patients in the sitting position with no anaesthesia-related complications. Nd: YAG laser capsulotomy could be considered as a non-invasive alternative to membranectomy for PCO in children.

Keywords: General anaesthesia, posterior capsular opacification, yttrium-aluminium-garnet capsulotomy

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Introduction

Neodymium yttrium-aluminium-garnet (Nd:YAG) laser is a solid-state laser with a wavelength of 1064 nm that can disrupt ocular tissues by achieving optical breakdown with a short, high-power pulse. Various surgical and chemical modifications such as posterior curvilinear capsulorhexis, anterior vitrectomy, polishing of the posterior capsule, mitomycin C in the bag have been described to prevent the development of posterior capsular opacification (PCO). Secondary capsular opacification is prevalent in almost 100% of children after cataract surgery. However, for treatment in children, few options exist. The most prevalent treatment modality in adults for PCO is Nd: YAG laser capsulotomy. Poor cooperation precludes the use of this non-invasive technique under topical anaesthesia in children. Surgery in the form of membranectomy is advised, in case of thick visually significant PCO. However, in cases of thin PCO in the visual axis, Nd:YAG laser can be a non-invasive alternative [Figures 1 and 2]. Here, we present a case series of 18 eyes that underwent Nd:YAG capsulotomy under general anaesthesia at our centre.

Materials and Methods

A retrospective review of records of patients who had undergone Nd:YAG capsulotomy under general anaesthesia from January 2007 to December 2016 was evaluated. Fourteen patients had Yag capsulotomy in one eye while four patients had the procedure done in both eyes.

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We describe a technique for Nd:YAG laser capsulotomy under general anaesthesia in the sitting posture, the technique followed in our institution.

All patients undergo a thorough pre-anesthetic evaluation. Patients are pre-medicated with injection glycopyrrolate 0.04 mg/kg intramuscular 1 h pre-operatively after ensuring adequate starvation.

Anaesthesia was induced in the supine position, and then, the patient is shifted to sitting position with the chin on the slit-lamp laser delivery system chin rest. Anaesthesia is induced with oxygen, nitrous oxide and sevoflurane. An intravenous line is secured and standard monitors are applied. A Guedel airway is used to maintain the patency of the airway while anaesthetic is delivered through face mask. The average duration of the procedure was 7–8 min.

An assistant was required to hold the baby in the lap in a sitting position taking care of the patients’ pelvis and legs. Other assistant helped to hold the head in position on the padded chin rest while anaesthesiologist holds the face mask, maintains the airway and monitors the patient. The ophthalmologist then proceeds with the capsulotomy [Figures 3 and 4].

On completion of the procedure, the patient is repositioned in the supine position till completely awake and then shifted to post-anaesthesia care unit for observation.

Yttrium-aluminium-garnet capsulotomy technique

Using the Lumenis YAG laser machine, Abraham contact lens was used to stabilise the eye, improve laser beam optics and facilitate accurate focusing. Shots were fired starting from lower energy and increasing the energy if the capsule failed to fall. A cruciate type of opening was initiated in all patients. Once the procedure was completed, the patient was prescribed topical steroids and pressure lowering medications for 1 week and was under regular follow-up.

Statistical analysis

Statistical analysis was carried out using SPSS 18 for Windows (SPSS Inc., Chicago, Illinois, USA). LogMAR visual acuity and intraocular pressure were compared for
Results

Eighteen eyes of 14 patients had undergone the procedure. The mean age at primary surgery for cataract was 2.15 ± 2.4 years. Twelve out of 14 patients belonged to American Society of Anaesthesiologist I category, and of the remaining two, one had cerebral palsy and the other had mental retardation due to hypoxic-ischaemic encephalopathy sequelae. Of the 18 eyes, 1 (5.5%) was a traumatic cataract, all the others being congenital cataracts. The mean age at Nd:YAG laser capsulotomy was 4.05 ± 2.38 years. The mean pre-procedural visual acuity was 0.654 ± 0.278 logMAR units and post-procedural visual acuity was significantly better at 0.502 ± 0.55 logMAR units, with \( P = 0.009 \). The average energy used was 154.33 ± 67.21 mJ. Five eyes (27.8%) developed a PCO post-laser capsulotomy. Only one patient (5.5%) developed secondary glaucoma after laser. No patient developed retinal detachment as a complication.

Discussion

Nd:YAG laser capsulotomy has led to minimally invasive treatment of visually significant PCO. The vertically mounted Nd: YAG systems used on patients in the supine position are not readily available and are very costly.\(^1\)\(^2\)\(^3\) In the very young patients, a surgical capsulotomy in the posterior pole is often performed. The technique described in the present report can be used to avoid a more invasive surgery in cases of thin PCOs. Limitations of Nd:YAG capsulotomy include the possibility of recurrence, especially in young patients. Although YAG capsulotomy in prone position has been described, we have not done any in our centre.\(^5\) None of the patients required repeat YAG capsulotomy in the series of three patients described by Longmuir \etal.\(^6\) In our study, five patients needed repeat intervention in view of recurrent capsular opacification. This could be accounted for by the longer follow-up in our patients.

The sitting position in general anaesthesia, as with any infrequent surgical procedure, requires communication between surgeon, anaesthesiologists and operating room staff to ensure that the procedure will run smoothly. Being alert at all times during the procedure can prevent the unnecessary complications.

Conclusion

The yag capsulotomy in sitting position under general anaesthesia is a challenging procedure for anaesthesiologists especially outside the operating room. It mandates a perfect co-ordination among all the members of the conducting team for a successful outcome.

Ethical statement

The study was approved by the institutional Ethics Committee of Goa Medical College ethical committee. (Approval No- 25.9.2015).

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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