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A STUDY TO DETERMINE THE ROLE OF DIFFERENT TYPES OF INTRAOCULAR LENSES IN THE MANAGEMENT OF TRAUMATIC CATARACT IN A TERTIARY HEALTHCARE CENTRE.

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Abstract:

Background: Cataract is the leading cause of blindness worldwide. Out of them traumatic cataract is a common variant occurring in the spectrum of ocular trauma. It is a significant prerequisite of monocular blindness worldwide. Timely management and early intervention are essential in view of traumatic cataract. Different types of lenses such as anterior chamber intraocular lens and posterior chamber intraocular lens, scleral fixated intraocular lens can be used in the management of traumatic cataract. This study will be conducted to find out the correlation between different types of intraocular lenses used in cataract surgery and their potential role in the visual outcome of the patient and meanwhile considering factors such as type of trauma, amount of time interval between trauma and surgery, preoperative and postoperative complications etc.

Objectives:

1.To know modes of presentation and different injuries causing traumatic cataract.
2.To assess the visual outcome of the patients post traumatic cataract surgery using different types of intraocular lenses.
3. To study the complications occurring in patients undergoing traumatic cataract surgery.

Methods: This study will be conducted in Acharya Vinoba Bhave Hospital, Sawangi (Meghe) associated to Datta Meghe institute of Medical sciences, Wardha, it will be a hospital based Interventional Cross sectional study with a sample size of 40 patients. Clinical history will be taken and Comprehensive ophthalmic examination, including best corrected visual acuity (Snellens chart), slit lamp, IOP measurement (applanation tonometer) and fundoscopy (slit lamp biomicroscopy with 90 D, indirect and direct ophthalmoscopy) and B- scan, IOL power calculation by SRK-T formula will be performed. Following which the patients will under undergo cataract extraction with intraocular lens implantation. Final visual outcome will be assessed by the end of 6 weeks. 3 follow ups will be there after first day, first week and sixth week.

Expected Results: The main objective of this study will be to assess the improvement in visual outcome of each of the 40 patients suffering from traumatic cataract by the use of different types of intraocular lenses depending upon the situation they present in. Studies conducted in the past have shown a considerable improvement in the visual outcome of the patients with the use of different types of intraocular lenses.

Keywords: Traumatic cataract, ocular trauma, management, intraocular lens, visual outcome.

INTRODUCTION:

Trauma to the eye is a significant and preventable cause of monocular blindness worldwide. On an average half a million people worldwide are blind due to ocular injuries.[1]

One of the most common manifestations of ocular trauma is traumatic cataract. It occurs due to blunt or penetrating ocular trauma. The different types of injury, degree of lens involvement and subsequent injury to the ocular structure, type of intraocular lenses used, time interval between the trauma and surgery help in determining the prognosis.[2]

Since the lens is damaged in traumatic cataract it needs to be removed. As a result of removal of the damaged lens, there is the uniocular aphakia. This needs to be corrected with the help of surgery as spectacle correction doesn't help in developing binocular vision and contact lens do not help much either[3]. If not treated by surgery the aphakic eyes remain unaided and gradually over a period of time can develop divergent squint and amblyopia.[3]

With the advent of intraocular lenses (IOL), it has become easier in treating patients of traumatic cataract and restoring binocular vision with the goal of eliminating uniocular aphakia by using IOL after the extraction of the traumatic lens. There is a need to eliminate uniocular aphakia as it in itself can cause a number of complications which are troublesome to deal with like loss of accommodation, hyperopia, vitreous detachment, retinal detachment and glaucoma[4].

Different types of intraocular lenses are used in traumatic cataract surgery. Some of them being 1Retropupillary Iris claw lens 2.scleral fixated IOL(SFIOL) 3. Anterior chamber IOL (AC-IOL) 4. Posterior chamber IOL.[4]

This is the study to determine the role of different types of intraocular lenses in the management of traumatic cataract and their role in the overall visual outcome of the patients keeping in mind other characteristics which can affect the visual outcome like type of trauma, mode of presentation, time interval between trauma and surgery.[5]

Background/rationale: Traumatic cataract is a common occupational hazard in rural areas due to work in factories etc and most people aren't aware about the treatment. Very less studies have been conducted in this region on the role of different types of intraocular lenses in the management of traumatic cataract. Therefore we intend to study the same in patients attending the eye department at AVBRH, that if there is any correlation between the use of different types of intraocular lenses and the potential visual outcome of patients with traumatic cataract

Objectives :

1.To know modes of presentation and different injuries causing traumatic cataract.

2.To assess the visual outcome of the patients post traumatic cataract surgery using different types of intraocular lenses.

3. To study the complications occurring in patients undergoing traumatic cataract surgery.

Materials and Methods:

Setting: This study will be conducted at the Department of Ophthalmology, in Acharya Vinoba Bhave Rural Hospital, at a tertiary centre, teaching hospital situated in the rural area od Wardha District . the study will be undertaken after approval from the Institute's Ethical Committee(applied for).

Patients: We will prospectively enrol all patients with traumatic cataract coming to the ophthalmology OPD of Acharya Vinoba Bhave Rural Hospital after taking inclusion and exclusion criteria into consideration. Written informed consent will be taken from all the patients.

Study design:
it is a hospital based interventional cross sectional study .

Inclusion Criteria:

1. Patients of non-paediatric age group who will be diagnosed positive for traumatic cataract.
2. Patients consenting to study/ giving valid consent.

Exclusion Criteria:

1. All cases diagnosed with posterior segment anomalies on B-scan like vitreous haemorrhage, retinal detachment.

2. All cases of traumatic cataract as a result of retained intraocular foreign body
3. Patients showing Corneal involvement and iris incarceration

METHODS

This study will be adhered to the tenets of the declaration of Helsinki and will be approved by the Institutional Ethical Committee (IEC) of DMIMS (DU).
All the patients will be made fully aware of the details of the procedure. The patients fulfilling the inclusion criteria will be sequentially recruited for the study.
Clinical history will be taken and Comprehensive ophthalmic examination, involving best corrected visual acuity (Snellens chart), slit lamp exam, IOP determination (applanation tonometer) and fundoscopy (slit lamp biomicroscopy with 90 D lens, direct and indirect ophthalmoscopy) and B- scan, IOL power calculation by SRK-T formula will be performed.

SURGICAL TECHNIQUE:[6,7]

1. IMPLANTATION OF POSTERIOR CHAMBER INTRAOCULAR LENS[6,7]

PHACOEMULSIFICATION:

Eyes will be prepared by cleaning the area with povidone–iodine (Betadine) and inserting a lid speculum. Topical proparacaine drops or peribulbar anaesthesia will be given depending upon the patient's need. Using lancetip, sideport entry will be made temporally. Anterior chamber will be filled with balanced salt solution. Trypan blue dye will be injected into anterior chamber to stain the capsule. After a few seconds dye will be washed by Balanced salt solution, Anterior Chamber will be made full with viscoelastic substance. Using needle cystitome will be made from 26 G needle continuous curvilinear capsulorrrhexis will be made. Superior clear corneal entry will be made using 2.8 mm blade. Hydrodissection will be done using Balanced salt solution. Viscoelastic will be injected into anterior chamber to protect endothelium. Phacoemulsification either by divide and conquer or stop and chop will be done . Remainder of the cortex will be aspirated with simcoe's irrigation aspiration cannula. Visco will be injected into capsular bag. Foldable lens will be implanted in the capsular bag . Viscoelastic will be washed using simcoe. Wounds will be sealed by hydration. Intracameral moxifloxacin is injected

SICS

Peribulbar anesthesia will be provided to the patient. Eyes will be prepared for surgery by cleaning the area with povidone–iodine (Betadine) and a lid speculum will be inserted. Superior rectus bridle suture will be given so as to engage the eye in downward gaze with the help of Dastoor's superior rectus holding forceps. Conjunctival flap will be made carefully by a sharp tipped scissors along the length of limbus from 10 to 2 o'clock. Haemostasis will be done by wet field cautery. 6.5-7mmsclero corneal tunnel incision will be taken. Side port entry sized 1.5 mm will be made at 9 o'clock position. Capsule will be stained by trypan blue stain. Anterior capsulotomy will be done. Hydrodissection will be done with Balanced salt solution. Nucleus will be delivered into anterior chamber with the help of dialer. Delivery of the nucleus outside will be done by wire Vectis method. The remaining cortex will be aspirated out by irrigation aspiration cannula. Posterior chamber intraocular lens(PCIOL)will be put in the capsular bag after it is filled with viscoelastic substance. Viscoelastic substance

will be irrigated from the anterior chamber by using 2 way irrigation aspiration cannula. Anterior chamber will be made full with Balanced salt solution put through side port entry. Sclerocorneal tunnel incision will be self sealed due to valve effect.

2. AB INTERNO SCLERAL FIXATED IOL IMPLANTATION[6,7]

Peribulbar anesthesia will be provided. Eyes will be prepared by cleaning the area with povidone–iodine (Betadine) and inserting a lid speculum. After taking all aseptic precautions, peritomy will be done from 2'o clock to 4'o clock and 8'oclock to 10'o clock. After that a superior scleral incision of 7mm will be taken and anterior chamber will be entered with the help of 3.2mm keratome. Anterior vitrectomy will be done along with maintenance of anterior chamber by viscoelastic will be done simultaneously. After that, straight needle will be used with 10.0 polypropylene suture and it will be placed through 9'o clock sclera flap. In the same way, a 26g needle will be inserted through 3'o clock flap. This needle will be inserted into the eye and syringe will be taken back. A part of the suture will be taken back through the scleral wound. the part will be cut, one end will be secured to superior haptic and other end will be secured to inferior haptic of the lens. The lens will be put into the sulcus and turns into position while detaching slack from sutures attached.

3.RETROPUPILLARY IRIS CLAW LENS IMPLANTATION[6,7]

Peribulbar anaesthesia will be provided. Eyes will be prepared by cleaning the area with povidone–iodine (Betadine) and inserting a lid speculum. After taking all aseptic precautions aseptic precautions, a superior or tempora incision,5.5mm sclero-corneal/clear corneal incision will be taken. Two paracenteses will be made at 9 and 3 o'clock positions from the main section. Intracameral pilocarpine will be used whenever needed. Iris claw Intraocular lens will be then put into the anterior chamber from the main section. A little bit of viscoelastic substance(2% hydroxypropyl methylcellulose) will be instilled on the peripheral iris. Optic held with a lens forceps, then one haptic will be tilted downward pushed under the iris slowly. A sinskeys hook will be passed from the same port. Haptic will be then tilted and will be pushed. The iris will then be enclaved into the haptic claw. A similar maneuver will be done from the other side of the port Viscoelastic will be aspirated by simcoe cannula/ I and A aspiration cannula, anterior chamber will be made well formed by balanced salt solution and conjunctiva will be reposited.

4. ANTERIOR CHAMBER INTRAOCULARLENS IMPLANTATION[6,7]

Peribulbar anaesthesia will be given depending upon the patient's need. Eyes will be prepared by cleaning the area with povidone–iodine (Betadine) and inserting a lid speculum. A Superior rectus bridle suture will be passed to engage the eye in downward gaze with the help of Dastoors' superior rectus holding forceps. Conjunctival flap will be prepared to expose the limbus. Haemostasis will be achieved by wet field cautery. Partial thickness groove will be made from 9.30 to 2.30 o' clock. The anterior chamber will be opened with a 3.2 mm keratome and a corneoscleral incision is given. A peripheral iridectomy will be performed with the help of iris forceps. After that the lens will be delivered into the anterior chamber. After the lens is delivered, iris will be put back into the anterior chamber by an iris repositor. The anterior chamber will be filled with balanced salt solution. Anterior chamber intraocular lens will be implanted into the anterior chamber. Incision will be the closed using 5 to 7

interrupted sutures. Conjunctival flap will be reposited Subconjunctival injection will be given of dexamethasone 0.25 ml and gentamicin 0.5 ml. Eye will be patched.

POSTOPERATIVE MANAGEMENT[6,7]

Systemic analgesics will be administered along with systemic antibiotics. Next morning eye will be checked under slit lamp. Patient will be started on topical antibiotic steroids with mydriatics drops (combination of dexamethasone and moxifloxacin and homatropine drops). Steroid eye drops will be later tapered . Nepafenac containing eye drops will be given in order to reduce the pain and inflammation in the eye .

Sample size:

Using sample size formula with desired error of margin

$$\frac{n=Z^2\ \alpha/2\ *P*(1-P)}{d^2}$$

Where

Zα/2 is the level of significance at 5 %

Ie: the 95 % confidence interval =1.96

P= the Prevalence of traumatic cataract =0.15 i.e. 0.015

d= Desired error of margin =4% =0.04

$n=1.96^2*0.015*(1-0.015)/0.04^2$

n= 35.47

n=36

total sample size= n+10% of patients lost to follow up

=n+10% of 36

=n+3.6

=36+3.6

=39.36

=40

=40 patients needed in the study.

In this interventional cross sectional hospital based study, total 40 SUBJECTS will be registered after fulfilling inclusion and exclusion criteria.

Statistical analysis

It is Done by using descriptive and inferential statistics, using chi square tests, Odds ratio and a software used in analysis with the SPSS-24.0 system and GraphPad prism 7.0 version and $p<0.05$ is considered as level of significance.

VARIABLES:

- Types of IOL
- Visual outcome
- Complications
- Traumatic cataract

DISCUSSION:

It is a study of 40 patients with traumatic cataract who will be managed by the use of different types of intraocular lens depending upon the situation encountered. Visual outcome in each of these patients will be evaluated as the primary goal of this study. However, characteristics of each of these patients will vary depending upon the type of injury, mode of presentation, time interval between the trauma and the surgery, thereby visual outcome of these patients will vary accordingly. As ocular trauma be it blunt or penetrating is common among people in rural areas especially in younger population, it is equally important to educate people in terms of road safety. Many studies have shown the improvement in visual outcome with the use of intraocular lens in the management of traumatic cataract.[8,9,10] A number of related articles have been reported [11-14.] Panjwani and Daigavane reported on visual outcome and complications of scleral fixated intraocular lens implantation[15]. Few of the articles on cataract surgery and eye care were reported [16,17,18]. Traumatic cataract being a common occupational hazard in rural central India, it is significant to study the visual outcome in each of these patients along with other characteristics of traumatic cataract.

LIMITATIONS:

- Sample size is small and studies on a larger scale are required to confirm these results
- Deciding type of IOL to be implanted will be a judgement call, since procedures do not yield similar results in different kind of patients.
- Follow up period is for 6 weeks, so late complications related to procedures are not studied.
- In cases of unplanned surgery the IOL power calculation is done at the operating table considering the type of surgery to be done.
- One of the ideal investigations like anterior segment Optical Coherence Tomography(OCT) is not being done preoperatively or postoperatively.

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