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The Incidence Of PCO After IOL Surgery And Its Management At Regional Eye Hospital, Kurnool, Andhrapradesh

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ABSTRACT
Back ground: *To undertake qualitative cataract surgery, it is universally accepted that Extra Capsular Cataract Extraction surgery is superior to Intra Capsular Cataract Extraction. The main and common drawback of the E.C.C.E surgery is development of posterior capsular opacification.It has been reportedly that visually significant Posterior Capsular Opacification occurs in 7.5 % -15.5% of eyes Rates as high as 50% has been reported with 3-5yrs of following surgery. The main objective of the study is to measure the incidence of PCO, its management to provide qualitative eye care after cataract surgery.*
Materials and Methods*: In this prospective randomised controlled study, The Present clinical study of 'Incidence of PCO after IOL surgery and its management' was undertaken in the department of ophthalmology, Regional Eye Hospital, Kurnool. The study was carried out on 2000 inpatients among them 1850 cases are of ECCE with PCIOL. The cases were followed up during September 2021 to February 2023.The present study was carried out with special reference to age groups, duration, material used to manufacture the implanted IOL and different modes of management of PCO.After written informed consent was obtained, a well-designed questionnaire was used to collect the data .*
Results*: Out of 1850 cataract surgeries, 138 were developed PCO. In our study as shown in the case of age between 1-20 years seven cases were operated. In three cases PCO developed within 2-4 months duration. Regarding IOL material multipiece IOL there is more incidence than single PMMA IOL. Regarding management of PCO the use of Nd-YAG laser has been a simple procedure for management of posterior capsule opacification being non-invasive. It is effective and successful.In our study out of 138 cases 133 were treated with Nd:YAG laser, remaining five were with surgical capsulotomy. In our study two cases were identified as having Cystoid macular edema.Improvement of Visual Acuity: This was excellent in our study. Visual acuity improved to 6/6 in 12 cases 6/9 in 17 cases, 6/12 in 55 cases, 6/18 in 30 cases, 6/24 in 18 cases and 6/36 in 4 cases.*
Conclusion*:PCO is a major complication of modern cataract surgery like ECCE with PCIOL. Improvement in visual acuity with Nd:YAG laser capsulotomy is excellent. Nd:YAG laser capsulotomy is a safe method of restoring the vision in patients with posterior capsular opacification. The Nd:YAG laser is easy, safe, non-invasive with excellent results and out patient procedure.*

Keyword:*QualitativeSurgery, PosteriorCapsular Opacification, Nd YAG capsulotomy, SurgicalCapsulotomy*

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I. Introduction

The prevalence of blindness due to senile cataract is high in Indian population. There is a need to undertake quality cataract surgery for both rural urban populations. It is universally accepted at this point of time that E.C.C.E is superior to I.C.C.E. because of free from major complications. The one drawback of the E.C.C.E with posterior chamber Intra ocular lens is posterior capsular opacification.

It has been reportedly that visually significant Posterior Capsular Opacification occurs in 7.5 % -15.5% of eyes with cataract extraction and intra ocular lens implantation in the period of 18 months.

The Incidence of PCO varies. Rates as high as 50% has been reported with 3-5yrs of following surgery.Lindstrom and Hams reported the incidence to be 3.6% at 6-12 months after implantation, 7.4% at 12-8 months, 13.8% at 18-24 months and 18.14% at 24-26 months.Nishi reported 7.1% opacification rate in eyes which had undergone ECCE and PC IOL with a minimum follow up of 2 yrs.In the ECCE/PC IOL group the

rate at which opacification was 4.5% in 1-2 years and 9.3% in 4-5 years where the loops of IOL present in the Capsular bag the rate of opacification is less.

Posterior capsule opacification following cataract surgery is the manifestation of migration and proliferation of lens epithelial cells on the central region of the Posterior Capsule. After-cataract sometimes called Secondary cataract is the term applied to the remnants of the lens left behind after discission or operative removal by the extracapsular extraction.There are two types of PCO (1) fibrosis type (2) pearl formation type.

Elschnig's pearls:Frequently the individual lens equator cells become swollen and vacuolated and attain considerable dimensions. They represent abberrant attempts of the epithelium to form new fibres.They are round or oval and transparent like toy halPCO can also be influencedeloos of soap bubbles.

Ring of Soemmerring: It was first described clinically by Detmar Wilhelm Soemmerring (1828). Equatorial cells are responsible for formation of a Sommering's ring. This ring is a dumb-bell or donut shaped lesions

Factors influencing the posterior capsular opacification are Age of patient:In Children Posterior capsule opacification occurs more frequently. It occurs almost in 100 percent of children within two years of surgery.This is because of greater proliferative potential of lens epithelial cells in younger age group.In old individuals more than 70 years the incidence of PCO is less.

Type of Anterior Capsulotomy: Continuous curvilinear capsulorrhexis (CCC) is considered to be the best opening of capsulotomy for the prevention of posterior capsular opacification. Removal of epithelial cells facilitated by hydro dissection in CCC.In can-opener technique the anterior capsular tags present contains epithelial cells so PCO incidence is more.

PCO can also be influenced by Intraocular Lens Design, shape**,** size, material and placement of IOL. Posterior convex or biconvex lenses have less incidence of posterior capsular opacification because they contact with the posterior capsule and prevent the migration of epithelial cells. In phacoemulsification in the case of small size (5.5mm) 10L optic, the events of incidence of PCO is more than that of 6.6 mm size (Optic) IOL. All PMMA IOLs are found to be better when compared to TOLS with polypropylene loops because PMMA haptics are of better quality and on insertion in the bags are able to come to their original shape and hence stretch the capsule bag more effectively.Sulcus intraocular lenses have more incidence of posterior capsular opacification. IOL in the bag is better position and prevent the posterior capsular opacification the bag. The incidence of PCO is high particularly fibrosis type A which extends from the attachment of anterior capsular edge to the posterior capsule.

The Management of after cataract is usually undertaken for optical reasons. The opening of posterior capsule is by six methods. They are Neodynium-Yttrium_Aluminium_(Nd Yag) laser posterior capsulotomy, Aspiration of Elschnig's pearls, Simple discision for a relatively thin membrane, Scissor section or two knife section for thicker membranes,Removal of a portion of the membranes through a larger limbal incision for the thickest membranes, Parsplanamembranectomy.

LASER:The wave length of ND-YAG laser is 1064 nm.Mechanism is photo disruption. The pulsed neodymium :YttriumAluminum-Garnet(YAG) laser has revolutionized the approach on after cataract membranes .This non invasive method can be performed as an O.P. method with or without topical anaesthesia.

Indications For Nd:Yag Laser are Posterior capsulotomies ,Pupillary membranectomies, Prophylactic Iridotomy in Primary angle closure glaucoma, Coreoplasty of updrawn pupil after failed ICCE, Synechiolysis, Removal of IOL precipitates ,Vitreolysis, Retained cortical matter

Absolute Contraindications for Laser are Corneal scars, irregularities or edema. Relative Contraindications are Glass IOLs,Known or suspected Cystoid macular oedema,Active Intra-ocular inflammation, High risk for retinal detachment

Anti-glaucoma medication like Oral acetazolamide- 250mg QID for 1day, Topical Brimonidine eye drops BD for 4days, Topical antibiotic+ steroid eye drops QID for 4days were given as follow up treatment.

Surgical Capsulotomy:In parts of world where Nd:YAG laser is not available or there is thick after cataract which is not amenable to YAG capsulotomy , we have to do discission, thick after cataract membranectomy,pars plana membranectomy, aspiration of elschnig's pearls.

II. MATERIAL AND METHODS OF STUDY

The Present clinical study of 'Incidence of PCO after IOL surgery and its management' was undertaken in the department of ophthalmology, Regional Eye Hospital, Kurnool.The study was carried out on 2000 inpatients among them 1850 cases are of ECCE with PCIOL. The cases were followed up during September 2021 to February 2023.The present study was carried out with special reference to age groups, duration, material used to manufacture the implanted IOL and different modes of management of PCO.Detailed case history was recorded. In each case regarding the complaints, duration, present and past illness were taken.Slit lamp examination was done for Anterior segment of the eye to assess the posterior capsular opacification.Direct and Indirect ophthalmoscopy was used to look posterior segment pathology like cystoid macular oedema and retinal

detachment.In management some of the cases were managed with Nd: Yagcapsulotomy and some with surgical methods.The results of present study are completely analyzed and discussed.

Procedure methodology

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited patients retrospectively. The questionnaire included socio-demographic characteristics such as age, gender, nationality, height, weight, and consanguineous marriage, physical activity and lifestyle habits like smoking and alcohol and statin prescribed for at least 2 years continuously and dose, type of DM, its duration, and clinical and biochemistry laboratory investigations such as fasting bloodglucose, glycated hemoglobin (HbA1C), total cholesterol, HDL and LDL cholesterol levels, and TGs.(10)

III. Result

The study was carried out on 2000 inpatients among them 1850 cases are of ECCE with PCIOL. The cases are followed up during September 2021 to February 2023.

Cases were divided according to Age/Sex wise and also according to duration between cataract extraction (ECCE with PCIOL) and development of posterior capsular opacification as follows.

TABLE-1
SEX WISE DISTRIBUTION

Sex	No. of cases operated	No. of cases PCO developed
Male	900	66
Female	950	72
Total	1850	138

This shows that there is no significant sex predilection

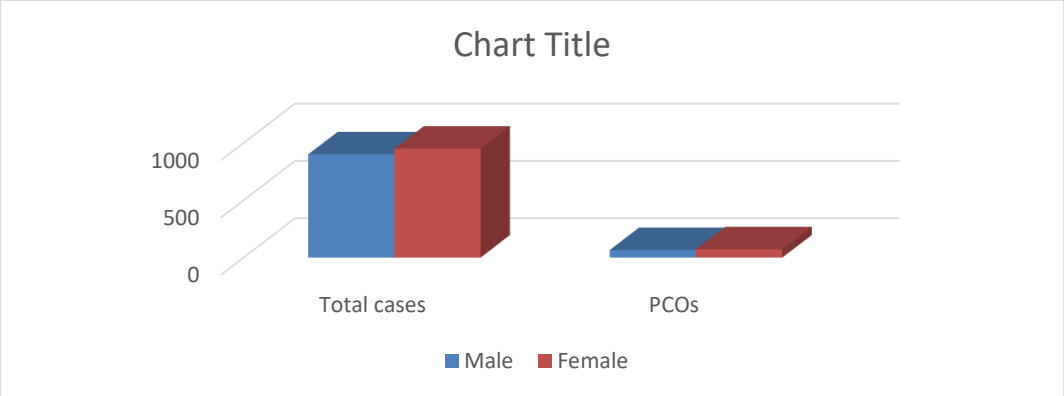

TABLE-II
AGE WISE DISTRIBUTION

S.No	Age	No. of cases operated	No. of cases PCO developed	Percentage
1.	1-10 yrs	5	5	100%
2.	11-20 yrs	5	2	40%
3.	21-30 yrs	45	12	26.6%
4.	31-40 yrs	90	24	26.6%
5.	41-50 yrs	625	29	4.6%
6.	51-60 yrs	900	66	7.3%
7.	61-70 yrs	180	0	0%

This shows that patients under 40 yrs. the PCO was earlier. In children PCO was 100% After 60 yrs PCO was negligible.

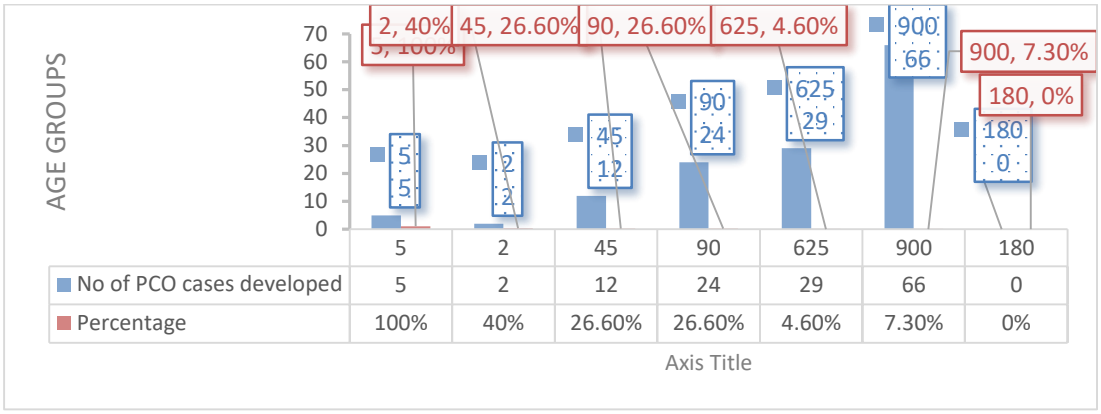

TABLE-III

DURATION BETWEEN CATARACT EXTRACTION AND DEVELOPMENT OF POSTERIOR CAPSULE OPACIFICATION

Duration in Months	No. of cases
1-6 months	50
6-12 months	47
12-15 months	26
16-18 months	15

This shows most of the cases PCO developed in duration of 1 year.

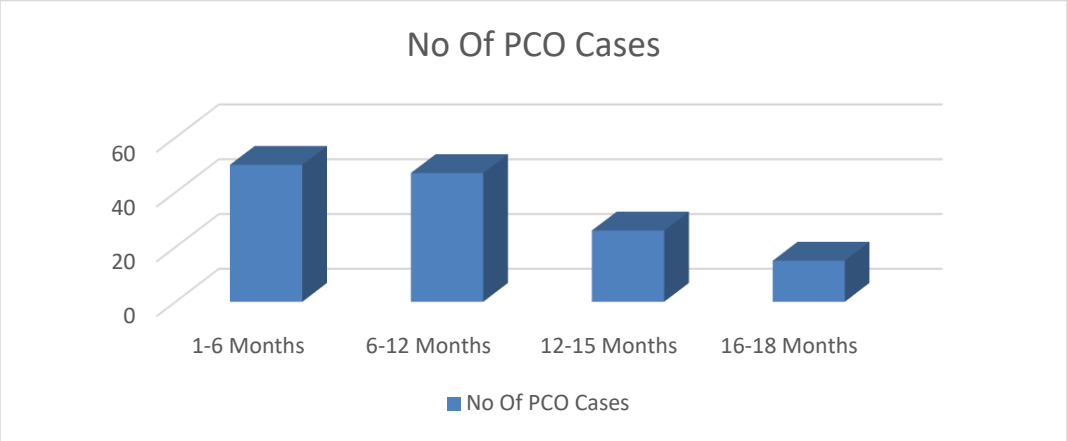

TABLE-IV

DURATION BETWEEN ECCE WITH PCIOL. AND DEVLOPEMENT OF POSTERIOR CAPSULE OPACIFICATION

Duration	No. of cases operated	No. of cases PCO developed	Percentage
1-6 months	618	8	1.2 %
6-12 months	632	65	10.2%
12-18 months	600	65	10.8%

This shows that in 18 months duration the PCO incidence in ECCE with PCIOL is more.

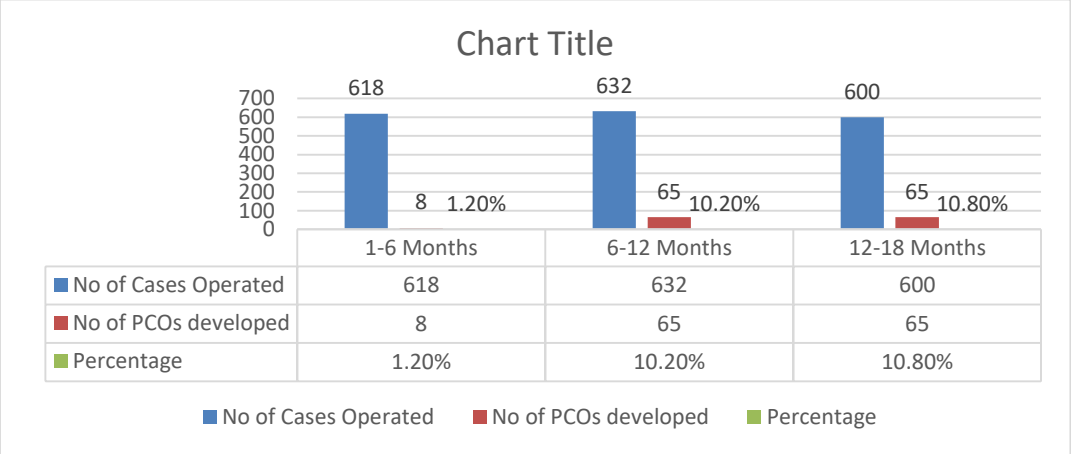

TABLE-V

AGE OF PATIENT AND DURATION BETWEEN CATARACT EXTRACTION AND DEVELOPMENT OF PCO

S.No.	Age	No. of cases	Duration between surgery & PCO
1	1-10 yrs	5	2 months
2	11-20 yrs	2	2 months
3	21-30 yrs	12	6 months
4	31-40 yrs	24	8 months
5	41-50 yrs	29	12 months
6	51-60 yrs	66	16 months
7	61-70 yrs	0	18 months

It has been shown that in patients less than 40 yes age the PCO occurs earlier, in patients under 20 yrs PCO occurs before 2 months, so it can be stated that younger the age earlier will be the PCO

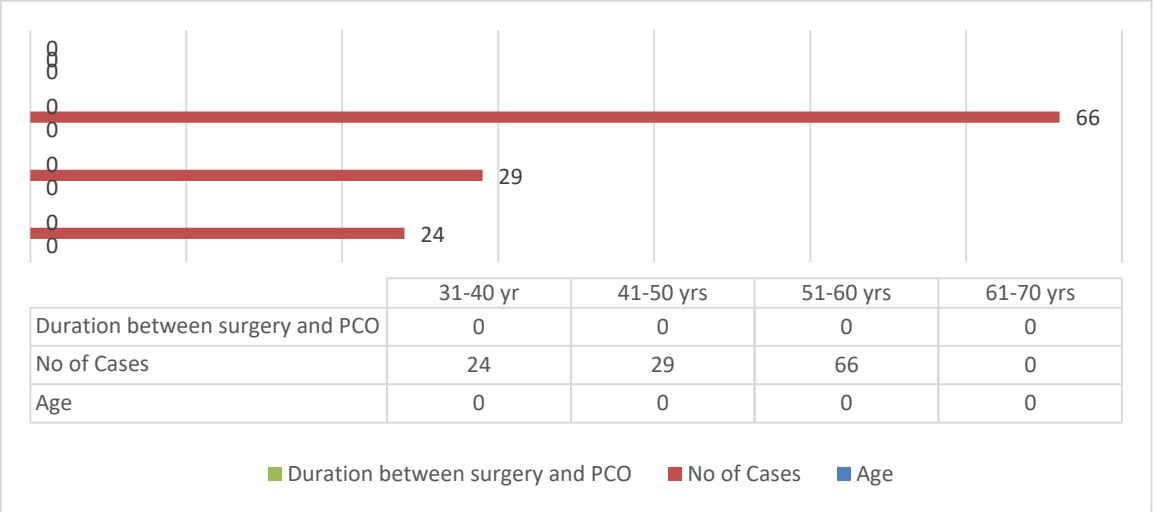

TABLE-VI

INCIDENCE OF PCO WITH VARIOUS IOL MATERIALS

Type of IOL	No. of cases operated	No. of cases PCO developed	Percentage
Single piece	1100	83	6.8%
Multipiece	750	75	10%

This shows that Multipiece IOL was more incidence of PCO.

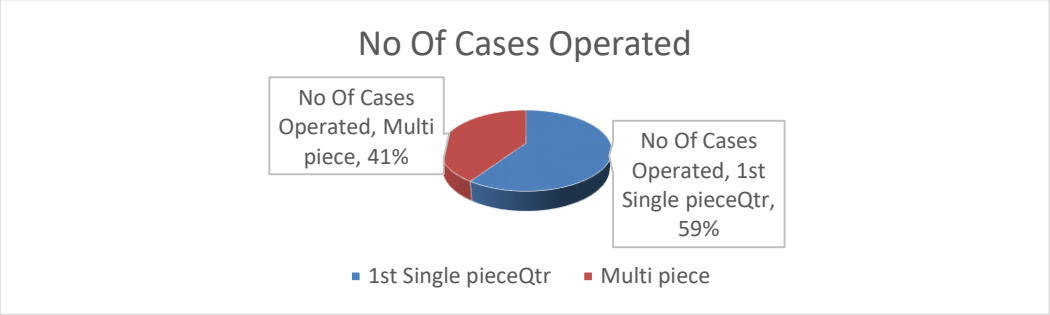

TABLE-VII
TREATMENT MODALITIES

No. of cases	YAG Laser Capsulotomy	Surgical capsulotomy
1850	133	5

It shows that most of the cases are treated with Nd-YAG laser and it was effective and successful. Energy used for posterior capsulotomy was 2.5 to 5 mJ.

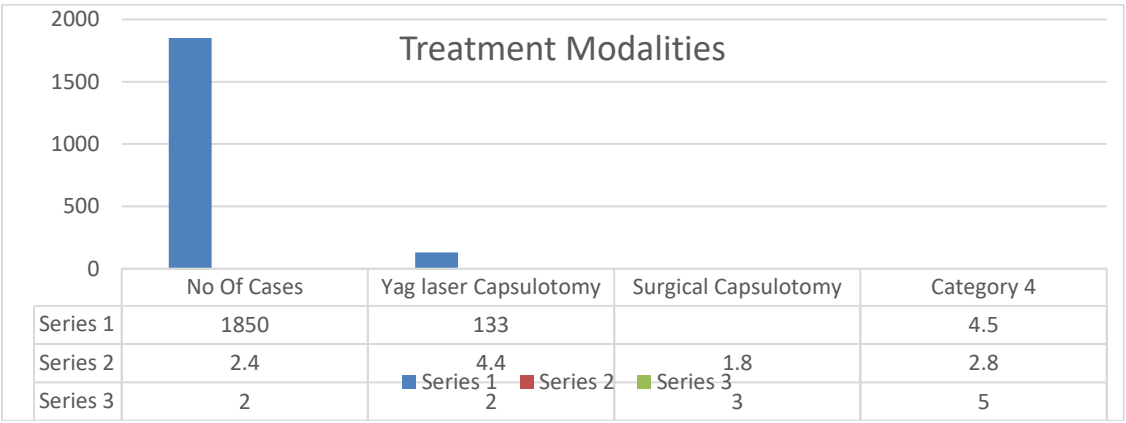

TABLE-VIII
COMPLICATIONS OF YAG LASER CAPSULOTOMY

S.No	Complication	No. of cases	Percentage
1	Aqueous flare	20	44%
2	Pitting of I0L	03	6%
3	Vitritis	02	4%

It shows that aqueous flare occurred in 44% cases, pitting of IOL in 6% and vitritis in 4% cases.

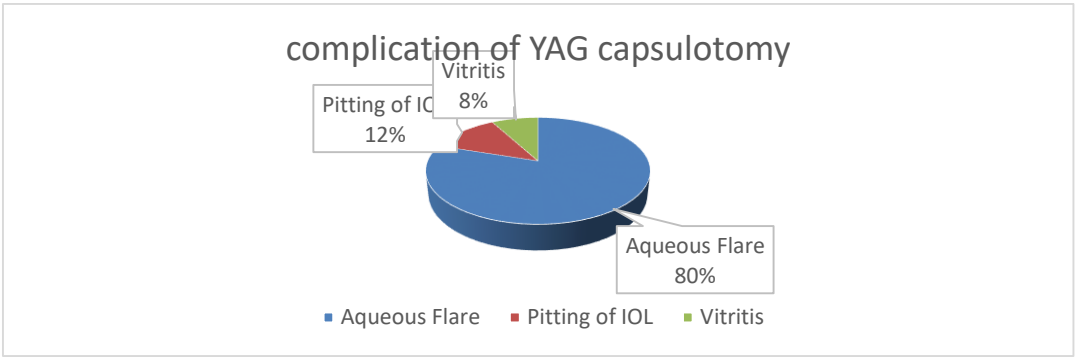

TABLE-IX
VISUAL IMPROVEMENT IN YAG LASER CAPSULOTOMY

Prelaser V.A.	No of cases	Post laser V.A. with glasses						
		6/6	6/9	6/12	6/18	6/24	6/36	6/30
HM – 5/60	19	-	6	4	15	14	2	-
6/60 – 6/36	17	8	11	41	15	4	2	-
6/24	04	4	-	10	-	-	-	-

Visual acuity improved to 6/6 in 12 cases, 6/9 in 17 cases, 6/12 in 55 cases, 6/18 in 30 cases. 6/24 in 18 cases and 6/36 in 4 cases.

IV. Discussion

Posterior capsular opacification is a major complication in modern cataract surgery. In our study of incidence of posterior capsular opacification, 1850 cataract surgeries were followed in 18 months duration.Out of 1850 cataract surgeries, 138 were were developed PCO.As shown in observations the cases were divided according to Age/Sex wise and also according to duration between cataract extraction and diminishing of vision and also according to the type of surgery and IOL material that is multipiece versus single piece IOLs.

On review of pertinent literature the incidence of posterior capsule opacification are Nishi reported that 7.1% opacification rate with a follow up of one year and an average 28 months in the case of eyes which underwent ECCE with PCIOL.Lindstrom and Harris reported that the incidence was 3.6% in 6-12 months duration after implantation and 7.4% in 12-18 months follow up.Mc Donell et al. noted that almost all pediatric age groups developed PCO.Enery et al., also noted that younger patients have a higher incidence of PCO than older ones.

In our study as shown in the case of age between 1-20 yrs seven cases were operated. In three cases PCO developed within 2-4 months duration.Regarding IOL material multipiece IOL there is more incidence than single PMMA IOL.Regarding management of PCO the use of Nd-YAG laser has been a simple procedure for management of posterior capsule opacification being non-invasive. It is effective and successful.

In our study out of 138 cases 133 were treated with Nd:YAG laser, remaining five were with surgical capsulotomy.Among 1-20 years age group, there are 5 children. In four cases, surgical capsulotomy was performed under general anesthesia. One patient of age 10 yrs. with traumatic cataract, we did ECCE with IOL implantation and we performed surgical capsulotomy because of thick posterior capsule.

In our study almost all cases were given immediate post laser acetazolamide. In our study out of 133 cases, 111 cases were within 25 mm of Hg. Only 12 cases were more than 25 mm of Hg. But as per the initial other studies are the incidence of elevated 1.0.P above 20 mm of Hg, was 32% and between 15-20 mm of Hg. was 68% in our study.No patient in the group treated with oral acetazolamide found an 1.O.P. elevation over 25 mm of Hg, where us 34.6% of the non-treated group had elevation to 25 mm of Hg or greater

In our study there was no case of Retinal detachment.This could be probably due to absence of risk factors in our cases .In our study two cases were identified as having Cystoid macular edema.In our study one case has been identified as having cystoid macular edema. In this case posterior capsule is very thickly opacified that visualization of optic disc & macula was not possible at the time of examination. So the development of CME could not be attributed to YAG laser application. In second case the patient was known diabetic with irregular compliance to anti diabetic drugs.The development of cystoid Macular Edema after Nd:YAG laser capsulotomy has been demonstrated in many studies.The incidence of CME according to WINSLOW and TAYLOR was 0.55% and they attributed this occurrence to vitreous instability which is secondary to hyaluronic acid and prostaglandin diffusion through the compromised posterior capsule.According to ALBERT et al., incidence of cystoid macular edema was 5.4%.

General complications like corneal abrasions, epitheliopathies and exacerbation of epithelial dystrophies have not been reported in our study.Pitting of IOL was seen in 3 cases. The patients who developed pitting of IOL are very uncooperative and they were moving their eyes when capsulotomy was being done.Other rare complications like corneal stromal scarring and macular holes did not occur in our study.

Improvement of Visual Acuity:This was excellent in our study. Visual acuity improved to 6/6 in 12 cases 6/9 in 17 cases, 6/12 in 55 cases, 6/18 in 30 cases, 6/24 in 18 cases and 6/36 in 4 cases.

In our study of 138 cases 72 are of with the rule astigmatism and 66 are of against the rule astigmatism.Because of high astigmatism some cases could not be improved to 6/6.

V. Conclusion

In Regional Eye Hospital, Kurnool, Ophthalmology department 2000 cases of modern cataract surgeries were done. The follow up of these cases was 18 months. In 138 cases posterior capsular opacification was noted in ECCE with PCIOL.A thorough preoperative assessment was made to confirm that the visual loss was only because of posterior capsular opacification.

The incidence of PCO in ECCE with PCIOL was 7.44% within 18 months duration.The incidence of PCO in younger individuals i.e. 1-10 yrs. was almost 100%. Whereas in 10-20 yrs age group was 40%, in 40 yrs. age was 26% and 51-60yrs are only 7.3%.The incidence of PCO during 1-6 months in IOL cases was only 12%, in 6-12 months duration it was 10.2%. In total duration of 18 months it was 10.8%.The incidence of PCO related to the age and duration of cataract surgery was important. In the younger group the PCO incidence was more and earlier.During follow up it was noticed that the incidence of PCO was more in these cases than single piece PMMA IOL.

The management of PCO in 133 cases was by Nd:YAG laser. Only 5 cases managed with surgical capsulotomy. The Nd-YAG laser capsulotomy was REDMI K20 ph out-patient treatment with dilatation of pupil. Cases wereobserved up to 6 wks. for any complications. like cystoid macular Edema, Retinal detachment, rise of Intraocular pressure and persistent iritis.Complications like transient rise in Intra Ocular pressure, Aqueous flare, pitting of Intra ocular lens, vitritis and cystoid macular edema had been reported in our study.
Vision improved to 6/6 in 12 cases, between 6/9 and 6/18 in 85 cases and between 6/24 and 6/36 in 22 cases.

PCO is a major complication of modern cataract surgery like ECCE with PCIOL.Improvement in visual acuity with Nd:YAG laser capsulotomy is excellent. Complications with Nd:YAG laser capsulotomy are minimal and transient.

Nd:YAG laser capsulotomy is a safe method of restoring the vision in patients with posterior capsular opacification. The Nd:YAG laser is easy, safe, non-invasive with excellent results and out patient procedure.

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