

# Role of fluorescein angiography as an early intervention in detecting cystoid macular edema in post operative cataract surgery patients

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## Abstract

**Introduction:** Cataract is the major cause of treatable blindness in India amounting to 81% of total number of blind cases. It is estimated that annual incidence of cataract induced blindness in India is about 2 million cases per year. Cataract surgery is one of the commonly performed surgeries. Cystoid macular edema (CME) is important postoperative complication after cataract surgery which can compromise result of cataract surgery if not detected and treated earlier. **Aim and objectives:** - 1) To study role of fundus fluorescein angiography (FFA) as an early intervention in detecting CME in post operative cases of cataract surgery. 2) To study the condition predilecting the development of CME in these cases. **Material and method:** A prospective study was conducted from June 2002-Sep 2003 at B. J. Medical College, Pune. A total 50 number of patients operated for cataract at Sassoon General hospital with suspected CME clinically were subjected to FFA and results were documented. Patients having CME on FFA were treated accordingly. **Results:** Of 50 patients studied 23 were male and 27 females. 17 males and 20 females had CME. 23/33 aphakic and 14/17 pseudophakics had CME. CME commonly presents between 4-8 weeks (26/37 patients). Posterior capsular rent was the commonest associated factor (8 patients). Visual acuity improved after treatment in 30/37 patients. No major adverse effect of fluorescein dye seen in our study. **Conclusions:** No sex predilection for development of CME. CME is more common in aphakic (82.4%) than pseudophakic patients. Average diminution of vision (DOV) was 1.10 lines of Snellen's chart. CME was developed from 1 week to 6 months postoperatively. CME can occur in uneventful cases. Posterior capsular rent was most common associated factor. Early diagnosis and treatment can improve visual acuity. FFA is a safe procedure.

**Keyword-** cystoid macular edema, fundus fluorescein angiography, cataract surgery

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## INTRODUCTION

Cataract is the major cause of treatable blindness in India amounting to 81% of total number of blind cases. It is estimated that annual incidence of cataract induced blindness in India is about 2 million cases per year.

Cataract surgery is one of the commonly performed surgery. CME is important postoperative complication after cataract surgery which can compromise result of cataract surgery if not detected and treated earlier. CME can occur even after uneventful cataract surgery but the incidence increases rapidly after complicated surgery. CME is mostly transient and resolves on its own but even these cases will have decreased contrast sensitivity. If it does not resolve and left untreated it will lead to permanent DOV along with various complication such as macular hole, retinal detachment. If diagnosed and treated earlier, patients will get a good vision. fluorescein angiography is used for a long time in diagnosing CME. The study was conducted to find out the role of FFA in early diagnosis of CME in postoperative cases of cataract surgery, so that patients can be treated earlier and thus we can give patient a better vision.

## AIM AND OBJECTIVES

- 1) To study role of FFA as an early intervention in detecting CME in post operative cases of cataract surgery.
- 2) To study the condition predilecting the development of CME in these cases.

### Anatomy of macula

Area centralis is located temporal to optic disc between superior and inferior temporal vascular arcades. It is having a diameter of 5.5mm and corresponds to  $15^{\circ}$  of visual field. The central part of macula is fovea with a diameter of about 1.85mm with thickness of 0.25mm corresponding to  $5^{\circ}$  of visual field. It is located at posterior pole 4mm temporal to disc and 0.8mm below horizontal meridian. The centre of fovea is foveola measuring 0.35mm in diameter with thickness of 0.13mm. It has only cones and corresponds to  $1^{\circ}$  of visual acuity. It represents the area of highest visual acuity.

Macula leutea is an oval zone of yellow discoloration within the area centralis. It is approximately 3mm in diameter with the centre being foveola. At macula 5-7 layers of ganglion cells are present. Outer plexiform layer is thicker at macula known as fiber layer of Henle. Macula is avascular with thicker pigment epithelial layer and choriocapillaries. Macula is prone to develop edema due to –

- 1) Thick fiber layer of Henle can absorb large quantities of fluid.
- 2) Avascularity of the central area limits absorption of the fluid.



## MATERIAL AND METHODS

A prospective study was conducted from June 2002-sep2003 at B.J.medical College, Pune. A total 50 number of patients operated for cataract at Sassoon General hospital with suspected CME clinically were subjected to FFA and results were documented. Patients having CME on FFA were treated accordingly.

### Selection of cases

Postoperative patients from Sassoon General Hospital with the following criteria were subjected for FFA and findings were noted. FFA was performed in the department of ophthalmology of Sassoon general

- 3) Thin fovea with its attenuated basal lamina provides a little protection against inflammatory exudates and toxic products from vitreous cavity.



### Cystoid macular edema

In 1953 Irvine described this condition. His findings were based on observations made during the era of ICCE where vitreous was disturbed during surgery. But now it is recognized that CME can occur even without vitreous loss and in uneventful cases also. In most instances CME is transient and self limiting. In rest of the cases it can lead to complications like macular degeneration, macular hole, vitreous traction retinal detachment causing DOV. If diagnosed and treated earlier these complications can be prevented with good visual outcome. It can be diagnosed earlier with the help of FFA. Leakage of dye at macula starts in the arteriovenous phase which coalesces to form a flower petal pattern in the late arteriovenous phase of angiography. This hyper fluorescence persists during late phase. Patients with angiographic CME were treated with topical NSAID (ketorolac tromethamine, flubuprofen) t.i.d., tab acetazolamide 125mg at night.



hospital. Written informed consent for the procedure, anaesthesia fitness and other necessary investigation were done prior to the procedure. Patients having CME were treated accordingly and followed up.

### Inclusion criteria

All postoperative cases of any age and sex with one or more of the following

- 1) H/o good postoperative visual acuity with diminution afterwards
- 2) Clinical features suggestive of CME but not with cystoid spaces at macula
- 3) Normal macular function preoperatively

4)Cases with h/o postoperative CME in other eye.

5)Cases with cataract surgery only.

#### Exclusion criteria

1)Cases allergic to fluorescein

2)Cases with media opacities in which fundus can not be visualized.

The following tests were conducted-

1)Torch light examination

2)Snellen's visual acuity test

3)Retinoscopy

4)Slit lamp examination with 90D lens

5)Slit lamp examination with Hruby lens

6)Direct ophthalmoscopy

7)Indirect ophthalmology

8)Fundus fluorescein angiography

#### OBSERVATIONS

50 cases of postoperative cataract surgery with suspected CME were studied with FFA.

**Table 1: Sex wise distribution**

Sex	Total	CME+	CME-
Males	23	17(73.9)	6
Females	27	20(74)	7
<b>Total</b>	<b>50</b>	<b>37</b>	<b>13</b>

**Table 2: Status of eyes**

Eye status	No of cases studied		
	Total	Positive cases	Negative cases
Pseudophakia	33	23 (69.7%)	16
Aphakia	17	14 (82.4%)	3
<b>Total</b>	<b>50</b>	<b>37 (74%)</b>	<b>13</b>

**Table 3: Time of detection**

Time of detection( weeks)	No of cases
1	2
2	1
1	2
4	6
5	1
6	9
7	3
8	7
9	0
Time of detection (months)	
3	2
4	1
5	1
6	2

**Table 4: Factors associated with CME**

Associated findings if any	No of cases
Diabetes mellitus (DM)	5
Hypertension (HTN)	1
DM with HTN	3
Uveitis	2

PC rent	8
PC rent with DM with HTN	1
Postoperative vitritis	1
Iris prolapse	1
IOL dislocation with PC rent with zonulodialysis	2
Revision of surgery	1
Uneventful surgery	12
<b>Total</b>	<b>37</b>

**Table 5: Associated findings in cases not having CME**

Associated findings	No of cases
Hypertension	2
PC rent with vitreous loss with vitrectomy	1
Post op trauma leading to explantation of IOL with vitreous loss treated with vitrectomy with iris abscission	1
Diabetes mellitus	1
HIV+	1
HTN + DM	1
Uneventful surgeries	1

**Table 6: Effect of treatment for angiographic CME**

Eye status	Cases treated	Cases improved	Cases not improved
Pseudophakic	23	20	3
Aphakic	14	10	4

**Table 1** shows Sex wise distribution of patients. Out of 50 patients 23 were male and 27 females. 17/23 (73.9%) males and 20/27 (74%) females had CME on angiography. Average age for male patients was 61.4yrs (40-85 yrs), while average age for female patients was 56.3yrs (41-70yrs)

**Table 2** shows status of the eye. 17 patients were aphakic and 33 were pseudophakic. Of the 17 aphakic patients, 16 were operated with ECCE and one was with ICCE. 14/17 (82.4%) aphakic and 23/33 (69.7%) pseudophakic patients had CME on angiography. Average DOV in BCVA after an initial improvement in patients having CME was 1.10 line of snellen's visual acuity. (1M – 3 lines) For patients not having CME the DOV in BCVA was 0.76 lines of snellen's visual acuity. 9 patients with angiographic changes of CME were not having DOV in BCVA at the time of angiography.

**Table 3** shows time of detection of CME postoperatively. 26/37 (70%) cases were detected between 4-8 weeks postoperatively. 2 (5.4%) cases of CME were detected in the 1<sup>st</sup> week postoperatively. Cases were detected from 1 week to 6 months postoperatively.

**Table 4** shows factors associated with development of CME. 12/37 cases were of uneventful cataract surgery. 10/37 cases had posterior capsular rent with vitreous loss as an associated factor. More than one associated factors

were presents in some cases. Diabetes mellitus was an associated factor in 7/37 cases.

**Table 5** shows findings associated in cases not having CME. A patient having anterior vitrectomy with vitrectomy cutter did not develop CME.

**Table 6** shows effect of treatment in cases having CME. 0/37 (81.1%) patients showed improvement in their visual acuity after treatment. 7/37 (19.1%) patients did not show improvement in their visual acuity. Cases having vitreous loss, associated DM, HTN were not improved after treatment.

#### Complication of FFA seen were-

- 1) Transient nausea for 1-2 min- 2 cases
- 2) Local extravasation of dye in 1 case.
- 3) Discoloration of urine, skin and vision in all cases due to the dye for 24-48 hours after the procedure.

No case of anaphylaxis was seen in our series of patients indicating FFA as a safe procedure.

## DISCUSSION

CME is an important complication after cataract surgery. It occurs in a significant number of cases but is usually self limiting. It is considered to be the most common cause of unfavorable visual outcome after an uneventful cataract surgery and it may result in permanent visual loss. CME though resolves on its own, but even in these cases contrast sensitivity may be defective in spite of good snellen's visual acuity<sup>8</sup>. These cases will benefit if diagnosed and treated earlier.<sup>19</sup> If untreated CME may lead to complications like macular degeneration, macular hole<sup>4</sup>, vitreous detachment, retinal detachment resulting in poor vision. FFA shows typical flower petal pattern in cystoid macular edema. The leakage is seen before the clinical changes of cystoid spaces are seen at macula and is the commonly used method for diagnosis of CME. In our study we have studied 50 patients operated for cataract in SASSOON GENERAL HOSPITAL. Patients with fresh changes on fundus examination as showing dullness at macula or absence of foveal reflex or DOV than previous follow up were studied with FFA and findings were noted. Other causes for diminution of vision were ruled out prior to FFA. 73.9% (17/23) male patients and 74% (20/27) female patients were having CME on angiography. Albert and Jackobiec<sup>2</sup> state that CME does not seem to have predilection by sex or eye. Thus our findings are correlating with their study.<sup>1</sup> 17 patients were aphakic and 33 patients were pseudophakic. CME was seen in 14/17 (82.4%) aphakic patients against 23/33 (69.7%) of pseudophakic patients. Most of the aphakic patients were having posterior capsular rent with vitreous loss and might be the major contributing factor

for development of CME in these patients. Lin Z found CME more common in cases with aphakia.<sup>15</sup> 9 cases with angiographic CME were not having DOV. Average DOV in cases having CME was 1.10 lines of snellen's visual acuity (1M – 3 lines). Thus FFA is useful in early diagnosis of CME. In most of the cases 26/37 CME was detected in 4- 8 weeks postoperatively. Klein RM<sup>12</sup> (1976) and Wright<sup>20</sup> (1988) found increased incidence of CME at 4-8 weeks postoperatively. Thus correlating with our study findings. 2/37 (5.4%) cases were detected in first postoperative week. Klein RM<sup>12</sup> had found CME angiographically in first postoperative week.

Posterior capsular rent is the most common associated finding 10/27 (27%) in cases having CME. Increased incidence of CME after complicated cataract surgeries was also observed by Bergman M<sup>3</sup> (1994). Diabetes mellitus was another major factor associated with CME 7/37 (18.9%). Same was observed by Pasquir N<sup>17</sup> (1991) and Zaczek A<sup>21</sup> (1999). 2 cases were having Uveitis with complicated cataract. One of them had posterior dislocation of intraocular lens. Study by Krishna R<sup>13</sup> (1998) have found increased incidence of CME in their series of patients operated for cataract with Uveitis. 12 cases of uneventful cataract surgery had CME on FFA. Lendi B<sup>14</sup> (1996) had found CME after cataract surgery in uneventful cases. Thus suggesting that CME can occur in uneventful cases but chances are increased in complicated cases. Cases with vitreous loss managed with automated anterior vitrectomy did not develop CME in postoperative period. Gimbel HV<sup>6</sup> (2001) found no CME in their series of cases of posterior capsular rent managed with PCCC with anterior vitrectomy with IOL implantation. Rossetti AL<sup>18</sup> (2002) found less incidence of CME in eye with vitreous loss managed with vitrectomy than those managed medically. Thus suggesting that good anterior vitrectomy can prevent postoperative CME. Pseudophakic eyes showed better visual improvement after treatment 20/23 than aphakic eyes (10/14), this correlates with increased rate of complication in aphakic eyes. The average improvement in visual acuity after treatment was 2 lines of Snellen's visual acuity.

## CONCLUSION

CME do not have predilection for sex or age. CME can be diagnosed much earlier with FFA before it can be seen clinically. CME can occur in uncomplicated cataract surgery but more complicated surgery more are the chances of developing CME. Multiple factors can act in combination in same patient. Aphakia, surgical complication and systemic complication affecting the vascular permeability increase the chances of developing CME. CME is more severe in cases associated with posterior capsular rent with or without vitreous



incarceration in the wound. CME is more common 4-8 weeks postoperatively but can occur in first week postoperatively. Proper vitrectomy may prevent CME. After treatment for angiographic CME most of the patients showed improvement in their V/A suggesting a good prognosis if diagnosed earlier. FFA is a safe procedure.

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