

## Visual Outcome in Patient Of Mature and Hypermature Cataract after Cataract Surgery

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### Abstract

**Introduction:** Cataract is defined as an opacification of the crystalline lens leading to visual impairment, usually manifested in ageing people. Having cataract extraction on both eyes if, of course, there is a vision-disturbing cataract in the fellow eye, results in significantly better visual functional outcome than first eye surgery alone. Improvement and satisfaction with vision is most frequently found in patients going through surgery of both eyes with a short interval between procedures. Aim: Evaluate the visual outcome in patient of mature or hypermature cataract after cataract surgery on a long-term basis.

**Methodology:** It was a prospective study conducted at Ophthalmology department of GMERS Medical College & Hospital, Gandhinagar, Gujarat. Patients who attended outpatient department of ophthalmology department of GMERS were included.

**Results:** The majority (75%) of the patients were more than 60 years of age in our study. 88.2% of the patients with pre-operative poor vision were evaluated as having good vision at the end of 6 weeks post-operatively.

**Conclusion:** MSICS promises to be a viable cost-effective alternative to the more expensive phacoemulsification.

**Keywords:** visual impairment, cataract, eye surgery.

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### Introduction

Cataract is defined as an opacification of the crystalline lens leading to visual impairment, usually manifested in ageing people. There is no known protective agent that can delay the onset or progression of cataract. The disorder cannot be cured by laser or drugs, and in the past it led to blindness. Today, only one

treatment is known, to surgically remove the lens and replace it by an intraocular plastic lens[1].

Global agencies for the elimination of avoidable blindness have pledged support to operationalizing strategies to reduce the burden of cataract blindness by the "Vision

2020: The right to sight" initiative[2]. India is committed to the goal of elimination of avoidable blindness by 2020 in line with the Global Vision 2020: the right to sight initiative.

The crystalline lens is one of the few structures of the body with continuous growth during lifetime. With increasing age, these lenticular fibres become more compact and thicker, and gradually there is an accumulation of yellow-brown pigment in the fibres. These changes reduce light transmission, and when there is a loss of optical clarity, the lens is cataractous. Since cataract most commonly appear in elderly people, it is called —senile cataract. However, if cataract develops before the age of 60, it can be defined as a presenile cataract.

Having cataract extraction on both eyes if, of course, there is a vision-disturbing cataract in the fellow eye, results in significantly better visual functional outcome than first eye surgery alone[3]. Improvement and satisfaction with vision is most frequently found in patients going through surgery of both eyes with a short interval between procedures[4-6]. The aim of the current study was to evaluate the visual outcome in patient of mature or hypermature cataract after cataract surgery on a long-term basis.

### Methodology:

Study was done at GMERS Medical College & Hospital, Gandhinagar, Gujarat. It was a prospective study conducted at Ophthalmology department of GMERS Medical College & Hospital, Gandhinagar, Gujarat. Patients who attended outpatient department of ophthalmology department of GMERS Medical College & Hospital, Gandhinagar, Gujarat. The study was conducted for two years (01/10/2017 to 30/09/2019).

All cases of mature and hypermature cataract undergoing cataract surgery were included in the study.

### Exclusion criteria:

- Patient not willing to undergo surgery.
- Congenital cataract.
- Complicated cataract
- Grade 1-3 cataract
- Macular lesions

A sample size of 80 is obtained by using the hypothesis testing method and based on following assumptions: Population size (for finite population correction factor or fpc)(N): 1000. Hypothesized % frequency of outcome factor in the population (p): 94%+/-5. Confidence limits as % of 100(absolute +/- %) (d): 5%. Design effect (for cluster surveys-DEFF). Collected data was entered in the excel data sheet and data analysis was done with the help of Epi. Info.7.2 software.

### Results:

The majority (75%) of the patients were more than 60 years of age in our study. Only one patient belonged to the age group less than 40, which was the case of traumatic cataract. The mean age of the study population was  $67.75 \pm 10.76$  years with a range of 38 – 82 years. Our study group consisted of 42.5% males and 57.5% females. More than two third (70%) of the patients belonged to lower socioeconomic class.

The presence of ocular co-morbidities was noted prior to surgery. A total of 61% were found to have no ocular co-morbidity, whereas 31% had some form anterior segment disease and 7.5% reported some form of posterior segment disease. The most common anterior segment co-morbidity was associated glaucoma in 10% of the patients. This was followed by corneal opacity (8.8%), scar of old keratitis (7.5%), pterygium (2.5%) and old iridocyclitis (2.5%).Posterior segment disease consisted of age 70 related macular degeneration, myopic degeneration and optic atrophy (2.5% each).

**Table 1: Distribution of associated ocular co-morbidity in patients (N=80)**

Associated ocular co-morbidity	Number (N)	Percentage (%)
<b>Anterior segment</b>	<b>25</b>	<b>31.3</b>
Corneal opacity	7	8.8
Scar of old keratitis	6	7.5
Pterygium	2	2.5
Glaucoma	8	10.0
Old iridocyclitis	2	2.5
<b>Post segment disease</b>	<b>6</b>	<b>7.5</b>
Age related macular degeneration	2	2.5
Diabetic retinopathy	0	0.0
Myopic degeneration	2	2.5
Optic atrophy	2	2.5
<b>No morbidity reported</b>	<b>49</b>	<b>61.2</b>
<b>Total</b>	<b>80</b>	<b>100.0%</b>

Out of total 80 patients diagnosed of having cataract, 68.7% had mature cataract whereas 32.3% had hyper mature cataract. Table below describes the association of background characteristics of the patients with mature or hyper mature cataract. Out of total 55 patients of mature cataract, 76.4% belonged to age group >60 years while 21.8% belonged to age group 40-60 years. Similarly among 25 patients of hyper mature cataract, 72% were of age >60 years and 28% belonged to age group 40-60 years. However there was no significant difference between the age group and development of mature or hyper mature cataract.

**Table 2: Background characteristics and type of cataract**

Background characteristics	Type of cataract		Total N=80	P value
	Mature N=55	Hyper mature N=25		
<b>Age group</b>				
<40 years	01 (01.8)	0 (0.0)	01 (01.3)	<b>0.92</b>
40-60 years	12 (21.8)	07 (28.0)	19 (23.7)	
>60 years	42(76.4)	18 (72.0)	60 (75.0)	
<b>Sex</b>				
Male	21 (38.2)	13 (52.0)	34 (42.5)	<b>0.24</b>
Female	34 (61.8)	12 (48.0)	46 (57.5)	
<b>Socio-economic status</b>				
Lower	38 (69.1)	18 (72.0)	56 (70.0)	<b>0.81</b>
Middle	15 (27.3)	06 (24.0)	21 (26.3)	
Upper	2 (03.6)	01 (04.0)	03 (03.7)	
<b>Ocular comorbidity</b>				
Present	18 (32.7)	13 (52.0)	31 (38.8)	<b>0.14</b>
Absent	37 (67.3)	12 (48.0)	49 (61.2)	

Thirty two percent of mature cataract patients had ocular morbidity whereas 52% among the hyper mature cataract patients were found to have one or other ocular morbidity.

Pre-operative visual acuity was measured for all the patients in this study, which ranged from perception of light (PL) to borderline (6/60-6/24) as shown in Table.

**Table 3: Pre-operative best corrected visual acuity (BCVA) in patients (N=80)**

Pre-operative BCVA	Number (N)	Percentage (%)
<b>&lt;6/60 (poor)</b>		
CF	17	21.2
HM	39	48.8
PL	20	25.0
<b>6/60 - 6/24 (borderline)</b>	4	5.0
<b>6/18 - 6/6 (good)</b>	0	0.0
<b>Total</b>	<b>80</b>	<b>100.0%</b>

Table below shows the outcome of manual small incision cataract surgery in terms of postoperative visual acuity. This was measured on 1st post-operative day, 1st week, 2nd week, 4th week and at 6th week post-operatively. Best corrected visual acuity was measured only at 6th week post-operatively. Levels of visual acuity after cataract surgery were categorized using WHO guidelines of good outcome being 6/6 – 6/18, borderline outcome as 6/24 – 6/60.

**Table 4: Post-operative vision outcome (N=80)**

Vision (outcome)	Post-operative follow up				
	Day 1 UCVA*	1 week UCVA	2 week UCVA	4 week UCVA	6 week BCVA#
<b>&lt;6/60 (poor)</b>	17 (21.2)	14 (17.5)	6 (7.5)	5 (6.3)	2 (2.5)
<b>6/60 – 6/24 (borderline)</b>	48 (60.0)	22 (27.5)	17 (21.2)	10 (12.5)	8 (10.0)
<b>6/18 – 6/6 (good)</b>	15 (18.8)	44 (55.0)	57 (71.3)	65 (81.2)	70 (87.5)
<b>Total</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>	<b>80</b>

\*UCVA = Uncorrected visual acuity, #BCVA = Best corrected visual acuity

Table below describes the comparison between pre-operative vision and post-operative best corrected vision. 88.2% of the patients with pre-operative poor vision were evaluated as having good vision at the end of 6 weeks post-operatively, 9.2% of them were having borderline vision and only 2.6% of them were having poor post-operative vision at 6 weeks.

**Table 5: Pre-operative BCVA v/s post-operative BCVA**

Pre-operative BCVA	Post-operative BCVA			Total
	Good	Borderline	Poor	
6/18 – 6/6 <b>(good)</b>	0	0	0	<b>0</b>
<6/18 – 6/60 <b>(borderline)</b>	3 (75.0)	1 (25.0)	0	<b>4 (100.0)</b>
<6/60 <b>(poor)</b>	67 (88.2)	7 (9.2)	2 (2.6)	<b>76 (100.0)</b>
<b>Total</b>	<b>70 (87.5)</b>	<b>8 (10.0)</b>	<b>2 (2.5)</b>	<b>80 (100.0)</b>

## Discussion

The mean age of the study population was  $67.75 \pm 10.76$  years with a range of 38 – 82 years. The above findings are similar to study conducted by Parul Desai et al[6] wherein 80% of the patients were above 60 years of age. Similar results were also obtained in the study by Reidy et al[7], Gogate P M et al[8] and Madhu Chanchlani et al[9].

The presence of ocular co-morbidities was noted prior to surgery. Posterior segment disease were difficult to diagnose due to hyper mature/ mature cataract and hence posterior segment diseases discovered during surgical procedure were also labelled as having ocular co-morbidity. Posterior segment disease consisted of age 70 related macular degeneration, myopic degeneration and optic atrophy (2.5% each). The rate of associated ocular pathology was found to be quite low in a study conducted by Rohit Khanna et al[10], where only 5.5% of the patients undergoing MSICS reported ocular pathologies. Another similar study done by Jing Yuan et al[11] reported that 30% had anterior segment disease and 17% had posterior segment disease, which were higher than those reported in this study group.

Madhu Chanchlani[9] in her study reported about 41% of mature cataract and 10% of hyper mature cataract. These findings are less than what were reported in this study. Thirty eight percent of the total patients of mature cataract were males, while 68% were females. Whereas among total patients with hyper mature cataract, 52% were males and 48% were females. This observed difference was statistically non-significant. Hence it can be concluded that sex of the patient has no association with development of mature or hyper mature cataract.

Pre-operative visual acuity was measured for all the patients in this study. In a study done by Erum Shahid et al[12], 100% patients had poor pre-operative vision. Jing Yuan et al<sup>11</sup> in

his study reported that 97% had poor vision whereas only 3% had borderline vision. Similar such study done by Venkatesh R et al[13] reported that pre-operatively, 88.5% patients had poor vision, 11% had borderline vision and 0.5% had good vision.

Levels of visual acuity after cataract surgery were categorized using WHO guidelines of good outcome being 6/6 – 6/18, borderline outcome as 6/24 – 6/60 and poor outcome as <6/60. The first post-operative day uncorrected visual acuity was poor in 21.2%, borderline in 60% and good in 18.8%. At the end of 6th week, majority (87.5%) had good vision, 10.0% had borderline vision and only 2 patients (2.5%) had poor vision. The poor vision in these two patients can be attributed to optic atrophy.

The above findings correlates well with the outcomes of various other studies[12,14-17]. Similarly Hennig et al.[18] showed in his study that in 88% of eyes examined at a one month follow-up visit, the vision achieved was 6/18 or better with full correction, this corresponds with our study. Parikshit Gogate et al[8] also reported that 89.8% had good vision on corrected post-operative visual acuity test. Even though the cataract surgical targets are being met, poor outcomes of cataract surgeries are a major problem in developing countries. With the resolution of the corneal edema and inflammation with time there was significant improvement in the visual acuity of the eyes 6 weeks after surgery compared to the visual acuity at discharge recorded at the first assessment.

We can conclude that in a developing country like India, which has significant volume of mature and hyper mature cataract surgical load, MSICS promises to be a viable cost-effective alternative to the more expensive phacoemulsification.

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