

# Clinical Presentation and Surgical Outcome of Hypermature Cataract in Tertiary Eye Centre of Bangladesh

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## ABSTRACT

**Aim:** To evaluate the clinical presentation, surgical outcome and complication and causes of delayed presentation of hypermature cataract.

**Methods:** It was a hospital based prospective interventional study which included 202 patients with hyper mature cataract in Chittagong Eye Infirmary and Training Complex over 1 year. All patients underwent small incision cataract surgery. Preoperative, peroperative and postoperative data were collected in data sheet when the patients attended at hospital during operation as well as subsequent follow-ups.

**Results:** The age of most of the patients were more than 50 years (n-149, 73.76%). Among them 91 numbers were female (45.04%). Other than white cataract (84.17%), intumescent cataract (9.4%), morgagnian cataract (7.92%) hard nucleus (2.47%), calcification of capsule, (9.9%) phacodonesis (1.48%) were clinical findings of hyper mature cataract. Difficulty in doing rhexis (11.38%), anterior chamber inflammation, corneal edema were most common intra and post-operative complication in 1st, 7th and 1 month follow up findings. Preoperatively all patients presented with poor visual acuity (Counting finger to PL positive). Post operatively 96.91% (n-157) patients had visual acuity in between 6/6-6/12 at final follow up and Good visual acuity (53.46%) in other eye. Having no attendance, difficulty in affording treatment, old age, systemic illness, fear of surgery were the main cause of delayed presentation.

**Conclusion:** Small incision cataract surgery in hyper mature cataract was quite satisfactory. Counseling the patients about good visual outcome of cataract surgery and developing painful loss of vision if the eye is left un-operated are important to reduce the incidence of hyper mature cataracts.

## Introduction

Visual impairment leading to blindness is a major public health problem all over the world. According to WHO, about 314 million people are suffering from visual impairments worldwide; 45 million of them are blind<sup>1</sup>. More than 90% of total visually impaired people live in developing countries<sup>1</sup>. Cataract is still the main cause of blindness across the globe particularly in the low and middle income countries. Almost 18 million people are bilaterally blind from cataract<sup>1</sup>. Like many other developing country, cataract is still the

major cause of avoidable blindness in Bangladesh. Bangladesh is estimated to have 750,000 adult blind (with a prevalence rate of 1.53% among people above 30 years and adult population)<sup>2</sup>.

Hyper mature cataract is defined as the stage of senile cataract in which the entire lens capsule is thin and wrinkled, when degenerating cortex reaches a hyper-osmotic state inside the capsule, contents may become solid and shrunken or soft and liquid. All the cataracts should be operated before they reach the stage of hyper-maturity. Reasons for late presentation according to the previous studies are economic condition, age, unwillingness for surgery, lack of attendance, daily work can be managed by comparatively good eye or pseudophakic eye, acceptance of poor vision as a part of aging coexisting systemic diseases<sup>2,3</sup>.

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So the mature and hyper mature cataracts constitute a significant volume of the cataract surgical load in ophthalmic practice in developing countries. There are some complications associated with hyper mature cataract such as lens induced glaucoma, subluxation of lens due to zonular weakness, difficulty in continuous curvilinear capsulorhexis (CCC), zonular dehiscence during nuclear emulsification or nucleus removal due to weak zonules. Postoperatively striate keratopathy, inflammation due to prolonged surgery or over handling are common complications. Both manual small incision cataract surgery (SICS) and phacoemulsification can be used for operating patients with hyper mature cataract. Continuous Curvilinear Capsulorhexis (CCC) and emulsification of hard nucleus are the two steps that make phacoemulsification difficult in these cases<sup>4</sup>. Outcome of the cataract surgery depends on various factors such as patients' pre-existing ocular and or systemic disease like Diabetes Mellitus, operative procedures like SICS, phacoemulsification etc. and also post operative follow up to manage the complications (if any). Outcome can be measured simply as the visual acuity in the operated eye or from patient perspective in terms of ability to function, quality of life, and economic rehabilitation.

So, the objective of the study was to evaluate clinical presentation of hyper mature cataract, intra and postoperative course of small incision cataract surgery, visual outcome of surgery among patients with hyper mature cataract and causes of delayed presentation for surgery.

#### Materials and Methods:

A hospital based prospective interventional study was undertaken over a period of 1 year from January, 2019 to December, 2019 in Chittagong Eye Infirmary and Training Complex. After obtaining informed consent from 202 patients with hyper mature cataract who came to the hospital underwent small incision cataract surgery by two senior surgeons. The exclusion criteria was lens induced glaucoma, traumatic cataract, amblyopia, relative afferent pupillary defect in to be operated eye, gross corneal pathology. Pre-operative data was taken including patient age, gender, address regard of urban or rural areas, pre-operative visual acuity by snellen chart (uncorrected and

best corrected), IOP by Goldmann applanation tonometry, pupillary reaction, depth of anterior chamber by ven herick method, any feature of hypermature cataract like wrinkles, thinning, calcification of capsule, morgagnian cataract, hard cataract, subluxated lens, intumescent cataract, post-dilated pupillary size, any associated pre-existing ocular conditions, or systemic diseases etc were noted and documented using a semi-structured questionnaire. The status of the other eye was simultaneously recorded. Per operative data included the date of the surgery, type of anesthesia, technique of surgery employed-including the type of surgery details of each step, particularly operative procedures like incision, placement of IOL power and types of complications (if any) and management of complications. All surgeries were performed under peribulbar anaesthesia. The suture less SICS was performed following the international standard technique. Superior and supero-temporal sclera-corneal tunnels of 6.5-7.5 mm were constructed. Trypan blue dye was introduced through side port entry for better visualization of the anterior capsule during capsulotomy in all cases. Continuous Curvilinear Capsulorhexis (CCC) was attempted in all cases. Can opener technique was utilized in that case where CCC was not possible and recorded. Postoperative data was documented on the first day, between 1 week and finally at 4-11 week's follow up visit. During every visit, best corrected visual acuity was noted along with detailed slit lamp examination of the anterior segment and posterior segment. Measures of outcome were classified as "good", "borderline" or "poor". "Good outcome" was defined as a visual acuity of better than or equal to 6/18 with the available correction; borderline outcome" as the VA in the range of 6/18- 6/60; and "poor outcome" as <6/60. On the last follow up (4-11 week visit), in addition to above examinations, refraction was performed and BCVA was noted. Treatment was given gutt homotropine/ atropine thrice daily. Gutt antibiotics four times daily for a week, Gutt steroid 6 times/8times/according to inflammation, others if needed was given depending upon on type of surgery, postoperative inflammation. Data was entered and analyzed by SPSS computer software version 16.

## Results

Among 202, 111 (54.95%) were male patients and 91(45.04%) were female patients. Around 112 (55.44%) patients had cataract in right eye and 90 (44.55%) had in left eye. About 127 (62.87%) numbers of patients hailing from urban areas and 75 (37.12%) from rural area. One hundred and fifteen (56.93%) patients had come from middle class family where as 87 numbers of patients (43.06%) from low income family.

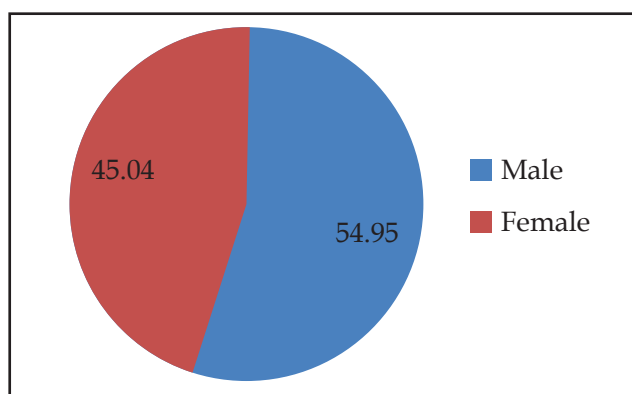


Figure-01: Gender distribution in study group

The age of the patients ranges from 20 years to 80 years and above. For the better understanding the results, the total patients (N=202) were categorized into 7 age groups. Most of the patients belonged to three age groups that are 41-50, 51-60 and 61-70 years. The percentage of patients into these groups are 23.76% (n=48), 29.7% (n=60) 31.68% (n=64) respectively (figure-2).

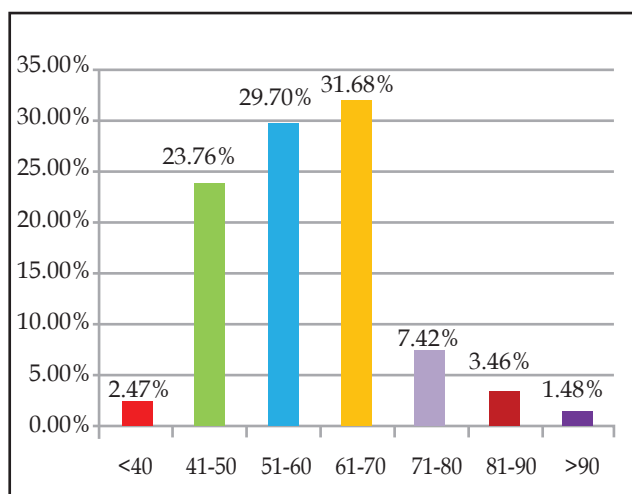


Figure-02: Age distribution in study group

Table-01: Occupation of the patients:

Occupation	Number of patients (%)
Housewife	85 (42.07%)
Retired	49(24.25%)
Farmer	28(13.86%)
Business	20 (9.90%)
Shopkeeper	13 (6.43%)
Service	7 (3.46%)
Total	202

Most of the female were housewife 42.07% (n=85), retired persons were 24.25% (n=49), 13.86% (n=28) were farmers, 9.90% (n=20) were businessman, 6.43% (n=13) were shopkeeper and 3.46% (n=7) were service holder (Table 01).

Table-02: Common systemic diseases in patients:

Disease	Number (%)
Hypertension	62 (30.69%)
Asthma	12(5.94%)
Cardiac	6(2.9%)
TB treated	1(0.49%)

Hypertension was found in 62 numbers of patients (30.69%). Around 26 patient (12.87%) had diabetes mellitus, 12(5.94%) had asthma, 6 patients had cardiac disease, 1 patients had TB which was treated (Table 02).

Table-03: Findings of slit lamp examination

Slit lamp examination	Number (%)
white cataract	170(84.17%)
Intumescent cataract	19(9.4%)
Morgagnian cataract	16(7.92%)
Hard nucleus	5(2.47%)
Phacodonesis	3(1.48%)
Rigid pupil	2(0.99%)
Calcification of capsule	20(9.9%)

On slit lamp examination most of the patient presented with white cataract (84.17%, n=170), with thin capsule. Nineteen patients (9.4%) presented with intumescent cataract with shallow anterior chamber but intraocular pressure was normal. Around 16 patients (7.92%) had morgagnian cataract, 5 patients (2.47%) had hard nucleus (brown color Grade 3) with liquefied cortex,

calcification of capsule had 20 (9.9%) numbers of patients and 3 patients had phacodonesis due to weak zonules. All preoperative findings were noted (Table 03).

**Table-04: Visual acuity in opposite eye**

Visual acuity	Number (%)
6/6-6/18	108(53.46%)
6/60<6/18	47(23.26%)
3/60<6/60	15(7.42%)
1/60<3/60	26(12.87%)
PL (+Ve) < 1/60	13(6.43%)
Total	202

About 40 of the patients in our study were pseudophakic in other eye. Around 53.46% (108) had a good visual acuity (VA) in between 6/6-6/18 in other eye. Forty seven (23.26%) patients had borderline VA in between 6/60 - 6/18 with immature cataract. Forty one patients (20.29%) had mature cataract. There were 13 numbers of patients (6.43%) who presented with bilateral hypermature cataract (Table 04).

**Table-05: Preoperative visual acuity in operated eye**

Counting finger ( CF)	33 (16.33%)
HM	60(29.70%)
PL (+ve)	109 (53.86%)
Total	202

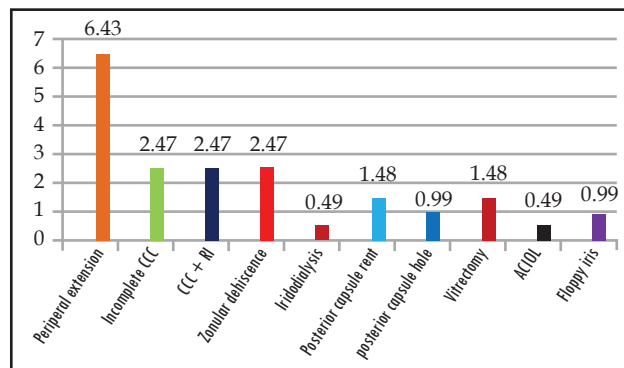
**Table-06: Post-operative complications**

1st PO day	N (%)	7th PO day	N (%)	Final FU	N (%)
A/C Inflammation (2+,3+)*	28(13.1%)	Striate	3(1.5%)	A/C Inflammation(2+)	6(3.7%)
Striate keratopathy	10(4.9%)	keratopathy	6(2.9%)	PCO	6(3.7%)
Corneal edema	10(4.9%)	A/C inflammation(2 +)	3 (1.5%)	Pupil irregular	3 (1.8%)
Hyphema	6(2.9%)	PCO		IOL inferiorly place	2 (1.24%)
Cortical matter	3(1.48%)				
PCO	3(1.48%)				

\* 2+ : cells in A/C 16-25 ,3+ : cells in A/C 26-50

Postoperatively A/C Inflammation (13.1% in ist post operative day , 1.5% in 7th postoperative day, 3.7% in final follow up) is most common complication. Then striate keratopathy, (4.9%, in first postoperative day ,1.5% in 7th postoperative day), corneal edema (4.9%),PCO were found. Hyphema was found in 6 patients (2.9%) and 2 cases need evacuation of blood and others are spontaneously resolve in 7th FU. PCO was found in 6 number of patients (3.7%), pupil irregular in 3 (1.8%) number of patients at final follow up. (Table 06)

Pre operatively, all patients presented with poor visual acuity. Patients presented with PL +Ve, HM, CF 1 meter to close to face about 53.86%, 29.70%, 16.33 % respectively (Table 05).



**Figure-03: Per operative complications**

CCC was done in 179 patients (88.61%), CCC related complications like peripheral extension, incomplete CCC, CCC with relaxing incision was done in 13 (6.43%), 5 (2.47%), and 5 (2.47%) numbers of patients respectively. Zonular dehiscence was seen in a total of 5 cases ( three with preexisting zonular dehiscence, 2 with intra operative zonular dehiscence) posterior capsule rent occurred in 3 (1.48%) patients and vitrectomy was done. In 2 patients intraocular lens (IOL) was given in sulcus and one patient was given secondary ACIOL. Posterior capsule hole occurred in two patients but vitrectomy was not needed. IOL was given in sulcus. Floppy iris was found in 2 patients. Accidentl iridodialysis ( superiorly ) occurred in one patients (Figure 03).

*Table-07: Post-operative visual acuity*

Visual acuity	Ist post op day	7th post op day	4-6 wks
6/6-6/18	145 (71.78%)	188 (94.47%)	160(98.76%)
6/24-6/60	49 (24.25%)	11 (5.52%)	2(1.23%)
<6/60	8 (3.90%)		
Total	202	199	162

At Ist post-operative day 71% of patients (n-145) had visual acuity in between 6/6-6/18 , 24.25% ( n- 49) had VA in between 6/24-6/18. 3.9% (n-8) had VA found less than-6/60.

Among them 94.47% (n- 188 ) patients had visual acuity in between 6/6-6/18, 5.52%(n-11) had VA in between 6/24-6/18 after 7 postoperative days. 98.76% (n- 160) patients had visual acuity in between 6/6-6/18, 1.23% had 6/24 -6/60 at final follow up. At discharge we found 162 numbers of patients to follow up out of 202 numbers of patients. (Table 07).

*Table-08: Causes of delayed presentation*

Causes of delayed presentation	Number of patients	Percentage
Good vision in other eye	78	38.61%
Lack of attendance	45	22.27%
Inability to afford treatment	30	14.65%
Old age (acceptance of blindness)	24	11.88%
Systemic illness	14	6.90%
Fear of surgery	11	5.44%
More than one of above causes	65	32.17%
<b>Total</b>	<b>202</b>	<b>100%</b>

Some causes of delayed presentation were found after asking the patients. Around 78 number of patient (38.61%) came lately because they have manage their work by good vision in other eye. Forty five of patients had complaints about having no attendance. Around 30 patients (14.65%) were unable to afford treatment. Unwilling to do surgery with acceptance of blindness due to old age was found in 24 number of patients (11.88%). Systemic illness and fear of surgery were found as a cause of delayed presentation in 14(6.90%) and 11(5.44%) numbers of patients respectively. More than one of above causes was found in 65(32.17%) numbers of patients.

## Discussion

Bangladesh's Cataract Surgical Rate (CSR) was 1,193 surgeries per million in 2013 as compared to the WHO target 3000<sup>5</sup>. Mature and hyper mature cataracts constitute a significant volume of the cataract surgical load in ophthalmic practice in the developing world. In India, incidence of hypermature cataract is 11.5%, among them 7.1% is mostly in rural population. In Bangladesh, there is no study in hyper mature cataract so far. Around 108 number of patients out of 202 had visual acuity in between 6/6-6/18 in other eye. They were able to manage good vision in one eye. This observation is also found in study of Tamilnadu<sup>8</sup>. Eighty Five numbers (42.05%) of patients are female in our study whom are mostly house wife, 49 numbers of patients are retired. According to khannas study the countries had lower CSC (cataract surgical coverage) for females as compared to males. In countries like Bangladesh,

Bhutan and Srilanka difference was high. It is likely that women in countries with lower CSC are less educated, have other domestic responsibilities and are not the main earning member of the house, thus having less access to eye care as well as other health care services<sup>9</sup>. CSC was lower in older people, those with no education as well as those residing in rural areas. In our study, most of the patient are in older group more than 50 years (72.26%). Pakistan National Blindness and VI survey also showed lower CSC for illiterates, those residing in rural areas as well as older people, suggesting gross inequity<sup>10</sup>.

Lack of attendance for females, older people is also important factor having less access to eye care. Unwilling to do surgery with acceptance of blindness due to old age is another factor. In our study, there was no difference between rural and urban patients, and patients were coming from poor and low middle class. But patient with bilateral cataract vision less than 6/60 were mostly from poor family. Here we have done hospital based study so the results may not be entirely reflecting the situation in the general population. Other factors like fear of surgery and old people with systemic illness were one of the important observations of preventing cataract patients from attending the hospital or free eye camps. The reasons of delayed presentation in this study finding was comparing to other study<sup>9</sup>. In this study good number of patients were aware of their eye condition needing surgical treatment but did not come to the hospital for surgery. We are said that widespread coverage alone will not solve the problem. We should need a change in the attitude of the patients. This might be achieved by educating patients and the community about benefits of early surgery, creating awareness about safety of cataract surgery, patients also need to be counseled that if they do not do surgery painless blind eye is going to be painful blind eye and outcome of cataract surgery may not good like other eye or other people who are doing early surgery. When this is carried out routinely, the number of patients opting for early second surgery may gradually increase.

We agree with Yorston that SICS can be a good alternative to Phacoemulsification while doing high volume cataract surgeries in developing

countries. In our country, still now, SICS was done for hyper mature cataract mostly. Here we included only SICS procedure<sup>11</sup>.

Most common intra-operative complications were CCC related (11.37%). This is comparable to other study<sup>8,12</sup>. Extension of the rhexis flaps mostly in intumescent cataract (n-19, 9.4%) with shallow A/C where intra lenticular pressure was very high. In SICS closed chamber is not maintained like phacoemulsification. Methylcellulose was used as a viscoelastic substance which has dispersive property anterior chamber pressure not always equally maintained in whole procedure. Though we used trypan blue in all cases but some cases peripheral extension occurred. Sixteen patients (7.92%) had morgagnian cataract, 5 (2.47%) had hard nucleus small CCC with relaxing incision was given. Zonular dehiscence (2.47%, n-5) and posterior capsule rupture with or without vitreous loss were seen in 5 (2.47%) cases. The incidence of posterior capsule rupture in white cataract reported by Chakrabarti et al.<sup>12</sup> was 1.9% whereas study done on hypermature cataracts by Shahid et al. in Pakistan found this to be 12%. Surgeries being done by two surgeons and meticulous preoperative evaluation could be the factors responsible for limited posterior capsule ruptures seen in our study.

The common immediate postoperative complications were A/C inflammation (n- 28, 13.1%) comparable to study in Tamilnadu<sup>8</sup> (14.8%) Corneal edema, (4.9%, n-10) similar to that in two previous studies finding<sup>8,12</sup>. Hyphema found in 6 (2.9%) cases. Two cases needed evacuation of blood. Rubbing, squeezing of eye during dressing, coughing, getting out of bed was the common causes of post-operative hyphema in our cases<sup>13</sup>. Here bleeding occurred from sclero-corneal wound and wounds located more posteriorly tend to bleed more. It is necessary that apposition of wound margins must be accurate and firm, wound not to be posterior and control of blood pressure after operation and avoid all kind of trauma. In our study 62 (30.69%) numbers of patient had systemic hypertension, and 26 (12.87%) number of patients had diabetes mellitus. We had done operation after controlling of pressure, sugar and stopping all anti coagulant medication. Pupil distortion was found due to

capsular tag ( n-3 ,6%) is comparable to one in Shahid et al. study (6% n-3 ) the rate of posterior capsular opacity is ( n-6 ,3.7%) as compared to Al hassan MB el in study (7%)<sup>14</sup>. Three patients had fibrous posterior capsule which found after immediate operation and 3 patients developed PCO with in 1 month. Two patients had inferior subluxated IOL at final follow up which had zonular dehiscence but they maintained good vision and follow up the patients, Shruti Prabhat el found 12 patients had inferior subluxation<sup>8</sup>.

Preoperatively, the study population presented with poor vision i.e. less than 6/60 in all of the cases. At 1st post operative day 37% of patients (n-76) had visual acuity in between 6/6-6/12, 47% ( n- 95) had in between in 6/24-6/12 and 11.38% (n-23) had visual acuity in between 6/36 -6/60. Only 3.9% (n- 8) had less than 6/60 .This result is much better than Shahid et al study. They found 26% patients had less than 6/60 visual acuity at 1st follow up. At final follow up 98.76% (n-160) patients had visual acuity in between 6/6-6/18. 1.23% patients (n-2) had visual acuity in between 6/18- 6/60. These results of outcome is satisfactory and can be said quite higher in a developing country like Bangladesh .Though we were dealing with hypermature cataract so first postoperative follow up vision was little bit reduced due to corneal edema , Inflammation in anterior chamber. But final follow up visual outcomes are also quite near to similar to the visual outcome in cataract surgery done in many developed countries like US, Canada, Denmark and Spain<sup>14</sup>. But 40 numbers of patients were not found for follow up. Some patients had given follow up locally. Some were missed the follow up and came late. The most likely causes for lost or delayed follow up may be due to lack of awareness, poor motivation to follow-up.

### Conclusion

Small incision cataract surgery in hyper mature cataract was quite satisfactory. Counseling the patients about good visual outcome of cataract surgery and developing painful loss of vision if left un-operated are important to reduce the incidence of hyper mature cataracts.

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