

## Reasons for delay in cataract surgery in patients with advanced cataracts during the COVID-19 pandemic

Rajesh Vedachalam, Kumaresan Yamini<sup>1</sup>, Rengaraj Venkatesh<sup>1</sup>, Narendran Kalpana<sup>2</sup>, Chandrashekar Shivokumar<sup>3</sup>, Madhu Shekhar<sup>4</sup>, Aravind Haripriya<sup>5</sup>, Ravilla Sathya<sup>6</sup>

**Purpose:** To analyze the reasons for delay in cataract surgery in patients with advanced cataracts during the COVID-19 pandemic. **Methods:** This was a prospective, cross-sectional, multicenter questionnaire study which included patients with mature cataract, nuclear sclerotic cataract grade IV, and cataracts with best corrected visual acuity (BCVA) <5/60, during the COVID-19 pandemic from December 2020 to April 2021. Reasons for delay in presentation to the hospital were analyzed. **Results:** One thousand four hundred seventy two patients were recruited with advanced cataracts. Absence of ophthalmic care nearby (44.2%), lack of awareness regarding elective surgeries (42.6%), lack of public transportation (37%), fear of contracting COVID-19 (23.4%), and waiting for outreach camps (20.4%) were found to be the reasons behind the delay in cataract surgery. 53.7% of the patients had worsening of defective vision and 55.3% of them had difficulty in carrying out activities of family living. 30.8% of the patients faced difficulty in commuting and 8.4% of the patients suffered a fall during this pandemic due to worsening of the visual acuity. **Conclusion:** The lockdown imposed during the pandemic has created a significant backlog of patients who are progressing to advanced cataracts due to lack of ophthalmic care nearby, lack of awareness regarding elective surgeries, lack of public transportation, and no outreach camps. Proactive measures to deal with this backlog are of utmost need to prevent blindness due to cataract.

**Key words:** Advanced cataracts during COVID-19 pandemic, barriers for cataract surgery during pandemic, delay in cataract surgery

Although the prevalence of blindness due to cataracts has declined in the past several decades, cataract remains the leading cause of preventable blindness globally.<sup>[1-5]</sup> A population-based survey in South India found that fear, monetary constraints, family responsibilities, fatalism, and an attitude of being able to cope with low or no vision were characteristics associated with low utilization of eye care services.<sup>[6]</sup> Distance to eye care services, lack of caregiver support, and good visual acuity in the fellow eye have previously been reported as obstacles to cataract surgery.<sup>[7-9]</sup> In India, these barriers to care were accentuated by the first lockdown associated with the COVID-19 pandemic, which lasted from 25 March 2020 to 20 April 2020, with periodic relaxation of travel restrictions<sup>[10,11]</sup>. Eye clinics were closed, government and private multispecialty hospitals focused all efforts on the overwhelming numbers of COVID-19 patients,<sup>[10,11]</sup> and all eye care outreach programs came to a halt. The onset of the pandemic led to travel

restrictions and economic setbacks nationwide, resulting in significant delays in obtaining eye care services, potentially leading to higher proportions of patients with advanced cataracts. This study aimed to determine patient characteristics associated with delayed cataract surgery in advanced cataracts during the COVID-19 pandemic.

### Methods

This prospective cross-sectional, multicenter study was performed using questionnaires from 16 December 2020 to 16 April 2021. It was conducted across six tertiary eye care centers. Institutional Review Board approval was obtained and the research adhered to the tenets of the Declaration of Helsinki.

Inclusion criteria included patients aged greater than 18 years with mature cataract, nuclear sclerotic cataract grade IV, cataracts with BCVA less than 5/60, fluency in Tamil, the regional language, and willingness to participate. Exclusion criteria included those with advanced cataracts associated with

Senior Resident, General Ophthalmology, Aravind Eye Hospital, Pondicherry, <sup>1</sup>Glaucoma Services, Aravind Eye Hospital, Pondicherry, <sup>2</sup>Cataract Services, Aravind Eye Hospital, Coimbatore, <sup>3</sup>Cataract Services, Aravind Eye Hospital, Tirunelveli, <sup>4</sup>Cataract Services, Aravind Eye Hospital, Madurai, Tamil Nadu, <sup>5</sup>Cataract Services, Aravind Eye Hospital, Chennai, Tamil Nadu, <sup>6</sup>Pediatric Ophthalmology and Adult Strabismus Services, Sri Venkateshwara Aravind Eye Hospital, Tirupati, Andhra Pradesh, India

**Correspondence to:** Dr. Rajesh Vedachalam, Ophthalmology, Consultant, Cornea and Refractive Surgery Services, Aravind Eye Hospital, Cuddalore Main Road, Thalavakuppam, Pondicherry - 605 007, India. E-mail: rajesh@aravind.org

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posterior segment pathology, those unable to perform the survey due to neurocognitive disorders, those with a diagnosis of traumatic cataract, and those who refused participation.

The medical records database was used to obtain demographic data, ophthalmic findings, diagnosis, best-corrected distance visual acuity (BCVA), and the telephone numbers of patients who were to undergo surgery for mature cataract, nuclear sclerotic cataract grade IV, and cataracts with BCVA lesser than 5/60. All patients underwent a complete ophthalmic examination, including slit-lamp biomicroscopy, gonioscopy, fundus examination or B-scan ultrasound if media opacity limited view of the posterior segment. After giving their informed consent, participants completed a questionnaire regarding reasons for their delayed presentation to the hospital for eye evaluation. A pilot study using the questionnaire was performed in October 2020 on 40 participants to validate survey questions, assess feasibility, and calculate sample size, which was calculated as 1,472. The validated patient survey questionnaire was administered in Tamil by experienced study coordinators.

### Statistical analysis

We performed statistical analyses using Stata software version 14 (Stata Corp). Continuous variables were presented as mean  $\pm$  standard deviation (SD) or as median and range. Proportions (%) were used to describe categorical variables. Chi-squared test or Fisher's exact test was used for comparing categorical variables. *P* values less than 0.05 were considered significant. Estimation of sample size was performed by considering outcomes from the pilot study, which included the same surveys included in the main study.

**Table 1: Reasons for visit to the hospital during the pandemic**

Reason for Visit to Hospital	Yes n (%)	No n (%)	Total n (%)
Defective Vision	1452 (98.6)	20 (1.4)	1472 (100)
Pain	37 (2.5)	1435 (97.5)	1472 (100)
Redness	3 (0.2)	1469 (99.8)	1472 (100)
Vomiting	1 (0.1)	1471 (99.9)	1472 (100)
Routine Check-up	15 (1.0)	1457 (99.0)	1472 (100)
Other Reason	21 (1.4)	1451 (98.6)	1472 (100)

*n* (%) represents frequency (percentage)

**Table 2: Difficulties faced during the pandemic due to defective vision**

Difficulty faced because of defective vision	Yes n (%)	No n (%)	Total n (%)
History Of Fall	124 (8.4)	1348 (91.6)	1472 (100)
Difficulty in transit	453 (30.8)	1019 (69.2)	1472 (100)
Difficulty in daily activities	814 (55.3)	658 (44.7)	1472 (100)
Difficulty in obtaining information	297 (20.2)	1175 (79.8)	1472 (100)
Difficulty in following preventive measures during COVID-19	62 (4.2)	1410 (95.8)	1472 (100)
No Difficulty	330 (22.4)	1142 (77.6)	1472 (100)

*n* (%) represents frequency (percentage)

## Results

### Demography

A total of 1,472 patients were surveyed over a period of 4 months. The mean age of participants was  $59.7 \pm 10.11$  years (median, range 23–95) and 54.4% were females. Mean logMAR BCVA was OU 1.08. 54.4% of the patients resided in rural communities. 49.2% of the patients had not received any formal education, while 12.1% had completed high school or beyond. Approximately 80% of patients resided within 100 km from a tertiary eye care centre.

### Motivations behind hospital visit

Among the 1,472 patients, 1,452 (98.6%) had defective vision as the main reason to visit the hospital, among which 791 (53.7%) felt their vision had worsened during the pandemic and thus needed medical care [Table 1]. Availability of E-pass, transportation (35.9%), and financial resources (14.3%) also were factors making them seek medical attention. Less fear of contracting COVID-19 was seen among 37.6% of the patients which made them attain medical care.

### Characteristics of defective vision

25.5% had undergone cataract surgery in their other eye among which 45.6% were operated more than 2 years ago [Table 2]. 13.9% of the patients were already advised cataract surgery in the eye with advanced cataract. 87.9% had noticed the drop in vision. 55.3% had difficulty in pursuing their activities of daily living, and 30.8% faced difficulty in commuting.

**Table 3: Reasons for delay in cataract surgery during the pandemic**

Reason for delaying Surgery	Yes n (%)	No n (%)	Total n (%)
No hospital near by	651 (44.2)	821 (55.8)	1472 (100)
No Public Transport	544 (37.0)	928 (63.0)	1472 (100)
Unable to get E-Pass	176 (12.0)	1296 (88.0)	1472 (100)
Eye surgery was being offered during the lockdown	627 (42.6)	845 (57.4)	1472 (100)
Worried that myself or members of my family would be exposed to COVID-19	344 (23.4)	1128 (76.6)	1472 (100)
No caregiver to apply medication all the time	165 (11.2)	1307 (88.8)	1472 (100)
No person to cook at home	175 (11.9)	1297 (88.1)	1472 (100)
Not enough money	429 (29.1)	1043 (70.9)	1472 (100)
Waiting for eye camp	300 (20.4)	1172 (79.6)	1472 (100)
Worried that the surgery would make my vision worse	149 (10.1)	1323 (89.9)	1472 (100)
Doctor did not let me undergo surgery due to uncontrolled systemic illness	183 (12.4)	1289 (87.6)	1472 (100)
Other Reasons	89 (6.1)	1383 (94.0)	1472 (100)

*n* (%) represents frequency (percentage)

**Table 4: Mode and Cost of Transport Prior to and post COVID-19**

Mode of Transport	Prior to COVID-19 <i>n</i> (%)	At present <i>n</i> (%)	Travel cost (₹)	Prior to COVID-19 <i>n</i> (%)	At present <i>n</i> (%)
Public transport	671 (45.6)	1071 (72.8)	<₹100	280 (19.0)	309 (21.0)
Share auto	76 (5.2)	107 (7.3)	₹100-₹1000	565 (38.4)	1034 (70.2)
Own two-wheeler	80 (5.4)	131 (8.9)	₹1001-₹2000	30 (2.0)	86 (5.8)
Own car	53 (3.6)	84 (5.7)	₹2001-₹5000	22 (1.5)	37 (2.5)
Hired taxi	26 (1.8)	60 (4.1)	>₹5000	5 (0.3)	6 (0.4)
Other	7 (0.5)	19 (1.3)			
Not Applicable	559 (38.0)	-	Not Applicable	570 (38.7)	-
Total	1472 (100)	1472 (100)	Total	1472 (100)	1472 (100)

*n* (%) represents frequency (percentage). ₹ represents Indian currency, the Rupee

**Table 5: Comparison of variables between patients with BCVA 5/60 to FCF and BCVA HM to no PL**

Variable	BCVA 5/60 to FCF	BCVA HM to No PL	<i>P</i> value
Total number of patients	773	699	
Residence ( <i>n</i> (%))			
Urban	372 (48.1%)	299 (42.7%)	0.040
Rural	401 (51.8%)	400 (57.2%)	
Postgraduate Education ( <i>n</i> )	53	25	0.027
Referral ( <i>n</i> )			
Private Practitioner	31	21	
Vision Center	56	77	0.0001

BCVA, Best corrected visual acuity; HM, Hand movements; PL, Perception of light; FCF, Finger counting close to face; *n* (%) represents frequency (percentage); *n* represents frequency

### Reasons for delaying surgery

Reasons for significant delay in cataract surgery among these patients were the absence of ophthalmic care nearby (44.2%), lack of awareness regarding elective surgeries being performed (42.6%), and lack of public transportation facilities (37%) during the lockdown period [Table 3]. The fear of contracting COVID-19 was seen in 23.4% of patients. About 29.1% of the patients had no monetary source while 20% waited for the outreach programs to restart. Systemic factors like uncontrolled diabetes and hypertension delayed the surgery in 12% and 10.3%, respectively.

### Caregiver support, Transportation and Costs

79.4% of the patients were accompanied by their immediate relatives, 11.4% were brought to the hospital by other relatives, 2% by neighbours, while 7% came on their own [Table 4]. 38% of the patients had not visited our hospital before. Public transport was the major mode of transportation in 72.8% of patients. Share auto was used by 7.3% while 8.9% of the patients relied on their own two-wheeler. Hired taxis were also observed in 4.1% of the patients. The cost of travel ranged from ₹100-₹1,000 during the pandemic in 70.2% of the patients, as compared to 38.4% who travelled at the same cost before the lockdown. 32.2% of our patients did not have an individual source of income and had to depend on their caregiver (54.8%) for paying their medical expenses. 19.3% of the patients belonged to the income group of less than ₹10,000 a month; there were 18.6% with an income of less than ₹5,000, and 15.4% earned a monthly income of less than ₹2,000.

### Factors associated with poor visual acuity at presentation

The patients were divided into two groups based on their BCVA: One group comprised of patients with BCVA ranging from 5/60 to Counting fingers (FCF) (*n* = 773), while the other group comprised of patients with BCVA ranging from hand movements (HM) to no perception of light (PL) (*n* = 699). Worse vision was associated with patients coming from rural areas (*P* < 0.05) [Table 5]. Education level varied between the two groups: Those with worse vision were less likely to have graduate or postgraduate education (*P* = 0.027). Referral for surgery differed between the two groups: Those with better vision were more likely to be referred by a private practitioner, general physician, or optometrist, while those with worse vision were more likely to be referred by a vision center or other groups (*P* = 0.0001) [Table 5]. There was no difference in the reports of duration of defective vision between the two groups. The two groups did not vary in reports of falls, difficulty in transit, daily activities, obtaining information, or following preventive measures.

36.6% of the patients admitted to losing their source of income and their job due to the lockdown; 91.3% of these patients admitted to experiencing severe economic setback and financial burden. 53.3% of all the patients had to depend on their caregiver or external sources for seeking eye care. 30.8% of the patients expressed their difficulties in getting a hospital room, while 35.9% of them expressed difficulties faced in commuting for multiple visits for pre-op and post-op follow-up. Awareness regarding vision centers during the pandemic was clearly lacking in 81.1% of the patients. 51.1% admitted that visiting vision centers for postoperative care was easier than travelling to the tertiary eye care center during the COVID-19 pandemic.

## Discussion

### Reasons for delaying cataract surgery

The reasons for delaying cataract surgery were multifactorial. During the initial phase of the lockdown, there was a lack of clarity among the hospitals regarding the protocols to be followed that would ensure the safety of patients undergoing surgery as well as the surgical team. As COVID-19 was thought to be a droplet infection and cataract surgeries could generate droplets at close proximity to the surgeon's face, surgeries were initially withheld and new protocols were being formulated.<sup>[12]</sup> A majority of the patients stated that cataract surgeries were not offered at facilities that they could access.

In the pre-COVID-19 era, the barriers to cataract surgeries were that the cataract not mature, whether the patient could manage daily work, could see clearly with the other eye, was too busy, the patient was female, feared surgery, or feared that the surgery would cause blindness.<sup>[6,7,8,9,13]</sup> In the COVID-19 era, the reasons were lack of nearby eye care facilities (44.2%), lack of awareness regarding elective surgeries (42.6%), lack of public transportation (37%), difficulty in procuring an E-pass (12%), and lack of outreach activities (20.4%).

Around 23% of patients were worried about contracting COVID-19 during a hospital visit. They feared the risk of exposure at hospitals. They also expressed concerns about putting their caregivers at risk, who would have to accompany them to the hospital.

As the economy took a major hit due to the pandemic, financial constraints were also a major hurdle for patients.<sup>[14]</sup> Of the 1,472 patients who were surveyed, only 4% had insurance coverage; 54% were dependent on their caregivers to pay for their expenses. The main earning member of the family had lost their livelihood due to the lockdown in more than 30% of the families of these patients, which prevented them from getting timely cataract surgery.

Around 20% of the patients stated that they were waiting for the eye camps to resume as the travel and surgical expenses would be met by the hospital, without the hassle of requiring a caregiver to accompany them.

Some patients (10%) were apprehensive about the visual outcome and so were not willing to undergo surgery, fearing that their vision might worsen during these challenging times.

Another concerning barrier we came across was that the patients experienced worsening of their existing systemic illnesses like diabetes mellitus or hypertension due to unavailability of local medical services. This further prevented them from undergoing cataract surgery due to poor systemic control. A multivariate regression analysis concluded that the duration of lockdown was directly proportional to the worsening of glycemic control and diabetes-related complications. Such increase in diabetes-related complications would put additional load on the already overburdened healthcare system, and also increase COVID-19 infections.<sup>[15]</sup> Among our study participants, 155 had uncontrolled diabetes, 177 had uncontrolled hypertension, and 33 patients had compromised cardiac status due to lack of accessible medical services during lockdown.

#### Difficulties faced because of defective vision

Around 55% of the patients complained that they could not carry out their day-to-day activities, which severely affected their livelihood. They also faced difficulty in transit, particularly those with bilateral defective vision. 22% of the patients reported no difficulty due to defective vision, probably because of functioning vision in the other eye. 8% gave history of sustaining a fall due to defective vision resulting in comorbidities, need for medical assistance, and temporary disability. Some patients also reported difficulties in following COVID-19 preventive measures as they found it cumbersome due to their defective vision.

#### Reasons for visiting the hospital

Despite all of the hurdles so far discussed, the reasons that prompted them to visit the hospital were analyzed. As lockdown

restrictions were slowly relaxed, public transportation resumed and patients had better access. 14% stated that improvement in their finances helped them to opt for surgical care. 39% of patients stated that they experienced further worsening of vision and they had no choice but to have surgery in order to be independent of their caregivers' assistance. As routine activities in the country resumed, the fear of COVID-19 took a backseat and patients were more comfortable to visit hospitals.

503 out of the 1,472 patients (34%) have been suffering with defective vision for more than 6 months. 26% of patients were previously advised cataract surgery before COVID-19 hit. They did not act on it earlier, not anticipating this unprecedented crisis.

#### Caregiver support and transportation hurdles

Public transport was the main mode of transport before and after lockdown. Non-availability of public transport during the lockdown had drastically reduced patient foot fall. More 70% of these patients are dependent on buses to reach the hospital. All bus services were suspended during the lockdown. Patients had to opt for taxi services, which again were curbed by strict E-pass regulations. Patients stated that the transportation charges have more than doubled compared to pre-COVID-19 times, which put a major strain on their affordability. More than 50% of the patients stated lack of public transport and difficulties in procuring E-pass as reasons for delaying their cataract surgery. A slight increase in patients opting for hired private vehicles was noted after the lockdown, probably due to fear of contracting the virus through shared transportation.

In more than 30% of the patients, the monthly income of themselves or their caregiver was ₹5000 or below, and around 56% of the patients relied on caregivers to pay for their surgery, followed by 37% who could support themselves in the group of patients with vision FCF or better. Insurance was used only by 5% of the patients. 90% mentioned that the financial burden in the family increased due to the pandemic, of which 36% had a family member losing or being displaced from their job. The major difficulty faced by the patients in undergoing surgery outside their locality was the challenges associated with multiple visits before and after surgery. 31% of the patients expressed their predicament of having no place to stay overnight for their surgery. 54% stated that they would prefer to visit the vision centers in their locality for their postoperative follow-ups rather than travelling to the tertiary eye care center.

We also found that patients were unaware of services available around them. Around 81% were unaware that vision centers were functioning even during lockdown. Necessary guidance and support could have been provided if patients had utilized these services.

India had released a report of the National Blindness and Visual Impairment Survey, which is the largest ever Rapid Assessment of Avoidable Blindness (RAAB) survey representing 31 districts across 24 states in India. The survey provided the most reliable current estimates of blindness and visual impairment in the country.<sup>[16]</sup> India was able to achieve the targets of the World Health Organization (WHO) Universal Eye Health: Global Action Plan 2014–19 to reduce the prevalence of avoidable visual impairment by 25% by 2019 compared to the baseline prevalence of 2010. India reached the target reduction of blindness and visual impairment by nearly

47% and 52%, respectively, which were mainly possible due to the outreach programs available till the start of the pandemic.<sup>[16]</sup> The COVID-19 pandemic had led to all outreach activities being cancelled. Travel restrictions and economic setbacks faced by the country led to huge burden of disease on the population with cataracts reaching an advanced stage.

## Conclusion

As hospitals were learning to adapt to the new normal, so were the patients. Lack of nearby eye care facilities, lack of awareness regarding elective surgeries, lack of transportation, and lack of outreach activities were the major reasons for delay in cataract surgery during the COVID-19 pandemic, leading to a significant backlog of patients with cataracts progressing to an advanced stage. Spreading awareness and assuring the patients that all safety measures are in place in the hospitals to prevent COVID-19 spread will go a long way in making the patients feel safe to visit the hospitals. It has been a great battle over many years to reduce the existing backlog in cataract surgery. These times call for our proaction in preventing a drastic increase in backlog.

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### Conflicts of interest

There are no conflicts of interest.

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