

## Diagnostic Errors in Ophthalmic Practice during COVID-19 Pandemic

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Received: March 19, 2021

Published: April 23, 2021

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### Abstract

**Background and Objective:** The area of diagnostic errors in ophthalmology in COVID-19 pandemic remains profoundly understudied. To describe a case series of 7 patients with diagnostic errors during COVID-19 lockdown in ophthalmology department of a multispecialty government hospital in north India.

**Design:** Retrospective case series of 7 patients.

**Participants:** Seven patients who visited the general ophthalmology clinic during COVID-19 lockdown period in India.

**Methods:** Retrospective case series of 7 patients who visited the general ophthalmology clinic between April 1 and June 30, 2020 and were found to have diagnostic error on their subsequent visits after further examination and investigations.

**Results:** In case 1, the diagnosis of central serous retinopathy was delayed until the patient returned with worsening of symptoms and was further evaluated for it. In case 2, 3 and 4, misdirected eyelashes, a 1 x 1 mm corneal opacity and a posterior subcapsular cataract respectively were missed on their first visit but the diagnosis was revised on next visit. Cases 5, 6 and 7 presented as red eyes. Allergic conjunctivitis was misdiagnosed as dry eyes in case 5 and as bacterial conjunctivitis in case 6. A foreign body lodged in conjunctiva was misdiagnosed as nodular episcleritis in case 7. The causes for these errors may be unique to the pandemic as both the patients and physicians tried to minimize their exposure.

**Conclusion:** COVID-19 pandemic has been a stressful situation for patient and healthcare workers where prevention strategy lies in hygiene and social distancing measures. While taking all the necessary precautions to control the transmission, it is also our duty to minimize the incidence of diagnostic errors during routine consultations.

**Keywords:** COVID-19; Diagnostic Error; Ophthalmic Practice; Slit-Lamp; Pandemic

### Introduction

COVID-19 pandemic has been an unprecedented event in the life of every person across the globe even more so for health care workers.

A countrywide lockdown and strict guidelines at healthcare facilities were implemented to control the spread of disease. The guidelines for ophthalmic clinics included use of personal protective equipment (PPE), maintaining a safe distance of more than

one meter; repeated sanitization of surfaces like slit lamp and trial frames, limiting the use direct ophthalmoscope, judicious use of slit lamp to avoid physical proximity, avoiding aerosol generating air puff tonometry and deferring non-emergency surgeries to a later date [1,2].

All these measures were taken in order to protect patients and healthcare workers from possible transmission of COVID-19 but on the contrary, a sudden rise in diagnostic errors was noticed at our facility. Few other authors have also reported diagnostic errors in other fields of medicine during this COVID-19 era [3,4]. A diagnostic error is defined by National Academy of Medicine as the failure to (a) establish an accurate and timely explanation of the patient's health problem(s) or (b) communicate that explanation to the patient. These errors comprise of delayed, missed or wrong diagnosis [5].

Although ophthalmologists across the world are focused on elucidating the ocular manifestations of COVID-19, the area of diagnostic errors in ophthalmology in this pandemic remains profoundly understudied. In these difficult times, where the entirety of focus lies upon the control of spread of COVID-19, it is our duty to bring these errors to light so that we can reduce the burden on an already overwhelmed system. Recognizing such diagnostic errors with self-reflection and patient feedback can help improve the patient care.

We present a total of 7 patients, from ophthalmology clinic of a multidisciplinary government hospital in north India, who visited during the pandemic for consultation. In these cases, the diagnosis was delayed, missed or wrong on their first consultation and had to be revised on subsequent visits and patients were managed accordingly on further follow up.

## Materials and Methods

A retrospective observational case series was performed. An approval was taken by the ethics committee. Patients visiting the eye hospital for the first time for their current ailment who were found to have diagnostic errors on their subsequent visit were included in the study. These errors comprised of delayed, missed or wrong diagnosis. An initial diagnosis was made on the first visit which had to be revised after relevant examination and investigations on the next visit when patient complained of worsening or no improvement of symptoms. Seven patients were identified over a period of 4 months of lockdown from April 1 to July 31, 2020. The records of these cases including patient particulars, presenting complaints,

initial diagnosis, initial treatment, time to revisit, complaints at revisit, final diagnosis and final treatment were compiled for the study.

## Results

### Case 1

A 35-year-old male visited the clinic with complaints of a small black spot floating in front of the right eye for 1 day. His visual acuity was 6/6p both eyes and torchlight examination was normal. Due to patient's anxiety and reluctance to stay longer in the hospital his dilated fundus examination was not done and a provisional diagnosis of a benign vitreous floater was made. He was asked to keep a close watch on his symptoms and review regularly. Patient revisited the clinic after 2 days with increase in the size of black spot and decreased visual acuity to 6/24 in right eye. This time he was convinced to undergo a detailed examination which finally revealed central serous retinopathy in the right eye. His further plan of action was then explained to him and kept on regular follow up in retina department.

### Case 2

A 65-year-old female came with complaints of watery eyes for 3 months. She has been using over the counter drops off and on with little benefit. Her torch light examination could not reveal any abnormality. A working diagnosis of dry eye syndrome was made and lubricating eye drops were prescribed. She returned after 1 week with no relief at all. Slit lamp examination revealed a misdirected eyelash in both the upper lids and were epilated with forceps. She improved symptomatically and lubricant drops were continued.

### Case 3

A 12-year-old male child was brought to the clinic with complaints of blurring of vision left eye. His visual acuity was 6/6 in right eye and 6/12 left eye which improved to 6/6p with -0.5DC at 120°. He was diagnosed as a case of astigmatic refractive error and advised glasses. The child returned after 1 month after breaking his glasses to get new a prescription. On examination a corneal opacity (1 x 1 mm) was found in the left eye in the superotemporal quadrant. The diagnosis for his left eye was revised to corneal scar induced astigmatism and parents were informed about the same.

### Case 4

A 58-year-old female visited with complaints of blurring and diminution of vision for 1 month. Visual acuity was 6/12 both eyes which improved to 6/9 with refraction. Patient was prescribed

glasses. However, she returned after 1 month with complaints of increased blurring during the daytime. Detailed examination revealed a bilateral posterior subcapsular cataract and patient was informed regarding further work up and surgery in the future.

#### Case 5

A 23-year-old male computer professional had complaints of itching and watering of eyes for last 2 week. Torch light examination revealed mild redness in both the eyes. A provisional diagnosis of dry eyes was made and patient was prescribed lubricating eye drops. Patient revisited the clinic after 1 week with worsening of symptoms. Slit lamp examination revealed papillae in superior tarsal conjunctiva and the diagnosis was revised to allergic conjunctivitis. Patient was prescribed anti-histamine drops and showed improvement over the course of 2 week on further follow up.

#### Case 6

A male child 5 years of age was brought to clinic with acute redness, swelling and watering of both eyes for 5 days. Torch light examination revealed conjunctival congestion. Rest was normal. A diagnosis of bilateral bacterial conjunctivitis was made and patient was prescribed topical antibiotics and lubricant. With no improvement in symptoms after 3 days, the child was brought back. After examining on slit lamp, follicles and papillae were found in the conjunctiva and a revised diagnosis of allergic conjunctivitis was made. Child was started on anti-histamine eye drops and steroid eye drops and showed improvement on next visit after 1 week and the treatment was continued.

#### Case 7

A 50-year-old male visited with complaints of redness in lateral part of right eye for 1 day with mild pain, watering and foreign body sensation. On torch light examination, sectoral congestion was seen in temporal half of conjunctiva with a central nodular lesion. A diagnosis of nodular episcleritis was made and patient was advised antibiotic and steroid eye drops. Patient revisited the clinic after 3 days with minimal improvement in redness but persistent foreign body sensation. On slit lamp examination, a conjunctival foreign body was revealed which was removed with a 26 gauge needle. Patient was symptomatically relieved on next day.

### Discussion

The incidence of diagnostic errors in medical practice is an under-recognized entity. A varied range of research focusing on this has shown that the incidence of these errors can be as high

as 10 - 15% [6-8]. Diagnostic errors can arise from various human and system-related factors and they are unavoidable even in places with best healthcare system [8-10]. In majority of cases, these errors are found to be cognitive in origin where the physician fails to interpret the available information to identify the correct diagnosis [11,12]. Various other factors including workplace stress, busy settings like emergency department and physician's overconfidence have also been shown to contribute to such errors [6,13].

Due to an alarming rate of spread of COVID-19 in India, a countrywide lockdown has been in place for the last four months and all places of aggregation have been closed except a few essential ones like healthcare facilities. At our facility like all others, it was decided to follow strict protective guidelines to prevent any spread among healthcare workers and patients. All the healthcare workers were equipped with appropriate PPE kit and patients were encouraged to wear face masks and maintain social distancing in the waiting area. While consultation, the healthcare workers were asked to maintain a working distance of more than 1 meter with the patient wherever possible. It was advised to use an indirect ophthalmoscope instead of a direct one for retinal examinations and avoid aerosol generating procedures like air puff tonometry. Trial frames and slit lamps were to be properly sanitized after each patient and slit lamp examination (equipped with a breath shield) was advised to be performed when it was felt necessary and safe. PPE kit for physicians included a hooded gown, eye shield, face shield, N95 face mask and latex gloves [1,2].

With more than 120 million cases worldwide and 11.5 million cases in India alone as on 18<sup>th</sup> March 2021, the pandemic has created a stressful situation for the physicians, which could affect their rational thinking and decision making to an extent. The strategy to limit the spread of COVID-19 has resulted in tendency to reduce exposure time with patient. Daily appointments have been minimized leading to long waiting time and delayed treatment. Telephonic or video consultations have emerged as alternatives to physical consultations where a photograph or a video is the only source of examination [14]. These practical difficulties may also act as additional factors in the upsurge of diagnostic errors [3].

All the 7 patients documented here had diagnostic error on their first visit, the reasons for which may be unique to the ongoing pandemic scenario. Case 1 was provisionally diagnosed as benign vitreous floater because his retinal examination could not be done due to his apprehension regarding touching the surfaces of multiple machines and reluctance to stay longer in the hospital. The

patient was advised regarding the red flag signs and review as soon he encounters one. He was observant enough to return after 2 days and finally got the correct diagnosis made and is under regular follow up. The diagnosis of case 2, 3 and 4 was missed in the similar manner due to insidious nature of the disease which had no external manifestation. A fine misdirected lash, a 1 x 1 mm corneal opacity and a posterior subcapsular cataract was missed on torch light examination owing to patients' unwillingness for a slit lamp examination as well as physician's over-confidence about the diagnosis.

Cases 5, 6 and 7 had red eye as their primary complaint which was incorrectly diagnosed. Case 5 and 6 had allergic conjunctivitis which was misdiagnosed as dry eyes and bacterial conjunctivitis respectively. Case 7 had a small foreign body lodged in the conjunctiva which was misdiagnosed as episcleritis. Although the baseline data regarding the incidence of diagnostic errors in red eye patients by trained ophthalmologist is scanty but a retrospective study showed that only 21% of general practitioners and 64% of casualty officers had the correct diagnosis of acute angle closure glaucoma on referral [15]. Hence it is reasonable to assume that a red eye, which has various etiologies ranging from self-resolving viral conjunctivitis to sight threatening angle closure glaucoma, is particularly susceptible to diagnostic error even in a routine scenario. It has already been established that COVID-19 can present as conjunctivitis in 0.8% to 5.2% of patients and red eye may be one of the early symptoms [16]. Therefore, every red eye patient was seen as a suspected case of COVID-19 unless proved otherwise. The exposure of such patients to other patients and machinery in the clinical setup was tried to be minimized and physicians were advised utmost caution while dealing with them [1,2,17]. The psychological stress of the physician while dealing with patients in these circumstances may be very high and thus errors of diagnosis are more likely to occur.

The sole motive of this article is to emphasize for a balanced approach towards our routine patients during the current pandemic. There is a need to measure the incidence of our diagnostic errors and the harm associated with it to address this silent but significant problem [18]. It is noteworthy that the health and safety of the patients is the primary responsibility of healthcare system and assessing the harm done by these diagnostic errors is an important aspect of patient care [19]. Although, a delayed diagnosis of allergic conjunctivitis, episcleritis or a conjunctival foreign body may not cause any long term harm but on the other hand missing an angle closure glaucoma, uveitis, keratitis or a retinal detachment can threaten the visual potential of patients [20].

The approach to reduce these errors can comprise of multidimensional strategies but the mainstay of focus should always be on a proper examination and investigation protocol. In any doubtful case, taking a second opinion can also prevent many such errors. Emphasis should be given to provide a blame free environment and errors should be taken as opportunities for learning and improvement. Some novel measures or modifications to slit lamp may be necessary to provide the necessary physical distance between the patient and the examiner and it may not be very long before the innovators come up with such inventions.

There is a very high possibility that the cases we present here may just be the tip of the iceberg and the actual incidence of diagnostic errors during this era may be very high in the healthcare system. We are hopeful that this case series will spark an interest in improving diagnosis and reducing patient harm from diagnostic errors.

## Conclusion

COVID-19 pandemic has been a stressful situation for healthcare workers where prevention strategy lies in hygiene and social distancing measures. Increase in the number of diagnostic errors, arising due to direct or indirect effects of the prevention strategy, needs to be addressed. If this problem remains unaddressed for long, we may encounter a number of complications arising from these diagnostic errors which may cost dear to the patients as well as healthcare system of every country. While taking all the necessary precautions to control the transmission, it is also our duty to minimize the incidence of diagnostic errors and patient harm during routine consultations.

## Declaration of Interests

The authors declare that they have no conflict of interest.

## Funding

None.

## Patients' Consent

All the patients gave their permission to be included in the manuscript.

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