



Management of ENT Surgical Emergencies Amidst COVID-19 Lockdown: Our Experience in a Tertiary Referral Hospital

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Abstract To describe our experience with ENT emergencies during lockdown due to COVID-19 pandemic and provide recommendations for triage, management and protective measures. Retrospective case series. Eleven patients requiring emergency ENT procedures in a tertiary referral hospital during the lockdown period of 24th March to 3rd May 2020 were identified. Clinical profiles, screening and operating room protocols along with the post-operative care and use of personal protective equipment are described. Nine patients were discharged from the hospital and two were in stable condition in the hospital. While lockdowns may be effective in controlling the transmission of COVID-19, they have a negative impact on the routine functioning of healthcare services. Appropriate protocols for screening, triage and management of non-COVID patients with due precautions and infection control strategies can ensure that emergencies get timely and appropriate attention while preventing spread of infection among patients and healthcare workers.

Keywords SARS corona virus · Health care worker-patient transmission · Pandemics · Emergency care · Otorhinolaryngological surgical procedures · Personal protective equipment

Introduction

The year 2020 saw the rise and spread of COVID-19 across the globe leading to a pandemic situation. Many countries reacted by enforcing lockdowns and social distancing in a bid to contain the spread of the infection and to keep infected cases at manageable levels. India went into a 21-day lockdown initially that was later extended for another 34 days.

There is evidence to show that lockdowns significantly slowed the spread of the disease as compared to a lack of intervention [1]. However, lockdowns can also considerably impact many aspects of healthcare including the routine and emergency care of non-COVID patients. Cancelling of routine OPDs and follow ups, discouraging of patients with non-emergency complaints from visiting the hospital, lack of availability of transport, inadequate testing facilities for asymptomatic patients and the fear of spread of infection to healthcare workers and other patients can all contribute to this.

COVID-19 being a relatively new disease, there is much about it that is not yet clear. While national and international bodies made an effort to bring out guidelines for ENT practice, these kept changing frequently as new information came to light, even as international data showed otolaryngologists to be at a high risk of contracting the disease. There is little in literature documenting how otorhinolaryngology departments are approaching ENT ailments in patients who are not infected with SARS COV 2 in the COVID-19 pandemic. There is also a lack of firsthand accounts of how emergency ENT cases are being managed. Appropriate and timely management of ENT emergencies in such a situation can pose special challenges to the otolaryngologist. In this article, we describe our experience with the triage and management of ENT

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emergencies at a tertiary referral hospital in the setting of a lockdown with limited resources and the protocol followed by us to maximize the safety of health care personnel involved and avoiding the possibility of hospital transmission of infection.

Materials and Methods

This case series was approved by the Institutional Ethics Committee of Apollo Hospitals, Bangalore. All patients presenting to the emergency department and those already in the intensive care units who required emergency ENT surgical intervention between March 24 and May 3, 2020 were included in the study. Patients who did not require admission were excluded from the study. All patients were screened thoroughly upon arrival at the hospital and those presenting with fever, breathlessness, loss of smell and other signs of Covid-19 and/or those with significant travel history were managed appropriately and excluded from the study. The patients who were categorized as those requiring elective surgeries were also excluded from the study. A total of 11 patients who required various ENT procedures were included in the study.

Six of the 11 patients presented to the A&E where they were examined with appropriate precautions. On admission, the patients were kept in a single room with central air-conditioning turned off. The procedures were performed on the same day as admission after due preoperative work up. The other 5 were primarily neurological cases undergoing treatment in the ICU, intubated and on ventilator support, referred to ENT for tracheotomy.

The 6 patients who presented to the emergency were cases of epistaxis (intractable epistaxis, referred after two attempts at control with nasal packing and out-patient based cauterization had failed), traumatic optic neuropathy, deep neck abscess, suspected laryngeal malignancy and 2 cases of acute invasive fungal sinusitis. (Table 1).

All patients were operated under general anesthesia with orotracheal intubation. The number of persons in the operating room was kept to a minimum. The air exchanges were kept above 25 cycles per hour in the operating room. Air conditioning and laminar flow were switched off during intubation and extubation. The temperature in the operating room was maintained at 18–20 °C. The surgeon entered the operating room 15 min after intubation and exited before extubation. Assistance was taken for surgery only when deemed necessary. Entry and exit of the operating room personnel was avoided during surgery. All personnel in the operating room wore full PPE with coveralls, N95 mask and hood. Donning and doffing were done in the designated areas with an observer noting/guiding the proper technique.

The surgeon, in addition, wore a surgical gown and an additional pair of gloves.

Four of the cases required endoscopic procedures—(1) cauterization for a sphenopalatine artery bleed, (2) post traumatic optic nerve decompression, (3) debridement for fungal sinusitis and (4) medial maxillectomy with infratemporal fossa debridement and orbital decompression for the second case of invasive fungal sinusitis (Fig. 1). Central suction was used to reduce aerosolisation. Powered instruments like microdebriders were avoided in all cases. Bipolar cautery in minimal setting was used sparingly. A 3 mm Medtronic diamond drill with a suction-irrigation port was used for a total of 3 min for the case of optic nerve decompression. In all cases where biopsy material was taken, the tissue was immediately transferred to appropriate containers and covered. Similar precautions were taken while performing microlaryngeal surgery and incision and drainage of the neck abscess. For the tracheotomies, complete cessation of ventilation during the opening of the trachea until inflation of the cuff after insertion of the tracheotomy tube was observed in order to minimize aerosolization.

The laryngeal biopsy patient was discharged on the same day and the epistaxis and traumatic optic neuropathy patients on the following day. The patients with invasive fungal sinusitis were started on intravenous Amphotericin B injections after confirmation of fungal infection with KOH preparation and discharged after they became stable. The patient who underwent incision and drainage for abscess was started on appropriate antibiotic following a culture report which showed MSSA and was discharged on the 3rd post operative day after removal of the drain. The patients who underwent tracheotomy were shifted back to the ICU. Maximal care was taken to minimize aerosol generation in these patients by using closed inline suction, closed circuit if on ventilator and a T-piece or a HME (Heat Moisture Exchanger) if ventilator support was not required.

Results

Of the 11 cases operated during this period, 9 were successfully discharged from the hospital. The remaining 2 were tracheotomized patients who remained in the hospital for medical reasons, but off ventilator support, on tracheotomy tube with minimal oxygen requirement of 2 L/min. Of the remaining 3 tracheotomized patients, 2 were decannulated on the 10th and 12th post operative days respectively and discharged from the hospital. The 3rd patient was discharged with the tracheotomy tube in situ for home care.

Table 1 Patient details

	Age/sex	Clinical features	Examination/tests	Diagnosis	Treatment given	Results/Follow up
1	25 yrs/ M	Blindness in right eye after trauma	No perception of light in right eye	Right traumatic optic neuropathy	Right Endoscopic optic nerve decompression + systemic steroids	Perception of light at 1 m distance on 1st postoperative day
2	40 yrs/ M	Blindness in right eye, inability to move the eye since 10 days. Newly detected Diabetes mellitus	No light perception in right eye, 3rd, 4th, 5th, 6th and 7th cranial nerve paralysis. Nasal endoscopy (Fig. 2) MRI-enhancing lesion in rt infratemporal fossa and orbital apex	Right invasive fungal sinusitis (Mucormycosis)	Right endoscopic medial maxillectomy + sphenoidectomy + debridement of infratemporal fossa + orbital decompression with intravenous amphotericin B injection	Partial recovery of 3rd, 4th, 6th and 7th cranial nerves at 2 weeks follow up
3	55 yrs/ M	Nasal stuffiness, headache, facial pain since 1 week. Newly detected Diabetes	Yellow nasal discharge and opacification of Left OMC, necrosed middle turbinate and adjacent nasal septum	Left invasive fungal sinusitis (Mucormycosis)	Debridement of left nasal cavity alongwith intravenous amphotericin B injection	Normal mucosalisation of left nasal cavity at 2 weeks follow up
4	50 yrs/ M	Right Nasal bleeding since 1 month. Several attempts of packing and cauterization on OP basis was unsuccessful	Nasal endoscopy revealed active bleeding from right lateral wall of nose at the attachment of middle turbinate	Intractable epistaxis	Endoscopic Right sphenopalatine artery cauterisation	No further episodes of bleeding on 1 week follow up
5	50yrs/ M	Cough and change of voice since 3 months	Whitish plaque on anterior 3rd of right vocal cord with cord thickening	Leukoplakia/ Malignancy of right vocal cord	Microlaryngoscopy and biopsy	Histopathology diagnosis—chronic non specific inflammation with foreign body giant cell reaction
6	73 yrs/ F	Neck swelling on right side with trismus since 1 week	CECT revealed neck abscess extending to masticator space	Deep neck abscess	Incision and drainage alongwith broad spectrum parenteral antibiotics	Total leucocyte count normalized with improvement of trismus
7	75 yrs/ M	Right MCA infarct			Surgical tracheostomy	Decannulated and discharged on 8 th postoperative day
8	65 yrs/ F	Ischaemic stroke			Surgical tracheostomy	Discharged with tracheostomy tube in situ after 10 days
9	28 yrs/ M	Intracerebral bleed			Surgical tracheostomy	Decannulated and discharged on 10th post operative day
10	45 yrs/ F	Myasthenia gravis in crisis			Surgical tracheostomy	Still in hospital, off ventilator
11	58 yrs/ M	Intracerebral bleed			Surgical tracheostomy	

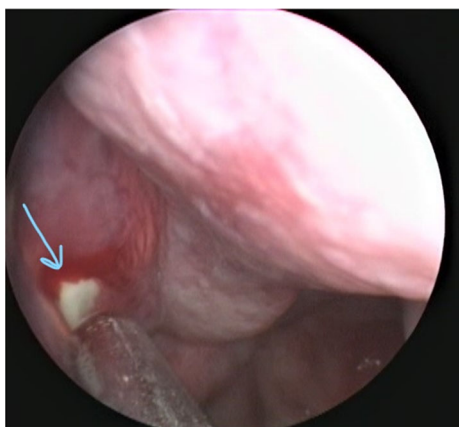


Fig. 1 Nasal Endoscopy showing necrotic area in right middle meatus adjacent to the sphenopalatine foramen in the case of invasive fungal sinusitis

The patient who underwent optic nerve decompression achieved perception of light from a distance of 1 m on the first postoperative day. The patient who underwent incision and drainage of deep neck abscess improved clinically with improvement in trismus and decrease in leucocyte counts. The patient with epistaxis had no recurrence of bleeding at 1 week follow up. The patient who underwent laryngeal biopsy was followed up after a week with histopathological diagnosis of chronic inflammation with foreign body granuloma.

Both cases of fungal sinusitis showed mucor on histopathology (Fig. 2) and were started on injection Amphotericin B. Repeat MRI scan at 2 weeks follow up showed a residual lesion in the basal meninges of the middle cranial fossa of one of the patients who had pre-operative involvement of orbital apex and infratemporal fossa. Clinically, the patient had improvement of eye movements but persistence of blindness and facial nerve paralysis. He was advised to continue Amphotericin B injection for 2 weeks.

Discussion

Due to the high rate of transmission, rapid spread and high mortality associated with COVID-19, lockdowns were enforced in several countries. India went into lockdown from 24th March, 2020, initially for 3 weeks, extended first upto 3rd May and then for a further period of 2 weeks with some easing of restrictions. At the time of initiation of lockdown in India, the total number of cases was 497 with 9 deaths with the count rising to 39,826 with 1323 deaths by the 2nd of May [2]. Lockdown was instituted to keep the infection at manageable levels and slow the spread of infection and number of hospitalizations. It would also buy

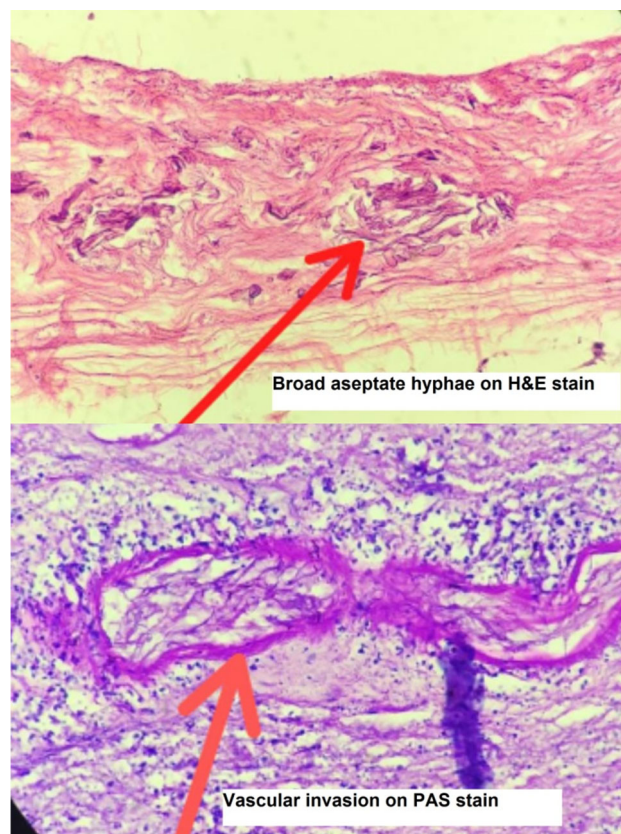


Fig. 2 Demonstration of mucor on histopathology

time for health systems to increase healthcare infrastructure, train healthcare personnel and create awareness among the general public.

However, medical literature has documented several accounts of the adverse effects of lockdown on healthcare systems. Reports from Italy showed that non-urgent outpatient procedures and scheduled operations other than cancer and emergencies were suspended with a drastic impact on services offered to patients [3]. Significant impact on many aspects of health including maternal and child health, mental health and non-communicable diseases among non-COVID patients has also been documented across the world. A survey conducted among ophthalmologists showed that there was near-total cessation of elective surgeries. Emergency services were attended by only 27% of the survey responders [4]. A similar situation was seen in many hospitals with reduced access for non-COVID patients seeking medical care. Many medical emergencies were ignored by the patients themselves due to the fear of the contagion and its threatening consequences in a hospital setting. One study also showed that patients are being deprived of surgical access and suggested that surgical services need a contingency plan for maintaining surgical care in an ongoing pandemic [5].

One of the reasons elective surgeries were postponed was to avoid the risk of nosocomial transmission in the hospital between hospital staff and patients. Many surgical societies came up with protocols, opinions, anecdotal reports, recommendations and perioperative guidelines to prevent possible in-hospital transmission of the virus [5]. Some studies suggested developing COVID and non-COVID hospitals as a reasonable way to preserve surgical services and normal function while containing the diseased population away from the non-infected [5]. This may, however, not be possible in all settings due to infrastructure constraints.

Testing for COVID 19 has also posed limitations on the healthcare system. There is currently only one reliable test that is sensitive and specific, the RT-PCR, where oropharyngeal and nasopharyngeal swabs are taken for assessment. The test has a maximum sensitivity of 71% for upper respiratory tract and 93% for bronchoalveolar lavage (lower respiratory tract) with high false negative results which are of concern in hospital settings [6]. Due to unavailability/shortage of testing kits in India, testing was not carried out widely. Each country/state had its own protocol for testing. Through the lockdown, the Indian Council for Medical Research (ICMR) recommended testing of only the following categories of people—all symptomatic individuals with travel history, all symptomatic contacts of lab-confirmed cases, symptomatic healthcare workers and hospitalized patients with severe acute respiratory illness (SARI) with the inclusion of patients with influenza-like illness (ILI) later [7]. Therefore, testing could not be carried out in hospitalized patients not fitting in any of the above categories.

Many healthcare workers were infected in the early part of the pandemic in China due to lack of awareness and insufficient infection control plans, with the risk being higher among otorhinolaryngologists [8–10]. Similarly, doctors in Italy and Spain were infected due to the lack of awareness of local spread. It is reported that about 150 doctors have died in Italy while 6414 health care workers were infected as of March 26th, 2020 [11]. Otorhinolaryngologists are thought to be more prone to occupational exposure as they come in close contact with the patients while examining the nose and throat and performing aerosol-generating procedures. The SARS COV 2 is known to be present in the nose and throat in high concentrations among both symptomatic and asymptomatic cases [12]. According to a report, dentists, otorhinolaryngologists and anaesthesiologists who work with the airway accounted for 12% of doctor deaths worldwide [13]. On the other hand, in Singapore, healthcare workers followed standard precautions with no outbreak being seen among them [14].

The majority of COVID-19 cases are afebrile early in the disease and many have mild symptoms or are

asymptomatic. This also aids in the spread of the infection [15]. The symptoms of SARS-COV-2 can often overlap with those of influenza or upper respiratory infection, making the otorhinolaryngologist vulnerable when adequate protective measures are not taken [16]. The standard preventive measures of daily workflow may not prevent the infection and specific masks (N95 or FFP2 or higher), personal protective equipment and dedicated sterilization methods are needed to prevent infection [17]. One report showed that 41 healthcare workers using standard PPE who had contact with aerosols of COVID-19 positive patients were not infected [18, 19]. Inadequate availability and lack of education of correct use of PPE can also contribute to infections among healthcare workers [8]. Recommendations for PPE usage have been defined the world over depending on the level of exposure and the type of spread anticipated. The current standard is to use gloves, triple layer mask and gown for anticipated contact spread, N95 or FFP2 mask for droplet prevention and full PPE with goggles, face shield and hood when aerosol generating procedures are done.

In our institution, workflow was reorganized to meet the changing needs in pandemic times.

Consultations for minor ailments and regular follow ups were done via tele or video consultation. For patients coming to the hospital, a screening system was instituted at the ambulance bay upon entry into the hospital where segregation of cases into high risk and low risk for COVID-19 was done (Fig. 3) [20]. Patients deemed as high risk were sent to the fever clinic which was located in a separate building adjacent to the main hospital for appropriate management taking adequate precautions. The high risk group included patients with high risk travel (international/interstate) in the past 28 days, travel from a containment zone where the number of positive cases was high, patients coming in close contact with a suspected/positive case of COVID and patients with fever, breathlessness, sore throat, cough and fatigue.

The other patients were referred to the emergency department where ENT examination was done. A surgical prioritization list was developed to categorize patients as urgent (next available OR, 3–6 h) and semi-urgent (to be done within 1 week) and elective cases depending on the urgency of the required surgical intervention (Table 2). In every case, risk of the procedure was weighed against the risk of delaying it. All elective cases were postponed until the end of lockdown as per government directives. The urgent/semi urgent category included all procedures that would affect the outcome if delayed. Making such a protocol is not only helpful to address patient needs but also to optimize hospital personnel and resource utilization at a time of shortage and ensuring the safety of personnel and other patients. We reviewed changes in guidelines and

recommendations on a day to day basis due to frequent changes as newer information came to light.

Early reports suggested that endoscopic procedures of the nose and throat carried high risk of transmission to the operating room personnel [21]. Four of the procedures in

our series were endoscopic surgeries of the nose and paranasal tissues. In all these cases, besides regular precautions taken for all operative cases, special precautions were taken to reduce aerosolization.

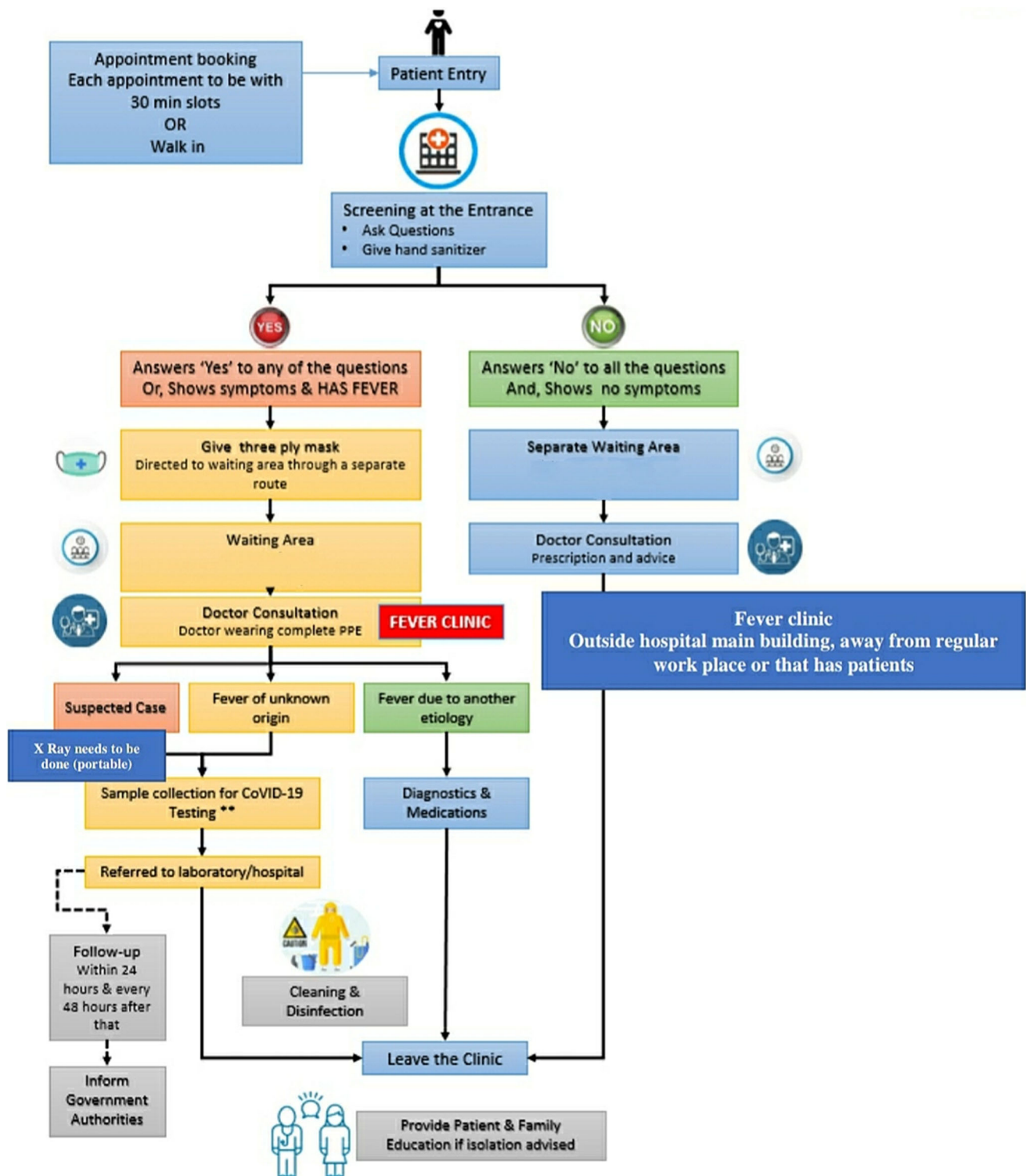


Fig. 3 Screening and triage flowchart

Table 2 Surgical categorization of ENT surgeries

Emergency/semi emergency cases	Elective cases
Tracheostomy	Tonsillectomy
Endoscopic optic nerve decompression	Cochlear implantation
Orbital decompression	Tympanoplasty
Invasive fungal sinusitis	Stapedotomy
Acute sinusitis with complications	Microlaryngoscopy
Acute/chronic otitis media with complications	FESS
Incision and drainage of deep neck abscess	Septoplasty
Scopy for biopsy in suspected malignancies Foreign body ear/nose/throat	Thyroidectomy and parotidectomy for benign lesions
Head and neck malignancies and trauma	

Central suction was used and portable suction machines avoided. Powered instruments like microdebriders were avoided in all cases. Bipolar cautery in minimal setting was used sparingly. A 3 mm Medtronic diamond drill with inbuilt suction-irrigation port was used for a total of 3 min for bone drilling in the case of optic nerve decompression. In all cases where biopsy material was taken, the tissue was immediately transferred to appropriate containers and covered.

Due to high risk of viral shedding in the upper aerodigestive tract, all patients with mucosal disease of nose, paranasal sinuses, nasopharynx, oral cavity, oropharynx and larynx should ideally be subjected to COVID testing as per recommendations of most bodies.²¹ But government directives, due to shortage of testing kits, prevented us from doing the same. Therefore, all necessary precautions like isolation, social distancing and the use of appropriate PPE by healthcare personnel when coming in close contact with the patient were followed after admission while also keeping hospital stay to a minimum. Work uniform, gown, surgical cap, N95 mask, goggles and disposable latex gloves were used for examination of the patients. Full PPEs (coverall including hood and shoe cover) were used during the surgical procedures. Protecting healthcare personnel is important in a hospital setting to avoid their becoming asymptomatic carriers with the possibility of infecting more vulnerable people in the hospital unless quarantined.

It has been well-documented that otorhinolaryngologists are at high risk of getting infected as they come in close contact with the patient during examination, high viral loads of COVID-19 being present in the upper aerodigestive tract in the infected [12]. The surgeon's nose, throat and eyes which are potential routes for transmission are within 30–60 cm of the patient's upper respiratory tract [22, 23]. During aerosol-generating procedures, as the otorhinolaryngologist goes closer to the patient, particle density increases exponentially due to the diffusion principle [24]. Based on these findings, otolaryngology

organizations and other ENT groups recommend a higher level of protection than what public health agencies recommend [25].

Similarly, surgeries of the upper aerodigestive tract, especially tracheotomy, are high aerosol-generating procedures. A study during SARS-COV-1 showed that health care workers in China who performed tracheotomy had 4.5 times greater odds of contracting the virus than controls who did not perform tracheotomy [21]. We performed five tracheotomies, where steps like completely paralyzing the patient and cessation of ventilation just before opening the trachea until inflation of the inserted tracheotomy tube were taken to minimize aerosol generation. Diathermy was used minimally; care was taken during transfer of patient from the operating room to the intensive care unit.

Though literature recommends preoperative COVID testing for all patients undergoing surgery, testing of asymptomatic patients awaiting surgery is not always possible, as the government recommendations in our country still do not include routine preoperative testing in their list of testing criteria. In the absence of testing facility, the above suggested protocol will be helpful while performing surgeries even after the lockdown period ends in order to minimize the risk of hospital transmission of infection and increase the safety of patients and healthcare workers.

Conclusion

Lockdowns, while effective in reducing transmission of infection in a pandemic situation, negatively impact routine healthcare services. Formulating a clear workflow pattern with prior planning about all aspects of triage, examination and management of non-COVID patients will help ensure that emergencies get timely and appropriate attention. It is also important to take full precautions to avoid possible spread of infection to keep healthcare personnel and other

patients safe. These protocols may still be relevant after the lockdown ends for as long as the pandemic scenario persists.

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Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical Standards This case series was approved by the Institutional Ethics Committee of Apollo Hospitals, Bangalore.

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