

## Is it Safe to Perform Rigid Bronchoscopy in Pediatric Foreign Body Aspiration During Covid-19 Pandemic?

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### Abstract

Paediatric foreign body aspiration is a potentially life threatening condition, requiring its management on urgent basis. It can have a variable presentation, from asymptomatic to respiratory compromise, arrest to even death. In all suspected cases of foreign body aspiration, rigid bronchoscopy under general anaesthesia is the gold standard treatment. But unfortunately during Covid-19 pandemic, as rigid bronchoscopy generates high aerosols it increases the risk of transmission to health care professionals performing it. We are presenting a cases series of ten cases of the paediatric foreign body aspiration managed by rigid bronchoscopy during Covid-19 pandemic. We are also describing the anaesthesia preparation and steps during bronchoscopy and trying to see the reasons behind sudden surge in such cases.

**Keywords:** Paediatric; Foreign Body Aspiration; Rigid Bronchoscopy; Covid-19

### Introduction

Corona virus Disease-19 (COVID-19) was declared pandemic by WHO(World Health Organization) on 11 March 2020 [1]. First case of COVID-19 in India was confirmed on January 2020 and nationwide complete lockdown was enforced on 25 March 2020 to break the transmission chain [2]. Till compilation of this manuscript India is third highest numbers cases of confirmed COVID 19 (more than 44 million) and our state with a population of seven million had around 2million cases.

Transmission of COVID 19 infection is via droplets, fomites and aerosols. Droplets are larger fluid particle and they travel lesser

distances while aerosols are smaller fluid particles, hence more likely to spread. Though this infection is affecting mainly the adult population, infection rate among paediatric age group is increasing. In China it is reported around 1% while in United states it was around 5% [2]. It is either asymptomatic (15%) or is a milder form of infection (25%) [3] so risk of transmission to Otolaryngologist performing rigid bronchoscopy (RB) is high.

Foreign body aspiration (FBA) is commonly seen in paediatric age group, especially 1-3 years and is one of leading cause unintentional deaths in under 12 months age group [4]. RB is treatment of choice for retrieval of such foreign body and is performed under general anaesthesia (GA) [5]. RB along with

other airway procedures like laryngoscopy and intubation are aerosol generating procedures (AGP). These aerosols can remain suspended for a longer time and can spread to a larger area. So they increase the risk of transmission of infection to the health care professionals performing such procedures. Also RB is performed under GA with an open circuit and air can leak through side ports during the procedure, it carries one of the highest risk of transmitting infection. Hence its indications in Covid pandemic, need to be very carefully chosen and should be performed only in extreme emergency conditions like FBA but with proper precautions and safety measures.

Lockdown, which was enforced in India during the first wave of the Covid-19 pandemic, as a method to breakdown the transmission chain but its prolonged duration has a negative effect on the psychological aspect of children and adolescents [2]. It has been reported recently in the literature that lockdown has increased the feeling of worry, fear, nervousness and self-isolation especially in children. Prolonged confinement at home and restricted outdoor activity has negatively impacted the physical and mental health [6].

Our hospital is a tertiary care hospital and is performing paediatric airway procedures since 2016. Our team was used to manage the paediatric FBA by performing the rigid bronchoscopy and prior to COVID-19 pandemic were performing 10-12 cases annually on average which comes to 1 case every month. However, in the year 2020, from March to May in three months duration (Lockdown period), we suddenly witnessed a surge in FBA cases and 12 cases, which was almost four times the average number of cases. All cases were successfully managed by rigid bronchoscopy under general anaesthesia with precautions guidelines prepared by our hospital. But these events have led us to evaluate the reasons for the surge in FBA cases, were precautions taken by the team adequate and what are the latest guidelines adopted worldwide? Also, to assess the feasibility of incorporating these into our setting with a aim of reducing the transmission of the virus among health professionals during such procedures.

## Materials and Methods

Our institute is a tertiary care hospital with 900 bedded established in 2007 and is currently equipped with facility for paediatric airway procedures. Paediatric Intensive care unit (PICU) and team including trained Otolaryngologist (SK), trained

Anaesthetists (VV) and supported staff are well versed with procedure. During lockdown the routine Outpatient department (OPD) and routine surgeries were suspended and only emergency cases were performed. Our hospital has a dedicated Flu corner, where all cases were initially screened through questionnaire about any symptoms of fever or cough and any history of contact or travel. Suspected cases were shifted to Severe acute respiratory infection ward (SARI) where testing for COVID-19 is through RT-PCR test (reverse transcriptase polymerase chain reaction). Positive cases were initially shifted to dedicated COVID centres but as numbers of cases increased they were home quarantined. Non-suspected cases were seen in emergency and consulted respective departments.

The FBA aspiration in children during COVID-19 poses a unique issue and a core team consisting of Otolaryngologist, anaesthetist, paediatrician, OT staff had formulated guidelines for emergency paediatric airway during COVID-19 pandemic. This was to effectively manage such cases and also to reduce risk of transmission to hospital staff. All children were presented with clear history of aspiration and were showing signs and symptoms of obstruction, hence had to be managed on urgent basis. All cases were male children and mean age was 5.6 years (range 2-12). They all were initially screened at flu corner and they all were non-suspect. The RT-PCR testing was not performed, as it usually takes 24-48 hours for result to come. X-ray chest confirmed foreign body in one case (metallic screw) (Figure 1), while in four cases was suggestive of obstruction (Figure 3) and in rest of five cases it was inconclusive. They all were immediately shifted to PICU and oxygen supplementation was given by nasal prongs under surgical mask. Four cases were accompanied by parents, among them two were of middle class and educated while two parents were uneducated. Rest of six children were accompanied by their relatives as their parents were away from home, however all were informed telephonically before bronchoscopy.

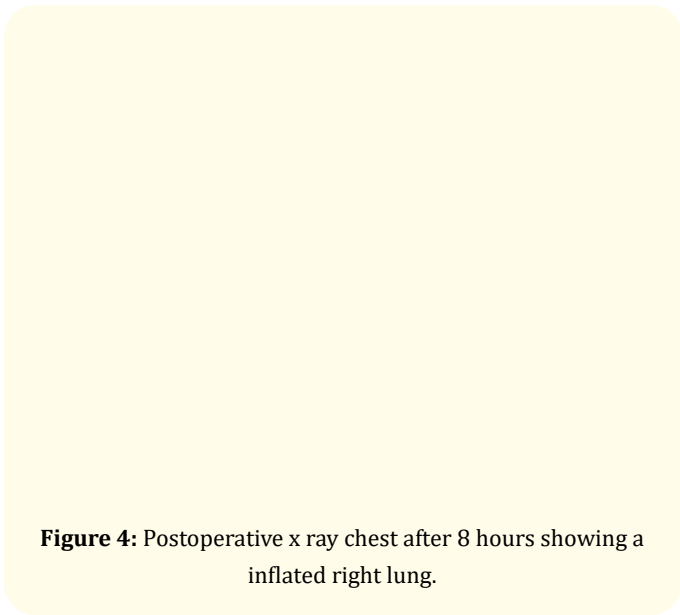
All patients were treated with presumption of positive infection and necessary precautions were taken. All were sampled by RT-PCR for Covid-19 infection, however results were not ready before bronchoscopy. The anaesthesia team was alerted and discussion with core team regarding checklist, steps of procedure, expected time and complications were discussed in detail. An informed high risk consent of procedure was obtained from parents.

**Figure 1:** Preoperative x-ray chest showing a radio opaque foreign body (black arrow) in right bronchus with collapse of right middle and lower lobe.

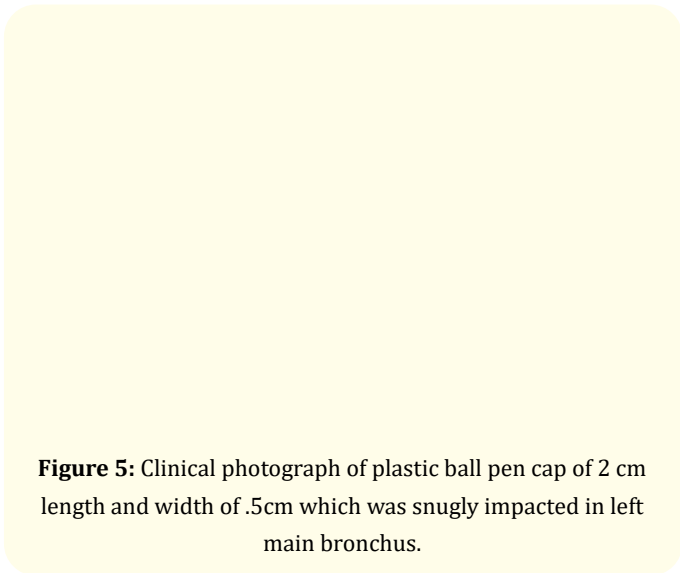
**Figure 2:** Clinical photograph of foreign body metallic screw of 1.5 cm size.

**Figure 3:** Preoperative x-ray chest of 12 years old child with complete collapse of left side lung and sudden obliteration of left bronchial air shadow (black arrow).

The equipment's and instruments were checked before shifting the child. All procedures were performed in designated Covid-19 OT and in order to reduce the numbers of persons in OT, only attending Otolaryngologist (SK), Senior anaesthetists (VV), one senior resident, one OT technician, one staff and circulating nurse were allowed inside. All wore PPE (personal protective equipment's) which include N95 Mask, Gown, double gloves and face shields. The child was shifted to dedicated operating theatre (OT) with surgical mask and nasal prongs for oxygen alone. The patient was draped in disposable C arm sheets and the anaesthesia was planned spontaneous assisted ventilation. The patient monitoring devices e.g. pulse-oximetry, electrocardiogram, non invasive blood pressure monitoring was applied. Pre oxygenation with adequately fitting mask was done for 3 minutes cautious intravenous induction with fentanyl 1 microgram/kg and propofol 0.5 mg/kg slowly started and spontaneous ventilation was maintained. Anaesthesia plane was further deepened by sevoflurane in 100% oxygen. The patient was handed to surgeon and larynx was visualized by video-laryngoscope and appropriate size rigid bronchoscope was introduced with Hopkins rod (0°) with connection to monitor for visualization of airway. The side port was immediately connected to Jackson Rees T-piece for ventilation and glass slide was applied to prevent gas leak. The trachea, carina and bronchus were carefully examined and once foreign body was localized and optical forceps were used to retrieval. Bronchoscope and forceps were withdrawn together and patient was handed over to anaesthetist for ventilation. The anaesthesia was maintained with intermittent boluses of injection ketamine 0.5 mg/kg and propofol 0.5 mg/kg. The check bronchoscopy was performed similarly in all cases to look for any trauma, bleeding or other foreign body. The injection dexamethasone 0.5 mg/kg, maximum 12 mg I.V. was given to minimize edema of airway which is expected due to foreign body or due manipulation. The average time taken for procedure was 15 minutes. The patient shifted back to PICU. The sheets were discarded and equipments and instruments were sprayed with sanitizing agents, cleaned and autoclaved. PPE were doff down and OT was closed down for 30 minutes and disinfected as per guidelines. In PICU postoperative x ray chest was done all the cases to assess the expansion of lung and rule out any lung injury (Figure 4). Foreign body were metallic screw (Figure 2), plastic ball pen cap (Figure 5), Peanut (n = 2), food particles (3) and seeds (n = 2). Foreign body was on right bronchus (n = 5), left (n = 3) and in trachea (n = 2). All did well post-operatively and were given I.V. antibiotics during stay in hospitals and were closely monitored. All were discharged after 48 hours and were followed



**Figure 4:** Postoperative x ray chest after 8 hours showing a inflated right lung.



**Figure 5:** Clinical photograph of plastic ball pen cap of 2 cm length and width of .5cm which was snugly impacted in left main bronchus.

up telephonically. We monitored all the staff involved in these procedures for any COVID signs and symptoms, fortunately none became symptomatic.

### Discussion

Pandemics has been part of human history since ages and first use of quarantine was practised in United Kingdom for plague, but the term quarantine was used in 1127 in Italy for leprosy [7]. In COVID-19 pandemic lock down and quarantine enforced to break transmission has impacted psychologically especially children, children as young as 2 years are aware of changes around them

and become unsettled and upset [8]. Though we have not assessed our patient and their parents about the psychological status and effect of lockdown but almost tenfold increased numbers of cases of FBA say it otherwise. As this age group constitutes around 42% of world population, it is better to assess the psychological effects OVID 19 and start programmes to mitigate its effect [9].

FBA in children is real time emergency requiring a prompt diagnosis and treatment in form retrieval by RB. In era corona pandemic, it definitely carries a very high risk of transmission of infection to health care workers. In order reduce risk various strategies should be planned. We have placed a plan of action in cases high AGP procedure like RB are as following-

- Screening of all patient including emergency at Flu corner and to isolate or perform testing in all suspected cases.
- Possible use of CT scan or virtual bronchoscopy in suspected cases when child’s vitals are stable, in order to reduce exposure risk of bronchoscopy.
- Dedicated OT for suspected cases and Team formation for

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