

A Retrospective Study of Rigid Bronchoscopy in 58 Paediatric Cases with Acute Respiratory Distress

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Abstract:

Context:

Rigid bronchoscopy has been time tested modality for management of acute respiratory distress, especially in paediatric cases of foreign body in bronchus. However, there still persists dilemma regarding its application in conditions other than foreign body bronchus.

Aims:

To explore extended indications of rigid bronchoscopy in paediatric cases with acute respiratory distress .

Settings and Design:

Retrospective study of rigid bronchoscopy performed in paediatric cases with acute respiratory distress from January 2006 to July 2011 at tertiary care centre in India.

Methods and Material:

All 58 paediatric cases who underwent emergency or elective rigid bronchoscopy for acute respiratory distress between January 2006 to July 2011 were included in the study.

Results:

Out of the total 58 cases included in our study, 35 (60%) patients had foreign body aspiration history and 23(40%) had no history of foreign body bronchus. However, while doing rigid bronchoscopy in the latter cases, foreign body was found in 5 patients whereas 18 had secretions and mucus plugs. All 23 patients had swift clinical recovery after the procedure.

Conclusions:

All paediatric cases presenting with acute onset of respiratory distress without history suggestive of foreign body aspiration should also be assessed by a diagnostic rigid bronchoscopy if they do not improve within 48 hours of medical treatment. Early diagnosis and intervention is the key to successful management.

Index terms:

Rigid bronchoscopy, wheeze associated lower respiratory tract infection (WALRI), foreign body bronchus

Key Messages:

If performed skilfully, rigid bronchoscopy proves to be a life-saving procedure in conditions simulating foreign body bronchus in paediatric patients. The unnecessary delay in doing this procedure due to its invasive nature may worsen the prognosis and hence it should be a part of standard protocol for management of paediatric acute respiratory distress.

I. INTRODUCTION

Dr. Gustav Killian, who introduced rigid bronchoscopy to the world, once famously quoted that "One must have had the experience of seeing a child that at 4pm aspirated a little stone, and that, after the stone has been bronchoscopically removed at 6pm, may happily return home at 8pm after anaesthesia has faded away. Even if bronchoscopy was ten times more difficult as it really is, we would have to perform it just for having these results". This speaks volumes of the procedure and its success in treating foreign body bronchus.¹

Rigid bronchoscopy is the trans-oral or trans-tracheotomy passage of rigid instruments for diagnostic or therapeutic purposes in the tracheobronchial tree. The practice of rigid bronchoscopy greatly decreased following the invention of the flexible bronchoscope². But the value of rigid bronchoscopy in paediatric patients with severe atelectasis, pneumonia and wheeze associated lower airway infection (WALRI) has been a matter of great confusion. Although bronchoscopy may not be indicated as an initial procedure to remove respiratory tract secretions, it may provide a beneficial option in cases where less invasive methods prove to be ineffective in removing secretions and mucous plugs³. The rigid bronchoscope provides superior airway control especially in cases of significant airway bleeding. It is also superior to flexible bronchoscopy for removal of foreign bodies in bronchus. For acute central airway obstruction (CAO), rigid bronchoscopy is the airway stabilization procedure of choice⁴.

The aim of the study was to direct the focus of surgeons to this procedure of rigid bronchoscopy especially in acute respiratory distress in paediatric patients.

II. SUBJECTS & METHODS

Fifty eight paediatric patients, all less than 14 years of age, who presented with acute respiratory distress to our tertiary care centre between January 2006 and July 2011 were included in our study. All cases were clinically evaluated and investigated by consultant ENT surgeons and Paediatrician in

emergency department. After initial resuscitation, blood investigations and chest X ray PA view were done.

In 35 out of 58 cases with preceding history of foreign body ingestion and radiological finding suggestive of atelectasis, emergency diagnostic and therapeutic rigid bronchoscopy was conducted. Post procedure child was monitored clinically and radiologically in ICU with antibiotics and supportive care (Venturi mask oxygen administration, age and weight adjusted tapered steroid) in association with paediatrician for minimum of 24 hours.

In cases without classical history of foreign body ingestion, primary treatment was conferred by paediatrician in ICU with supportive care (Venturi mask oxygen administration, steroid & antibiotics). Deterioration or non-improvement of clinical and/or radiological condition of child was considered as indication for elective diagnostic cum therapeutic rigid bronchoscopy. Post procedure treatment was continued as described above.

All rigid bronchoscopies were performed under apnea hyperventilation technique of general anaesthesia. Patient positioned supine with extension of neck and placement of shoulder bag. Age matched size of rigid bronchoscope was introduced and tunnelled through trachea, carina and into the respective bronchus. The forcep space is judged and with appropriate instrumentation the foreign body was removed in minimum attempts to avoid laryngeal edema. Tracheostomy was carried out if procedure required multiple attempts or there was persistent fall in oxygen saturation. Such patients were weaned off of tracheostomy in 7 days.

III. RESULTS

Out of total 58 cases of acute respiratory distress we considered all children with history of foreign body ingestion as Group 1 and those without obvious history of foreign body ingestion as Group 2.

Demographic data:

Table I: Age statistics

| Group 1 (age in years) | Group 2 (age in years) |
|------------------------|------------------------|
| Mean | 4.2 |
| | 6.4 |

Table II: Gender statistics

| Group 1 (n=35) | Group 2 (n=23) |
|----------------|----------------|
| Males | 24 |
| Females | 11 |
| | 11 |

Table III: Type of foreign body

| Group 1 (n=35) |
|-----------------|
| Vegetative – 22 |
| Metallic -- 13 |

Table IV: Bronchus involved

| Group 1 (n=35) |
|----------------|
| Right |
| 22 |

| | |
|--------------------------|----|
| Carina and left bronchus | 13 |
|--------------------------|----|

Table V: Tracheostomy required

| Group 1 (n=35) | Group 2 (n=23) |
|----------------|----------------|
| Yes | 6 |
| No | 29 |
| | 12 |

On analysing the retrospective data certain observations noted are as follows

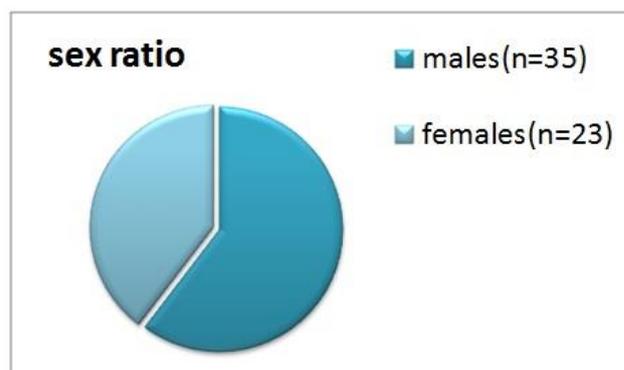


Figure 1: Gender distribution

It was noted that of total n=58 cases included in study, 23 cases had no history of foreign body whereas 35 cases had positive history of foreign body and which was retrieved on rigid bronchoscopy in all cases. However out of the 23 cases which were taken for bronchoscopy based on clinical suspicion of surgeon, 5 cases were such that foreign body was retrieved even though no obvious history of same noted suggesting old and accidental ingestions while the rest 18 cases had retained secretions. These secretions were secondary to infective pathology in 8 cases and inflammatory in 10 cases. In terms of percentage 40% cases had no history of foreign body but were subjected to the procedure for diagnostic purpose and turned out to be therapeutic. From this 40%, 22% presented foreign body at the time of bronchoscopy and 78% were a combination of secretions of pneumonia 35% and asthma /WALRI 43%.

In the above data we can see that cases without history of foreign body but presenting with acute respiratory distress were treated by therapeutic bronchoscopy by removing the accidentally noted foreign body and secretions of pneumonia, the only patients subjected to this invasive procedure with little benefit were asthma and WALRI. Hence risk benefit ratio favours towards the treatment. Benefitted patients were 57% cases versus 43% risked to the procedure of bronchoscopy ie cases with asthma and WALRI.

Major Observations are as follows :

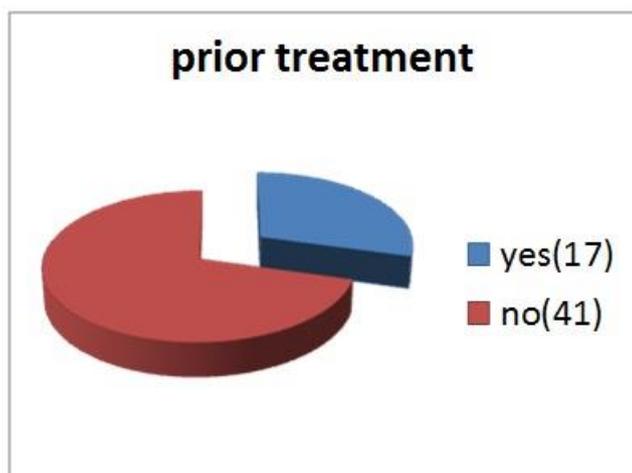


Figure 2: Past history of treatment at other centre on presentation.



Figure 5: Unilateral collapse of lung

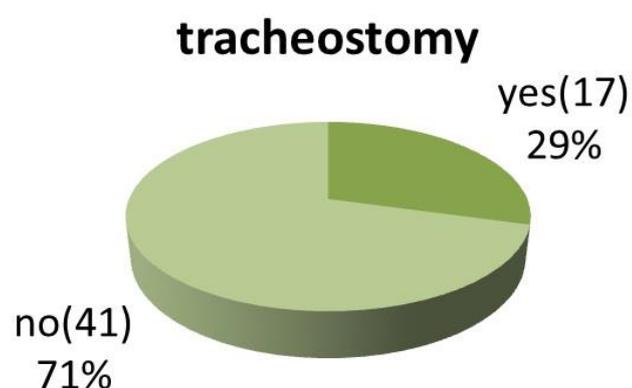


Figure 3: Distribution of patients undergoing tracheostomy

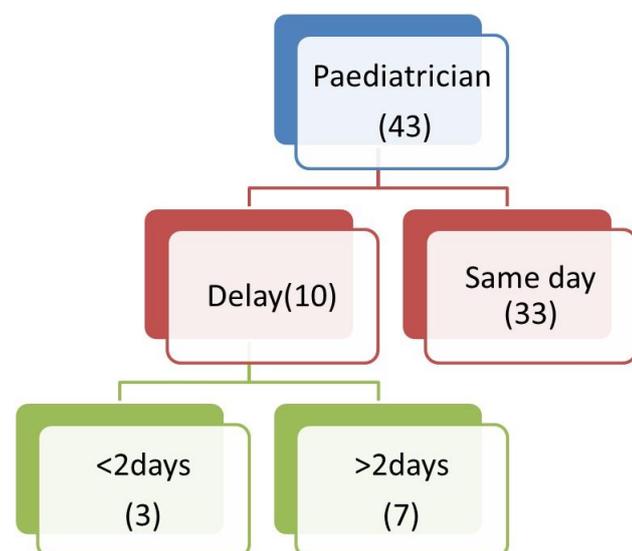


Figure 4: Paediatrician referral of cases and delays in same.

On analysing radiological data of the above patients it was concluded that unilateral collapse (figure -5) was a definitive indication for rigid bronchoscopy but a unilateral focal radio opaque shadow if not resolved with higher antibiotic and ICU management, a check bronchoscopy is indicated.

Other important findings were:

The most common foreign body were vegetative foreign body of which peanuts and seeds of imli maximally encountered. Both were notorious in management, as these foreign bodies have hydrophilic action and swells up.

The cases without foreign bodies were the ones presenting with mucous plugs and thick secretions blocking the secondary bronchioles, a meticulous suction was performed for same on bronchoscopy.

Tracheostomy was done for 17 cases out of 58 as a sequelae to bronchoscopy but were weaned off within average period of 7 days.

IV. DISCUSSION

In India, the most commonly reported use of rigid bronchoscopy is for foreign body removal.

Diagnosis largely depends on the first physicians to see the patient because clinical history is the most important element to make diagnosis of FBA (foreign body aspiration). In the literature, history has been considered an important diagnostic method.^{5,6,7} A witnessed episode of choking is considered to be an important component of the history that leads to the correct diagnosis of aspiration. A history of choking episode can usually be obtained from parents or caretaker. Stridor is a common symptom in infants. However, the chances of missing significant structural pathology in the airway are high if the stridor is severe, persistent, associated with apnoea, failure to thrive, an abnormal cry and a prior ventilated child. Endoscopic examination of the airway is indicated in this group of children.⁸ Unilateral or unresponsive wheeze may also indicate structural abnormality in the lower airway or even an inhaled foreign body and bronchoscopy is a logical investigation of these symptoms. Persistent cough is a common paediatric symptom. If it is refractory to treatment, bronchoscopy may be indicated but the diagnostic value is relatively low in the absence of other symptoms or signs, for example haemoptysis, persistently productive cough, localised wheeze, or radiological abnormalities. In a child with intractable symptoms bronchoscopy can be of great reassurance, even if normal. Bronchoscopy is indicated for

persistent atelectasis. If radiological changes persist despite apparently adequate treatment, bronchoscopy should be considered to exclude a foreign body and obtain specimens for microbiological and cytological examination. Extensive atelectasis in young children will usually respond to selective bronchoalveolar lavage and suction. Inhaled foreign bodies can be remarkably capricious and may present with any of the symptoms discussed above⁹. The presence of a foreign body in the tracheobronchial tree cannot be excluded without bronchoscopy. When the history is suspicious bronchoscopy should be performed promptly.

Retrieval of foreign bodies with a flexible bronchoscope is extremely difficult and this is regarded as one of the few absolute indications for rigid bronchoscopy. Bronchoscopy has become a valuable tool for the investigation of pulmonary infections. Bronchoalveolar lavage has a high yield in three particular groups of children: the immunosuppressed, children who fail to respond to broad spectrum antibiotics, and children who present with symptoms suggestive of an atypical pneumonia^{10,11,12}. Bronchoalveolar lavage can be directed to areas of radiological abnormality.

In our study we saw 43 patients primarily presented to paediatrician with delay of 10 days on an average before otolaryngologist came into managing the cases. The golden period of 48 hours was lost in 7 cases whereas rest 3 cases were timely intervened and managed. Fortunately no fatal complication occurred due to delay in treatment.

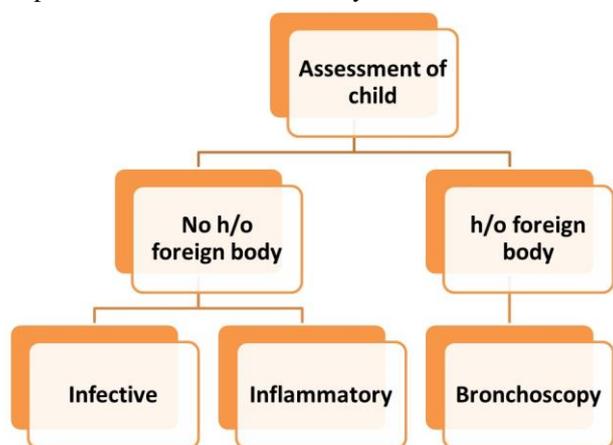


Figure 6 : Protocol for management of paediatric cases of acute respiratory distress.

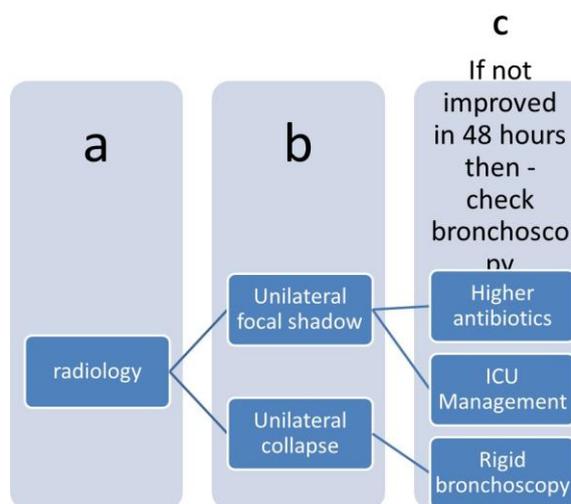


Figure 7 : Radiological protocol for management of paediatric cases of acute respiratory distress.

V. CONCLUSION

To summarize, rigid bronchoscopy should be included in the standard protocol for management of paediatric cases of acute respiratory distress Figure-6 &7. On presentation from history and clinical signs if suspicious of foreign body straight away head to rigid bronchoscopy if not then keeping the probable infective and inflammatory respiratory pathologies as diagnosis and manage patient on medical lines. After 48 hours of medical intensive care management, perform a check bronchoscopy. Hence as a surgeon we should remember that all cases of stridor are not foreign body and not all foreign body present as stridor making bronchoscopy an essential investigation. Early diagnosis on high index of suspicion is the key to rewarding results of paediatric rigid bronchoscopy

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