Wire-Aided Reintubation Following Rigid Bronchoscopy: A Safe Technique

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The management of a neonate with a known difficult airway is a challenge to any clinician. We report a four-day-old neonate with a known difficult airway, who presented to us for rigid bronchoscopy. We used an innovative, economical and easily available adult central venous line guidewire to secure the airway and reintubate the child.

Key words: *Child, Guidewire, Difficult airway, Rigid bronchoscope.*

The management of a neonate with a known difficult airway is a challenge to any anaesthesiologist. There is always the fear of loss of control over the airway and difficult reintubation following rigid bronchoscopy. Preparation, therefore, should include a plan for safe reintubation. We report a case of a four-day-old neonate who presented to us for rigid bronchoscopy and an innovative technique to secure the airway and reintubate the child.

CASE HISTORY

A four-day-old neonate presented to our hospital for evaluation of the airway using a rigid bronchoscope. The neonate was full-term and delivered by cesarean section for fetal distress. He had poor respiratory effort and bradycardia at birth and required endotracheal intubation. The initial attempts for endotracheal intubation by a pediatric resident failed. The airway was finally secured with a 2.5 endotracheal tube (ETT) after multiple traumatic attempts by a senior pediatrician. The neonate was ventilated and shifted to our center on the fourth day for evaluation of airway congenital anomalies. The systemic examination was normal and the neonate was breathing spontaneously and moving all limbs. The chest *X*-ray confirmed the position of the endotracheal tube and no abnormality was noted. The pediatrician who intubated the child was contacted and he opined that it was an extremely difficult airway to access as there was probably an anatomical distortion and blood in the upper airway. The prenatal ultrasound scans did not indicate any anomalies. The risk of losing control of the airway was discussed with the surgeons and a backup plan tracheostomy was made, if reintubation was difficult.

On arrival to the theatre and under routine monitoring, the child was induced with sevoflurane 1-6% in 100% oxygen. A leak test was performed and an audible air leak was found around the ETT at pressure of less than 15 cm H_2O. Direct laryngoscopy with a miller 1 blade showed intraoral edema and only the tip of the epiglottis could be visualized. Anticipating a difficult airway, we did not paralyse the child and introduced a central venous line (CVP) guidewire (60 cm and 0.89 mm) into the ETT to the length of approximately 15 cm. Extubation was done over the guide wire and a size 3 ventilating rigid bronchoscope was introduced into the trachea by the side of the guide wire. On bronchoscopy, no congenital anomalies were revealed, except for glottic edema and the guidewire had not caused any injuries. At the end of the procedure, direct laryngoscopy was done and the larynx was visualized with a Lehane and Cormack grade 3 view and the trachea was reintubated easily with a 3.5 ETT railroaded over the guidewire. ETT placement was confirmed by auscultation and capnography. A leak test was performed and an audible leak was present at pressure of 20 cm H_2O. The neonate was shifted to the Neonatal Intensive Care unit after the return of spontaneous breaths and ventilated postoperatively. The neonate was nebulised with adrenaline and parenteral steroids were administered post procedure. Post-operative chest *X*-ray had no radiological abnormalities. He had an uneventful recovery and was extubated after two days.

DISCUSSION

Rigid bronchoscopy is a safe technique in the neonatal/ infant period for the diagnosis of airway pathology and it

directs early management of these cases [1]. It gives an excellent view of the large airways, but requires general anaesthesia/sedation and the neonate has to be extubated to introduce the bronchoscope. Reintubation may be a challenge in neonates with a known difficult airway and may end up as a catastrophe if there is a delay in securing the airway.

Reintubation at the end of the procedure by conventional methods in this neonate was anticipated to be difficult because of severe intraoral edema caused by multiple and prolonged airway instrumentation, also due to the suspicion of congenital anomalies. In addition the neonate had not received any steroid to reduce airway edema at the referring hospital. Dexamethasone in a dose of 0.25-0.5 mg/kg iv; 3-5 doses starting at least 6-12 hours is indicated for elective extubation of "high risk" neonates, before extubation [2]. We have used a guidewire to prevent the loss of airway, to serve as a guide for rigid bronchoscopy and to facilitate endotracheal intubation at the end of procedure without interfering with the rigid bronchoscopy.

Guidewires have been safely used in many scenarios for facilitating endotracheal intubation. The CVP guidewire has been used as a guide for changing an oral tube to a nasal tube in the absence of sophisticated equipment [3]. They have also been used for retrograde intubation in infants as young as one month [4]. Scherlitz and Peters [5] have reported two cases with difficult airway, where a guidewire was left in the trachea postoperatively for assisting in rapid reintubation in the immediate postoperative period, if required. Guidewires have been introduced anterograde through the Laryngeal Mask Airway for subsequent endotracheal intubation [6,7]. Rodriguez, *et al*. [8] used a guidewire through the working channel of the fiberoptic bronchoscope (FOB) for railroading an ETT in a case of Treacher Collins syndrome.

The guidewire is long (60 cm), smooth, and sufficiently rigid to allow "railroading" of tracheal tube over it. The small outer diameter of the guidewire allows a tracheal tube as small as 2.5 mm. A rigid bronchoscope can easily be introduced into the trachea by the side of the guidewire. The guidewire is visible throughout the procedure and the anaesthesiologist has control over its movement or dislodgement. The main disadvantage of this technique is inability to provide supplemental oxygen if there is a delay in reintubation and although it is a blunt wire there is always a small risk of lower airway injuries. We have used the straight end of the guidewire rather than the J tip end as we anticipated that the J tip may get entangled with the rigid bronchoscope or may get entrapped in the bronchi during bronchoscopy. Though there is a small possibility of CVP guidewire related complications (kinking, knotting or perforation), we had to use it as our options were limited. A pediatric FOB or a neonatal airway exchange catheter (AEC) was not available in our institution.

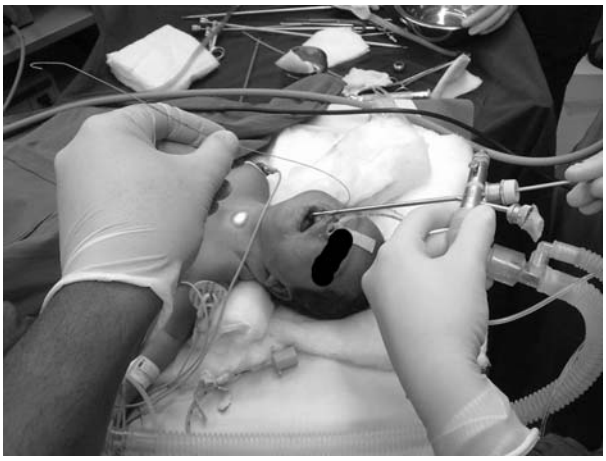

FIG. 1 *The guide wire held in place by the anaesthesiologist. Rigid bronchoscopy being done by the surgeon; transillumination can clearly be seen in the anterior aspect of the neck.*

The use of ultra-thin pediatric FOB for assessment of tracheo-bronchial injuries and congenital abnormalities is a safer alternative to rigid bronchoscopy [9-10]. In a developing country like ours, very few tertiary care centers have an ultra thin FOB. The use of AEC airway exchange catheters (AEC) for difficult extubation is safe technique, but was not feasible in this scenario as the AEC would interfere with space required for introduction of the bronchoscope.

In conclusion, the use of a CVP guidewire to prevent the loss of airway and to reintubate neonates/infants at the end of rigid bronchoscopy is an innovative, safe, cost effective and successful technique.

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Tracheobronchopathia Osteochondroplastica in a 5-year-old Girl

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Tracheobronchopathia osteochondroplastica (TO) is considered an orphan disease with exceptional occurrence in children. We report a 5-year-old female child who was referred to us with chronic cough and recurrent pneumonia. After several investigations, bronchoscopy showed multiple nodules in the tracheobronchial lumen, whose distribution was consistent with TO. The patient was followed for four years, with no change in the pattern of the disease.

Key words: *Tracheobronchopathia osteochondroplastica, Recurrent pneumonia.*

Tracheobronchopathia osteochondroplastica (TO), also known as tracheopathia chondro-osteoplastica or tracheopathia osteoplastica, is a rare chronic disease of undetermined etiology. It stems from osteocartilaginous metaplasia and is characterized by an bronchoscopic finding of multiple subepithelial nodules that project into the tracheobronchial lumen and does not affect the lungs or other organs. The nodules may be present from the larynx to the peripheral bronchi in the anterolateral tracheal wall. In general, the posterior wall is spared. This peculiarity is exclusive of this disease and allows the exclusion of other differential diagnoses. TO is often an endoscopic finding and its prevalence in bronchoscopic studies is estimated to range from 1:125 to 1:6000 [1-3]. To date, less than 400 cases have been reported in the literature, and only four were in children [1,2,4].

Diagnosis can be made from the typical endoscopic finding of the disease, dispensing biopsy [1,5,6]. Biopsy, when done, shows ossification or calcification of the bronchial submucosa [6].

CASE REPORT

A 5-year-old female child with chronic cough and a history of chronic cough and recurrent pneumonia since age 3 years was referred to us. The first episode consisted of right upper lobe pneumonia that progressed to pneumatocele, resulting in a permanent cicatrical atelectasis. The other respiratory infection episodes in the following year were also interpreted as pneumonia but were based, apparently, on a radiographic image that had persisted since the first episode: chronic atelectasis of the left lower lobe and adhesive atelectasis in the right lung. Further examination showed no signs of atopy. Her pulmonary auscultation was normal. The child was HIV seronerative and had a normal immunoglobulin profile. Tuberculin skin test was 6 mm. At the time she was treated as an outpatient and the disease course was favorable, despite frequent coughing and two more episodes of respiratory infection and cervical adenitis treated with antibiotics. At age seven years, she underwent rigid bronchoscopy, which showed widespread nodular mucosal irregularity extending from trachea into bronchial