

A survey of Pediatric Flexible bronchoscopy in India

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Abstract

Background: Pediatric bronchoscopy is an important tool in pediatric pulmonology. However, the practices involved in the procedure are variable. **Objective:** To evaluate prevalent practice and variations in pediatric flexible bronchoscopy in India. **Methods:** An online survey conducted between September 2018 to March 2019 via Google forms. The survey was sent to members of the Respiratory Chapter of IAP, personal contacts, and members of Indian Chest Society. Physicians performing flexible bronchoscopy in children were asked to respond. Survey had 95 questions in seven domains including patient preparation, sedation, procedural aspects, monitoring, bronchoscope cleaning, and complications. **Results:** The survey received 24 (14 in private sector) complete responses from 14 cities. Pediatric bronchoscopy was mainly done for diagnostic purposes. Conscious sedation was used by most (19, 79%). Midazolam plus fentanyl 9 (37.5%) was the preferred sedation regimen. Routine atropine was used by 4 (16%). For topical anaesthesia- nebulized only, both nebulized and spray as go, and spray as go lignocaine only was used by 1 (4.2%), 6 (25%), and 17 (71%) centres, respectively. The methods of providing oxygen during bronchoscopy were free flow (9,37.5%), nasal prongs (8,33.3%), mask (6,25%), and LMA (1,4.2%). Therapeutic procedures included removal of mucus plugs (17, 71%), bronchoscopic intubation (11, 45%) and foreign body removal (10, 41%). The suction for BAL included wall mounted suction in maximum (15, 62.5%). The number of aliquots for BAL varied from 2-6 and volume for each aliquot also varied (1-2 ml/kg or 5-10 ml). The complications rate of less than 5 % was reported by almost all. **Conclusion:** There is large variation in pediatric flexible bronchoscopy practices across the country highlighting the need to develop a uniform guideline.

Introduction

Flexible bronchoscopy is an important procedure in pediatric pulmonology and many centres across India have started performing this procedure. However, the practices involved in the procedure are variable and standard guidelines are not available. It is important to have a standardized procedure for optimal output. The first step in this direction is to assess the current practices. There are surveys regarding bronchoscopy in adults from various countries like Canada (1), UK (2), Japan (3), Australia and New Zealand (4), and India (5). There is hardly any survey exclusively for pediatric bronchoscopy. Guidelines for pediatric bronchoscopy are available (6) (7), but it is little known, how much they are followed.

We conducted a survey to evaluate prevalent practice and variations in pediatric flexible bronchoscopy practices in India. The survey also aimed to compare current pediatric flexible bronchoscopy practices with published guidelines.

Methods

The pediatric bronchoscopy survey was an online survey via an email link. It was sent to members of the Respiratory Chapter of Indian Academy of Pediatrics (IAP) and those performing pediatric flexible bronchoscopy were asked to complete the survey. The same survey email was also sent to members of Indian Chest Society of adult pulmonologists to know if they were doing flexible bronchoscopy in children. Authors also sent emails to their personal contacts doing pediatric flexible bronchoscopy.

The survey had 95 questions in following seven domains: (A) Demographics, (B) Patient preparation, (C) Sedation/Anesthesia, (D) Bronchoscopy procedure, (E) Bronchoscope cleaning, (F) Monitoring during and after procedures, and (G) Complications (Supplementary file S1). The questions for survey were decided by bronchoscopy guidelines and questions used in previous adult bronchoscopy surveys.

A “Google form” was created using Google interface for the online survey. Questions were yes/no type, multiple option questions and space for additional information was also provided. A trial run was done where authors themselves completed the survey to identify any difficulty in completing the survey. The survey link was sent within 2 weeks to all and kept open for the next 3 months to collect the responses. A reminder was sent after 1 month. The participation in the survey was voluntary and no incentives were offered to the participants for responding. The study was approved by Institute Ethics Committee.

Statistics

The categorical variables were presented as percentage and continuous variables as mean (SD) if normally distributed or as median (IQR) if not normally distributed. Chi-square test, Fisher exact test, t-test, Mann-Whitney test, analysis of variance (ANOVA), and Kruskal-Wallis tests were used as appropriate. We used the STATA version 12 software for statistical analysis.

Results

We emailed the survey to 256 members of respiratory chapter of IAP including personal contacts and 336 to members of Indian Chest Society. There were 48 and 89 wrong emails for respiratory chapter of IAP and members of Indian Chest Society respectively. Seven replied that they were not doing pediatric flexible bronchoscopy. We received a total of 27 completed survey. Out of these, three were from outside India (two from United Kingdom and one from Nepal) and were excluded. We included 24 responses from India for this study.

Demographic profile : It is shown in Table 1. All except one had right hand as dominant hand. Maximum [9, (37.5%)] were from Delhi, three (12.5%) from Jodhpur (Rajasthan) and remaining 12 were one each from 12 different cities of India including Pune (Maharashtra), Mumbai (Maharashtra), Lucknow (Uttar Pradesh), Kanpur (Uttar Pradesh), Coimbatore (Tamilnadu), Srinagar (Jammu and Kashmir), Bangalore (Karnataka), Eluru (Andhra Pradesh), Vijayawada (Andhra Pradesh), Mandi (Himachal Pradesh), and Thiruvalla (Kerala). Name of city was missing in one response.

The median (IQR) number of years for which bronchoscopist were performing pediatric bronchoscopy was 3.5 (2,8) years with a range of one year to 28 years. Fourteen (58.3%) had experience of less than 5 years, 3 (12.5%) each had an experience of 5-10 years and more than 10 years. The median (IQR) number of total bronchoscopy and bronchoscopy in last one year was 75 (25, 428) and 25 (15,45) respectively with range of 10 to 1000 and 5 to 230 respectively. Six (25%) were also doing bronchoscopy in adults and four (16.7%) were also doing rigid bronchoscopy. Three (12.5%) were performing endobronchial Ultrasound (EBUS).

Patient preparation and monitoring: The patient preparation and monitoring details are summarized in Table 2. All the respondents took written informed consent and filled checklist for bronchoscopy. There is high variability in use of drugs for patient preparation (Table 2).

Sedation/anesthesia (Table 2): Pre-procedure institution of xylocaine was universal but the site of instillation differed. Mostly used conscious sedation, but choice of sedative agents and person administering the sedation varied markedly (Table 2).

Procedural aspects (Table 3): Mostly held the bronchoscope in left hand and stood behind the patient while performing the bronchoscopy. Oxygen was routinely supplemented by most but the method of delivering oxygen was variable (Table 3). The quantity of saline used for BAL was also variable ranging from fixed 5 ml or 1 ml to 2 ml/kg and number of aliquots also varied from 2 to 6 aliquots (Table 3). Type of assistant varied from trained pediatric pulmonologist or trained nurse or pediatric resident or a fellow or lab technician or anesthetist.

Bronchoscope cleaning and disinfection (Table 4): Again, there was wide variation in doing cleaning of bronchoscope, frequency of leak test, duration of disinfection and storage of the bronchoscope (Table 4).

Post procedure monitoring was done till child regains full consciousness by 18 (75%) respondents. The approximate rate of overall complication was reported to be <5%. Most common complications observed were transient desaturations, bleeding from nose, tachycardia and tachypnea.

Discussion

We reported one of the first pediatric flexible bronchoscopy survey from India and found that there is highly variation in the bronchoscopy practices. There is no uniform protocol for sedation, amount, and number of aliquots for BAL etc. The therapeutic procedures using flexible bronchoscope are being done very rarely in children.

Pediatric pulmonology is an emerging subspecialty in pediatrics. To our knowledge there would be around 40 physicians who are performing pediatric flexible bronchoscopy all over the country. The results of this survey showed that most of the respondents were based in major cities of the country and majority of them were young with an experience of less than 5 years. This reflects the paucity of pediatric bronchoscopy services, but gradually the services are expanding.

The common indications for which bronchoscopy was performed were evaluation of airways, obtaining bronchoalveolar lavage and removal of mucus plugs. Very few respondents were removing foreign body and none were putting stents. Congenital anomalies and airway malformations still remains the major indication of bronchoscopy in children as against adults in whom diagnostic and therapeutic bronchoscopy (airway examination, lavage, washings, TBNA, or biopsies) are the major indications (5). Therapeutic and interventional bronchoscopy is less frequently practiced in pediatrics probably due to several factors such as the risks involved in small child, need for general anesthesia, size of airway and the expertise of the bronchoscopist limiting the interventions. Pre procedure nebulization with bronchodilator, prophylactic antibiotics and routine atropine use was also observed in few. Pre medication with atropine is not recommended now as there isn't enough evidence to support its use (8). Similarly, nebulization with bronchodilator and prophylactic antibiotics are not recommended as a routine.

The majority of respondents were doing bronchoscopy under conscious sedation; however, the choice of sedation was quite variable. Similar observations were made in adult bronchoscopy surveys as well. In adults a large number of respondents performed bronchoscopy without sedation in our country as well as other countries. In Indian survey of bronchoscopy practices in adults, bronchoscopy was performed only under topical anesthesia and without any conscious sedation in 59% of patients whereas in our study almost all performed bronchoscopy under some form of intravenous sedation (5). The reason for this is obvious as children are not cooperative as adults and also that sedation facilitates the performance of bronchoscopy and improves tolerance to the procedure providing a comfortable environment for both patient and bronchoscopist. There are no guidelines regarding use of sedation in pediatric bronchoscopy and there is controversy regarding proceduralist-administered versus anaesthetist-administered sedation. Even though proceduralist administered sedation has been found to be safe and cost effective, the risks of sedation should be considered and appropriate facility to handle the adverse reactions should be available (9,10,11). With regards to topical anesthesia spray as you go was the most referred choice which is a well-established modality of topical anesthesia. The evidence regarding nebulized lignocaine is not well established (12). As against the literature in adult bronchoscopy surveys, where transtracheal lignocaine is commonly used, administration of transtracheal lignocaine in pediatric patients was not observed in this survey (1,5). A recent survey from China about pediatric flexible bronchoscopy also revealed the variation in the procedure and less therapeutic procedures in children (13).

Providing oxygen during procedure was universal but the methods used were variable. All of them monitored heart rate and oxygen saturation but blood pressure was monitored only by 5 (21%).

The strengths of the study are that large number of questions (95) covering almost all domains of bron-

choscopy procedure were included. Also, this the first of its kind survey done in pediatrics. However, the study also had few limitations such as the number of respondents were quite less. This could be because of the electronic platform used or as such the number of physicians performing pediatric bronchoscopy in the country are very few. As per our estimate there would be approximately 40 physicians performing pediatric bronchoscopy in India. Of these we got 24 responses i.e 60% response rate which was fair and comparable to the other bronchoscopy surveys (1-5).

To conclude, this survey documents the practices in pediatric bronchoscopy in our country and reflects the wide variation in practices. This documentation would further help in formulation of appropriate guidelines. It also highlights that there is tremendous scope for improving the overall procedure and need to develop standard operating procedures (SOP) for various interventions such as foreign body removal and putting stents. There is also need to develop guidelines regarding use of pre procedure bronchodilator, prophylactic antibiotics and use of atropine which is not indicated in all. There is also a need to define safe sedation, method for providing oxygen during procedure: nasal cannula or nasopharyngeal cannula and need for monitoring including blood pressure, electrocardiogram and saturation. For negative suction, wall mounted suction is found to be better but there is need for more studies.

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