

Research Article

Pearl pin inhalation accidents: an emerging tracheobronchial challenge to surgeons

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ABSTRACT

Background: The practice of wearing head scarf pin or pearl pins is very common among young Muslim girls and wrong habit of holding a number of pins in the mouth and utilize them one by one to fix the scarf leading to accidental inhalation has emerged a frequently seen entity in our practice now and managing the tracheobronchial pearl pin foreign body poses a lot more different challenges to surgeon than conventional foreign bodies. The study presented an experience with pearl pin inhalation and discussed the unique clinical characteristics of this problem and challenges in management.

Methods: A cross sectional hospital based observational study was conducted in tertiary care hospital (SMHS), department of ENT for period of 2 years August 2013 to July 2015.

Results: Total of 36 (34 females and 2 males) patient were considered with mean age of 14.2 years (range 6-32 years). The average duration of reporting to our emergency department was 5 hours with delayed presentation ranging from 24 to 36 hours. In 31 patients the pin was successfully removed with rigid bronchoscope and in 2 cases fiberoptic bronchoscopy was needed, thorocotomy for more distal location was done successfully in two cases and another one gastroenterologist consultation was sought for reverse ingestion in to the abdomen.

Conclusions: Pearl pins behave as floating or/are mobile in nature especially in the early phase of inhalation and initial Immediate pre-op x-rays are beneficial. The removal can encounter certain difficulties and the surgeon needs to be vigilant & skilful.

Keywords: Pearl pins, Head scarf, Foreign body, Broncoscopy

INTRODUCTION

Foreign body aspiration is a common life threatening emergency and easily preventable problem.¹ Infants and kids are more vulnerable due to immature swallowing coordination, lack of adequate dentition and they are tempted to put objects into their mouth. Foreign body inhalation presents with a variety of clinical pictures ranging from irritability, coughing to acute dramatic acute airway obstruction and subsequent presentation with picture of complications, e.g. bronchiectasis and

recurrent pneumonia.^{2,3} In elderly the primary reason generally is impaired airway protection mechanism due to various causes. The object aspirated depends on various factors like, age, sex, occupation, geographical area, sociocultural factors and nutritional habits.⁴ However, there has been noticed a distinct group of patients who are at risk now a days. These patients include girls wearing headscarves and inappropriately placing the pearl pins in their mouth prior to securing the veils leading to an accidental FB inhalation. In recent years there have been various papers mainly from Islamic

world regarding the characteristics of this novel foreign body.⁵⁻¹⁰ In contrast to other forms of FB inhalation, this group often presents early and the diagnosis is made solely on radiography due to the radiopaque nature of the pins.

Bronchoscopy is frequently necessary for diagnosis as well as treatment of all foreign body aspiration.^{11,12} The use of bronchoscope has dramatically reduced the need for more invasive procedure like thoracotomy. In this paper, we present a cross sectional observational study of 36 cases of pearl pin inhalations and analyzing the role of immediate preoperative X-rays with particular emphasis on difficulties and challenges faced during management using rigid bronchoscope.

METHODS

A cross sectional hospital based observational study was done in the department of ENT, GMC, Srinagar, India and HNS, SMHS hospital; a tertiary care centre for a period of 2 years from august 2013 to July 2015. All patients reporting with pearl pin inhalation during this period were included in this study. Patients were subjected to pre-operative neck and chest X-ray (PA view). The data collected from each patient included, age, sex, history of inhalation, time interval between inhalation and presentation to our hospital, presentation symptoms, physical signs, radiological findings, bronchoscopic findings (type of bronchoscopy, location of the pin in the tracheobronchial tree, technique of removal, complications if any) and data was tabulated for analysis.

All the procedures were performed in an operating room setting under general anesthesia after proper preoperative assessment and anesthetic evaluation including an informed consent. Rigid bronchoscope of various sizes (Karl storz, Germany) equipped with 0°Hopkin rod endoscope and grasping forceps were utilized for the procedure. After giving supine position the bronchoscope was introduced by classic technique under standard anesthetic monitoring and assisted ventilation. The foreign body was visualized and retrieved by grasping forceps of appropriate length and design.

RESULTS

A total of 36 pearl pin foreign bodies were seen during a period of two years. Thirty four patients were young girls with a mean age of 14.2 years (range 6-32 years). Two patients were male aged 8 and 11 years. Out of the 34 females 32 wore head scarf which was secured by means of 3-4 cm metallic pins with plastic knob of various shapes, sizes and color. Inhalation happened accidentally while holding one or more pins in mouth while fixing the scarf and laughing, coughing, talking or sneezing during the act (Figure 1). Two female and two male patients were not scarf wearers; they had picked the pin and out of curiosity put it in their mouth and inhalation happened

accidentally. The average duration of reporting to our emergency department was 5 hours with delayed presentation ranging from 24 to 36 hours. Thirty two patients were symptom free and ambulatory at presentation while 2 complained of odynophagia and 2 picking sensation inside throat. None of the patients had any specific physical findings. No associated neurologic or psychiatric comorbid condition was documented in any of the patient. Twenty two patients had reported to primary health centre before being referred to our hospital and had an X-ray chest done at that health facility. In these patients another chest X-ray was done just prior to the procedure. Among 14 patients who directly reported to our hospital, bronchoscopy was delayed in four for anesthesia reasons. In these four patients a second chest X-ray was done just prior to the procedure. Thus a comparison X-ray was available in 26 patients to evaluate any change in position of pin. Final position of the pin was confirmed by bronchoscopic localization. Comparison of the two X-rays available in 26 patients showed that the pin had shifted from its previous position in six patients.

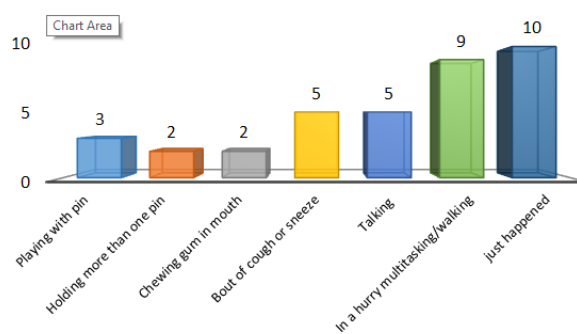


Figure 1: What prompted inhalation?

Figure 2 depicts the change in position of the pin among the six patients. No attempt was made to predict whether the pin was in primary or secondary bronchus on chest x-ray.

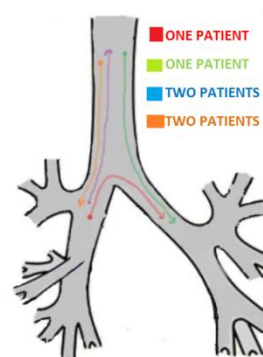


Figure 2: Schematic representation of migration of foreign body.

Bronchoscopic visualization of pin was consistent with the immediate pre-operative x-ray in all. The chest radiographic and bronchoscopic position of the 36 patients is shown in Table 1. In 31 patients the pin was successfully removed with rigid bronchoscope. In two patients the pin couldn't be retrieved by rigid bronchoscope since they were beyond the reach of the cope and were removed by flexible bronchoscope in the same sitting. In two cases pin could not be retrieved at all because of penetration into lung parenchyma and hemorrhage due to initial manipulation. These patients were referred to cerebral venous thrombosis section (CVTS) for further management wherein the pin was successfully removed by thoracotomy in both patients. In one patient the pin could not be located on bronchoscope and the pin was found in abdomen on a repeat post-operative x-ray (Figure 5). The patient was referred to gastroenterology department for further management.

Table 1: Location of pearl pin in tracheobronchial tree.

Anatomic site	On final X-ray	On bronchoscopy
Subglottis	0	0
Trachea	10	9
Right main	15	8
Right secondary	0	7
Left main	11	6
Left secondary	0	5
Total	36	35*

Case 1, 2 and 3

Showing the patients with migration of pearl pins on radiographs taken at different intervals. Foreign body was seen in trachea that got shifted to left bronchus (Figure 3a, 3b). A pin in right bronchus got migrated to left bronchus on presentation (Figure 4a, 4b).⁷ A pearl pin was seen initially in right bronchus and got coughed back into abdomen. (Figure 5a, 5b).

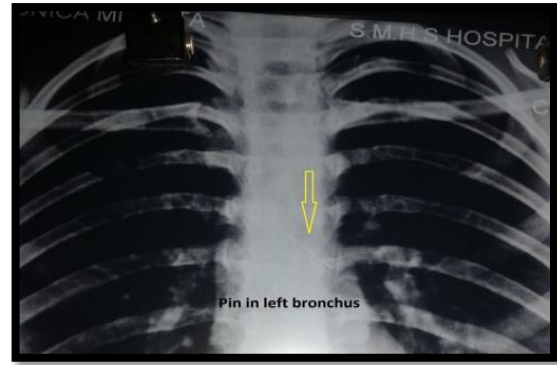


Figure 3b: Pin in left bronchus.

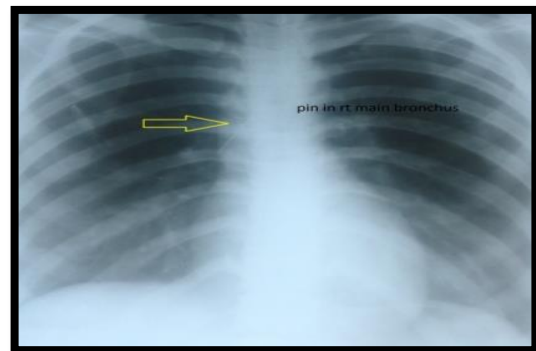


Figure 4a: Pin in right main bronchus.

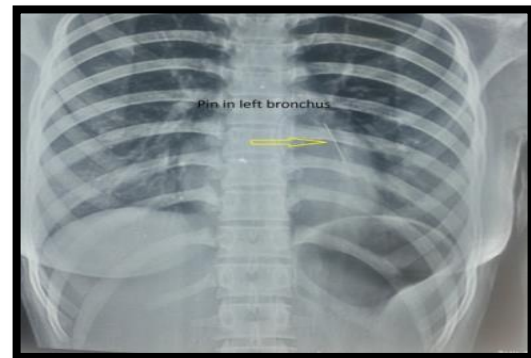


Figure 4b: Pin in left bronchus.

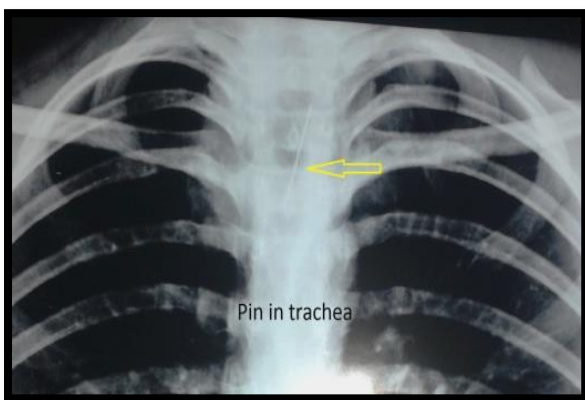


Figure 3a: Pin in trachea.

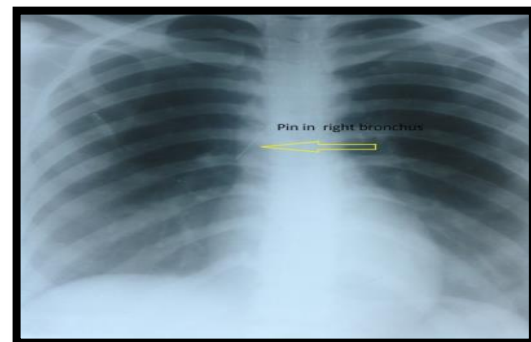


Figure 5a: Pin in right bronchus.



Figure 5b: Pin in lower abdomen.



Figure 6: Video bronchoscopy removing pins from bronchus.

DISCUSSION

The foreign body inhalation is a common emergency encountered in ENT and CVTS emergencies. The age group most commonly involved is young children in the age group of 6 months to 5 years due to incomplete development of swallowing mechanism.¹³ Children make up to 85% of all foreign bodies inhalation. Adults more than 60 years comprise another category due to inadequate function of airway protective mechanism due central nervous system disorders, facial trauma, intubation or dentures.^{13,14} However in recent years a different type of foreign body inhalation is becoming more common in hijab wearing young muslim girls. The foreign body was unreported in literature till 1980 when scarf pin inhalations began to be reported from Turkey. Ucan ES, noted in a case report published in 1996 that such foreign bodies were reported exclusively from Turkey with no cases reported from other muslim countries till that date.¹⁵ However during the last two decades many reports of similar foreign body inhalations have been published from different areas with predominant muslim population.⁵⁻¹⁰

In Kashmir wearing hijab (kassab) and headscarf (putch) has been a traditional and religious custom from centuries but they used to be secured by knots below chin or behind head or by means of safety pins. The current design of colorful pins with a plastic head of various shapes and sizes with a 3 to 4 cm long metallic shaft is a new fashion statement among young post pubertal girls. The scarf is wound around the head into many layers and

is kept in position by pins with or without the use of some hard flexible object like flexible cardboard over the forehead within the scarf. This complex task is usually done by both hands in front of a mirror with one or more pins held between lips or teeth with plastic end inwards during sequential insertion of pins. Any maneuver during the task like talking, coughing, sneezing or laughing predisposes them to inhalation of the pins especially in young teenage group who lack the requisite experience that the task demands. The review of presenting histories in published literature highlights a striking similarity of the event leading to pin inhalation.^{5,6,8,10,16}

Due to dearth of literature, particular clinical characteristics, mobile nature, and sharp pointed shape we sought to highlight the challenges in bronchoscopic management of this foreign body. Certain diagnosis is made on chest X-rays taken as first suspicion or a general search for a suspected ingestion of the foreign body. X-rays are sufficient in diagnosis due to opaque nature of the foreign body. For a proper correlation of size and location full scale digital chest X-rays are helpful. We found no data regarding comparison of pin location in different sequential x rays. In our study 6 out of 26 (18.18%) pins changed position on a second X-ray. In two patients pearl pins shifts from trachea to right bronchus while in two other patients pins retrograde shift was seen right bronchus to trachea. In one patient it changed its position from trachea to left bronchus and in one pin shifted its position from right side via carina and then finally settled in the left side. No shifting of pin from left to right was observed in our study. Possible reason for this pattern of change is explained on age old adage of right main bronchus being larger and straighter in line with trachea than the left main bronchus. The shifting nature of the pins was observed in those patients who had delay in performing the bronchoscopy, especially those patients who were referred from peripheral hospitals. These factors could possibly activate protective mechanism of lungs which trying to cough out the foreign body thus forcing the pin to change its position or may actually be coughed out as happened with one of our cases. Thus due to this mobile or floating nature of the pins the surgeon should ascertain the position of the pin by a chest X-ray immediately before removal. Hasdiraz et al, Ucan et al and Kaptanoglu et al noted an increased prevalence of pin in the right bronchial tree, but Sersar et al, Yuksel et al, M. Hamad et al have reported an increased prevalence in left bronchial tree explained on the basis of narrow lumen of left bronchial apparatus leading to more suction pressure explained by Bernoulli theorem.^{8,15,5,6,12,18,19} Our study also supports right predominance over left with (41.66%) in right bronchial tree compared to the left bronchial side in (30.55%). Thirty one foreign bodies were removed utilizing a Karl Storz rigid bronchoscope. The use of rigid bronchoscope is preferred method in our setup due to ease of use, more field of vision, ability to manipulate the foreign body, lesser anesthetic challenge and easier management of inadvertent hemorrhage. The use of flexible

bronchoscope requires more skill and is probably the most challenging bronchoscopic procedure but is considered a gold standard procedure by Rafanan and Mehta.^{20,21} In our study the removal of pins by rigid bronchoscopy was comparable to other studies published in the literature.

Challenges in removal of pearl pin

The removal of a solid slender metallic foreign body from a wider trachea bronchial tree appears an easy procedure but can be challenging to any unwary surgeon. The difficulties and challenges that could be faced are broadly classified as follows

Equipment related

In our study most of the pins were removed with the conventional bronchoscope of 30 cm length, 4/5/6 cm diameter copes. The presence of pin beyond reach of 30 cm cope proved challenging. The option of using the 6.5mm/43 cm bronchoscope is hampered by the difficulty of negotiating it through the progressively narrowing airway lumen. The flexible bronchoscope comes handy in such situation. In our study two of the pins not reachable by rigid bronchoscope were successfully removed by a flexible bronchoscope.

Foreign body related

Being a sharp mobile object in a highly turbulent airway, these foreign can change location persistently. The pins get positioned head down with the sharp end engaged in the mucosa. Most of the pins tend to go to the deepest possible location because of the weight of the pin and suctioning pressure. The pin suspected to be in main bronchus on X-ray may actually be in secondary bronchus or even deeper, so the surgeon should prepared beforehand mentally as well as equipment wise to deal such situations.

Surgeon related

Since the sharp end of the pin is usually embedded within the bronchial wall to various degrees, the safe and atraumatic technique that we found useful in removal of the pin, is to grasp the shaft of the pin and gently push it down till the embedded tip is freed. The grip should then be changed to catch hold of the tip. The grasping forceps should preferably be a crocodile or similar type forceps. The forceps with a hole on the front area should be avoid since there is always a chance of foreign body slipping into the hole and getting caught in the hole (Figure 6). While removing attention should be given to continuously observe the foreign body, trying to keep it within the center of the airway. Sometimes the head (knob) of the foreign body may be getting caught at the tip of the cope leading to inadvertent slipping away of the pin. In such situations once the foreign body is snared all

three (bronchoscope, grasping instrument and foreign body) are removed simultaneously.

The continuous epidemic of scarf pins as foreign body in the young adolescent in our population is a case of concern. The foreign body is due to fashion following and a bad habit of placing the particular type of pin in the mouth and is largely avoidable by raising public health awareness discouraging such habits and the use of different type of safety pins to secure the scarf or use of an elastic stole without need of fastening. Adhesive bands or snap fasteners can be utilized as advised by Kaptanoglu et al.⁵

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Ethical approval: The study was approved by the departmental /institutional Ethics Committee

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