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Clinical Study of Foreign Bodies in Tracheo-Bronchialtree with Specific Attention towards HRCT as a Diagnostic Tool in Suspected Cases

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Abstract:
Introduction: *Inhaled Foreign body remains a significant cause of morbidity and mortality especially in young Children. The treatment of choice is prompt diagnosis and removal with maximum safety and minimum trauma. High resolution computed tomography (HRCT) is the technique that is helpful in diagnosis of foreign bodies in suspected cases that is missed by other modalities.*
Aim*: To established the role of HRCT in diagnosis of foreign bodies in suspected cases.*
Material and methods:*60 patients with symptoms of respiratory distress, stridor, and history of chocking were recruited between November 2011-12 and investigated by history, clinical examination, chest X-ray, High Resolution computed tomography (HRCT) chest. All patients underwent virtual bronchoscopy for confirmation and removal.*
Results*:Among the 60 patients the incidence of foreign body inhalation was found more between age group of 1-3 years (41.66%) with male preponderance .The most common symptom was cough (83.33%) and most common sign was unilateral diminished air entry (83.33%). In 95% X-rays was not confirmative. Overall HRCT is 100% sensitive and 100% specific in diagnosis of foreign bodies in suspected cases.*
Conclusion:*Foreign bodies are missed byclinical and X-ray examination in many cases and that is only picked up by HRCT. Thus it is the ideal modality in diagnosis of foreign bodies to avoid the morbidity and mortality associated with missing foreign body.*
Keywords: *foreign bodies,high resolution computed tomography*

I. Introduction

Obstruction of airway by foreign body (FB) in children is the common cause of emergency in Otolaryngology (ENT) practice sometimes it can cause severe, even fatal consequences and it may produce a wide range of clinical symptoms from sudden acute respiratory distress to vague respiratory symptoms presenting even months after the acute episode[1].The symptoms depend on the nature, size, location and the time since lodgment of FB. A study of US national safety council FB inhalation carries a mortality rate of 1.2 per 100,000 people per year[2].The treatment of choice is prompt diagnosis and endoscopic removal .Early diagnosis is imperative to prevent mortality as well as late complications like recurrent acute respiratory distress, chronic and recurrent pneumonia, pulmonary abscess and granulation tissue[3, 4].The radiological diagnosis of FBinhalation ischallenging for several reasons.Chest radiography may show a variety of findings including air-trapping, consolidation, and atelectasis and bilateral over aeration. Only 10 % of FBis radiopaque. The findings of chest radiography are normal in up to 30% of children who inhaled a FB and the presence of pulmonary infiltrates may misdirect the management of FB inhalation [5].Bronchoscopy is often performed for definitive diagnosis and management, however, it is invasive and procedure related serious complications may occur. Recently developed high resolution computed tomography (HRCT) and virtual bronchoscopy is a noninvasive technique that provides realistic 3D views of the tracheobronchial tree. In addition to the detection of foreign body HRCT and virtual bronchoscopy can help the surgeon plan for operative bronchoscopy and safe removal of foreign body [5, 6, 7].

II. Material and method

Sixty patients with suspected FB inhalation on the basis of clinical history and symptoms like respiratory distress, stridor, and history of chocking were recruited for study in department of Otorhinolaryngology in SMS Medical College and Hospital, Jaipur Rajasthan between Nov 2011to Nov 2012. These patients were further underwent chest X-Ray and findings were noted followed by HRCT was performed in all patients and images were taken. The presence of FB, its location, size and density were determined by consultant radiologist. Associated findings i.e. collapse, consolidation; emphysema,mediastinalshift and pneumothorax were also noted.All patients were undertaken for rigid bronchoscopy under general anesthesia (GA) for confirmation and removal of FB. The correct size of bronchoscope according to the age was used. The finding in form of age, sex, type and site of FB noted and results of HRCT compare with X-ray and bronchoscopy.

III. Results:

Table: 1 Demographic characteristics of study population

Age (year)	N=60	percentage
<1	10	16.66%
1-3	25	41.66%
3-6	15	25%
>6	10	16.66%
Male/female	40/20	2:1

Sixty patients presented with suspected foreign bodies in tracheobronchial tree. There are 25/60(41.66%) patients within the age group of 1-3 years .The smallest child presented in this study was 8 month old onlyand the age ranges from 8 month to 7 year. There were 40 males and 20 females. **(Table-1)**

Table: 2 Clinical symptoms

Symptoms	No.of Cases	Percentage
Cough	50	83.33
Breathlessness	40	66.66
Fever	10	16.66
Wheeze	20	33.33
Changein voice	5	8.33
Vomiting	5	8.33

The patients were reported with various clinical symptoms but the cough was the most common presenting symptom 50/60(83.33%) followed by breathlessness 40/60(66.66%)**(Table-2).**

Table: 3 Clinical signs

Site	Signs	No. of Cases	Percentage
	Respiratory Rate – increased	50	83.33
	Cyanosis	5	8.33
Trachea	Palpable Thud	20	33.33
Chest	Diminished movement on affected side	40	66.66
	Dull percussion note on affected side	40	66.66
	Diminished air entry	50	83.33
	Crepts	10	16.66
	Rhonchi	10	16.66
	Wheeze	20	33.33

All study participants demonstratevarying degree of signs on clinical examination.Respiratory distress was found in 50/60(83.33%),rhonchiin 10/60(16.66%) to diminished air entry on affected side 50/60(83.33%) on auscultation **(Table- 3)**

Table:4 X-ray findings

X-Ray Chest PA View	No. of Cases	Percentage
F.B. Seen (Radio-Opaque)	3	5
Normal	15	25
Radiological Change due to F.B. inhalation	42	70
1. Collapse	15	35.71
2. emphysema	18	42.85
3. Consolidation	9	21.42

All patients underwent x-ray chest and X- ray showed FB only in 3 patients because FB was radiopaque in these cases remaining 15/60(25%) showed normal X-ray findings. But42/60 (70%) had associated changes in various forms and the most common was emphysema lung 18/42(42.85%) followed by collapse 15/60(35.71%) **(Table -4)**

Table:5Site foreign body lodgment

S. No.	Site of Lodgment	No. of Cases	Percentage
1.	Trachea	8	16.00
2.	Right Main Bronchus	30	60.00
3.	Left main bronchus	12	24.00
Total		**50**	**100**

Table:6 Types of foreign body

Foreign Body	No. of Cases	Percentage
Vegetative46 92		
Groundnut	15	30
Chana (Black Gram)	10	20
Betal nut (Arecanut. Supari)	15	30
BajrekiPhali	2	4
Cheeku Seed	4	8
Non-Vegetative4 8		
Hypodemirc Needle	1	2
Metallic Screw	1	2
Safety Pin	1	2
Cap of Ball Pen	1	2
Total	**50**	**100**

The most common site of FB lodgment was right main bronchus (60%)**(Table- 5)**and most common FB was vegetative (92%) on evaluation patient by X-ray examination and HRCT **(Table -6)**

Table 7:HRCT findings

S. No.	HRCT	No. of Cases	Foreign Body		Percentage	p-value
			+	-		
1.	HRCT history +	30	28	2	93.33	
3.	HRCT history -	30	22	8	73.33	
Total		**60**	**50**	**10**		**0.037**

Among the sixty patients HRCT confirm the diagnosis of FB in 93.33% patient with positive clinical history of FB inhalationand also diagnosed the FB in73.33% patient with negative clinical history which can be missed by X-ray.Overall HRCT detected FBin 50/60 (83.33%) of suspected cases and it is confirmed by bronchoscopy(Table 7).Patient who did not show any FB on HRCT 10/60(16.66%) confirm no foreign bodies on bronchoscopy also. Thus HRCT is 100% sensitive and 100 %specific in diagnosis of FB in suspected cases.

IV. Discussion:

The foreign body into the tracheobronchial tree occurs in all age groups, infants and small children suffer most commonly. The anatomic relation of the larynx, shouting, crying and playing while eating and lack of parental supervision contributes to this hazard. Most patients in the present study were below 3 years and smallest child was 8 month old withmale to female ratio was 2:1which is similar to the that reported in other study [8].In50/60(83.33%) patients cough was the most common presenting symptom followed by breathlessness 40/60(66.66%).Theclinical sign ranging from ronchi10(16.66%) to diminished air entry on affected side 50(83.33%) while **Inglis et al 1992** reviewed 173 cases and found that the classic triad of cough, wheezing and unilaterally diminished breath sounds was present in 65% of cases[9]. Since the most common aspirated objects are vegetative and thus radiolucent, their presence is usually established by the indirect signs of atelectasis or air trapping due to partial obstruction. In our study normal X-ray in 15/60 (25%) patients and X- ray picked FB in 3/60(5%) patients due to radio-opacity of FB and 42/60(70%) X- ray was inconclusive but FB associated changes like collapse of ipsilateral lung15/42 (35.71%), emphysema 18/42(42.85%) and consolidation8/42((19.04%) was found and these findings supported by other study[10]. Sensitivity of chest X-ray in foreign body detection is only 5% in our study although it is much lesser than the previous studies thus, although chest radiography may help, it seems neither sufficiently sensitive nor specific for the diagnosis of foreign body aspiration[11,12]. The right main bronchus has a greater diameter, is shorter and is more vertical than the left[13] .Thus it is the most common site of FB lodgment and it was (60%) in our study .The most common FB was vegetative (92%) [8,14].Multidetector CT scan chest is the diagnostic technique used for detection of foreign bodies. It not only can reveal foreign bodies in the bronchial tree but also is very sensitive in detecting associated findings[15].in our study FB were detected in all 50 / 60 patients and 10/60 patients having no foreign body airways on HRCT. Thus, Multi-detector CT chest having the overall sensitivity of 83.33% and have sensitivity of 93.33% to detect FB in patient with positive history of FB body inhalation and 73.33% in patient with no history of FB inhalation but associated with other symptoms. Overall HRCT detected FB in 50 (83.33%) of cases and it is confirmed by bronchoscopy and 10(16.66) patient who did not show any FB on HRCT confirm no foreign bodies on bronchoscopy as the bronchoscopy is also thus HRCT is 100% sensitive and specific in diagnosis of FB in suspected cases.

V. Conclusion:

The HRCT is the modality which has 100% sensitivity and 100%specificity in detection of FB in our study thus it can be used as a diagnostic modality for detection of foreign body in suspected patient and it will help in reducing morbidity associated with foreign body by early detection and timely treatment.

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