

**Original Article:**

## **ROLE OF NCCT THORAX IN DETECTION OF TRACHEO- BRONCHIAL FOREIGN BODIES**

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**Abstract:**

**Background:** Inhalation of foreign bodies can be life threatening and are common in paediatric age group with peak incidence in the age group of 1-3 years.

**Objectives:** To assess the sensitivity and specificity of Non Contrast Computerised Tomography (NCCT) thorax in detection of tracheo-bronchial foreign body.

**Method:** A prospective hospital based observational study conducted on 100 patients with suspected FB inhalation, included consecutively in study after obtaining informed consent for 2 yrs. Patients were assessed and interviewed for socio demographic details and examined using chest X- Ray PA view, NCCT thorax, routine investigations and pre-anaesthetic evaluation. After all investigations a diagnostic bronchoscopy under General anaesthesia was performed to extract the foreign body. Data were analyzed through tables and diagrams and appropriate test of significance by Epi Info software.

**Result:** total 100 suspected FB inhalation cases (up to 10 years) in which Maximum 46% were in 1-3 year age group, 70% were male, 94% were presents with cough and on chest examination 89% found to had decreased air entry, 75% presents with decreased movement and dull percussion on affected side. Foreign body found were groundnut (48%) followed by supari (30%) mostly in Rt. Main bronchus. For NCCT PPV  $\approx$  95% NPV = 91%, Sensitivity  $\approx$  97% and specificity  $\approx$  85%.

**Conclusion:** Sensitivity and specificity of NCCT is good and reliable tool for foreign body detection.

**Keywords:** FOREIGN BODIES, NCCT

### **Introduction**

Children aged 1-3 years are particularly at risk for foreign body aspiration because of their increasing independence, lessening of close parental supervision as they become older, increasing activity, curiosity because of hand – mouth interactions.<sup>1</sup> Foreign body is common serious problem among children accounting for 7% of the lethal accidents in children aged between 1 to 5 years.<sup>2</sup> According to National safety council statistics, mechanical suffocation accounted for 5% (167) of all unintentional deaths among children in the United States younger than 4 years of age. Boys comprise more than 50% of all cases of foreign body aspiration.<sup>3</sup> The treatment of choice is prompt diagnosis and endoscopic removal. The radiological diagnosis of FB inhalation is challenging for several reasons. 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.<sup>4</sup> Only 10 % of FB is radio-opaque. 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 (NCCT) and virtual bronchoscopy is a non-invasive technique that provides realistic 3D views of the tracheobronchial tree. In addition to the detection of foreign body NCCT and virtual bronchoscopy can help the surgeon plan for operative bronchoscopy and safe removal of foreign body.<sup>5</sup>

**Objective:** To assess the sensitivity and specificity of Non Contrast Computerised Tomography (NCCT) thorax in detection of tracheo-bronchial foreign body.

#### **Material and Method**

This prospective hospital based observational study was conducted in department of Otorhinolaryngology and Head and Neck surgery, at tertiary care hospital between January 2019-December 2020 including 100 consecutive patients with suspected FB inhalation on the basis of clinical history and long standing chest infections. Patients with definitive history and Patients with severe respiratory distress which warrants emergency bronchoscopy without prior investigations and not willing were excluded from study. Patients were assessed and interviewed for socio demographic details and examined using chest X- Ray PA view, NCCT thorax, routine investigations and pre-anaesthetic evaluation. After all investigations a diagnostic bronchoscopy under General anaesthesia was performed to extract the foreign body. Data were analyzed through tables and diagrams and appropriate test of significance by Epi Info software.

#### **Results**

The present study was conducted in department of Otorhinolaryngology and Head and Neck surgery, at tertiary care hospital from January 2019-December 2020. Maximum 46% were in 1-3 year age group, 70% were male, 70% residing in rural area and 60% had lower socioeconomic status.

Table1. Socio demographic profile

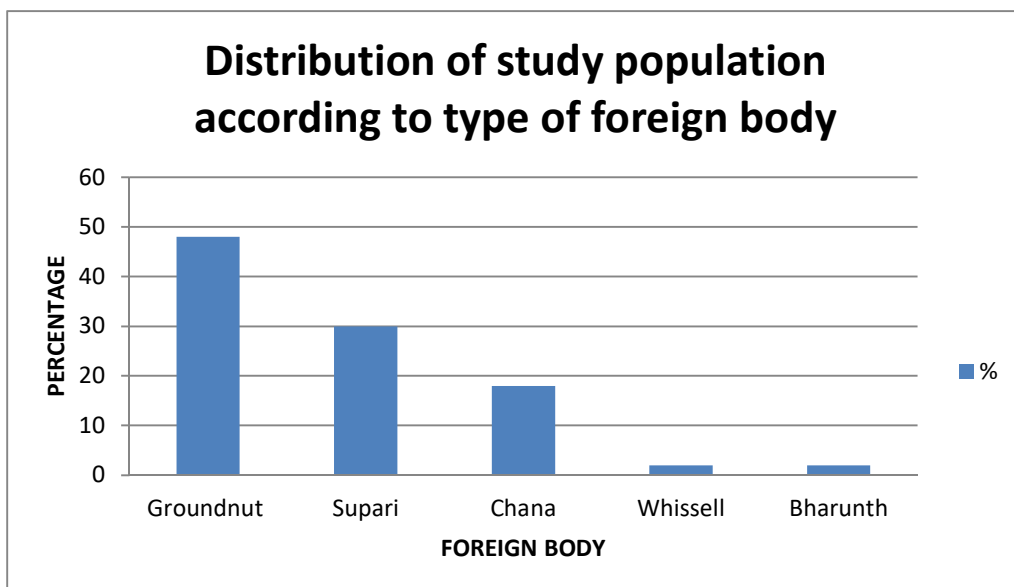
<b>Age (year)</b>	<b>Frequency</b>	<b>%</b>
<1	14	14.00
1-3	46	46.00
3-5	20	20.00
5-10	20	20.00
<b>Sex</b>		
Male	70	70.00
Female	30	30.00
<b>Residence</b>		
Urban	30	30.00
Rural	70	70.00

**Table2.** Presenting complaints and duration

DURATION	No.	%
<24 hrs	10	10.00
1-5 days	20	20.00
5days – 2weeks	50	50.00
>2 Weeks	20	20.00
<b>Presenting complaints</b>		
Cough	94	94.00
Difficulty in breathing	75	75.00
Fever	22	22.00
Wheeze	12	12.00
Vomiting	5	5.00
Change in voice	2	2.00

50% of cases were presented to OPD in 5 days to 2 weeks duration whereas only 10% were in <24 hrs. 94% presented with cough, 75% with difficulty in breathing and only 2% had change in voice. On chest X ray 35% had normal chest xray. On bronchoscopy foreign body found in Rt. Main bronchus (68%) followed by 20% in Lt. main bronchus.

**Table3.** NCCT findings



NCCT	Bronchoscopy	
	+ ve	-ve
+ ve	88	2
-ve	1	9

NCCT had Positive productive value  $\approx$  98%, Negative Productive Value = 90%, Sensitivity  $\approx$  99% and Specificity  $\approx$  82%.

### Discussion

In this prospective hospital based study mainly pediatric age group was included in which 46% were in 1-3 year age group, 70% were male, 70% residing in rural area and 60% had lower socioeconomic group.

All most all (94%) presents with cough also Meena et al (2015)<sup>5</sup> Suligavi et al (2016)<sup>6</sup> found chronic cough commonest presenting symptoms. 30% had emphysema followed by 25% collapse of lung whereas minimum 10% had consolidation whereas Nagaraj et al (2016)<sup>7</sup> found that commonest radiological finding was obstructive collapse (37%). In our study 35% of patients had normal chest X ray finding whereas Wolach et al (1994)<sup>8</sup> found lesser (18%) and higher proportion were found by Bai et al (2010)<sup>9</sup> and Meena et al (2015)<sup>5</sup>.

In our study Foreign body found maximum 68% in Rt. Main bronchus followed by 20% in Lt. main bronchus whereas minimum 12% in trachea. Similar results were found by Mukherjee and Paul (2011)<sup>10</sup> and Abd-El Gawad et al (2014).<sup>11</sup>

In present study 48% were groundnut followed by supari 30% and chana (18%). Similarly Mukherjee and Paul (2011)<sup>10</sup> and Suligavi et al (2016)<sup>6</sup> found Vegetables were the most common FBs . In our study on NCCT 90% were +ve and 10% were -ve whereas Bai et al (2010)<sup>9</sup> found 100% tracheobronchial foreign bodies on chest CT. Out of 90 NCCT +ve cases, on bronchoscopy 88 were +ve whereas 2 were -ve (PPV  $\approx$  98%) while out of 10 NCCT - ve cases, on bronchoscopy 9 were -ve whereas 1 was +ve (NPV = 90%). Sensitivity of NCCT was  $\approx$  99% and specificity was  $\approx$  82%. Mukherjee and Paul (2011)<sup>10</sup> Rigid bronchoscopy was done in all the cases for diagnostic and therapeutic purpose and foreign body was successfully retrieved in 78.7% of cases of CT +ve.

### Conclusion

Prevention is best, but early recognition remains a critical factor in the treatment of FB inhalation in children. Sensitivity and specificity of NCCT is good and reliable tool for foreign body detection.

### References:

1. Zerella JT, Dimler M, McGill LC, Pippus KJ. Annual meeting of the Pacific Association of Pediatric Surgeons No31, Maui, Hauii, ETATA-UNIS.1998; 33(11):1651-1654.

2. Marlow DR, Redding AB. Textbook of Pediatric Nursing. 6<sup>th</sup> Ed. New Delhi: Elsevier Publication. 2008; p. 613-5.
3. Rovin JD, Rodgers BM. Aspiration of foreign bodies by children. *Pedsinreview*. 2000; 21 (3): 86-90.
4. Khan MF, Herzog C, Ackermann H, Wagner TO, Maataoui A, Harth M et al. Virtual endoscopy of the tracheo-bronchial system: sub-millimeter collimation with the 16- row multidetectorscanner. *Eur Radiol*. 2004;14(8):1400-5.
5. Meena RK., Nirwan s., Mehtar., Gupta DP., Sharma MP. Clinical Study of Foreign Bodies in Tracheo-Bronchialtree with Specific Attention towards HRCT as a Diagnostic Tool in Suspected Cases. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*. 2015;14(11): 46-49.
6. Suligavi SS, Patil MN, Doddamani SS, Hiremath CS, Fathima A. Tracheo-bronchial foreign bodies: our experience at a tertiary care hospital. *Int J Otorhinolaryngol Head Neck Surg* 2016;2:116-9.
7. Nagaraj N, Sehra RN, Berwal P, Choudhary S, Deepchand, Kadela R, Raj R, Patel P. A clinical study of foreign bodies in air passages. *Indian J Child Health*. 2016; 4(2):151-154.
8. Wolach B, Raz A, Weinberg J, Mikulski Y, Ben Ari J, Sadan N. Aspirated foreign bodies in the respiratory tract of children: eleven years experience with 127 patients. *Int J Pediatr Otorhinolaryngol*. 1994 Jul;30(1):1-10.
9. Bai W, Zhou X, Gao X, Shao C, Califano JA, Ha PK. Value of chest CT in the diagnosis and management of tracheobronchial foreign bodies. *Pediatr Int*. 2010;53(4):515-8.
10. Mukherjee M and Paul R. Foreign Body Aspiration: Demographic Trends and Foreign Bodies Posing a Risk. *Indian J Otolaryngol Head Neck Surg*. 2011; 63(4):313–316.
11. Abd-ElGawad EA., Ibrahim MA. , Mubarak YS. Tracheobronchial foreign body aspiration in infants & children: Diagnostic utility of multidetector CT with emphasis on virtual bronchoscopy. *The Egyptian Journal of Radiology and Nuclear Medicine*. 2014;45:1141-1146.