

Study of the variations in trachea bronchial branching through bronchoscopy

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Introduction

Tracheobronchial variations (TBV) can be found during routine bronchoscopy or computed tomography. Fiber optic and rigid bronchoscopy are widely used diagnostic and therapeutic tool in pulmonary medicine. Although the variations are easily appreciated during bronchoscopy they are not given much attention. Most of the cases don't present with any symptoms and are detected incidentally. Symptomatic patients typically present with cough and lower respiratory tract infection. Investigators often neglect the bronchial variations; however, bronchial variations may have important implications for bronchoscopy, brachy therapy, pulmonary resections and intubation. A part from these, much bronchoscopic procedure has been started for management for emphysema, persistent broncho-pleural fistula for which proper localization of involved segment and knowledge of anatomical variation is essential. The

main embryonic theories for congenital bronchial abnormalities are the reduction, migration, and selection theories. It is accepted that anatomic variations of the airways are developmental anomalies of the lungs. As a result, lung buds grow to an inappropriate number or arise at typical sites. The availability and popularity of flexible bronchoscopy in recent years has led to the increase in identification and reporting of TBV. This information is invaluable during localization of lesion, follow-up bronchoscopy as well as lung resection.

Objective

1. To determine the incidence of trachea-bronchial variations in our region.
2. To determine most frequently observed Tracheo-bronchial Variation.

Material and method

We investigated 600 consecutive reports and videos of flexible bronchoscopy retrospectively irrespective of

indication and outcome. Out of 600, 52 reports were excluded because of incomplete visualization of Tracheobronchial tree due to poor patient cooperation, obstruction mass lesion etc.

All the relevant data is collected along with pictures and prepare din master chart and analysed

Result

Contrary to the numerous variations of lobar or segmental bronchial subdivisions, abnormal bronchi originating from the trachea or main bronchi are rare. In our study, variations of the Tracheobronchial tree were found in 152(27%) of the patients examined by bronchoscopy with 65.4% in men and 39.4% in women. Eighty one and five- tenths percent (81.5%) of the TBV were observed on the right bronchial system, 28.2% on the left, and 0.7% in the trachea. The most frequent finding was a bifurcate pattern (Fig.1c) in the right upper lobe (7.2%) followed by four segmental bronchi (Fig.1a & Fig.1b) or quadrivial pattern (4.3%). Four cases (0.7%) had tracheal bronchus (Fig.-3). All of them were defined as right preperarterial, arising from the junction between the trachea and carina. The most frequently observed TBV were right lower lobe basal orifice with two sub segments (Fig.5a), left upper lobe with three segments (Fig.2), accessory opening in basal segments of right lower lobe (Fig.5b & 5c), and right lower lobe with asubapical segment. In the same lobe bronchus, single variation and two different TBV were seen in 86.8% and 23.6% of patients, respectively. Bilateral TBV is seen in 13.6% cases. Number of TBV increased with the number of lobes involved. In three cases, hyperplasia right middle lobe bronchus was found (2.6%) and in another 2.6% cases trifurcated opening (Fig.4) seen. Four cases were found (2.5%) with four orifices in left lower lobe, eight cases (5.2%) with hypo plastic opening in

LUL. In 28 cases (18%), there were two basal orifices in left lower lobe. We describe the most commonly encountered variations, tracheal bronchus, along with other minor abnormalities.

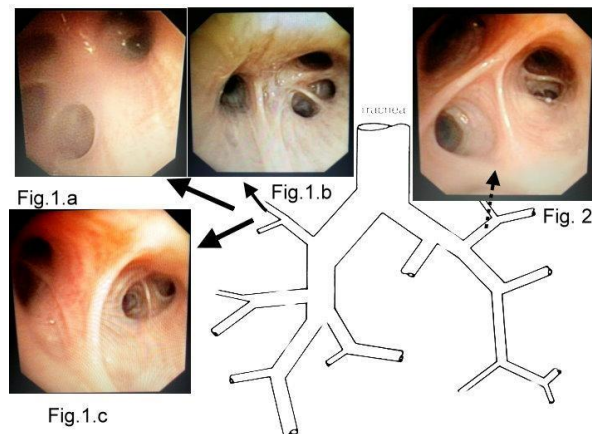


Fig. 1a & 1b: Four segmental opening in Right upper lobe

Fig.1c: Bifurcate opening in Right upper lobe

Fig. 2: Three separate opening of Left upper lobe proper

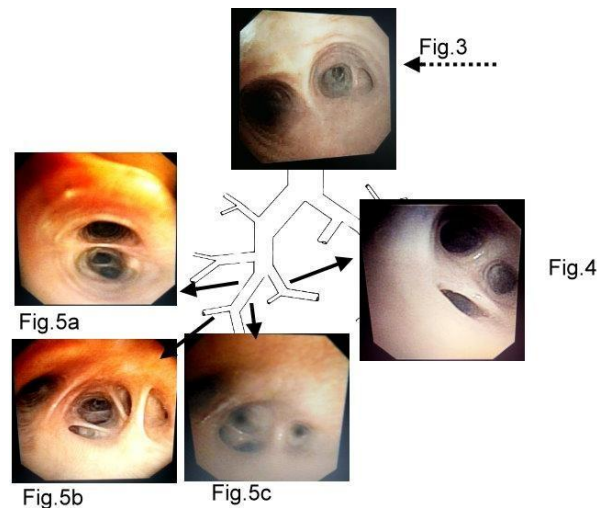


Fig.3: Tracheal Bronchus

Fig.5a: Right Lower Lobe with two orifices

Fig.5b&5c: Accessory opening in basal segments of right lower lobe

Discussion

Variation may only be discovered through systemic bronchoscopic exploration identifying all the segmental branches. In large bronchoscopic studies,

anatomical variations of the Tracheobronchial System are Reported as 1–12%, compared to 27% in our study. Navarro et al reported that only 27% of individual sunder going bronchoscopy had normal bronchial distribution we can assume that 73% of said population had some variation². Another series registered 35.5% of variants, in the Mexican population, is among the ranges described at the international level.³ In our study, TBV are more common in males (65.4%) which is consistent with study done in Turkish population⁴ (71.3%) as well as study Gonlugur U et al⁵. Variation were more common in right lung in our study (81.5%), which is quite high compared to study in Turkish population⁴ and similar to study in Mexican population³. The most frequent finding was a bifurcate pattern in the right upper lobe similar to finding noted by Gonlugur U et al. Trachealanamolies are rare, we identified in 0.72% cases compared to 1.2% in Turkish population⁴.

Among the limitations of this study, the retrospective nature and the small number of patients included are them ostobvious. It is possible that although in complete bronchos copies were discarded, subtle variations of the bronchial segmentation may have been missed. On the other hand, the number of patients analyzed may not be representative of the region. It is important to mention that based on our knowledge, it is the first study that describes the most frequent bronchial variants in Indian population, a population known to have genetic and ethnic-racial characteristics different from the rest of the country.

Conclusion

Knowledge and understanding of congenital bronchia lab normalities may have important implications for diagnosis, bronchoscopy, resection, brachy therapy, and intubation. Right upper lobe presents the highest frequency of bronchial anatomical variations in the population undergoing bronchoscopy. The explanation of the difference between the reported variations may be due to genetic and racial factors, and there is also the possibility of sub-registers in the bronchial variations reported in the available literature.

References

1. Wooten, C., Patel, S., Cassidy, L., Watanabe, K., Matusz, P., Tubbs, R. and Loukas, M. (2014). Variations of the tracheobronchial tree: Anatomical and clinical significance. *Clinical Anatomy*, 27(8), pp.1223-1233.
2. Navarro, F. and Cicero, R. (1999). Divisional Variability of the Tracheobronchial Tree Based on Bronchoscopic Examinations. *Journal of Bronchology*, 6(3), pp.166- 170.
3. Lazcano- Hernández E, Guerrero-Mariles E, Velázquez- Serratos J, Juárez-Hernández F, Silva-Alvarado M, Flores-Hernández S, et al. Rare anatomical bronchial variants. Communication of three cases. *Rev Inst Nal Enf Resp Mex* 2007; 20(2): 119-125.
4. Beder, S., Küpel, E., Karnak, D. and Kayacan, O. (2008). Tracheobronchial variations in Turkish population. *Clinical Anatomy*, 21(6), pp.531-538.
5. Gonlugur, U., Efeoglu, T., Kaptanoglu, M. and Akkurt, I. (2005). Major anatomical variations of the tracheobronchial tree: Bronchoscopic observation. *Anatomical Science International*, 80(2), pp.111-115.