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Anatomical Variations of Bronchial Arteries on Contrast-Enhanced Ct Thorax: A Cross-Sectional Study

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ABSTRACT:
Background: Bronchial arteries supply blood to the lungs and nearby structures. However, their origin, numberand course can vary from person to person. These variations are important to know during thoracic procedures such as bronchial artery embolization. This study was done to examine the anatomical variations and measurements of bronchial arteries using contrast-enhanced computed tomography (CECT) of the thorax. **Materials and Methods**: This was a hospital-based cross-sectional observational study carried out for 18 months in the Department of Radiology at Geetanjali Medical College and Hospital, Udaipur. A total of 115 patients between 15 and 90 years of age who underwent CECT thorax were included in the study. The bronchial arteries were studied for their origin, number, vertebral level of origin, location of the ostium, mediastinal course, branching pattern and diameter. The collected data were analysed using SPSS software and a p-value of less than 0.05 was considered statistically significant. **Results**: Among the 115 patients, 63 were males and 52 were females with a mean age of 49.90 ± 18.62 years. Ectopic bronchial arteries were found in 49 patients (42.61%) while 66 patients (57.39%) had normal (orthotopic) arteries. Bronchiectasis showed a significant association with ectopic bronchial arteries ($p = 0.04$). Most bronchial arteries originated from the thoracic aorta (68.69%) followed by the aortic arch (29.56%)while a small number arose from other vessels (1.74%). Most arteries originated between the T4 and T6 vertebral levelsand the T5–T6 level was the most common. Left bronchial arteries were observed slightly more often than right bronchial arteries. The average diameter of bronchial arteries was 1.62 ± 0.29 mm. Right bronchial arteries had a larger diameter than left bronchial arteries ($p < 0.001$) and males had larger diameters than females ($p = 0.013$). Left bronchial arteries were mostly located on the left side of the

oesophaguswhile right bronchial arteries were found on both sides (p = 0.001). Common trunk bronchial arteries (CTB) were seen in 79 patients and intercostobronchial trunks (IBT) in 82 patientswith IBT having a slightly larger average diameter. **Conclusion:** Bronchial arteries show many anatomical variations when seen on CECT thorax. Understanding these variations, including ectopic arteries and trunk patterns such as CTB and IBT, is important for correct interpretation of imaging and for safe planning of thoracic procedures, especially bronchial artery embolization.

INTRODUCTION:

Bronchial arteries are important blood vessels in the chest because they supply blood to the trachea, bronchi, lung tissue, visceral pleura, lymph nodes and the oesophagus [1]. Normally, they are described as a pair of arteries that arise from the descending thoracic aorta, usually between the T5 and T6 vertebral levels. However, their anatomy can vary from person to person in terms of where they originate, how many arteries are present, their course and their branching pattern [2]. These variations are clinically important because they can affect medical procedures and surgeries, especially in fields such as interventional radiology, thoracic surgeryand in the treatment of conditions like hemoptysis[3].

The bronchial circulation is a high-pressure blood supply which is different from the pulmonary circulation that is a low-pressure system mainly responsible for gas exchange in the lungs. In chronic inflammatory diseases such as bronchiectasis the normally small bronchial arteries can become dilated and tortuous[4]. If these enlarged arteries rupture they can cause massive hemoptysis. More than 90% of massive hemoptysis cases arise from the bronchial arteries rather than the pulmonary arteries because of their higher pressure[5]. Bronchial artery embolization (BAE) is an important treatment used to control massive hemoptysis where a catheter is used to block these arteries at their origin from the aorta[3]. However, if doctors miss ectopic or abnormal bronchial artery origins, it may lead to serious complications during BAE, such as spinal cord infarction, cerebellar strokeor myocardial ischemia if nearby vessels are accidentally blocked [6].

Even though cross-sectional imaging techniques have improved, the bronchial arterial system is often not described in detail in routine thoracic computed tomography (CT) reports. This is mainly because these arteries are very small, follow a tortuous course, and often overlap with other blood vessels in the mediastinum which make them difficult to identify clearly [4]. Contrast-enhanced computed tomography (CECT) of the thorax is a commonly available and widely used imaging method that provides a reliable and non-invasive way to visualize and map bronchial arteries in detail [4,7]. The use of contrast material helps improve the visibility of internal organs and blood vessels, although it may cause temporary changes in blood pressure in some patients [8].

There is limited population-based data on variations of bronchial arteries especially in different population groups. Most previous studies have been based on cadaver studies, angiography or small single-centre CT studies. Differences in race, ethnicity and geography may affect how often these variations occur and the types of variations seen. Similar differences have already been reported for other arteries such as the aortic arch, coronary arteries, brachiocephalic artery, celiac trunk and renal arteries using CT angiography [9–13]. Knowing these anatomical variations is important for doctors, surgeons and radiologists to avoid complications during medical procedures. Therefore, this study aimed to evaluate the types, frequency and measurements of bronchial artery variations using standardized CECT thorax in a hospital-based cross-sectional observational study. The goal was to provide useful population-specific anatomical information that can improve diagnosis, procedural safety and clinical decision-making in thoracic medicine,especially during procedures like BAE.

MATERIALS AND METHODS:

Study Design: This study was a hospital-based cross-sectional observational study conducted to evaluate the variation in bronchial arteries on CECT thorax.

Study Duration: The study was carried out over a period of 18 months from September 2022 to January 2024.

Study Area: The study was carried out in the Department of Radiology at Geetanjali Medical College and Hospital, Udaipur, Rajasthan.

Study Population: The study population comprised patientswho underwent CECT thorax during the study period at the study centre.

Inclusion Criteria:
- Patients of both sexes.
- Patients aged between 15 and 90 years undergoing CECT thorax.

Exclusion Criteria:
- Claustrophobic patients.
- Patients with a known history of allergy to contrast agents in previous contrast studies.
- Pregnant patients.
- Patients suspected to have malignancy.
- Patients with chronic renal failure.

Sample Size: A total of 115 patients were enrolled during the study period.

Sampling Methodology: A purposive sampling technique was employed, where all eligible patients meeting the inclusion criteria during the study period were enrolled.

Data Collection and Procedure:
- After obtaining informed consent, patients underwent CECT thorax using the Revolution Frontier CT scanner.
- Standard contrast-enhanced scanning protocols were followed.
- All bronchial arteries were systematically evaluated based on their origin, branching pattern, ostium location, vertebral level of origin, lumen diameterand mediastinal trajectory in relation to the oesophagus and the main bronchus.
- Relevant demographic data such as age and gender were recorded.

Data Analysis:
- Data were entered into Microsoft Excel and analysed using SPSS software (version 20).
- Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables were presented as frequencies and percentages.
- The t-test was used for comparison of quantitative variables where applicable.
- A p-value of <0.05 was considered statistically significant.

Ethical Considerations:
- Ethical approval was obtained from the Institutional Ethics Committee before commencement of the study.
- The study adhered to ethical principles outlined in the Declaration of Helsinki.
- Written informed consent was obtained from all participants.
- Patient confidentiality was maintained by anonymising all collected data.

RESULTS

A total of 115 patients underwent CECT thorax evaluation during the study period. Of these, 63 (54.78%) were males and 52 (45.22%) were females. The overall mean age of the study population was 49.90 ± 18.62 years, with an age range of 18 to 90 years. The mean age among males was 47.40 ± 19.05 years (range: 19–80 years), while among females it was 52.67 ± 17.86 years (range: 18–82 years). The gender distribution between groups was homogeneous and not statistically significant (p = 0.215).

Out of the 115 patients, 49 (42.61%) had ectopic bronchial arteries (BA), while 66 (57.39%) had orthotopic bronchial arteries. Among patients with ectopic BA, 20 (40.81%) were males and 29 (59.19%) were females. In contrast, among patients without ectopic BA, 43 (65.15%) were males and 23 (34.85%) were females.

When analysed according to aetiology, bronchiectasis was significantly associated with ectopic bronchial arteries (p = 0.04). Among patients with bronchiectasis, 21 cases had ectopic BA and 40 cases had orthotopic BA. Fungal infection was seen in 10 patients with ectopic BA and 9 patients without ectopic BA, which was not statistically significant (p = 0.33). Other aetiologies were observed in 18 patients with ectopic BA and 17 without ectopic BA, which was also not statistically significant (p = 0.206).

Between 2 and 5 bronchial arteries distal to the origin were identified per patient. A slightly higher prevalence was observed on the left side compared to the right; however, this difference was not statistically significant (p = 0.499). Males had a slightly higher number of bronchial arteries compared to females, but this difference was also not statistically significant (p = 0.650).

Bronchial arteries most commonly originated from the thoracic aorta (68.69%), followed by the aortic arch (29.56%), and other vessels (1.74%). Rare origins (1.74%) included branches from the left subclavian artery, right thyrocervical trunk, common trunk of the left thyrocervical trunk, and left internal thoracic artery. No significant association was observed between arterial origin and side (p = 0.293) or gender (p = 0.354) (Table 1).

Table 1: Origin of Bronchial Arteries According to Side and Gender (n = 115)

Origin of Bronchial Artery	**Overall M/F (Total %)**	**Right Side M/F (n=60)**	**Left Side M/F (n=55)**
Thoracic aorta – Independent	43 / 36 (79, 68.69%)	15 / 20 (35, 58.33%)	28 / 16 (44, 80.00%)
IBT	25 / 19 (44)	9 / 8 (17)	16 / 11 (27)
CTB	18 / 17 (35)	6 / 12 (18)	12 / 5 (17)
Aortic arch – Independent	19 / 15 (34, 29.56%)	18 / 6 (24, 40.00%)	1 / 9 (10, 18.18%)
IBT	3 / 3 (6)	2 / 0 (2)	1 / 3 (4)
CTB	16 / 12 (28)	16 / 6 (22)	0 / 6 (6)
Others	1 / 1 (2, 1.74%)	1 / 0 (1, 1.67%)	0 / 1 (1, 1.82%)
Total	63 / 52 (115)	34 / 26 (60)	29 / 26 (55)

IBT, Intercostobronchial trunk; CTB, Common trunk of bronchial arteries; M, Male; F, Female

Most bronchial artery ostia arising from the thoracic aorta were located in the anterior-medial position, followed by anterior and medial locations, while posterior-lateral origin was not observed. Bronchial arteries originating from the aortic arch were most commonly located in the superior-medial position, with fewer arising from superior-lateral and inferomedial positions. Rarely, bronchial arteries originated from other vessels. Overall, left bronchial arteries were more frequently observed than right bronchial arteries. There was no significant differences in the location ostium between the left and right bronchial arteries (p = 0.398) (Table 2).

Table 2: Location of the Ostium of Bronchial Arteries (n = 115)

Origin	**Ostium Location**	**RBA**	**LBA**	**Total n (%)**
Thoracic Aorta	Anterior-medial	20	30	50 (43.48%)
	Anterior-lateral	1	7	8 (6.96%)
	Posterior-medial	5	1	6 (5.22%)
	Posterior-lateral	0	0	0 (0.00%)
	Anterior	4	6	10 (8.70%)
	Medial	7	3	10 (8.70%)
Aortic Arch	Superior-medial	8	15	23 (20.00%)
	Superior-lateral	2	1	3 (2.61%)
	Inferomedial	1	2	3 (2.61%)
Others	—	1	1	2 (1.74%)
Total		**49**	**66**	**115 (100%)**

RBA, Right bronchial artery; LBA, Left bronchial artery

Most bronchial arteries originated between the T4 and T6 vertebral levels, with the T5–T6 level being the most common site of origin. A smaller number arose from adjacent levels such as T4, T4–T5, T5, and T6, while very few originated at T3–T4. No bronchial arteries were observed to originate from the upper thoracic or cervicothoracic levels (C7–T3) or from lower levels beyond T6. Both right and left bronchial arteries showed a similar pattern of distribution across vertebral levels in males and females (Table 3).

Table 3: Vertebral Level of Origin of Bronchial Arteries (n = 115)

Vertebral Level	**RBA (M, F)**	**LBA (M, F)**	**Total (M, F)**
C7–T1	0 (0, 0)	0 (0, 0)	0 (0, 0)
T2	0 (0, 0)	0 (0, 0)	0 (0, 0)
T3	0 (0, 0)	0 (0, 0)	0 (0, 0)
T3–T4	0 (0, 0)	1 (1, 0)	1 (1, 0)
T4	10 (4, 6)	13 (6, 7)	23 (10, 13)
T4–T5	9 (7, 2)	10 (5, 5)	19 (12, 7)
T5	2 (1, 1)	3 (2, 1)	5 (3, 2)
T5–T6	26 (14, 12)	20 (9, 11)	46 (23, 23)

T6	13 (8, 5)	8 (6, 2)	21 (14, 7)
T6–T7	0 (0, 0)	0 (0, 0)	0 (0, 0)
T7	0 (0, 0)	0 (0, 0)	0 (0, 0)
Total (n)	**60 (34, 26)**	**55 (29, 26)**	**115 (63, 52)**

RBA, Right bronchial artery; LBA, Left bronchial artery; M, Male; F, Female

Left bronchial arteries were predominantly located on the left side of the oesophagus, whereas right bronchial arteries were distributed on both sides of the oesophagus, showing a statistically significant association (p = 0.001). In relation to the main bronchus, both right and left bronchial arteries showed a relatively similar distribution on either side, with no statistically significant difference (p = 0.217) (Table 4).

Table 4: Mediastinal Trajectory of the Bronchial Arteries in Relation to the Oesophagus and Main Bronchus (n = 115)

Artery	Oesophagus			Main Bronchus		
	Left	Right	p-value	Left	Right	p-value
LBA	53	2	0.001	23	32	0.217
RBA	38	38		28	32	
Total	**75**	**40**		**55**	**60**	

RBA, Right bronchial artery; LBA, Left bronchial artery

The luminal diameter of the bronchial arteries showed variability across patients, with right bronchial arteries generally having larger diameters than left bronchial arteries, which was statistically significant (p < 0.001). A significant difference was also observed between genders (p = 0.013), with males demonstrating larger bronchial artery diameters compared to females (Table 5).

Table 5: Diameters of the Bronchial Arteries

Sex	Artery	Mean ± SD (mm)	Range (mm)
Female	LBA	1.49 ± 0.26	1.14–2.97
	RBA	1.67 ± 0.30	1.22–2.55
	Total	**1.58 ± 0.29**	**1.14–2.97**
Male	LBA	1.58 ± 0.21	1.19–2.32
	RBA	1.75 ± 0.34	1.31–2.93
	Total	**1.66 ± 0.29**	**1.19–2.93**
Overall	LBA	1.54 ± 0.24	1.14–2.97
	RBA	1.71 ± 0.32	1.22–2.93
	Total	**1.62 ± 0.29**	**1.14–2.97**

RBA, Right bronchial artery; LBA, Left bronchial artery; SD, Standard deviation

Both Common trunk bronchial arteries (CTB) and intercostobronchial trunks (IBT) were commonly identified bronchial artery trunks. CTB arose mainly from the thoracic aorta but also showed origins from the aortic arch and rarely other vessels, while IBT originated predominantly from the thoracic aorta with occasional aortic arch origin. The common ostium was most frequently located anteromedially, and the most common vertebral level of origin was T5 for thoracic aorta origin and T4 for aortic arch origin in both trunks. The mean diameter of IBT was slightly larger than CTB. CTB commonly gave rise to both right and left bronchial arteries, whereas IBT predominantly gave rise to the right bronchial artery along with a posterior intercostal artery. Distinct branching patterns were observed for both trunks, and their mediastinal course generally showed no contact with the main bronchus (Table 6).

Table 6: Characteristics of Common Trunk and Intercostobronchial Trunk of Bronchial Arteries

Parameter	Common Trunk (CTB)	Intercostobronchial Trunk (IBT)
Number identified	79 trunks (79 patients)	83 trunks (82 patients)
Origin – Thoracic aorta	43 (≈54.4%)	77 (93.90%)
Origin – Aortic arch	34 (29.56%)	6 (7.22%)
Origin – Other vessels	2 (1.74%) – left thyrocervical trunk	—
Common ostium location	Anteromedial (57.50%) – thoracic aorta origin; Superomedial (26.45%) – aortic arch origin	Anteromedial (54.54%) – thoracic aorta origin; Inferomedial (50%) – aortic arch origin
Most common vertebral level	T5 (58.65%) – thoracic aorta origin; T4 (49.45%) – aortic arch origin	T5 (62.33%) – thoracic aorta origin; T4 (100%) – aortic arch origin
Mean diameter (mm)	1.82 ± 0.35 (1.19–2.69)	1.99 ± 0.40 (1.32–3.21)
Bronchial arteries arising	94 total	86 total
Right bronchial arteries	43 (45.74%)	80 (93.02%)
Left bronchial arteries	51 (54.25%)	6 (6.97%)

Main branching pattern	1 right + 1 left BA (86.95%)	1 right BA + posterior intercostal artery (96.38%)
Other branching patterns	1R + 2L BA (8.69%); 2L BA (4.34%)	1L BA + posterior intercostal artery (2.40%); 1R + 1L BA + intercostal artery (1.20%); 1R + 2L BA + intercostal artery (1.20%)
Mediastinal course	Usually left of oesophagus; no contact with main bronchus	Usually branches before reaching oesophagus; no contact with main bronchus

DISCUSSION:

Detailed evaluation of bronchial artery variations using CECT thorax is important for clinical procedures such as BAE for treating hemoptysis and for planning thoracic surgeries [1]. In this study, 115 patients underwent CECT thorax examination. Among them, 49 patients (42.61%) had ectopic bronchial arteries and 66 patients (57.39%) had orthotopic bronchial arteries. The mean age of the patients was 49.90 ± 18.62 years. Bronchiectasis was found to be significantly associated with the presence of ectopic bronchial arteries ($p = 0.04$).

In the present study, ectopic bronchial arteries were found in 42.61% of patients. This is slightly higher than some previous reports which suggest that ectopic bronchial arteries occur in about one-third of cases [6]. However, other studies have shown a wide range by reporting abnormal bronchial artery origins in 8.3% to 35% of cases [14]. A large meta-analysis by Ostrowski et al., that included 37 studies, reported that at least one ectopic bronchial artery was present in 37.80% of cases [1]. The higher percentage seen in our study may be due to differences in the study population and imaging methods used.

The association between bronchiectasis and ectopic bronchial arteries seen in our study is similar to previous studies. Chronic lung diseases such as bronchiectasis are known to be common causes of hemoptysis and often require treatment such as BAE [15,16]. Choi et al. studied 600 patients with hemoptysis and found that 24.7% of patients had at least one ectopic bronchial artery [17]. They suggested that long-term airway inflammation can cause the blood vessels to enlarge and become tortuous whichmakes it important to identify these abnormal arteries during treatment. Continuous inflammation and structural changes in bronchiectasis can also lead to the development or enlargement of ectopic bronchial arteries through collateral circulation. Because of this increased blood supply in chronic lung diseases, severe hemoptysis can occurwhich usually arises from the high-pressure bronchial circulation rather than the pulmonary circulation.

In our study, the thoracic aorta was the most common origin of bronchial arteries (68.69%) followed by the aortic arch (29.56%) (Fig. 1).

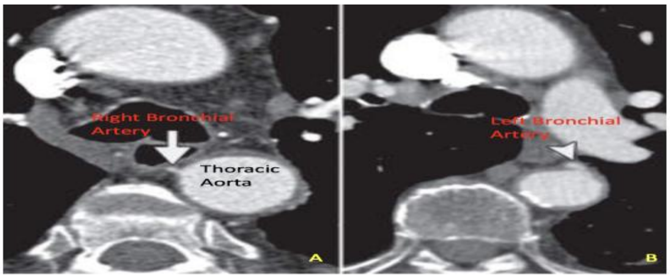

Fig. 1: (A) Axial CT angiogram shows right bronchial artery (arrow) originating from the anteromedial thoracic aortic wall. (B) shows an orthotopic left bronchial artery (arrowhead) originating from the anterior thoracic aortic wall.

These findings are similar to earlier radiological studies. A meta-analysis reported that bronchial arteries arise from the aorta in about 92.71% of cases, while the aortic arch is the most common source of ectopic bronchial arteries [1]. In our study, a few rare ectopic origins were also seen from vessels such as the subclavian artery and thyrocervical trunk (Fig. 2 & 3)

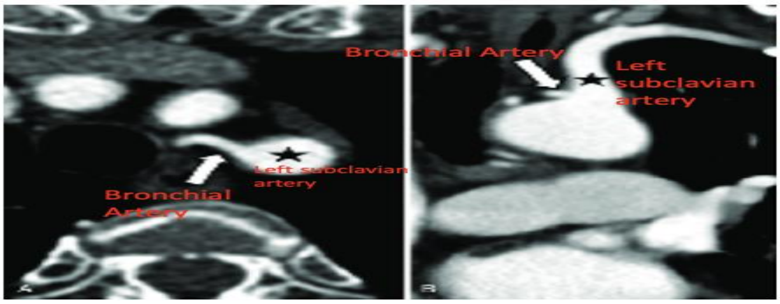

Fig. 2:Ectopic bronchial artery from left subclavian artery. (A, B) Chest CT shows common trunk of bronchial artery (white arrow) originate from left subclavian artery (star).

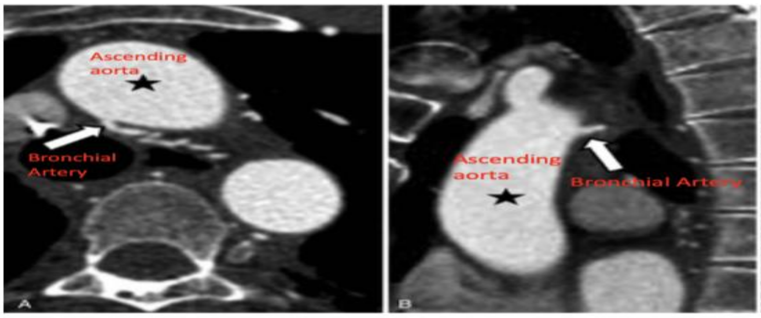

Fig. 3: Ectopic bronchial artery from ascending aorta. (A, B) Chest CT shows common trunk of bronchial artery (white arrow) originates from ascending aorta (star).

Similar findings were reported by Choi et al. who stated that although the descending aorta is the main source, branches from the aortic arch can also give rise to ectopic bronchial arteries [17]. These results show that careful CT angiographic evaluation is important to identify such variations, especially before interventional procedures.
The location of the bronchial artery ostium in our study showed that arteries arising from the thoracic aorta most commonly originated from the anteromedial aspect, while those arising from the aortic arch were predominantly located in the superomedial position. These findings are consistent with previous reports. Esparza-Hernández et al.identified the anteromedial aspect of the thoracic aorta as the most frequent origin site in 58.29% of cases[18]. Similarly, Walker et al.noted a superomedial preference for bronchial arteries arising from the aortic arch[19]. The clustering of ostia in these regions provides a practical anatomical reference during selective catheterization in bronchial artery embolization procedures.

Bronchial arteries that came from the thoracic aorta were most commonly found in the anteromedial position. Arteries that came from the aortic arch were mostly located in the superomedial position. These results are similar to previous studies. Esparza-Hernández et al. reported that the anteromedial part of the thoracic aorta was the most common origin site in 58.29% of cases [18]. Walker et al. also found that bronchial arteries arising from the aortic arch were mainly located in the superomedial position [19]. Knowing these common locations is useful during procedures such as bronchial artery embolization as it helps them find and catheterize the arteries more easily.

Most bronchial arteries in our study originated between the T4 and T6 vertebral levels, with the T5–T6 level being the most common site (Fig. 4).

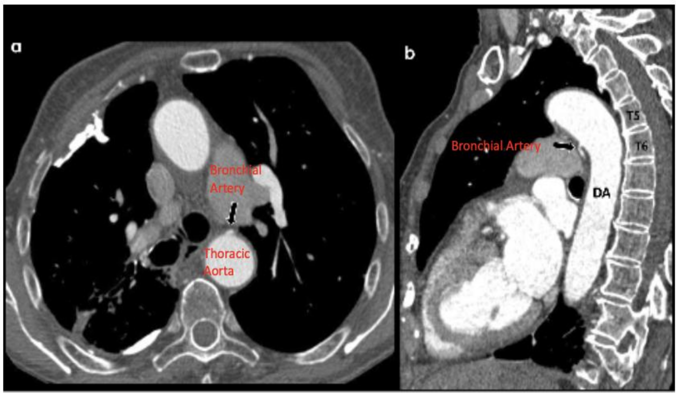

Fig. 4: Origin of orthotopic bronchial arteries. Axial (a) and saggital (b) CECT view of an orthotopic bronchial artery (black arrows) originating from the descending thoracic aorta(DA) at the T5–T6 vertebral plane, near the carinallevel.

This finding is consistent with the usual anatomical description, where normal (orthotopic) bronchial arteries arise from the descending thoracic aorta around the T5–T6 level [6]. Similar results were reported by Esparza-Hernández et al. who found that about 66.34% of bronchial arteries originated between T5 and T6 [18]. This shows that the mid-thoracic region is an important landmark when identifying bronchial arteries during CT angiography and endovascular procedures.

Regarding the mediastinal course, most left bronchial arteries were found on the left side of the oesophagus, while right bronchial arteries were present on both sides of the oesophagus. This difference was statistically significant ($p = 0.001$). This pattern may be related to the complex arrangement of structures in the mediastinum, such as the thoracic ductwhich crosses the midline around the T5–T6 vertebral level. In addition, no bronchial arteries were seen to arise from the posterior-lateral part of the thoracic aorta, which is consistent with previously reported anatomical patterns.

The mean diameter of the bronchial arteries in our study was 1.62 ± 0.29 mm which is very similar to the mean diameter of 1.62 mm reported by Esparza-Hernández et al. [18]. In our study, the right bronchial artery was generally larger than the left which agrees with previously reported anatomical findings. Yener et al. also reported that the number and mean diameter of right bronchial arteries were significantly higher than those of left bronchial arteries ($P < 0.05$) [2]. Their study further showed that males had a higher number and larger diameter of bronchial arteries compared to females ($P < 0.05$). These findings are similar to our results which also showed larger bronchial artery diameters in males and on the right side.

In our study, we identified CTB and IBT which supports the known patterns of bronchial artery branching. CTB usually gave rise to both right and left bronchial arterieswhile IBT mainly gave rise to the right bronchial artery along with a posterior intercostal artery. Identifying these trunks and their branching patterns is very important during BAE because missing these variations can lead to incomplete embolization or failure of the procedure [20]. Previous studies have also shown that preserving the bronchial arteries during surgeries such as thoracoscopic lobectomy is important which highlights the need for accurate knowledge of bronchial artery anatomy [21].

This study provides detailed information about the anatomy and variations of bronchial arteries using CECT thorax. The results support previously known anatomical patterns but also show a relatively higher occurrence of ectopic bronchial arteries and their association with bronchiectasis. These findings highlight the importance of careful imaging before procedures and a clear understanding of bronchial artery anatomy to improve the safety and success of thoracic interventions, especially BAE. Overall, the study adds to the existing literature and shows that the bronchial arterial system is complex and can vary between individuals.

CONCLUSION:

This study shows that bronchial arteries have significant anatomical variation in their origin, number, course and branching pattern on CECT thorax. The thoracic aorta was the most common source of originwith most arteries arising between the T4 and T6 vertebral levels. Ectopic bronchial arteries were also observed and were significantly associated with bronchiectasis. Right bronchial arteries generally had larger diameters than left bronchial arteriesand males had significantly larger diameters than females. Additionally, CTB and IBT were identified with characteristic branching patterns. Understanding these variations is important for accurate imaging interpretation and for planning procedures such as bronchial artery embolization.

REFERENCES:

1. Ostrowski P, Bonczar M, Glądys K, Klimeczek-Chrapusta M, Musiał A, Matuszyk A, et al. The complex anatomy of the bronchial arteries: a meta-analysis with potential implications for thoracic surgery and hemoptysis treatment. Sci Rep 2024;14:30942. https://doi.org/10.1038/s41598-024-81935-5.
2. Yener Ö, Türkvatan A, Yüce G, Yener AÜ. The Normal Anatomy and Variations of the Bronchial Arteries: Evaluation With Multidetector Computed Tomography. Canadian Association of Radiologists Journal 2015;66:44–52. https://doi.org/10.1016/j.carj.2014.07.001.
3. Nishihara T, Ishikawa H, Omachi N, Yamaguchi Y, Kitaguchi K, Hattori T. Prevalence of non-bronchial systemic culprit arteries in patients with hemoptysis with bronchiectasis and chronic pulmonary infection who underwent de novo bronchial artery embolization. EurRadiol 2022;33:4198–204. https://doi.org/10.1007/s00330-022-09310-4.
4. Almeida J, Leal C, Figueiredo L. Evaluation of the bronchial arteries: normal findings, hypertrophy and embolization in patients with hemoptysis. Insights Imaging 2020;11:70. https://doi.org/10.1186/s13244-020-00877-4.
5. Sidhu M, Wieseler K, Burdick TR, Shaw DWW. Bronchial Artery Embolization for Hemoptysis. Semin InterventRadiol 2008;25:310. https://doi.org/10.1055/s-0028-1085931.
6. Babu CSR, Sharma V, Gupta OP. Ectopic Bronchial Arteries – Incidental Findings on Multi-detector Computed Tomography. J Anat Soc India 2024;73:300–6. https://doi.org/10.4103/jasi.jasi_123_24.
7. Sabri YY, Mohammed MR, Mohamed MMAEF, El Hinnawy YH, Ewis NM. Bronchial arteries assessment by multi-detector computed tomography in cases of suspected chronic pulmonary thromboembolism and hemoptysis cases. Egyptian Journal of Radiology and Nuclear Medicine 2025;56:213-. https://doi.org/10.1186/s43055-025-01640-9.
8. Monteiro J, Adarsh K, Dabholkar AD. Comparison of Blood Pressure Variation among Patients Undergoing CECT Thorax and NCCT Thorax: A Cross-sectional Study. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH 2024. https://doi.org/10.7860/jcdr/2024/69645.19472.
9. Emmanuel Tito A, Edet Obeten K, Archibong V, Monday Etukudo E, AtupeleMwabaleke J, Michael Usman I, et al. Anatomical variations of the brachiocephalic artery and their clinical relevances: A cadaveric study of Ugandan population. Indian J Clin Anat Physiol 2025;10:250–6. https://doi.org/10.18231/j.ijcap.2023.056.
10. Keskin N, Bamac B, Cakir O, Ciftci E, Colak T, Barut C. Evaluation of the celiac trunk and its branching pattern by magnetic resonance angiography. Annals of Anatomy - Anatomischer Anzeiger 2024;253:152222. https://doi.org/10.1016/j.aanat.2024.152222.
11. Taşdemir R, Öztürk C, Çiftçi R, Cihan ÖF. Morphological and Morphometric Analysis of the Renal Artery Using Computed Tomographic Angiography. European Journal of Therapeutics 2023;29:577–87. https://doi.org/10.58600/eurjther1769.
12. Jalamneh B, Nassar IJ, Sabbooba L, Ghanem R, Nazzal Z, Kiwan R, et al. Exploring Anatomical Variations of Abdominal Arteries Through Computed Tomography: Classification, Prevalence and Implications. Cureus 2023;15. https://doi.org/10.7759/cureus.41380.
13. Tasdemir R, Cihan ÖF, Ince R, Sevmez F, Tasdemir R, CİHAN ÖF, et al. Anatomical Variations in Aortic Arch Branching Pattern: A Computed Tomography Angiography Study. Cureus 2023;15. https://doi.org/10.7759/cureus.36731.
14. Nair DPJR, Zachariah S, Abraham A, Sacks D, Koslow M, Hingorani R. Anomalous Bronchial Artery Origin - Canary in the Coal Mine - For Diagnosing Chronic Thromboembolic Pulmonary Hypertension. Eur J Case Rep Intern Med 2024;11. https://doi.org/10.12890/2024_004616.
15. Duan Y, Sui W, Cai Z, Xia Y, Li J, Fu J. Bronchiectasis morphology and hemoptysis recurrence after bronchial artery embolization: a cohort study using inverse probability of treatment weighting. Front Med (Lausanne) 2025;12:1645331. https://doi.org/10.3389/fmed.2025.1645331.
16. Lu GD, Yan HT, Zhang JX, Liu S, Shi H Bin, Zu QQ. Bronchial artery embolization for the management of frequent hemoptysis caused by bronchiectasis. BMC Pulm Med 2022;22:394-. https://doi.org/10.1186/s12890-022-02198-2.
17. Choi WS, Kim MU, Kim HC, Yoon CJ, Lee JH. Variations of bronchial artery origin in 600 patients: Systematic analysis with multidetector computed tomography and digital subtraction angiography. Medicine 2021;100:e26001. https://doi.org/10.1097/MD.0000000000026001.
18. Esparza-Hernández CN, Ramírez-González JM, Cuéllar-Lozano RA, Morales-Avalos R, González-Arocha CS, Martínez-González B, et al. Morphological Analysis of Bronchial Arteries and Variants with Computed Tomography Angiography. Biomed Res Int 2017;2017:9785896. https://doi.org/10.1155/2017/9785896.
19. Walker CM, Rosado-De-Christenson ML, Martínez-Jiménez S, Kunin JR, Wible BC. Bronchial Arteries: Anatomy, Function, Hypertrophy, and Anomalies. RadioGraphics 2015;35:32–49. https://doi.org/10.1148/rg.351140089.
20. Cho S, Kubota K, Hirose Y, Yoshimura N, Murai Y, Hirose Y. Massive hemoptysis treated with embolization of an ectopic bronchial artery arising from the right thyrocervical trunk: a case report. CVIR Endovasc 2022;5:6-. https://doi.org/10.1186/s42155-022-00285-3.
21. Pan L, Zhou X, Xu C, Ding C, Chen J, Zhu X, et al. Effects of preserving the bronchial artery on cough after thoracoscopic lobectomy. Thorac Cancer 2021;12:2151–60. https://doi.org/10.1111/1759-7714.14012.