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Vessel pattern of bronchial artery in Selective angiogram in patients with hemoptysis

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Introduction

Bronchial artery angiography is the angiography method to find the variation in the anatomy of bronchial artery.Bronchial artery angiography are done by selective angiography followed by aortography.

In 1948 [1] reported four classic bronchial artery branching patterns; two on the left and one on the right that presents as intercostal bronchial trunk (ICBT) (40% cases; one on the left and one ICBT on the right (21%); two on the left and 2 on the right (one ICBT and Bronchial artery) (20%) one on the left and 2 on the right (one ICBT and 1 bronchial artery) (9.7%).

Aims And Objectives

To study the angiographic pattern of the bronchial artery branching in patient with hemoptysis and to correlate with etiology.

Methods And Meterials

Exclusion criteria

- Non pulmonary cause like cardiovascular causes.
- Bleeding diasthesis.
- Severe Renal failure.
- Allergy to contrast medium.

Inclusion criteria

- All ages with hemoptysis are included in the study.

Review Of Literature

Visualization of bronchial arteries was first documented in late 1950's and early 1960s using non selective aortography.

In 1963, the first selective bronchial arteriogram.[2] performed the first BAE in 1973 to control hemoptysis.1976, published a series of four cases of successful BAE for the control of hemoptysis. Their Embolization material consisted of gelatin sponge strips (3 patient) and topical thrombin injection into left bronchial artery (one patient). In 1983[3]reported their experiences with 33 patients with massive hemoptysis who underwent selective bronchial arteriography and treatment by embolization or surgery.In 1985 ulflacker reported the long-term result in a larger group of 75 patients about the role BAE in management of hemoptysis.1990 in Radiology,1990 in chest, 1998 in Am J Respir Critcare Med, 2002 in chest.

All of which have found that BAE in patients with CF who have hemoptysis is an effective, safe therapeutic approach offering better long-term control of recurrent bleeding and quality of life than Medial therapy alone.

In 2003 in radiology had published reports about prediction of non-bronchial systemic arterial supply with chest CT Two CT features were considered suggestive of a non-bronchial systemic arterial supply (a) pleural thickness of more than 3 mm adjacent to the parenchymal lesion and (b) enhancing vascular structures within the extra pleural fat layer. They reported that in the determination of a nonbronchial systemic arterial supply, CT had a sensitivity of 80%, specificity of 84% positive predictive value of 73%, negative predictive value 91%, and accuracy of 84%.

Embolization is useful in a broad spectrum of clinical situations. Embolization can be particularly effective in hemorrhage, regardless of whatever the etiology. It can be performed anywhere in the body where a catheter can be placed with the availability of coaxial micro-catheters, super selective can be performed. In many patients, embolization for hemorrhage is preferable to surgical alternatives. Embolization procedures begin with diagnostic angiography to identify the source of bleeding.

Anatomy of Bronchial Artery

In 1948 reported four classic bronchial artery branching patterns; two on the left and one on the right that presents as intercostal bronchial trunk (ICBT) (40% cases; one on the left and one ICBT on the right (21%); two on the left and 2 on the right (one ICBT and Bronchial artery) (20%) one on the left and 2 on the right (one ICBT and 1 bronchial artery) (9.7%).

Type I 40%	Right ICBT	Left 2 Bronchial
Type II 2%	Right 1(ICBT)	Left (1 Bronchial)
Type III 20%	Right (2 ICBT + Bronchial)	Left 2 Bronchial
Type IV	Right	Left

9.7%	2 ICBT+Bronchial	1 Bronchial

Our Variation Of Bronchial Artery,Total number of patient in our study-20.Selective angiogram done by sheldingers technique.

Type I 55%	Right ICBT	Left 2 Bronchial
Type II 20%	Right 1(ICBT)	Left (1 Bronchial)
Type III 5%	Right (2 ICBT + Bronchial)	Left 2 Bronchial
Type IV 20%	Right 2 ICBT+Bronchial	Left 1 Bronchial

Variation of the bronchial artery	Type I	Type II	Type III	Type IV
Candwell Variation	40%	21%	20%	9.7%
Present study (n=20)	55%	20%	5%	20%

The right intercostal bronchial artery is the most consistently seen vessels at angiography (80% individuals). The right ICBT usually a arises from the right postero lateral aspect of the thoracic aorta and the normal right and left bronchial arteries arises from the anterolateral aspect of the aorta Right and left bronchial arteries that arise from the aorta as a common trunk are not uncommon at angiography.

The true prevalence of a common bronchial artery trunk is unknown. The diameter is usually around 1-3 mm never seen in aortogram. Therefore needs selective catheterization. The successful catherization induces the cough reflux on test injection. They are arise ventrally from the aorta between T4 to T8 vertebrae. The useful landmark is the air column of the left main bronchus.

Anomalous Bronchial artery origin

Bronchial arteries that originate a way from the area between the T3 and T8 vertebrae are considered to be anomalous. The reported prevalence of bronchial arteries with an anomalous origin ranges from 8.3% to 35%. The aberrant bronchial arteries may originate from the aortic arch, internal mammary artery, thyro cervical trunk, subclavian artery costocerivcal trunk, brachiocephalic artery, percardiophenricartery inferior phrenic artery, or abdominal aorta. Aberrant orgins have been described by Bolenga.

Non bronchial systemic collaterals

Non bronchial systemic arteries may also contribute to pulmonary hemorrhage. Innumerable anastomotic path ways from systemic to pulmonary vessels tend to open up. They usually arise from internal mammary, thyrocervucal costocervical Inferiorphrenic, subclavian, Inter costal and lateral thoracic vessels.

Differentiating Anomalous origin from systemic collaterals

Aberrant bronchial arteries can be distinguished anatomically and angiographically from non bronchial systemic collateral vessels in that they extend along the course of major bronchi. In contrast, non bronchial systemic collateral vessels enter the pulmonary parenchyma through the adherent pleura or via pulmonary ligament and their course is not parallel to that of bronchi[4].

Bronchial artery and spinal branches

Two kinds of spinal arteries may be seen at bronchial and intercostals angiography during BAE. Dorsal and ventral redicular arteries are small vessels that arise from segmental spinal arteries and supply the dorsal and ventral roots.[5] The artery of adamkiewicz or greater anterior medullary artery rein force the circulation of lumbar enlargement of spinal cord. This unilateral vessels has been observed to arise between T9 and T12 in 75% of cases. Anterior medullary arteries have a characteristic hair pin configuration at angiography. Radiculer arteries are often visualsed during BAE. Unintentional embolization of radicular arteries does not causes clinicial problem like spinal cord ischemia. It has been stated that the presence of redicular arteries is not considered to be a contraindication for BAE. Anteriormedullary arteries are rarely observed, but embolization and repeat Angiography should be avoided because the spinal cord ischemia may occur with embolization. It has been suggested that spinal arteries will arise from intercostal branch of the right ICBT in 5% - 10% of cases, but it is generally beloved that the blue pervalance is considered lower.

Bronchial artery Anatomy in Computed Tomography

By considering the normal anatomy and the course of the bronchial artery, the locations of hypertrophied bronchial arsteries on CT Scan can be anticipated[6]. The right inter costobronchial artery commonly has an initial vertical oroblique course upward and to the right from the retroesophageal space within the mediastium after arising from aorta. The left bronchial artery usually orginates from the anterior surface of the thoracic aorta or from the cancavity of the aortic arch. In spiral CT enhanced with intravenously administered contrast material bronchial arteries are demonstrated as nodular or linear structures within the mediastinal soft tissue and central air way that have the same attenuation as thoracic aorta.

The major locations of hypertropied bronchial arteries are retrotracheal area, retroesophageal area retrobronchial area, posterior wall of the main bronchus and aorto pulmonary window = Mediastinal lymphnodes, the azygos vein and an enhancing esophageal wall can mimic athe bronchial arteries at CT =. The azygos vein and retro aortic anaestamosis of the azygos system can be mistaken for bronchial arteries if enhanced by reflux of contrast material from the SVC. Successive caudal CT scans obtained during a different phase of peak enhancement

will help differentiate these two entities mediashral lymphnodes and the esophageal wall enhanced with contrast material should be carefully distinguished from the bronchial artery. In adults, normal bronchial arteries measures less than 1.5 mm indiameter at their orgin and 0.5 mm at their point of entry into a broncho pulmonary segment. = A bronchial artery larger than 2 mm at CT is most likely abnormal [7].

Discussion

Variation of the Bronchial artery anatomy shows similar that of the caudwell variation.CT added to the value of identification of the lesion in the systemic and non systemic collaterals.

Conclusion

Angiography is the primary modality in identifying the Bronchial artery anatomy.

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