



Case Report

Enhancing bronchial artery embolization planning through AI-based image creation

Lakshmanan^{1*}, Amalan Ignatius², Esaki Rajulu³, Aditiya⁴, Meenakshi Paramasivan⁵

¹Senior Consultant Anesthesiology, Kauvery Hospital, Tirunelveli, Tamil Nadu

^{2,3}Consultant Interventional Radiologist, Kauvery Hospital, Tirunelveli, Tamil Nadu

⁴Consultant Pulmonary Medicine, Kauvery Hospital, Tirunelveli, Tamil Nadu

⁵ HOD - Department of Radiology, Kauvery Hospital, Tirunelveli, Tamil Nadu

*Correspondence

Abstract

Background: Bronchial artery embolization (BAE) is an established first-line, minimally invasive treatment for life-threatening and recurrent hemoptysis. We report a case of a 51-year-old female presenting with moderate hemoptysis (100–200 mL/day) secondary to bilateral lower-lobe cystic bronchiectasis, with hypertrophied right intercostobronchial, left bronchial, and bilateral superior phrenic arteries identified on CT angiography. In accordance with CIRSE recommendations, preprocedural vascular mapping was performed, and AI-generated illustrative images were used as an adjunct to conventional imaging to assist procedural planning and team coordination. These images, generated using voice-prompted AI tools and externally referenced with safety pins at the T6–T8 vertebral levels, were carefully cross-verified with patient-specific CT angiographic findings prior to embolization. Selective embolization of all three major arterial feeders was successfully performed, resulting in near-complete resolution of hemoptysis by the second post-procedural day. The procedure was completed with a total fluoroscopy time of approximately 40 minutes and a contrast volume of 100 mL of nonionic contrast. This case highlights the potential role of AI-generated visual aids in improving procedural efficiency, anatomical orientation, and interdisciplinary communication during complex BAE, while emphasizing the necessity of meticulous validation against standard imaging modalities.

Keywords: Bronchial artery embolization; AI image creation; Haemoptysis

Citation: Lakshmanan, Amalan Ignatius, Esaki Rajulu, Aditiya, Meenakshi. Enhancing bronchial artery embolization planning through ai-based image creation. *Kauverian Med J.* 2026;3(5):32-36.

Academic Editor: Dr. Venkita S. Suresh

ISSN: 2584-1572 (Online)



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions.

1. Introduction

Bronchial artery embolization (BAE) is an established, minimally invasive treatment for life-threatening and recurrent hemoptysis, a respiratory emergency associated with high mortality if managed conservatively. When performed by experienced interventional radiologists, BAE is a safe and effective first-line therapy, often serving as definitive treatment or a bridge to surgery^[1,2].

Haemoptysis most commonly arises from bronchial circulation ($\approx 90\%$), with pulmonary circulation accounting for only $\sim 5\%$, and the remaining cases originating from the aorta or other systemic arteries. In acute and chronic lung diseases, pulmonary arteriolar obstruction due to hypoxic vasoconstriction, thrombosis, or vasculitis leads to compensatory hypertrophy of bronchial arteries.

These fragile, enlarged bronchial vessels in inflamed lung tissue may rupture under systemic arterial pressure, resulting in haemoptysis^{3,4}.

2. Case Presentation

Here we share the experience of a 51-year-old female presented with moderate haemoptysis (approximately 100–200 mL per day) over the past two days. The blood was bright red in colour. She had no comorbidities, no prior history of tuberculosis or other significant medical conditions. Imaging revealed as shown in fig 1, bilateral lower lobe cystic bronchiectasis, with hypertrophied right intercostobrachial artery, left bronchial artery, and bilateral superior phrenic arteries supplying the diseased regions. The initial plan was embolization of the right intercostobrachial, left bronchial, and bilateral superior phrenic arteries.

Patient was planned as per CIRSE recommendations¹, for life-threatening haemoptysis, MDCT/CTA done initially to map the anatomy, unless urgent airway control is needed – then bronchoscopy comes first. Before embolization, scrutinize for non-target vessel to heart, brain or cord, use the left main bronchus as a landmark, and employ appropriate embolic agents (PVA, larger particles, coils) while addressing underlying diseases to reduce recurrence.

In the treatment plan we used AI image creating tool along with 2 safety pins placed in midline at the back T6, T7, T8 level. Initially pin was placed and the ribs were counted by the techs. The AI image is generated by voice prompt to image creation as shown in fig 2. However, the final image must be confirmed by the techs and primary interventional radiologist with the parent CT anatomy of the patient.

On day 2 her haemoptysis almost reduced to less $< 2\text{ml}$ per day and she developed no major complications. Mild right shoulder pain which subsided after analgesics. However, the BAE has 16 % recurrence rate especially in extensive parenchymal diseases¹. Here we have embolised the 3 major vessels that supplied the diseased parenchyma as shown in fig 3. More than 3 arteries embolization reduces the chance of recurrence¹.

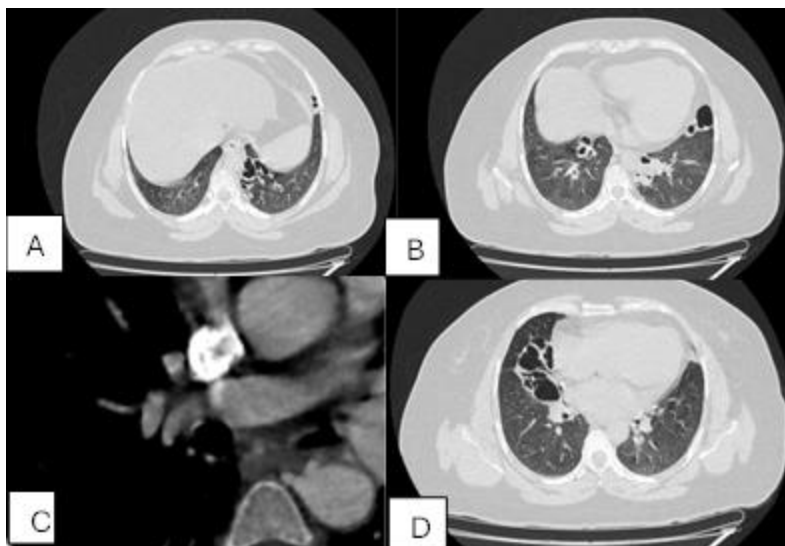


Fig (1): a) Depicts bronchiectatic changes in the medio-basal segment of the right lower lobe. b) Shows bronchiectatic changes in the medio-basal segment of the right lower lobe, the anterior and posterior basal segment of the left lower lobe. c) Shows the origin of hypertrophied right intercostobronchial and left bronchial arteries (blue arrows). d) Displays extensive cystic bronchiectatic changes in the superior and anterior basal segments of the right lower lobe, with air-fluid levels.

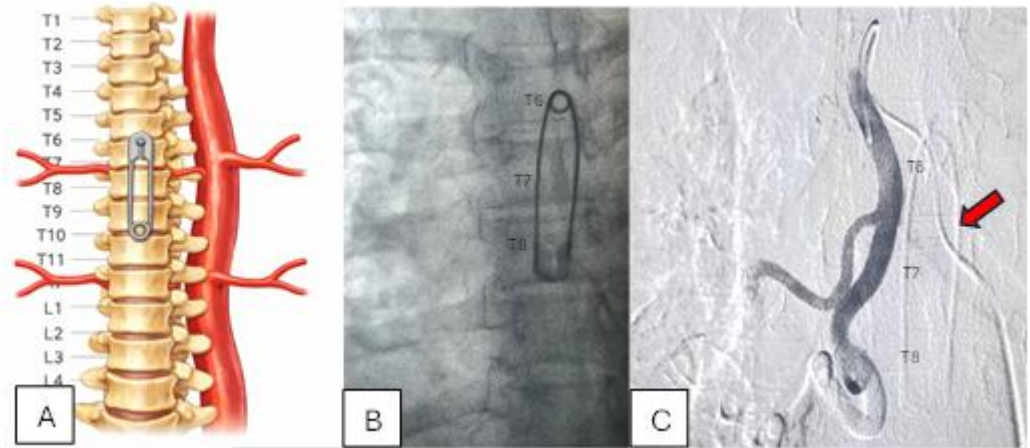


Fig (2): a) A safety pin is shown spanning vertebral levels T6, T7, and T8. The right intercostobronchial artery arises at T6/7 intervertebral disc level, the left bronchial artery arises at T6/7 intervertebral disc level, and bilateral superior phrenic arteries arise at the T12 body level. b) Shows the corresponding Fluoro imaging matching the vertebral level. c) Showing the right ICBT origin at right T6/T7 IV-disc level.

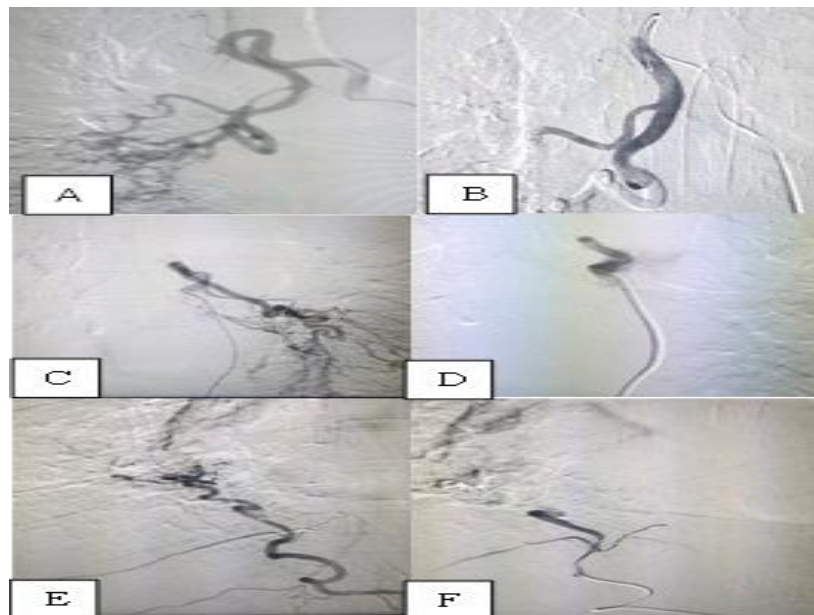


Fig (3): a & b): Show the pre- and post-embolization of a hypertrophic right intercostobronchial artery arising at the T6–T7 IVD level. c & d): Depict the pre- and post-embolization of a hypertrophic dysplastic left bronchial artery arising at the T6–T7 IVD level left side. e & f): Display the hypertrophic and dysplastic right superior phrenic artery originating at the T12 vertebral body level.

3. Discussion

Artificial intelligence–based enhancement software is rapidly evolving in the field of surgery and is creating significant improvements in healthcare delivery [\[5\]](#). Artificial intelligence–generated images carry an inherent risk of hallucination, and currently there are no validated standards to assess their clinical accuracy [\[6\]](#). In addition, some generated images may be anatomically irrelevant. Therefore, all AI-generated images must be carefully cross-verified with patient-specific imaging, particularly contrast-enhanced CT angiography of the chest, before being used for procedural planning.

In this case, AI-generated images were used only after thorough correlation with CT angiographic findings and were applied as an adjunct to conventional planning. These images facilitated improved coordination between the interventional radiologist and technical staff, particularly during table positioning, catheter navigation, contrast administration, and radiation dose management.

Compared with routine bronchial artery embolization (BAE), the overall fluoroscopy time and contrast usage in this patient were relatively lower. Based on the operator’s experience, embolization of three arterial feeders was completed with a total fluoroscopy time of approximately 40 minutes and a contrast volume limited to 100 mL of nonionic contrast (iohexol, Omnipaque). Although there are currently no published studies directly comparing fluoroscopy time and contrast usage in BAE with and without AI-assisted planning, this case highlights the potential role of AI-generated visual aids in improving procedural efficiency.

Notably, the AI-assisted visualization reduced confusion during identification and selective catheterization of small-caliber vessels, particularly the superior phrenic arteries. When used judiciously and in conjunction with standard imaging, AI-generated images may contribute to reduced radiation exposure, lower contrast volume, and more effective procedural workflow during complex embolization procedures.

4. Conclusion

AI-generated illustrative images can enhance treatment planning, improve team coordination, and facilitate better understanding of the procedure for both clinicians and patients. Accordingly, such images may have a supportive role in planning bronchial artery embolization. However, larger prospective studies are required to validate these observations.

References

- [1] Kettenbach J, Ittrich H, Gaubert JY, et al. CIRSE Standards of Practice on Bronchial Artery Embolisation. *Cardiovasc Intervent Radiol* 2022; 45:721–32.
- [2] Yoon W, Kim JK, Kim YH, et al. Bronchial and nonbronchial systemic artery embolization for life-threatening hemoptysis: A comprehensive review. *Radiographics* 2002; 22:1395–409.
- [3] Bronchiectasis IN, Limow AA, Hales MR, et al. ENLARGEMENT OF THE BRONCHIAL ARTERIES, AND THEIR ANASTOMOSES WITH THE PULMONARY ARTERIES.
- [4] Deffebach ME, Charan NB, Lakshminarayan S, et al. States of Art the Bronchial Circulation Small, but a Vital Attribute of the Lung 13.
- [5] Shah YB, Krishnan AS, Goldberg ZN, et al. Transforming Surgery with Artificial Intelligence: An Early Analysis of Private Industry Trends. *Cureus* <https://doi.org/10.7759/cureus.82328>.
- [6] Duggan JL, Mohamed O, Forrest E, et al. Limitations of Artificial Intelligence Generated Images for Hand Surgery Patient Education. *J Hand Surg Glob Online* 2025;7.