International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Bronchial Artery Embolization (BAE) In Patients with Hemoptysis – Single Centre Experience

Dr. Sowmya. A[1], Dr Siva Lakshmana Teja Alapati[2]

[1]Assistant professor., Dept of Radiodiagnosis and Interventional radiology, Vydehi Institute of medical science and research institute
[2]Associate professor, Dept of Anaesthesia, Vydehi Institute of medical science and research institute

OPEN ACCESS

Corresponding Author:

Dr. Sowmya. A
Assistant professor., Dept of Radiodiagnosis and Interventional radiology, Vydehi Institute of medical science and research institute

Received: 04-01-2026
Accepted: 23-01-2026
Available online: 01-02-2026

ABSTRACT

Background: Hemoptysis is a potentially life-threatening condition most commonly arising from the bronchial circulation. Bronchial artery embolisation (BAE) is a well-established minimally invasive treatment for moderate to severe and recurrent hemoptysis.
Aim: To evaluate the safety and efficacy of bronchial artery embolisation in patients presenting with hemoptysis at a single tertiary care centre.
Materials and Methods: This retrospective observational study included patients who underwent BAE for hemoptysis between June 2023 and October 2024. Demographic data, aetiology, procedural details, technical success, complications, recurrence, and the need for repeat embolisation were analysed. Technical success was defined as the immediate cessation of hemoptysis with angiographic stasis of the target vessel.
Results: A total of 50 patients underwent BAE, including 35 males (70%) and 15 females (30%). Tuberculosis was the most common aetiology (70%), followed by bronchiectasis (26%). Technical success was achieved in 100% of cases. Clinical success was observed in 98% of patients, with only one patient experiencing recurrence due to non-compliance with etiological treatment and requiring repeat embolisation. Minor complications such as transient chest pain were noted, while no major complications were encountered.
Conclusion: Bronchial artery embolisation is a safe, effective, and reliable first-line treatment for controlling hemoptysis, with high success rates and minimal complications. Early intervention and adherence to etiological treatment are crucial for sustained clinical outcomes.

Keywords*: Hemoptysis; Bronchial artery embolization; Tuberculosis; Interventional radiology; Massive hemoptysis; Bronchiectasis.*

INTRODUCTION

Hemoptysis is a common clinical presentation that ranges from mild self-limiting episodes to massive, life-threatening haemorrhage. Massive hemoptysis, although variably defined, is generally considered when expectorated blood volume exceeds 200–600 mL within 24 hours or when bleeding leads to respiratory compromise or hemodynamic instability [1]. Regardless of volume, hemoptysis warrants prompt evaluation due to the risk of airway obstruction, asphyxiation, and mortality.

The majority of cases of significant hemoptysis arise from the bronchial circulation, which is a high-pressure systemic vascular network responsible for nearly 90% of bleeding episodes, while the pulmonary arterial system accounts for a smaller proportion [2]. Common etiologies include pulmonary tuberculosis, bronchiectasis, chronic infections, aspergillosis, and malignancy, with notable geographic variation. In developing countries, tuberculosis remains the leading cause of hemoptysis due to chronic inflammatory changes and neovascularisation [3].

Traditional management options for massive hemoptysis include conservative medical therapy, bronchoscopic interventions, and surgical resection. However, surgery is associated with significant morbidity and mortality, particularly

in patients with active infection, poor pulmonary reserve, or unstable clinical status [4]. Consequently, less invasive treatment strategies have gained prominence.

Since its initial description by Rémy et al. in 1974, bronchial artery embolisation (BAE) has become a well-established first-line treatment for moderate to severe and recurrent hemoptysis [5]. BAE is a minimally invasive procedure that allows targeted occlusion of abnormal bronchial and non-bronchial systemic arteries responsible for bleeding, achieving rapid hemostasis while preserving lung function. Reported technical success rates range from 85% to 100%, with low complication rates and acceptable long-term outcomes [6,7].

Despite its widespread use, recurrence of hemoptysis following BAE remains a concern and is often related to progression of underlying disease, incomplete embolisation, or non-compliance with etiological treatment [8]. Outcomes of BAE may vary based on patient demographics, aetiology, and institutional expertise, highlighting the importance of single-centre experience reports.

The present study aims to evaluate the safety, efficacy, and clinical outcomes of bronchial artery embolisation in patients presenting with hemoptysis at a single tertiary care centre, with particular emphasis on etiological distribution, procedural success, recurrence rates, and complications.

MATERIALS AND METHODS

This retrospective observational study was conducted at a single tertiary care centre. Institutional records were reviewed for all patients who underwent bronchial artery embolisation (BAE) for the management of hemoptysis between June 2023 and October 2024.

Study Population

All patients presenting with moderate to severe or recurrent hemoptysis who were referred for bronchial artery embolisation during the study period were included. Patients with incomplete medical records or those who underwent alternative interventions were excluded. A total of 50 patients were identified and included in the analysis.

Data Collection

Demographic data, including age and gender, were recorded. Clinical data collected included the aetiology of hemoptysis, underlying pulmonary pathology, and prior medical management. Procedural details such as technical success, peri-procedural complications, recurrence of hemoptysis, and the need for repeat embolisation were documented. Follow-up information was obtained from hospital records and outpatient visits.

Procedure Technique

Bronchial artery embolisation was performed under local anaesthesia using standard interventional radiology techniques. Vascular access was obtained via the common femoral artery, followed by selective catheterisation of the bronchial arteries using appropriate diagnostic catheters. Angiography was performed to identify hypertrophied or abnormal bronchial arteries and the culprit vessel responsible for bleeding. Embolisation was carried out using embolic agents as per operator preference. The procedural endpoint was defined as angiographic stasis of the target vessel.

Outcome Measures

Technical success was defined as the immediate cessation of hemoptysis following embolisation. Clinical success was assessed based on the absence of recurrent hemoptysis during follow-up. Recurrence was defined as any episode of hemoptysis requiring medical attention or repeat embolisation. Complications were classified as minor or major based on standard interventional radiology criteria.

Statistical Analysis

Data were analysed descriptively and expressed as frequencies and percentages for categorical variables. Continuous variables were summarised using means or medians where applicable.

RESULTS AND OBSERVATIONS

A total of 50 patients underwent bronchial artery embolisation (BAE for hemoptysis) during the study period from June 2023 to October 2024.

Patient Demographics

Among the study population, 35 patients (70%) were male and 15 patients (30%) were female, showing a male predominance.

Table 1: Patient Demographics

Parameter	Number of Patients (n=50)	Percentage (%)
Male	35	70
Female	15	30

Aetiology of Hemoptysis

Tuberculosis was the most common underlying cause of hemoptysis, accounting for 70% of cases, followed by bronchiectasis (26%). Less common causes included aspergillosis and malignancy.

Table 2: Aetiology of Hemoptysis

Etiology	Number of Patients	Percentage (%)
Tuberculosis	35	70
Bronchiectasis	13	26
Aspergillosis	1	2
Malignancy	1	2
Total	**50**	**100**

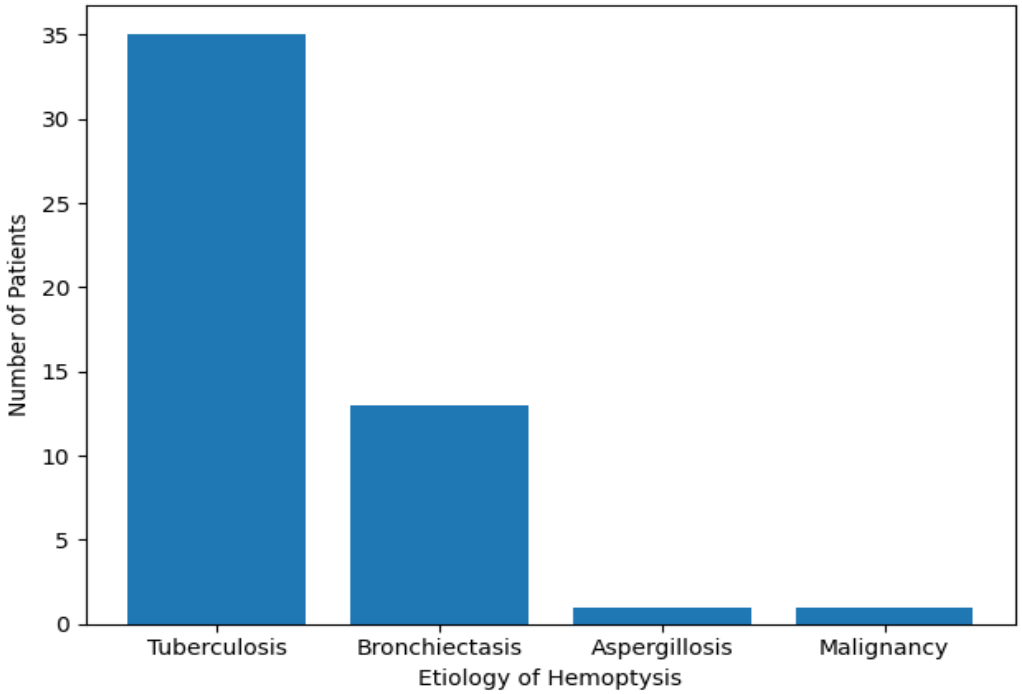

Figure 1: Aetiology of Hemoptysis

Procedural Outcomes

The technical success rate was 100%, defined as immediate cessation of hemoptysis following embolisation with angiographic stasis of the culprit vessel.

During follow-up, 49 patients (98%) remained symptom-free, while 1 patient (2%) experienced recurrence of hemoptysis, attributed to non-compliance with etiological treatment. Only one patient required repeat embolisation.

Table 3: Procedural Outcomes

Outcome	Number of Patients	Percentage (%)
Technical success	50	100
Clinical success	49	98
Recurrence of hemoptysis	1	2
Repeat embolization	1	2

Complications

The procedure was well tolerated with a low complication rate. Minor complications such as transient chest pain were observed in a few patients and managed conservatively. No major complications, including non-target embolisation, spinal ischemia, catheter-related infections, or procedure-related mortality, were reported.

Table 4: Complications Following BAE

Complication	Number of Patients	Percentage (%)
Minor (chest pain)	Few	—
Major complications	0	0

REPRESENTATIVE CASE IMAGES:

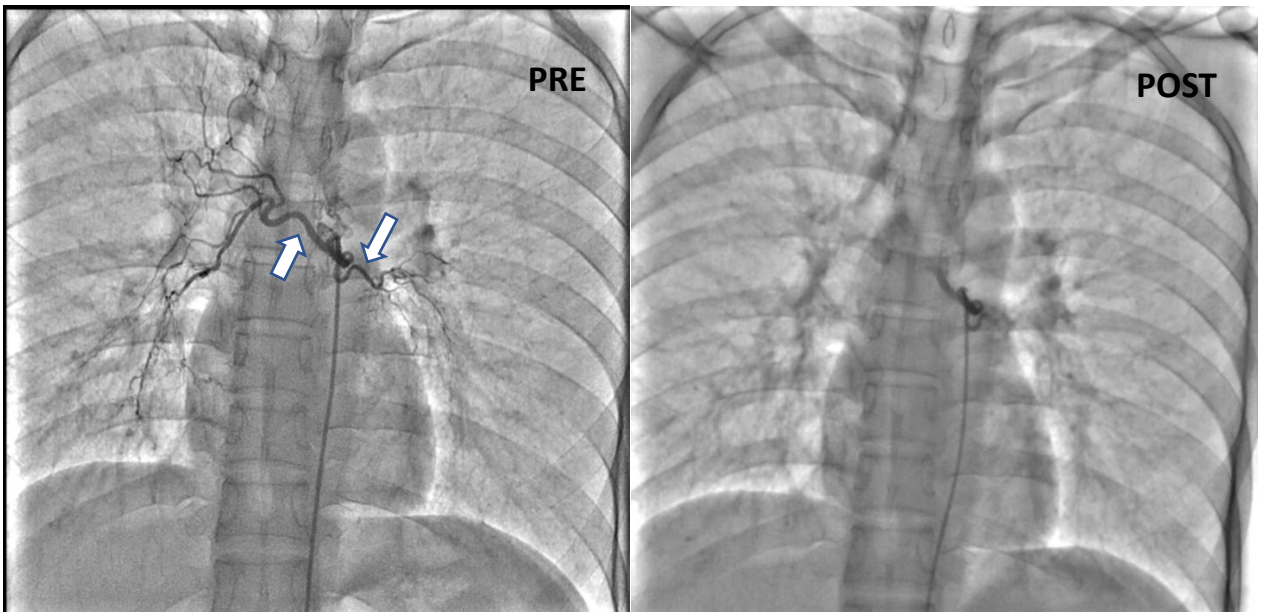

Image 1: Pre : Arteriogram reveals bilateral bronchial arteries (white arrows) showing abnormal hyper vascularity and tortuosity. **Post :** Arteriogram showing bilateral bronchial artery was successfully embolized with polyvinyl alcohol particles

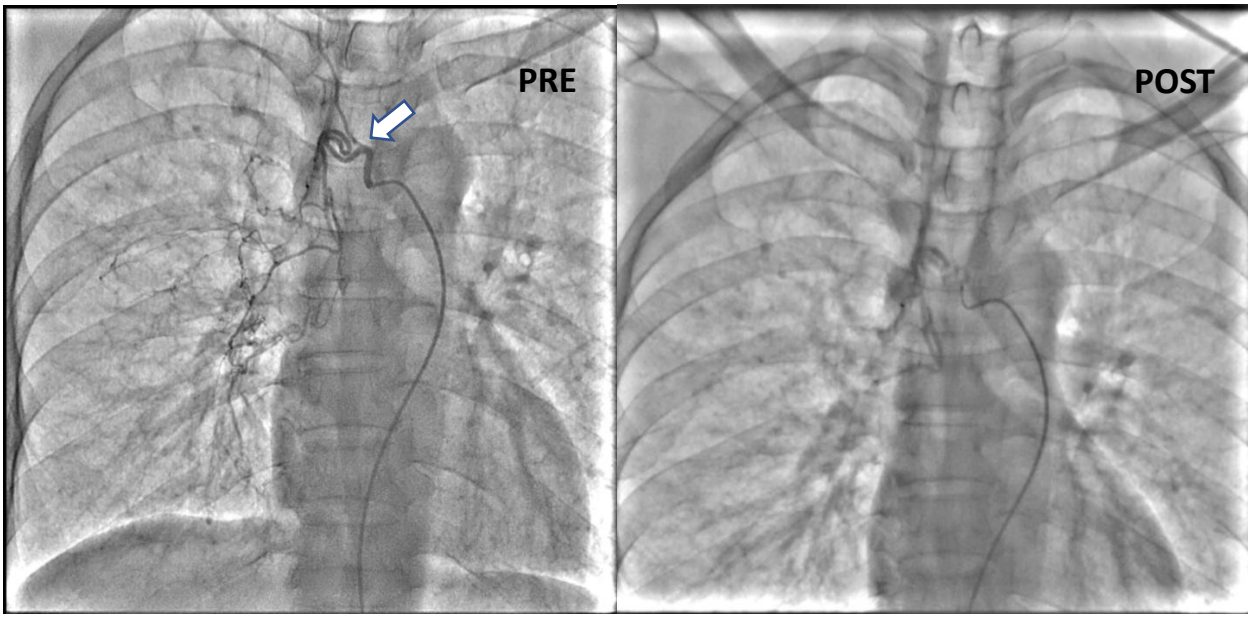

Image 2: Pre : Arteriogram reveals right bronchial artery (white arrow) showing abnormal hyper vascularity and tortuosity. **Post :** Arteriogram showing right bronchial artery was successfully embolized with polyvinyl alcohol particles

DISCUSSION

Hemoptysis remains a challenging clinical condition requiring prompt and effective management to prevent morbidity and mortality. In this single-centre retrospective study, bronchial artery embolisation (BAE) demonstrated excellent technical and clinical success with a favourable safety profile, reinforcing its role as a first-line treatment for moderate to severe and recurrent hemoptysis.

The present study achieved a 100% technical success rate, defined as immediate cessation of bleeding with angiographic stasis of the culprit vessel. This success rate is comparable to previously reported series, where technical success ranges

from 85% to 100% [1,2]. The high success rate in our cohort may be attributed to accurate angiographic identification of bleeding vessels, selective catheterisation, and timely intervention.

Tuberculosis was the most common aetiology of hemoptysis in our study population, accounting for 70% of cases, followed by bronchiectasis (26%). This etiological distribution is consistent with studies from tuberculosis-endemic regions, where chronic inflammatory changes and neovascularisation predispose patients to recurrent bleeding [3,4]. In contrast, studies from developed countries report bronchiectasis and malignancy as more common causes [5], highlighting the influence of regional disease patterns on hemoptysisaetiology.

Clinical success was achieved in 98% of patients, with only one patient experiencing recurrence during follow-up. The recurrence rate of 2% observed in our study is lower than that reported in the literature, where recurrence rates vary from 10% to 55% depending on duration of follow-up and underlying pathology [6,7]. The single recurrence in our cohort was attributed to non-compliance with etiological treatment, emphasizing the importance of addressing the underlying disease process alongside embolization to achieve sustained outcomes.

BAE was found to be a safe procedure, with no major complications observed. Minor complications such as transient chest pain were self-limiting and managed conservatively. Serious complications such as spinal cord ischemia, non-target embolization, bronchial or esophageal ischemia, and procedure-related mortality were not encountered. These findings are consistent with prior studies reporting major complication rates of less than 5% with modern embolization techniques and improved catheter technology [8,9].

The absence of major complications in this study underscores the importance of meticulous angiographic evaluation, careful embolic agent selection, and operator expertise. Advances in imaging and super-selective embolisation have significantly reduced the risk of non-target embolisation, particularly involving spinal arteries [10].

Despite its encouraging results, this study has certain limitations. The retrospective design and relatively small sample size may limit the generalizability of the findings. Additionally, the follow-up period was variable, which may underestimate late recurrence rates. Long-term outcomes and comparisons between different embolic agents were not assessed.

Nevertheless, this single-centre experience adds to the growing body of evidence supporting BAE as a safe, effective, and minimally invasive treatment option for hemoptysis, particularly in regions with a high prevalence of tuberculosis. Early referral and intervention, combined with appropriate etiological treatment, can significantly reduce recurrence and improve patient outcomes.

CONCLUSION

Bronchial artery embolisation is a safe and effective first-line treatment for moderate to severe and recurrent hemoptysis. This single-centre study demonstrated high technical and clinical success with minimal complications and low recurrence. Tuberculosis remained the most common underlying cause. Early intervention combined with appropriate etiological management is essential for sustained outcomes. Larger prospective studies are needed to validate these findings and assess long-term efficacy.

REFERENCES

1. Mal H, Rullon I, Mellot F, et al. Immediate and long-term results of bronchial artery embolisation for life-threatening hemoptysis. *Chest*. 1999;115(4):996–1001.
2. Chun JY, Morgan R, Belli AM. Radiological management of hemoptysis: diagnostic imaging and bronchial arterial embolisation. *Cardiovasc InterventRadiol*. 2010;33(2):240–250.
3. Panda A, Bhalla AS, Goyal A. Bronchial artery embolisation in hemoptysis: a systematic review. *DiagnIntervRadiol*. 2017;23(4):307–317.
4. Hwang HG, Lee HS, Kim YJ, et al. Bronchial artery embolisation for hemoptysis: a retrospective review of 334 cases. *J VascIntervRadiol*. 2015;26(4):558–565.
5. Revel MP, Fournier LS, Hennebicque AS, et al. Can CT replace bronchoscopy in the detection of the site and cause of bleeding in patients with large or massive hemoptysis? *AJR Am J Roentgenol*. 2002;179(5):1217–1224.
6. Fruchter O, Schneer S, Rusanov V, et al. Bronchial artery embolization for massive hemoptysis: long-term follow-up. *Asian Cardiovasc Thorac Ann*. 2015;23(1):55–60.
7. Lee MK, Kim SH, Yong HS, et al. Outcomes of bronchial artery embolization for life-threatening hemoptysis. *Clin Radiol*. 2010;65(7):519–523.
8. Corr PD. Bronchial artery embolization for life-threatening hemoptysis using tris-acryl gelatin microspheres. *J VascIntervRadiol*. 2005;16(4):541–549.
9. Sopko DR, Smith TP. Bronchial artery embolization for hemoptysis. *Semin InterventRadiol*. 2011;28(1):48–62.
10. Yoon W, Kim JK, Kim YH, et al. Bronchial and nonbronchial systemic artery embolization for life-threatening hemoptysis: a comprehensive review. *Radiographics*. 2002;22(6):1395–1409.