

Pulmonary Aspergilloma After Tuberculosis Presenting With Recurrent and Life-Threatening Haemoptysis: A Five-Patient Tertiary-Centre Case Series

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Abstract

Background: Pulmonary aspergilloma commonly develops in pre-existing cavities after tuberculosis and may cause recurrent or life-threatening haemoptysis. Surgery is the definitive treatment for localized disease, while embolization can control acute bleeding. **Methods:** We retrospectively reviewed five patients with pulmonary aspergilloma associated with previous or presumed pulmonary tuberculosis who underwent definitive surgical treatment at a tertiary-care centre in South India between March and May 2025. Four patients presented with recurrent haemoptysis and underwent elective lobectomy. One patient with life-threatening haemoptysis underwent pulmonary arterial embolization followed by definitive lobectomy. **Results:** Histopathology confirmed aspergilloma in all resected specimens. Dense pleural adhesions and distorted tissue planes were encountered in several patients. Postoperative complications included prolonged air leak in one patient and empyema in one patient; both were managed successfully. There was no perioperative mortality or recurrence of haemoptysis during the 6-month follow-up period. **Conclusions:** Surgical resection provided definitive treatment for localized post-tuberculous aspergilloma with significant haemoptysis. Pulmonary arterial embolization was effective for controlling life-threatening bleeding before definitive surgery. Multidisciplinary coordination between thoracic surgery or interventional radiology is important for managing these complex cases.

Keywords: Pulmonary aspergilloma; chronic pulmonary aspergillosis; post-tuberculous lung disease; haemoptysis; lobectomy; pulmonary arterial embolization; thoracic surgery; interventional radiology.

1. Introduction

Pulmonary aspergilloma is a localized form of chronic pulmonary aspergillosis characterized by colonization of a pre-existing pulmonary cavity by *Aspergillus* species. Previous pulmonary tuberculosis is one of the most common underlying conditions, particularly in tuberculosis-endemic regions. Residual tuberculous cavities, bronchiectasis, fibrosis, and other structural lung abnormalities provide a suitable environment for fungal colonization and subsequent development of an aspergilloma.

The clinical presentation ranges from asymptomatic disease to chronic cough, constitutional symptoms, and recurrent haemoptysis. Haemoptysis is the most clinically important manifestation and may occasionally become massive or life-threatening because of involvement of bronchial or pulmonary vessels. Management therefore depends on symptom severity, disease extent, pulmonary function, and the patient's operative risk.

For patients with symptomatic and localized pulmonary aspergilloma, particularly those with significant or recurrent haemoptysis, surgical resection remains an important definitive treatment. However, surgery can be technically challenging in patients with previous tuberculosis because of dense pleural adhesions, hilar fibrosis, distorted anatomical planes, and loss of functional lung parenchyma. In patients presenting with severe or life-threatening haemoptysis, endovascular embolization may provide rapid haemorrhage control and, in selected cases, serve as a bridge to definitive surgical treatment.

Although pulmonary aspergilloma following tuberculosis is well recognized, patients presenting with severe haemoptysis may require individualized and multidisciplinary management involving thoracic surgery, interventional radiology, respiratory medicine, anaesthesia, and perioperative critical care. This is particularly relevant in tuberculosis-endemic settings where post-tuberculous structural lung disease remains common.

In this case series, we describe the clinical presentations, radiological findings, operative challenges, interventional

management, histopathological findings, and postoperative outcomes of five patients with post-tuberculous pulmonary aspergilloma presenting with recurrent or life-threatening haemoptysis who underwent definitive surgical management at a tertiary referral centre. All patients were followed for six months following treatment.

Methods

Study Design and Setting

This retrospective case series was conducted at a tertiary referral centre and included five patients with post-tuberculous pulmonary aspergilloma who presented with recurrent or life-threatening haemoptysis and subsequently underwent definitive surgical management. Patients were identified from institutional thoracic surgery and interventional radiology records over the study period. All thoracic surgical procedures were performed with involvement of the cardiothoracic and vascular surgery (CTVS) team, with interventional radiology, respiratory medicine, anaesthesia, and critical care involvement according to clinical requirements.

Patient Selection

Patients were eligible for inclusion if they had: 1) a history of previous pulmonary tuberculosis; 2) radiological evidence of a pulmonary cavity containing an aspergilloma or other findings suggestive of pulmonary aspergillosis; 3) recurrent, severe, or life-threatening haemoptysis; and (4) surgical resection performed with curative intent. Patients without a documented history of pulmonary tuberculosis, those managed exclusively with medical therapy or embolization, and those without adequate clinical or follow-up information were excluded.

Clinical and Radiological Assessment

Demographic characteristics, presenting symptoms, relevant medical history, smoking status, previous tuberculosis treatment, comorbidities, and haemoptysis severity were recorded. Haemoptysis was classified according to the clinical severity and need for urgent intervention, transfusion, airway protection, or haemodynamic support.

Preoperative evaluation included physical examination, laboratory investigations, chest radiography, and contrast-enhanced computed tomography of the chest. Imaging findings assessed included the location and size of the cavity, presence of an intracavitary fungal ball, surrounding fibrosis or bronchiectasis, pleural thickening, destruction of adjacent lung parenchyma, and evidence of active bleeding or vascular abnormalities. Pulmonary function testing and cardiopulmonary assessment were performed when clinically feasible to determine operative risk and the extent of resection that could be tolerated.

Documented nutritional indicators, including clinically reported weight loss, were recorded when available; formal nutritional and frailty assessments were not routinely performed during the retrospective study period.

Initial Management of Haemoptysis

Patients presenting with severe or ongoing haemoptysis received resuscitation, correction of coagulopathy where necessary, blood-product support when indicated, and airway and respiratory management according to clinical need. Bronchial artery embolization or other endovascular intervention was performed in patients with uncontrolled or life-threatening bleeding, either as an emergency measure or as a bridge to definitive surgery. The embolization procedure, target vessels, technical success, and early clinical response were documented.

Surgical Management

The decision to proceed with surgery was made by a multidisciplinary team comprising thoracic surgeons, respiratory physicians, interventional radiologists, anaesthesiologists, and critical care specialists. Surgical treatment was considered for patients with localized disease and recurrent or significant haemoptysis, particularly when the bleeding source was not adequately controlled by conservative or endovascular measures.

The type of resection was determined by the extent and anatomical distribution of disease and included wedge resection, segmentectomy, lobectomy, or pneumonectomy where required. Intraoperative findings, including pleural adhesions, hilar fibrosis, distorted anatomy, dense inflammatory tissue, vascular involvement, and difficulty with dissection, were recorded. Additional procedures, blood loss, transfusion requirements, operative duration, and intraoperative complications were also documented.

Histopathological Evaluation

All resected specimens were submitted for histopathological examination. The diagnosis was confirmed by identification of fungal hyphae consistent with *Aspergillus* species within a pre-existing cavity, together with associated necrotic material, inflammatory changes, fibrosis, or bronchiectatic and post-tuberculous lung changes. Microbiological investigations were performed when clinically indicated.

Postoperative Outcomes and Follow-up

Postoperative data included duration of mechanical ventilation, intensive care and hospital stay, chest tube duration, postoperative complications, need for reintervention, and in-hospital mortality. Complications were recorded according to their clinical severity and management requirements.

Patients were followed for six months after treatment through outpatient review and clinical assessment. Follow-up evaluation focused on recurrent haemoptysis, respiratory symptoms, radiological recurrence or progression, postoperative complications, and overall clinical status.

CASE PRESENTATION

Case 1 :

History and presentation: A 25-year-old male with a history of pulmonary tuberculosis treated in 2020 and hypothyroidism on regular thyroxine presented with recurrent episodes of haemoptysis for 2 months. He reported mild fatigue but denied fever, chest pain, dyspnoea, or other systemic symptoms.

Examination: On admission, the patient was alert and oriented and haemodynamically stable, with a heart rate of 80/min, blood pressure of 120/70 mmHg, and oxygen saturation of 98% on room air. Chest auscultation revealed coarse crackles over the right upper zone. Cardiovascular, abdominal, and neurological examinations were unremarkable.

Investigations: His haemoglobin level was 13.8 g/dL on admission and decreased to 8.6 g/dL during the perioperative period. The total leukocyte count increased from 4,330 cells/mm³ preoperatively to 12,440 cells/mm³ postoperatively. Coagulation parameters and renal and liver function tests were within normal limits, except for a mild elevation of serum glutamic-oxaloacetic transaminase (SGOT) to 57 IU/L. Computed tomography (CT) of the chest demonstrated a thick-walled cavitory lesion in the apical segment of the right upper lobe containing an intracavitary soft-tissue mass, consistent with a pulmonary aspergilloma. Fibrobronchiectatic changes and calcified nodules suggestive of previous pulmonary tuberculosis were also noted (Figure 1).

Management: Following multidisciplinary evaluation, the patient underwent right upper lobectomy through a posterolateral thoracotomy on 11/03/2025. Dense adhesions between the right upper lobe and the parietal pleura were encountered intraoperatively, making dissection technically demanding. The pulmonary vein, pulmonary artery, and bronchus supplying the right upper lobe were sequentially dissected, ligated, and divided. Saline leak testing demonstrated no evidence of an air leak. The resected lobe showed a well-formed cavity containing a fungal ball, consistent with the radiological diagnosis (Figure 2).

Postoperative course: The patient was extubated on postoperative day (POD) 1, and the chest drains were removed on POD 2. His postoperative recovery was otherwise uneventful, and he was discharged on POD 5 with advice regarding chest physiotherapy and incentive spirometry. A postoperative chest radiograph demonstrated expansion of the remaining right lung (Figure 3). At 6-month follow-up, there was no clinical evidence of recurrent haemoptysis or recurrence of aspergilloma.



Figure 1. Contrast-enhanced CT chest demonstrating a thick-walled cavity in the apical segment of the right upper lobe with an intracavitary soft-tissue mass (fungal ball), consistent with pulmonary aspergilloma. Associated post-tuberculous fibrobronchiectatic changes are also present.

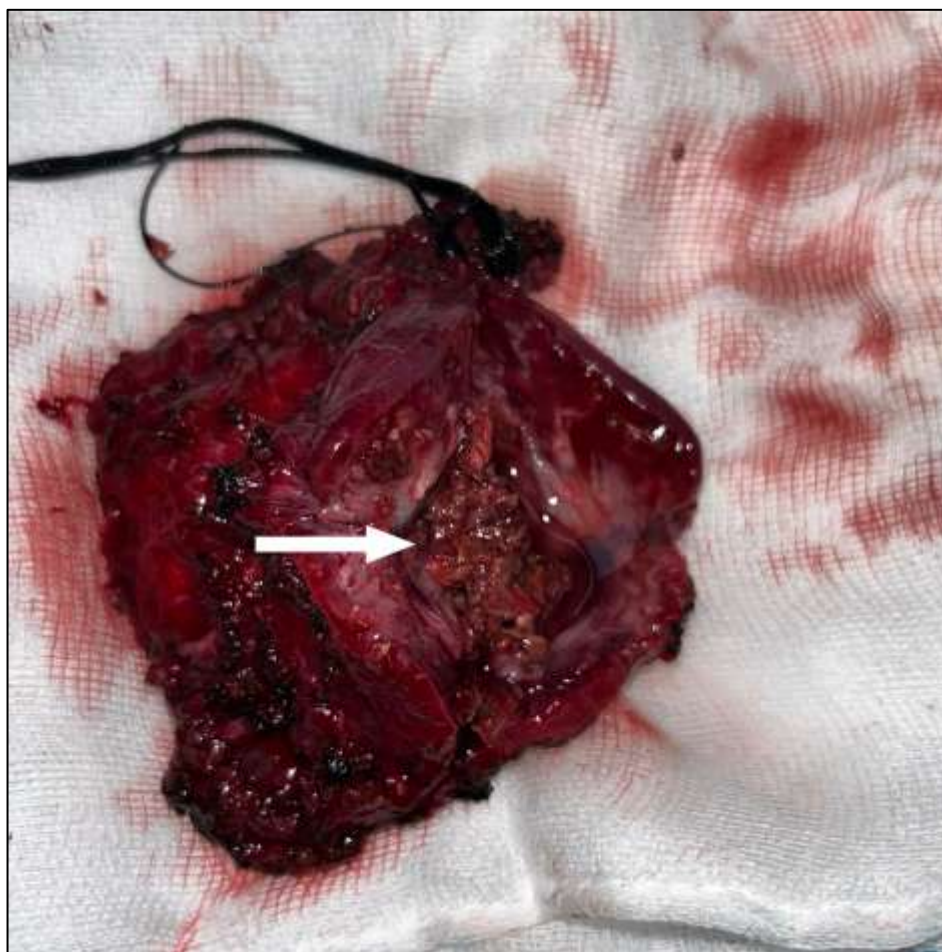


Figure 2. Gross specimen of the resected right upper lobe showing a thick-walled cavity containing an intracavitary fungal ball (white arrow).

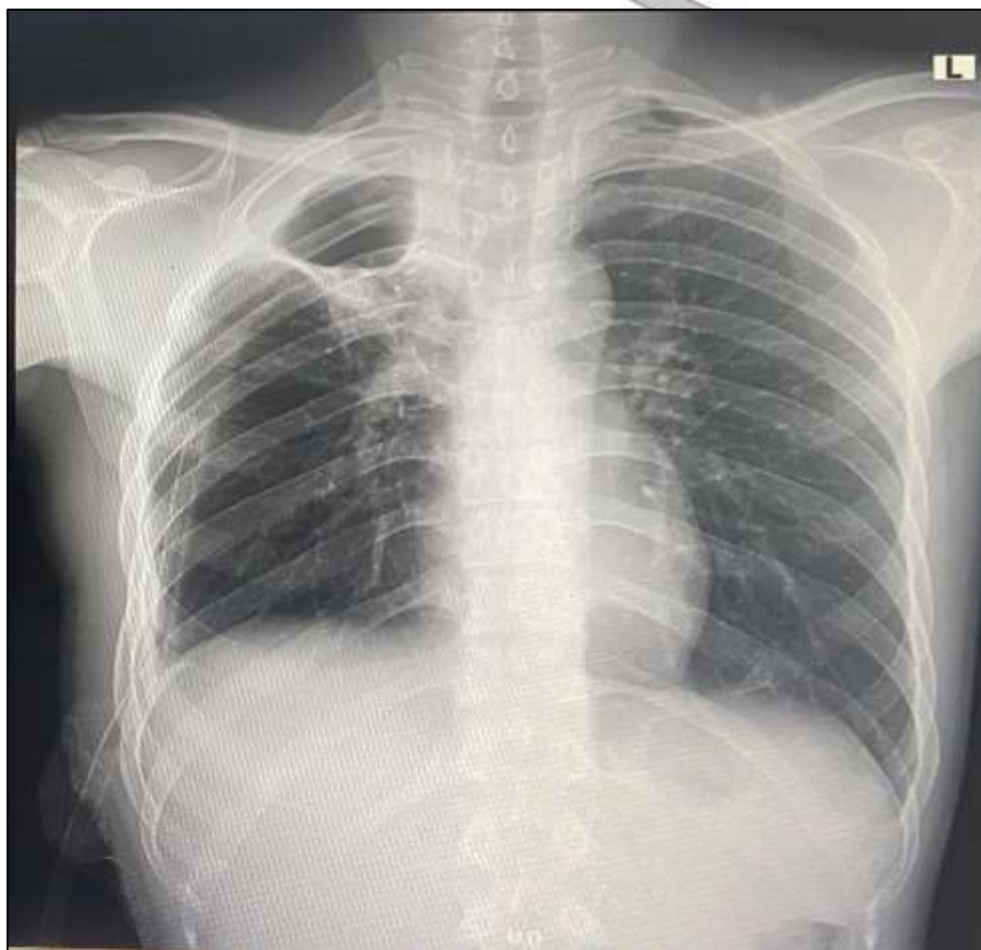


Figure 3. Postoperative chest radiograph following right upper lobectomy demonstrating expansion of the remaining right lung.

Case 2:

History and presentation: A 50-year-old male with a history of pulmonary tuberculosis treated in 2022 and poorly controlled type 2 diabetes mellitus presented with recurrent episodes of haemoptysis for 2 months. He also reported significant weight loss of approximately 15 kg over the preceding 8 months. There was no history of fever, chest pain, or other systemic symptoms.

Examination: The patient was conscious, afebrile, and haemodynamically stable. Respiratory examination revealed reduced air entry over the right upper zone. The cardiovascular, abdominal, and neurological examinations were unremarkable.

Investigations: Laboratory evaluation revealed a haemoglobin level of 15.1 g/dL and a total leukocyte count of 11,400 cells/mm³. Glycaemic control was poor, with an HbA1c of 14.2%. Renal and liver function tests were within normal limits. CT of the chest demonstrated multiple cavitary lesions with associated fibrobronchiectatic changes in the right upper lobe. One of the cavities contained an intracavitary soft-tissue mass consistent with an aspergilloma. Patchy ground-glass opacities were also noted in the right lower lobe (Figure 4).

Management: Following multidisciplinary evaluation, the patient underwent right upper lobectomy through a posterolateral thoracotomy on 05/03/2025. Dense pleural adhesions were encountered and carefully lysed. The pulmonary vessels and right upper lobe bronchus were sequentially dissected, ligated, and divided. The resected specimen demonstrated a well-defined intracavitary fungal ball (Figure 5).

Postoperative course: A Class IV air leak was noted on forceful expiration in the postoperative period and required prolonged intercostal chest drainage. The chest radiograph on postoperative day (POD) 3 demonstrated expansion of the remaining right lung, with a small residual air leak noted clinically (Figure 6). Subsequent chest imaging following removal of the intercostal drain demonstrated continued lung expansion without evidence of a significant residual pleural collection or pneumothorax (Figure 7). The patient was discharged on POD 5 in stable condition. At 6-month follow-up, there was no documented recurrence of haemoptysis or aspergilloma.

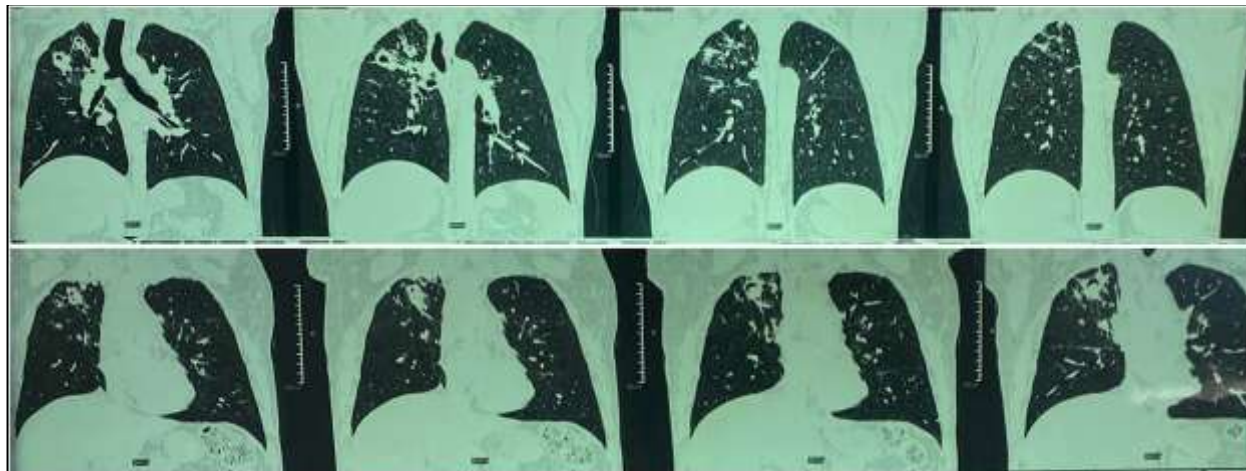


Figure 4. CT chest showing right upper lobe cavities, one containing an intracavitary fungal ball, with post-tuberculous fibrobronchiectatic changes.



Figure 5. Resected right upper lobe specimen.

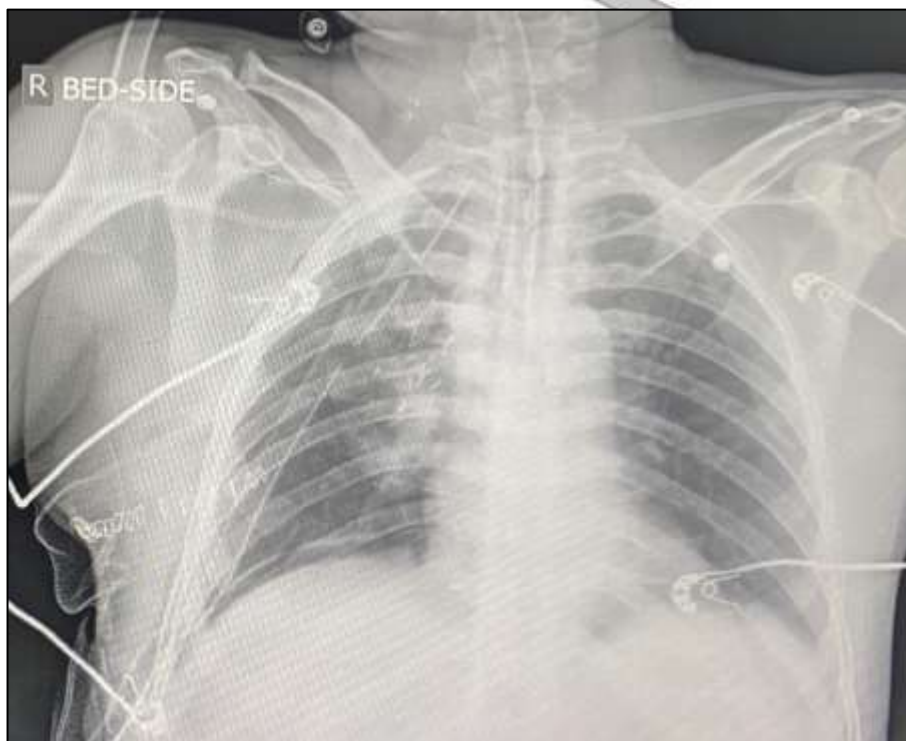


Figure 6. Postoperative day 3 chest radiograph demonstrating an intercostal drain in situ and expansion of the remaining right lung.



Figure 7. Postoperative chest radiograph after intercostal drain removal demonstrating expansion of the remaining right lung without evident pneumothorax.

Case 3:

History and presentation: A 48-year-old hypertensive female receiving anti-tubercular therapy for presumed

pulmonary tuberculosis presented to the emergency department with massive haemoptysis, exceeding 400 mL over 24 hours. She was tachypnoeic but haemodynamically stable on arrival.

Examination: Chest examination revealed decreased air entry and coarse crackles over the left upper zone. Other systemic examinations were unremarkable.

Investigations: Laboratory investigations showed a haemoglobin level of 12.1 g/dL and a total leukocyte count of 9,800 cells/mm³, with normal renal and liver function tests. CT pulmonary angiography demonstrated a thick-walled cavity involving the left upper lobe, with a dilated superior segmental branch of the pulmonary artery and a small focal aneurysm (Rasmussen aneurysm) within the anterior wall of the cavity. No bronchial artery aneurysm or hypertrophy was identified (Figure 8).

Management: In view of the ongoing massive haemoptysis, emergency pulmonary arterial embolization was performed under digital subtraction angiography (DSA) guidance using coils and glue. Successful occlusion of the identified bleeding vessel was achieved, with cessation of haemoptysis. Following stabilization, the patient underwent elective left upper lobectomy. Dense pleural adhesions were encountered intraoperatively and carefully lysed. The resected lobe contained a thick-walled cavity with an intracavitary fungal ball (Figure 9). In view of the ongoing massive haemoptysis and the identified pulmonary arterial source, pulmonary artery embolization was performed. The left upper lobe pulmonary artery was embolized using coils and glue, following which the patient tolerated the procedure well. Diagnostic fiberoptic bronchoscopy was not performed. In view of the CT pulmonary angiographic demonstration of pulmonary arterial involvement and the ongoing massive haemoptysis, the immediate priority was vascular localisation and haemorrhage control by endovascular embolization.

Postoperative course: The postoperative recovery was uneventful, with no further episodes of haemoptysis. Postoperative imaging demonstrated satisfactory expansion of the remaining left lung. The patient was discharged on antifungal therapy with advice for clinical follow-up. At 6-month follow-up, there was no documented recurrence of haemoptysis or aspergilloma.

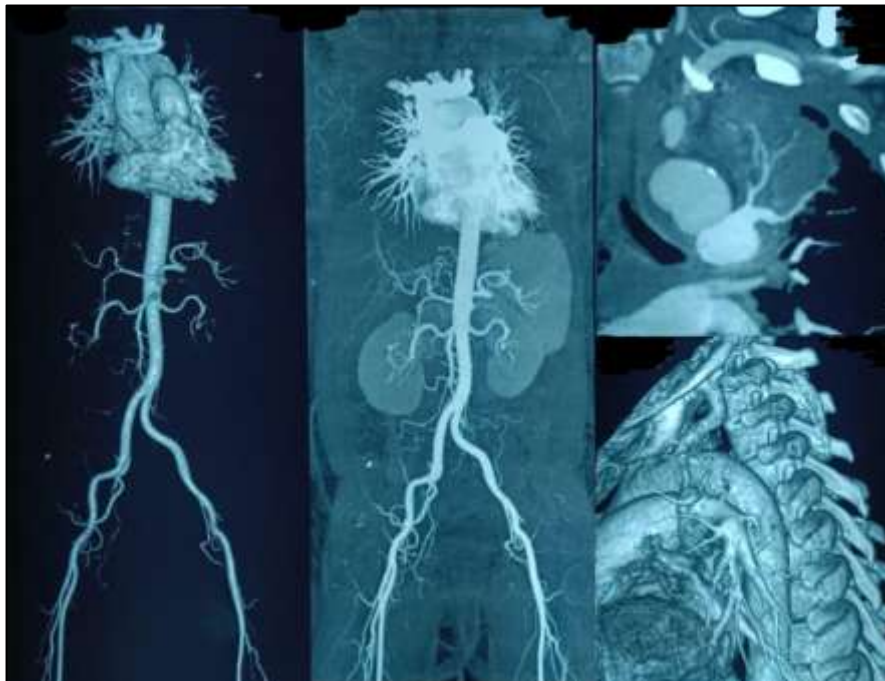


Figure 8. CT pulmonary angiography demonstrating a thick-walled left upper-lobe cavity with a dilated superior segmental branch of the pulmonary artery and a focal Rasmussen aneurysm within the anterior wall of the cavity.

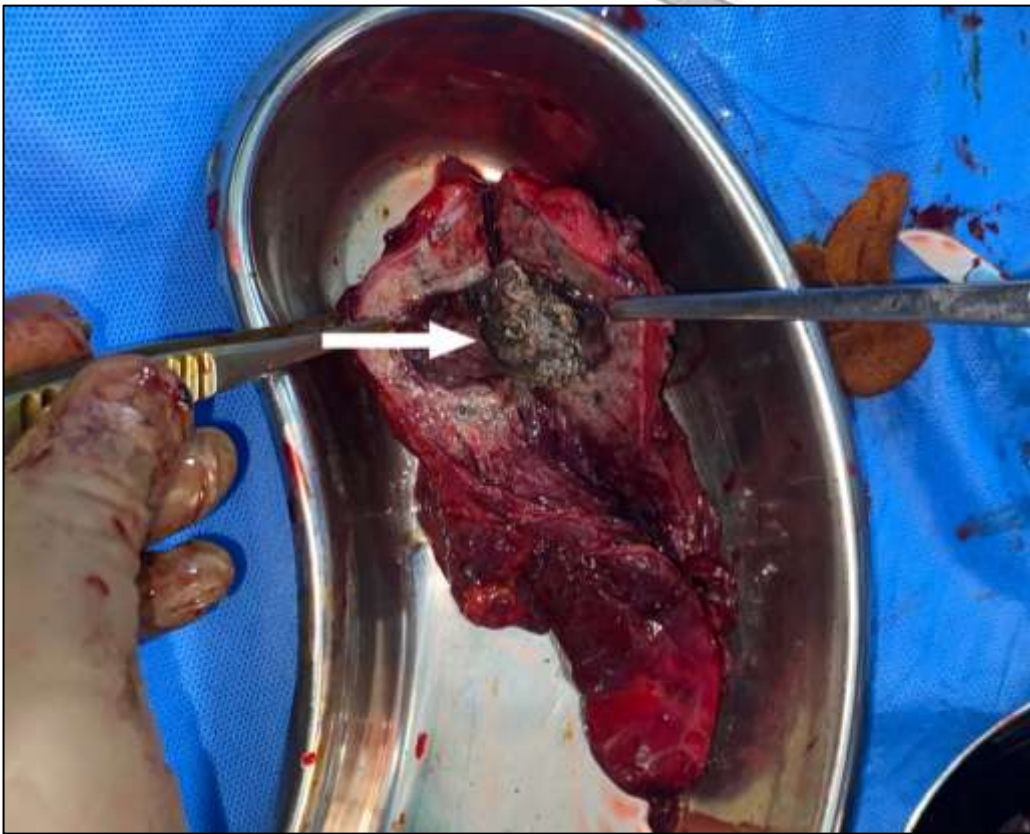


Figure 9. Resected left upper lobe specimen showing a cavity containing an intracavitary fungal ball (White arrow).

Case 4:

History and presentation: A 25-year-old male with a history of pulmonary tuberculosis presented with recurrent haemoptysis for 1 month. He denied fever, weight loss, or other systemic symptoms.

Examination: Vital signs were stable. Reduced breath sounds were noted over the right upper zone; other systemic findings were unremarkable.

Investigations: CT chest demonstrated a simple aspergilloma within a post-tuberculous cavity in the right upper lobe, with a classical air-crescent sign (Figure 10). No evidence of active tuberculosis or other pulmonary lesions was identified.

Management: Right upper lobectomy was performed through a posterolateral thoracotomy. Dense pleural adhesions were carefully lysed, followed by sequential ligation and division of the pulmonary vessels and right upper lobe bronchus. The resected specimen showed a cavity containing an intracavitary fungal ball (Figure 11).

Postoperative course: Recovery was uneventful. A postoperative chest radiograph obtained before intercostal drain removal demonstrated expansion of the remaining right lung with the drain in situ (Figure 12). The intercostal drain was subsequently removed on postoperative day 2. The patient was discharged on postoperative day 6 and remained free of recurrent haemoptysis during 6-month follow-up.

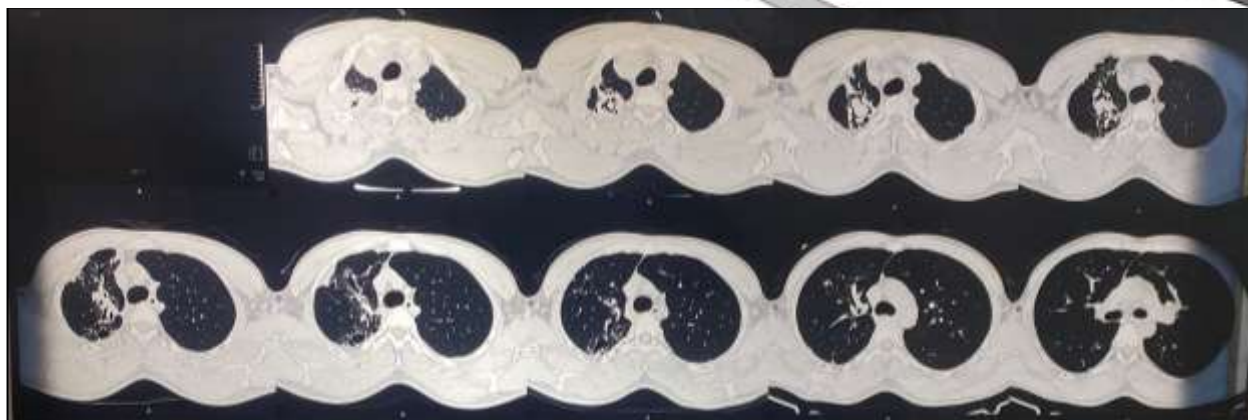


Figure 10. CT chest showing a well-defined aspergilloma within a post-tuberculous cavity in the right upper lobe, with a classical air-crescent sign.

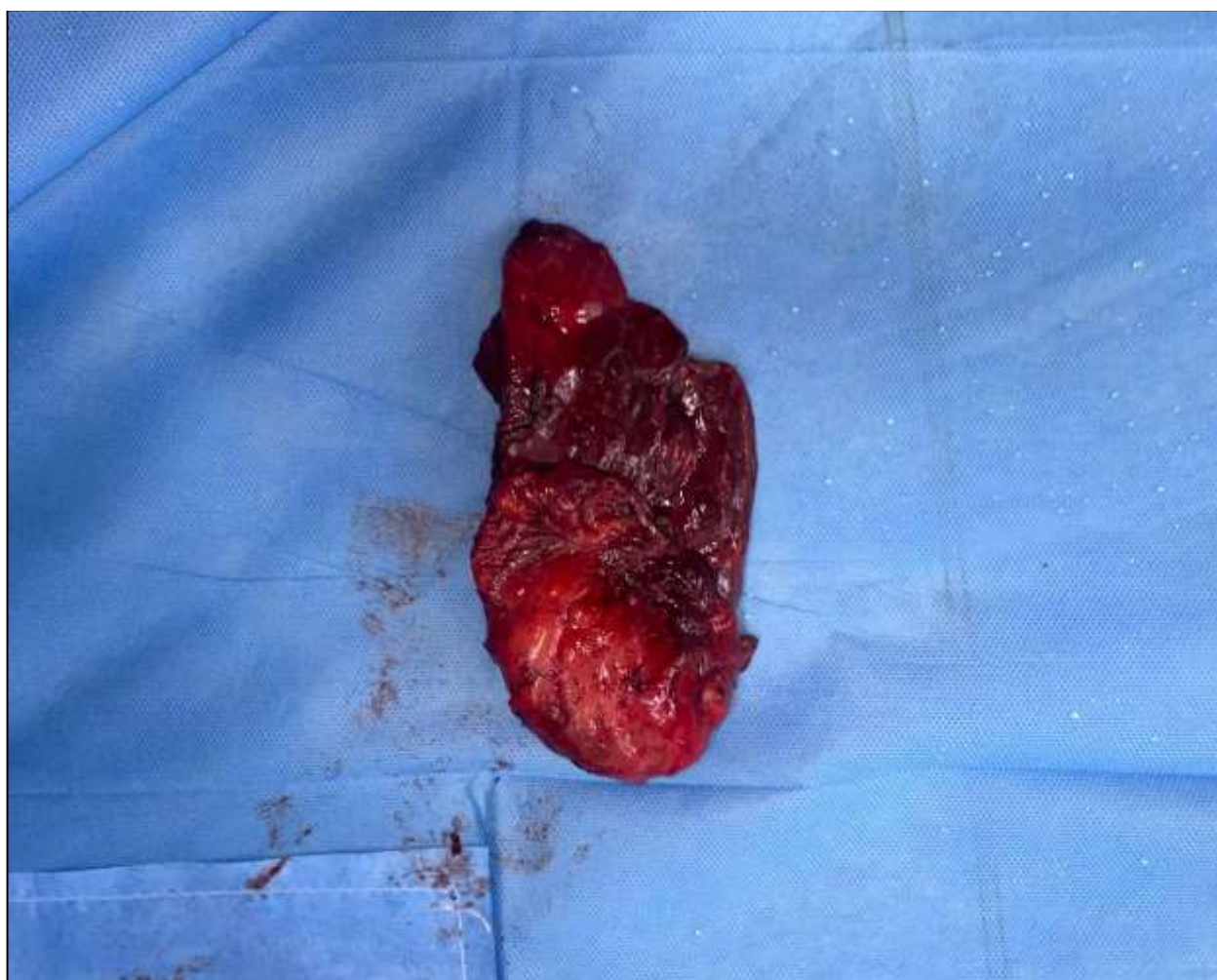


Figure 11. Resected right upper lobe specimen showing a cavity containing an intracavitary fungal ball.

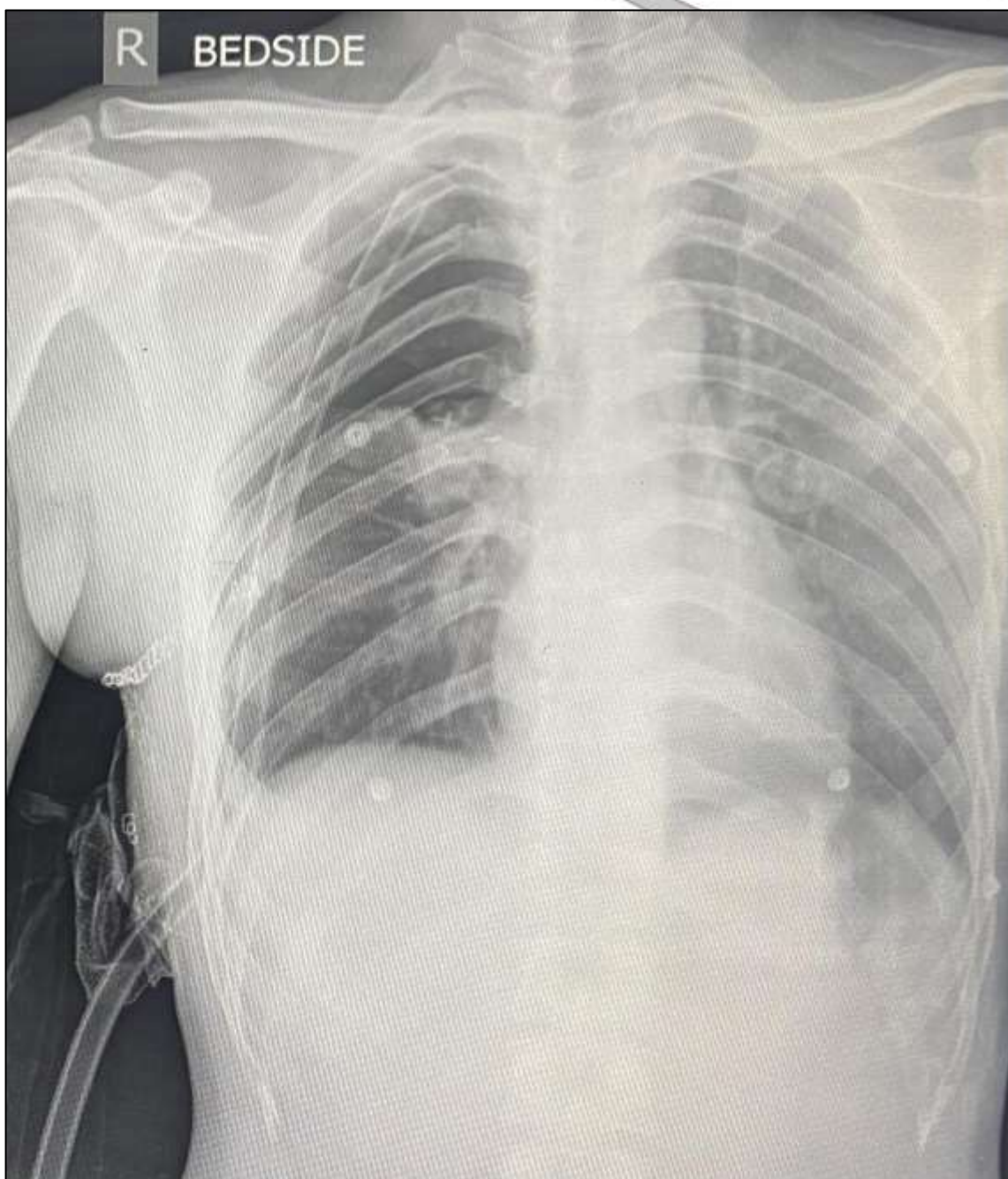


Figure 12. Postoperative chest radiograph obtained before intercostal drain removal, demonstrating the drain in situ and expansion of the remaining right lung following right upper lobectomy.

Case 5:

History and presentation: A 55-year-old female with a history of pulmonary tuberculosis presented with life-threatening haemoptysis requiring emergency admission.

Examination: She was tachycardic and mildly hypotensive. Reduced breath sounds were noted over the right lower lung field; other systemic findings were unremarkable.

Investigations: Laboratory investigations showed a haemoglobin level of 9.2 g/dL and a total white blood cell count of 13,400 cells/mm³, with other parameters within normal limits. CT chest demonstrated a right lower lobe cavity containing an aspergilloma, with associated fibrotic changes and surrounding parenchymal damage (Figure 13).

Management: Emergency right lower lobectomy was performed. Dense pleural adhesions and friable tissue required careful dissection. The resected lobe contained an intracavitary fungal ball (Figure 14).

Postoperative course: The patient developed minor empyema, which was managed conservatively with antibiotics and chest drainage. Chest radiography on postoperative day 5 demonstrated expansion of the remaining right lung (Figure 15). She was discharged on postoperative day 7 in stable condition.

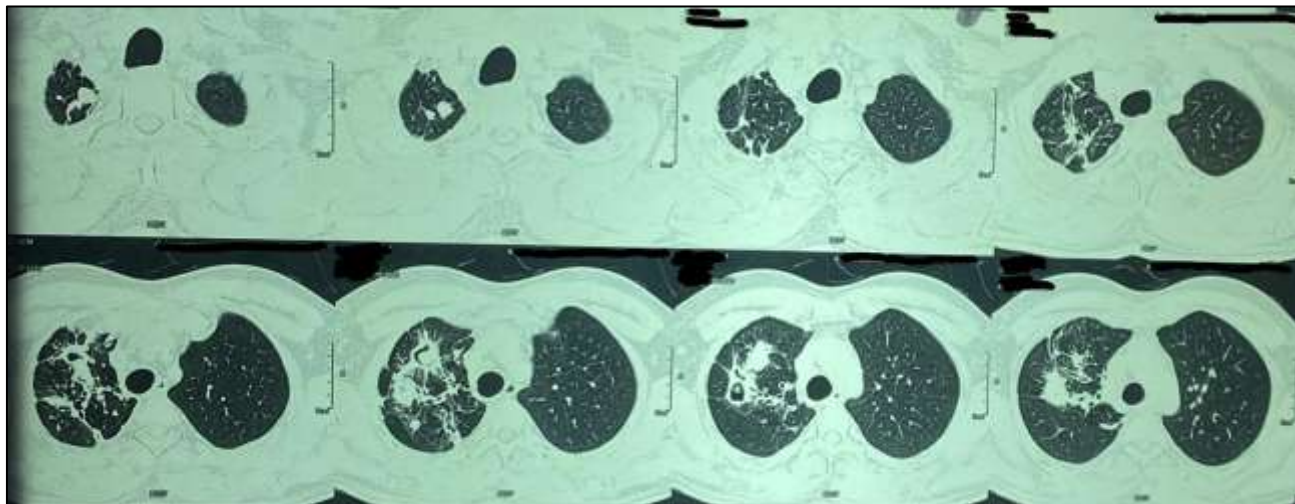


Figure 13. Coronal CT chest showing a right lower lobe aspergilloma within a fibrotic cavity, with surrounding parenchymal damage and volume loss.



Figure 14. Resected right lower lobe specimen .

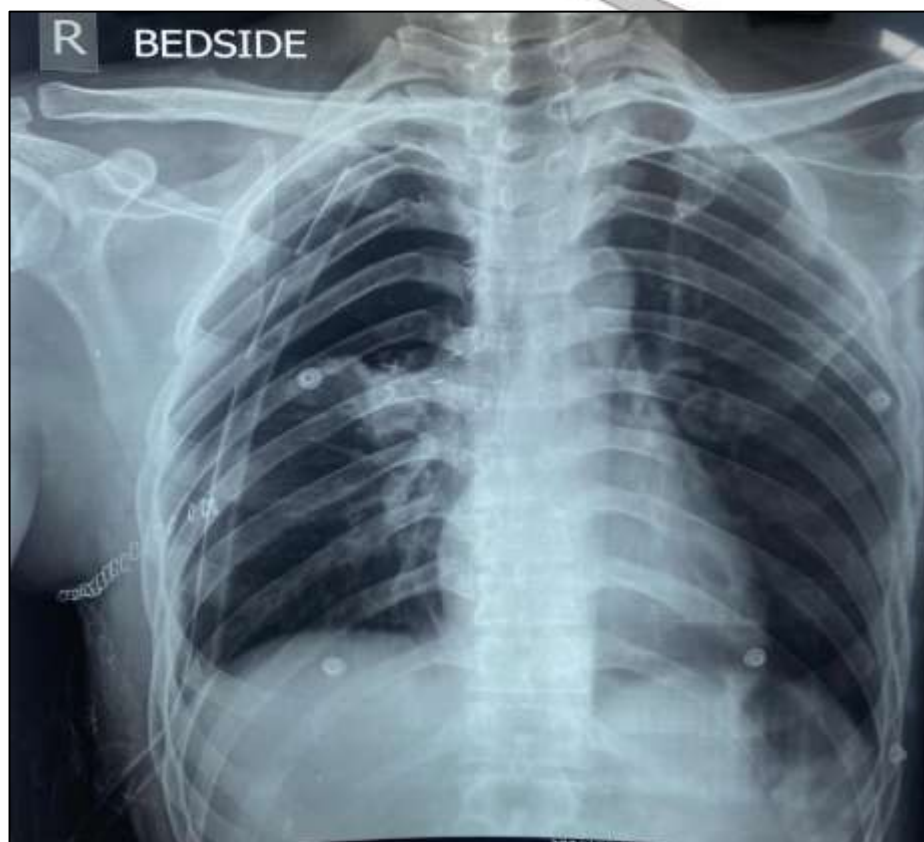


Figure 15. Postoperative day 5 chest radiograph demonstrating an intercostal drain in situ and postoperative changes following right lower lobectomy.

Histopathology

Histopathological examination of the resected specimens confirmed the diagnosis in all surgically managed cases. Microscopy revealed numerous fungal spores and narrow, septate hyphae with acute-angle branching, highlighted by hematoxylin and eosin (H&E) staining (Figure 16) and Gomori methenamine silver (GMS) staining (Figure 17). These fungal elements were associated with a limited inflammatory cell infiltrate, supporting the diagnosis of pulmonary aspergilloma.

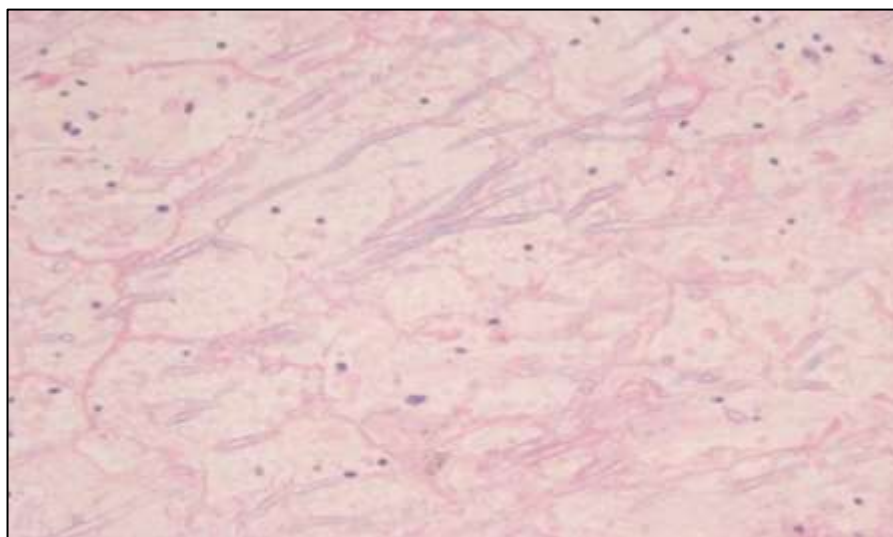


Figure 16. Narrow, septate hyphae branching at acute angles, accompanied by a few inflammatory cell infiltrates (H&E, 40×).

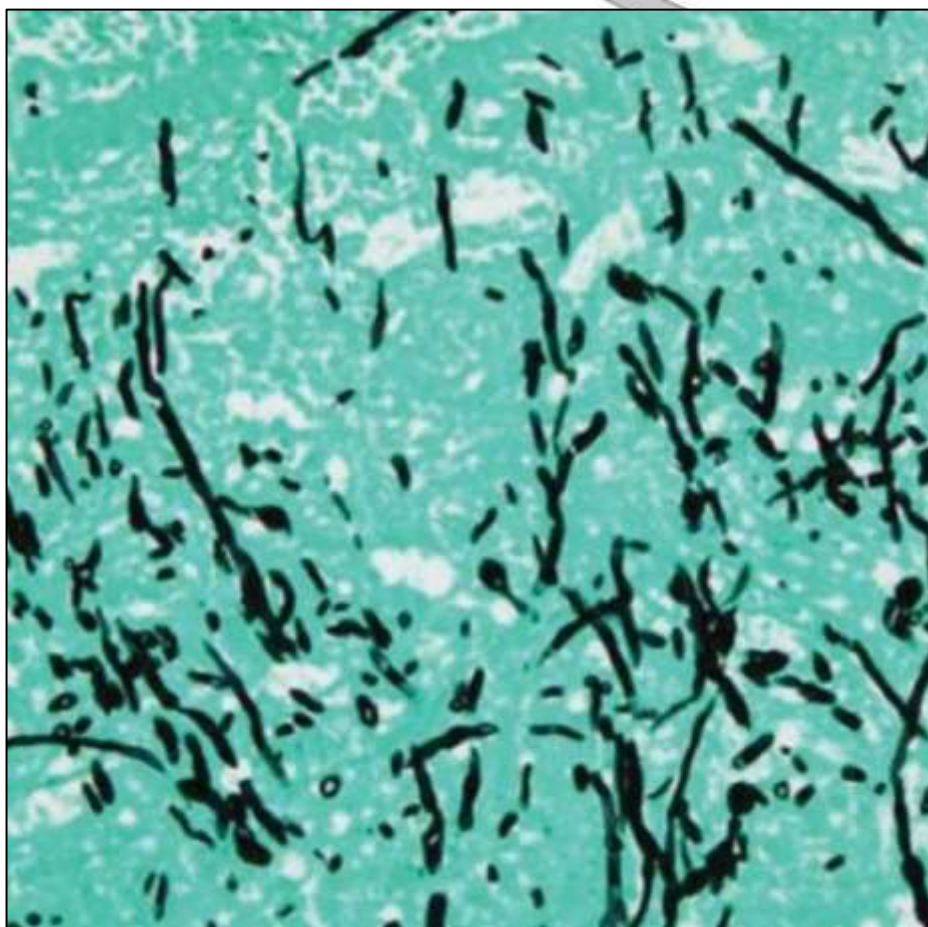


Figure 17. Gomori methenamine silver (GMS) stain demonstrating numerous spores and hyphae consistent with aspergillosis (40×).

Follow-up and outcomes

All five patients were followed for six months after definitive treatment. One patient developed a prolonged postoperative air leak and another developed minor empyema; both were managed successfully with conservative measures. The patient who underwent pulmonary arterial embolization followed by lobectomy had no further haemoptysis after treatment. There was no perioperative mortality, and no recurrence of haemoptysis was documented during the six-month follow-up period. Detailed case characteristics, management, postoperative complications, and outcomes are summarised in Table 1.

Table 1. Summary of Clinical Characteristics, Management and Outcomes of the Five Patients

Case	Age/Sex	Previous TB	Presentation	CT Findings	Initial/Definitive Management	Postoperative Course	6-Month Outcome
1	25/M	Treated in 2020	Recurrent haemoptysis for 2 months	Right upper lobe thick-walled apical cavity with intracavitary fungal ball and post-tuberculous	Right upper lobectomy through posterolateral thoracotomy	Uneventful recovery; drain removed POD 2; discharged	No recurrent haemoptysis or clinical evidence of aspergilloma

				fibrobronchiectatic changes		POD 5	
2	50/M	Treated in 2022	Recurrent haemoptysis for 2 months with significant weight loss	Multiple right upper lobe cavities with fibrobronchiectatic changes; one cavity containing fungal ball	Right upper lobectomy through posterolateral thoracotomy	Prolonged air leak requiring continued intercostal drainage; subsequently resolved	No documented recurrence of haemoptysis or aspergilloma
3	48/F	On ATT for presumed TB	Massive/life-threatening haemoptysis (>400 mL/24 h)	Left upper lobe thick-walled cavity with fungal ball and hypertrophied pulmonary arterial branches; contrast extravasation from pulmonary arterial circulation	Emergency pulmonary arterial embolization under DSA followed by elective left upper lobectomy	Uneventful recovery; no further haemoptysis	No recurrent haemoptysis
4	25/M	Previous TB	Recurrent haemoptysis for 1 month	Right upper lobe post-tuberculous cavity containing aspergilloma with classical air-crescent sign	Right upper lobectomy through posterolateral thoracotomy	Uneventful recovery; drain removed POD 2; discharged POD 6	Remained free of recurrent haemoptysis
5	55/F	Previous TB	Life-threatening haemoptysis requiring emergency admission	Right lower lobe cavity containing aspergilloma with fibrosis and surrounding parenchymal damage	Emergency right lower lobectomy	Minor empyema managed with antibiotics and chest drainage; discharged POD 7	No documented recurrence

Discussion

Pulmonary aspergilloma is a localized form of chronic pulmonary aspergillosis (CPA) caused by colonization of a pre-existing pulmonary cavity by *Aspergillus* species. Previous pulmonary tuberculosis is an important predisposing condition, particularly in tuberculosis-endemic regions, where residual cavities, bronchiectasis, fibrosis, and chronic parenchymal destruction may provide a suitable environment for fungal colonization [1–6]. The global burden of CPA following pulmonary tuberculosis is substantial, although the condition remains under-recognized [1,2].

All five patients in the present series had a previous history of pulmonary tuberculosis with residual structural lung abnormalities on imaging. The demographic characteristics, clinical presentations, radiological findings, management, postoperative complications, and follow-up outcomes are summarised in Table 1. Haemoptysis was the presenting

symptom in all patients and ranged from recurrent bleeding to life-threatening haemorrhage. It is the most clinically important manifestation of pulmonary aspergilloma and may result from chronic inflammation, neovascularization, vascular erosion, or involvement of adjacent bronchial or pulmonary vessels [7–9].

Computed tomography was central to diagnosis and treatment planning in our series, demonstrating the underlying cavities, intracavitary fungal balls, post-tuberculous parenchymal changes, and the extent of pulmonary destruction. A classical air-crescent sign was observed in one patient. In another, CT pulmonary angiography suggested an unusual pulmonary arterial source of active bleeding, which was subsequently confirmed by digital subtraction angiography [10–12].

Management of pulmonary aspergilloma depends on symptoms, disease extent, pulmonary reserve, and operative risk. Observation may be appropriate in selected asymptomatic patients, whereas surgical resection remains an established definitive treatment for symptomatic localized disease, particularly in patients with recurrent or significant haemoptysis and adequate cardiopulmonary reserve [1,13]. In the present series, all five patients underwent lobectomy for symptomatic localized disease. The findings therefore reflect the application of established management principles rather than a proposed new treatment strategy.

Lobectomy was feasible in all patients, with no requirement for pneumonectomy. Previous surgical series have reported favourable outcomes following anatomical resection for localized pulmonary aspergilloma, while more extensive resections may be associated with increased morbidity [14–18]. The present experience illustrates the feasibility of a lung-preserving approach when the anatomical extent of disease permits, although the small sample size precludes comparison of different surgical strategies.

Surgical resection following previous tuberculosis can be technically challenging because of dense pleural adhesions, hilar fibrosis, distorted anatomical planes, and friable pulmonary tissue [19,20]. Similar operative difficulties were encountered in several patients in our series. Careful adhesiolysis, identification and control of vascular structures, and meticulous handling of the diseased lung were important during resection.

One patient presented with life-threatening haemoptysis and underwent pulmonary arterial embolization before definitive lobectomy. The bronchial circulation is generally the principal source of haemoptysis, and bronchial artery embolization remains the established endovascular approach. In this patient, however, CT pulmonary angiography and subsequent digital subtraction angiography demonstrated active bleeding from hypertrophied pulmonary arterial branches supplying the aspergilloma. Targeted pulmonary arterial embolization was therefore performed to control the documented source of haemorrhage and stabilise the patient before definitive surgery [9,18]. This represents an unusual vascular finding within the series rather than an alternative routine approach to haemoptysis.

Postoperative complications consisted of a prolonged air leak in one patient and minor empyema in another, both of which were managed conservatively. Such complications are recognised following surgery for pulmonary aspergilloma [14,15,17,19]. There was no perioperative mortality in this series; however, the small sample size does not permit conclusions regarding surgical safety or mortality risk.

Histopathological examination confirmed aspergilloma in all resected specimens. The specimens demonstrated fungal spores and narrow, septate hyphae with acute-angle branching on haematoxylin and eosin and Gomori methenamine silver staining, with limited inflammatory-cell infiltrate, consistent with pulmonary aspergilloma [21].

The principal value of this case series is its descriptive account of the presentation and management of symptomatic post-tuberculous pulmonary aspergilloma in a tertiary referral setting. The cases demonstrate a spectrum ranging from recurrent haemoptysis managed with definitive surgical resection to life-threatening haemorrhage requiring endovascular haemorrhage control before surgery. The pulmonary arterial bleeding identified in one patient also highlights the importance of detailed vascular assessment when the bleeding source is not adequately explained by the usual bronchial circulation.

Several limitations should be acknowledged. This was a retrospective case series of only five patients from a single tertiary referral centre, limiting generalisability and increasing the possibility of selection bias. There was no comparison group, and treatment was individualised according to clinical circumstances rather than a predefined protocol. Follow-up was limited to six months, and pulmonary function, nutritional status, frailty, symptom burden, and quality-of-life measures were not systematically assessed in all patients. The pulmonary arterial bleeding source was observed in only one patient and should therefore not be considered representative of pulmonary aspergilloma in general. Accordingly, the findings should be interpreted as descriptive and hypothesis-generating rather than as evidence of treatment superiority. Larger prospective multicentre studies with longer follow-up and standardised outcome assessment are required to better define long-term outcomes [22,23].

Overall, this series illustrates the clinical and operative challenges associated with post-tuberculous pulmonary aspergilloma presenting with significant haemoptysis. The management observed in these patients was consistent with

established principles of haemorrhage control and definitive surgical resection. Detailed radiological assessment, appropriate vascular intervention when indicated, careful surgical planning, and multidisciplinary care are important in the management of patients with severe haemoptysis and localized pulmonary aspergilloma.

Conclusion

Pulmonary aspergilloma should be considered in patients with previous pulmonary tuberculosis who present with recurrent or life-threatening haemoptysis. In this five-patient case series, lobectomy provided definitive treatment for symptomatic localized disease, with no perioperative mortality and manageable postoperative morbidity. In the patient with life-threatening haemorrhage, pulmonary arterial embolization successfully controlled the documented pulmonary arterial bleeding and facilitated subsequent definitive resection. The findings emphasize the importance of detailed radiological assessment, careful surgical planning, and multidisciplinary management in specialized thoracic centres. Larger prospective studies with longer follow-up are required to better define long-term outcomes and predictors of postoperative complications and recurrence.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with institutional policies and the principles of the Declaration of Helsinki. Ethics approval was waived by the relevant institutional ethics committee because this was a retrospective case series with informed patient consent and no experimental intervention. Patient confidentiality was maintained throughout data collection, analysis, and reporting.

Consent for publication

Written informed consent for the publication of this case series and for the accompanying images was obtained from the patients. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials

All data generated or analyzed during this study are included in this article.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions:

Dheenu S : Conceptualization, Investigation, Data Curation, Writing – Original Draft, Visualization.

Srikanth Thiyagarajan: Supervision, Methodology, Validation, Writing – Review & Editing.

Najeem Fazil : Methodology, Formal Analysis, Writing – Review & Editing, Supervision.

All authors reviewed and approved the final manuscript.

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