

Management of post-tuberculous complex aspergilloma of the lung: role of surgical resection

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Abstract

Of 14 patients with complex aspergilloma complicating healed tuberculosis, 12 underwent lobectomy or pneumonectomy for recurrent haemoptysis. No deaths occurred, though one patient needed re-exploration for bleeding. There was no postoperative worsening of dyspnoea despite a mean forced vital capacity (FVC) of 60% predicted for the patients undergoing surgery and of 20% predicted for two patients with severe restrictive defects, perhaps owing to the fact that there was little or no function in the resected part of the lung, as shown by preoperative isotope ventilation-perfusion scanning, and that patients were under the age of 50 and generally fit. There has been no recurrence of haemoptysis during follow up, which has been from 12 to 33 months. Surgical resection, provided that cases are carefully selected, offers the best chance of cure with low mortality and morbidity.

Aspergilloma is an opportunist infection of the lung complicating necrotic cavitary lesions

such as tuberculosis. The high mortality from aspergilloma is related to the underlying disease¹⁻⁴ and to the frequent occurrence of haemoptysis.¹⁻³ Whether surgical or medical management is better is unresolved.⁴⁻¹² Medical treatment occasionally causes the lesions to shrink,^{4,13} but is usually unsuccessful,^{1,6,14-16} and surgical resection is associated with a high incidence of complications.^{11,17}

We report our experience with 14 cases of complex pulmonary aspergilloma complicating healed fibrotic tuberculosis.

Patients and methods

Fourteen cases of complex aspergilloma¹² complicating healed pulmonary tuberculosis were seen during 1985-9. All had a rounded mass with an air crescent located in a fibrotic lung cavity on the plain chest radiograph or computed tomogram. Resected lung in all cases showed branched septate hyphae and inflammatory cells lying free in a chronic fibrotic cavity on histopathological examination. Conservatively treated patients had aspergillus grown from sputum and positive precipitins in the serum.¹⁸ In addition, all patients had a history of pulmonary tuberculosis, for which chemotherapy had been given, or had *Mycobacterium tuberculosis* in sputum cultures. To be eligible for inclusion all surgical patients had to have a minimum of 12 months' postoperative follow up.

Results

The 14 patients (table), eight male and six female, were aged from 16 to 50 years. Complex aspergillomas occurred in the upper lobes in 13 patients and in the lower lobes in one. Twelve patients reported recurrent moderate (200 ml) to severe (600 ml) haemoptysis. Preoperative spirometry showed that two patients had a normal forced vital capacity (FVC) (>80% predicted), seven mild abnormality (60-80% predicted), three moderate abnormality (40-60% predicted), and two severe abnormality (<40% predicted). The mean FVC for the patients undergoing surgery was 60% predicted (table).

Isotope ventilation-perfusion scans performed in 10 of the 12 patients undergoing surgery showed absent or greatly reduced perfusion and ventilation in the affected lobe or lung in all cases. Chest radiography showed an aspergilloma in eight patients; the other six aspergillomas were seen only by computed tomography.

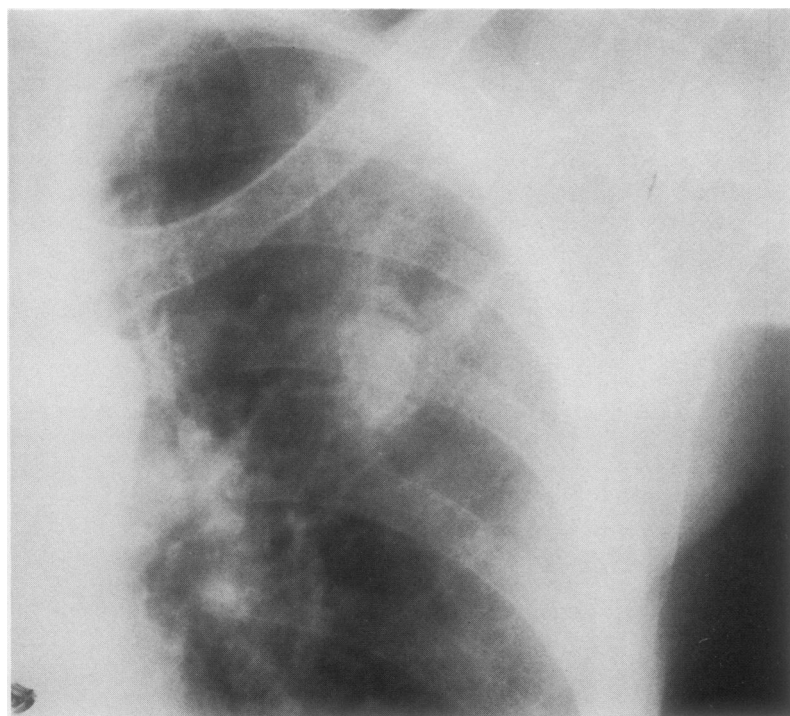


Figure 1 Radiograph of an aspergilloma in the left upper lobe showing a classical mass with an air crescent.

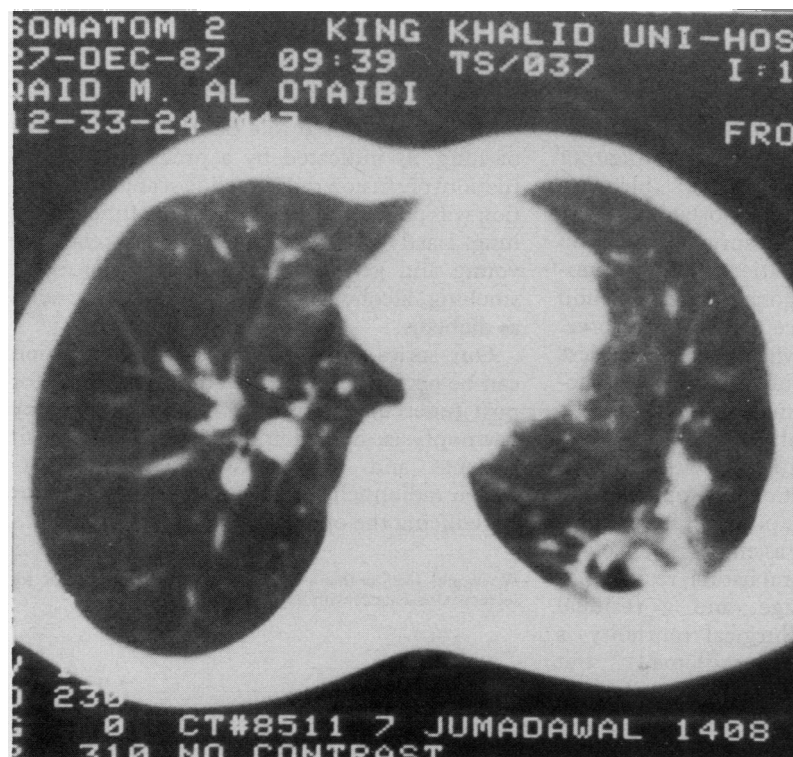


Figure 2 Computed tomogram of the chest showing an aspergilloma.

Surgical resection was performed in the 12 patients with haemoptysis. All operations were elective except in the case of patient 1, who underwent urgent pneumonectomy for massive uncontrolled bleeding. Nine patients had a lobectomy and three a pneumonectomy. At operation dense vascular adhesions were found obliterating the pleural space and

surrounding the atelectatic fibrotic lobe of the lung. Bronchial arteries were enlarged and tortuous. In two patients the aspergilloma was eroding into the chest wall. Extrapleural mobilisation was carried out in all cases. Bleeding from the chest wall responded to temporary packing with or without diathermy.

None of the surgical patients had diabetes, smoked, or were alcoholic and all could be regarded as generally fit. There was no surgical mortality and complications were low. One patient (case 5) developed transient intraoperative atrial fibrillation and another (case 8) was re-explored for postoperative bleeding. None of the patients undergoing surgery developed late complications such as empyema, bronchopleural fistula, or recurrence of aspergilloma or haemoptysis during the follow up period, which ranged from 12 to 33 months. None of the patients reported worsening of dyspnoea after resection—not even the two patients who had a severe reduction in their FVC (20% and 37% predicted).

Discussion

Aspergilloma is an important complication of tuberculosis. In 544 patients with healed cavitory tuberculosis the prevalence of aspergilloma was 11%, rising to 17% three years later.² Although aspergillomas may undergo natural lysis and spontaneous resolution,^{2,4} most persist, giving rise to haemoptysis in more than half the patients.^{1,3,7,11,18} The high mortality from aspergilloma is frequently related to the severity of the underlying disease^{1,3,18} rather than to the aspergilloma, and is higher in

Details of the patients

Case No	Age, sex	Haemoptysis	Chest radiograph	FEV ₁ (pred %) FVC (pred %)	Ventilation-perfusion scan	Operation
1	25, F	Massive	Aspergilloma left upper lobe and extensive fibrotic collapse left lung	1.5 (48) 1.9 (46)	Substantial reduction left upper zone	Left pneumonectomy
2	50, F	Moderate	Fibrotic collapse right upper lobe	1.74 (92) 2.02 (89)	Defect right upper zone	Right upper lobectomy
3	16, M	Moderate	Fibrosis collapse left upper lobe and thick walled aspergilloma	2.8 (69) 3.7 (73)	Defect left upper zone	Left upper lobectomy
4	45, M	Moderate	Fibrotic collapse left upper lobe and thick walled aspergilloma	2.17 (70) 2.97 (76)	Substantial reduction left upper zone	Left upper lobectomy
5	45, F	Moderate	Fibrotic collapse right upper lobe and thick walled aspergilloma	1.90 (48) 3.06 (48)	Marked reduction right upper zone	Right upper lobectomy
6	30, F	Moderate	Extensive fibrotic collapse left lung bronchopleural fistula with hydropneumothorax	0.7 (22) 0.83 (20)	Defect left lung	Left pneumonectomy
7	40, M	Severe	Fibrotic collapse right upper lobe	3.25 (78) 4.24 (78)	Substantial reduction right upper zone	Right upper lobectomy
8	47, M	Severe	Fibrotic collapse left lung	1.38 (44) 1.42 (37)	Defect left lung	Left upper lobectomy
9	48, F	Moderate	Fibrotic collapse right upper lobe	1.64 (69) 1.94 (67)	Substantial reduction right upper zone	Right upper lobectomy
10	50, M	Nil	Fibrotic collapse left upper lobe and thick walled aspergilloma	1.9 (62) 2.5 (65)	Not done	None
11	30, M	Nil	Fibrosis left upper lobe and thick walled aspergilloma	3.71 (82) 4.7 (84)	Not done	None
12	37, M	Moderate	Fibrosis left upper lobe and thick walled aspergilloma	2.50 (55) 3.20 (60)	Not done	Left upper lobectomy
13	45, M	Mild	Fibrotic collapse left upper lobe and thick walled aspergilloma	1.80 (58) 2.69 (67)	Multiple matched perfusion substantial in the apical part of the left lung	Left upper lobectomy
14	48, F	Moderate	Fibrosis and collapse consolidation of apico-posterior segment of right upper lobe	1.64 (69) 1.94 (67)	Not done	Right upper lobectomy

patients with a diffuse lung disease such as sarcoidosis than in a localised disease such as tuberculosis.³ Haemoptysis, however, is important also as up to 28% of patients with non-malignant aspergilloma die as a direct result of massive haemoptysis.¹⁹ The management of aspergilloma with a history of bleeding therefore acquires a special importance.

There is agreement that surgical resection should be performed in patients with haemoptysis and adequate pulmonary reserve,¹⁸ and avoided in the presence of poor reserve. Opinion is divided on whether symptomless patients should have routine surgical resection^{7 11 19-21} or be treated medically.¹⁴ There is no evidence that surgical resection improves prognosis except in patients with massive haemoptysis,¹¹⁸ and resection is complicated by a high rate of serious postoperative complications,^{7 11 17 19 20 22} such as empyema, prolonged air leak, bronchopleural fistula, respiratory insufficiency, haemorrhage, and a residual intrapulmonary space. Surgical mortality is below 10% in simple aspergilloma,^{11 20} but increases to 34% in complex aspergilloma.¹⁷ Alternative procedures have been attempted in patients considered unsuitable for surgical resection but none is fully satisfactory. Treatment with intravenous amphotericin or 5-flucytosine is usually ineffective.^{1 13 18} Although bronchial artery embolisation arrests bleeding in most cases, haemoptysis invariably recurs,^{23 24} possibly owing to the presence of a rich "parasite" blood supply from the chest wall to the aspergilloma.²³ Endobronchial or intracavitary instillation of various antifungal agents have given encouraging results.^{14 19} with disappearance of the mycetoma, but the long term outcome is unknown. More importantly, intracavitary instillations have resulted in serious and often fatal bleeding. Intracavitary instillation of *N*-acetylcysteine and aminocaproic acid with amphotericin B was successful in arresting bleeding during acute episodes of haemoptysis, but bleeding recurred in four of the six cases.²⁵ Radiotherapy might temporarily arrest massive haemoptysis without changing the size of the aspergilloma.²⁶

In our series there was no recurrence of bleeding over a follow up period of 12-33 months. We encountered no serious complications or deaths despite the fact that all the patients treated surgically had complex aspergillomas and five had severe or moderate reduction in spirometric measurements. None of the patients reported worsening of dyspnoea after resection. We consider that several factors might have contributed to this favourable outcome. All our patients had unilateral disease, in which resection might be associated with a low incidence of respiratory insufficiency, though previous studies document some postoperative deaths and morbidity in post-tuberculous aspergillomas. In one study of eight cases of surgical resection for post-tuberculosis aspergilloma, one patient required postoperative tracheostomy and respiratory support and another had a prolonged air leak.¹¹ Among nine cases of aspergilloma complicating active tuberculosis surgery resulted in two deaths

from bleeding and three patients developed an empyema.²⁷ The difference in outcome may be related to the selection of cases for surgery. Another possible factor is that resection in our patients was limited to a poorly perfused lobe or lung, as indicated by a preoperative ventilation-perfusion radionuclide scan, and attention was paid to preservation of the functioning lung. Lastly, all of our patients were relatively young and generally fit, with no history of smoking, alcoholism, or systemic disease such as diabetes.

Our series suggests that surgical resection can be performed, with relatively low risk, for post-tuberculous aspergilloma complicated by haemoptysis. Selection of relatively young, fit patients and preoperative ventilation-perfusion radionuclide scanning could play a part in reducing the operative risk.

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