ORIGINAL RESEARCH PAPER

Surgery

ASPERGILLOMA:EARLY SURGICAL RESECTION-A RETROSPECTIVE STUDY

KEY WORDS:

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ABSTRACT

OBJECTIVES: The aim of the retrospective study is to assess results of the surgical treatment for pulmonary aspergilloma and to prove that early complete surgical resection can provide effective outcome for these patients.

MATERIALS AND METHOD: From 2017 to 2018, patients underwent thoracotomy for treatment of pulmonary aspergilloma. The most common indication for operation was hemoptysis (82%), asymptomatic (18%). Underlying diseases were tuberculosis (95%), bronchiectasis (5%). The procedures were lobectomy (74%), segmentectomy (12%), wedge resection (9%).

RESULTS: Postoperative complications occurred in 15% of the patients including: empyema, bleeding, wound infection and bronchopleural fistula.

CONCLUSION: We recommend early surgical complete resection of symptomatic aspergilloma and even asymptomatic cases resulting in good outcome.

INTRODUCTION

In India tuberculosis is an endemic disease; the healed tubercular cavities acts as a nidus for saprophytic colonization by *Aspergillus*. Pulmonary aspergillosis occurs due to colonization of empty lung cavities by a saprophytic fungus, *Aspergillus fumigatus*. The fungus forms a freely moving fungal ball inside the healed pulmonary cavities which consists of matted fungal hyphae, fibrin, and inflammatory cells. The toxins released by aspergilloma erodes the walls of the cavity which causes massive haemoptysis (if the erosion invades bronchial vessels). Spores of A. fumigatus are widespread in nature and a common contaminant in the bronchoalveolar lavage specimens from patients with chronic lung diseases.[1] Chest X-ray and computed tomography (CT) scan form the mainstay of diagnosis, which show the fungal ball and the air crescent sign. Surgery is the primary modality of treatment. The aspergillus fungus is responsible for many clinical entities or a wide spectrum of pathology in the human body. Lung manifestations are quite diverse and include:

I. Pulmonary aspergilloma;
II. Allergic bronchopulmonary aspergillosis;
III. Chronic necrotizing pulmonary aspergillosis;
IV. Invasive aspergillosis

In most patients, chest X-ray gave a clue to diagnosis showing a cavitary lesion in the lungs with a hyperdense material inside it. However, CT scan was diagnostic in all the patients showing the pulmonary cavity along with the freely mobile fungal ball and the characteristic air crescent sign . CT scan was also helpful in properly locating the lobe of the lung involved, the size and nature of the cavity and the condition of the rest of the lung parenchyma

MATERIALS AND METHODS

We studied the presentations, nature of the underlying lung disease, surgical procedures and outcome of patients with pulmonary aspergillosis, for a period from February 2017 to march 2018 operated at our institute. Sample size was 75 patient.

Following preoperative investigations were performed before the planned elective surgery.

- complete hemogram
- liver function test
- kidney function test
- Chest X-ray (posteroanterior view) and CT scan of thorax.

Chest X-Ray (PA View) - right upper lobe Aspergilloma

CT Thorax coronal section - Right upper lobe Aspergilloma (pulmonary cavity along with the freely mobile fungal ball and the characteristic air crescent sign)

INCLUSION CRITERIA

1. All patient aged 20-50 years clinical, and radiological s/o of as pergilloma

EXCLUSION CRITERIA

1. Patient with other cavitary lesions
2. Patient unwilling for surgery

3. Poor surgical candidate
4. Active tuberculosis and associated endobronchial lesions
5. Patient with prior bronchial artery emobolization

OPERATIVE TECHNIQUE

All operations were performed by a single surgeon under general anaesthesia and double lumen endobronchial intubation. Patient was turned to a lateral position with the affected side up. Posterolateral thoracotomy incision was made, and the thoracic cavity entered through the fifth intercostal space. Adhesiolysis was done to mobilize the lung all around. The affected segment of the lung was identified. The interlobar fissure was dissected, branches of the pulmonary artery and vein supplying the lobe were identified and stapled. The lobar bronchus was identified and dealt similarly. The bronchial stump was over sewn with 4-0 polypropylene. Specimen was sent for histopathological examination. The bronchial stump and the lungs checked for any air leak. Haemostasis were achieved. Two chest drains were inserted. Chest closed with 1-vicryl sutures. All patients were extubated in ICU on same day. Histopathological examination of the fungal ball with haematoxylin and eosin stain and Gomori methenamine silver stain.

POSTOPERATIVE CARE

All patients were extubated in ICU within two hours. Optimal postoperative analgesia and hydration maintained. Patients were encouraged to do breathing exercises with an incentive spirometer from POD1. Chest drains were usually removed by 48 hours . Intravenous antibiotics continued for 3 days postoperatively and oral thereafter. Most of the patients were discharged by 7th postoperative day. Follow-up was done in the outpatient department with chest X-rays after 2 weeks and after 1 month and 6 months.

RESULTS

1. male female ratio was 3:1
2. Mean age of presentation was 35 years
3. Tuberculosis was the most common cause in 98% patient
4. All patient had h/o tuberculosis in childhood and had taken ATT before
5. Duration of gap between development of tuberculosis and aspergilloma ws 6-7 years
6. Hemoptysis was the main symptom.

Table 1 Preoprative Symptom

Symptoms	%
Hemoptysis	82%
No symptom	18%

Table 2 Lobe Involved

Lobe involved	%
Right Upper Lobe	70%
Left Upper Lobe	30%

Table 3 Operation Performed

Operation	No.of patients	%
1. Lobectomy	52	70%
2.Segmentectomy	18	24%
3.Wedge resection	5	6%

DISCUSSION

Pulmonary aspergillosis has been classified into three categories: (1) The saprophytic infection, leading to fungus balls within parenchymal or pleural cavities; (2) the invasive aspergillosis observed in neutropenic or immune-compromised patients; and (3) the allergic bronchial aspergillosis known as Hinson–Pepy's disease.[2]Belcher and Plummer classified saprophytic pulmonary aspergillomas into simple and complex types. Simple aspergilloma is a thin walled cavity with little or no surrounding parenchymal disease, whereas complex aspergilloma is a thick-walled cavity surrounding lung parenchymal disease.[3] In our study we had operated upon all simple, complex aspergillomas symptomatic or asymptomatic.

A. fumigatus usually colonizes in the pre-existing pulmonary cavities, predominantly in the upper lobes of the lungs. This colonization leads to the formation of a fungus ball or aspergilloma. The cavitary lesion might have been formed due to tuberculosis, bronchiectasis, sarcoidosis, histoplasmosis, lung abscess, bronchogenic cyst, or cavitating lung carcinoma. In the developing countries, pulmonary tuberculosis is highly prevalent. Healed tubercular cavities in the upper lobes of lungs form a suitable nidus for saprophytic colonization of *A. fumigatus*. Many case series in the past have reported the association of tuberculosis with aspergilloma to be 13–89%.[4] In our series, tuberculosis was associated in 98%, which may be due to high prevalence of tuberculosis in this part of the world. The duration from diagnosis of tuberculosis to the diagnosis of aspergilloma has been very variable. The British Thoracic and Tuberculosis Association reported 6% of patients with healed tuberculous cavity developing an aspergilloma within 3 years.[5] Rergkliang *et al*. reported a history of tuberculosis ranging from 2 to 20 years (average 8.2 years) in their patients of aspergilloma.[6]

In our study, the duration from active tuberculosis to aspergilloma was from 6-7 years. The spectrum of clinical presentation of aspergilloma ranges from incidental radiological finding to exsanguinating hemoptysis.[6] In our study 82% patients had haemoptysis and remaining 12 % were asymptomatic or had mild cough. Bleeding usually occurs from the bronchial arteries, and it stops spontaneously.[7]However, when the cavity erodes into the intercostal vessels, the haemoptysis is severe and is unlikely to stop. Several mechanisms have been proposed for haemoptysis that include erosion of the vascular cyst wall by the motion of the mycetoma, elaboration of endotoxins by the fungus and the patient's underlying disease[8] Bronchial artery embolization can be attempted for patients with life-threatening haemoptysis. It can reduce the bleeding temporarily, but it does not control bleeding permanently due to massive collaterals. In our study, there were no such patients with life-threatening haemoptysis.

Surgery usually offers three potential benefits: control of symptoms, prevention of recurrent haemoptysis, and possible prolongation of life. However, the technique involved ranks among the most complex in thoracic surgery. Previous series reported mortality rates of up to 25% and morbidity including excessive haemorrhage, residual pleural space, bronchopleural fistula, and empyema of up to 60% .The fluctuating nature of the disease process and the modest surgical results restricted surgery to those patients with significant symptoms. But recent reports showed a dramatic reduction in both mortality and morbidity. In the absence of effective medical treatment, early surgery in all patients with pulmonary aspergilloma is now recommended. In our study we had no mortality amongst them, probably due to lower sample size smaller cavities, early surgery. Patient with prior bronchial artery embolization were managed conservatively postoperative complications mainly depend on underlying pulmonary condition.

We had complications such as wound infection, most major complications are mainly caused by bleeding or dead space (15%). Bleeding is dependent on the severity of pleural thickening or symphysis and dead space is dependent on parenchymal condition. Transfusion was needed for excessive bleeding, and 1 unit of blood transfusion given to almost all patient. 5 of our patient had excessive bleeding and required multiple transfusion, though all the patient recovered after then. Pleural thickening especially apex of the lung with cavity invading chest wall made surgery extremely difficult in these cases and was the cause of excess bleeding. Usually, full posterolateral thoracotomy was

deployed in such cases. But in some instances, anterolateral thoracotomy could be selected if tight adhesion is confined only on the apex. Some authors recommended to spare lattissimus dorsi muscle for potential use for close of bronchopleural fistula or filling residual space in second surgery. But it could hinder operative field of first surgery which is most important.

From the start of surgery every effort was made toward meticulous haemostasis.. After small area dissection with electrocautery, we tightly packed the dissected area with gauze and moved to the other site for dissection. After dissecting and packing, we moved to the previous gauze packed site for further dissection. Using this method, we could minimize loss of blood to avoid transfusion. Dissection was targeted to mediastinal side first which has usually no tight adhesion. After freeing mediastinal side just cephalad to hilum, we can continue dissection of apex bidirectionally, mediastinal side and chest wall side. At the apex, if the cavity invades chest wall, we did not hesitate opening the cavity. If cavity is opened, curettage is needed until necrotic tissues are completely removed. Before completing pulmonary resection, we packed adhesiolysis sites tightly with gauze. After completing the procedure, we again make cauterization of chest wall.

There were no dropouts in study. Follow up period was for 3 months and almost all patient had positive outcome in terms of symptomatic relief and improved quality of life.

CONCLUSION:

We recommend early complete surgical resection of symptomatic aspergilloma and even asymptomatic cases resulting in superior outcome.

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