

**Case Report**

# Endoscopic Management of a Symptomatic Endobronchial Lipoma

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**Abstract:** Lipomas are common benign tumours that arise anywhere on the body. Endobronchial lipomas on the other hand are rare tumours. They may also cause obstructive complications in the bronchial tree. Their presentations may vary from being asymptomatic to stridor accompanied by haemoptysis. We describe a case of endobronchial lipoma and its subsequent management.

**Keywords:** Endobronchial Tumour, Minimally Invasive Surgery, Lipoma, Endobronchial Surgery

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## 1. Introduction

Index patient is an 81-year-old gentleman. He presented to the out-patient clinic after being referred for persistent haemoptysis for 9 months. The amount of blood in sputum will vary but sometimes may be significant. This is associated with a cough and increasing shortness of breath and occasional wheezing. He has no fever, recent weight loss, bone pain, night sweat or reduced appetite. He has been treated for a lower respiratory tract infection on several occasions, however symptoms have persisted.

He has a history of smoking, but has stopped for years. In addition, his past medical history is significant for laryngeal cancer eleven years ago, for which he had laryngectomy and permanent tracheostomy with a speaking valve. He also has a history of circumcision, inguinal hernia repair, umbilical hernia repair and haemorrhoidectomy.

## 2. Presentation

On examination, he appeared frail with mild distress, however his vital signs were normal. Of significance, he had reduced air entry in the left hemithorax with occasional expiratory wheeze. The remainder of his examination was normal.

He presented to the outpatient clinic after being discussed by the multidisciplinary team. Prior to presentation, he was investigated by his respiratory physician with multiple chest roentgenograms and flexible bronchoscopy from which multiple cytological samples were taken from inflamed appearing right middle and lower lobe bronchus. Analysis of these samples was negative for malignancy. However on serial bronchoscopy a polypoid right upper endobronchial mass was seen, which was biopsied and was found to be benign in nature.

He was also investigated with serial computed tomography, which revealed a mass in the proximal right upper lobe bronchus with atelectasis in the medial segment of the right upper lobe. A 2.6mm nodule and atelectasis is present in the right middle lobe. Irregular scarring is present extending from the lower pole of the left hilum into the lower lobe with a peripheral speculated soft tissue mass noted measuring 2.3x1.9 cm. No significant thoracic lymphadenopathy is present. (see Fig. 1)

The patient however continued to worsen clinically and radiologically. The source was thought to be the endobronchial mass. Hence, he was referred for endoscopic resection. The risk and benefit of the procedure was explained to the patient and his family. He was consented for endoscopic resection of bronchial mass and a possible thoracotomy and

sleeve resection.

### 3. Procedure

After in depth consultation between the surgical and anaesthetic team, a size 9Fr endotracheal tube was inserted through which the bronchial tree was examined. The mass appeared to be polypoid, and non-friable with almost complete occlusion of the right upper lobe bronchial orifice. It was bypassed with a flexible bronchoscope and a snaring cutting loop was passed through. Electrocautery was then used to resect the mass leaving a fibrosed looking base. There was good haemostasis at the resection site. Further inspection of the bronchial tree revealed copious secretions, which was evacuated by suctioning. The patient however had high airway pressures on the table and had to be given salbutamol and dexamethsone. His post operative chest roentgenogram was unremarkable.

He had no significant post operative problems and was discharge the following day after his procedure. The histopathology revealed fragments of a polypoid lesion, which is intensely inflamed and focally ulcerated. Within the core of the polyp there is inflammation and there are aggregates of mature adipocytes with several large blood vessels. The presence of adipose tissue raises the possibility of an endobronchial lipoma. There is no evidence of malignancy in the tissue. He was seen in the outpatient clinic 6 weeks' post-surgery and continues to improve.

### 4. Conclusion

Although benign by nature, endobronchial lipomas can be a significant cause of morbidity due to its location in the tracheobronchial tree. Endoscopic resection is possible with excellent outcomes and a short length of stay.



*Figure 1. Coronal View of right endobronchial tumour.*



*Figure 2. Polypoid mass post excision.*



*Figure 3. Post excision of endobronchial mass.*

### 5. Discussion

Lipomas are one of the commonest benign soft tissue tumors that exist. Overall, they are seen more often in women than in men. Lipomas are most often seen in the trunk and neck, however they can occur in many other anatomical locations. Pulmonary lipomas are seldomly encountered while other tumors such as hamartomas are seen more commonly [1]. Endobronchial lipoma (EL) is a rare benign tumour composed of mature adipose tissue, with an incidence ranging from only 0.1% to 0.5% in all lung tumors. The tumors are commonly found in the central airways, in lobar or segmental bronchi of the endobronchial tree. Endobronchial lipomas are also more commonly seen in the right lung, with almost two thirds of the tumors occurring in this location [2, 3, 4]. These tumors are easily detected during bronchoscopy, with only a small percentage being in the periphery of the lung. When these tumors are examined on a macroscopic level, they appear as well-circumscribed, soft, yellow masses ranging in size from 10 to 30 mm in the greatest diameter, with a smooth round surface.

The origin of endobronchial lipomas is largely unknown.

However, it has been proposed that they arise from adipose tissue within proximal lobar or segmental bronchi. In addition, parenchymal lipomas possibly originate from adipose tissue in subsegmental bronchi or subpleural adipose tissue [1].

In terms of gender and age distribution, endobronchial tumors are found most commonly in middle aged men [5]. Muraoka et al in their study looked at 64 cases reports and identified endobronchial tumors in 50 men and 14 women, with a mean age ( $\pm$  SD) of  $60.0 \pm 11.4$  years [5].

The presentation of endobronchial lipomas varies but largely depends on the degree of pulmonary obstruction. Small tumors may be found incidentally, while large obstruction tumors may present with a myriad of problematic symptoms. Numerous symptoms related to endobronchial lipomas have been reported. The most common of these include cough, sputum, hemoptysis, fever, dyspnea and recurrent pneumonia. Recurrent chest infections have been attributed to the mechanical obstruction of the tumour [6, 7]. MacArthur et al reported haemoptysis to occurred in 15 of 48 reported cases (31%) and tends to be a late symptom. They postulated that the haemoptysis is likely to have been related to distal lung disease rather than directly to the tumour in the majority of patients [4]. Although no direct causative factors have been identified, smoking and obesity are significant risk factor for developing endobronchial lipoma [1, 2, 3]. The index patient had a strong history of smoking and this could have been a major predisposing factor for the development of his condition.

Differential diagnoses that were considered in the index patient included carcinoid, hamartomas, and endobronchial carcinoma.

Radiological investigations are extremely helpful in the assessment of these tumours. Chest radiographs can appear to be normal in a small number of cases. This is particularly true in asymptomatic patients. However endobronchial lipomas may also be solitary opacities on chest radiographs. Of note these tumors are usually indistinguishable from other malignant neoplasms [8]. Muraoka et al in their review reported additional abnormal radiographic findings for 51 patients (80%). They also reported that eighteen patients had atelectasis, fourteen patients had infiltration or consolidation, six patients showed volume loss of the lung, mass shadow was identified in nine patients, and other abnormalities including pleural effusion was found in four patients [5].

Further investigation with a high resolution computed tomography scan is usually indicated. These tumors are typically well defined and homogeneous with a density analogous to that of fat (approximately -100 HU) and no tumour contrast enhancement are considered diagnostic [1, 2, 9, 10, 11]. Of note, helical CT is often superior to bronchoscopy for evaluation of these rare lesions. Hence by utilizing helical CT scans, accurate and early diagnosis can be made. This may then obviate the need for an unnecessary surgical procedure such as a thoracotomy and prevent irreversible complications especially in asymptomatic patients [10]. However, of importance, it is key to note that radiologic findings alone are never characteristic enough to definitively

exclude the possibility of malignancy tumour, hence histopathological diagnosis is usually desired [12].

The histopathology of endobronchial lipomas shows features that are similar to lipomas seen in other locations. They are comprised of bland, mature adipocytes and are often covered by a thin fibrous capsule. In addition, the bronchial submucosa may be less well differentiated from endobronchial lipomas tissue [1]. Endobronchial lipomas are usually histologically benign in character. Simmers et al on the other hand reported that recurrent obstructive pneumonia might induce enough nuclear atypia to suggest malignancy in endobronchial brush cytology of this tumour. Hence the authors recommend surgical treatment, including pulmonary resection, since it is not always possible to diagnose the lesion as a benign tumor [13].

There are several surgical treatment options available. Current modalities have included bronchoscopic removal techniques. More invasive options in the excision of a lipoma include thoracotomy with bronchotomy, segmentectomy, lobectomy or pneumonectomy [10].

Several techniques have been described and used with the flexible bronchoscope for the excision of endobronchial tumors. The most commonly utilized method is to resect these tumors (either piecemeal or completely in case of a pedunculated growth) using the electrocautery snare, as the case was with the index patient. The resected tumour can then be extracted using a dormia basket forceps or biopsy forceps [3]. The resection can also be done with the use of the rigid bronchoscope. By using the barrel of the rigid scope, the tumour can be debulked mechanically. The tumour can then be retrieved using rigid forceps. Several other ablative techniques have been used in conjunction with the rigid bronchoscope. These include Nd: YAG lazer, ethanol injection into the base of the tumour, electrosurgical snaring, argon plasma coagulation of base, and cryotherapy [14]. Of all the options available, electrosurgery, may be the most widely used method. The reasons for this are that it is relatively inexpensive and widely available. Also, it is relatively easy procedure to learn and perform [15].

Adachi et al in 1984 reported the first case of endoscopic surgical treatment of endobronchial lipoma using a bronchial fiberscope [16]. Since then, several other cases have been reported in the literature.

Currently, many authors have proposed that bronchoscopic resection should be the first line of management of endobronchial lipomas. The procedure is minimally invasive and allows for the complete removal of these tumors, which is both diagnostic and curative. In addition, both flexible and rigid bronchoscopies have been used with good success rates.

Nassiri et al looked at a multicenter retrospective study of interventional bronchoscopic treatment of endobronchial lipomas. They found that rigid bronchoscopy was performed in 94.7% (36 of 38) patients. Tumour excision with the use of lazer and mechanical debulking was achievable in 76.3% of cases. In the remaining 2 patients, flexible bronchoscopy and lazer was used. Flexible bronchoscopy was followed by a rigid bronchoscopy therapeutic procedure in 5 cases [17]. Similarly,

Muraoka et al reported on 64 endobronchial lipomas patients. Forty-one patients underwent surgical resection, while six did not undergo any treatment at all. The remaining seventeen cases were treated with flexible bronchoscopy. Of these, seven underwent Nd: YAG laser treatment, five by using electro-surgical snaring forceps, and another five with a combination of both modalities [5].

A low recurrence rate of endobronchial lipoma has been reported. No recurrence was noted in two large studies that used bronchoscopy for management of endobronchial lipoma [4, 17]. Muroaka and associates [8] in their series of 64 patients of which 17 of them received an endobronchial procedure, noted that no recurrence was seen in the treated patients. Similarly, Nassiri and colleagues [17] in their retrospective multicenter study in 38 patients and found no recurrence in the subjects during the study period. This would suggest that either flexible or rigid bronchoscopy could be used effectively in the treatment of patients with endobronchial lipomas with very little change of recurrence.

The decision to use flexible or rigid bronchoscopy is dependent on several factors which include; the available modality, surgeons experience and preference, the underlying disease process and anatomical location of the tumour, presence of airway compromise, and its effects on the patient's respiratory state. Tumors located in a central position with airway compromise or endobronchial tumors that are susceptible to bleeding may be better managed with rigid bronchoscopy [14].

It is widely believed that bronchoscopic resection should be the first line management in treatment of endobronchial lipoma. However open resection is warranted in certain patients with specific clinical presentation. These include; difficulty of definite diagnosis and possible complicated malignant tumour; peripheral pulmonary destruction due to long term obstruction with atelectasis or pneumonia; extrabronchial growth or subpleural lipomatous disease, or if technical difficulties are anticipated during the endoscopic procedure due to multidirectional development of the tumour [5].

Cockcroft et al divided the treatment of endobronchial lipoma into local resection of the lesion or resection of the lipoma and distal lung tissue. In their review of 40 cases, 15 lipomas were resected and 2 were coagulated at bronchoscopy. Three were resected through bronchotomy incisions and 22 were treated by with pulmonary resection 16 via lobectomy and 6 via pneumonectomy. Most patients were again found to have significant symptoms and evidence of major bronchial obstruction [18]. Similarly, Muraoka et al in their retrospective review of 64 cases reported that surgical resection was performed for 40 patients. Four pneumonectomies, 24 lobectomies, 8 bilobectomies, and 4 resections by bronchotomy. In this study 80% of patients were found to have positive radiological findings, which may indicate distal airway destructive disease and hence the rationale for surgical resection [5].

Endobronchial lipomas are rare tumours, which typically occur in middle age male and on the right side of the tracheobronchial tree. Due to the rarity, there are mainly case

reports and reviews that exist in the literature. Most patients with this pathology are symptomatic. Fortunately, most can be successfully treated with bronchoscopic resection, with a low or no recurrences rate being reported. However, surgery may be indicated in certain individuals. The index patient had indications for lung resection based on evidence of distal lung destruction due to long term atelectasis and infection. Bronchoscopic resection was preferred since due to his comorbidities the morbidity and mortality risk were too high to justify a thoracotomy. He was still consented for a thoracotomy as an alternative procedure if endoscopic resection had failed or became complicated.

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