ORIGINAL CONTRIBUTION

Surgical Management of Bilateral Bronchiectases: Results in 29 Patients

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ABSTRACT

Bronchiectasis is a major cause of morbidity and mortality in developing countries. Staged bilateral segmental resection of the lungs is performed in selected patients. Our experience of surgical removal of 87 bilateral bronchiectases in 29 patients during an 11-year period was reviewed retrospectively. High-resolution computed tomography was performed preoperatively in all patients to locate the anatomic sites of bronchiectasis. The mortality and morbidity of the surgical procedure, clinical symptoms, age distribution, etiology, bacteriology, and operative procedures were analyzed. There were 22 males (76%) and 7 females (24%), aged 5 to 60 years, with a mean age of 30 years. Complications developed in 11 patients (38%); atelectasia was the most common (14%). There was one hospital death. Clinical symptoms disappeared in 19 (66%) patients, improved in 5 (17%), and were unchanged in 4 (14%). Staged bilateral resection for bronchiectases can be performed at any age with acceptable morbidity and mortality.

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INTRODUCTION

Bronchiectasis refers to an abnormal permanent dilation of a subsegmental airway with destruction of the bronchial walls. Before the antibiotic era, bronchiectasis was considered a morbid disease with a high mortality rate due to respiratory failure and cor pulmonale.[1,2] The prevalence of bronchiectasis decreased with the development of antibiotics, but the emergence of drug-resistant microorganisms lead to increased postinfection bronchiectasis. The incidence has declined in the last 20 years due to better programs of vaccination, especially against tuberculosis, but despite advances in treatment, bronchiectasis is still a major cause of morbidity and mortality in developing countries.[1,3,4] Since the 1930s, various operative procedures have been proposed for the treatment of bronchiectasis.[5–7] In most cases, surgical treatment of localized bronchiectasis, especially in patients with severe or recurrent complications, is handled by thoracic surgeons.[8–10] The presence of multiple or bilateral bronchiectases is generally regarded as a contraindication to operate.[11–13] This retrospective study reviews our surgical experience and results of treatment of 29 patients with bilateral bronchiectases during an 11-year period.

PATIENTS AND METHODS

Of the 210 patients who underwent pulmonary resection for bronchiectasis in Razi Hospital, Rasht, between 1992 and 2002, 29 had bilateral lesions. High-resolution computed tomography was performed preoperatively in all patients to locate the anatomic sites of bronchiectasis. To determine involved segments, bronchoscopic examinations were carried out once or twice before each operation. Data on the etiology, symptoms and signs, culture of microorganisms, distribution of involved lobes, type of procedures, complications, and results of surgery were collected.

For segmentectomy, after the hilar structure was exposed and the major fissure was opened, the pulmonary artery

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Table 1. **Etiology of Bilateral Bronchiectases in 29 Patients**

Etiology	No. of Patients	%
Childhood infections	15	52
Whooping cough	4	14
Tuberculosis	4	14
Kartagener syndrome	1	3
Obstruction due to foreign body	2	7
Unknown	3	10

Table 2. **Symptoms and Signs of Bronchiectases in 29 Patients**

Symptoms and signs	No. of Patients	%
Productive cough	26	90
Recurrent infections	16	55
Hemoptysis	10	34
Failure to thrive	2	7
Clubbing and pulmonary hypertrophic osteoarthropathy	4	14

was identified. The arterial branch to the involved segment was isolated, secured, and divided. The segmental veins and bronchus were divided. In some patients, separation of the diseased segment was accomplished by blunt dissection, vascular and small airway connections had to be clamped, divided, and ligated. Bronchial stump closure was performed with polyglactin sutures reinforced with pleura, intercostal muscle, or pericardial fat.

RESULTS

There were 22 males (76%) and 7 females (24%). The mean age of the patients was 30 years, with a range of 5 to 60 years. The most common etiology of bronchiectasis was childhood infections. Other etiologies are shown in Table 1. Productive cough and recurrent infections were the most common symptoms observed (Table 2). Bacteriology reports of sputum culture from the tracheobronchial tree showed *pseudomonas aeruginosa* and *hemophilus influenza* as well as the other microorganisms listed in Table 3.

Spirometry data with vital capacity and forced expiratory volume in 1 sec were available in 23 patients, which revealed obstructive lung diseases in 16 (70%) and obstructive and restrictive disease in 7 (30%). In the

Table 3. **Bacteriological Findings in 29 Patients**

Microorganisms	No. of Patients	%
Pseudomonas aeruginosa	12	41
Hemophilus influenza	7	24
Klebsiella pneumonia	4	14
Staphylococcus aureus	4	14
Tuberculosis	2	7

Table 4. **Distribution of Bronchiectases in 29 Patients**

Group	No. of Patients	Lobes Involved	No. of Lobes
1	10	RLL	10
		LLL	10
		Lingulae	10
2	10	RLL	10
		2 segments of LLL	10
		Lingulae	10
3	6	LLL	6
		RML	6
		Anterior segment of RUL	6
4	2	LLL	2
		RUL	2
		2 segments of RLL	2
5	1	RLL	1
		LUL	1
		Anterior segment of LLL	1

LLL = left lower lobe, LUL = left upper lobe, RLL = right lower lobe, RML = right middle lobe, RUL = right upper lobe.

29 patients, 87 surgical resections were performed. A posterolateral thoracotomy was carried out on one side, and after 2–3 months, the other side was operated on. All patients were operated on using single-lung ventilation anesthesia. Pathological involvement of the lungs was classified into 5 groups. Most of the cases (10 patients) were in group 1 which involved the right and left lower lobes and the lingulae. The distribution of bronchiectases according to location is shown in Table 4. Lobectomy was the most common type of resection. The various surgical procedures performed are listed in Table 5. All patients were monitored in the intensive care unit postoperatively. Twenty patients were extubated in the operating room, 9 were extubated 24 to 72 hours postoperatively in the intensive care unit. Ventilator dependency was not seen

Table 5. **Types of Resection Performed**

Group	No. of Patients	Type of Resection	No. of Resections
1	10	Right lower lobectomy	10
		Left lower lobe lobectomy	10
		Lingulectomy	10
2	10	Right lower lobectomy	10
		Lingulectomy	10
		Segmentectomy of LLL	10
3	6	Left lower lobectomy	6
		Right middle lobectomy	6
		Segmentectomy of RUL	6
4	2	Left lower lobectomy	2
		Right upper lobectomy	2
		Segmentectomy of RLL	2
5	1	Right lower lobectomy	1
		Left upper segmentectomy	1
		Segmentectomy of LLL	1
Total	29		87

LLL = left lower lobe, RLL = right lower lobe, RUL = right upper lobe.

Table 6. **Postoperative complications**

Complication	No. of Patients	%
Atelectasis	4	14
Air leakage (moderate)	2	7
Bronchopleural fistula	2	7
Empyema	2	7
Postoperative bleeding	1	3

in any of these patients. The mean length of hospital stay after surgery was 7 days (range, 5 to 12 days). Complications occurred in 11 patients (38%). As can be seen from Table 6, the most common complication was atelectasis. Complications were treated by physiotherapy, thoracostomy tube, or transfusion; there were no reoperations. There was a single hospital death (3.4%) caused by gastrointestinal bleeding due to empyema, sepsis, and stress ulcer. Complications were common in post-tuberculosis patients with a long duration of disease, right upper lobe bronchiectasia, and sputum culture positive for *pseudomonas*. Bronchopleural fistula was diagnosed by air leaks from the thoracostomy tube and fiberoptic bronchoscopy. All cases of bronchopleural fistula and empyema responded to a thoracostomy tube. Air leakage was controlled by injection of autologous blood into the pleural space. The mean period of follow-up was 1 year (range, 1 to 6 years). Symptoms disappeared in 19 patients (66%), 5 (17%) showed improvement, while 4 (14%) experienced no change. Clubbing and pulmonary hypertrophic osteoarthropathy disappeared in all cases.

DISCUSSION

The incidence of bronchiectasis has decreased in industrialized countries due to adequate treatment of pulmonary infections by specific antibiotics and vaccinations in childhood. However, bronchiectasis remains a chronic disorder and a surgical problem in developing countries.[1–3,14] It is widely accepted that the etiology of bronchiectasis is recurrent pulmonary infections either in childhood or adult life.[10,14,15] This was true in our patients. Since the 1950s, surgical resection of bronchiectasis has played a significant role in dealing with this disorder in developing countries.[3,16] The indications are well accepted among thoracic surgeons, and operations are performed on localized bronchiectasis. From the end of the 1970s, some surgeons have been suggesting that bilateral bronchiectases might not contraindicate resection.[2,6–18]

We preformed pulmonary function studies in all patients. In some series, it was found to be normal in patients with localized bronchiectasis, but in those with severe bronchiectasis, a mixed obstructive and restrictive pattern with hypoxemia has been observed.[1] The therapeutic options in non-focal bronchiectasis are limited. Usually, patients are treated with antibiotics and physiotherapy. Recently, progress has been made with the use of new antibiotics and inhalation of tobramycin solution in cases of *pseudomonas aeruginosa* colonization.[10,19] These therapies allow a good quality of life for several years, but progression to chronic respiratory failure with a poor prognosis must be considered.[16,18–20] Transplantation remains a procedure for patients with advanced disease and seriously compromised pulmonary function with chronic respiratory failure.[3]

Some investigators have proposed radical operations for bilateral bronchiectases, but others reported higher operative mortality.[9] It seems that limited operations should be offered to some patients with diffuse bronchiectasis.[12,13,16] Two factors should be considered in the selection of patients: the respiratory function and performance status must be compatible with the anesthetic risk; and the resection should be performed quite early in the evolution of the disease because of the risk of contamination of healthy bronchi.[7] Surgery for bilateral bronchiectases is considered risky, and hemorrhagic or infectious complication are expected because of the bronchial arterial circulation and septic

context.[6,9] In a study on 16 patients, there was no mortality and low morbidity (2 infections without empyema and one persistent air leak).[15] We compared our results with those of patients who underwent surgery for localized disease.[14] Among 166 patients, 115 lobectomies, 12 pneumonectomies, 24 wedges resections, and 15 combined procedures were performed. Morbidity was 21% (n = 35) and mortality was 1% (n = 2), which was similar to results in non-localized disease.[15] Our study shows the benefits of surgery in non-localized bronchiectasis. Disappearance or regression of the preoperative symptoms occurred in 83% and there was no change in 14% of patients. We did not use video-assisted thoracoscopy for resection of bronchiectases, but it has been used in some centers.[14] In another study that showed the benefits of surgery in non-localized bronchiectasis, disappearance or regression of the disabling symptoms occurred in 75% of patients, and reductions in hospitalization and antibiotic consumption resulted in improved quality of life.[9] Of course, the rate of complete cure was lower than in localized bronchiectasis, which is 35% to 50%.[9,15] Other studies have shown operations for localized bronchiectasis gave complete cure in 59%, improvement in 29%, and 12% of patients had stable disease.[13,20]

Our study suggests that severe bronchiectasis with bilateral involvement, which is resistant to medical treatment and physiotherapy, could improve with surgical procedures.

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