

# Surgical Treatment in Bronchiectasis: Analysis of Our Patients

F. Gradica<sup>1\*</sup>, L. Lisha<sup>1</sup>, Dh. Argjiri<sup>3</sup>, F. Kokici<sup>2</sup>, A. Cani<sup>2</sup>, F. Gradica<sup>4</sup>, Z. Perduka<sup>5</sup>

<sup>1</sup> Thoracic Surgeon, University Hospital "Shefqet Ndroqi" Tirana, Albania, \*Prof. Asoc. Dr. of Surgery, University of Medicine, Tirana, Albania

<sup>2</sup> Intensive Care Unit, University Hospital "Shefqet Ndroqi" Tirana, Albania

<sup>3</sup> Pulmonology Departement, University Hospital "Shefqet Ndroqi" Tirana, Albania

<sup>4</sup> Pharmacy Service, Tirana, Albania

<sup>5</sup> Department of Pneumology, Hospital of Rreshen, Albania

\* Corresponding author: Prof. Asoc. Dr. Fadil Gradica, fadil\_gradica68@hotmail.com

## Abstract

**Background:** Bronchiectasis is usually caused by pulmonary infections and bronchial obstructions. It is still a serious problem in developing countries, as our country. We reviewed the morbidity and mortality rates and outcomes of bronchiectasis surgical treatment.

**Patients and methods:** Between years 2000 and 2016, one hundred and seven (107) patients, sixty nine (69) of whom female and thirty eight (38) male underwent pulmonary resection for bronchiectasis. The mean age was 35 years (range, 13–66 years). Mean duration of symptoms was 12 years.

**Results:** Symptoms were copious amount of purulent sputum in 84 patients, expectoration of foul-smelling sputum in 72, haemoptysis in 21 and cough in all patients. The indications for pulmonary resection were: medical therapy failure in eighty two (82) patients, massive haemoptysis in eighteen (18) and lung abscess in seven (7) patients. The disease was bilateral in twenty seven (27) patients and mainly confined in the lower lobe. Eighty six (86) patients had a lobectomy, 7 had a segmentectomy, two patients right pneumonectomy. Operative morbidity was seen in 47 patients (43.9 %) and mortality in two (2) patients. Follow-up was complete in 97 patients with a mean of 5 years. Overall, 78 patients were asymptomatic after surgical treatment; symptoms were improved in 24, and unchanged or worse in 5.

**Conclusions:** Surgical treatment of bronchiectasis is more effective in patient with localized disease. It is satisfactory with acceptable ratio of morbidity and mortality.

**Keywords:** *Bronchiectasis, surgical treatment, haemoptysis*

## Introduction

Bronchiectasis, a chronic necrotizing infection of the bronchi and bronchioles leading or associated with abnormal dilation of these airways, was first described by Laennec in 1819 [1, 2]. Today, with the improvement of health care and the availability of suitable antibiotics, the prevalence of bronchiectasis has declined and the patients with early disease can be treated successfully by conservative procedures in developed countries. Bronchiectasis still constitutes an important problem in developing countries, mainly due to infections such as tuberculosis, pneumonia, pertussis and serious rubeola infections [3–5]. Few recent reports of surgical management of bronchiectasis are available in English literature.

**Objective:** We present here our 15-year experience on 86 patients with bronchiectasis who underwent surgical treatment.

**Patients and methods:** Between 2000 and 2016, 107 patients with bronchiectasis were operated on in the Department of Thoracic Surgery in University Hospital “Shefqet Ndroqi”. All patients were evaluated with a detailed history and physical examination and blood tests including a complete blood count and biochemical analysis. Pulmonary function tests were performed routinely. Quantitative pulmonary ventilation and perfusion scans were carried out in patients with poor pulmonary function. Radiologic examinations included chest radiography, and a thorax computed tomography (CT).

Treatment of severe exacerbations of Bronchiectasis to hospital and their treatment is usually done by Pulmonologist and surgery is reserved for patients with focal disease and poorly controlled with conservative treatment, after a team consult, both pulmonologist, thoracic surgeons and radiologists. All patients had intensive chest physiotherapy in preoperative period. Sputum culture and sensitivity tests of all patients were examined and received prophylactic antibiotics. Chest physiotherapy was continued until the daily volume of the sputum decreased to 50 ml or less. Flexible bronchoscopy was also performed for all patients for the removal of secretion and determining foreign body or endobronchial lesions. During surgi-

cal procedure, a double-lumen endotracheal tube was used to provide isolated ventilation to each lung to prevent spilling of secretion to the other side. Poster lateral thoracotomy was performed in all patients. If the disease is limited to one lobe, lobectomy was done and when the whole lung was affected, pneumonectomy was performed. When patients had poor respiratory functions tests or disease is fairly limited, segmentectomy was performed.

During pulmonary resection, excessive bronchial dissection was avoided, and peribronchial tissues were preserved. Toilet-bronchoscopy was performed routinely preoperatively, after intubation. All resection specimens were subjected to histopathologic examination in order to confirm the diagnosis. Postoperative management included intensive chest physiotherapy and administration of antibiotics and analgesics.

Operative mortality included patients who died within 30 days after thoracotomy or those who died later but during the same hospitalization. Follow-up information was obtained for all survivors, either by periodic clinical evaluation or by telephone call with the patients or his/her relatives.

The patients were followed up for a mean period of 5 years, ranging from 6 months to 15 years. Segmentectomy was accepted as an incomplete resection. At last follow up, the outcome of surgery was evaluated according to the following criteria: (1) excellent-complete absence of preoperative symptoms leading to surgery; (2) good-marked reduction in preoperative symptoms; and (3) no-change no-reduction in preoperative symptoms.

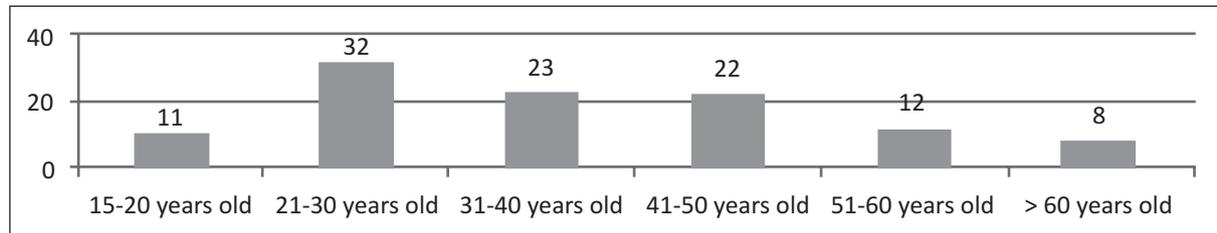
The patients were evaluated according to gender, age, symptoms, clinical and radiographic findings, the method of treatment, and prognosis. Data are expressed as mean  $\pm$  standard deviation and differences were considered statistically significant when the P value was less than 0.05.

## Results

The mean ages results  $37 \pm 18.8$  years (ranging from 13 to 69 years). Female patients 69 (64.5%) were greater than male patients 38 (35.5%) in number, but without statistically significance

( $p=0.084$ ). More than  $\frac{1}{2}$  of patients 66 (61.8%) were between 21 to 40 years-old (Table. 1). Symptoms were copious amount of purulent sputum in 84 (78.5%) patients, expectoration of foul-smelling sputum in 72 (67.2%), haemoptysis in

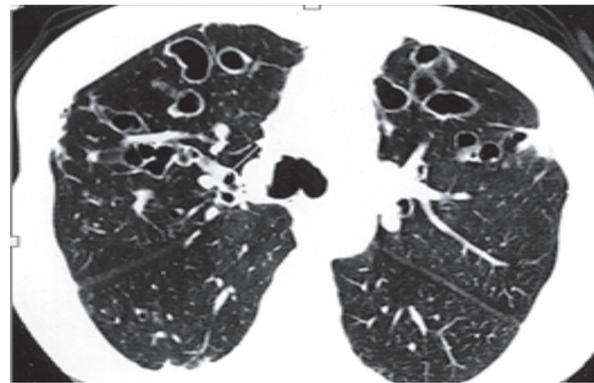
18 (16.8%) and cough in all patients. Mean time of complaining was 6 years (range 4 to 12 years). Nearly all patients had recurrent pulmonary infection.



**Table 1: Age distribution of patients.**

Chest CT scan was performed in 84 patients. The major findings were: Cystic or saccular bronchial dilation (Fig. 1), in approximately 68 % of patients,

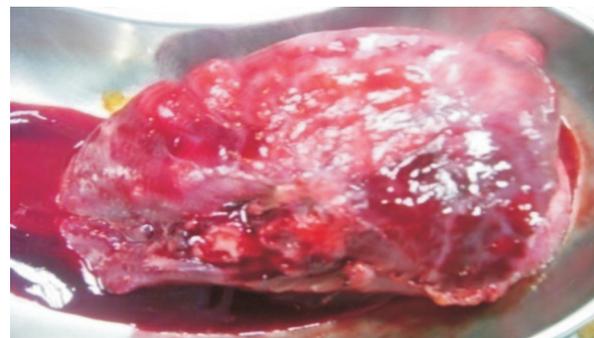
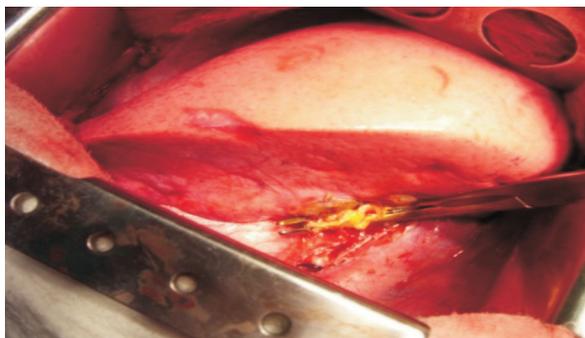
lobar retraction was noted with CT scan (Fig. 1 B). Bronchography was performed in two patients in other clinics.



**Figure 1: CT scan image: A) a cystic bronchiectasis in the left lower lobe BA) cystic bronchiectasis in anterior distribution in both tow lungs;**

The most common microorganisms found in sputum cultures were: Haemophilus influenza (15.8%), Pseudomonas aeruginosa (8.4%) and Streptococcus pneumonia (7.4%). In preoperative bronchoscopic examination, neither a foreign body nor an endobronchial lesion was detected.

The indications for pulmonary resection were: poorly controlled symptoms with conservative therapy in 83 (77.5%) patients, massive haemoptysis in 18 (16.8%) and lung abscess in 6 six (5.7%). Posterolateral thoracotomies were performed in all patients.



**Fig. 2: A) moment during surgery procedure, B) Gross figure of lung bronchiectasy**

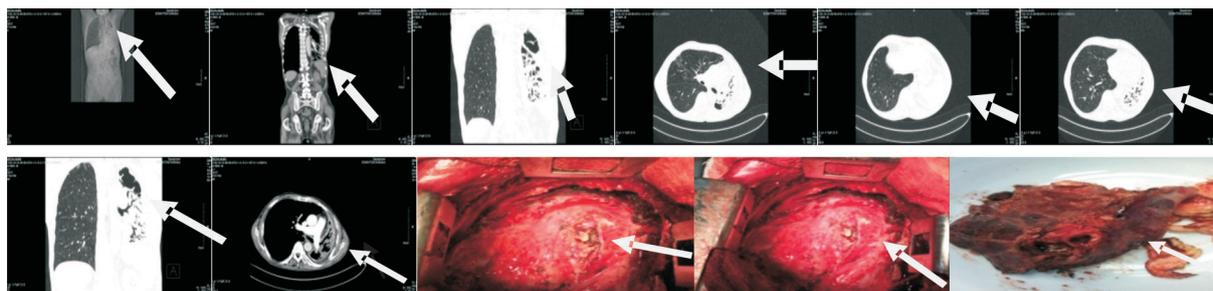


Fig.3 CT Bronchoectasi Saciforme Cistine, Pulmon sinister et finrothorax sinister.

Pleurepneumonectomi sinister.

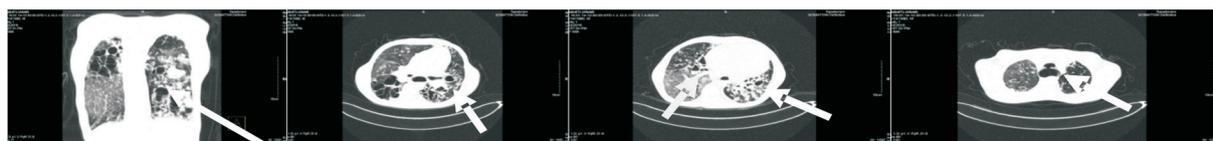


Fig.4: Bilateral lung saciforme bronchoectasia et tracheoesophageal fistulae.

According to operative findings, right lower lobe 64 (59.8%) was the most common localization. 86 (80.4 %) had a lobectomy, 2 (1.9%) had a pneumonectomy, 7(6.5%) had a segmentectomy and

combined lobectomy and segmentectomy in 1 (1.5%). Lobectomy was the most preferred surgical method (Table 2).

	Right lung pat. Nr. (%)	Left lung pat. Nr. (%)	p-value	Total pat. Nr. (%)
<b>Pneumonectomy</b>	2 (3.1%)	2 (4.6%)	-	2 (1.9%)
<b>Lobectomy</b>	55 (85.9%)*	29 (67.4%)*	P=1.00	86 (80.4%)
<b>Lobectomy+ segmentectomy</b>	1 (1.5%)	1 92.3%)		2 (1.9%)
<b>Segmentectomy</b>	5 (7.8%)*	2 (4.6%)*	P= 0.751	7 (6.5%)
<b>Total</b>	64 (100%)	43 (100%)		107 (100%)

Table 2: Surgical procedures: \* p =1.0; p =0.751 (no significant difference)

Operative morbidity was seen in 47 (43.9%) patients with 11 (11.2 %) major and 36 (33.6%) minor complications (Table 3). Re-thoracotomy and open window was performed in 2 patients for postoperative empyema. Nasotracheal aspi-

rations and flexible bronchoscopy were used in four patients with atelectasis for the removal of secretion. Operative mortality was seen in two patients. The causes of death were pulmonary embolism and myocardial infarct.

Complications	Total Pat. Nr. (%)
<b>Postoperative bleeding</b>	7 (6.5%)
<b>Bronchopleural fistula</b>	4 (3.7%)
<b>Empyema</b>	4 (3.7%)
<b>Pulmonary embolism and myocardial infarct</b>	2 (1.9%)
<b>Pleural fistula</b>	5 (4.8%)
<b>Prolonged air leak</b>	3 (3.4%)
<b>Wound infection</b>	10 (9.4%)
<b>Atelectasis</b>	8 (7.4%)
<b>Total</b>	47 (43.9%)

Table 3: Complications following surgery bronchiectasis

Follow-up was complete in 98 patients with a mean of 5 years (range 6 months–15 years). Seventy eight patients were asymptomatic after surgical treatment; symptoms were improved in 24

patients, and unchanged or worse in five cases. The results of complete resection were better than those of incomplete resection, with significant difference (Table 4).

<i>Outcome</i>	<i>Complete resection pat. Nr. (%)</i>	<i>Incomplete resection pat. Nr. (%)</i>	<i>p-value</i>
<b>Excellent</b>	78 (85%)	- (0%)	-
<b>Good</b>	16 (11.2%)*	8 (80.0%)*	P = 0.0018
<b>No change or worse</b>	3 (3.4%) **	2 (20.0%) **	p = 0.0084
<b>Total</b>	97 (100%)	10 (100%)	

**Table 4: Results of complete and incomplete resections. \*, \*\* significant difference**

## Discussion

The incidence of bronchiectasis is unknown [3]. Bronchiectasis is usually caused by pulmonary infections or bronchial obstruction. Bronchiectasis is still a problem in developing countries as our country [3, 4]. In spite of the advances in thoracic surgery, the optimal treatment for bronchiectasis remains controversial.

Recurrent pulmonary infection of childhood is an important factor in the etiology. Similar to the other series, most of our patients have recurrent infections in their histories [3, 5, and 6]. This situation is significant because of emphasizing the importance of the adequate and favorable treatment of pulmonary infections of childhood.

The diagnosis of bronchiectasis today is not a problem. Before the usage of CT scan, bronchography was the standard procedure for diagnosis [7, 8]. However, in bronchography, timing of the study is important. Only one lung is studied at a time, and the study should be done when the patient is in optimal condition, after postural drainage, and antibiotics have controlled any acute exacerbation and secretions are decreased to a minimum [1]. However, these conditions are not required for CT scan. The detailed images demonstrate bronchial dilatation, peribronchial inflammation and parenchymal disease [7, 8, and 9]. The preoperative diagnosis based on CT scan findings was consistent with operative findings in all our cases. Some authors recommended bronchography as a reliable method for the diagnosis of bronchiectasis [4, 5]. After the routinely usage

of CT, we did not use bronchography and do not recommend it for the diagnosis of bronchiectasis. The use of bronchography has been decreasing and has been progressively replaced by CT scan as in our series [9, 10]. In our study only in two patients performed it in other clinics. According to our experience, preoperative CT findings and operative evaluation are sufficient to make a decision for complete resection in bronchiectasis.

The treatment of bronchiectasis includes: controlling of bronchial secretions and infections, prevent further damage and infections and reduce symptoms. Surgical therapy should be considered: in poorly controlled disease (focal disease poorly controlled by antibiotics), in massive haemoptysis, foreign body or tumor removal [1, 11]. Almost all patients with bronchiectasis have been followed by chest physicians, being on medical treatment for many years. The most common symptoms were chronic cough, expectoration of foul-smelling, purulent sputum. Sometimes the daily volume of the sputum could be raised up to 250–500 ml. Consequently, patients suffer from social deprivation and intrinsic depression. According to our clinical experience, patient with bronchiectasis is often introverted. The use of antibiotics in almost every recurrence of pulmonary infections increases the costs of treatment and frequently causes side effects related with these drugs. Hospitalization during pulmonary infections also causes loss of work ability. After every acute infection, surrounding normal pulmonary tissues are also affected and bronchiectatic areas

get larger and lead to destroyed lung.

Moreover the surgical treatment of bronchiectasis is satisfactory with acceptable operative mortality and morbidity rates of 1–8.6 and 14–53% previously reported, respectively [3–6, 11]. These rates were 2.3 and 38.3% in our series.

In bronchiectasis, unilateral, segmental or lobar distribution, persistent, recurrent symptoms when medication is discontinued, recurrent infection and hemoptysis is each an indication for surgical treatment [3–5, 11]. The goals of surgical treatment are complete resection and to ensure the quality life. For successful surgery: (1) we recommend that the operation should be performed in 'dry period'. (2) In intraoperative examination, if suspected areas that could not be determined by radiological examination are present, these parenchymal areas should be resected to perform complete resection and to decrease relapse rates. (3) Surgical treatment of bronchiectasis should be done in childhood because the residual lung could still grow to fill the space left in the chest after resection.

Most of our patients have limited disease, and

complete resection was possible in 90% (n=97). Bilateral bronchiectasis does not present a contraindication to surgical therapy in selected patients [1, 4, and 5]. In our series, 27 patients (25.2%) had bilateral bronchiectasis. Results of these cases were similar to those of other reports [1, 5, and 11]. Complete resection of the lesion is important in these patients. In our series, patients with complete resection had better prognosis than those with incomplete resection. More than 90% of our patients had total relief or substantial improvement in their preoperative symptoms. These results are similar to other series [1, 5, and 11].

### Conclusion

Surgical treatment for bronchiectasis should be limited when localized disease and life-threatening symptoms are present. For a successful result, complete resection should be performed. In patients with bronchiectasis, pulmonary resection can be performed with acceptable morbidity and mortality rates.

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