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Current Surgical Therapy for Bronchiectasis

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Abstract. The ideal classification system for bronchiectasis continues to be debated. As an alternative to the present morphologic classification, a hemodynamic-based functional classification is proposed. This study examines the rationale for and outcome of surgery based on this classification in patients with unilateral or bilateral bronchiectasis. Between July 1987 and January 1997 the morphologic and hemodynamic features in 85 bronchiectatic patients were examined: 18 with bilateral bronchiectasis and 67 with unilateral disease. A policy of unilateral lung resection of the nonperfused bronchiectasis and preservation of the perfused type was adopted in all patients. The mean age at operation was 29.4 ± 9.7 years (range 6–55 years) with a mean follow-up period of 45.2 ± 21.0 months (range 2–120 months). Left-sided predominance of bronchiectasis was evident in this series both in frequency and severity. In those with unilateral disease, bronchiectasis was left-sided in 49 (73.1%) patients and right-sided in 18 (26.9%). The left lung was totally bronchiectatic in 11 (16.4%) patients and the right in 3 (4.4%). Moreover, among the patients with bilateral bronchiectasis, 14 of 18 (77.7%) patients had the left lung more severely involved. Based on the morphologic and hemodynamic features in the investigated patients, two types of bronchiectasis were recognized: a perfused type with intact pulmonary artery flow and a nonperfused type with absent pulmonary artery flow. Lobectomy was performed in 55 patients, basal segmentectomy and preservation of the apical segment in 16, and pneumonectomy in 14. There was no mortality in this series. Altogether 63 patients (74.1%) achieved excellent results, 19 (22.4%) scored good results, and 3 (3.5%) patients had not benefited from surgery at last follow-up. In the face of the general criticism of the traditional morphologic classification, the proposed classification not only predicts whether the involved lung will have a measure of respiratory function with regard to gas exchange but reflects the degree of severity of the disease process. Thus the question of which side to resect and which to preserve is defined more precisely. This classification was found to be logical, physiologically sound, and of proven benefit.

In developing countries bronchiectasis is still a major cause of morbidity and mortality [1]. As the disease progresses, physical activities become increasingly limited and patients fail to thrive. Eventually, patients suffer from social deprivation and intrinsic depression.

Medical management of bronchiectasis has alleviated the morbidity associated with it [2, 3]. However, with conservative treatment, mortality still ranges from 19% to 31% [2, 4]. With irreversible bronchiectasis, only resection of involved segments offers the possibility of cure. Based on our previously described classification of bronchiectasis [5], we reviewed our experience with the surgery of both unilateral and bilateral bronchiectasis in 85 patients. The proposed new classification and the outcome of surgery form the basis of this report.

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Methods

Patient Population

Between July 1987 and January 1997 a series of 85 patients with unilateral and bilateral bronchiectasis were operated on at King Khalid University Hospital, Riyadh, Saudi Arabia. Among them, 67 had unilateral disease and 18 bilateral disease. There were 53 males and 32 females. All patients were referred from chest physicians after being on medical treatment for many years. None was known to have α_1-antitrypsin deficiency or cystic fibrosis.

Eligibility criteria included a symptomatic patient who had failed medical treatment and continued to suffer from productive cough, hemoptysis, or failure to thrive. The diseased lung tissue must be localized according to computed tomography (CT) of the chest or bronchography. Moreover, the diseased lung must be nonperfused according to a ventillation-perfusion lung scan (V/Q). Screening the patient ruled out coexisting major medical problems. These criteria were adhered strictly to avoid any compromise of pulmonary functions or increase the risk postoperatively.

Initial diagnosis was made on clinical grounds including productive cough of long duration and hemoptysis. The evaluation process including radiologic and physiologic parameters. For precise localization of the disease, chest CT and bilateral bronchograms were done for all patients. To capture the various hemodynamic alterations in bronchiectasis, the findings of pulmonary angiography and thoracic aortography that were reported previously in 17 patients with bilateral bronchiectasis [5] are presented here in detail. Added to this are a few other hemodynamic features that were not described previously. Cardiorespiratory assessment included full pulmonary function tests, arterial blood gases, V/Q lung scan, and electrocardiography. Sputum was cultured routinely for pyogenic and tubercular bacili.

The mean age at operation was 29.4 ± 9.7 years (range 6–55 years). Of the 85 patients 72 (84.7%) were below the age of 40, and 18 (21.1%) were below the age of 20 years.

Operative Technique

Prior to surgery all patients had intensive chest physiotherapy and antibiotics based on the culture and sensitivity tests. With premedications, all patients received prophylactic antibiotics. Bronchoscopy was done routinely to rule out endobronchial lesions as a possible cause of bronchiectasis and to clear bronchial secretions. A left-sided double-lumen tube was used to provide isolated ventilation to either lung without the risk of spillover of secretions to either side. A thoracic epidural or an extrapleural catheter positioned in the paravertebral region during surgery were placed routinely. The modified muscle-sparing thoracotomy approach was adopted in all patients [6]. In view of the expanded bronchial circulation and the extensive adhesions these patients have, careful hemostasis was strictly adhered to in all patients. Excessive bronchial dissection was avoided, and peribronchial tissues were preserved. The bronchial stump was closed in all patients using a stapler. The various pulmonary resections performed included 55 lobectomies, 16 basal segmentectomies with preservation of the apical segment, and 14 pneumonectomies. Resected specimens were sent for histopathologic examination.

Postoperative management included intensive chest physiotherapy and continuous administration of bupivacaine through the epidural or the extrapleural catheter. When the patient was not cooperative with chest physiotherapy, a small intravenous canula was placed in the trachea percutaneously for instillation of normal saline. We found this technique to be effective in inducing an effective, productive cough.

The mean follow-up period was 45.2 ± 21.0 months (range 2–120 months). At last follow-up, the outcome of surgery was evaluated according to the following criteria:

Excellent—complete abscence of preoperative symptoms leading to surgery
Good—marked reduction in preoperative symptoms
No change—no reduction in preoperative symptoms

Statistical Analysis

All data were calculated using the mean and standard deviation. Fisher's exact test was used for statistical evaluation, and a p value of <0.05 was considered significant.

Results

Bilateral Bronchiectasis

There were 8 men and 10 women with a mean age of 28.6 ± 7 years (range 18–48 years). All patients had had a productive cough for 12.6 ± 6.1 years (range 2–23 years); 10 (55.6%) of 18 had hemoptysis as well. Severity of hemoptysis ranged from blood-tinged sputum to massive hemoptysis up to 300 ml of blood. The average duration of hemoptysis was 1.9 ± 4.5 years (range 6 months to 19 years).

On the basis of chest CT and bronchography, two types of bronchiectatic changes were recognized: cylindrical and cystic. Cylindrical changes were seen in 15 lungs, 13 on the right and 2 on the left. Cystic changes were found in 19 lungs, 15 on the left and 4 on the right. Pulmonary angiography showed absent pulmonary artery flow in 21 lungs and intact flow in 15. These findings were confirmed by the V/Q lung scan in all patients. When morphologic features of bronchiectasis were correlated with the angiographic findings, all lungs with cylindrical bronchiectatic changes were seen to be perfused (15 lungs) (Fig. 1), whereas those with cystic changes were nonperfused (n = 21) (Fig. 2). Thus in 15 patients bronchiectasis was perfused on one side and nonperfused on the other side (mixed bronchiectasis). The other three patients had bilateral nonperfused bronchiectasis. Thoracic aortography revealed retrograde filling of the pulmonary artery and dilatation of bronchial arteries in patients with nonperfused bronchiectasis (Fig. 3). These changes were noted to be more extensive among patients with posttuberculous bronchiectasis.

Intraoperatively, obliteration of pleural spaces with vascular adhesions and lung adherence to the chest wall, pericardium, and diaphragm were common findings. Operations performed included left pneumonectomy (m = 2), lower lobectomy (m = 11: 3 right and 8 left), lingulectomy with basal segmentectomy (m = 4), and middle lobectomy (m = 1). There was no mortality in this group of patients. Histologic examination of resected lungs (nonperfused bronchiectatic lungs) showed extensive cavitations beyond which lay compressed, fibrosed, and chronically inflamed alveolar tissues. The pulmonary capillary bed was not seen. Dilatation and proliferation of bronchial arteries and bronchopulmonary shunt formations were seen in most specimens.

Average duration of follow-up was 48.3 ± 21.3 months (range 13–120 months). Of 15 patients with mixed bronchiectasis, 8 achieved excellent results and 7 scored good results. Seven of ten patients with hemoptysis were cured during the follow-up period. On the other hand, the three patients with bilateral nonperfused bronchiectasis did not benefit from unilateral resection and continued to be symptomatic.

Unilateral Bronchiectasis

The 67 patients included 49 with left-sided disease and 18 with right lung involvement. There were 44 males and 23 females with an average age of 29.8 ± 11.9 (ISD) years (range 6–55 years). All patients had a chronic productive cough of 9.7 ± 7.9 years' duration (range 1–36 years). The average sputum quantity expectorated per day was 67.9 ± 81 ml (range 10–300 ml). Forty-nine patients also had hemoptysis, the severity of which ranged from frequent blood-tinged sputum to massive hemoptysis of up to 700 ml. The average duration of hemoptysis was 2.8 ± 4.8 years (range 6 months to 26 years). Preoperative bronchoscopy revealed bronchial obstruction in eight patients: endobronchial tumor in two, mucormycosis in one, and foreign bodies in five. The distribution of bronchiectasis in various lobes of each lung is shown in Table 1. Twelve patients had total lung involvement; the left lung was involved in 9 and the right lung in 3.

There was no mortality in this group, and the morbidity is shown in Table 2. The average duration of follow-up was 30.6 + 15.4 months (range 12–69 months). Altogether 55 patients had excellent results, and the remaining 12 scored good results.

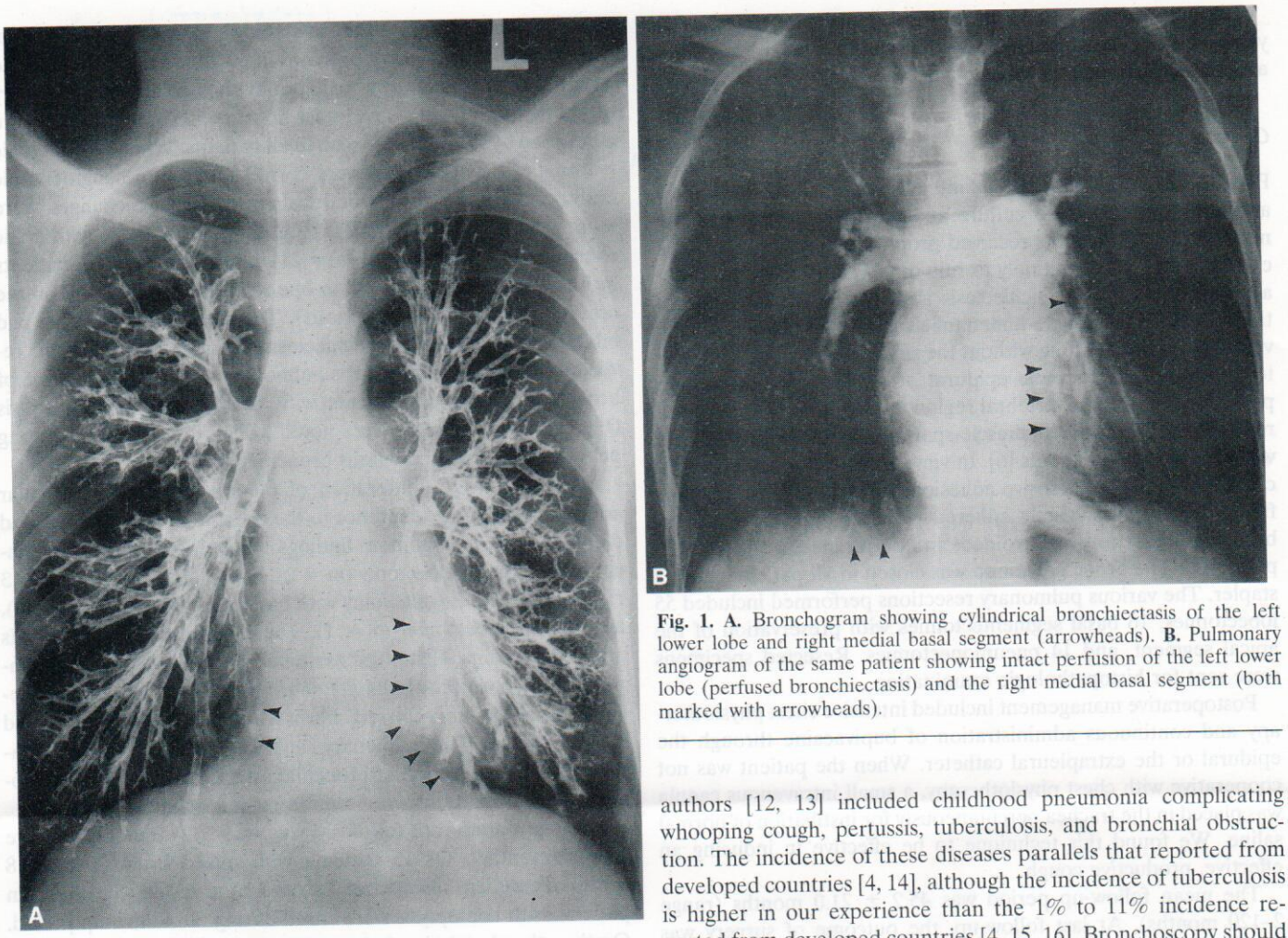


Fig. 1. A. Bronchogram showing cylindrical bronchiectasis of the left lower lobe and right medial basal segment (arrowheads). **B.** Pulmonary angiogram of the same patient showing intact perfusion of the left lower lobe (perfused bronchiectasis) and the right medial basal segment (both marked with arrowheads).

Discussion

In developing countries bronchiectasis is still a significant major cause of morbidity and mortality [1]. As the disease progresses, physical activities become increasingly limited, patients fail to thrive, and ultimately they suffer from social deprivation and intrinsic depression. Although antibiotics and postural drainage are widely applied in the medical management of the disease, resection of the involved lung remains the only treatment modality that can offer a potential cure. The disease pattern, hemodynamic alterations in bronchiectasis, proposed new classification, and outcome of surgery for both unilateral and bilateral bronchiectasis are discussed.

Disease Pattern

There is a preponderance of male patients in this series (male/female 52:33), which is at variance with series reported from Western countries where most of the patients are female [7–9]. Of the 85 patients, 72 were below 40 years of age, and 13 were below 20 years of age. A similar incidence was reported by Crutcher and Pellegrino [10], but it differs from that of Wong-You-Cheong et al. [11], where 22 of 26 patients were below 40 years of age.

The etiology of bronchiectasis as previously reported by the authors [12, 13] included childhood pneumonia complicating whooping cough, pertussis, tuberculosis, and bronchial obstruction. The incidence of these diseases parallels that reported from developed countries [4, 14], although the incidence of tuberculosis is higher in our experience than the 1% to 11% incidence reported from developed countries [4, 15, 16]. Bronchoscopy should be done in all patients considered for surgery to rule out endobronchial lesions, which could be the cause of bronchiectasis as demonstrated in eight patients in this series. No case of α_1-antitrypsin deficiency or cystic fibrosis was encountered in this series.

Sputum culture results for 53 bronchiectatic patients, which were reported previously by the authors [5, 12], showed that the culture grew normal flora in 33, *Haemophilus influenzae* in 13, and *Pseudomonas aeruginosa* in 5. Two patients grew *Staphylococcus aureus.* Sputum was negative for acid-fast bacilli in all patients.

The average duration of productive cough was 9.7 years, and that of hemoptysis was 2.8 years. The difference in the average duration of these two most common symptoms is likely due to the fact it takes a few years for the bronchial circulation to enlarge [17]. The hemodynamic changes seen in this series were noted to be more extensive among patients with posttuberculous bronchiectasis—hence the increased frequency and severity of hemoptysis among this group of patients.

Left-sided Predominance of Bronchiectasis

In this series, the major focus of the disease was in the lower lobes (Table 1), consistent with the known distribution of bronchiectasis. However, it was evident that bronchiectasis affected the left

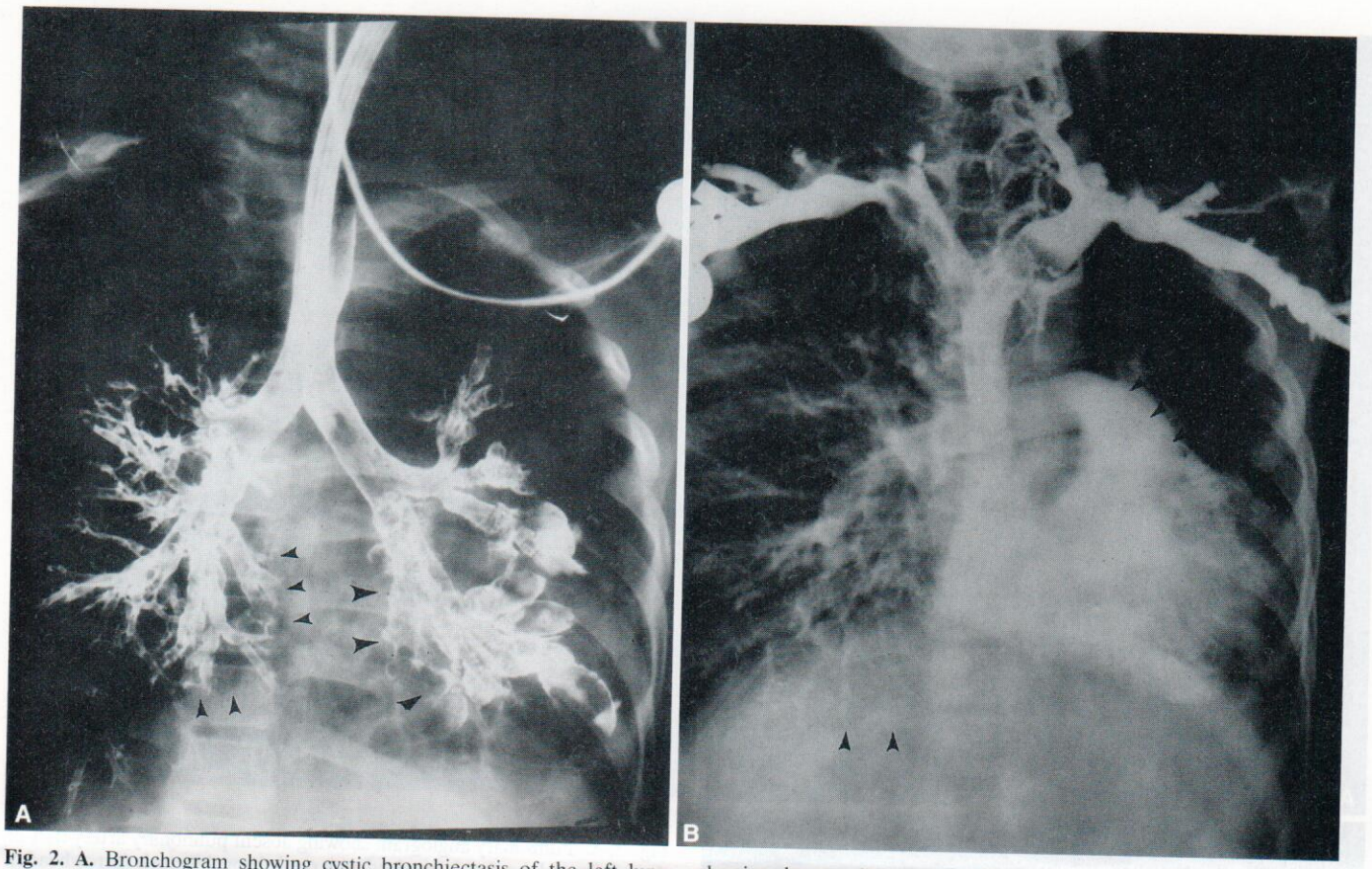


Fig. 2. A. Bronchogram showing cystic bronchiectasis of the left lung (large arrowheads) and cylindrical bronchiectasis of the right medial basal segment (small arrowheads). **B.** Pulmonary angiogram of the same patient showing absent pulmonary artery flow to the left lung (nonperfused bronchiectasis; arrowheads in lower left) and intact perfusion of the right medial basal segment (perfused bronchiectasis; arrowheads in middle right).

lung more frequently and severely than the right. With unilateral disease, bronchiectasis was left-sided in 49 (73.1%) patients and right-sided in 18 (26.9%). The left lower lobe and lingula were involved in 39 (58.2%) patients and the right lower and middle lobes in 11 (16.4%). Moreover, the entire left lung was involved in 11 (16.4%) patients and the right in 3 (4.4%). Furthermore, in patients with bilateral bronchiectasis, 14 of 18 (77.7%) patients had nonperfused bronchiectasis of the left lower lobe, and 3 (16.6%) of the right lower lobe. These findings suggest that the left lung is more vulnerable to bronchiectasis than the right, a clinical observation that could be explained on the basis of the anatomic peculiarities of the left main bronchus. The latter, when compared to the right bronchus, has a longer mediastinal course, a narrower diameter, and limited peribronchial space as it passes through the subaortic tunnel (Fig. 4). These features make the left bronchus more vulnerable to obstruction than the right [18, 19].

Hemodynamic Alterations in Bronchiectasis

The word bronchiectasis as currently used is a descriptive term that fails to indicates which type of the disease may have a measure of respiratory function with regard to gas exchange. Dilatation and hypertrophy of bronchial circulation and bronchopulmonary shunt formation in bronchiectasis were described by Leibow et al. [20] in 1949 and Pump [21] in 1972. Darke and Lewtas [22] recognized two patterns of bronchopulmonary shunt: those with forward flow and those with reverse flow. These hemodynamic alterations were generalized descriptive findings and were not linked to a particular type of bronchiectasis. A previous study by one of the authors [5] showed that the pattern of pulmonary perfusion in patients with bronchiectasis was not uniform, and hemodynamic alterations specific to each type of bronchiectasis were demonstrated. Thus when the morphologic features of bronchiectasis were correlated with angiographic findings, two types of bronchiectasis were recognized: nonperfused and perfused. All lungs with cylindrical bronchiectatic changes were found to be perfused (Fig. 1), whereas those with cystic bronchiectatic changes were nonperfused (Fig. 2). This discrepancy in the pattern of pulmonary perfusion reflected the difference in the severity of the disease process. An absent pulmonary artery flow indicated end-stage disease. This observation was supported by histologic examination of the resected lungs. On the other hand, intact pulmonary artery flow indicated a lesser inflammatory process.

With nonperfused bronchiectasis [5], the involved lungs showed absent pulmonary artery flow, retrograde filling of the pulmonary artery via the systemic circulation, and cystic bronchiectatic changes (Fig. 3). As a result of the pulmonary capillary bed destruction in these lungs, pulmonary capillary resistance increased; thus the shunted blood was forced to travel through the pulmonary artery toward the hilum (Fig. 3A,B). This phenomenon was described previously as reversal of pulmonary artery flow

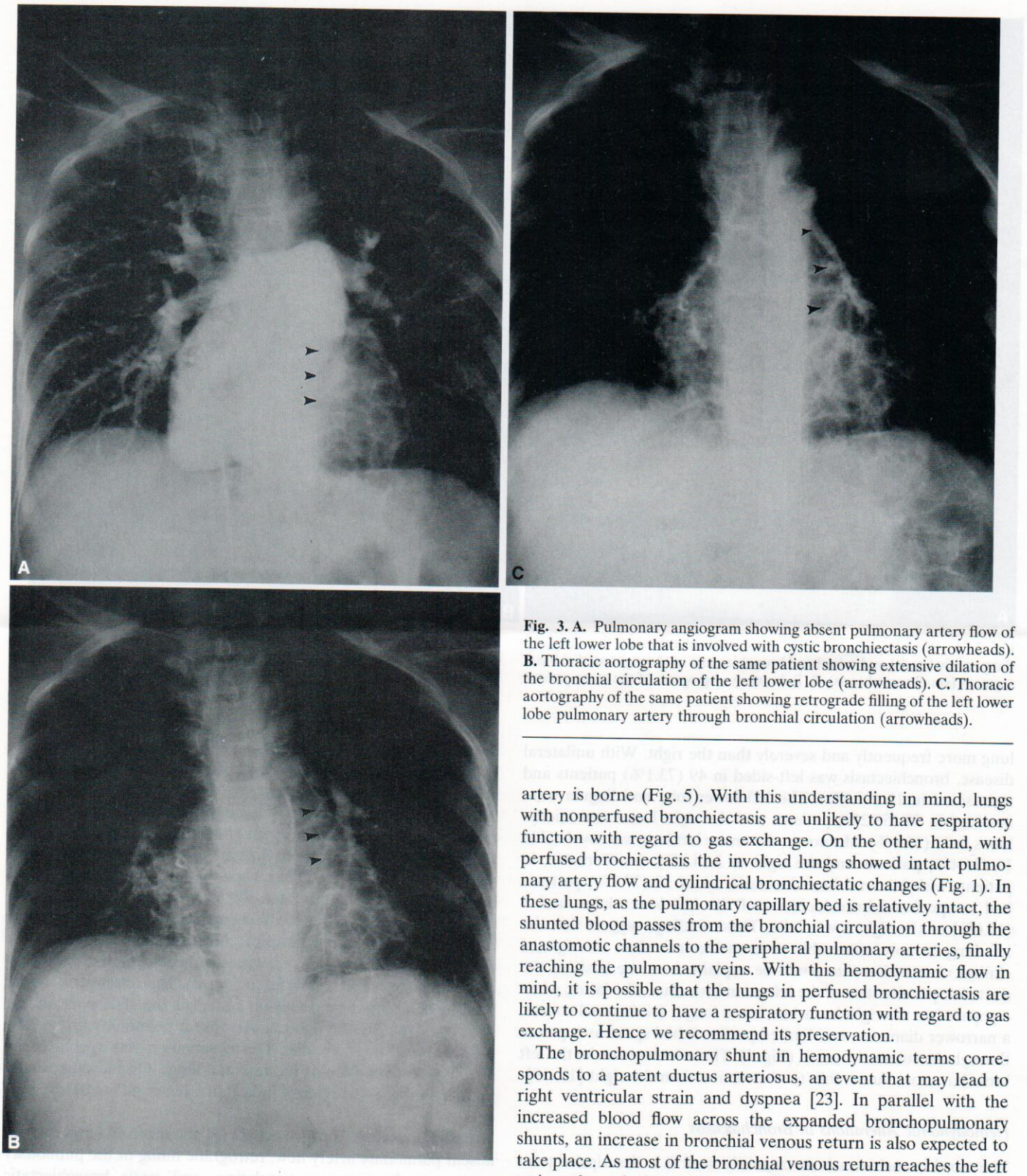


Fig. 3. A. Pulmonary angiogram showing absent pulmonary artery flow of the left lower lobe that is involved with cystic bronchiectasis (arrowheads). **B.** Thoracic aortography of the same patient showing extensive dilation of the bronchial circulation of the left lower lobe (arrowheads). **C.** Thoracic aortography of the same patient showing retrograde filling of the left lower lobe pulmonary artery through bronchial circulation (arrowheads).

[22]. Consequently, the contrast material injected during pulmonary angiography cannot sufficiently penetrate the pulmonary artery because of the hemodynamic block created by the opposing stream of systemic inflow. Thus a false impression of an empty artery is borne (Fig. 5). With this understanding in mind, lungs with nonperfused bronchiectasis are unlikely to have respiratory function with regard to gas exchange. On the other hand, with perfused brochiectasis the involved lungs showed intact pulmonary artery flow and cylindrical bronchiectatic changes (Fig. 1). In these lungs, as the pulmonary capillary bed is relatively intact, the shunted blood passes from the bronchial circulation through the anastomotic channels to the peripheral pulmonary arteries, finally reaching the pulmonary veins. With this hemodynamic flow in mind, it is possible that the lungs in perfused bronchiectasis are likely to continue to have a respiratory function with regard to gas exchange. Hence we recommend its preservation.

The bronchopulmonary shunt in hemodynamic terms corresponds to a patent ductus arteriosus, an event that may lead to right ventricular strain and dyspnea [23]. In parallel with the increased blood flow across the expanded bronchopulmonary shunts, an increase in bronchial venous return is also expected to take place. As most of the bronchial venous return reaches the left atrium through the pulmonary veins, it is bound to increase left ventricular output and consequently may cause left ventricular hypertrophy. To this effect, unilateral and more likely bilateral bronchiectasis with extensive bronchopulmonary shunt, may cause not only right ventricular strain but also left ventricular hypertrophy as well. Moreover, the thin-walled bronchial vessels may

Table 1. Distribution of unilateral bronchiectasis (n = 67).

Site	Number of patients
Right lung	18
Upper lobe	4
Middle lobe + lower lobe	5
Lower lobe	3
Basal segments	3
Whole lung	3
Left lung	49
Upper lobe	1
Lingula + lower lobe	13
Lower lobe	18
Basal segments	8
Whole lung	9

Table 2. Complications following surgery for unilateral bronchiectasis.

Complication	No.	%
Postoperative bleeding	4	6
Prolonged air leak	2	3
Atrial fibrillation	2	3
Empyema	1	1.5
Infected seroma space	1	1.5
Lobar pneumonia	1	1.5
Total	11	16.5

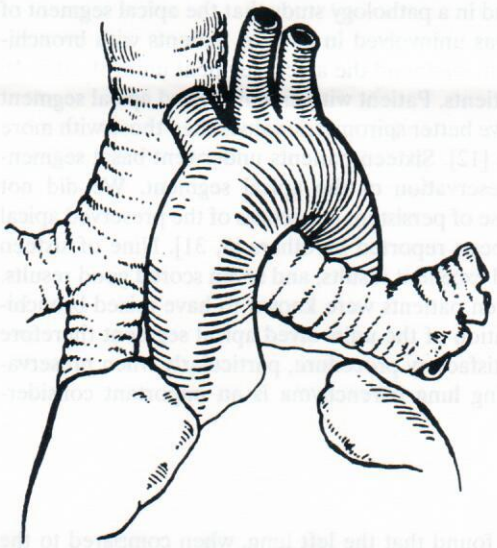


Fig. 4. Anatomy of the left main bronchus as it passes through the subaortic tunnel.

rupture, causing hemoptysis during the course of the disease [24]. In previous reports by the authors [5, 12], 40 of 57 patients who had hemoptysis were known to have nonperfused bronchiectasis. It was noted from this study that patients with posttuberculous bronchiectasis developed more extensive bronchial circulation than other bronchiectatic patients with a different etiology. This might explain why most of these patients developed hemoptysis more frequently and more severely than others.

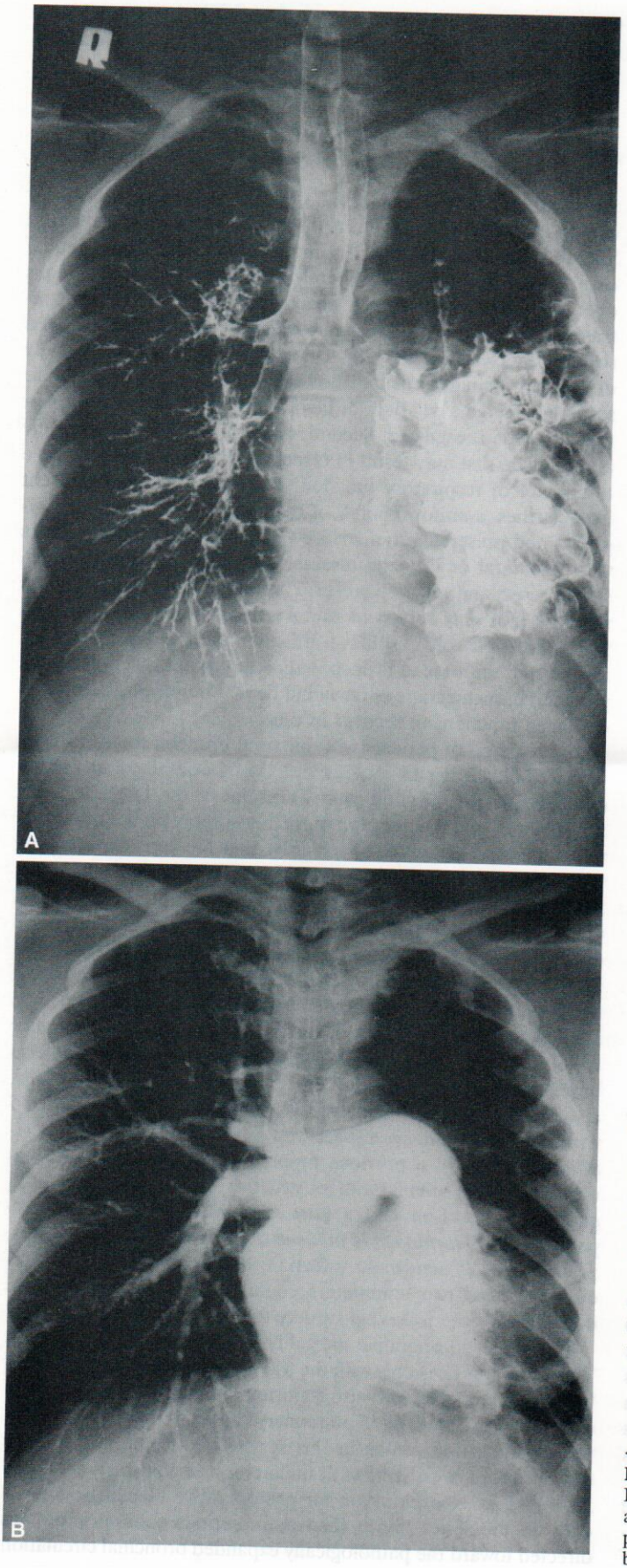
In view of the general criticism of the traditional morphologic classification of bronchiectasis being inadequate [1, 25], the proposed functional classification not only reflects the degree of severity of the disease process but predicts which type may have a measure of respiratory function. Thus the question of which side to resect and which to preserve is defined more precisely.

Rationale and Outcome of Surgery

Although antibiotics and postural drainage are widely applied for conservative management of the disease, resection of the involved lung remains the only treatment modality that can offer potential cure. When dealing with bilateral bonchiectasis, most surgeons operate on the more severely affected side first [26–28]. In contrast to this approach, Kergin elected to operate on the less severely affected side first [29]. This sharp swing in the philosophy of surgical management had two pitfalls. First, the term "more severely affected side" did not involve precise descriptive criteria that could be recognized. Second, operating on the less severely affected side first may result in resection of lung tissues that have a measure of respiratory function. To avoid these management irregularities, a uniform policy of resecting nonperfused bronchiectasis and preserving the perfused type was adopted in patients with unilateral or bilateral disease. Thus the question of which side to resect and which to preserve is defined more precisely. This resection not only served to remove the major source of sepsis with its possible role in spillover infection to other lung segments, it corrected the state of bronchopulmonary shunt. As a result, the perfused bronchiectatic parts would be in a better position for its deranged functions to recover in time.

In the group of patients with bilateral bronchiectasis, 18 were operated on. Of the 15 patients with mixed disease, all had either excellent (n = 8) or good (n = 7) results. These 15 patients felt much better, and the question of further surgery on the other side was not raised. These results suggest that the contralateral lung with perfused bronchiectasis recovered its function with time. Seven of ten patients with hemoptysis became free of symptoms. On the other hand, the three patients with bilateral nonperfused disease did not benefit from unilateral resection alone and continued to have symptoms. This result suggests that unilateral resection in patients with bilateral nonperfused bronchiectasis is inadequate. Instead, staged bilateral resections are likely to offer a more favorable outcome. A group of 67 patients with unilateral bronchiectasis, were operated on; 55 (85%) had excellent results, and 12 (17.9%) scored good results. These 12 patients included 5 with obstructive airway disease and 3 with *Pseudomonas aeruginosa* infection. In a previous report by the authors [12] it was observed that patients with obstructive airway disease and *P. auruginosa* infection had a poor cure rate. Whereas 8 of 13 patients with *Haemophilus influenzae* achieved excellent results, patients with *P. aeruginosa* infection scored good results. Consequently, these two parameters could have predictive value in determining cure following surgery for bronchiectasis.

There was no operative mortality in this series of 85 patients. This compares favorably with the 8% operative mortality reported by Annest et al. [2], who also reported late deaths in another 8% of patients, attributable to pulmonary causes. We did not encounter any such late deaths in this series. The significant hospital complications in patients with unilateral bronchiectasis are listed in (Table 2). Reexploration for postoperative bleeding occurred early in the series. Since then more serious consideration was directed toward the pathologically expanded bronchial circulation



in these patients; consequently, more careful hemostasis was secured.

Preservation of chest wall muscle integrity through adoption of the muscle-sparing thoracotomy was not only essential for enabling these patients to generate an effective cough, it was vital for reducing postthoracotomy pain [6]. None of our patients required tracheostomy, but in 10 patients a cough catheter was inserted for normal saline instillation. Insertion of a short venous cannula into the trachea is simple; and more important, it generates an effective productive cough once normal saline is instilled. Postthoracotomy pain control was achieved through continuous administration of bupivacaine via epidural or an extrapleural catheter placed in the paravertebral region during surgery. Supplementary oral ketoprofen was given as required. Antibiotics, usually a cephalosporin were given intravenously for 7 days. This coverage was expanded when new pulmonary infection was recognized.

During follow-up progressive subjective and functional improvement was reported by most patients. This achievement generally is due to resection of the source of pulmonary sepsis and elimination of the bronchopulmonary shunt. Thus planned surgery for these patients helps to bring about termination of the course of the disease and leaves the remaining lung tissues to recover their deranged function over time.

Preservation of Apical Segment of Lower Lobe

Whitwell [30] fond in a pathology study that the apical segment of the lower lobe was uninvolved in 68% of patients with bronchiectasis. In contrast, we found the apical segment uninvolved in 16 (18.8%) of 85 patients. Patient with an uninvolved apical segment were found to have better spirometric values than those with more extensive disease [12]. Sixteen patients underwent basal segmentectomy with preservation of the apical segment. We did not encounter any case of persistent atelectasis of the preserved apical segment as has been reported by others [8, 31]. Nine of sixteen patients have had excellent results, and seven scored good results. Five of these seven patients were known to have mixed bronchiectasis. Conservation of the uninvolved apical segment therefore seems to be a satisfactory procedure, particularly when preservation of functioning lung parenchyma is an important consideration.

Conclusions

In this series we found that the left lung, when compared to the right, is more vulnerable to the bronchiectatic process both in frequency and severity. Anatomic features of the left main bronchus makes it more prone to obstruction than the right.

In view of the general criticism that the traditional morphologic classification of bronchiectasis is inadequate [1, 25], a hemodynamic-based functional classification is proposed. Accordingly, two types of bronchiectasis were recognized: perfused and non-

Fig. 5. A. Bronchogram showing cystic bronchiectasis of the left lung. **B.** Pulmonary angiogram of the same patient giving a false impression of the absent left pulmonary artery. Injected contrast material cannot sufficiently penetrate the left pulmonary artery because of a hemodynamic block caused by retrograde filling of the pulmonary artery through the systemic circulation.

perfused. This classification not only predicts which type may have a measure of respiratory function, it reflects the degree of severity of the disease process. Thus the question of which side to resect and which to preserve is defined more precisely. This classification was found to be logical, physiologically sound, and of proven benefit.

Careful interpretation of chest CT or bronchography and V/Q lung scans prior to surgery is mandatory, not only to classify the disease but to avoid recurrent symptoms postoperatively because of residual disease. Resection is restricted to nonperfused bronchiectasis in patients with unilateral or bilateral disease. On the other hand, lung with perfused bronchiectasis is preserved. Thus a planned surgery for these patients may help to bring about termination of the course of the disease and leave the remaining lung tissues to recover their deranged function as time goes on.

Résumé

Objectifs: La classification idéale des bronchiectasies continue d'être un sujet de débat. Nous proposons une classification fonctionnelle, basée sur l'hémodynamique, à la place de la classification actuelle, morphologique. De même, nous examinons, en tenant compte de cette classification, le rationnel et l'évolution de la chirurgie chez des patients ayant une bronchiectasie uni- ou bilatérale. Méthodes: Entre juillet 1987 et janvier 1997, les caractéristiques morphologiques et hémodynamiques de la bronchiectasie ont été analysés chez 85 patients. Parmi ceux-ci, 18 patients avaient une forme bilatérale et 67 avaient une forme unilatérale. Une résection pulmonaire unilatérale a été pratiquée pour toute bronchiectasie non perfusée. L'âge moyen au moment de l'opération a été de 29,4 +/− 9,7 ans (extrêmes: 6 à 55 ans) avec une période de suivie de 45,2 +/− 21 mois (extrêmes, 2 à 120 mois). Résultats: En termes de fréquence et de sévérité, on a noté une nette prédominance du côté gauche. En ce qui concerne la maladie unilatérale, la bronchiectasie était à gauche chez 49 (73,1%) patients et à droite chez 18 (26,9%). Le poumon gauche était totalement bronchiectasique chez 11 (16,4%) patients, alors que cet état n'a été retrouvé que chez 3 (4,4%) patients bronchiectasiques à droite. De plus, chez les patients ayant une forme bilatérale, le poumon gauche a été plus sévèrement atteint chez 14 des 18 (77,7%) patients. Se basant sur les caractéristiques morphologiques et hémodynamiques, on a identifié deux types de patients: un type avec perfusion adéquate, avec conservation du débit dans l'artère pulmonaire et un type non perfusé, pour lequel le débit n'était pas conservé. On a réalisé une lobectomie chez 55 patients, une segmentectomie basale avec conservation du segment apical chez 16 et une pneumonectomie chez 14. Il n'y a eu aucune mortalité dans cette série. Les résultats étaient excellents chez 63 patients (74,1%), bons chez 19 (22,4%) alors que 3 (3,5%) patients, au moment du pointage des résultats, n'en ont tiré aucun bénéfice. Conclusions: En raison des critiques actuellement formulés à l'égard de la classification traditionnelle, morphologique, la classification que nous proposons non seulement prédit si l'on peut espérer récupérer la fonction du poumon intéressé en ce qui concerne l'hématose, mais aussi, elle indique le degré de sévérité de la maladie. La question de savoir quel côté réséquer ou préserver est définie avec plus de précision. On a trouvé que cette classification était logique, bien fondée physiologiquement, et qu'elle apporte des bénéfices aux patients.

Resumen

Hoy, todavía, se discute sobre cual es el sistema ideal de clasificación de las bronquiectasias. Como alternativa a la actual clasificación morfológica se propone una funcional basada en la hemodinámica. Basándonos en esta clasificación se valora en pacientes con bronquiectasias uni o bilaterales, cual es la cirugía más racional así como sus resultados. Métodos: Entre julio de 1987 y enero de 1997, se estudiaron las características morfológicas y hemodinámicas de 85 pacientes bronquiectásicos; de ellos, 18 padecían bronquiectasias bilaterales y 67 unilaterales. Nuestra actitud quirúrgica, en todos los pacientes, fue la resección pulmonar unilateral de las bronquiectasias no perfundidas, conservando las perfundidas. La edad en el momento de la operación fue de 29,4 ± 9,7 años (rango 6 a 55 años) y el seguimiento medio fue de 45,2 ± 21 meses (rango 2 a 120 meses). Resultados: Las bronquiectasias fueron más frecuentes y más graves en el lado izquierdo. Cuando la afección era unilateral se localizó en el pulmón izquierdo en 49 (73,1%) pacientes y en el derecho sólo en 18 (26,9%) casos. El pulmón izquierdo presentaba bronquiectasias totales en 11 (16,4%) casos, mientras que en el derecho sólo las observamos en 3 (4,4%) pacientes. Incluso, en 14 de 18 (77,7%) pacientes con bronquiectasias bilaterales, el pulmón izquierdo presentaba lesiones bronquiectásicas más graves. Basados en las características morfológicas y hemodinámicas se diferenciaron, dentro de los pacientes estudiados, dos tipos de bronquiectasias: Un tipo perfundido, con flujo arterial pulmonar intacto y un tipo no perfundido con total ausencia de flujo arterial pulmonar. Se efectuaron lobectomías en 55 pacientes, segmentectomía basal con conservación del segmento apical en 16 y pneumectomía en 14 casos. No se registró mortalidad alguna. En 63 pacientes (74,1%) se obtuvieron excelentes resultados, en 19 (22,4%) buenos y sólo 3 pacientes no se beneficiaron de la cirugía. Conclusión: En contra de la clasificación morfológica tradicional, la clasificación funcional propuesta, permite no sólo pronosticar sí el pulmón afectado va a desempeñar alguna función respiratoria, por lo que al recambio gaseoso se refiere sino que también, refleja el grado de gravedad del proceso bronquiectásico. Se define con precisión qué es lo que debe de resecarse y que segmentos han de preservarse. Encontramos que esta clasificación es lógica, con fundamento fisiológico y de probada utilidad.

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