Comparison of respiratory function in patients with bronchiectasis or allergic bronchopulmonary aspergillosis

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Introduction

nchiectasis is a rare disease involving infection, inflammation and permanent thickening and tation of the bronchi and bronchioles.

current microbial infection and inflammatory secretions cause obstruction and damage of the way, infiltration by neutrophils and T lymphocytes and enhanced generation of inflammatory diators.

rgic bronchopulmonary aspergillosis (ABPA) is a specific form of bronchiectasis caused by an mune reaction to the mold *Aspergillus fumigatus* in patients with asthma.

PA is characterised by wheezing, mucus production, fever, peripheral blood eosinophilia, high IgE els and pulmonary infiltrates.

ABPA, the bronchiectasis tends to involve central rather than distal airways and a subset of patients go on to develop end-stage fibrotic lung disease.

ients with bronchiectasis have impaired spirometry due to airflow obstruction, but one study ggests that carbon monoxide diffusing capacity (D_{LCO}) may be normal.

wever, it is not known whether the transfer coefficient (K_{CO} = D_{LCO}/alveolar volume) is normal in nchiectasis or if different factors influence K_{CO} in bronchiectasis compared with ABPA.

hypothesised that the factors influencing gas transfer may differ in ABPA compared with nchiectasis due to the different location of the disease within the airways.

Aim

compare the detailed respiratory function data, including K_{CO} and D_{LCO} in carefully characterised ents with bronchiectasis or ABPA

Methods

y design

was a retrospective review of the patient records of a cohort of outpatients with stable ABPA (n = 7) nchiectasis that was not due to allergic bronchopulmonary aspergillosis (n = 30).

tients had undergone at least one detailed respiratory function test in the previous twenty years and managed by a single respiratory physician.

ion criteria included a history of bronchiectasis as diagnosed by clinical examination and high tion CT scan or chest X-ray, or a history of ABPA as defined by clinical data, elevated serum IgE, esolution CT scan and positive skin prick testing.

was excluded from analysis if the patient had severe anaemia, polycythaemia, or a history of nary vascular disease or interstitial lung disease.

and FVC were measured by spirometry. TLC, VC and RV were measured by the plethysmograph ique or, if that was not feasible, by the helium dilution technique.

tandard single breath technique was used to measure D_{LCO}, V_A and K_{CO} = D_{LCO}/V_A. D_{LCO} and K_{CO} expressed as % predicted values and normal limits for K_{CO} were defined as predicted ± 1 SD.

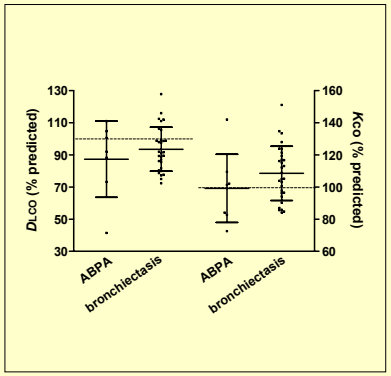
ther data recorded for each patient included gender, age, BMI, duration of disease, atopic status, ng status and pack years smoked.

Results

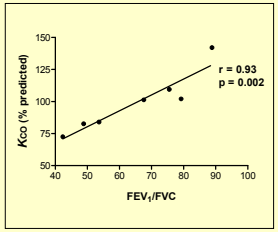
Characteristics of Patients With ABPA or Bronchiectasis

	ABPA	Bronchiectasis	Significance
Number	7	30	
Females (%)	4 (57.1)	26 (86.7)	NS
Age (SD)	50.4 (18.3)	57.9 (12.9)	NS
BMI (SD)	24.4 (5.5)	24.7 (4.7)	NS
Atopic (%)	7 (100)	8 (26.7)	p = 0.001
Non-smokers (%)	7 (100)	20 (66.7)	NS
Ex-smokers (%)	0	9 (30)	NS
Smokers (%)	0	1 (3.3)	NS
Duration of Disease (years, SD)	27.4 (22.4)	20.6 (18.3)	NS
FEV_1 (mean % pred, SD)	81.1 (26.3)	86.1 (17.2)	NS
FEV_1/FVC (mean, SD)	65.2 (17.3)	70.6 (7.6)	NS
RV (% pred, SD)	132.2 (58.4)	126.6 (32.5)	NS

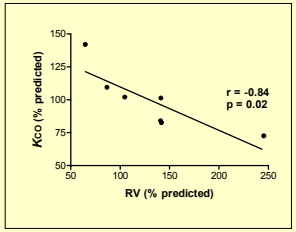
D_{LCO} and K_{CO} in ABPA and Bronchiectasis



Correlation between K_{CO} and FEV_1/FVC in ABPA patients



Correlation between K_{CO} and RV in ABPA patients



Summary

- D_{LCO} was reduced in both ABPA and bronchiectasis, whereas K_{CO} was significantly elevated only in bronchiectasis.
- K_{CO} was above normal in 20 (66.7%) bronchiectasis patients and in 4 (57.1%) ABPA patients
- There was a significant positive correlation between % predicted K_{CO} and FEV_1/FVC in ABPA but not in bronchiectasis.
- There was a significant negative correlation between % predicted K_{CO} and % predicted RV in ABPA but not in bronchiectasis.
- Among the bronchiectasis patients, % predicted K_{CO} did not differ significantly between non-smokers and ex-smokers.

Conclusions

- The degree of airway obstruction is not significantly different be ABPA and bronchiectasis patients.
- However, the reduction in gas transfer is strongly correlated wit increased airway obstruction in ABPA, but not in bronchiectasis
- Similarly, increased air trapping in ABPA is associated with a reduction in gas transfer.
- These findings support the concept that in bronchiectasis, the disease is localized to the peripheral airways, resulting in reduc alveolar volumes and elevated K_{CO}.
- In ABPA, however, obstruction of the central airways appears t major factor contributing to reduced gas transfer.