ORIGINAL ARTICLE

BRONCHIAL AND BRONCHOALVEOLAR LAVAGE IN DIAGNOSIS OF SUBACUTE AND CHRONIC PNEUMONIA IN BRAZILIAN CHILDREN

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Abstract

Background: To describe the results of bronchoalveolar lavage (BAL) and bronchial lavage (BL) in the etiological diagnosis of chronic pneumonia in children in a pediatric tertiary center in Rio de Janeiro, Brazil.
Methods: Observational descriptive study consisting of children with chronic pneumonia. Fiberoptic bronchoscopy was done to collect BAL followed by BL. The collected materials were analyzed for cellularity and pathology, cultured for bacteria, fungi, viruses and M. tuberculosis. Material cultured for Gram-positive cocci (S. pneumoniae, S. pyogenes and Staphylococcus aureus) was positive if > 103 cfu/mL-1.
Results: Twenty two children were included in the study. Male: Female ratio was 14:8 with mean age of 3.5 years. In 7 (31.8%) patients, etiological diagnosis was determined by BAL and 4 (18.1%) by BL. Bacteria were isolated in 4 (18.1%) BAL and in 3 (13.6%) BL.
Conclusion: BAL contributed most frequently for the etiological diagnosis of chronic pneumonia than BL. Both methods proved to be safe.

Introduction

There is no consensus with respect to the understanding of the terms recurrent pneumonia and chronic pneumonia. In general, chronic pneumonia is defined as a disease of slow progress followed by respiratory symptoms and radiological changes that remain for at least one month (1). Pediatric bronchoscopy is frequently indicated in these cases aiming at to elucidate the diagnosis (1,2). Most of the centers that perform pediatric bronchoscopy in Brazil use diagnostic bronchoscopy with bronchial lavage (BL) to collect material for microbiological examination because bronchoalveolar lavage (BAL) requires more technical training and expertise in analysis of the material. This study aimed at to compare the usefulness of BL and BAL in chronic pneumonia in children.

Material and Methods

This is an observational descriptive study carried out at a reference center for pediatric pulmonology in Rio de Janeiro, Brazil. Patients aging from 1 to 12 years 11 months, who were referred for bronchoscopy with chronic pneumonia (1), from March to December 2004, were prospectively studied. Those who were using antimicrobial drugs for up to 3 days or more preceding the examination date, had any contraindication for bronchoscopy (2), had any malformation of the tracheobronchial tree and/or presence of a foreign body were excluded. Also those patients with insufficient BAL sample (< 5 ml) were excluded from the study.

BAL was performed according Midulla et al first (3) followed by BL. Both samples were sent to the hematology, bacteriology, virology, mycology and pathology laboratories. Total and specific cellularity counts were performed, as well as quantitative

culture for pyogenic germs, culture and search for Mycobacterium tuberculosis and fungi, direct examinations for respiratory syncytial virus, influenza A and B, parainfluenza 1, 2 and 3 and adenovirus. Sudan and Pearl stains were also performed.

This project was approved by the IFF Research Ethical Committee and child's caregiver signed a free and informed consent form.

Table 1: Isolated bacteria and Colony-forming Units (CFU) in Bronchoalveolar lavage (BAL) culture and bronchial lavage (BL) of the patients who had positive diagnosis (>10,000 cfu.mL-1).

Patient	Isolated bacteria	CFU	BAL/ BL
3	Alpha-hemolytic Streptococcus	>100,000	BAL
4	Klebsiella pneumonia Strenophomonas maltophilla	30,000 30,000	BAL
11	Streptococcus pneumoniae Gram-negative Diplococcus Alpha-hemolytic Streptococcus	30,000	BAL BL BL
13	Gram-negative Diplococcus	80,000	BAL
1	Gram-negative Diplococcus Alpha-hemolytic Streptococcus		BL
19	Staphylococcos aureus		BL

Results

Of the 38 patients who had been initially selected, 10 were excluded because of loss of material, 1 because had a tracheoesophageal fistula, 3 because of unsatisfactory BAL samples and 2 because BAL collection could not be obtained.

Of the 22 patients included, 14 were males; the mean age was 3.5 years. Fourteen patients (77%) had comorbidities (most common were asthma and neuropathy). One patient had a complication during the examination - cardiac arrhythmia (extrasystoles), which was reversed by suspending the anesthetic drug and by supplying oxygen ventilation.

Toxocara genus was found in the BAL of one patient who had an initial diagnosis of asthma of difficult resolution with persistent pulmonary infiltrates, eosinophilia of 70% and elevated IgE (>2000). Cellularity analysis revealed a significant increase of segmented neutrophils, 80% in BAL and 78% in BL.

Hemosiderophages (macrophages containing hemosiderin) and positive Pearl stain occurred in one patient. BAL cellularity in this case had increased segmented neutrophils, accounting for 73% of the total cellularity. The aspect of BAL coloration had a pinkish tone right after the first instillation of fluid. The endoscopic report of this patient was normal and the X-Ray revealed the presence of an infiltrate in the middle lobe.

Increased cellularity was observed in 9 of the 22 patients. The cells involved were segmented neutrophils in 4 patients, eosinophils and segmented neutrophils in 1 patient, segmented neutrophils and lymphocytes in 1 patient, lymphocytes in 2 patients and eosinophils in 1 patient.

The etiological diagnosis was established in 7 out of 22 patients with BAL and in 4 out of 22 with BL. The bacteria found were Gram-positive cocci (S. pneumoniae, S. pyogenes and Staphylococcus aureus). Not other microorganisms were found. (Table 1)

Discussion

BAL contributed more often for the etiological diagnosis of chronic pneumonia when compared with BL, in our limited sample of 22 patients. This sample, although reduced, is similar to other series found in the literature (4,5). Studies on the diagnostic contribution of BAL in chronic pulmonary infiltrates present positive results in 17 to 47% of the patients, similar to the range found in our sample. (5,6) Both BAL and BL are relatively safe.

The exclusion of a considerable number of patients, most of the time due to loss of the material sent for analysis, indicates the need for a good supporting infrastructure for this diagnostic method. Furthermore, there is also a lack of trained professionals to analyze the material, mainly to evaluate cellularity. Many factors interfere in the sensitivity of BAL, such as the amount of liquid instilled, the aspiration pressure, the interval between collection and analysis, and the laboratory techniques performed, all of them directly reflecting on the results. As long as the collection protocol is followed, the quality of the material collected in children is comparable to that collected in adults (3).

In our sample, male patients without a visible cause prevailed, as found in other studies (6). In respect to age, 68.2% were up to 3 years old, compatible with the period in which children are more susceptible to respiratory infections. Furthermore, infants and young children are more likely to develop chronic respiratory problems after infections because of the physiological characteristics of their airways (1). More than two thirds of the cases were of asthma and neuropathy since these diseases are usually associated to a more affected respiratory tract than that of the general population (1,2). In our study only one patient had oxygen desaturation this complication (4.5%), in a similar frequency reported in the literature (6-10).

There are no reports in the pediatric literature of reference values for BL cellularity. Studies on BL usually report that the total cellularity and the percentage of macrophages are lower in BL, however there is an increase of neutrophils (11). Important differences were not observed in the results of the cultures for pyogenic germs in BL and BAL. Therefore, we obtained

a positive result for bacteria in BL and BAL in only one patient.

Conclusion

BAL contributed most frequently for the etiological diagnosis of chronic pneumonia than BL. Both methods proved to be safe.

Conflicts of Interests: None

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