



ROLE OF GASTRIC LAVAGE AND BRONCHO-ALVEOLAR LAVAGE IN THE BACTERIOLOGICAL DIAGNOSIS OF CHILDHOOD PULMONARY TUBERCULOSIS

Paediatrics

Dr Ajay Patwardhan

Professor and HOD, Department of Paediatrics, ZMCH, Dahod, Gujarat, Pin-389151.

Dr Sneha Valay Zaveri

Assistant Professor, Department of Paediatrics, ZMCH, Dahod, Gujarat, Pin-389151.

Dr Brajendra Kumar

Professor and HOD, Department of General Medicine, ZMCH, Dahod, Gujarat, Pin-389151.

ABSTRACT

The aim of the study was to find out if bronchoalveolar lavage (BAL) would be better than gastric lavage for in the bacteriological diagnosis of childhood pulmonary tuberculosis. The result of the study indicates that GL done on three consecutive days is better than BAL for the bacteriologic diagnosis of childhood pulmonary tuberculosis.

KEYWORDS

Gastric lavage and Broncho-alveolar lavage, Bacteriological diagnosis, Childhood pulmonary tuberculosis.

INTRODUCTION

Tuberculosis is a chronic bacterial infection caused by mycobacterium tuberculosis that is characterized by the formation of granulomas in infected tissues and by cell mediated hypersensitivity. AIM OF THE STUDY=To compare the mycobacteriological yield from GASTRIC LAVAGE and BRONCHOALVEOLAR LAVAGE in children with pulmonary tuberculosis.

MATERIAL AND METHODS

Subjects And Methods: Methodology-Study Design:Descriptive Study, Study Place: DEPARTMENT OF PAEDIATRICS, Study Population: Children in the age group of 0 to 12 years with suspected pulmonary tuberculosis are included in the study.

(a).Inclusion Criteria:

1.A provisional diagnosis of pulmonary tuberculosis made in the presence of the following criteria are included in the study.2.Abnormal chest x-ray suggestive of tuberculosis like Intrathoracic Adenopathy, Segmental lesion like consolidation, Collapse, Miliary appearance, unresolving pneumonia of more than 3 weeks, cavitary lesion with.3.Positive mantoux test which is taken as 10mm or more induration at 48-72hrs following ITU of PPD intradermally or/ and,4.Positive history of contact,

(b). Exclusion Criteria:

Children who are started on ATT or children who had ATT in the past.

Manoeuvre:-

Children in the age group of 0-12 years with persistent parenchymal lesions after an adequate course of antibiotics such as Intrathoracic adenopathy, consolidation, collapse, miliary appearance, chronic cavitary lesion, with a positive history of contact (Definition, Child living in a house with an adult source who is on antituberculosis treatment or who had completed treatment within two years) or Positive mantoux (0.1ml of 1TU PPD RT tween 80 is given intradermally and read after 48 hrs. More than 10mm. Induration is taken as positive) are included in this study. For these children a detailed history including the presenting complaints, past history of hospitalization, past history of antituberculosis therapy, past history of any chronic lung disease were taken. Thorough clinical examination with assessment of nutritional status, general examination, assesment of BCG scar, respiratory system and other system examination were done.

Gastric Lavage:-

Gastric lavage collects the respiratory secretions which are swallowed at night. For all the children included in this study resting gastric juice analysis by gastric lavage was done on three consecutive morning.

Procedure:

A nasogastric tube was instilled and 20 to 30ml of 0.9% normal saline was used for gastric lavage. The lavaged specimen was sent to the

department of Microbiology for staining by Zeihl Neelson technique – Smear for AFB and culture in L-Jmedium.

Flexible fibre optic Bronchoscopy:

Olympus BF 3C30 3.5mm Bronchoscope was used in a bronchoscopy suite. An informed written consent was obtained. After overnight fasting, the procedure was done under local 2% lignocaine anaesthesia through nasal route in all the patients. The vocal cords were anesthetized by spraying 2% lignocaine. After inspecting the normal side, the affected side was examined. Throughout the procedure, vital parameters and oxygen saturation were monitored. A thorough intraluminal examination was done.

BAL:

BAL samples the alveolar epithelial lining fluid directly and has been useful in the diagnosis of tuberculosis. When lesions suggestive of EBTB were visualized the bronchoscope was advanced into the most involved area and wedged or into a segment of the right middle lobe if the lesion was diffuse. 1- 2ml/kg of sterile 0.9% normal saline was instilled through the suction port and subsequently aspirated by suction into the mucus trap in aliquots. After the procedure the samples were immediately sent for staining and culture.

Smear for AFB:

Smear of both gastric lavage and BAL specimens were stained by Zeihl Neelson technique. The smears were covered with carbol fuchsin and gently heated intermittently until steam rises for 5-7 minutes. The slide is then washed with water and decolourized with 20% sulphuric acid till the smear is only faintly pink. After washing, the smear is counterstained with Loeffler's methylene blue for 1 minute and washed. After blot drying, the smear was viewed under the oil immersion objective, acid fast bacilli are seen as pink to red rods while the background is blue. A positive report is given only if two or three typical bacilli are seen.

Culture in LJ medium:

The specimen were inoculated into the standard LJ medium and incubated at 37 -38 C for six weeks. The culture were checked weekly for any growth. The organisms were identified by colony morphology and standard biochemical reactions. The results were tabulated and analysed using SPSS for WINDOWS version 11.0 Statistical analysis were done using Chi-square test.

RESULTS

A total of 61 children were included in the study during the study period. 37 (60.6%) were Male children and 24 (39.3%) were Female children. The Major radiological features were consolidation in 29 (47%), bronchopneumonia in 11(18%), Cavity in 6 (10%), Consolidation with Collapse in 5 (8%), Intrathoracic Lymphadenopathy in 4 (6.5%), Miliary TB in 1 (1.6%), Bronchiectasis in 2 (3.2%) and pleural effusion in 2 cases (3.2%) and Chest X-ray was normal in 1[1.6%]. The observed age distribution was 18 less than 1

year (29.5%), 22 (36%) between 1-4 years of age, 11 (18%) between 5-8 years and 10 (16%) between 9-12 years of age. Among the 29 cases of consolidation 5 (17%) were less than 1 year of age 13 (45%) between 1-4 years, 7 (24%) between 5-8 years and 4 (14%) between 9-12 years of age. Positive Mantoux was found in 17 (58%) of cases with consolidation & Positive History of contact was present in 15 (52%) of cases. GL was positive in 9 (31%) of cases among consolidation. BAL was positive in 6 (21%) of cases. The bronchoscopic findings among the 29 cases of consolidation were chronic inflammation of the airways in 12 (41%), acute inflammation of the airways in 7 (24%), normal study in 5 (17%), EBTB 4 (14%) and 1 (3%) had external compression of the airways. Among the 11 cases of bronchopneumonia, 8 (72%) were less than 1 yr of age, 2 (18%) patients between 1-4 years, 1 (9%) between 9-12 years of age. A positive Mantoux was present in 4 (36%) and a positive history of contact was present in 9 [82%] of patients. GL was positive in 2 (18%) of patients. BAL was positive in 7 (64%) of patients. The bronchoscopic findings among 11 cases of bronchopneumonia were chronic inflammation of airways in 4 (36%), acute inflammation of airways in 2 (18%), Normal Study in 3 (27%), EBTB in 2 (18%) of patients. Among the 6 cases of cavity 3 (50%) were less than 1 year of age, 3 (50%) between 1-4 years of age, A positive Mantoux was found in 3 (50%) and a positive history of contact was found in 3 (50%) of patients. GL was positive in 1 (17%) and BAL was positive in 2 (34%) of patients. Bronchoscopic findings were acute inflammation of airways in 3 (50%) endobronchial TB in 2 (33%), Normal airways in 1 (17%) of patients. Among 5 cases of consolidation with collapse, 1 (20%) were less than 1 year and 1 (20%) between 1-4 years of age, 2 (40%) between 5-8 years of age and 1 (20%) between 9-12 years of age. A positive mantoux was present in 3 (60%) and a history of contact was present in 2 (40%) of patients. Bronchoscopic findings were chronic inflammations of airways in 2 (40%), Acute inflammation of airways in 1 (20%) and EBTB in 2 (40%) of patients. GL was positive in 1 (20%) and BAL was positive in 1 (20%) of patients. Among 2 cases of bronchiectasis, mantoux was positive in 1 (50%) and contact was positive in both (100%) of patients. Among 4 cases of Intrathoracic lymphadenopathy, mantoux was positive in 2 [50%] and positive history of contact in 2 [50%]. Bronchoscopic findings were EBTB in 2 [50%], [125%] had external compression of airway, 1 with normal mucosa. Among 16 cases of EBTB 7 (44%) under 1 year of age, 5 (31%) between 1-4 years, 4 (25%) between 9-12 years of age. Mantoux positivity was found in 11 (68%) and history of contact was found in 7 (44%) of patients. BCG Scar was absent in 3 (19%) of patients. Consolidation was found in 4 (25%) of patients, Consolidation with collapse in 2 (12%) cavity in 2 (12%), Bronchopneumonia in 2 (12%), Intrathoracic Adenopathy in 2 (12%), Miliary TB in 1 (6%), Bronchiectasis and Pleural effusion each in 1 (6%) and 1 patient had normal x-ray. GL was positive in 4 (25%) and BAL was positive in 9 (56%) of patients. GL smear was positive in 12 (20%) of cases while culture was positive in 15 (24.5%), BAL smear was positive in 14 (23%) and culture positivity was found in 20 (32.7%). GL culture was positive in 3 (17%) in <1 year and 6 (27%) 1-4 years, 2 (18%) between 5-8 years, and 4 (40%) between 9-12 years of age. BAL culture was positive in 9 (50%) in <1 year and 9 (40%) between 1-4 years, 2 (20%) between 9-12 years. Both BAL and GL was found positive in 5 [8%] patients. Analysis of 30 AFB culture positive cases of children with suspected pulmonary tuberculosis showed a sex ratio of 18 (60%) boys and 12 (40%) girls. Age distribution was 11 (36.6%) less than one year, and 11 (36.6%) between 1-4 years of age 8 (27%) between 5-12 years of age. A positive mantoux was present in 16 (53%) and a positive history of contact in 17 (57%). BCG scar was absent in 4 (13%) patients, while one was not immunized, others have been the immunized in the 1st year. The major radiological findings were segmental lesions in the form of consolidation in 13 (43%) and consolidation with collapse in 2 (7%), persistent bronchopneumonia in 8 (27%) cavity in 3 (10%), miliary TB, Bronchiectasis and pleural effusion each in 1 (3%) patient. One patient had normal chest x-ray, while CT scan showed alveolar hemorrhage and found to have EBTB in bronchoscopy with culture positivity in both GL and BAL. The major bronchoscopy findings were inflammation of the airways in 19 (63.3%) and EBTB is 10 (33.3%) and 1 (3%) showed normal airway.

DISCUSSION

Out of total of 61 children, 37 (60.6%) were boys and 24 (39.3%) girls. The observed aged distribution was 65.5% <4 years and 34% between 5-12 years. B J Marais et al in his study showed age distribution of 74.9% <5 years and 25% between 5-12 years of age. Positive history of contact in our study was identified in 34 (55.7%) and a positive mantoux was observed in 34 (55.7%) of patients. Mantoux reactors

were equally distributed between culture positive and culture negative patients. This is comparable to the study done in Peru by Guillermo E et al where 51% of patients had a positive mantoux. Meenusingh et al have shown positive mantoux reaction in 40 (68.9%) of patients and a history of contact was found in 32 (55%) of patients. The common symptoms included cough (96%), Fever (77%), Breathlessness (52%), FTT in (22%), Hemoptysis (6.5%), 48 [78%] children were malnourished. In a similar study by Meenu Singh et al had cough [96%] as a predominant symptom and 76% were malnourished. The Major radiological features in our study were segmental lesions in the form of consolidation in 29 cases and consolidation with collapse in 5 patients making a total of 34 (55.7%). This is comparable to the study done by Meenu Singh et al where 32 (55%) patients had segmental lesions in the form of consolidation or collapse. Other findings in our study are Bronchopneumonia in 11 (18%) and cavity in 6 (9.8%) intrathoracic adenopathy in 4 (6.5%), Bronchiectasis in 2 (3.27%) pleural effusion in 2 (3.27%) Miliary TB in 1 (1.63%) and Chest X-ray was normal in 1 patient while CT Scan suggested alveolar hemorrhage with severe narrowing of short segment of distal left main bronchus and bronchoscopy showed left main bronchus was compromised with bleed suggesting granulation tissue. The major bronchoscopy findings in our study were inflammation of the airways in 32 (52.4%), EBTB in 16 (26%), normal Mucosa in 10 (16%), 2 (3.27%) had external compression of the airways and 1 (1.63%) had bronchiectasis. EBTB in our study was found in 16 (26%) of patients. The most common age of presentation was 75% <4 years of age. This is comparable to earlier reports that the chances of EBTB are greatest in the first year in 25% and 1-5 years in 10%. Chan S. et al in a study had analysed 36 children with active pulmonary tuberculosis and found EBTB in 15 (41.7%). The most common radiological findings in EBTB in our study is in the form of segmental lesions such as consolidation in 4 (25%) and consolidation with collapse in 2 (12%). This is in conjunction with earlier study conducted by Ledesma et al where atelectasis, consolidation and hyperinflation were the major radiological findings observed in cases with EBTB. The results of this study indicate that both BAL and GL cultures are complementary to each other for isolation of mycobacterium tuberculosis in children clinically diagnosed to be suffering from pulmonary tuberculosis. Mycobacterial isolation rate increased from 24.5% to 49% by the addition of BAL as an investigation. The difference in the recovery rates of mycobacterium tuberculosis by GL and BAL was not statistically significant. These results are contrary to earlier reports where gastric lavage proved better than BAL and BAL did not improve the yield of mycobacterium tuberculosis. Of the 61 cases included in our study, mycobacterium tuberculosis was grown in culture in 15 (24.5%) Gastric lavage samples and 20 BAL (32.7%) Samples making a total of 30 (49%) culture proven cases. Both GL and BAL were positive in 5 patients. In a similar study, done by Meenusingh et al, in 1999 had studied 58 children clinically suspected of pulmonary tuberculosis and found that 10 (17.2%) of Gastric lavage samples and 12 (20.6%) BAL samples proved positive for mycobacterium tuberculosis. Overall mycobacterial isolation was 20 (34.4%) as 2 children had grown mycobacterium tuberculosis in both GL and BAL. Thus, we conclude when both GL and BAL are used, these procedures complement each other.

CONCLUSION

Bronchoalveolar Lavage (BAL) is a useful investigation to aid in the bacteriological diagnosis of childhood pulmonary tuberculosis. There is no difference in mycobacterial isolation rates from GL and BAL. When studied in isolation. However, when both gastric lavage [GL] and Bronchoalveolar lavage [BAL] are used for isolation of mycobacterium tuberculosis, these procedures are COMPLEMENTARY to each other. Bacteriological yield is DOUBLED by the addition of BAL as a diagnostic investigation in children with suspected pulmonary tuberculosis.

REFERENCES

1. World Health Organization 2006. Guidance for national tuberculosis programmes on the management of tuberculosis in children. [WHO/HTM/TB/2006:371].
2. Kabra SK, Lodha, Seth V. Some current concepts on childhood tuberculosis. Indian J Med Res 2004; 120(4):387-397.
3. Starke JR, Correa AG. Management of Mycobacterial infection and diseases in children. *Pediatr Infect Dis J* 1995; 14: 455-470.
4. Flor M, Munoz, Jeffrey R, Starke N. Nelson Textbook of pediatrics; 17th edition 2004, 958-964.
5. Betty A Forbes, Daniel F Sahm, Alice S Weissfeld. Bailey and Scott's Diagnostic microbiology, 11th edition 2002; 538.
6. Nagappa DR. Adult tuberculosis – Fountain head of pediatric tuberculosis in New Medwave – Childhood tuberculosis ed. Dr. UK Sharma, Dupin Laboratories Ltd, June 1983, PP 5-11.
7. Wallgren A. On Contagiousness of childhood tuberculosis. *Acta paediatr*, 1937; 22: 2292-2234

8. Com stock GW – Epidemiology of tuberculosis. AM Rev Respir Dis 1982, 125 (suppl); 8-16
9. Selwyn PA, Sikkell BM, Alcibes P, Friedland GM, Klein RS, Schoenbaum EE. High risk of active TB in HIV infected drug users with cutaneous anergy. JAMA 1992; 268; 504-09.
10. O.P.Ghai, Piyush Gupta V.K. Paul. GHAI Essential Pediatrics 6th Edition, Revised and Enlarged. 2006. 231-238.