



Study of Role of Fiberoptic Bronchoscopy in 50 Cases of Pneumonia with Special Reference to Broncho-Alveolar Lavage

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ABSTRACT

Background : The diagnostic and therapeutic utility of flexible fiberoptic bronchoscopy has led to its increasing use in diagnosis and management of a variety of pulmonary disorders. Technological advances in diagnostic and therapeutic bronchoscopy continue to improve our ability to perform minimally invasive, accurate evaluations of the trachea-bronchial tree and to perform an ever increasing array of therapeutic and palliative interventions. BAL also helps to identify causative organisms responsible for culture negative pneumonias and thereby defining etiology of pneumonias. It is also helpful in differentiating infection from malignancy when combined with other methods like cytology, transbronchial needle aspiration or transbronchial biopsy. **Objectives :** To evaluate the role of bronchoscopy and BAL in patients of pneumonia for diagnostic purpose. To identify various etiological factors responsible for clinical pneumonia by microscopic examination of BAL with various staining, cultures and cytological examination. **Methods :** 50 cases of pneumonia admitted in our hospital in 3 year duration. These were difficult to diagnose by routine methods. These were undergone fiberoptic bronchoscopy by which BAL was taken which was subjected to microscopic examination. **Results :** Mean age of patients is 42.44 years (13-77) with male preponderance (M:F ratio- 2.8-1). In BALF examination, pyogenic infections were most common (46%) with gram negative organisms (30%) and pulmonary tuberculosis (12%), fungal infection (14%), malignancy (12%). Overall diagnostic yield of BAL was 84% in this study which was similar to yield of sputum in CAP.

KEYWORDS : Pneumonia, Fiberoptic bronchoscopy, Broncho-alveolar lavage (BAL)

Introduction

The diagnostic and therapeutic utility of flexible fiberoptic bronchoscopy has led to its increasing use in the diagnosis and management of various pulmonary disorders¹. Technological advances continue to improve our ability to perform minimally invasive bronchoscopy, accurate evaluations of the tracheobronchial tree and to perform an ever-increasing array of therapeutic and palliative interventions².

Fiberoptic bronchoscopy is extremely useful in finding a specific diagnosis for a non-resolving pneumonia³. BAL has well established role in the diagnosis of opportunistic pulmonary infections in immunocompromised patients. It is also useful for defining etiology of pneumonias and differentiating consolidation from malignancy⁴. Bronchoscopy plays an important role in the diagnosis of smear negative pulmonary tuberculosis⁵ and wrongly diagnosed tuberculosis⁶. BAL has also gained considerable popularity in investigation of various interstitial lung diseases⁷, but its routine use in such patients cannot be recommended⁸.

Objectives

This study was performed to evaluate the role of bronchoscopy and BAL in patients of pneumonia for diagnostic purpose. And also to identify various etiological factors responsible for pneumonia by microscopic examination of BAL.

Materials and Methods

50 cases of pneumonia which were admitted in our hospital in 3 years duration were included in our study. These were the patients in whom appropriate clinical examination, routine laboratory investigations and radiology could not clinch the diagnosis. The clinical presentation was cough (dry/ productive), fever, chest pain, breathlessness, hemoptysis and other constitutional symptoms. Routine laboratory investigations included CBC, RBS, S. Creatinine, SGPT, MT, ESR, S. HIV-Ab test and Sputum examination. Chest X-ray PA showed alveolar shadows/ fibrotic lesions/ consolidations. Suspected cases of pulmonary tuberculosis which were smear negative were also included. All patients have undergone fiberoptic bronchoscopy by which BAL was taken and subjected to microscopic examination for various staining, culture and cytology.

Observation and Discussion

Age distribution

Age in years	No. of patients	Percentage
11-20	3	6%
21-30	7	14%
31-40	14	28%
41-50	12	24%
51-60	9	18%
> 60	5	10%

Above data shows that 10 (20%) patients were below 30 years of age, 35 (70%) were between 30- 60 years of age, and only 5 (10%) patients were above 60 years of age. The mean age of patients studied was 42.44 (13- 77) years which is comparable to GS Gaude et al⁴ study, having mean age of 47 (17-83) years.

Sex distribution

Sex	No. of patients	Percentage
Male	37	74%
Female	13	26%

Present study shows Male predominance with M:F ratio 2.5:1.

Symptomatology

Symptom	Male		Female		Total	
	No. of patients	Percentage	No. of patients	Percentage	No. of patients	Percentage
Dry cough	9	18%	5	10%	14	28%
Productive cough	28	56%	7	14%	35	70%
Fever	32	64%	9	18%	41	92%
Breathlessness	17	34%	8	16%	25	50%
Chest pain	16	32%	4	8%	20	40%
Hemoptysis	7	14%	-	-	7	14%
Weight loss	11	22%	3	6%	14	28%
Anorexia	5	10%	-	-	5	10%

The table shows occurrence of fever in 41 (92%) and cough in 49 (98%) of patients. Breathlessness occur in 25 (50%) of patients and constitutional symptoms found in 19 (38 %) of patients. Our findings are comparable with S Bansal et al⁵ study, showing fever in 90%, cough in 97%, breathlessness in 48% and chest pain in 48% of patients.

Habits

Habits	Male		Female		Total	
	No. of patients	Per-centage	No. of patients	Per-centage	No. of patients	Per-centage
Tobacco users	15	30%	1	2%	16	32%
Smokers	18	36%	-	-	18	36%
Alcohol-ics	3	6%	-	-	3	6%
No habits	5	10%	12	24%	17	34%

The table shows that 16 (32%) of patients are tobacco users and 18 (36%) are smoker, indicating its strong association with pneumonia.

Andres de Roux et al⁹ study has concluded an independent association between pneumonia and alcohol, but current alcohol abuse was associated with increase severity of community acquired pneumonia.

Past history

Past history	Male		Female		Total	
	No. of patients	Per-centage	No. of patients	Per-centage	No. of patients	Per-centage
Tuber-culosis	12	24%	1	2%	13	26%
Diabe-tes II	2	4%	2	4%	4	8%
Hyper-tension	1	2%	1	2%	2	4%
Bron-chial asthma	1	2%	-	-	1	2%
CVA	1	2%	-	-	1	2%
No past history	23	46%	10	20%	33	66%

Our study showed that 26% patients had past history of Tuberculo-sis, 8% had Diabetes II and 4% had HTN. Compared to S Bansal et al⁵ study, we found slight increase in Diabetes 8% vs 4.2% and slight decrease in HTN 4% vs 7%.

Radiology findings

Side of Consolidation	Male		Female		Total	
	No. of patients	Per-centage	No. of patients	Per-centage	No. of patients	Per-centage
Right side	26	52%	7	14%	33	66%
Left side	10	20%	5	10%	15	30%
Bilateral	1	2%	1	2%	2	4%

Radiological examination on Chest X-ray showed consolidation, with 66% patients having on right side and 15 (30%) on left side. Where as in 4% patients bilateral consolidation was found. This indicates that right side of lung is more prone to develop infection, because right main bronchus is wider than left main bronchus and also is more in line with trachea.

Zone involvement in Chest X-ray

Zone involve-ment	Male		Female		Total	
	No. of patients	Per-centage	No. of patients	Per-centage	No. of patients	Per-centage
One zone	30	60%	8	16%	38	76%
Two zone	5	10%	3	6%	8	16%
> Two zone	2	4%	2	4%	4	8%

In our study, consolidation in chest X-ray involves one zone in 76% patients, two zone in 16% patients and more than two zones in 8% of patients. It is comparable with N Chavda et al¹⁰ study showing 84% involving one zone, 12% involving two zone and 4% involving more than two zone.

Bronchoscopy findings

Bronchosc-opy findings	Male		Female		Total	
	No. of patients	Per-centage	No. of patients	Per-centage	No. of patients	Per-centage
Mucosal changes	12	24%	4	8%	16	32%
Abnor-mal secre-tions	16	32%	4	8%	20	40%
Bron-chial narrow-ing	3	6%	2	4%	5	10%
Bleed-ing	2	4%	-	-	2	4%
Abnor-mal growth	-	-	1	2%	1	2%
Normal findings	4	8%	2	4%	6	12%

While viewing airways during bronchoscopy, 32% patients showed mucosal changes like edema, pallor, inflammation etc. Abnormal secre-tions were found in 40% patients, whereas 10% patients showed bronchial narrowing and 4% showed bleeding. This was comparable with JIN Fa-guang et al¹¹ study showing mucosal changes in 31% and bronchial narrowing in 8% cases, but bleeding was reported in much large number of cases ie. 24%.

Microscopic examination of BALF

Micro-or-ganisms and Cell findings in BALF	Male		Female		Total	
	No. of patients	Per-centage	No. of patients	Per-centage	No. of patients	Per-centage
Strepto-coccus Pneumo-niae	4	8%	-	-	4	8%
Staphy-lococcus Aureus	3	6%	1	2%	4	8%
Escheri-chia Coli	3	6%	2	4%	5	10%
Klebsiella Pneumoniae	3	6%	2	4%	5	10%
Pseu-domonas Aerugi-nosa	5	10%	-	-	5	10%
Candida Albicans	5	10%	1	2%	6	12%
Aspergil-lus Niger	1	2%	-	-	1	2%
Mycobac-terium Tubercu-losis	5	10%	1	2%	6	12%
Squa-mous (Malignant) cells	3	6%	3	6%	6	12%
No growth/Normal cell findings	5	10%	3	6%	8	16%

Cultures showed Strept. pneumonia in 8% patients, Staph. aureus in 8%, E. Coli in 10%, Klebsiella in 10% and Pseudomonas in 10% patients. KOH mount has shown Candida albicans in 12% and Aspergillus in 2% patients. ZN staining has revealed Mycobacterium tuberculosis in 12% patients. Cytological examination of BALF showed Malignancy in 12% patients. BALF had negative cultures and normal cytology findings in 16% patients. This was comparable with GC Bhatia et al¹² study showing Strept. pneumonia in 5.4% patients, Staph. aureus in 4.6%, E. Coli in 13.7%, Klebsiella in 17.3%, Pseudomonas in 8.2% patients, Candida albicans in 11.6%, Aspergillus in

0.5% patient, Mycobacterium tuberculosis in 21.4% patients, Malignancy in 2% patients and negative cultures & normal cytology findings in 14.4% patients. This comparison showed that BALF had high percentage for detection of malignancy but low percentage for detection of pulmonary tuberculosis in our study.

Conclusion

Fiberoptic bronchoscopy and BALF examination is extremely useful in specific diagnosis. Mean age of patients was 42.44 years with range between 13-77 years and M:F ratio was 2.8 : 1 There is a association of pneumonia with tobacco (32%) and smoking (36%). Our study also concluded alcohol as an independent risk factor of pneumonia. In BALF examination, pyogenic infection were most common with gram positive organisms playing predominant role. BALF examination can be of value in diagnosis of pulmonary tuberculosis, fungal infections and pulmonary malignancy. To conclude, bronchoscopy has valuable role in non productive cough. It is particularly helpful to get uncontaminated sputum and bronchial wash material collection. Thus, grams staining, bacterial cultures and AFB examination of BALF has immense diagnostic utility in the infective process of lung with cytology of BALF has added diagnostic value.

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