

Clinical study of various kinds of pleurisy and pleural effusion pH

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ABSTRACT We have examined whether or not pleural effusion pH is useful in differential diagnosis involving pleurisy. Subjects were 25 patients each of bacterial pleurisy, tuberculous pleurisy, carcinomatous pleurisy, and transudative pleural effusion. Pleural effusion pH was measured using litmus paper. Results revealed that pleural effusion pH was distributed from 7.6 to 8.2 in each disease. The mean pH was 8.0 for the 4 diseases, showing no difference between them. Based on the above, it was considered impossible to differentiate pleurisy by pleural effusion pH.

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Key words : **Pleural effusion pH, Bacterial pleurisy, Tuberculous pleurisy, Cancerous pleurisy
Transudative pleural effusion**

INTRODUCTION

When pleural effusion is suspected, pH is commonly measured along with specific gravity, protein concentration, leukocyte classification, adenosine deaminase (ADA), culture of bacteria or tubercle bacillus, and cytological diagnosis at a number of hospitals. However, the diagnostic significance of pleural effusion pH is not clear. Thus we have examined the pleural effusion pH of various types of pleurisy we have seen to clarify its usefulness in the differential diagnosis of pleurisy.

SUBJECTS AND METHODS

Subjects

The subjects were 25 patients each of bacterial pleurisy, tuberculous pleurisy, carcinomatous pleurisy, and transudative pleural effusion. Subjects were registered until 25 cases of each disease were reached.

Methods

The pleural effusion pH of these cases was measured using litmus paper. Pleural effusion pH was compared by disease to determine whether or not it is useful for differential diagnosis.

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RESULTS (Fig. 1)

Pleural effusion pH was distributed from 7.6 to 8.2 for all 4 types of bacterial pleurisy, tuberculous pleurisy, carcinomatous pleurisy, and transudative pleural effusion. The mean pH was 8.0 for all four diseases, showing no difference between 4 groups.

DISCUSSION

The normal value of pleural effusion pH is 7.6, and in case of pleurisy, both effusion and transudate are to be less than 7.6¹⁾.

In case of bacterial pleurisy, particularly empyema, the pH is the lowest^{2,3,4,5)}, and a paper has been published reporting that a large number of dividing walls within the pleural cavity are created at a pH of 7.2 or less, thus leading to the indication of drainage.

Kokkola *et al.*⁶⁾ mentioned that the value frequently becomes 7.25 or less in tuberculous pleurisy, and Houston *et al.*⁵⁾ reported values of 7.4 or less in tuberculous pleurisy, and 7.4 or greater

in carcinomatous pleurisy, thus pH becomes lower in tuberculous pleurisy when compared with in carcinomatous pleurisy. A paper has been published reporting values of 7.3 or less in both in tuberculous pleurisy and carcinomatous pleurisy.

Another paper reports that in carcinomatous pleurisy, the lower (from 7.3⁸⁾ to 7.35 or less⁹⁾ pH becomes, the worse the prognosis becomes.

Funahashi *et al.*¹⁰⁾ noted higher values of 7.3 or greater in cases of transudative pleural effusion with cardiac insufficiency when compared with bacterial or tuberculous pleurisy. In the end, there may be no definite opinion regarding pleurisy and pleural effusion pH.

However, in all the cases of bacterial, tuberculous, and carcinomatous pleurisy that we have experienced, values ranged from 7.6 to 8.2 with a mean value of 8.0. Furthermore, even in transudative pleural effusion, values ranged from 7.6 to 8.2 with a mean value of 8.0, indicating an absence of specificity.

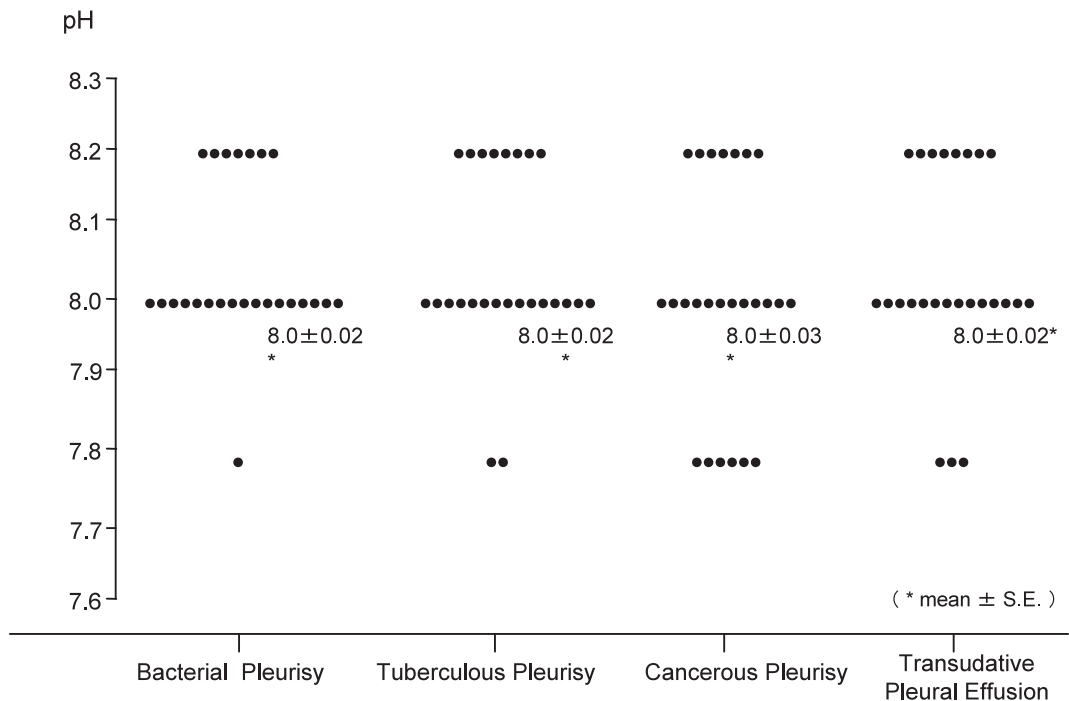


Fig. 1. Pleurisy and pH of pleural effusion

Reasons for the differences between this and the conventional reports may include: (1) the use of litmus paper for the measurement of pleural effusion, (2) many past reports were published 20 years ago, making differences in the level of precision between the past and the current reports.

Pleural effusion pH of bacterial pleurisy, tuberculous pleurisy, carcinomatous pleurisy, and transudative pleural effusion measured using litmus paper revealed a mean value of 8.0 in all of the 4 diseases. It was, therefore, concluded that it is impossible to differentiate pleurisy using pleural effusion pH.

REFERENCES

- 1) Yano M, Shimomura K : Effusion of body cave
3.Examination of clinical chemistry. Medical Technology
33:1379-1389,2005
- 2) Light RW, MacGregor MI, Ball WC, Luchsinger PC:
Diagnostic significance of pleural fluid pH and Pco₂.
Chest 64:591-596,1973
- 3) Light RW, Moller DJ, George RB: Low pleural fluid in
parapneumonic effusion. Chest 68:273-274,1975
- 4) Potts DE, Levin DC, Sahn SA: Pleural fluid pH in
parapneumonic effusions.Chest 70:328-331,1976.
- 5) Houston MC: Pleural effusion:diagnostic value of
measurements of Po₂,Pco₂,and pH. SMJ 74:585-
589,1981
- 6) Kokkola K, Sahlstrom K, Vuorio M: Oxygen and carbon
dioxide tensions and the pH of pleural effusion. Scand J
Resp Dis 89:195-200,1974
- 7) Good JT, Taryle DA, Maulitz RM, Kaplan RL,Sahn SA.
The diagnostic value of pleural fluid pH. Chest 78:55-
59,1980.
- 8) Sahn SA,Good JT:Pleural fluid pH in malignant
effusions-diagnostic, prognostic, and therapeutic
implications. Ann Intern Med 108: 345-349,1988
- 9) Rodriguez-Panadero F, Lopez-Mejias J:Survival time of
patients with pleural metastatic carcinoma predicted by
glucose and pH studies. Chest 95:320-324,1989.
- 10) Funahashi A,Sarkar TK,Kory RC:Measurements of
respiratory gases and pH of pleural fluid. Am Rev Respir
Dis 108:1266-1268,1973