นิพนธ์ต้นฉบับ

Massive pleural effusion : a study of 286 cases

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Charoenlap P, Wongthim S, Udompanich V, Limthongkul S. Massive pleural effusion : a study of 286 cases. Chula Med J 1990 Jun; 34(6) : 449-455

Between 1977 and 1989, a total of 286 cases of massive pleural effusions at Chulalongkorn Hospital were studied. One hundred and seventy-eight cases (62.2%) were malignant and 108 cases (37.8%) were non-malignant. The common cause of non-malignant effusion was tuberculosis (25.9%)

From the relationship between the fluid color and the age distribution, tuberculosis was shown to be the most common cause of straw-colored fluid for ages below 40 years (88.5%). Malignancy was diagnosed in 77.1 per cent of patients over 40. Of 56 patients older than 40 years, 55 had serosanguinous fluid due to malignancy. Most cases of bloody effusions were Caused by malignancy.

In conclusion, straw-colored pleural fluid below 40 years of age was suggestive of tuberculosis whereas fluid of any color above 40 was more likely due to malignancy.

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Receiced for publication. March 21, 1990.

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ในระหว่างปี พ.ศ. 2520-2532 ได้ทำการศึกษาหาสาเหตุของผู้ป่วยที่มีน้ำในโพรงเยื่อหุ้มปอดเต็มทั้งข้างของปอดข้างใดข้างหนึ่ง มีจำนวนทั้งสิ้น 286 ราย พบว่าสาเหตุที่เกิดจากมะเร็ง 178 ราย (62.2%) และสาเหตุที่ไม่ใช่จากมะเร็ง 108 ราย (37.8%) วัณโรคเป็นสาเหตุที่พบบ่อยที่สุด 74 ราย คิดเป็นอัตราร้อยละ 25.9

เมื่อได้ศึกษาถึงความสัมพันธ์ระหว่างสีของน้ำจากโพรงเยื่อหุ้มปอดและอายุของผู้ป่วย พบว่าถ้าน้ำเป็นสีขา อายุของผู้ป่วยน้อยกว่า 40 ปี สาเหตุเกิดจากวัณโรคพบมากที่สุด คิดเป็นอัตราร้อยละ 88.5 แต่ถ้าอายุมากกว่า 40 ปี สาเหตุเกิดจากมะเร็งพบได้เป็นอัตราร้อยละ 77.1 ถ้าน้ำที่ดูดออกมาเป็นสีแดง อายุของผู้ป่วยน้อยกว่า 40 ปี สาเหตุเกิดจากมะเร็ง 4 ราย วัณโรค 3 ราย แต่ถ้าอายุมากกว่า 40 ปี พบว่าสาเหตุเกิดจากมะเร็ง 55 ใน 56 ราย คิดเป็นอัตราร้อยละ 98.2 เมื่อน้ำที่ดูดออกมาเป็นสีเลือด ไม่ว่าผู้ป่วยอายุมากหรือน้อยกว่า 40 ปี สาเหตุเกิดจากมะเร็งทั้งสิ้น

สรุป ผลจากการศึกษาครั้งนี้พบว่า ผู้ป่วยที่มีน้ำในโพรงเยื่อหุ้มปอดเต็มทั้งข้าง ถ้าน้ำที่ดูดออกมาได้เป็นสีขา อายุน้อยกว่า 40 ปี ส่วนใหญ่เกิดจากวัณโรค แต่ถ้าอายุมากกว่า 40 ปี ไม่ว่าน้ำจะเป็นสีอะไร ส่วนใหญ่เกิดจากมะเร็ง

Pleural effusion occurs commonly in acute and chronic diseases. Localized as well as systemic diseases may be the underlying causes. Congestive heart failure and cirrhosis can cause transudative pleural effusion while localized diseases such as pneumonia, tuberculosis and malignancy are common causes of exudative effusions. Determining the cause of pleural effusion can pose a dilemma as the possibilities are so varied. The diagnosis can be made from history taking and physical examination, supplemented by routine laboratory tests, pleural biopsy, cytologic and bacteriologic study and pleural fluid analysis. Non-purulent pleural fluid pH of less than 7.05 often indicates an early empyema, which requires chest tube drainage. On the other hand, a pleural fluid pH of greater than 7.05 predicts resolution with antibiotic therapy.[1]

The most common cause of massive pleural effusion especially in elderly subjects is malignancy. Serosanguinous or bloody fluid carry a higher incidence of malignancy.[2] Carcinoma of lung and breast were the common sites of origin of malignancies.[3,4]

The purpose of this study is to review the causes of massive pleural effusion in 286 patients with particular emphasis on patient's age and color of pleural fluid.

Materials and Methods

Massive pleural effusion was defined as an effusion occupying the entire hemithorax from apex to the base as evident on a standard postero-anterior chest roentgenogram.

Cases with massive pleural effusion being treated at Chulalongkorn Hospital between 1977 and 1989 were the subjects for this study. There were 286 cases; 136 men and 150 women, aged 15 to 84. Twenty-nine patients were excluded from this study due to non-diagnostic work-up.

Cases were divided into two groups: malignant and non-malignant groups. The diagnosis of a malignant cause was established from autopsy, and/or pleural biopsy or cytologic studies of pleural fluid. The non-malignant group with tuberculous effusion was confirmed by a positive pleural biopsy, a definite response to specific antituberculous chemotherapy or an accompanying tuberculous infection elsewhere. Empyema thoracis was diagnosed by aspiration of purulent fluid from the pleural cavity. Early empyema was determined by measuring pleural fluid pH; a pleural fluid pH of less than 7.05 and/or pCO2 of greater than 55 mmHg. and/or pleural fluid glucose of less than 50 mg/dl with neutrophil predominent in the fluid called for chest tube drainage.

A transudate was defined as one with pleural fluid specific gravity of less than 1.016 or pleural fluid protein of less than 3 gm/dl. Cirrhosis of the liver and congestive heart failure were the major causes of such transudates.

Results

During the 13 year period (1977-1989), a total of 286 cases with massive pleural effusions were studied, as shown in Table 1

Table 1. Causes of Massive Pleural Effusion in 286 Patients.

	Male	Female	Total
Malignant	83	95	178 (62.2%)
Non Malignant			
Tuberculosis	32	42	74 (25.9%)
Empyema	12	8	20 (7.0%)
Early Empyema	5	2	7 (2.5%)
Cirrhosis	2	2	4 (1.4%)
Heart Failure	2	1	3 (1.0%)
	136 (47.5%)	**150 (52.5%)**	**286 (100%)**

In 178 of 286 patients (62.2 per cent) the causes were malignant. Seventy-four of these (25.9 per cent) had tuberculosis, 7 per cent had empyema thoracis, 2.5 per cent were cases of early empyema and in 2.4 per cent the fluid was transudative.

Table 2. lists the causes of straw-colored effusion in relation to age.

Table 2. Straw Color Fluid and Age Distribution in 139 Patients.

Condition	Age (Years)	
	Under 40	**Over 40**
Malignant	1 (1.4%)	54 (77.1%)
Tuberculosis	61 (88.5%)	9 (12.9%)
Early Empyema	5 (7.2%)	2 (2.9%)
Cirrhosis	-	4 (5.7%)
Heart Failure	2 (2.9%)	1 (1.4%)
	69	**70**

Sixty-one of 69 patients (88.5 per cent) with tuberculous effusion and only 1 patient (1.4 per cent) with malignant effusion, were less than 40 years of age. In contrast, 55 of 70 patients (77.1 per cent) with malignancy, a (12.9 per cent) with tuberculosis and 5.7 per cent with cirrhosis. were over 40 years.

Although in the under forty age group, the incidences of tuberculosis and malignancy were not different, in the over forty age group, malignancy was the predominant cause of serosanguinous fluid (98.2 per cent)

Table IV shows the causes of bloody effusion.

Table 3. Shows the Causes of Serosanguinous Fluid in Relation to Age.

Condition	Age (Years)	
	Under 40	**Over 40**
Malignancy	4 (57.1%)	55 (98.2%)
Tuberculosis	3 (42.9%)	1 (1.8%)
	7 (100%)	**56 (100%)**

Table 4. Bloody Fluid.

Condition	Age (Years)	
	Under 40	**Over 40**
Malignancy	9 (100%)	55 (100%)
Tuberculosis	0	0
	9 (100%)	**55 (100%)**

Most cases were malignant. There were other causes of bloody effusions but they were not massive and were not included in this study.

Discussion

In this study, 286 patients with massive pleural effusion were studied. The incidence of massive effusion was about 10 per cent (of total effusions). Diagnosis of effusion was definitive in approximately 90 per cent of cases, the remaining 10 per cent with undiagnosed fluid were excluded from the study.

The first important step in diagnosis is to decide whether the effusion is a transudate or an exudate.[5,6] In the case of an exudate, a systemic analysis of the pleural fluid coupled with clinical features will often help to diagnose the cause of the pleural effusion. Pleural biopsy using a Cope's or Abram's needle is an effective means of obtaining histologic sample of the parietal pleura. The presence of malignant cells or a positive gram stain, acid-fast bacilli stain or pleural fluid culture will lead to the definitive diagnosis.

The finding of low pleural fluid pH (less than 7.30) indicates intense pleural inflammation. Severe pleural fluid acidosis parallels a low glucose content.[7,8] In the presence of pneumonia, a pH of less than 7.05 and a glucose content of less than 50 mg/dl indicates early empyema[9] (even when there is no gross purulence), requiring closed chest tube drainage. The preceeding criteria, however, do not apply to rheumatoid[10], malignant[11] or tuberculous fluids[12,13] although the pH is also often low. The finding of low glucose level and low pH in a malignant effusion suggests that the effusion has been present for several months, having a poor prognosis and response to the sclerosing agent is poor.[14]

If the effusion is transudative, pleural disease is unlikely. The criteria for diagnosing a transudate are fluid specific gravity of less than 1.016 or a pleural fluid protein concentration of lower than 3.0 gm/dl. Such criteria misclassify about 10 per cent of transudates caused by heart failure, 10 per cent of exudates caused by tuberculosis and 30 to 40 per cent of parapneumonic and malignant effusions.[5] In this study, liver cirrhosis and congestive heart failure are associated with transudative fluids. In cirrhosis of the liver, the effusion is usually right sided but can be bilateral. The fluid probably moves from the peritoneal to pleural cavity via a defect in the diaphragm or via diaphragmatic lymphatic channels.[15-17] There were two such cases in this study in whom the characteristics of both the pleural and the peritoneal fluids were shown to be similar.

The effusion in congestive heart failure is usually bilateral but can be unilateral. The effusions are small to moderate and massive effusions are unusual.[18] In the case of straw-colored fluid, 61 or 69 cases (88.5 per cent) were due to tuberculous process, their ages being below 40 years. Malignant effusions were found in 54 of 70 patients (77.1 per cent) and were mostly in patients over 40 years old.

Serosanguinous effusions are difficult to interprete. Fluids containing red blood cells as few as 5000 to 6000/mm^3 may exhibit a rosy tint, whereas those with over 10,000/mm^3 show a red color. Thus 1 to 2 ml of blood in a litre of pleural effusion will produce a rosy red color.[19] Trauma from thoracentesis commonly induces small volume of blood into the pleural space. When serosanguineous fluid were obtained repeatedly, malignancy is most common. Bloody fluid obtained from a traumatic thoracentesis usually clots within several minutes but bloody fluid caused by pleural disease generally does not clot. Bloody effusions may be caused by tumor, pulmonary infarction,[20] trauma or ruptured of aortic aneurysm. A massive bloody effusion in the

abscence of trauma is almost always due to malignancy. The most common tumors to metastasize to the pleura are those of the lung (often adenocarcinoma) and the breast.[2,21] Less commonly, tumors of the ovary and the stomach metastasize to the pleura also. Carcinomatous pleurisy is almost always associated with mediastinal lymph node carcinomatosis.

Conclusion

Two hundred and eighty-six patients with massive pleural effusion admitted during a 13-years period (1977-1989) were reviewed. One hundred and seventy-eight cases (62.2 per cent) were due to malignancy and 74 (25.9 per cent) were due to tuberculosis. The remaining cases included empyema thoracis, early empyema, liver cirrhosis and congestive heart failure. Straw-colored fluid occurred in tuberculosis (61 of 69, 88.5 per cent), and most patients were below 40 years of age. In contrast, 54 of 70 cases (77.1 per cent) were due to malignancy and were mostly over 40 years old. Fifty-five of 56 cases with serosanguinous fluids, whose ages were over 40, were due to malignancy. Most cases with bloody effusions were caused by malignancy.

Acknowledgment

The authors would like to thanks Dr. Nusont Kladcharoen for his suggestion and revision for completeness of this report.

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