Study of C-reactive protein in the pleural fluid

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Abstract

The present study evaluates C reactive protein (CRP) that can be used as a new marker to better determine Exudative Pleural Effusions (EPE), whether it be parapneumonic, tuberculosis or malignancy pleural effusion.

The test was submitted to 131 patients with pleural effusion hospitalized at the hospital of lung disease " Shefqet Ndroqi" in Tirana. The CRP was examined in the pleural liquid and the peripheral blood that were taken in the same moments to the patients. The method used to make the examination was immune-turbidimetric with the apparatus Cobas 2010 and high sensitivity CRP test, at Intermedica Laboratory. The etiology of the effusion was determined by pneumologist doctors, based on clinical and laboratory data of the patients. The data were subjected to a statistical processing using One Way Anova test and Student t- test. The difference between the three groups was more evident based on the values of CRP in pleural liquid in compare with: the values of CRP at the peripheral blood, or the proportion CRP pleural liquid - CRP peripheral blood. The $p<0.05$ suggested that CRP is statistically a significant marker to differentiate the three subgroups of EPE. The values: (< 16 mg/l) suggest a malign effusion, (>70 mg/l) suggest a tuberculosis effusion and (40-60 mg/l) suggest a parapneumonic effusion. A better difference is seen between the CRP values of the two groups, malignancy and tuberculosis. Future tests, like Adenosine Deaminase (ADA) is being considered to be studied for a better determination of the three groups.

Keywords: *C-reactive protein, exudative pleural effusion, malign pleural effusion, parapneumonic pleural effusion, tuberculosis pleural effusio*

Main Body

C reactive protein is an acute-phase protein, is found in the blood, and its levels rise in response to inflammation and it is a member of the pentraxin family of proteins. Its physiological role is to bind to phosphocholine expressed on the surface of dead or dying cells (and some types of bacteria) in order to activate the complement system via the C1Q (Thompson D, Pepys MB, Wood SP ,February 1999) . CRP is synthesized by the liver (Pepys MB, Hirschfield GM ,June 2003) in response to factors released by macrophages and fat cells (adipocytes) (Lau DC, Dhillon B, Yan H, Szmitko PE, Verma S ,May 2005). It is Discovered by Tillett and Francis in 1930 (Tillett WS, Francis T.,September 1930). The *CRP* gene is located on the first chromosome (1q21-q23). During the acute phase response, levels of CRP rapidly increase within 2 hours CRP is used mainly as a marker of inflammation

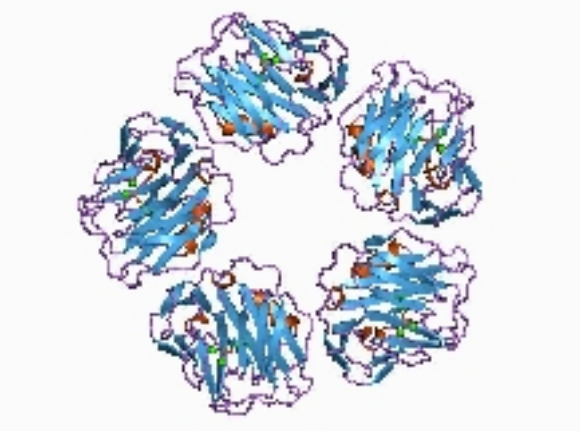

Fig 1.1 Pentameric structure of CRP

The aim of the study is to evaluate that the measures of CRP in the pleural liquid is valuable test to identify the pleural effusion transudate from exudates and it is valuable to differentiate the subgroups of exudative pleural effusion (parapneumonic, tuberculosis, or malignancy)

Method

In these study were taken in the same time the pleural liquid and the pherifpheal blood of patient hospitalized at the hospital of lung disease Shefqet ndroqi in Tirana. The study was based on 131 patients with pleural effusion. To examine CRP was used the imunoturbidimetric (Price Cp.,Trull Ak., Berry D., Gorman EG 1987) (Senju O., Takagi Y., Gomi K., Ishii N., Mochizuki S., Ishii N et al.1983) method with the apparatus Cobas 2010 and high sensitivity CRP test, at the laboratory Intermedica. The etiology of the effusion was determined by pneumologist doctors, based on clinical and laboratory data of the patients. Based as well on Light Criteria were identified: 41 cases with Malign pleural effusion; 13 cases Tuberculosis pleural effusion ; 34 cases with Parapneumonic pleural effusion ; 34 cases transudate and 9 cases that it was not possible to determine in either of the above groups.

Table 1.1. The frequency of the diagnosed groups

	Diagnosed groups	Frequency
1	**Exudate**	**88**
	Malign	41
	Tuberculosis	13
	Parapneumonic	34

2	**Transudate**	**34**
3	**Not identified**	**9**
	Total	**131**

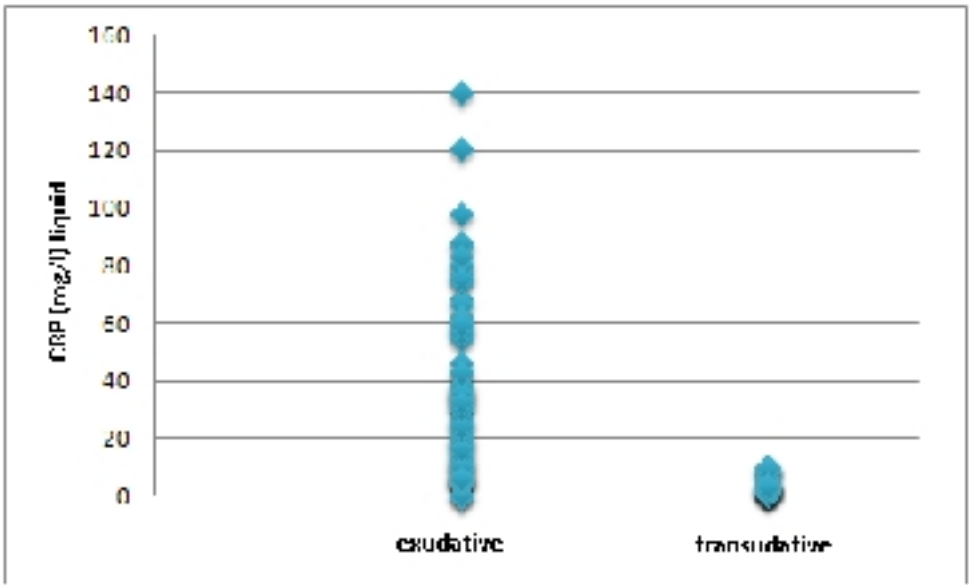

Fig 1.2 Individual value of CRP for exudative and transudative pleural effusion

The number of transudative pleural effusion cases was very limited, for this the study is subjected for further studies. The separation between exudates from transudat should be used together with Light Criteria (Light R,. Macgregor M., Luchsinger P., Ball W. 1972)

The CRP data of exudative pleural effusion were subjected to a statistical processing using the programme SPSS (Statistical Package for the Social Sciences). At the tables 1.2 - 1.4 are demonstrated the results of the statistical processing, the average and the standard error for the

values of CRP in pleural liquid, in serum and the ration liquid - serum at the three subgroups of exudative pleural effusion

Table 1.2 Average and standard error of CRP in pleural liquid

Exudative pleural effusion	CRP(mg/l) in pleural liquid
Malign	13,5244±2,49072
Parapneumonic	43,1176±4,31239
Tuberculosis	72, 1231±4,66998

Table 1.3 Average and standard error of CRP in serum

Exudative pleural effusion	CRP (mg/l) serum (pheripheal blood)
Malign	47,4659±7,74375
Parapneumonic	89,9706±9,73646

Tuberculosis	167,569±22,4922

Table 1.4 Average and standard error of CRP ratio liquid/serum

Exudative pleural effusion	**CRP (mg/l) liquid/serum**
Malign	0, 3100±0,02066
Parapneumonic	0,5263±0,03127
Tuberculosis	0,5153±0,05858

The data were subjected to a statistical processing using One Way Anova test and Ssudent t- test to evaluate if the three groups of exudative effusion differ from each other based on the CRP values. Fig 1.3 and fig. 1.4 demonstrate the distribution of the individual values of CRP in the

pleural liquid and in serum. The values of CRP from the ration liquid/ serum are not significative from our test.

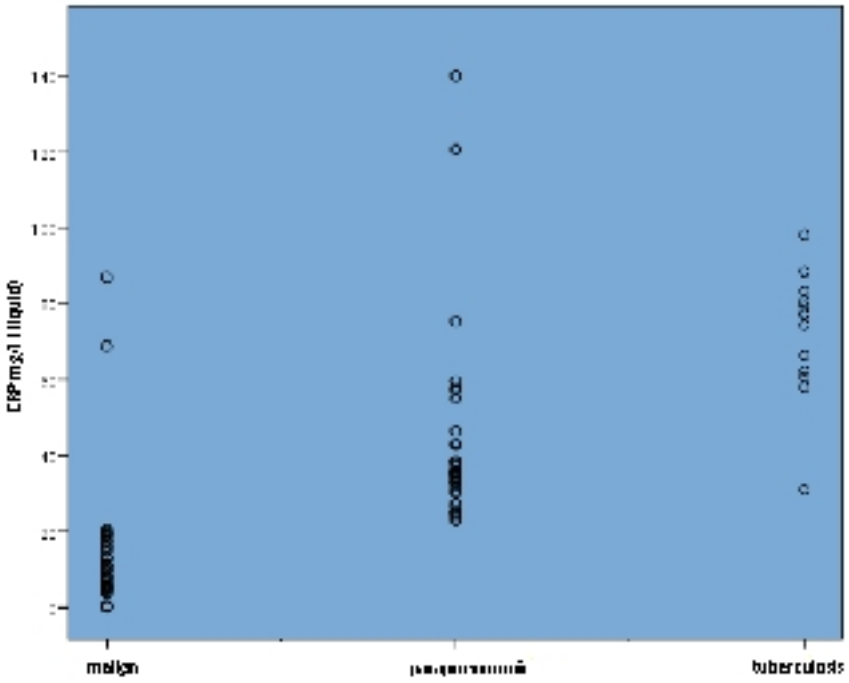

Fig 1.3 Individual value of CRP in pleural liquid for each diagnosed group

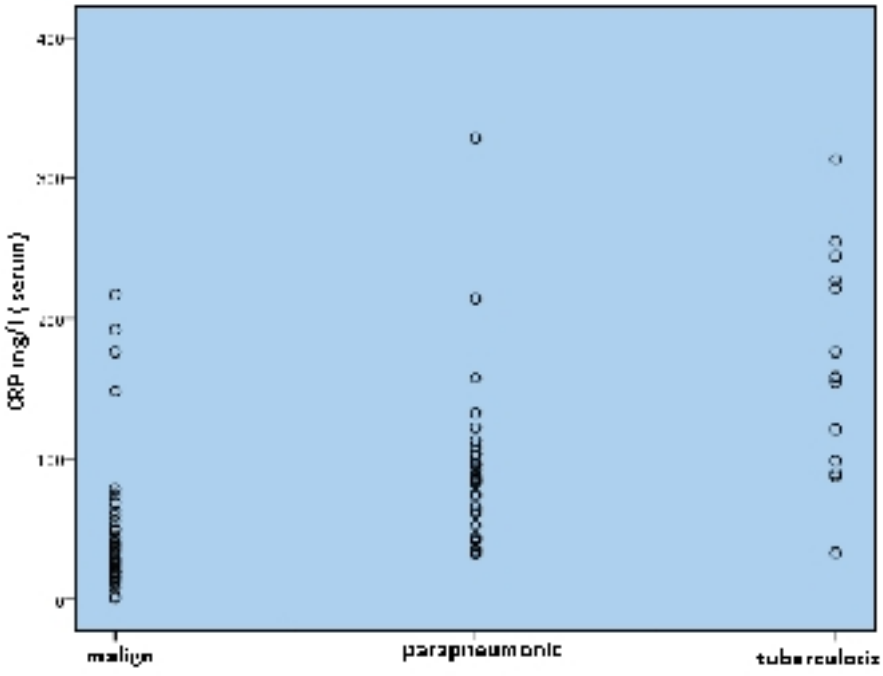

Fig 1.4 individual value of CRP in serum liquid for each diagnosed group

The $p<0.05$ suggested that CRP is statistically a significant marker to differentiate the three subgroups of EPE. Based on fig 1.3 and 1.4 the differences between the three groups is more obvious for the CRP in liquid and better difference is seen between the CRP values of the two groups, malignancy and tuberculosis The values of CRP: (< 16 mg/l) suggest a malign effusion, (>70 mg/l) suggest a tuberculosis effusion and (40-60 mg/l) suggest a parapneumonic effusion. Future tests, like Adenosine Deaminase (ADA) is being considered to be studied for a better determination of the three groups.

Results

- Measurement of the CRP in the pleural liquid provides important diagnostic information that should be taken in consideration together with other epidemiological data, cytological and biochemical.
- the level of CRP is important in the differentiations of exudative from transudative pleural effusion. As the number cases of transudative pleural effusion was very limited, the study is subjected for further studies. The separation between exudates from transudat should be used together with Light Criteria.
- The proportion of CRP liquid/ serum is not important to diagnose pleural effusion
- The values of CRP: (< 16 mg/l) suggest a malign effusion, (>70 mg/l) suggest a tuberculosis effusion and (40-60 mg/l) suggest a parapneumonic effusion.

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