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Finding Thrombocytosis at the Time of the Diagnosis in the Patients With Pneumonia, Bronchiolitis and Asthma, and Its Importance in Terms of the Diagnosis

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Abstract

Introduction: The aim of our study is to evaluate thrombocytosis at the time of the diagnosis in the patients with pneumonia, bronchiolitis and asthma, and its importance in terms of the diagnosis.

Materials and Methods: We evaluated 583 patients diagnosed as asthma (n=36), bronchiolitis (n=387) and pneumonia (n=160) in pediatry clinic of GATA Haydarpasa Training Hospital and Zeynep Kamil Research Hospital between January 1, 2007 and January 1, 2010; and the ratio of patients with thrombocytosis at the time of diagnosis retrospectively.

Results: We found that the mean thrombocyte counts in patients who had been diagnosed as pneumonia and as bronchiolitis were found significantly higher than control group ($p < 0.05$). But, there wasn't a significant difference between the patients with asthma and control group ($p = 0.77$). Otherwise, the number of patients who have thrombocytosis with pneumonia and bronchiolitis were significantly higher than control group ($p < 0.005$). But there wasn't a significant difference in chronic asthma group ($p = 0.81$).

Conclusion: Our study supports that, the thrombocyte counts are also another parameters that can help while making the diagnosis of the infectious pulmonary pathologies.

Keywords: Reactive thrombocytosis; Asthma; Pneumonia; Bronchiolitis.

Introduction

The thrombocyte counts' being more than 400.000/ml is called thrombocytosis. This value is accepted as the upper physiologic limit in children. The increased thrombocyte count may be primary (autonomic-the growth factor related) or secondary (reactive-cytokine related). The reactive thrombocytosis is the most common one in the causes of the thrombocytosis. Any study was made neither about the pneumonia and bronchitis which occur due to the viral and bacterial infections; nor in the asthmatic patients who are noninfectious in character. We analysed the existence and the degree of the thrombocytosis in the pneumonia, asthma and bronchiolitis in our study.

Methods

We evaluated the patients diagnosed as asthma (n=36), as bronchiolitis (n=387) and as pneumonia (n=160), who had applied to the pediatry clinic of GATA Haydarpasa Training Hospital and Zeynep Kamil Research Hospital between January 1, 2007 and January 1, 2010; and the ratio of patients with thrombocytosis at the time of diagnosis retrospectively.

Definitions

Pneumonia: The diagnosis was made with the anamnesis, cough, fever ($>39^{\circ}\text{C}$), the leukocytosis, the auscultation findings and the infiltration detected on the lung X-rays [1].

Asthma: The diagnosis was made (with excluding the infection) with the anamnesis, the haemogram and the lung X-rays in the patients who were being followed up because of asthma; and at the time of an acute asthmatic attack in the patients who had been taking chronic treatment [2].

Bronchiolitis: The diagnosis was made with the anamnesis, the existence of growling respiration, the complete blood count (CBC) and the increase in the air content on the lung X-rays [3].

Thrombocytosis: The thrombocyte counts' exceeding the normal values is called thrombocytosis. It is the thrombocyte count's being more than 400.000/mm³ [4].

Primary thrombocytosis: It is the thrombocytosis which occurs because of an autonomic situation in the bone marrow. It is seen in the course of the myeloproliferative diseases [5].

Secondary thrombocytosis: It is the thrombocytosis which occurs as a result apart from the bone marrow autonomy giving rise to a thrombocytosis. It is thrombopoietin and IL-6 mediated [5].

The patients verifications of the complete blood count (CBC) taken at the time of the diagnosis were analysed retrospectively. The thrombocyte counts above 400.000/mm³ which is accepted as the physiologic upper limit of the thrombocyte count are accepted meaningfully high.

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The CBC assay was evaluated with the acquaintance obtained from the COULTER MD II hemolytic analyser. 100 healthy children were determined as a control group. There weren't any other thrombocytosis causes like iron deficiency anemia, connective tissue disease, surgery or malignancy in the patients attending to our study.

The statistical analysis

The statistical datas were evaluated with SPSS 15.0. Number of thrombocytes in groups were analysed by mean and standart deviation. In study, non-parametric variables were evaluated with Mann-Whitney U test. Categorical variables were evaluated with chi-square test or Fisher's exact test. Statistical significance was accepted as $p < 0.05$.

Results

160 patients who had been diagnosed as pneumonia, 387 patients who had been diagnosed as bronchiolitis, 36 patients who had been diagnosed as asthma, and their thrombocyte counts obtained from the CBC (which is made at the time of the diagnosis) were evaluated. As a control group, the CBC verifications from the 110 children, who had applied to the pediatry clinic and had no complaint, were planned. Among them, 10 people who had anemia were excluded from the study.

53.8% of the patients who had been diagnosed as pneumonia were boys, 46.2% of them were girls. The mean age was 26.4 months; the standart deviation (SD) was ± 30.7 months. The mean hemoglobin value was 11.3 g/dL (± 0.15). At the time of the diagnosis, in the 37.5% of the patients the thrombocyte counts were above 400.000/mm³. The mean thrombocyte count was 368.000, the SD was ± 148.000 . Only in one patient, there was 1.000. 000/mm³ thrombocyte count.

69.2% of the patients who had been diagnosed as bronchiolitis were boys, 30.8% of them were girls. The mean age was 20.4 months, the SD was ± 26.1 months. The mean of the hemoglobin values was 11.6 g/dL (± 0.4). At the time of the diagnosis, the thrombocyte counts in the 38% of the patients were above 400.000/mm³. The mean thrombocyte count was 379.000/mm³, the SD was ± 128.000 . The maximum thrombocyte count was 826.000/mm³.

61.1% of the patients who had been diagnosed as asthma were boys, 39.9% of them were girls. The mean age was 61.8 months, the SD was ± 37.4 months. The mean of the hemoglobin values was 12.4 g/dL (± 1.4). At the time of the diagnosis, the thrombocyte counts in 22.2% of the patients were above 400.000/mm³. The mean thrombocyte count was 331.000/mm³, the SD was ± 120.000 . The maximum thrombocyte count was 605.000/mm³.

50% of the control group were boys, 50% of it were girls. The mean age was 56.4 months, the SD was ± 32.5 months. The mean of the hemoglobin values was 12.6 g/dL (± 0.3). The mean thrombocyte count was 309.000/mm³, the SD was ± 67.000 . The thrombocyte counts in 19.8% of them were above 400.000/mm³.

The demographic datas and the hematological findings of the patients and the control group are demonstrated in table 1.

The mean thrombocyte counts in the patients who had been diagnosed as pneumonia and as bronchiolitis were found significantly higher than control group ($p < 0.05$). But, there wasn't a significant difference between the patients with asthma and control group ($p = 0.77$).

Likewise, the number of patiens who have thrombocytosis with pneumonia and bronchiolitis were significantly higher than control group ($p < 0.005$). But there wasn't a significant difference in chronic asthma group ($p = 0.81$).

Discussion

Typically, the thrombocytosis is established incidentally in the CBCs at the time of an irrelevant case's survey. In our study, we researched if this information, which may be obtained at the time of the diagnosis of the bronchiolitis, asthma and pneumonia, is statistically significant or not.

The increased thrombocyte count may be reactive (cytokine related) or autonomic (growth factor related) [6,7]. The reactive thrombocytosis reflects the situations apart from the autonomic thrombocytosis like the chronic myeloproliferative or myelodysplastic diseases. There is an increase due to the surgical or internal problems ;and when this situation is ameliorated, it comes back to the normal levels.

The rective thrombocytosis is seen more commonly both in the adults and in the children, when it is compared to the autonomic thrombocytosis [8]. The most common causes of the reactive thrombocytosis are the infections (31%), the surgery and infection association (27%), the condition after the surgery (16%), the malignancy (9%), the postsplenectomy (9%) and an acute blood loss or iron deficiency (6%) [9].

Thrombopoietin is a hormone which plays a key role in the course of megakaryocyte differentiation and proliferation. Interleukin-6 (IL-6) and IL-11 may also take a role in the accessory ways in this process. The megakaryocytes and their precursors have thrombopoietin receptors (c-Mpl receptors). The thrombopoietin in the plasma binds to the c-Mpl on the thrombocytes. The free thrombopoietin can induce magakaryocyte proliferation. Together with it, when the thrombocyte counts decrease, the increased free thrombopoietin can induce thrombocytosis. When the thrombocyte counts regress to the normal levels, the decreased thrombopoietin levels slow down the megakaryopoiesis. Thus, the total thrombocyte amount keeps the thrombocyte production at a certain level [10].

In some cases of the reactive thrombocytosis, the underlying inflammatory stimulus may increase the amount of the thrombopoietin produced in the liver. The plasma thrombopoietin levels in the reactive

	Pneumonia	Bronchiolitis	Asthma	Control
Gender(M/F)	53.8/46.2	69.2/30.8	61.1/39.9	50/50
Age (Month)	26.4(± 30.7)	20.4(± 26.1)	61.8(± 37.4)	56.4(± 32.5)
WBC Count/L	13.6(± 0.59)	11.7(± 0.24)	11.1(± 0.75)	6.7(± 0.38)
Hemoglobin (gr/dl)	11.3(± 0.15)	11.6(± 0.4)	12.4(± 1.4)	12.6(± 0.3)
Platelets /L	368.000 (± 148000)	379.000 (± 128.000)	331.000 (± 120.000)	309.000 (± 67.000)
>400.000 platelet	37.5%	38%	22.2%	19.8%

M: Male F: Female WBC: White Blood Cell

Table 1: The demographic datas and the hematological findings of the patients and the control group.

thrombocytosis may be normal or it may be normal in an inappropriate form. This increase in the acute inflammation stimulates the counts of the thrombocytes to increase.

It is reported that, the plasma IL-6 plays a key role in the reactive thrombocytosis situations. This interleukin plays a dominant role in the acute phase response in the inflammatory and neoplastic situations. Thus, the thrombopoietin increases the expression of Messenger RNA (mRNA) in the liver [11].

In this way, IL-6 might be taking a key role in the thrombopoietin synthesis in the reactive thrombocytosis.

There are researches analysing the reactive thrombocytosis and the lower respiratory tract infections. The informations about these are as follows:

Efraim et al. [12] found a significant relation between the thrombocytosis seen in the patients with RSV bronchiolitis and the disease, in their study. But, they didn't search the thrombocytosis relation in the other respiratory tract pathologies.

Yang et al. [13] have reported the increased thrombopoietin and thrombocyte counts in the SARS disease. Also, Vlacha and colleagues have reported that the thrombocytosis had occurred in serious lower respiratory tract infections [14].

In these studies, generally, the thrombocytosis which occurs due to a pulmonary infection was studied. But, the comparison with the other pulmonary cases which aren't due to infections wasn't made. In our study, we evaluated the thrombocytosis in the patients who had been followed up because of asthma and who had been followed up because of bronchiolitis and pneumonia formed due to infection.

In our study we found that the mean thrombocyte counts in the patients who had been diagnosed as pneumonia and as bronchiolitis were significantly higher than control group. But, there wasn't a significant difference between the patients with asthma and control group indicating that the reactive thrombocytosis occurs secondary to an infection more commonly.

In our study, we searched the thrombocyte count's being above 400.000 /mm³. (Which is the physiological upper limit of the thrombocyte count) in the patients with pneumonia, bronchiolitis and asthma, at the time of the diagnosis. The number of patients who have thrombocytosis with pneumonia and bronchiolitis were significantly higher than control group. But there wasn't a significant difference in chronic asthma group (p=0.81). This result also suggested that the reactive thrombocytosis occurs secondary to an infection more commonly.

As a result of our study, we determined that, the thrombocyte counts in the pulmonary diseases that are due to the infections (pneumonia, bronchiolitis) are higher than they are in the pulmonary diseases that are not due to the infections (asthma). In this way, one can think that the thrombocyte counts' being high in the patients, who have applied because of a complaint of a pulmonary disease, may ensure considering the infectious diseases at the foreground. The thrombocyte count may be a valuable helper in the evaluation of the patients who have applied to the doctors because of respiratory system complaints.

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