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EOSINOPHIL COUNT AND ITS IMPACT ON GENERAL ANESTHESIA

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ABSTRACT

The association between absolute eosinophil count and perioperative respiratory dysfunction is a risk factor for the development of adverse respiratory events. Important diseases associated with high eosinophil count are asthma, drug allergies, skin diseases, parasitic infections, acute lymphoblstic leukemia, Hodgkin's lymphoma, systemic lupus erythematosus, and familial eosinophilia. Hyper reactive airway is important to be diagnosed early as this may result in perioperative respiratory dysfunction ranging from coughing, stridor to atelectasis. The results of our study show a mean absolute eosinophil count of 718 (p =0.0457) for five patients undergoing nephrectomy. However, there was no respiratory event encountered. The three variables of bronchospasm, stridor and decreased SPO2 levels serve as good parameters to check for complications that may arise out of high eosinophil count during general anesthesia.

INTRODUCTION

Eosinophils are one of the components of white blood cells and are pro-inflammatory linked to the immune system. Though these cells make up 1-2% of white blood cells yet, their differentiation is cytokine-dependent especially the Interleukin – 5 (IL – 5). Eosinophils have a circulatory life span of 8 – 12 hours but may persist in tissues for 1- 2 weeks.1 Eosinophils play an important role during viral infections while they cause tissue damage due to the release of inflammatory mediators, especially in Bronchial asthma. 2, 3, 4

IMPLICATIONS OF EOSINOPHIL COUNT AND GENERAL ANESTHESIA

World Health Organization (WHO), 2015 has given a range for eosinophil count with the upper the normal range of eosinophil in the blood from 3% to 5 %.The absolute eosinophil count (AEC) is a measurement of the percentage of eosinophils multiplied by white blood cell count with a normal range between 350 – 500/mm^3.

When the levels go beyond normal the condition is called eosinophilia. Eosinophilic counts have a diurnal variation with the lowest counts which found in the morning and the highest at midnight. Broadly eosinophilia is divided into primary, secondary, and idiopathic eosinophilia. Important diseases associated with high eosinophil count are Asthma, drug allergies, skin diseases (Pemphigus, dermatitis, etc), parasitic infections, acute lymphoblstic leukemia, Hodgkin's lymphoma, systemic lupus erythematosus, familial eosinophilia, etc.

"Eosinophilia is Classified as mild (AEC 600-1500 cells/ l), moderate (1500-5000/ l) and severe (AEC->5000/ l)."6

RISK FACTORS FOR PERIOPERATIVE BRONCHOSPASM

Respiratory infection, chronic smoking, chronic bronchitis and emphysema, bronchial asthma, allergic rhinitis and drug-induced bronchospasm.

CLINICAL PRESENTATION AND DIAGNOSIS

Clinically eosinophilia is a presentation of varied dermatological symptoms like rashes, fever, arthralgia or angioedema followed by other organs (lungs, heart and gastrointestinal) dysfunction. Gaikwad et al (2015) conducted a study to identify the association between AEC and perioperative respiratory complications in children and concluded that AEC>600 is a definite risk the factor for adverse respiratory events. The Authors reported important respiratory events such as desaturation which occurred in 90% while four patients had encountered laryngospasm and decreased Oxygen saturation (80%).7

PERIOPERATIVE BRONCHIAL HYPERACTIVITY

Bronchial hyperactivity is a result of increased activated eosinophils with mast cell degranulation. Eosinophil granules contain eosinophil peroxidase which can initiate mast cell secretion and promote inflammation.This is characterized by the presence of eosinophilic cationic protein and tryptase which is toxic for helminthes. A study by BS Von Ungern – Sternberg has reported a high concentration of both these parameters (P = 0.002 and p = 0.01) in bronchoalveolar lavage fluid analyzed from both patients suffering from asthma and healthy children. Gundappa Parameswara has reported great concern in delivering anesthesia for patients with hyperreactive airway as this may result in perioperative respiratory dysfunction ranging from coughing, stridor to atelectasis.5,8

EXPERIENCE AT A TERTIARY CARE CENTER: A BRIEF REPORT

The main aim of the study is to examine the relationship between eosinophil count and adverse perioperative respiratory events in three variables namely: bronchospasm, stridor and fall in SPO2 level in the perioperative period, at the time of recovery and postoperative period (12 and 24 hours) respectively. We share herewith a brief report of patients undergoing surgical Nephrectomy in Table 1 and 2 as shown below.

RESULTS AND OBSERVATIONS :

Expressed as descriptive analysis of frequency and means with standard deviation. The statistical analysis by Unpaired t-test have also been shown in Table -2.

Table 1: Demographic Profile and Type of Surgery

Demographic Profile	Demographic Profile	Frequency
Gender	Male	3
	Female	2
Age(years)	Minimum	24
	Maximum	61

Type of Surgery	Right Nephrectomy	2
	Left Nephrectomy	3
Type of Anesthesia	General Anesthesia + Epidural Anesthesia	5

Table: 2: Blood Count and Respiratory Parameters

Parameters	Parameters	Frequency
Blood Count	– Absolute Eosinophil	728 ± 302.4 **
	– Absolute Eosinophil Count Range	718 92.7%
Respiratory Parameters	– SPO2 Intraoperative	100%
		94 ± 2.9
		95 ± 2.3

**P = 0.0457 (Unpaired t- test)

The overall findings showed an increase in AEC in three cases. However, no respiratory adverse event was encountered.

CONCLUSION

The diagnostic interpretation of eosinophil count and absolute eosinophil count is helpful in predicting airway responsiveness in most patients undergoing surgery. The type of anesthesia and complications which may arise should be considered as unwanted perioperative and postoperative events may be encountered. The article focuses on airway dysfunction as a result of increased eosinophil count. Even though our study showed no adverse events, it should not be taken as tool of exclusion with regards to eosinophil count. The limitation being the obvious, that is less sample size and further evaluation in larger sample population is being undertaken.

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