



Research Paper

Variation of Neutrophil Count during Pre- Operative and First Post Operative Days

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ABSTRACT:- Stress is a state of threatened Homeostasis. It may be induced by various Physical and Psychological factors called Stressors. One amongst the various stressors is Surgery - either Surgical Trauma or other aspects of Surgery. The experience of undergoing Surgery or the very thought of it is known to induce a short term Fight and Flight Physiological Stress Response. The primary objective is to identify the changes in Neutrophil count by using Leishman Staining technique during pre-operative and first post operative days in adults posted for elective surgery as it is an easy, simple, inexpensive, reliable prognostic index to determine host immunity and to predict the post operative outcome. The excessive inflammatory response together with the depression of immunity after Surgery appears to be responsible for increased susceptibility to sepsis due to the role of Neutrophils in inflammation. Neutrophil count is also used to monitor the responses to stress caused by Surgery.

Keywords:- Adults, Leishman Staining technique, Neutrophil count, pre-operative day, first post operative day

I. INTRODUCTION

Surgery is a medical speciality where-in operative procedure and instrumentation is used to investigate and treat a disease or injury. During surgery the skin, mucous membranes are cut and the internal tissues are exposed to external environment and pathogens. It also produces tissue damage and inflammation^[1]. A patient undergoing surgery experiences sudden and intense change in the normal physiological functions of the body. The Stress Response is a part of systemic reaction to injury which compromises a wide range of endocrinal, metabolic, hematological, immunological effects secondary to cellular, organ system insult, tissue injury and nociceptive stimulation.

An optimum stress Response would enhance the recovery of the surgical patient. But, the excessive stress response and deviation from the normal course may affect the recovery and post operative outcome^[2]. The magnitude of surgical stress exerted on the patient is of paramount importance. Surgical stress response is accompanied by a general peripheral leucocytosis with changes in the various subsets like Neutrophils, Lymphocytes, Monocytes, Basophils and Eosinophils.

II. MATERIALS AND METHODS

The present study was conducted in the department of Physiology, Kurnool Medical College and department of surgery in Government General Hospital, Kurnool in Andhra Pradesh for the selection of subjects. Prior to the commencement of the study consent was obtained from the College Ethical Committee and written consent was obtained from the subjects. Each subject was informed in detail of its objective, the aim of the research protocol and the method to be used. Along with routine pre-operative lab investigations, Differential Leucocyte Count of the pre operative and post operative blood samples was determined using Leishman Staining technique. A total of 50 adult subjects of male and female posted for elective surgery like Hernia repair, Hydrocele, Cholecystectomy, Excision of Lipoma and Dermoid with no signs of infection pre-operatively, without any hormonal therapy and blood transfusion during pre and post operative period were

selected. Pre-operative and first post operative day neutrophil count was considered as control group and case group respectively. 1ml of venous blood was collected under strict aseptic precautions using sterile disposable syringes on the day of admission prior to surgery and first post operative day respectively. The collected blood was transferred to a sterile specimen bottle containing an anti coagulant – EDTA. The collected blood sample was subjected for estimation of Differential Leucocyte Count by using Leishman Staining technique. Neutrophils were identified according to their size, nucleus, cytoplasmic and nuclear ratio, cytoplasm color, presence of granules, their color and size.

III. RESULTS

The data obtained was analysed by using unpaired student's t-test for difference of means with unequal variances for statistical analysis.

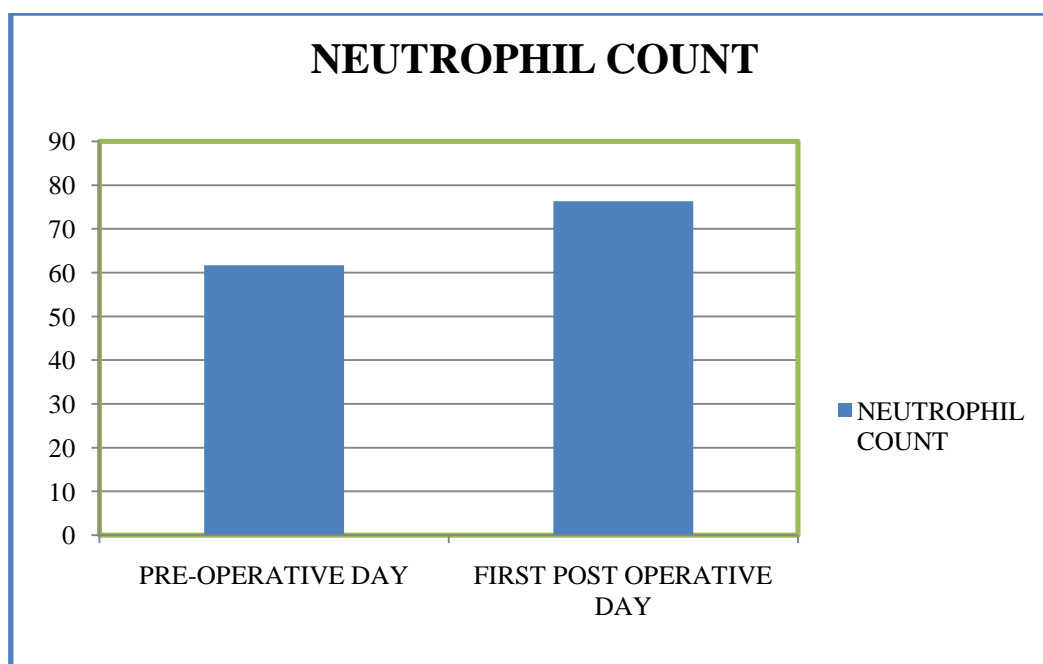
TABLE SHOWING COMPARISON OF NEUTROPHIL COUNT DURING PRE- OPERATIVE AND FIRST POST OPERATIVE DAYS

DIFFERENTIAL LEUCOCYTE COUNT	PRE-OPERATIVE DAY (MEAN±SD)	FIRST POST OPERATIVE DAY (MEAN±SD)
NEUTROPHIL COUNT	61.70±4.61	76.32±4.50

Values are Mean ±SD for 50 subjects in each group. P value is <0.0001

Neutrophil count was significantly affected during first post operative day when compared to pre operative day. Mean and Standard Deviation of both groups was being compared in the table.

There is a significant increase in neutrophil count during first post operative day when compared to pre-operative day as shown in the graph.



IV. DISCUSSION

Stressful experiences may affect both physical well being and immune functions of the body. Surgery evokes an endocrine stress response characterized by increased serum cortisol and other changes basically the immune response. The immune response to surgery is a beneficial reaction needed in local host defence, wound healing and in preventing the body from making auto antibodies against its own tissues. The responses may however contribute to the development of post operative infections and spread of malignant diseases. During uncomplicated conventional surgeries the immune response goes clinically unnoticed without any harmful effects. Absent responses, excessive high responses on the other hand harm the patient.

Understanding of normal course of surgical stress response can enable the clinician, surgeon to get prepared for the expected responses, to identify any deviations in order to plan the post operative care.

Differential cell counting is the enumeration and classification of the leucocytes seen on the blood smear. Alterations in the relative proportions of different leucocytes are a measure of reactions of the body to various noxious agents.

There was a significant increase in the neutrophil Differential Leucocyte Count during the first post operative day. The stress response to surgery compromises a number of hormonal changes initiated by neuronal activation of the Hypothalamic Pituitary Axis. The Endocrine response is activated by the afferent impulses from the site of injury. These travel along sensory nerve roots through the dorsal root of spinal cord up to mid brain to activate hypothalamus.

Host immune response is triggered locally as a tissue response to injury/surgery consists of a non specific, primitive inflammatory response followed by a specific immunity. Inflammation is an initial vasoactive phase characterized by vasodilatation, hangs in vascular permeability and oedema. This is followed by a second phagocytic phase of inflammation characterized by infiltration of the injured site with neutrophils and monocytes. Neutrophils function to eradicate foreign particles and microorganisms. Cytokines have important role in mediating and maintaining inflammatory response to tissue injury. After Surgery the important cytokines released are IL-1, TNF-a, IL-6 etc are released from the activated immune cells like neutrophils, lymphocytes, monocytes etc.

Neutrophil function is also regulated by the Neuro endocrine Axis. Cortisol causes increase in the neutrophil count primarily by release from storage in the vessel walls. Although it is observed in the present study that the alterations persisted till the 5h day post operatively and the values returned to the preoperative values by 7th day; As a limitation to this Ogawa et al observed significantly decrease in lymphocytes persisted for about 2 weeks Post operatively in patients with Gastrointestinal Cancer. This may be because the cancer patients are already immunosuppressed and if they are subjected to surgery the immunity of the host would be further depressed. And this makes a Surgeon to be Cautious about the immune status of the patient and further more the Immune status of the patient should be taken into consideration for appropriate planning of Surgery.

V. CONCLUSION

The increase in neutrophil count during first post operative day may be regulated by the neuro endocrine axis. Cortisol causes increase in the neutrophil count primarily by release from storage in the vessel walls. Understanding the normal course and magnitude of stress response can aid the surgeon/clinician in preparing for normal expected changes, recognizing and perhaps correcting the deviations from the normal. Deviations from the normal time course may represent the effects of pre existing medical illnesses, treatment of post operative complications.

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