

Study Protocol

Title of Study/article: “Clinical Significance Of Neutrophil Lymphocyte Ratio And Platelet Lymphocyte Ratio In Predicting Postoperative Complications In Patients Undergoing Major Abdominal Surgery “

ABSTRACT:

Background: Major abdominal surgeries are those that require more than 30 minutes, are conducted under general anaesthesia, and need at least a six-day stay in the hospital

Aim: To examine the clinical significance of pre-operative and postoperative NLR and PLR as separate morbidity parameters and the occurrence of surgical or non-operative complications in major abdominal operations. **Objectives:** . To determine the possible postoperative association of the importance of Neutrophil Lymphocyte Ratio(NLR) and Platelet Lymphocyte Ratio (PLR) with postoperative complication. **Methodology:** This prospective study to find out the prediction postoperative complication after major abdominal surgery by nlr and plr values would be conducted in Acharya VinobhaBhave Rural Hospital located in Central India in 30-50 participants between July 2019 to October 2021. **Results:** The findings obtained during the course of the study would be analysed using SPSS software version 25.0 by the statistician.

Conclusion: The Nlr and Plr Ratio Is An Important Inflammatory Predictive Value In Assessing The Post-Operative Morbidity In Cases Of Major Abdominal Surgeries

Keywords: Nlr And Plr, Post Operative Complications, Clavindindo Classification

Introduction

Major abdominal surgeries are those that require more than 30 minutes, are conducted under general anaesthesia, and need at least a six-day stay in the hospital. (1). Major abdominal surgery included operations on the gastrointestinal system such as esophagectomy, gastrectomy, pancreatectomy, hepatectomy, colectomy, small bowel resection, tumour resection, and laparoscopic gastrointestinal surgeries. The term "abdominal tumour resection" refers to a number of procedures used to remove benign and malignant intraabdominal tumours. Small bowel and colon resections are included in laparoscopic gastrointestinal resections. These procedures were closely linked to a red blood cell (RBC) transfusion.(2)

These procedures were closely linked to a red blood cell (RBC) transfusion. The biological goal of this response is to repair cellular damage produced by a stimulant, clear up cellular debris and foreign bodies, and contain bacteria and/or stimulants to prevent harmful effects on the body. Inflammation can be caused by a variety of viral or noninfectious processes, but the response is always the same. White blood cells (WBCs) are important in the development of inflammation. Any stimulant that activates leukocytes leads these cells to secrete key mediators that are involved in the inflammatory process. (3). Most important inflammatory factors are not easy to approach before surgery and some tools are only used for research. Systemic inflammatory response is a key factor in cancer development but there are indicators based on inflammation which measure for different type of cancer.

Systemic inflammation status are revealed through simple and widely available markers like preoperative platelet to lymphocyte ratio (PLR) and neutrophil to lymphocyte ratio (NLR). There is formation of platelet clots around tumor, and clearance of tumor cell impaired NK cell mediated due to attenuation of perioperative anticoagulation after surgery. Furthermore, neutrophils can promote tumour growth by inhibiting lymphocyte and other immune cell activities. Patients' inflammatory and immunological responses to malignant tumours may be exhibited in peripheral blood cells, which are important for predicting therapy responsiveness and clinical outcomes in cancer patients. Therefore, the importance of the systemic inflammatory response in the advancement of cancer has been recognised and it is supported.

Platelets, lymphocytes, and neutrophils are all easily detectable on a regular blood count, and each plays a critical role in the inflammatory and anti-inflammatory processes, immunological response, and coagulation status. These are linked to cancer progression and prognosis in a variety of solid tumours. Neutrophils may come into direct contact with circulating tumour cells, function as reservoirs for circulating vascular endothelial growth factor, and aid metastasis in the inflammatory response to cancer. Lymphocytes are important tumour suppressors because they induce cytotoxic cell death and produce cytokines that impede cancer cell proliferation and spread. Increased NLR, which can be produced by lymphocytopenia or a high neutrophil count, can result in a suboptimal immune response to cancer and an increased risk of recurrence. In the inflammatory reaction, platelets may release thrombotic and suspected tumour growth factors, accelerating endothelial cell development and promoting cancer progression. Low preoperative

LMR was a major predictor of poor prognosis in a variety of malignancies. The patient's nutritional and immunological condition are reflected in PNI, which is determined using blood albumin levels and peripheral lymphocyte counts.

The leukocytes' physiological reaction to stress is an increase in neutrophil count and a reduction in lymphocyte count. Despite modern surgical methods and preventive perioperative medication, surgery stimulates an immediate inflammatory process over a stress reaction, and some major consequences such as surgical site infection, sepsis, and multiple organ failure may emerge in the early postoperative period. (4). Some biomarkers can assist the clinician track the patient by partially estimating the reaction. The neutrophil/lymphocyte ratio (NLR) and the platelet/lymphocyte ratio (PLR) are two inexpensive, repeatable, and quantitative indicators of systemic inflammation. (5,6) NLR has been proposed as a basic biological indicator for evaluating cancer outcomes and classifying the risk of mortality after severe cardiac events. (7,8). Inflammatory indicators are now being studied for their predictive value in a variety of malignancies. In various cancer types, NLR was found to be linked to a poor prognosis and overall survival. (9) Numerous studies have found a link between NLR, PLR, and prognosis, particularly in colorectal malignancies.

Increased morbidity leads to longer hospital stays, higher hospital expenditures, chemotherapy delay, and a lower standard of living.

Inflammatory cells, growth factors, activated stroma, and DNA-damage-promoting substances all contribute to cell proliferation and neoplastic risk in the inflammatory milieu. Meanwhile, the tumour promotes tumour proliferation and metastasis by decreasing apoptosis and boosting angiogenesis and DNA damage, while decreasing apoptosis and increasing angiogenesis. A number of biochemical markers, such as the neutrophil lymphocyte ratio (NLR) and platelet lymphocyte ratio (PLR), have historically been used to determine the extent and impact of an inflammatory reaction (PLR). Systemic inflammation characterises the host response to malignant tumours, resulting in relative thrombocytosis, neutrophilia, and lymphocytopenia.

Platelets promote tumour growth by promoting angiogenesis, enhancing microvascular permeability, and aiding cancer cell extravasation. Inflammation and immune system activation have anticancer properties. They also play a function in cancer carcinogenesis and development. The neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR) are two simple and effective inflammatory and immune markers. Finding reliable biomarkers to detect patients at risk of relapse or metastases, as well as providing individualised treatment, could enhance clinical results.

In this study, we aim to investigate the clinical importance of preoperative and postoperative NLR and PLR as independent parameters of morbidity and development of surgical or non-surgical complications in major abdominal surgery.

Background and rationale

Significant abdominal surgery are operations that take longer than 30 minutes, are conducted under general anesthesia and require a stay of at least six days in the hospital (1). Gastrointestinal procedure procedures in the following types were called major abdominal surgery: esophagectomy, gastrectomy, pancreatectomy, hepatectomy, colectomy, small bowel resection, tumor resection, and laparoscopic gastrointestinal surgery. Abdominal tumor resection for benign and malignant intraabdominal cancers covers a wide variety of procedures.

AIM AND OBJECTIVES

AIM:

To determine the clinical significance of neutrophil lymphocyte ratio(NLR) and platelet lymphocyte ratio (PLR) when predicting postoperative complications in patients undergoing major abdominal surgery

OBJECTIVES:

To Determine The Possible Association Of The Importance Of Preoperative Neutrophil Lymphocyte Ratio(NLR) And Platelet Lymphocyte Ratio (PLR) With Postoperative Complication.

To Determine The Possible Postoperative Association (Day 1,Day 3,Day 5) Of The Importance Of Neutrophil Lymphocyte Ratio(NLR) And Platelet Lymphocyte Ratio(PLR) With Postoperative Complication.

MATERIALS AND METHOD:

Study design: Prospective observational Study

Study population: Patients undergoing major abdominal surgery in avbrh hospital

Setting: A.V.B.R.H. Sawangi (Meghe) Wardha.

Duration of study: 2 years

Sample Size: 30-50 patients

Duration of study: 2 years

Inclusion criteria:

All the patients coming to AVBRH undergoing major abdominal surgery whose age (> 18years)

Exclusion criteria:

Immunosuppression

Ongoing antibiotic and/or chemoradiotherapy

Multiple operations and bleeding disorder

Study Protocol:

It is a prospective study, done on the patients undergoing major abdominal surgery. It will be conducted at Dept.ofsurgery, J.N.M.C and Acharya VinobaBhave Rural Hospital, Sawangi (Meghe), Wardha of DMIMS (DU).

The study will be conducted on patients undergoing major abdominal surgery. Informed consent will be obtained from all the patients and prior approval from institutional ethical committee, DMIMS (DU) will be taken. The NLR and PLR will be calculated by dividing the mean neutrophil counts and the mean platelet counts by the mean lymphocyte count respectively, and its significance will be correlated with post-operative surgical/non-surgical complication after major abdominal surgery. Surgical complications will be graded on the basis of The **Clavien-Dindo** Classification.

Expected outcome\result

Other markers are the neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR), and several studies have shown that elevated NLR or PLR is an important prognostic factor for predicting postoperative complications and cancer-related inflammation induces the suppression of antitumor immunity by recruiting regulating T cells and stimulating chemokines, contributing to tumor growth and metastasis. The involvement of both neutrophilia and thrombocytosis appears to be an unspecific reaction to inflammation associated with cancer. The interactions between preoperative leukocytosis and cancer and neutrophilia remain uncertain. Nevertheless, it has been shown that cancer releases myeloid growth factors such as granulocyte colony-stimulating factor, tumor necrosis factor-alpha, interleukin-1, and interleukin-6 that can affect tumor-related leukocytosis and neutrophilia. In summary, our research found that preoperative NLR and PLR are important predictors of overall survival and postoperative complications in patients with severe leukocytosis and neutrophilia. Strong Nlr and plr value which indicates poor postoperative complications and low survival.

Discussion

The present study evaluated the value of NLR and PLR as predictive markers of post operative complications in major abdominal surgeries. The study was conducted in 80 consecutive patients who were admitted for major abdominal surgeries. There were 51 (63.8%) males and 29 (36.2%) females who were included in the study. Similar gender distribution was reported by **Cho et al (2018)** which included 68.3% males in their study.

In this study, overall, most of the participants (68.8%) were from the age group of 31-60, which included 40.0% males and 28.8% females. About 21 (26.25%) participants were from the age group

of 51-60 years, which included 15.0% males and 11.25% females. About 16.25% were below the age of 30 years and 14.5% were above the age of 60 years. Similar age and gender distributions were also reported by **Xia et al (2020)** and **Lan et al (2017)**.

In the present study, malignancy was the most common diagnosis in 38.8% of the cases, followed by obstruction among 27.5% of the cases and perforation in 17.5% of the cases. About 53.75% of the cases underwent emergency surgery whereas, 46.25% were posted for elective surgeries. Resection and anastomosis were performed among 30.0% of the cases, exploratory laprotomy in 20.0%, Ileostomy/colostomy in 18.8% and Graham perforation repair in 15.0% of the cases.

In the current study, we investigated the value of NLR and PLR for predicting post operative complications in patients undergoing major abdominal surgeries.

In the current study, the significance of NLR and PLR in patients posted for major abdominal surgeries was evaluated. In order to derive the prognostic values of these mediators of inflammation, a ROC curve was used to determine the cut-off scores. As a result, the optimal cut-off values for NLR, and PLR were obtained as 3.5 and 150.0 respectively. These were similar to those observed in other studies (**Zhang et al 2017** and **Templeton et al 2014**).

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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