

## Diagnostic importance of Neutrophil to Lymphocyte Ratio NLR in the Diagnosis of acute Appendicitis

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### Abstract

#### Introduction:

Appendicitis is considered a surgical emergency and acute disorder and is common in widespread all over the world, which can present with specific and sometimes non-specific symptoms. Appendicitis means Inflammation of the Appendix followed by obstruction of Lumen of the Appendix, which is used various methods to diagnose it, including laboratory examination of the blood. It is said that 80 to 85 percent of Patients with Appendicitis have Leucocytosis and more than 75 to 78 percent of patients have Neutrophilia and Lymphopenia.

#### Objective

To determine of Neutrophil to Lymphocyte ratio in acute appendicitis.

#### Method

Across Sectional study was performed in which Differential Leukocyte Count (DLC) of Patients suffering from appendicitis in Aliabad Teaching Hospital surgical service during the year (2018-2019), was studied the ratio of neutrophils to lymphocytes was determined.

#### Results

In total the laboratory exam of 63 patients with appendicitis had been included for the evaluation and statistical analysis.

The average ratio of N/L was found to be  $3.8 \pm 0.1$ , that is higher than its normal value (2.06), So the results of this Study shows that the Ratio of Neutrophil to Lymphocyte in Patients with Appendicitis is too high, which might be a good Diagnostic criterion for these Patients.

#### Conclusion

As the Ratio of Neutrophils to Lymphocytes increases in Patients with Appendicitis, it is suggested that this ratio be considered at the time of Diagnosis in addition to other diagnostic Examinations.

**Keywords:** Appendicitis, Neutrophil, Lymphocyte, Ultrasonography and Neutrophil-to-Lymphocyte ratio.

## **Introduction:**

Appendicitis is considered a surgical emergency and acute disorder and is common in widespread all over the world, which can present with specific and sometimes non-specific symptoms.

Appendicitis refers to the Inflammation of the Appendix that occurs after the obstruction of the Lumen of appendix, due to obstruction of various factors, including swollen lymph node tissue, thickened mucus, or faecal mass. As a result of reactions there caused Inflammation.

Sign of this Disease are sometimes covered by adjacent Sign of Organ Studies by (Sahin, K. 2014) and Colleagues have shown that the accuracy of Clinical Diagnostic findings are approximately 76 to 92% despite advances in the number of Patients with accurate diagnosis (Jung, SK. 2017).

The correct Diagnosis of Appendicitis is important from two aspects. On the one hand, in the event of suspected cases, criteria should be considered to minimize misdiagnosis and to prevent negative surgical procedures. According to the statistics, about 12 to 30 percent of cases of appendicitis can develop perforation due to delayed diagnosis (Goodman, DA et al. 1995).

Statistical studies have also shown negative Appendectomy about 10 to 30% (Jung, SK. 2017).

The use of Ultrasound, Computed Tomography and Laparoscopy can bring us accurate Diagnosis of these Patients, but the use of these Diagnostic Methods is not only available everywhere but can also lead to high Economic costs if used. And Impress the Patients (Yeldem, O. et al. 2006).

Some Laboratory Examinations can help the Surgeon Diagnose the Patient more accurately, including Haematological examinations including White Blood Cell count (TLC) and percentage of Neutrophils and Lymphocytes (Yeganeh, RA. 2005).

Studies show that 80 to 85 percent of patients have Leucocytosis and more than 75 to 78 percent have Neutrophilia and Lymphopenia (Hussian Poor M 2013).

Diagnosis of appendicitis is by obtaining a detailed history and accurate physical examination and performing ultrasound diagnostic tests and blood tests.

Leucocytosis occurs in the course of any inflammatory event, so an increase in the number of White Blood Cells alone cannot be used as a Diagnostic sign of Appendicitis.

The researchers believe that Neutrophil-to-Lymphocyte Ratio (NLR) is more sensitive than leucocytosis to testing for the diagnosis of Appendicitis.

In a study by (Goodman, DA. et al 1995) the ratio of neutrophils to lymphocytes was greater than or equal to 3.5 with a sensitivity of 77.5%.

Also in a study by (Benjamain, IS 2002) and Colleagues, results show that White Blood Cell count and Neutrophil-to-Lymphocyte Ratio (N / L) are higher in Patients with Appendicitis than non-infected individuals.

In the same study that was conducted by (Goodman D.2014) and his colleagues also found that the number of Neutrophils is high in Appendicitis and the number of Lymphocyte has been reduced.

Similarly, Research (Sahin k 2014) and colleagues at Ankara in the Department of Surgery also found that Neutrophil-to-Lymphocyte Ratio was 5.74% in Patients with appendicitis and the sensitivity was 70.8%. Diagnostic value of NLR was not clear so, this study was performed and its results will be available to other health workers.

## **Objective**

Finding of Neutrophil to Lymphocyte Ratio and its diagnostic value in Appendicitis.

## **Questions**

- What is the ratio of Neutrophils to Lymphocytes in Patients with Appendicitis?
- What are the Changes in White Blood Cells in Patients with Appendicitis?
- Is the Ratio obtained consistent with other Diagnostic Examinations?

## **Methods and Materials**

This Retrospective Descriptive-Analytic study was performed on patients with Appendicitis who were admitted to Surgical Ward of Aliabad Hospital and did operations during the year (2018-2019), And so that all cases of patients collected from the Archives of Surgical Ward of Hospital that operated in (2018-2019), then Collected the cases of Appendicitis that admitted and operated during the above mentioned time . And then collected their laboratory

examinations and evaluated the Neutrophils to Lymphocytes Ratio (NLR) and compared it with other diagnostic Examinations.

### **Number of Samples:**

In this study, all Appendicitis Patients who underwent Surgery in Ali Abad Surgical Service during the year (2018-2019) were included from all 83 incidents in this Year, just 63 cases (76%) with Laboratory Examinations was studied. And there were 20 cases without Laboratory Examinations that were not included in this Study.

**Sampling method:** Census (all cases of appendicitis in 2018-2019)

### **Inclusion Criteria:**

All patient cases operated under Appendicitis and have laboratory examinations.

### **Exclusion Criteria:**

Cases of Appendicitis without laboratory examination, and patients who are admitted to the feature of other surgical cases.

### **Variables:**

- **Independent Variables:** Diagnosis of Surgeon.
- **Non-independent Variables:** Number of Lymphocytes - Number of White Blood Cells - Number of Neutrophils.

### **Data Collection Equipment and Research Resources:**

Patient cases of Appendicitis in the year 1397 and the Data obtained are of primary type.

**Data Analysis:** The MS Excel (2013) is used to analyse the collected Data.

### **Facilities:**

Files of Appendicitis patient available at the Archive of Aliabad Hospital.

### **Limitations:**

Absence of Laboratory Examination Attached to Patient Cases, fortunately 76% of cases had a Laboratory examination but 24% did not have laboratory Examination files.

## Ethical Aspects:

Because this study was based on records of patients, all ethical considerations have been taken into account and the name of the patient has been withheld.

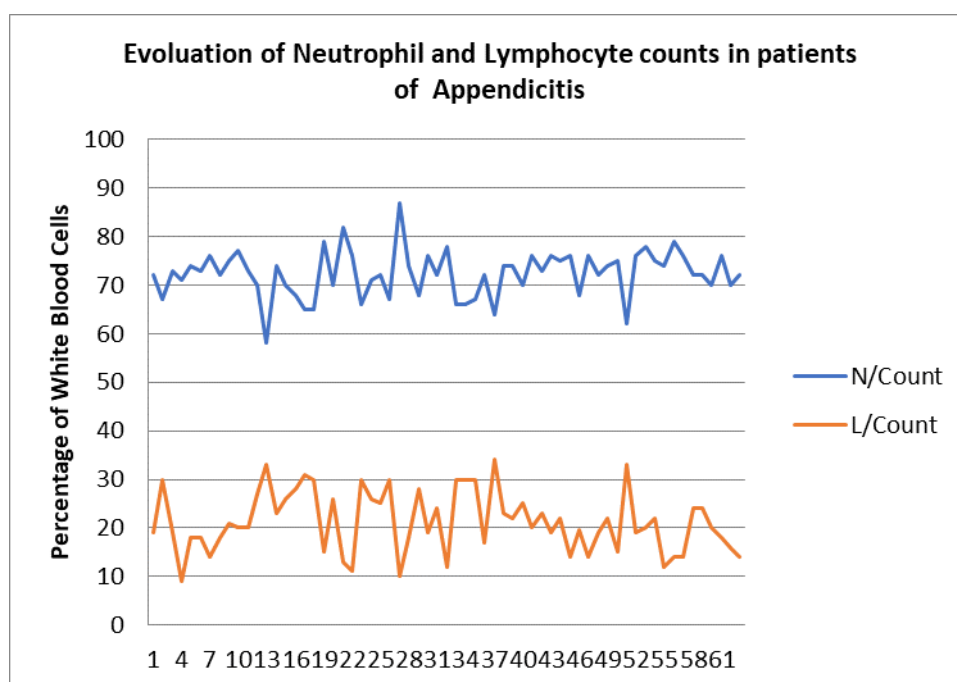
## Results:

In this study the cases of 63 patients whom they appendicitis surgery had been intended for statistical evaluation and analysis we found that the average ratio of these SEM was  $3.8 \pm 0.1$ , while the ratio in normal is 2:06(Guton H 2016)

The Statistical Studies are summarized in Table (1).

Table (1) statistical analysis of results.

Descriptive Statistics	N. Count	L. Count	Age	N/L Ratio
Mean	72.3	21.2	27.7	3.8
Median	73	20	26	3.5
Mode	76	30	18	5.4
Standard Division	4.8	6.3	10.06	1.4
Standard Error	0.6	0.7	1.2	0.1



## **Discussion:**

Ratio of Neutrophils to Lymphocytes increases in appendicitis. Appendicitis is considered a Surgical Emergency and acute disorder is common in the World that can present with typical and sometimes non-typical Signs. Appendicitis refers to Inflammation of the Appendix that occurs after the obstruction of the Lumen of Appendix. Using Ultrasound, Computed Tomography, and Laparoscopy can bring us even closer to accurate Diagnosis of these Patients, but the use of these diagnostic Methods is not only available everywhere but can impose huge Economic Costs on patients (Yeldem, O. et al. 2006). Some laboratory examinations can help the surgeon diagnose the patient more accurately, these include Hematological Examinations, including White Blood Cell count (TLC) and percentage of Neutrophils and Lymphocytes (Yeganeh, RA. 2005). Studies show that 80 to 85 Percent of patients with Appendicitis have leukocytes in more than 75 to 78 percent have Neutrophilia and Lymphopenia (Hussian Poor M 1391). The results of this Study are similar to other Studies conducted in other Countries which show an increase in the ratio of Neutrophils to Lymphocytes in Appendicitis patients, summarizing some of the researches done in other countries is as follow.

In a study by (Goodman, DA. et al. 1995) and his colleagues did the ratio of Neutrophils to Lymphocytes was equal or greater than 3.5 and sensitivity is 77.5%.

Also in a study by (Benjamain, IS 2002) and colleagues, Results show that White Blood Cell count and Neutrophil-to-Lymphocyte ratio (N / L) was higher in patients with Appendicitis than non-affected individuals.

A similar study by Goodman DA et al. found that the rate of Neutrophil counts and Lymphocyte counts decreased in the Appendicitis. Similarly, Sahin k 2014 and colleagues at Ankara in the Department of Surgery also reported the ratio of Neutrophils to Lymphocytes among patients with Appendicitis, about 5.74% and sensitivity 70.8%, respectively.

After assessing the Patient's case it was found that usually the Ratio of Neutrophils to Lymphocytes increases and the Diagnosis should be considered in this respect.

## **Suggestions:**

Since it has been found that in Patients with Appendicitis, the Ratio of Neutrophil to Lymphocyte is increased, it is suggested that in addition to other Diagnostic Examinations, this Ratio should be taken into account in preventing miscarriage in Diagnosis.

## **Thanks:**

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