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The Efficacy of Neutrophil to Lymphocyte Ratio in Predicting Acute Appendicitis

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I. INTRODUCTION: -

Acute appendicitis is one of the most common causes of acute abdomen. The lifetime occurrence of this disease is approximately 7%, with perforation rate of up to 20%. Despite the well-known classical symptoms and clinical findings of acute appendicitis, early diagnosis can be sometimes challenging. Failure to diagnose acute appendicitis at an early stage may result in adverse outcomes including perforation which can be associated with significant morbidity and even mortality.In addition to this, several blood tests are being used to predict appendicitis and its severity. While blood cells (WBC) counts are mostly elevated in patients with appendicitis; however, an elevated WBC count has no predictive value in differentiating simple and complicated appendicitis.Neutrophil-to-lymphocyte ratio (NLR) is a simple inexpensive marker of subclinical inflammation, which is easily calculated from the differential WBC counts.

NLR provides information regarding two different immune and inflammatory pathways which may make it a potential marker to predict appendicitis and its severity.The neutrophil count highlights active and continuing inflammation, whereas the lymphocyte count highlights the regulatory pathway.NLR was calculated as ratio of neutrophils to lymphocyte using the differential WBC count on admission.NLR as an accurate marker has a great potential to facilitate decision-making in selected populations.NLR, in addition to predicting appendicitis, can distinguish between complicated and uncomplicated appendicitis.NLR may also have implications for patients who do not routinely undergo CT scan (pregnant or pediatric patients) and in Places or settings where "twenty-four seven" access to immediate CT is limited.NLR >4.7 was independent predictor of appendicitis and NLR >8.0 was independent predictor of complicated appendicitis.

KEYWORDS: - Appendicitis, NLR

II. AIM: -

To check the role of neutrophil to lymphocyte ratio (NLR) in prognosticating gangrenous/perforated appendicitis.

III. METHOD: -

- **STUDY AREA:** Chettinad Hospital and Research institute, Kelambakkam
- **STUDY POPULATION:** Patients with symptoms suggestive of Acute Appendicitis and taken up for Appendicectomy.
- **SAMPLE SIZE:**51 patients
- **STUDY PERIOD:** 1 year, 2021-2022
- **TYPE OF STUDY:** Prospective study

Study Tools: Neutrophil and lymphocyte counts, Ultrasound abdomen, Intra operative findings, Histopathological findings

- **INCLUSION CRITERIA**
- Patients who diagnosed of having Acute appendicitis
- Age between 15-60 years
- **EXCLUSION CRITERIA**

Appendicular lump/mass

IV. METHODOLOGY:-

Patients admitted in CHRI with clinical examination suggestive of acute appendicitis were enrolled for this study. All the routine investigations along with Neutrophil and lymphocyte counts were done. Final confirmation of diagnosis is by Histo-pathological examination of the post op specimen. Correlation is made between laboratory investigations, ultrasonography and clinical diagnosis depending upon intraoperative and histo-pathological diagnosis. The value of neutrophil and lymphocyte counts is very

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helpful in management of perforated /gangrenous appendicitis.

V. RESULTS:-

A total of 51 patients were taken for this study among which 29.4% patients that is 15 patients were between the age of 21-30 years .35.3% that is 18 patients were between the age of 31-40 years, which includes the major proportion of the patients in this study. Only 2 patients were above 60 years of age which is 1% of total study population. Majority of the study population are males which is 58.8 %, which is 30 patients out of 51. Remaining 41.2% are females.

All the patients are having tenderness in right iliac fossa positive. Also, all the patients are having rebound tenderness.12 out of 51 patients are having abdominal distension. Bowel sounds is absent in 11 patients.

CLINICAL EXAMINATION	NUMBER OF PATIENTS		SD
	POSITIVE	NEGATIVE	
TENDERNESS	51	0	36.06244584
REBOUND TENDERNESS	51	0	36.06244584
DISTENSION	12	39	19.09188309
BOWEL SOUNDS	40	11	20.50609665

Among 51 patients total uncomplicated cases are 30 cases. Among 30 uncomplicated cases, NLR is positive in 29 cases. Complicated cases are 21 cases. Out of these 21 cases, NLR is positive in 20 cases.

NLR	>3	>4	>8	SD	P VALUE
acute appendicitis	2	28	0	15.6205	<0.0005(S)
mucocele appendix	1	0	0	0.57735	
acute appendicitis with perforation at tip	0	1	7	3.785939	
appendicular abscess	0	0	3	1.732051	
acute appendicitis with gangrenous changes	0	0	7	4.041452	
acute appendicitis with perforation at the body of appendix	0	0	2	1.154701	
TOTAL	3	29	19	26.91199	

P value for NLR is <0.0005. which is significant.
Radiology Findings: -

Diagnosis	RADIOLOGY
acute appendicitis	30
acute appendicitis with perforation at tip	8
appendicular abscess	3
acute appendicitis with gangrenous changes	7
acute appendicitis with perforation at the body of appendix	3

Table showing various radiological findings among the study group.

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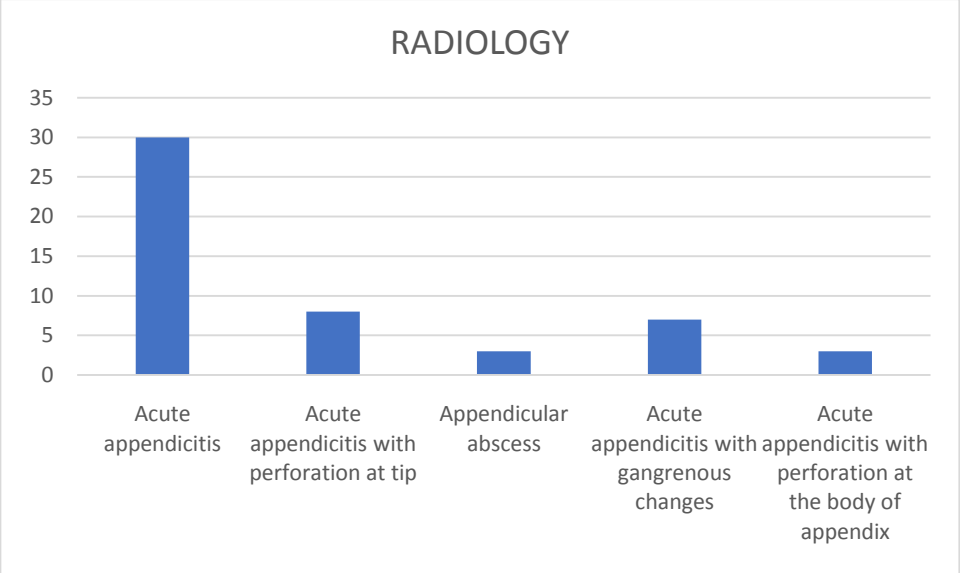

Bar diagram showing distribution of different radiological findings among study population.
Histopathological Examination Findings: -

	HISTOPATHOLOGY
acute suppurative appendix	29
appendicular abscess	3
acute suppurative appendix with gangrenous changes	8
acute suppurative appendix with gangrenous changes, perforation at body	3
acute suppurative appendix with gangrenous changes with perforation at tip	7
mucocele appendix	1

Table showing different HPE findings and their distribution among the patients.

VI. DISCUSSION: -

Appendicitis is a clinical diagnosis. But various investigations will help in diagnosing this condition and helps to confirm a treatment plan.

In my study I have taken 51 cases of acute appendicitis cases which were admitted in the Chettinad hospital and research institute between the years 2021-20212.And results were analysed as above. In this study we have observed the Neutrophil to lymphocyte ratio pre-operatively. In recent studies it was observed that neutrophil to lymphocyte ratio was elevated in acute appendicitis cases.

It was also observed that NLR will be >8 in complicated appendicitis cases. NLR will help in predicting complicated appendicitis cases pre-operatively. So, these values can be observed and treatment can be planned accordingly. Also, these values will help in predicting complicated appendicitis in a setup where radiological investigations are not available.

We have observed that out of 51 acute appendicitis cases 30 cases were uncomplicated appendicitis cases and 21 were complicated appendicitis cases.Among these 30 uncomplicated cases Neutrophil to Lymphocyte ratio is more >4 in 29 cases. NLR was normal in one patient.

NLR was elevated more than 8 in 20 cases of uncomplicated appendicitis out of 21 cases.From the above results it was observed that NLR is positive in predicting complicated cases

The sensitivity of NLR is calculated as 95% in predicting complicated appendicitis and 96% in uncomplicated cases in the given study population.P-value shows <0.0005 for NLR which is significant.

NLR may play an important role in diagnosing appendicitis in pregnant patients.NLR predicts both diagnosis and severity of appendicitis.

VII. CONCLUSION: -

- In this study conducted in the patients of sample size 51, in Chettinad Hospital And Research Institute during the period of 1 years i.e. 2021-2022 shows that the Neutrophil to lymphocyte ratio (NLR) has got better sensitivity and predictive value in predicting complicated appendicitis
- Hence, we can use Neutrophil to lymphocyte ratio (NLR) to know whether an acute appendicitis is having any complications like gangrenous appendix or appendicular abscess or perforation of appendix.

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