RESEARCH ARTICLE

AN OBSERVATIONAL CLINICAL STUDY OF ASSOCIATION OF LINTULA SCORE IN SUSPECTED CASE OF ACUTE APPENDICITIS IN TERTIARY CARE HOSPITAL

Dr. Kapil Garg, Dr. Savan K. Shah and Dr. Rushita Thakore

(M.S General Surgery), Government Medical College Surat.

Manuscript Info	Abstract
	Acute appendicitis is the most common general surgical emergency. About 8% of people have appendicitis at some time during their life. [1] Early surgical intervention improves outcomes. [1] Lintula scoring system is based solely on clinical examination. This might improve the clinical outcomes in adults with suspected appendicitis. A study was conducted on 50 patients suspected of having acute appendicitis were admitted in surgery department. The variables of the Lintula score were recorded and the sum of the score for each patient was calculated. Patients were treated according to standard protocol decided by consultant. The result of the score will be compared to intraoperative diagnosis using chi square test. After comparing positive and negative appendicitis with positive and negative Lintula scores, sensitivity and specificity of Lintula scoring system in diagnosis of acute appendicitis were found to be 55% and 90% respectively. The positive predictive value and diagnostic accuracy of the test has been found to be 95.65% and 80% respectively. (p value <0.05).

Introduction:-

Acute appendicitis is the most common general surgical emergency. About 8% of people have appendicitis at some time during their life. [1] Main stay of diagnosis of acute appendicitis is accurate history & physical examination. It is further reinforced by investigations like leukocytes count, ultrasonography, computed tomography (CT) scanning, and laparoscopy. [2] Early surgical intervention improves outcomes. [1] Delay in diagnosis of acute appendicitis is associated with high morbidity and mortality. The morbidity of perforated appendicitis far exceeds that of a negative appendectomy. Thus, the strategy has been to set a low enough threshold for removal of the appendix so as to minimize the cases of missed appendicitis. Despite an increased use of ultrasonography, computed tomography (CT) scanning, and laparoscopy, the rate of misdiagnosis of appendicitis has remained constant (15.3%), as has the rate of appendiceal rupture. [2] Lintula scoring system is based solely on clinical examination. This might improve the clinical outcomes in adults with suspected appendicitis.

Aims And Objectives:-

1. To evaluate the predictive accuracy of Lintula score in diagnosis of patients suspected of having acute appendicitis.
2. To evaluate the sensitivity, specificity, predictive values and diagnostic accuracy of Lintula score.
3. To study negative appendicectomy rate.

Corresponding Author:- Dr. Kapil Garg
Address:- (M.S General Surgery), Government Medical College Surat.

The Lintula Score
The Lintula score includes nine variables:
1. Gender (male, 2 points; female, 0 points),
2. Intensity of pain (severe, 2 points; mild or moderate, 0 points),
3. Relocation of pain (yes, 4 points; no. 0 points).
4. Pain in the right lower abdominal quadrant (yes, 4 points; no, 0 points).
5. Vomiting (yes, 2 points; no, 0 points).
6. Body temperature (>37.5°C, 3 points; <37.5°C, 0 points),
7. Guarding (yes, 4 points; no, 0 points).
8. Bowel sounds (absent, tinkling or high-pitched, 4 points: normal, 0 points) and
9. Rebound tenderness (yes, 7 points; no, 0 points)

The Lintula score has a minimum of 0 points and a maximum of 32 points. The cut-off level to predict acute appendicitis is >21 points. The cut-off level for rule out acute appendicitis is <15 points. Patients with scores >21 are recommended to undergo emergency appendicectomy, and those with scores <15 points are amenable to discharge. Patients with the appendicitis score between 16 and 20 points are recommended to be observed.

Methodology:-
This is an Observational Prospective study of done in tertiary teaching hospital from May 2020 to April 2021 after obtaining approval from Institutional Ethics Committee. After obtaining written & informed consent, from 50 random patients with suspected appendicitis admitted in surgical ward, the variables of the Lintula score were recorded and the sum of the score for each patient was calculated.

Patients were further investigated as per necessity like complete blood count, ultrasound of abdomen, CT scan etc. and treated according to standard protocol decided by consultant. The patients who improved within 2 days were considered as negative appendicitis, other patients had undergone appendicectomy. The result of the score was compared to intraoperative diagnosis using chi square test. The p value of <0.05 will be considered statistically significant.

Inclusion Criteria:
All Patients at casualty or OPD with suspected acute appendicitis with age group 5 to 60 years.

Exclusion Criteria
Patients with a history of
1. Previous appendicectomy
2. Abdominal trauma
3. Chronic abdominal pathology
4. Patients with other intra-abdominal pathology requiring emergency laparotomy will be excluded from final analysis
5. Pregnant women.

Results And Analysis:-

| LINTULA SCORE	APPENDICECTOMY		TOTAL
	ACUTE APPENDICITIS	NORMAL APPENDIX	
>21	22	1	23
16 TO 20	16	2	18
<15	2	7	9
TOTAL	40	10	50

A total of 50 patients were included in this study with clinical diagnosis of acute appendicitis. Among these 33 were male and 17 are female with mean age of all patients included in this study was 28.64 years. Out of 50 patients 6 were managed conservatively and 44 patients were operated.

LINTULA SCORE	Positive appendicectomy	Negative appendicectomy

Positive(21 or more)	22	1
Negative(15 or less &intermediate(15 to 20)	18	9

Distribution of Lintula score in positive and negative appendicitis.

Distribution of Lintula score in positive and negative appendicitis
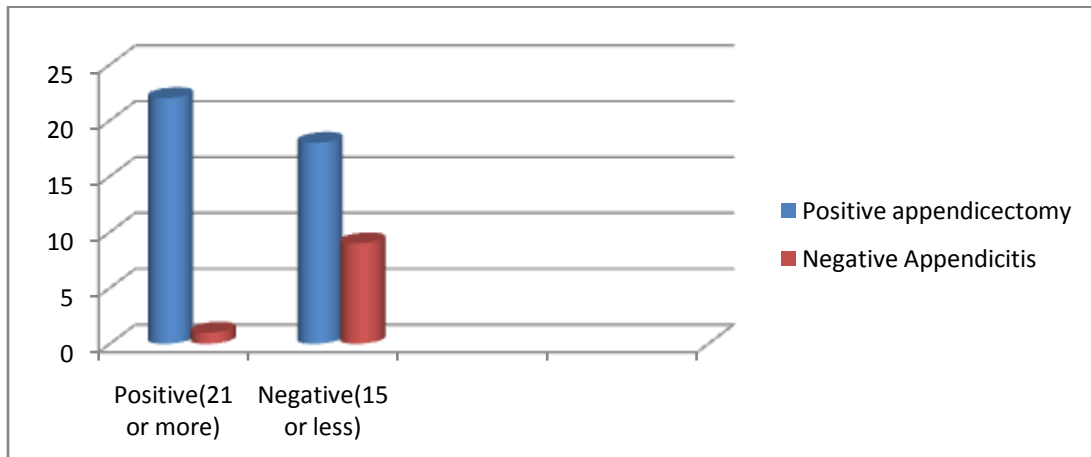
Sensitivity of Lintula score= 22/(22+18) = **55 %**
Specificity of Lintula score= 9(9+1) = **90%**
Predictive value of positive score = 22/(22+1) = **95.65%**
Predictive value of negative score = 9/(9+18) = **33.33%**
Likelihood ratio: LR+= Sensitivity/(1- Specificity) = **5.5**
LR- = (1- Sensitivity)/Specificity = **0.5**
Diagnostic accuracy = **80%**

Discussion:-

Despite of all improvements, diagnosis in acute appendicitis still reminds a challenging problem. Initial management of patients with suspected appendicitis is based on the disease history, physical signs, and basic laboratory tests reflecting the inflammatory response. Lintula and co- workers described a new scoring system including 9 variables and no laboratory tests included in this score [3].

It is common for scoring systems to not perform as well when tested in a new population [4,5]. The success or failure of a clinical score is related to the population to which it is applied. So we decided to validate the Lintu la score among patients suspected of having acute appendicitis in Tertiary Care centre. The variables of Lintula score are depended on the physical examination so that the score can be used to diagnose acute appendicitis especially in rural hospitals in which other diagnostic tools such as ultrasound, computed tomography and serum C- reactive protein levels cannot be used.

In this study, mean age of all the patients included in this study was 28.64 years which was comparable with study done by O. Yoldas in Turkey and found the mean age of the patients was 29.9 years. [6]

Lintula Scoring System:
The Lintula score has a minimum of 0 point and a maximum of 32 points. The cut off level to predict acute appendicitis is >21 points. In the present study, diagnosis and decision to operate had been taken on clinical basis. The result of operation was correlated with Lintula scoring system to evaluate its usefulness in diagnosis.

After clinical analysis 6 patients were managed conservatively and improved in 48 hours and considered as negative appendicitis and 44 patients were operated and each appendicectomy is categorized into positive and negative according to intraoperative findings. Thus total negative appendicitis rate in our study was 20%. Following table compares our study with other studies.

Outcome measures (%)	Omer Yoldas et al(A)[6]	Chandrabose k et al (B)[7]	Present Study (C)	Difference Between A and C	Chi square 95% CI	P value
Sensitivity	88.11	72.36	55	33.11	3.87	**0.04**
Specificity	91.66	88.88	90	1.66	0.011	0.91
Positive Predicitve value	97.8	90.16	95.65	2.15	0.01	0.9
Negative Predictve value	64.7	69.56	33.33	31.37	5.36	**0.02**
Accuracy	88.8	79	80	8.8	0.19	0.66
Negative appendicectomy rate	16	41.53	20	4	0.22	0.63

When the present study was compare with the study by Omer Yoldas et al [6] , there was a significant difference in the results of sensitivity and negative predictive value at confidence interval of 95 %.

From above study we concluded that,

1. The variables of the Lintula score are dependent on the physical examination. Therefore, the Lintula scoring system plays significant role in diagnosis of acute appendicitis, especially in rural hospitals in which other diagnostic tools such as ultrasound, computed tomography and C- reactive protein levels are not available.
2. Diagnosis of acute appendicitis solely on clinical grounds may decrease the delay associated with further investigations and thus reduce the morbidity and mortality associated with complicated appendicitis.
3. Due to high specificity (90%), the negative appendicectomy rate may also decrease and thus the morbidity of unnecessary surgery in case of patients without appendicitis may be reduced.
4. Early diagnosis and prevention of peritonitis decreases wound infections and thus reduces the hospital stay and promotes early return to work.
5. Due to prevention of complications by early diagnosis and avoidance of undue investigations, cost to patient as well as healthcare system may be reduced.
6. However, the negative predictive value of Lintula score is found to be poor (33%), a negative score should be interpreted cautiously & repeated clinical examination with investigations as per necessity may be more helpful in these cases.

Few limitations of our study were:

1. This was an observational study with a relatively small sample size of 50 patients who were included prospectively.
2. Observational studies are likely to have a wide variety of biases.
3. Long term follows up of the patients was not possible in the study.

References:-

1. Sabiston textbook of Surgery 21st edition.
2. Schwartz's Principles of surgery 11th edition.
3. Lintula H, Kokki H. Kettunen R. Eskelinen M. Appendicitis score for children with suspected appendicitis. A randomized clinical trial. Langenbecks Arch Surg 2009,394:999e1004.
4. Laupacis A. Sekar N, Stiell IG. Clinical prediction rules: a review and suggested modifications of methodological standards. JAMA 1997:277:488e94.
5. Lintula H, Kokki H, Pulkkinen J, Kettunen R, Gröhn 0, Eskelinen M. Diagnostic score in acute appendicitis. Validation of a diagnostic score (Lintula score) for adults with suspected appendicitis. Langenbecks Arch Surg 2010;395:495e500.

6. Omer Yoldas, TurgutKaraca, MesutTez. External Validation of Lintula Score in Turkish acute appendicitis patients. International Journal of Surgery 10(2012)25-27.
7. Chandrabose K, Nair V. Comparison of predictive value of Alvarado score and Lintula score in acute appendicitis in adults. Int J surg Orthopedics.2017; 3(3):60-65.