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General Surgery

EVALUATION OF ACUTE APPENDICITIS ACCORDING TO RIPASA SCORING SYSTEM

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ABSTRACT

INTRODUCTION: Acute appendicitis is one of the most common surgical emergencies encountered. Even with the diagnostic aids like laboratory examination of blood and urine, ultrasonography, the rate of negative appendectomy is 15 – 25%. Several scoring systems have been introduced to increase the diagnostic accuracy of appendicitis with the Alvarado scoring system being the most popular. However these were developed in the western countries and several studies have shown reduced sensitivity and specificity when applied to a population with a completely different ethnic origin. A new RIPASA scoring system was developed to aid in the diagnosis of acute appendicitis in the Asian countries. The aim of this prospective randomized clinical study is to evaluate this scoring system in our set up.

PATIENTS AND METHODS: The present study was a prospective comparative observational study which consists of 100 patients admitted under General Surgery with Right Iliac Fossa (RIF) pain, with suspected case of appendicitis in Mamata General Hospital. The study was conducted for a period of 24 Months, from October 2015 to September 2017 in the department of General Surgery, Khammam

OBSERVATIONS AND RESULTS: Appendix was inflamed in 93% of cases where as it was normal in 7%. Out of 7 cases of normal appendix, no pathology was found in 4, and in the rest 3, each of a case of ruptured ovarian cyst, gangrenous Meckel's diverticulitis and ectopic pregnancy was found. Negative appendectomy rate was 5% in males (3 males), 10% (4 Females) in females and overall was 7%. In the present study, the sensitivity and specificity was 81.72% and 85.71% while positive and negative predictive values were 98.70% and 26.09%, calculated keeping the cut off value of RIPASA score of 7.5.

CONCLUSION: RIPASA score is very effective in the diagnosis of acute appendicitis in males but some other diagnostic modality may be necessary to ascertain the diagnosis in females along with the clinical scoring system to rule out other pelvic pathology and thereby reducing the higher rates of negative appendectomy in females.

KEYWORDS : Acute appendicitis, RIPASA Score, Appendix scoring

INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies encountered, in the world particularly in age group of less than 30 years of age[01]. A Surgeon's good clinical assessment is the most important requisite in the diagnosis of acute appendicitis among several other similar conditions relating to genitourinary and gynaecology that mimic the clinical condition[02]. Acute appendicitis is a common cause of abdominal pain for which a prompt diagnosis is rewarded by a marked decrease in morbidity and mortality[03]. The morbidity due to perforation ranges from 17 – 40%. The perforation rate is higher in elderly and children[04]. Failure to diagnose early appendicitis converts acute appendicitis to perforated appendicitis, a disease with potential complication including abdominal wall abscess, wound infection and death[05]. The negative laparotomy ranges from 15- 35 % and is associated with significant morbidity[04, 06]. Ultrasonography has greatly helped in diagnosis thereby reducing the incidence of negative appendectomy[07]. Only Contrast Enhanced Computed Tomography (CECT) can diagnose the condition with very high sensitivity and specificity but it is not feasible to have this investigation done for every patient suspected to be appendicitis, particularly in emergency in our country with limited resources[08, 06]. Even with these diagnostic aids, the rate of negative appendectomy is 15 – 25%.

Several scoring systems have been introduced to increase the diagnostic accuracy of appendicitis with the Alvarado scoring system being the most popular. However these were developed in the western countries and several studies have shown reduced sensitivity and specificity when applied to a population with a completely different ethnic origin[09]. A new RIPASA scoring system was developed to aid in the diagnosis of acute appendicitis in the Asian countries. **RIPASA** (*Raja Isteri Penigiran Anak Saleha Appendicitis*) scoring system is a relatively new scoring system developed by Chong et al [09], which is a more extensive, yet simple scoring system consisting of 14 fixed parameters and an additional parameter, patients' demographics, National Registration Identity Card (NRIC) that is unique to Asian population. Due to uncertainty in diagnosis of this common clinical condition we started a study with objective to evaluate the reliability of RIPASA scoring system in the clinical diagnosis of acute appendicitis and to find an association between the score and histopathological findings in acute appendicitis.

MATERIAL AND METHODS

The present study was a prospective comparative observational study which consists of 100 patients admitted under General Surgery with Right Iliac Fossa (RIF) pain, with suspected case of appendicitis in Mamata General Hospital. The study was conducted for a period of 24 Months, from October 2015 to September 2017 in the department of General Surgery, Khammam. All patients presenting with Right Iliac Fossa (RIF) Pain with clinical suspicion of acute appendicitis and willing to take part are included in the study. Patients presenting with non-RIF pain and those who have been admitted to other specialties for different complaints but who subsequently developed RIF pain, Patients with RIF Mass, Patients with perforation peritonitis, and Patients not willing to take part in the study are excluded. After admission, detailed history and thorough physical examination of the admitted patients to be included under the study was done and recorded as per the prewritten *Proforma*. The outcomes was recorded and analyzed at the end of the study using IBM statistical package for social science (SPSS) Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., USA).

TABLE 01: TABLE SHOWING RIPASA SCORE AND RANGE

	PARAMETER	SCORE
1.	**PATIENT'S DEMOGRAPHIC**	
	Female	0.5
	Male	1.0
	Age < 40 years	1.0
	Age > 40 years	0.5
2.	**SYMPTOMS**	
	RIF Pain	0.5
	Pain migration to RIF	0.5
	Anorexia	1.0
	Nausea & Vomiting	1.0
	Duration of Symptoms < 48 hrs	1.0
	Duration of Symptoms > 48 hrs	0.5
3.	**SIGNS**	
	RIF Tenderness	1.0
	Guarding	2.0
	Rebound Tenderness	1.0
	Rovsing Sign	2.0
	Fever >37° C < 39° C	1.0
4.	**INVESTIGATIONS**	
	Raised WBC	1.0
	Negative Urine Analysis	1.0
5.	**ADDITIONAL SCORE**	
	Foreign NRIC	1.0
	TOTAL SCORE	17.5

SCORE	PROBABILITY OF APPENDICITIS
<5	Probability of Acute appendicitis is **unlikely**
5-7	**Low probability** of Acute appendicitis
7.5-11.5	Probability of Acute appendicitis is **high**
>12	**Definite** Acute appendicitis

RESULTS:

Most patients were of young age less than 40 years (89 %). Among them men were (60%) and women (40%) with a male to female ratio of 3:2. Right Iliac fossa pain was present in all patients with migration of pain seen in 48 patients, anorexia in 34 patients and nausea and vomiting in 47 patients. Histopathological correlation of symptomatology of appendicitis pain is shown in *Table 02*. Among the 100 patients, 55 patients (55%) presented with a history lasting less than 2 days (48hrs) while 45 patients (45%) presented with history lasting more than 2 days (>48hrs). Histopathological correlation of signs of appendicitis pain is shown in *Table 03*. In laboratory investigations, 69 patients had elevated TLC count 79 patients (79%) had negative urine analysis. Post operatively appendix was inflamed in 93% of cases where as it was normal in 7%. Out of 7 cases of normal appendix, no pathology was found in 4, and in the rest 3, each of a case of ruptured ovarian cyst, gangrenous Meckel's diverticulitis and ectopic pregnancy was found. The relation of post-operative diagnosis with RIPASA score range groups is shown in *Table 04*. RIPASA score is divided into 4 score range groups as depicted in *Table 05*. It was observed that as the RIPASA score increases, the rate of negative appendectomy decreases; 40% for a score of <5, whereas there was no negative appendectomy for a score of >12, implicating that higher the score, the lower the negative appendectomy rate.

In the present study, negative appendectomy rate was 5% in males (3 males), 10% (4 Females) in females and overall was 7% (7). On statistical analysis it was found that the sensitivity and specificity of RIPASA score was 81.72% and 85.71% while positive and negative predictive values were 98.70% and 26.09%, calculated keeping the cut off value of RIPASA score of 7.5.

TABLE 02: CORRELATION OF SYMPTOMS WITH HISTOPATHOLOGY

SYMPTOM	PRESENT	CORRELATION WITH HPE (%)	ABSENT
RIF PAIN	100	93 (93)	0
MIGRATION OF PAIN	48	47 (97.9)	52
ANOREXIA	34	34 (100)	66
NAUSEA AND VOMITING	47	46 (97.9)	53

TABLE 03: Correlation Of Signs With Histopathology

SIGN	PRESENT	CORRELATION WITH HPE (%)	ABSENT
RIF TENDERNESS	100	93 (93)	0
GUARDING	22	20 (90.9)	78
REBOUND TENDERNESS	58	57 (98.2)	42
ROVSING SIGN	29	28 (96.6)	71
FEVER	39	38 (97.4)	61

TABLE 04: Post Operative Diagnosis And Distribution According To Ripasa Score

RIPASA SCORE	ACA	ASA	AGA	APA	EA	RA	NA	Other diagnosis	Total
<5	1	1	0	0	1	0	2	0	5
5-7	8	2	1	0	2	1	2	2	18
7.5 – 11.5	38	13	4	2	4	9	0	1	71
>12	0	0	4	2	0	0	0	0	6
TOTAL	47	16	9	4	7	10	4	3	100

[ACA – Acute Catarrhal Appendicitis, ASA – Acute Suppurative Appendicitis, AGA – Acute Gangrenous Appendicitis, APA – Acute Perforated Appendicitis, RA – Recurrent Appendicitis, EA – Eosinophilic Appendicitis, NA – Normal Appendix]

TABLE 05: PATIENT DISTRIBUTION ACCORDING TO RIPASA SCORE RANGE GROUPS AND HPE OF APPENDIX

RIPASA SCORE	TOTAL NO OF PATIENTS (n)	NO. OF PATIENTS WITH ACUTE APPENDICITIS (%)	NO. OF PATIENTS WITH NORMAL APPENDIX (%)
<5	5	3 (60%)	2 (40%)
5-7	18	14 (77.8%)	4 (22.2%)
7.5 – 11.5	71	70 (98.6)	1 (1.4%)
>12	6	6 (100%)	0

DISCUSSION

Acute appendicitis is the most common and challenging surgical emergency. It can lead to appendiceal perforation and peritonitis, which is concomitant with high mortality and morbidity. The decision for a surgical operation based only on the patient's signs and symptoms results in removing normal appendices. A decrease in unnecessary appendectomies should not cause an increase in perforation rates[10]. Currently the diagnosis of acute appendicitis relies on the ultrasound examination and Computed Tomography. Ultrasound is the non-invasive, easily available and cost-effective, and can accomplish more than computed tomography scans. However, there is no certainty about its effect on the clinical outcomes of patients and is operator dependent. Counting the neutrophils as a parameter of the Alvarado scale is not routine in many laboratories. Computed tomography imaging also aids in making a definite diagnosis and have been reported to have high sensitivity (94%) and specificity (95%) for diagnosing acute appendicitis[10]. Moreover, all these methods are not cost effective, time consuming and not readily available.

Various scoring systems are being used to aid the diagnosis of acute appendicitis and bring down the negative appendectomy rates. These include but not limited to, Alvarado, Samuel, Tzanakis, Ohmann, Eskelinen, Fanyo, Lindberg, logistic score of Kharbanda et al and so on. The most known of these is Alvarado score, which was developed in 1986[05]. It contains eight predictive factors and said to be practical and easy to use. However, this scoring system was developed in the West, and when applied in different environments, such as the Middle East and Asia, the sensitivity and specificity levels achieved were very low[10]. A study by Al-Hashemy et al.[11] in 2004 using the modified Alvarado scoring system in a Middle Eastern population reported a low sensitivity of 53.8% and a specificity of 80%.

RIPASA score is a more extensive yet simple additive scoring system consisting of 14 fixed parameters and an additional parameter (NRIC) that is unique to Asian population setting. All these 15 parameters are easily obtainable from a good clinical history, examination and investigations. The results were analyzed, interpreted and compared with the results of various studies like Chong et al.[09] (2010), Karan et al.[12] (2015), Rathod et al.[13] (2015), Srikantaiah et al.[14] (2015), Ajay Singh et al.[15] (2017).

In the present study, the age range was 9 – 63 years with a mean age of 16.7 years which was at par with the study done by Ajay Singh et al.[15] (15.5 years). 38 patients (38%) patients were in the age group of 21 – 30 years which is comparable to those found in Rathod et al.[13] (38%) and Srikantaiah et al.[14] (39%). Most susceptible group was found to be 21 – 30 years (38%) followed by 11 – 20 years (37%). Incidence of acute appendicitis was less below the age group of 10 years (2%) and tends to decrease with increasing age and is least common after 50 years (3%). 89 patients (89%) were below 40 years of age which was consistent to the findings by Chong et al.09 (84.3%), Srikantaiah et al.[14] (85%) and Ajay singh et al.[15] (89%). Only 11 patients were above 40 years. In the present study, there was male preponderance with 60 males (60%) as compared to 40 females (40%) with a male to female ratio of 1.5:1 which is comparable to the studies done by Chong et al.09 (1.4:1) and Rathod et al. [13] who reported 1.5:1 male to female ratio with 59 % males. 48 patients (48%) had history of pain migration to RIF and was similar to the study by Karan et al.[12] (44.8%). A total of 34 patients (34 %) gave a positive history of anorexia while 47 patients (47%) gave a history of Nausea and vomiting which were similar to the study by Srikantaiah et al.[14] (29% and 33%). In the present study 55% of patients presented with symptoms of <48 hours duration, while 45% presented with >48 hours of duration. The early presentation had a finding that is less than compared to other studies, the reason which may be attributed to the large number of patients being from rural areas who neglect an early consultation to a concerned physician/surgeon. In the study by karan et al.[12], Srikantaiah et al.[14], and Ajay Singh et al.[15],an early presentation of patients can be noticed with majority being within <48 hours period, 84.37%, 65% and 76% respectively.

All the patients (100%) had RIF tenderness which was similar to the studies by Karan et al.[12] (100%), Ajay Sing et al.[15] (100%). A total of 22 patients (22%) had guarding that was localized in 19 patients and generalized in 3 patients that were similar to the studies by Karan et al.[12] (20.83%) and Srikantaiah et al.[14] (17%). 58 patients (58%), had rebound tenderness, which was similar to the studies by Srikantaiah et al.[14] (61%), and Ajay Singh et al.[15] (60%). In the present study, 29 patients (29%), had a positive rovsing's sign which was similar to the studies by Karan et al.[12] (23.95%) and Srikantaiah et al.[14] (30%). In the present study 39 patients (39%) had fever which varied from the other studies.

About 69% of patients had raised TLC count which was comparable to the studies by Karan et al.[12] (75%) and Srikantaiah et al.[14] (75%). 79 patients (79%) had negative urine analysis. These results were comparable to the studies by Ajay Singh et al.[15] (79%) and Srikantaiah et al.14 (85%).

Overall positive and negative appendectomy rates were 93% and 7% respectively which was comparable to other studies by Karan et al.[12] (94.8% and 5.2%), Rathod et al.[13] (79.3% and 20.7%) and Srikanthaiah et al.[14] (95% and 5%). The negative appendectomy rate of 7% was also comparable to the original study in the development of RIPASA score by Chong et al.[09] which was 6.9%.

In the present study, the sensitivity and specificity of the RIPASA scoring system with a cut-off of 7.5 were 81.72% and 85.71% respectively which was comparable to other studies by Chong et al.[09] (88.46% and 66.67%), Rathod et al. [13] (82.61% and 88.89%). The PPV was 98.7 % which was comparable to the studies by Chong et al.[09] (93%), Karan et al.[12] (98.89%), Rathod et al.[13] (96.61%), Srikantaiah et al.[14] (95%), Ajay Singh et al.[15] (98.8%). However, NPV was lesser compared to other studies.

To summarize, RIPASA score is very effective in the diagnosis of acute appendicitis in males but some other diagnostic modality may be necessary to ascertain the diagnosis in females along with the clinical scoring system to rule out other pelvic pathology and thereby reducing the higher rates of negative appendectomy in females.

CONCLUSION:

RIPASA scoring system is an easy, simple, cheap, reliable and safe tool that can aid in making pre-operative diagnosis of acute appendicitis effectively.

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