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Comparative Study of Preoperative Diagnosis by Clinical and Sonological Evaluation Versus Intra Operative Findings in Diagnosis of Acute Appendicitis

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Abstract

Acute appendicitis constitute a third of all the cases who get hospitalized with the acute surgical abdomen. The Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) which was initially designed for use exclusively with the Asian population, is broader and simpler and consists of seventeen items. Studies using RIPASA Score in Indian setup is limited and found variable validity in screening of acute abdomen. Hence this study was conducted the objective to compare the clinical diagnosis of suspected appendicitis cases using RIPASA scores and sonological evaluation. The present study was done at Department of general surgery, Srinivas Institute of Medical Sciences and Research Centre, Mukka, Mangaluru during September 2020-September 2022. Subjects were evaluated clinically and if found to be a suspected case of appendicitis, then RIPASA scoring system were utilized and findings were noted. Then the subjects were subjected to routine investigations and sonological investigations to establish the diagnosis. In case the sonological evaluation was negative for appendicitis but a thorough clinical evaluation is strongly suggestive of acute appendicitis, then the subject was considered for surgical management. During intra op, findings of acute appendicitis were noted and finally compared with sonological findings. Data was analyzed using SPSS version 22 (IBM SPSS Statistics, Somers NY, USA). In the present study 125 subjects with pain abdomen were included. Among them majority of subjects were in the age group 18-20 years (36%). Males were in majority 64%. Male: Female ratio was 1.77:1. Pain abdomen was present in all the subjects, vomiting was the next most common symptom at presentation (47.2%). RIPASA Score had a Sensitivity of 94.74%, Specificity of 66.67% and Accuracy of 88.00% in diagnosis of acute appendicitis. RIPASA Score has good Sensitivity and a moderate Specificity in the diagnosis of acute appendicitis. Hence RIPASA score can be used as an alternative for USG in screening of acute abdomen.

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Key Words

RIPASA score, sensitivity, USG, HPE, intra operative findings, acute appendicitis

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INTRODUCTION

Acute abdomen is the most widespread surgical complaint that is seen across all ages that present to the emergency room[1]. Patients visiting emergency room for a surgical consult, many at times it is difficult to elicit a proper history, as the result of the agonizing pain. Appendicitis constitute a third of all the cases who get hospitalized with the acute surgical abdomen in children[2,3]. Approximately 7 percent of the population will have appendicitis in their life, peaking between 10 and 30 years. The estimated incidence of appendicitis in children is found to be around 8.67 percent for the male child and 6.7 for the female child. Management of appendicitis is most often surgical[4]. But in certain special situations likes, pregnancy, severe comorbidities that pose a risk to surgery, and sometimes in children antibiotic therapy is also shown to be effective.

Although the diagnosis and management of appendicular pathology has improved drastically, still appendicitis remains a very important reason that contributes to significant diagnostic dilemma in spite of the available investigations. There are a number of pathologies that can mimic the acute appendicitis especially in females as the right ovarian pathology has a similar presentation. A deferral in carrying out an appendectomy has a higher morbidity in terms of sepsis and perforation. The reverse decision to perform an appendectomy without a clear diagnosis can be a negative appendectomy[5].

Negative explorations can lead on to longer length of stay in hospital, higher costs and added morbidity and mortality as well. It is a well-known fact that not all cases of appendicitis need to be treated surgically, especially those cases involving catarrhal appendicitis[6,7]. Unnecessary appendicectomies also need to be avoided prevent potential complications such as ileus (found in 1.2% of cases), incisional hernias (found in 0.68% of cases) and increased cost to the patient. So, a quick, easy and reliable method to diagnose appendicitis in the clinical setting can be of great use. Various scoring systems have been developed to aid in the clinical diagnosis of acute appendicitis. The Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score was one of the diagnostic scoring system developed in 2008 at the Department of Surgery, Raja Isteri Pengiran Anak Saleha Hospital, Darussalam, Brunei[8,9]. This scoring system, which was initially designed for use exclusively with the Asian population, is broader and simpler and consists of seventeen items. So, this study will help us in assessing the accuracy of clinical diagnosis of acute appendicitis cases when compared to sonological investigation.

Objectives: To study and compare the clinical diagnosis of suspected appendicitis cases using RIPASA scores and sonological evaluation and to correlate the Intra Operative findings with ultrasonography findings.

MATERIAL AND METHODS

A Hospital based cross sectional study was conducted among 125 adult patients (age >18 years) visiting the outpatient department of department of General Surgery or Emergency room, with complaints of pain abdomen, Srinivas Institute of Medical sciences, Mangaluru for two years between (September 2020-September 2022). Patients were selected using convenient sampling method till the desired sample size was achieved.

Data Collection: Study subjects meeting the inclusion criteria were selected among the patients visiting OPD. Subjects were evaluated clinically and if found to be a suspected case of appendicitis, then RIPASA scoring system was utilized and findings was noted. Then the subjects were subjected to routine investigations and sonological investigations to establish the diagnosis. In case the sonological evaluation was negative for appendicitis but a thorough clinical evaluation is strongly suggestive of acute appendicitis, then the subject was considered for surgical management. During intra op, findings of acute appendicitis were noted. A structured proforma was used to collect sociodemographic data, clinical findings, suspected acute appendicitis were assessed using RIPASA scoring system, sonography findings and intra operative findings.

Data Analysis[10]: Data was analyzed using SPSS version 22 (IBM SPSS Statistics, Somers NY, USA). Categorical data was represented in the form of Frequencies and proportions. Validity of Screening test was assessed by determining sensitivity, specificity and Diagnostic accuracy in comparison with Gold standard. $p<0.05$ was considered as statistically significant.

RESULTS AND DISCUSSIONS

In the present study 125 subjects with pain abdomen were included. Among them majority of subjects were in the age group 18-20 years (36%). Males were in majority 64%. Male: Female ratio was 1.77:1. Pain abdomen was present in all the subjects, vomiting was the next most common symptom at presentation (47.2%) [Table 1].

On USG, majority 47% had 6.6-9 Caliber of The Appendix, 66% had Appendicular Inflammation, 10% had Appendicolith, 3% had Discontinuity in Wall of Appendix, 85% had Post Ileal/Pre-Ileal location of appendix and 61% were diagnosed as Acute Appendicitis in USG [Table 2].

Intra operatively, majority 68% had >7 cms Caliber, 66% had Appendicular Inflammation, 10% had

Table 1: Profile of subjects with appendicitis

		Frequency (N = 125)	Percent
Age	18-20 years	45	36
	21-30 years	22	18
	31-40 years	5	4
	41-50 years	18	14
	51-60 years	10	8
	61 -70 years	1	1
	> 70 years	7	6
Sex	Males	80	64
	Females	45	36
Clinical features	Abdominal Pain	125	100
	Vomiting	59	47.20
	Nausea	26	20.80
	Fever	18	14.40

Table 2: USG Findings of clinically diagnosed appendicitis

		Frequency (n = 125)	Percent
Caliber of The Appendix	4 to 6.5	21	17
	6.6-9	59	47
	> 9	45	36
Appendicular Inflammation	Yes	83	66
	No	42	34
Appendicolith	No	113	90
	Yes	12	10
Wall of Appendix	Discontinuity	4	3
	Continuous	121	97
Location of Base	Post Ileal/Pre-Ileal	106	85
	Retrocaecal	14	11
	Subhepatic	5	4
USG Report	Acute Appendicitis	76	61
	Edematous	21	17
	Engorged	21	17
	Prominent	2	2
	Perforated	3	2
	Acute Appendicitis with Free Fluid in Peritoneal Cavity	1	1
	Distended	1	1

Table 3: Intraoperative findings of appendicitis

		Frequency (n =125)	Percent
Caliber of The Appendix	> 7 cms	85	68
	< 7 cms	40	32
Appendicular Inflammation	Yes	83	66
	No	42	34
Appendicolith	No	113	90
	Yes	12	10
Wall of Appendix	Perforation in the Wall	18	14
	No Perforation in the Wall	107	86
Location of Base	Post Ileal/Pre-Ileal	88	70
	Retrocaecal	29	23
	Subhepatic	8	6
Intra-Operative Diagnosis	Gangrenous Appendicitis	10	8
	Perforated	9	7
	Acute Appendicitis Only	99	79
	Acute Appendicitis with Free Fluid in Peritoneal Cavity	2	2
	Early Mass	5	4

Table 4: HPE Findings among subjects with appendicitis

		Frequency	Percent
Caliber of The Appendix	4 - 6.5	4	3
	6.6 - 9	80	64
	>9	41	33
Appendicular Inflammation	Yes	125	100
	No	0	0
Appendicolith	No	108	86
	Yes	17	14
Wall of Appendix	Discontinuity	22	18
	Continuous	103	82
HPE Diagnosis			
	Acute appendicitis	15	12
	Acute appendicitis with peri appendicitis	25	20
	Acute appendicitis with peri appendicitis with perforation	2	2
	Acute appendicitis with peritonitis	5	4
	Acute suppurative appendicitis	1	1
	Acute ulcerative appendicitis with peri appendicitis	3	2
	Appendix with lymphoid hyperplasia	8	6
	Gangrenous appendicitis	3	2
	Lymphoid hyperplasia of appendix	10	8
	Resolving appendicitis with lymphoid hyperplasia	1	1
	Resolving appendicitis	39	31
	Resolving appendicitis with peri appendicitis	1	1
	Gangrenous appendicitis with appendicular mass	1	1
	Acute ulcerative appendicitis with peri appendicitis	2	2

Table 5: Diagnostic Value of RIPASA Score

Parameter	Value	95% CI
Sensitivity	94.74%	88.14% to 98.27%
Specificity	66.67%	47.19% to 82.71%
Positive Likelihood Ratio	2.84	1.71 to 4.72
Negative Likelihood Ratio	0.08	0.03 to 0.19
Disease prevalence	76.00%	67.54% to 83.18%
Positive Predictive Value	90.00%	84.41% to 93.74%
Negative Predictive Value	80.00%	62.16% to 90.69%
Accuracy	88.00%	80.98% to 93.13%

Comparison of validity of RIPASA Score with Other Studies

Study	Sensitivity	Specificity	PPV	NPV	Accuracy
Present study	94.74%	66.67%	90.00%	80.00%	88%
Chong CF *et al*16	97.5%	81.8%	86.5%	96.4%	91.8%
Nanjundaiah N *et al*17	96.2%	90.5%	98.9%	73.1%	91.8%
Akbar I *et al*18	98.02%	75%	96.48%	84.7%	91.5%

Appendicolith, 14% had Perforation in the Wall, 70% had Post Ileal/Pre-Ileal location of appendix and 79% were diagnosed as Acute Appendicitis Intra operatively [Table 3]. On HPE, majority 64% had 6.6-9 cms Caliber, 100% had Appendicular Inflammation, 14% had Appendicolith, 18% had Perforation in the Wall [Table 4].

In the present study majority of subjects had RIPASA Score of >7 (72%), 2% had Score 5 to 7 and 1% had Score of <5. RIPASA Score had a sensitivity of 94.74%, specificity of 66.67% and Accuracy of 88% in diagnosis of appendicitis. USG had Sensitivity, Specificity and Accuracy of 100% in diagnosis of appendicitis [Table 5].

Acute abdomen is the most widespread surgical complaint that is seen across all ages that present to the emergency room[1]. The management of appendicitis is most often surgical.8 Although the diagnosis and management of appendicular pathology has improved drastically, still appendicitis remains a very important reason that contributes to significant diagnostic dilemma in spite of the available investigations. There are a number of pathologies that can mimic the acute appendicitis especially in females as the right ovarian pathology has a similar presentation. The management of acute appendicitis is a double-edged sword with deferral in carrying out an appendectomy has a higher morbidity and doing appendectomy without also causing morbidity. Hence this study was conducted to compare the clinical diagnosis of suspected appendicitis cases using RIPASA scores and sonological evaluation and to correlate the Intra Operative findings with ultrasonography findings.

In the present 36 % were female and 64 % were males. Majority of subjects were in the age of 21-30 years at 36%, mean age was 29.7±9.18 years, Range was 18-71 years. Chada[12] had 85 females (42.5%) and 115 males (57.5%) with male to female ratio 1.35:1. Mean age was 34.26±8.64 years. Talukder[13] also had a male dominance. Siddique[14] in their study had 70 males and 64 females and mean age was 28.7±11.9 years. Jade[2] in a study observed that majority of the patients were in age group 21-30 years at 44%. Males were 92 cases, male: female ratio was 3:2. Anita Samraj[15] in their study found that acute appendicitis was more common among males and the commonest age group affected is 21-30 years. From the literature it can be observed that middle age males are more commonly presenting with appendicitis.

In the present study abdominal pain was complained by 100%. Other symptoms noted were vomiting in 47.20% , nausea in 20.80% , and 11.40% in fever.

Chada[12] in their study, observed that rebound tenderness in right iliac fossa was present in all the subjects, they also described migratory pain in RIF as the commonest symptom in acute appendicitis. The most common sign was tenderness in the RIF.

Anita Samraj[15] in their study found that right iliac fossa pain was the most common presenting symptom followed by nausea/vomiting.

Chada[12] in their study among 160 cases observed an overall sensitivity and specificity at 97.18% and 55.56% respectively. Among 160 cases histopathologically confirmed cases of acute appendicitis were 142 (88.75%) and 18 normal cases without histopathological diagnosis were operated with a negative appendectomy rate of (11.25%).

In the present study majority of subjects had RIPASA Score of >7 (72%), 2% had Score 5-7 and 1% had Score of <5. RIPASA Score had a sensitivity of 94.74%, specificity of 66.67% and Accuracy of 88% in diagnosis of appendicitis. USG had Sensitivity, Specificity and Accuracy of 100% in diagnosis of appendicitis.

Validity of RIPASA score in the present study was similar to the studies in literature. Hence RIPASA score provides a good alternative for screening of acute abdomen in absence of USG.

CONCLUSION

From the study it can be concluded that Appendicitis predominately affects males in the middle age, with abdominal pain in the right iliac fossa as the commonest presentation. There is good correlation between the clinical findings, histopathological findings

and intra operative findings. RIPASA Score had good Sensitivity and a moderate Specificity in the diagnosis of acute appendicitis. Hence RIPASA score can be used as an alternative for USG in screening of acute abdomen.

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