ORIGINAL ARTICLE

Diagnostic accuracy of RIPASA scoring system for acute appendicitis in a tertiary care Hospital in Peshawar

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Abstract:

Objective: This study was done to find out the diagnostic accuracy of RIPASA scoring system for acute appendicitis in a tertiary care hospital in Peshawar.

Material and Methods: This study was done on 206 consecutive patients presenting to the emergency department with clinical evidence of acute appendicitis over a period of 6 months from July to December 2019. The study was conducted at the department of surgery, MTI Khyber Teaching Hospital, Peshawar. Validity of RIPASA score as a diagnostic test for acute appendicitis was determined by calculating its sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy, using histopathology as gold standard.

Results: Out of 206 patients, 107(51.9%) were males and 99(48.1%) were females. The mean age of participants was 23±6.3 years. A total of 147(86.4%) patients were diagnosed with acute appendicitis on histopathology. Negative appendectomy rate was 13.6%. RIPASA scoring system had a sensitivity of 96.6%, specificity of 92.9%, PPV of 98.9%, NPV of 81.2% and diagnostic accuracy of 96.1% at a cut-off score of 7.5.

Conclusion: RIPASA score is a highly sensitive, specific and accurate test for the diagnosis of acute appendicitis and can be utilized in the emergency department where facilities such as ultrasound and CT are posing diagnostic delay.

Keywords: Acute appendicitis, RIPASA scoring system, validation study

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Introduction:

Acute appendicitis remains to this day, the most common surgical emergency which due to a large number of differential diagnoses poses a significant problem for the surgeon in the emergency department(ED).[1] Its diagnosis is largely based on clinical assessment and scoring systems such as the Alvarado and the Modified Alvarado scoring systems.[2] Modalities such as ultrasound and computed tomography are being increasingly used to reduce the negative appendectomy rate which is currently reported to be 15-30%.[3,4] The cost and availability issue of these modalities in developing countries, makes diagnosis time consuming for the surgeon in the emergency department and this diagnostic delay may present itself in any of the complications of acute appendicitis such as perforation, sepsis and even death.[5]

In 2010, a group in Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, in Brunei, developed a new scoring system called RIPASA score with the claim that it is more suitable for Asian and Middle East populations in terms of increased sensitivity and overall reduction in negative appendectomies.[6] The system has a total of 18 parameters and score for the parameters range from 0.5 to 2 with a cut off of 7.5 taken as diagnostic of acute appendicitis.[1] A comparative study done between RIPASA and Alvarado scores for acute appendicitis showed sensitivities of 93.2% and 73.7% respectively (p<0.01).[7] Another study reported even higher figures; sen-

Table : *RIPASA scoring system for acute appendicitis*

Patient Characteristics	Score
Gender	
Female	0.5
Male	1.0
Age	
< 40 years	1.0
> 40 Years	0.5
Symptoms	
RIF Pain	0.5
Pain Migration to RIF	0.5
Anorexia	1.0
Nausea and Vomiting	1.0
Duration of Symptoms	
< 48 h	1.0
> 48 h	0.5
Signs	
RIF Tenderness	1.0
Guarding	2.0
Rebound Ternderness	1.0
Rovsing's sign	2.0
Fever > 37 C, < 39 C	1.0
Investigations	
Raised WCC	1.0
Negative urinalysis	1.0
Total	16.5

WCC: white cell count, RIPASA: Raja Isteri Pengiran Anak Appendicitis, RIF: Right Iliac fossa

Table 1: *Validity of RIPASA using histopathology as gold standard*

RIPASA score	Histopathology		
	Acute appendicitis	Normal appendix	Total
>7.5	172	2	174
<7.5	6	26	32
Total	178	28	206

Table 2: *Association of RIPASA score with age and gender*

	Age groups:	
Score	< 40 years	>40 years
>7.5 (Acute appendicitis)	154	20
<7.5 (not appendicitis)	32	0
	P<0.05	
	Gender:	
Score	Males	Females
>7.5 (Acute appendicitis)	88	86
<7.5 (not appendicitis)	19	13
	p>0.05	

sitivity and specificity of RIPASA score as 96.2% and 90.5% respectively compared to Alvarado score (58.9% and 85.7%) establishing RIPASA as the superior scoring system.[8]

We aim to find the diagnostic accuracy of RIPASA scoring system in our setup using histopathology as the gold standard, so that we may be able to utilize this new tool and enhance our efficacy in diagnosing appendicitis.

Material and Methods:
After obtaining ethical approval from the institutional review board (IRB), this validation study was conducted at the department of surgery, MTI Khyber Teaching Hospital, Peshawar from July to December 2019. All patients between the ages of 16 to 55 years, presenting to the emergency department with clinical evidence of acute appendicitis were included in the study. Pregnant females and patients having an appendicular mass on examination were excluded. The RIPASA scoring system was applied to each patient by a 3rd year or 4th year surgery resident and final decision to operate was taken by registrar of the ward. A cut off score of 7.5 was taken as diagnostic of acute appendicitis. After surgery, the specimen retrieved was sent for histo-pathological examination to Khyber Teaching Hospital's Pathology laboratory. Findings were recorded and documented on a structured proforma along with the RIPASA score for each patient. Data was analysed using SPSS 22 to determine the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy.

Results:
A total of 206 patients underwent appendectomy in the surgical department of which 107(51.9%) were males and 99(48.1%) were females. The mean age of participants was 23±6.3 years. The major portion of the population (n=186, 90.3%) belonged to the below 40 years age group with the remaining (n=20, 9.7%) being above 40 years of age.

A total of 147(86.4%) patients were diagnosed with acute appendicitis on histopathology out of
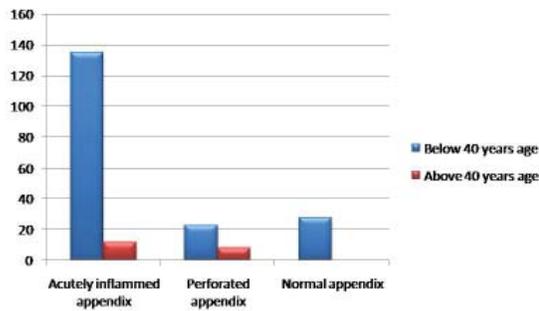
Graph1: Cases of acute appendicitis among different age groups

which 31(15%) were perforated and the remaining 28(13.6%) patients had a normal appendix. Therefore, the negative appendectomy rate was 13.6%. Cases of acute appendicitis among different age groups are shown (Graph-1).

At a cut off score of 7.5, the RIPASA scoring system had a sensitivity of 96.6%, specificity of 92.9%, positive predictive value of 98.9%, negative predictive value of 81.2% and diagnostic accuracy of 96.1% (table-1). RIPASA score was similar among both genders (p>0.05) but differed among the two age groups (p=0.04) (table 2).

Discussion:
Among the surgical emergencies, acute appendicitis is noteworthy for giving the emergency room surgeon a tough time because not only does its diagnosis require strong clinical judgement but the surgeon has to make a quick & firm decision of whether or not to operate.[9] Both cases present with their own dilemma; on the one hand, an unnecessary surgery (negative appendectomy) burdening both the patient and the health care facility and on the other hand, serious consequences (perforation & sepsis) if not operated soon enough.[9,10] CT scan and ultrasound have greatly aided the surgeon in making a firm and timely decision with a subsequent reduction in the negative appendectomy rate but with their own negative impacts in terms of cost, availability and radiation exposure.[11,12] To solve all these problems and enhance diagnostic accuracy, scoring systems such as Alvarado[13] and RIPASA have been established over the years, with RIPASA being a recent advancement.[1,6] Multiple studies have shown both systems to

be highly sensitive and accurate as well as being easily available and free of cost.[7-9,11]

The mean age of participants in our study was 23±6.3 years with a slight male dominance (51.9%). Most of the population (90.3%) was below 40 years of age. These figures are comparable to findings of other studies done in the same region however they reported a higher male to female ratio.[14-16] The negative appendectomy rate in our study was 13.6% which is comparable to that reported by other studies and much lower than the internationally accepted rate of 20-40%, hence establishing the fact that RIPASA is better than other scoring systems for diagnosing appendicitis.[16,17] However, in contrast to our findings, studies done by Chong et al., and Rathod et al., reported higher negative appendectomy rates of 22.9% and 22.69% respectively when comparing Alvarado score to RIPASA.[3,18]

The results of RIPASA scoring system in our study showed a sensitivity of 96.6%, specificity of 92.9%, PPV of 98.9%, NPV of 81.2% and diagnostic accuracy of 96.1% which were comparable to figures reported by studies done by Akbar et al and Noor et al.[14,16] The sensitivity of RIPASA score reported by these studies was slightly higher than our study (Akbar et al:98.02%, Noor et al: 98.52%) whereas the specificity was lower (Akbar et al: 90%, Noor et al: 75%)than our study. Akbar et al reported a low diagnostic accuracy of 86.55% whereas Noor et al reported 97.67% higher than our study.[14,16] Multiple comparative studies conducted both at the national and international level have shown RIPASA to be superior to the Alvarado score in the diagnosis of acute appendicitis and hence can be readily utilized by surgeons in the emergency setting.[17-19]

Conclusion:
RIPASA scoring system is a highly sensitive, specific and accurate system for the diagnosis of acute appendicitis in our setting. Its ease of availability and in-expensiveness make it the scoring system of choice for surgeons in the emergency department. It helps in rapid and timely diagno-

sis and avoids the need for radiological investigations.

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Fazal Hussain, conception and design

Misbah Riaz, analysis & interpretation of data, drafting of article.

Nazish, acquisition of data & interpretation.

Nida Khan: acquisition of data.

Mah Muneer Khan, critical evaluation of intellectual content & Final approval.

Rizwan Ahmed Khan, collected the references and also helped in discussion writing

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