ORIGINAL ARTICLE

DIAGNOSTIC ACCURACY OF RIPASA SCORE

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Background: Acute appendicitis is one of the most common acute surgical emergencies on emergency room floor and timely diagnosis of the condition is of utmost importance. Multiple diagnostic Score exist to help in the clinical diagnosis; among Which RIPASA is a recent introduction. **Methods:** The study was carried out Ayub Teaching hospital of Abbottabad from Sept-2017 to Feb-2018, Department of General Surgery. The ultimate decision to perform surgery was not guided by the scores and the surgeon's decision was the final word, and specimens were sent afterward for histopathology. The results compiled and entered into SPSS 20. **Results:** Out of the 308, 288 patients underwent surgery for AP, 165 (57.3%) were male and 123 (42.7%) were female, 252 (87.5%) had positive histopathology report and 36 (12.5%) had a negative report, with resultant negative appendectomy rate of 12.5% well below the average. 26 (9.02%) had a perforated appendix and 8 (2.8%) had post-op wound infection. The sensitivity of RIPASA score at a cut-off value of 7.5 was 98.02%, with specificity of 75%, and Positive Predictive Value of 96.48%, and Negative Predictive Value of 84.7%. Compared to Alvarado's Score Sensitivity and Specificity of 53% and 75% respectively. **Conclusion:** On the balance the RIPASA Score detects early preventing from dreadful complication and in turn have low specificity giving way to a slightly higher negative appendectomy rate with the consequent morbidity and mortality of unnecessary surgery. Still RIPASA Score outperforms the Alvarado and Modified Alvarado Score.

Keywords: Acute Appendicitis; RIPASA Score; South-Asian Population

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INTRODUCTION

Appendicitis is reported in ancient byzantine and Egyptian texts[1], and is one of the most often times performed surgical wards, with population incidence of 50%, meaning one in two people will have appendectomy performed on him.[2] Furthermore it's one of the few diseases which are mostly emergency cases requiring immediate surgery, and is one of the top differentials in the setting of abdominal pain.[3–5]

Due to its high incidence and often times presenting in the emergency department the correct diagnosis of acute appendicitis still remains one of the most important skill to be mastered by an ER doctor and for this purpose alone multiple scoring system dependent upon clinical signs and symptoms and laboratory findings have been developed namely Alvarado, Modified Alvarado and consequently RIPASA scoring system.[6–8] These scoring systems are base essentials of ER doctors all over the world and failure to diagnose Acute Appendicitis in time can result in perforation, peritonitis and sepsis.[5,9]

For this reason alone doctors are always under pressure to operate unless they run out of time and in this conundrum predictive score gives them an umbrella to operate and not to operate.[9] By using these scoring systems it was observed that, in the use of Alvarado score in Asiatic population the negative appendectomy rate was higher, and herein lays the sensitivity and specificity of these scoring systems (Alvarado, Modified Alvarado, 14 point RIPASA, and 15-point RIPASA) which are 53-88-93-96% and 75-80-87-93% respectively.[10]

We did this study to check the negative appendectomy rate with histopathology and ascertain whether RIPASA is the scoring system of choice for our doctors in our native clinical setting in Ayub teaching hospital using 16-point RIPASA Scoring System.

MATERIAL AND METHODS

This study was based on patients presenting to the ER of Ayub teaching hospital Abbottabad and subsequently referred to surgical emergency for evaluation. Patients aged less than 11 and pain more than 7 days were excluded from the study. The patients would be examined by Postgraduate Trainees who would do all the base-line investigations Blood Counts, Urine R/E, and Ultrasonography, followed by history and examination and present the patient to the on call registrars and note down the clinical and laboratory parameters on the Proforma, the senior registrar would then make a judgement call on whether to operate or not, and in case of operation the resected appendix would be subsequently sent to

histopathology and result noted down in the same profile. The Research proposal was put forward through the hospital ethical review board and post approval the first cases started in the September of 2017 till February of 2018, a six months' span, and an adequate sample of 305 patients in total was collected, complied and entered into SPSS 20.0 for Statistical Analysis.

RESULTS

Out of the 305, 288 patients underwent surgery for AP, 165 (57.3%) were male and 123 (42.7%) were female. They were further divided into Age groups, of Age (11-25) there were 129 (44.8%), Age (26-40) were 112 (38.9%), of Age (41–55) were 43 (14.9%). Out of 288, 252 (87.5%) had positive histopathology report and 36 (12.5%) had a Negative report, with resultant negative appendectomy rate of 12.5% well below average. The distribution by age group of positive and negative appendectomy is outlines in Figure-1. Twenty-six (9.02%) had a perforated appendix and 8 (2.8%) had post-op wound infection. The sensitivity of RIPASA Score at a cut-of value of 7.5 was 98.02%, with specificity of 75%, and Positive Predictive value of 96.48%, and Negative Predictive value of 84.7%. Compared to Alvarado's Score Sensitivity and Specificity of 53% and 75% respectively.

Rate of negative appendicectomies

		Acute Appendicitis		
		Yes	No	Total
RIPASA SCORE	Yes	252	36	288
	No	5	12	17
	Total	257	48	305

A 2 by 2 contingency table analysis was conducted to evaluate whether Acute Appendicitis on Histopathology (Yes, No) was associated with Acute Appendicitis Diagnostic Score RIPASA (Yes, No). The analysis yielded a Pearson chi-square (1, n=305) = 40.8454094186313, which is greater than the critical value of 3.85. Thus, the null hypothesis of no association was rejected (p<.05). Phi was estimated at 0.36594996262201.

Table-1: Demographic distribution

Demography	No. of Patients (%)
Gender Male Female	 165 (57.3%) 123 (42.7%)
Total Emergency Appendectomy	288
Positive Histopathology for AP	252 (87.5%)
Negative Histopathology for AP	36 (12.5%)
Mean Hospital Stay	1.8 days
Perforated Appendix	26 (9.02%)
Wound Infection	8

Note: Gender Distribution and the Net result of the Study, showing clearly that RIPASA Score has high sensitivity which results in higher negative appendectomy rate.

Table-1: RIPASA Score

	Score
Male	1
Female	0.5
<39.9 years	1
>40 years	0.5
Foreign national	1
Symptoms	
Pain in the right iliac fossa	0.5
Nausea/ vomiting	1
Migratory pain	0.5
Anorexia	1
Symptoms < 48 h	1
Symptoms > 48 h	0.5
Signs	
Tenderness in RIF	1
Abdominal guarding	2
Rebound tenderness	1
Rovsing sign	2
Fever > 37°C <39°C	1
Laboratory studies	
Leukocytosis	1
Negative urinalysis	1
Total score	16

RIF: Right Iliac Fossa.

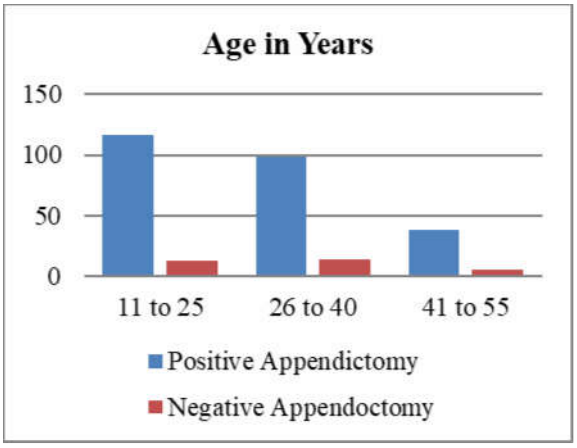

Figure-1: Distribution of patients who underwent appendectomy according to age.

DISCUSSION

Acute Appendicitis is a major surgical emergency and is one of the most often admitted cases to the surgical ward. Due to its increased incidence, a ED doctor need to be at its best to correctly diagnose a case of acute appendicitis, but being the best is not enough in high capacity ED department in a major tertiary care hospital of the region.[11] Timely intervention is needed to circumvent any risk of perforation, peritonitis and sepsis. To operate or not to operate is conundrum forever facing a surgeon. And in case of negative appendectomy the patient undergoes unnecessary surgery.[12] As a diagnostic help modalities such as Ultrasound and CT scan can be employed to help in the diagnostic process.[13] Ultrasound being operator dependent have a low threshold of sensitivity and specificity.[14] And

Computer Tomography Scan has a high sensitivity 96% but exposes the patient to ionization radiation and incurs high cost.[15] Both ultrasound and CT scan are not ideal modalities in the diagnostic process especially in emergency setting as in case of acute appendicitis and are mostly expensive or woefully unavailable in developing nations or with region with limited development.[15] The Alvarado scoring system was introduced to help in diagnosing of acute appendicitis by set criterion, and it worked like a charm, reducing the number of negative appendectomies drastically.[6] First introduced in 1986, Alvarado scoring system quickly gained popularity among the surgical circles and became a handy tool to have a final or a prospective say in the management plan of the patient, but this scoring system also had a high false positive specially in females of child bearing age, and a further modification was later on added in the form of modified Alvarado score in 1994, in which shift to the left of neutrophils was excluded[7], this further improved sensitivity and decreased the false positive percentage; the reported sensitivity and specificity of these scoring system were 53–88% and 75–80% respectively.[16] While these scoring systems came of use all around the world, over time in surgical centers of Asia, it was seen that Alvarado as well as modified Alvarado were deficient for the purpose of accurately diagnosing acute appendicitis with decreased sensitivity and specificity.[17–19] In 2010, it was reported by Department of Surgery, Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, Brunei Darussalam in a retrospective analysis a new scoring system that could cater better to differentiate ethnic population with different diet.[17,18]

So was introduced RIPASA scoring system for Asian population with better sensitivity and specificity for detection of acute appendicitis was 96.2% and 85.7% respectively when compared with RIPASA.[10] This must be kept in mind that RIPASA scoring system has been adopted and tested now in multiple centers around Pakistan and had shown promising results, in Kohat. Butt et al has shown that RIPASA Score had sensitivity of 96.7%, specificity 93.0%, diagnostic accuracy was 95.1%.[20] And our study showed the same profile sensitivity and specificity, PPV, NPV, FP rate and FN rates was reported by Butt *et al*.

It was noted among our results that the major bulk of Acute appendicitis presented in male predominantly 129 (57.3%) to be exact and 123 (42.7%) female, 1.34 times more than females Table-1. Secondarily the age groups distributions showed interesting results for a practicing surgeon to consider as high risk group being the adolescent to early twenties namely of Age 11–25, were 129 (44.8%).[2] This probably reinforces the fact that nonconforming and variable and unsafe dietary practices which are the hallmark of this age group most probably contributes to the increased incidence of acute appendicitis in the said segment of the population.[2,21] Similarly it is also noted that most of the false positives arose from females in child bearing age group or married, with normal appendix[22], and their complains having another primary cause namely ruptured ovarian cyst, ovarian torsion, ectopic pregnancy[23]. It was further noted that the false positives, patients in whom the diagnosis for acute appendicitis was missed was in age group of 40–55 and mostly female and diabetic[24], adding another perspective to the issue of a multiple differentials to be excluded and females pose a difficult problem therein and always needs to be considered carefully and investigated fully in context of this latest evidence.[25,26] Over all our sensitivity of RIPASA Score at a cut-of value of 7.5 was 98.02%, with specificity of 75%, and Positive Predictive value of 96.48%, and Negative Predictive value of 84.7% respectively. Greatly reinforcing the confidence of this scoring system.

CONCLUSION

In the lieu of the study and its results herein we conclude that RIPASA scoring system is the scoring system of choice for the doctor in ED to help in diagnosis of the acute appendicitis with good sensitivity albeit a hit high and specificity albeit a bit low profile. Furthermore, it is recommended that the age group 11–25 be considered high risk group to be taken into account and taken on low threshold for diagnosis. Also, care must be taken to rule out all the possible differentials in women of childbearing age to keep the number of negative appendectomies in check.

AUTHORS' CONTRIBUTION

IA: Data collection, supervision, references. SA: Write-up, statistic work. JAS: Date collection,

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