

To evaluate outcome of combined modified RIPASA scoring and Ultrasonography to improve diagnostic accuracy in acute appendicitis

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Abstract: *Background:* Acute appendicitis a surgical emergencies is still a difficult diagnosis to make, especially in young persons, the elderly, and in reproductive-age women. Different scoring systems have been created to increase diagnostic accuracy based on clinical history and intial lab parameters. *Objectives:* This study was done to prospectively evaluate the Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score for the diagnosis of acute appendicitis in patients presenting to the Accident and Emergency department or the Surgical wards with right iliac fossa pain. *Methods:* A prospective study was conducted in MVJ MC & RH on symptomatic patients presented with complaints of right iliac fossa pain. Clinical history and examination, radiological record and histopathologic reports were noted. We studied accuracy modified RIPASA score with Ultrasound and Histopathological reports in evaluation the diagnosis of acute appendicitis. *Results:* In our study we noted Sensitivity, specificity and diagnostic accuracy of modified RIPASA score was 89.5%, 66.7% and 88.3% respectively. Sensitivity, specificity and diagnostic accuracy of USG was 70.2%, 67% and 70% respectively. On combining modified RIPASA score with USG, Sensitivity, specificity and diagnostic accuracy were 98.2%, 66.7% and 96.7% respectively. *Conclusion:* On adding USG with modified RIPASA score there is increase in sensitivity and diagnostic accuracy. So modified RIPASA score with USG can be used in patient with RIF pain for making diagnosis of acute appendicitis.

Keywords: Acute appendicitis, Appendicectomy, RIPASA Score.

Introduction

Acute appendicitis is the most common cause of surgical emergencies in patients presenting with pain abdomen with an incidence of about 1.2 to 1.9 per 1,000 population. The lifetime risk of having acute appendicitis is about 8.4% in men and 6.6% in women and the common age occurrence of this disease is during 25-35 years of age. It is still difficult to make, the diagnosis of acute appendicitis especially in young persons, the elderly, and in reproductive-age women due other genitourinary or gynecologic inflammatory conditions can have a similar clinical presentation as acute appendicitis.

Diagnosis is based purely on the clinical history and physical examination, combined with the results of laboratory studies, such as a high white

cell count. *Different scoring systems have been created to increase the diagnostic accuracy of appendicitis that are low-cost, noninvasive, and easy to use or reproduce.* Numerical values are assigned to different signs and symptoms of acute appendicitis .to develop a scoring system for assessing the severity of acute appendicitis. The Raja Isteri Pengiran Anak Saleha appendicitis (RIPASA) scoring system is a new scoring system developed in 2010 at the RIPAS Hospital of Brunei for assessing the severity of acute appendicitis .Modified Raja Isteri Pengiran Anak Saleha Appendicitis (modified RIPASA) is a scoring system to diagnose acute appendicitis in patients having right iliac fossa pain in an outpatient department based on clinical and lab parameters.

Numerical values are assigned to different signs and symptoms of acute appendicitis to develop a scoring system for assessing the severity of acute appendicitis. The Raja Isteri Pengiran Anak Saleha appendicitis (RIPASA) scoring system is a new scoring system developed in 2010 at the RIPAS Hospital of Brunei for assessing the severity of acute appendicitis.

Modified Raja Isteri Pengiran Anak Saleha Appendicitis (modified RIPASA) is a scoring system (Table 1) to diagnose acute appendicitis in patients having right iliac fossa pain in an outpatient department based on clinical and lab parameters.

Table-1: Modified RIPASA	
Male	1
Female	0.5
<39.5 years	1
>40 years	0.5
Foreign national	1
<i>Symptoms</i>	
Pain in RIF	0.5
Nausea and vomiting	1
Migratory pain	0.5
Anorexia	1
<48 hrs	1
> 48 hrs	0.5
<i>Signs</i>	
Tenderness in RIF	1
Abdominal guarding	2
Rebound tenderness	1
Rovsings sign	2
Fever	1
<i>Lab studies</i>	
Leukocytosis	1
Total score	16

Score interpretation suggests 4 management groups:

- a) < 5 points (unlikely, patient observation)
- b) 5-7 points (low probability, emergency room observation, abdominal ultrasound),

- c) 7.5-11.5 points (high probability, surgical evaluation and preparation for appendectomy), and
- d) > 12 points (appendicitis diagnosis, appendectomy).

Material and Methods

A prospective study was conducted in MVJ MC & RH on symptomatic patients presented with complaints of right iliac fossa pain. Clinical history with clinical examination, and radiological record of patient had been taken. A note was taken of intra-operative finding in every case. Diagnosis was confirmed by post-operative histopathological examination reports. We compared combined modified RIPASA score and Ultrasound with Histopathological reports and accuracy of modified RIPASA score with ultrasonography was evaluated in diagnosis of acute appendicitis.

Results

In our study patients in age group of 21-30 years comprises (Table-2) the greatest number of patients. Male were more affected than female (Table-3).

Table-2: Age Distribution		
Age	Cases	Percentage
10-20	10	8
21-30	55	45
31-40	24	20
41-50	18	15
51-60	15	12
Total	122	100

Table-3: Gender Distribution		
Sex	Cases	Percentage
Male	87	71
Female	35	29
Total	122	100

Sensitivity, specificity and diagnostic accuracy of modified RIPASA score was 89.5%, 66.7% and 88.3% respectively (Table-4). Sensitivity, specificity and diagnostic accuracy of USG was 70.2%, 69.7% and 70.6% respectively (Table-4).

Tables-4: RIPASA score outcome			
Modified RIPASA	Histopathology		Total
	Yes	No	
Yes	80	11	91
No	9	22	31
Total	89	33	122
Sensitivity = 89.5, Specificity = 66.7 and Accuracy = 83.3			
USG			
Yes	62	10	72
No	27	23	50
Total	89	33	122
Sensitivity = 70.2, Specificity = 69.7 and Accuracy = 70.06			

On combining modified RIPASA score with USG, Sensitivity, specificity and diagnostic accuracy were 97.7%, 66.6% and 89.3% respectively (Table-5). It is noted that by adding USG with modified RIPASA score sensitivity and diagnostic accuracy is increased and negative appendicectomy is reduced to 5%.

Table-5: Combined score outcome			
Modified RIPASA + USG	Histopathology		Total
	Yes	No	
Yes	87	11	98
No	2	22	2
Total	89	33	122
Sensitivity = 97.7, Specificity = 66.6 and Accuracy = 89.3			

Discussion

Acute appendicitis is one of the most common surgical emergencies encountered especially by junior doctors during on call duties with emergency appendicectomy making up 10% of all emergency abdominal surgeries. A shifting pain from the umbilical area to the right iliac fossa, which is normal, is a usual symptom presentation of this condition. There is also a high temperature, anorexia, abdominal pain, and guarding [1-2].

In around half of all cases of acute appendicitis symptoms are vague and unusual which makes the diagnosis of acute appendicitis difficult [3].

There are a number of studies that may help in the early detection of acute appendicitis, including CT scans. CT scan is now usually performed in major hospitals on all patients suspected for acute appendicitis [4].

Despite this, making a quick and accurate diagnosis of acute appendicitis can be difficult. Radiological investigations such as computed tomography (CT) scan have been reported to have high sensitivity (94%) and specificity (95%) for diagnosing acute appendicitis. It is now common practice in major centres to perform a CT scan in all patients suspected of having acute appendicitis.

However, such practice can be very costly and stretch an already overburdened national healthcare system. Furthermore, arrangement for CT scan may delay emergency appendectomy. Recent reports have suggested that the indiscriminate use of CT scan may lead to the detection of early low-grade appendicitis and these patients may then be subjected to unnecessary appendicectomy, in a condition that would otherwise have resolved spontaneously with antibiotics therapy [5-6]. To diagnose clinically, different scores have been designed that associate the clinical features of acute appendicitis with some laboratory findings to correctly diagnose this condition [7].

One of them is the Alvarado score, which was designed in 1986 and is very popular among surgeons. Another score developed by the clinicians was the modified Alvarado score. Alvarado's score was modified by omitting some points of the clinical parameter. However, the two scores did not differ significantly in results [8].

The Alvarado and the Modified Alvarado scoring system helped residents in making a clinical decision in achieving an accurate diagnosis of acute appendicitis in the fastest and cheapest way [9]. This scoring system provided guidelines to help junior doctors to select patients for either emergency appendicectomy or conservative management with further radiological investigations if required [9-10].

Even though both Alvarado score and the modified Alvarado score were established in the West, the specificity and sensitivity levels reached when applied to Asia and the Middle East was poor. One study research done by Khan et al, the Alvarado scoring system had 23% specificity and 59% sensitivity in an Asian population [11].

The RIPASA scoring system is simple scoring system of symptom and signs and lab parameters with higher diagnostic accuracy, especially for Asian population who generally live in rural settings lesser access or afford radiological tools for diagnosis [8]. This prospective evaluation of our RIPASA score correctly classified 97% of all patients with confirmed histological acute appendicitis to the high probability group (score >7.5) and 81.5% of negative appendicitis to the low probability group (score) [12]. Sensitivity, specificity, negative predictive value, diagnostic accuracy, and positive predictive value were all calculated using the RIPASA score in the current investigation. Chong et al [17] did a similar investigation and found comparable findings. 98% of patients were accurately recognized as having acute appendicitis (RIPASA score >7.5) and treated adequately, according to Chong et al [17].

Recently, a new scoring system called 'Appendicitis inflammatory response score' was introduced by Andersson et al in 2008 [14]. This scoring system had a sensitivity of only 96% and a specificity of 73% for a cut-off threshold set at >4 or a sensitivity of 37% and specificity of 99% if the cut-off threshold was set at >8.13. Using this Appendicitis inflammatory response score, 73% of the non appendicitis patients (true negative and false positive) were classified to the low probability group while 67% of patients with advanced appendicitis (true positive and false negative) were classified to the high probability group with a high accuracy, in comparison with 97% and 82% respectively for the RIPASA score.

In the Appendicitis inflammatory response score, a significantly higher percentage (37%) of patients were in the indeterminate group, in comparison with 9.7% for the RIPASA score (p score between 7.5 and 12, it would be advisable to perform further investigations such as an abdominal ultrasound to exclude pelvic

pathology, as 75% of patients in the false positive group were female [12-14].

The RIPASA score is a simple and easy to use quantitative scoring system and as shown in Appendix, most of these 14 clinical parameters are easily obtained from a good clinical history and examination. This also include a urinalysis which can be easily performed on the spot. Hence a score can be obtained quickly and a rapid diagnosis made without having to wait for the full investigations to be available when a score of >7.5 is obtained [15-16].

The additional parameter which is unique to our local population consists of foreign nationality. As previously explained, foreign nationals were included as an additional parameter as the probability of acute appendicitis among foreign nationals presenting with RIF pain was 0.96 based on logistic regression analysis [17].

Although the RIPASA score was specifically developed for our local population, the 14 fixed clinical parameters are general to all populations and hence the RIPASA score can be applied in any country. The additional parameter of foreign NRIC can be included to the score in countries where there is a large foreign work-force like our own who have to pay for any healthcare treatment. In conclusions, the RIPASA score is a simple scoring system with high sensitivity and specificity for the diagnosis of acute appendicitis. The 14 clinical parameters are all present in a good clinical history and examination and can be easily and quickly applied. Therefore, a decision on the management can be made early. Although the RIPASA score was developed for our local population, we believe that it should be applicable to all regions [17-18].

Conclusion

A Patient presenting with Right iliac fossa pain in the emergency department should be carefully evaluated clinically and radiologically. Possible differential diagnosis should be excluded before making final diagnosis of acute appendicitis. Modified RIPASA score is found to be more consistent

in Asian population. On adding USG with modified RIPASA score there is increase in sensitivity and diagnostic accuracy. So modified

RIPASA score with USG can be used in patient with RIF pain for making diagnosis of acute appendicitis.

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