Research Paper

Medical Science

Comparision of Alvarado And Ripasa Scoring Systems in Diagnosis of Acute Appendicitis

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ABSTRACT

The diagnosis of acute appendicitis is mainly based on clinical examination. Various diagnostic scores are available to aid in the diagnosis of acute appendicitis with varying success rates. We compared Alvarado and RIPASA scoring systems for the diagnosis of acute appendicitis and their negative appendectomy rate in 100 patients of appendicitis. We observed that RIPASA scoring system was more sensitive but less specific than Alvarado scoring system and the accuracy of negative appendectomy rate was higher in RIPASA scoring system than Alvarado scoring system.

KEYWORDS | Appendicitis, Appendectomy, Alvarado Score, RIPASA Score

INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies encountered in the world.[1] The diagnosis of acute appendicitis may be difficult in patients who present with atypical signs and symptoms on physical examination.[2] Alvarado scoring system is one of the most commonly used scoring tool which incorporates symptoms, signs and laboratory investigations to reach the diagnosis.[3] Another scoring system, RIPASA score has been claimed to have better outcomes in Asian settings.[4]

Many studies in the literature are available on diagnostic scores for acute appendicitis in western population but there are only few studies available in Indian population. We carried out a prospective study to compare Alvarado and RIPASA scoring systems for the diagnosis of acute appendicitis and their negative appendectomy rate.

PATIENTS AND METHODS

The present study was conducted in 100 patients in department of surgery of our institute. Patients of all age groups presenting with right iliac fossa pain, suspected to be having acute appendicitis were included in this study.

The data including the patients' demographics (Foreign National Registration Card [NRIC] number, age and gender), the presenting symptoms (right iliac fossa pain, nausea and vomiting, anorexia and the duration of symptoms), clinical signs (right iliac fossa tenderness, guarding, rebound tenderness, Rovsing's sign and fever) and laboratory investigations (elevated white cell count and negative urinalysis, shift to left) were recorded. Confirmation of acute appendicitis as the final diagnosis was obtained from histopathological analysis of the resected appendix in the department of pathology.

Data regarding patient's admission and discharge dates, date of appendectomy if performed, name and signature of confirming surgeon, post–operative complications and use of radiological investigations were recorded. Patients who were treated conservatively and subsequently discharged, were reviewed once in the surgical out-patient clinic a week after discharge. All patients with true negative RIPASA score status were later contacted via telephone within a month to confirm their true negative RIPASA score status and that they have not been readmitted and have undergone emergency appendectomy either at this hospital or at another hospital at a later date.

Data was analysed using SPSS-17 software and appropriate statistical tests (chi Square test, unpaired t test and ANOVA test) were applied to draw conclusion.

OBSERVATIONS

In our study, 83% patients were of <40yrs of age and 67% were males. All the patients presented with complaint of pain in Right illiac fossa. Migration of pain to right illiac fossa, anorexia, nausea-vomiting and fever were present in 94%, 88%, 78% and 36% patients respectively. All the patients were having tenderness and rebound tenderness. Guarding and Rovsing's sign were present in 49% and 40% patients respectively. Seventy seven patients had raised leucocyte count with shift to the left seen in only 7 patients. The routine microscopy was normal in 96 patients.

When ALVARADO score was applied to all patients, 80 patients had their score ≥7 i.e. 80% patients had acute appendicitis and when RIPASA score was applied, 99 patients had their score >7.5 indicating that 99% patients had acute appendicitis.

On analyzing the data, there was definitive agreement that both the scoring systems were positively correlating with each other with respect to diagnosis of the disease. For compairing both the scoring systems with each other, the scoring systems were analyzed with respect to histopathology which is considered the gold standard. A total of 100 patients under study were operated for appendicitis and it was confirmed histopathologically in 91 patients. Nine patients did not have evidence of appendicitis and were considered to have undergone negative appendectomy as per histopathology. On histopathology, the most common type was acute appendicitis with periappendicitis(49%). Other types were acute diffuse suppurative appendicitis, gangrenous appendicitis, obliterative appendicitis and granulomatous appendicitis.

According to Alvarado score, 80 patients were diagnosed to have appendicitis. Out of these 80 patients, only 75 patients had evidence of appendicitis histopathologically. Five patients were falsely diagnosed to have appendicitis by Alvarado scoring system. Out of 20 patients diagnosed by Alvarado as not having appendicitis, 16 patients were missed by this scoring system. However, the findings were not statistically significant (Table no. 1).

TABLE NO. 1
COMPARISON OF ALVARADO SCORE WITH FINAL HISTO-PATHOLOGICAL DIAGNOSIS
n=100

Alvarado score	Total no of patients	No appendicitis	Appendicitis
Alvarado score <7	20 (100%)	4 (20%)	16 (80%)
Alvarado score ≥7	80 (100%)	5 (6.3%)	75 (93.8%)
Total	100 (100%)	9 (9%)	91 (91%)

Accoring to RIPASA score, 99 patients were diagnosed to have appendicitis. Out of these 99, 91 patients had evidence of appendicitis histopathologically. Eight patients were falsely diagnosed to have appendicitis by RIPASA scoring system. Appendicitis was not found to be present in the only patient who was diagnosed on RIPASA scoring system as not having appendicitis. The findings were statistically significant (Table no. 2).

TABLE NO. 2
COMPARISON OF RIPASA SCORE WITH FINAL HISTO-PATHOLOGICAL DIAGNOSIS
n=100

RIPASA score	Total no of patients	No appendicitis	Appendicitis
RIPASA score <7.5	1 (100%)	1 (100%)	0 (0.0%)
RIPASA score ≥7.5	99 (100%)	8 (8.1%)	91 (91.9%)
Total	100 (100%)	9 (9%)	91 (91%)

Sensitivity of the Alvarado scoring system in the study was 82.42% and specificity came out to be 44.44%. The positive and negative predictive values were 93.75% and 20% respectively. Accuracy of the Alvarado scoring system was 79% in the studied population. Sensitivity of the RIPASA scoring system in the study was 100% and specificity came out to be 11.11%. The positive and negative predictive values were 91.92% and 100% respectively. Accuracy of the RIPASA scoring system was 92% in the studied population. The negative appendectomy rate was higher for the RIPASA scoring system (8.1%) as compared to the Alvarado scoring system (6.3%) with respect to the histopathology findings (Table no 3).

TABLE NO. 3
COMPARISON OF ALVARADO WITH RIPASA SCORING SYSTEMS IN THE DIAGNOSIS OF ACUTE APPENDICITIS
n=100

Statistical parameters	Alvarado score	RIPASA score
Sensitivity	82.42%	100%
Specificity	44.44%	11.11%
Positive predictive value	93.75%	91.92%
Negative predictive value	20%	100%
Accuracy	79%	92%
Negative appendectomy rate	6.3%	8.1%

DISCUSSION

Appendicitis is a condition characterized by inflammation of appendix. Acute appendicitis has a lifetime prevalence rate of approximately 1 in 7.[5] The first description of a case of appendicitis was by Fernel in 1554.[6] McBurney in 1889 contributed his classical sign to the diagnosis of appendicitis.[7] Several other conditions can mimic appendicitis.[8] Only CECT can diagnose the condition with very high sensitivity and specificity but it is not feasible to have this investigation for each and every patient suspected to be having appendicitis, particularly in countries with limited resources.[9,10] Delay in diagnosis can lead to morbidity and even mortality. To prevent this delay, various investigations have been tried but surgeons' good clinical assessment is considered to be the most important requisite in the diagnosis of appendicitis.

Till date we have no laboratory parameters that could indicate or reliably point to presence or absence of acute appendicitis. There has been a need of scoring system with acceptable sensitivity, specificity and negative appendectomy rate.

We compared the diagnostic value of Alvarado scoring system and RIPASA scoring system for acute appendicitis and analyzed the negative appendectomy rate for the above two mentioned systems in 100 patients of appendicitis who underwent appendectomy.

In the present study, the mean age of the patients with appendicitis was 28.10±10.887 years. Most of the patients were in the younger age group with age less than 40yrs and mare preponderance as evidenced by various studies in the literature.[11-16] The cause of male predominance is still not clear but increased incidence of appendicolith in males is thought to be responsible for it. The most common symptom in patients with appendicitis was pain in the right illiac fossa which is consistent with other studies in the literature.[13,14] Tenderness was observed in all the patients as mentioned in the other studies published in literature.[13,17]

In our study, the most common type of appendicitis on histopathology was acute appendicitis with periappendicitis which was same as reported in other studies in literature. In the present study, negative appendectomy rate was observed in 9% of the patients, which is similar as in the studies done by Erdem et al and Nshuti et al. However, the negative appendectomy rates are variable in different studies in literature.[11,13,14,18-20]

In the present study, the sensitivity, specificity, positive predictive value and negative predictive value of Alvarado score was 82.42%, 44.44%, 93.75% and 20% respectively. Other studies in literature show variable results.[11,15,17,21-23] Accuracy in the present study was 79% which was similar to the studies done by Jawaid et al and Erdem et al and lower in the study done by Chong et al. In the present study the negative appendectomy rate of the Alvarado score was 6.3% which was lower than in other studies in the literature available.[17,21,23]

Similarly, the sensitivity, specificity, positive predictive value and negative predictive value of RIPASA score was 100%, 11.11%, 91.92% and 100% respectively and the studies in literature show varying results.[4,15,17,23] The accuracy in the present study was 92% which was similar to the studies done by Chong et al and Alnjadat et al and higher than in the studies done by Erdem et al.[15,17,23] In the present study, the negative appendectomy rate of the RIPASA score was 8.1% which is quiet variable as evidenced by other studies in literature.[4,15,17]

SUMMARY AND CONCLUSIONS

RIPASA scoring system was more sensitive but less specific than Alvarado scoring system. Positive predictive value of Alvarado scoring system was more than RIPASA scoring system and negative predictive value of Alvarado scoring system was less than RIPASA scoring system. Accuracy of negative appendectomy rate was higher in RIPASA scoring system than Alvarado scoring system.

In the present study, we concluded that RIPASA scoring system is better than Alvarado scoring system in diagnosing acute appendicitis. Our study design should however, be applied to a larger group of patients to further evaluate the validity of our results. This can contribute to the quest for surgical excellence and better patient care for one of the most commonly performed surgical procedure in the world.

CONCLUSIONS

We can say that for $1m^3$ M20 grade of concrete consumption of fine aggregate is 775.96 kg. Here in specimen M-3 we replace fine aggregate by 24.62 kg of crumb rubber for $1m^3$M20 grades of concrete. So, we can say that up to 15% foundry sand utilized for economical and sustainable development of concrete. Uses of crumb rubber in concrete can reduce the harmfulness to the environment and produce a 'greener' concrete for construction. An innovative supplementary Construction Material is formed through this study.

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