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A Comparative Study of RIPASA Score and Modified Alvardo Score in the Diagnosis of Acute Appendicitis in Himachal Pradesh

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Abstract:-

- ***Introduction:***

Acute appendicitis is most common abdominal surgical condition which is more common in young males and white races.But its diagnosis can be difficult because it can mimic other abdominal conditions. Various scoring systems/ techniques have been devised to assist in its diagnosis specially in equivocal cases. Accuracy of ModifiedAlvarado score has been reported low in Asian population and RIPASA score was devised specially for Asian population.

- ***Aim***

The aims of this study were to evaluate the sensitivity and specificity of RIPASA score and ModifiedAlvarado score in diagnosis of acute appendicitis.

- ***Materials And Methods:***

This study was carried out in I.G. medical college teaching hospital Shimla from July 2015 to August2018 in patients with the diagnosis of acute appendicitis. A total of 200 cases that underwent surgery for suspected acute appendicitis were included. Modified Alvarado score and RIPASA scores were computed for each patient and the suggested cutoff value 7.5 for RIPASA and 7 for MAS were used to find out the accuracy of these scores. Post-operative histopathological report was correlated with different scoring systems.

- ***Results:***

RIPASA scoring system correctlydiagnosed histologically proved ac. appendicitis in 97.17% patients&had specificity of 69.56% with cut of value of 7.5. While MAS sensitivity for diagnosing ac.appendicitis was 64.97% with cut off value of 7 and had 47.82% specificity.

- ***Conclusions:***

RIPASA scoring system is more accurate,convenient as compared to modified Alvarado score in our studied population.

Keywords:- *RIPASA score, Modified Alvarado (MAS) scoring systems, ac. Appendicitis.*

I. INTRODUCTION

Acute appendicitis is most common abdominal surgical emergency which is more common in young males and white races taking less fibre diet and it has seasonalvariation[1]. Fernel first time described ac. appendicitis in detail in 1556.First appendicectomy was performed by Amynand in 1736[2].

Appendicectomy is one of the common surgical procedure performed in cases of acute abdomen.A negative appendicectomy is if performed for preoperative diagnosis of acute appendicectomy while resulting in normal appendix on histopathology or some other surgical pathology [3] and the various studies reported the rate of negative appendicectomy between 2% to 30% [4]. Due to complications and unnecessary costs, negative appendicectomy should be avoided [5]. A number of aiding systems were devised to assist the surgeon specially in equivocal cases to decide regarding appendicectomy. Classical Alvarado score was evolved which was more accurate to Western population. Kalan et al later omitted the shift to the left in leucocyte count because this investigation was routinely not available in many laboratories specially in emergency hours. Accuracy of Alvarado and Modified Alvarado scores is disappointingly low in Asian population, RIPASAscore was developed by Chong et al from the Department of Surgery at Raja Isteri Pengiran Anak Saleha Hospital, Brunei Darussalam [6]. RIPASAscore consists of 15 clinical and laboratory variables with a maximum score of 16 pts and additional 1 point is given for foreignNRIC.(Table 2).

II. MATERIALS AND METHODS

This study performed upon the patients with the clinical suspicious of acute appendicitis followed by histopathological evidence of acute appendicitis in the department of General Surgery, Indira Gandhi Medical College, Shimla w.e.f. July 2015 to august 2018,after obtaining the institutional ethical clearance.

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This study included200 cases and detailed clinical history regarding duration of pain abdomen, its initiallocation and later migration to RIF,any nausea or vomiting with fever was recorded.clinical examination includedMcBurney's point tenderness in RIFwith guarding, elicitation of rebound tenderness, & demonstration of Rovsing's sign was performed.

Laboratory investigations included complete hemogram, KFT, LFT, Blood sugar, routine urine analysis and investigations from anaesthesia point of view which included ECG, Xray's chest, BT, CT and INR.

Modified Alvarado score (Table 1) and RIPASA score(Table2) werecalculated for every patient before surgery and cut off values of 7 & 7.5 were taken for MAS & RIPASA respectively and both systems were compared after surgery.But as the studied population was local Asian population, hence NRIC point was not considered in RIPASA score and it was modified with a cut-off score of 7.5. AlthoughUSG of abdomen was done in majority of patient and CT scan abdomen in few patients. But their help was taken to rule out other acute abdominalcondition. Decision to operate were taken by surgeon aftertaking into account of clinical, laboratory and radiological findings. MAS AND RIPASA scores were calculated for study purpose only. Histopathologicalreport was considered as the standard for comparison.

SYMPTOMS	SCORE
Anorexia	1
Nausea/ vomiting	1
Pain migration to RIF	1
SIGNS	
Tenderness in RIF	2
Rebound tenderness in RIF	1
Fever	1
INVESTIGATION	
Leucocytosis	2
TOTAL	9

Table 1: Modified Alvarado Scoring system

Interpretation: ≥ 7- likely appendicitis; 5-6 less likely appendicitis; 0-4 probably not appendicitis.

PATIENT DATA	SCORE
Female	0.5
Male	1.0
Age<39.9 years	1.0
Age >40	0.5
SYMPOTOMS	
Pain in RIF	0.5
Migration of pain to RIF	0.5
Anorexia	1.0
Nausea/ Vomiting	1.0
Duration of Symptoms <48 hrs.	1.0
Duration of symptoms > 48 hrs	0.5
SIGNS	
Tenderness in RIF	1.0
Guarding in RIF	2.0
Rebound tenderness in RIF	1.0
Rovsing's Sign	2.0
Fever $>37^0$ C$<39^0$C	1.0
INVESTIGATION	
Leucocytosis	1.0
Negative urine analysis	1.0
TOTAL	16.5

Table 2: Modified RIPASA scoring system

Interpretation :<5.0 Probability of ac. appendicitis is unlikely;5.0-7.0 Low probability of ac. appendicitis;7.5-11.5 Probability of ac. appendicitis is high; >12 Definite ac. appendicitis.

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Adult patients of both sexes with suspicion of ac. Appendicitis were included.

While children below 15 yrs., pregnant females& patients with Rt.Iliac fossa mass or with history of pelvic inflammatory disease or history of urinary system stones were excluded.

Intraoperative findings were recorded as normal appendix, ac. catarrhal appendicitis, obstructed appendicitis with faecolith / with perforation or with abscess or with localized or generalised peritonitis or as appendicular lump formation. Other pathology in Rt. Iliacfossa causing ac. abdomen were also documented. All operated specimens ofappendix or other pathology were sent for histopathological examination.

➢ *Statistical Analysis*

Both scoring systems were correlated with histopathologyreport. Scores of these two systems were recorded for all patients and compared by Chi-square test using SPSS version 16.0. Pearson's test was applied to compare the performance of two systems.

III. RESULTS

Total 200 patients were included in this study.Incidence of ac. appendicitis was more in male patients with male to female ratio of 2.4:1. Ac. appendicitis was more common in the age group of 21-30 years with mean age of 27 years.

Out of 200 patients, 177 (88.5%) patients had histopathological proved acute appendicitis (Table 3). Accuracy of surgeon's clinical decision was 88.5%. Negative appendicectomy rate was 11.5% (23/200) which was higherfor female patients.

Diagnosis	Number (%)
Ac. Appendicitis	177(88.50%)
Normal Appendix (Negative Appendicectomy)	11(5.50%)
Ileocaecal Inflammatory Mass	3(1.50%)
Carcinoma caecum	2(1.0%)
Ovarian cysts (benign)	2(1.0%)
Enteric perforation of ileum	2(1.0%)
Non-specific Mesenteric Lymphadenitis	2(1.0%)
Meckel's diverticulitis	1(0.50%)
TOTAL CASES	200(100%)

Table 3: Histopathological diagnosis.

Out of total 177 patients of ac. appendicitis ,128 patients had ac. catarrhal appendicitis, while49 patients had obstructive appendicitis leading to gangrene or perforation or abscess formation or lump formation of appendix(fig.1)

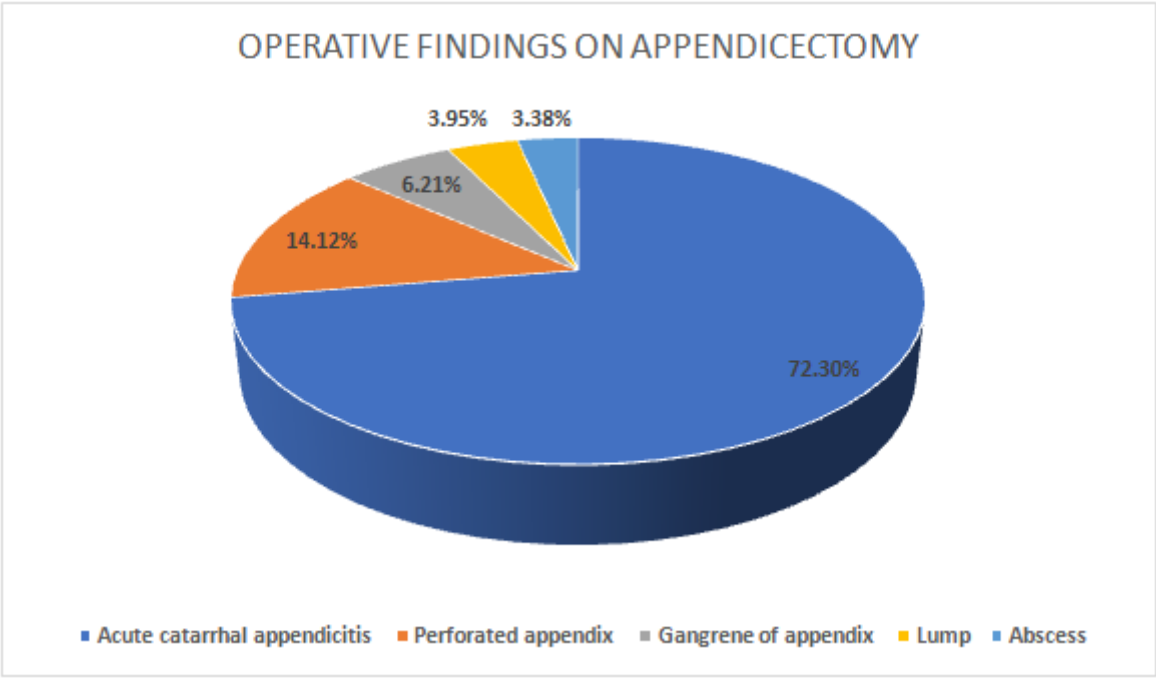

Fig 1:- Operative findings of acute appendicitis.

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Total 127 patients had modified Alvarado score > 7, out of which 115(93.04%) patients had ac. appendicitis, while 11(44%) patients out of 23 patients having score ≤ 4, had ac. appendicitis (Table 4).

Score	Ac. Appendicitis	No appendicitis	Total no. of cases
≥7	115	12	127
0-6	62	11	73
Total cases	177	23	200

Table 4: Showing sensitivity & specificity of ModifiedAlvarado score. Sensitivity= 64.97% Specificity = 47.82%, Positive predictive value = 90.55%; Negative predictive value = 15.06%.

In RIPASA scoring system, 172 patients out of 179 patients having score > 7.5 had ac. appendicitis, while 5 patients out of 21 patients having score < 7.5 had ac. appendicitis (Table 5).At optimum cut off value > 7.5 %, the specificity and sensitivity values for RIPASA system were 69.56% and 97.17% receptively, with positive predictive value and negative predictive values of 96.08% and 76.19% respectively.

Score	Ac. Appendicitis	No appendicitis	Total no. of cases
≥ 7.5	172	7	179
< 7.5	5	16	21
Total no. of cases	177	23	200

Table 5:- Showing sensitivity and specificity of RIPASA score.

IV. DISCUSSION

Acute appendicitis is a common abdominal emergency, with life time prevalence rate of about one in seven[7]. Despite a common condition, the diagnosis of ac. appendicitis remains a dilemma specially in females of reproductive age and in urological and gynaecological conditions mimicking as ac. appendicitis [8]. Delay in operation for ac. appendicitis increases the rate of complications and morbidity, while a negative appendicectomy has its own disadvantages. Various literature quotes negative appendicectomy rates between 10-30% [4].

In this study overall negative appendectomy rate was 11.5% and which was much higher in female patients. Other studies have also reported higher rates of negative appendicectomies in females because many gynaecological conditions can mimic ac. appendicitis [3,9,10]. This study showed that RIPASA score has high sensitivity and specificity as 97.17% and 69.56% respectively as compared to MAS which has sensitivity and specificity as 64.97% and 47.82%respectively. Both scoring systems had a high positive predictive value (90.55-96.08%). The negative predictive value for MAS was only 15.06 %.

Out of 177 cases of acute appendicitis in this study, 49(27.7%)cases were of obstructed ac. appendicitis leadingto perforation / gangrene/ abscess or lump formation. Perforation of appendix was seen in 14.12% of cases which is lesser than to the findings of Flum et al [11]&Korner et al[12] whoreported perforation rate of25.8 % & 19%respectively.

In our study, comparison was done between Modified Alvarado score and RIPASA soring systems. RIPASA score was better than MAS as 97.1% of patients who actually had ac. appendicitis were correctly diagnosed with RIPASA score and were placed in high probability group (score ≥7.5-11.5). While the diagnostic accuracy of MAS was 64.97% and difference of 32.12% in diagnostic accuracy of RIPASA and MAS was statistically significant (p<0.0001).

Comparing these findings withother studies shows mixed results. Lone et al [13]has shown higher sensitivities for MAS compared to our study, while Siddique et al [10], Sooriakumaran et al [14] have obtained lesser sensitivities for MAS system.While Siddique et al [10] and Gwynn et al [15] have higher sensitivities as well as specificities for RIPASA systemas compared to our findings.

Our study has observedthat RIPASA scoring system is more sensitiveas 97.17 % of patients with score >7.5 had appendicitis. Contraryto this Klabtawee et al [16] reported a very low (41.7%) sensitivity of RIPASA score. Inpresent study, accuracy ofMAS was 64.97 % using a cut off of ≥7. Positive predictive value, negative predictive value for RIPASA score and ModifiedAlvarado score were96.08%,76.19% and 90.55%,15.06% respectively.

Similarly, other studies have also reported higher accuracy of RIPASA scoring system for clinical diagnosis of ac. appendicitis as compared to Modified Alvarado scores [13,15]. Meanwhile other studies pointed out that MASis acceptable for men but not for female patients [10,17].

Bhabatosh et al [18] reported 98.1% sensitivity for RIPASA score and 96.2% sensitivity for Alvarado score and concluded that RIPASA was better than Alvarado scoring system in all the parameters compared.

RIPASA scoring system is better than MAS as it requires clinical history, examination and simple blood investigations. Suspected patients of ac. appendicitis having score >7.5 can be operated and those having score <7 can be kept under observation.

Limitations to our study includes, as patientsreported beyond 24 hours (> 60 %) due to Hilly terrain of state and difficulty in transportation and paediatric patients were not included. Secondly, there may be subjective variation in clinical findings as same patient is examined at different points in time or by different clinicians which can result in difference in scoring by both systems. Similarly,time from start of the symptoms and evolution of signs depends on duration time in which patientsreports to surgeon and this also influences the scoring by two systems.

However, none of the scoring systems being studiedideally fulfilled all the parameters for a valid test. The clinical diagnosis of acute appendicitis was found to be more accurate and reliable than using any of these scores. A careful history and physical examination supplemented with ultrasonography of abdomen can still provide valuable information for the diagnosis of acute appendicitis.

Thus, detail history & clinical examination still forms the mainstay ofsurgical decision making; scoring systems and imaging modalities may be used as an adjunct to diagnosis but cannot be a substitute for a careful history and physical examination.

V. CONCLUSION

From our study, RIPASA score is currently a better scoring system with higher sensitivity and accuracy as compared to MAS particularly in Indian population.And expensive imaging studies can be avoided as we can get all parameters of it by clinical history, physical examination and simple investigations. However, a careful clinical history and physical examination cannotbe substituted by any scoring system.

REFERENCES

[1]. Sriram Bhat M.Acuteappendicitis.SRB MANNUAL of surgery .5thedition;Jaypee brothers medical publisher(P)ltd;938-939.
[2]. Thomas CG. Classic description of disease. Springfeild;1932.
[3]. WaniMM,Yousaf MN, Khan MA, et al. Usefulness of the Alvarado scoring system with respect to age, sex and time of presentation with regression analysis of individual parameters. Internet jSurg. 2007;11(2)[Google scholar]
[4]. Andersson RE. Meta-analysis of the clinical and laboratory diagnosis of appendicitis. Br J Surg. 2004;91:28-37. Crossref
[5]. Flum DR, Koepsell T. The clinical and economic correlates of misdiagnosed appendicitis: nationwide analysis. Arch Surg. 2002;137(7):799-804.
[6]. Chong CF, Adi MIW, Thien A, Suyoi A, Mackie AJ, Tin AS, et al. Development of the RIPASA score: a new appendicitis scoring system for the diagnosis of acute appendicitis. Singapore Med J. 2010;51(3):220-5.
[7]. Stephens PL, Mazzucco JJ. Comparision of ultra sound and the Alvarado score for the diagnosis of acute appendicitis. Conn Med. 1999;63:137-40.
[8]. Gilmore CF,Adi MI, Thein A, et al.Appendicitis and mimicking conditions . A prospective study . Lancet 1975;2:421-24.
[9]. Velanovich V, Satava R. Balancing the normal appendectomy rate with the perforated appendicitis rate: implications for quality assurance. Am Surg. 1992;58(4):264-9. Crossref.
[10]. Siddique K, Jamil A, Ali Q, Ehsan A, Anwar I, Zafar A. Evaluation of modified Alvarado score and ultrasonography in acute appendicitis. International Journal of surgery. 2007(Jun);209.
[11]. Flum DR, Koepsell T. The clinical and economic correlates of misdiagnosed appendicitis: nationwide analysis. Arch Surg. 2002;137(7):799-804.
[12]. Körner H, Söndenaa K, Söreide JA, Andersen E, Nysted A, Lende TH, et al. Incidence of acute nonperforated and perforated appendicitis: age-specific and sex-specific analysis. World J Surg. 1997;21(3):313-7.
[13]. Lone NA, Shah M, Wani KA, Peer GQ. Modified Alvarado score in diagnosis of acute appendicitis. Ind J Pract Dr. 2006;3(2):5-6.
[14]. Sooriakumaran P, Lovell D, Brown R. A comparison of clinical judgment vs the modified Alvarado score in acute appendicitis. International Journal of Surgery. 2005;3:49-52. DOI:10.1016/j.ijsu.2005.03.009.
[15]. Gwynn L. The diagnosis of acute appendicitis: clinical assessment versus computed tomography evaluation. J Emerg Med. 2001;21:119-23.
[16]. Klabtawee W, Saensak W, Khetsoongnern A, Piriyasupong T. Accuracy of RIPASA and Modified RIPASA score comparing with Alvarado score for diagnosis of acute appendicitis and complication of acute appendicitis. KhonKaen Medical Journal. 2011;35(1):4050.
[17]. Kalan M, Talbot D, Cunliffe WJ, Rich AJ. Evaluation of the modified Alvarado score in the diagnosis of acute appendicitis: a prospective study. Ann R Coll Surg Engl. 1994;76(6):418-9. Crossref
[18]. Bhabatosh D, Singh G, Sambhaji L, Lekshmipriya RS, Sharma LK. Comparison between RIPASA and Alvarado score in the Diagnosis of Acute Appendicitis. Int J Curr Res. 2016; 8(01):25538-46.