ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

ORIGINAL RESEARCH ARTICLE

A COMPARATIVE STUDY OF MASS AND RIPASA FOR THE DIAGNOSIS AND EVALUATION OF ACUTE APPENDICITIS

Dr Chandranath Banerjee[1], Dr Kajal Kumar Patra[2*], Dr Niladri Roy[3]

1. Associate Professor, Dept of General Surgery, Burdwan Medical College and Hospital, Burdwan, West Bengal, India ddchandranath@rediffmail.com
2. Professor and Head, Dept of Gynae and Obstetrics, Gouri Devi Institute of Medical Science, Durgapur, West Bengal, India drmch2000@gmail.com,
3. PGT, Dept of General Surgery, Burdwan Medical College and Hospital, Burdwan, West Bengal, India

Author for correspondence and reprint request:

Dr Kajal Kumar Patra

Professor and Head, Dept of Gynae and Obstetrics

Gouri Devi Institute of Medical Science

GT Road, National Highway 2, Rajbandh,

Durgapur, West Bengal 713212

Mobile : +91 9830212433

Email: patrakajal8@gmail.com, drmch2000@gmail.com

Running Title: Study of mass and RIPASA for the diagnosis and evaluation of appendicitis

A comparative study of mass and RIPASA for the diagnosis and evaluation of acute appendicitis

Dr Chandranath Banerjee[1], Dr Kajal Kumar Patra[2*], Dr Niladri Roy[3]

ABSTRACT

Background: Acute appendicitis is one of commonest surgical emergencies, and it is more prevalent in the second and third decades and decreasing with age. Up-till now there are no laboratory parameters that could indicate reliable for diagnosis of acute appendicitis. Several diagnostic scores have been developed to increase the diagnostic accuracy in acute appendicitis. Many studies in the literature are available on diagnostic scores for acute appendicitis as RIPASA Score.

Materials and Methods: This study was a prospective study conducted in a group of 100 patients who got admitted in Department of General Surgery during the study period with symptoms and signs suggestive of appendicitis satisfying the criteria and underwent emergency appendicectomy from January 2014 to July 2014. This study was conducted in 100 consecutive patients who underwent emergency appendicectomy in our unit who satisfied the inclusion and exclusion criteria.

Results: In the present study maximum incidence is found in the age group of 11-40 years

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

amounting to 88%, with maximum between 11-20 years accounting to 37% and the incidence reduced after the age of 40 years. Male to female ratio is 3.9:2.4. 42% of patients presented with pain around umbilicus, which later shifted to right iliac fossa. Majority of the patients had colicky type of pain which was noted in 80 % of the patients. The commonest symptom is anorexia (88%) followed by vomiting (76%) and fever (37%). Alvarado Score was 9-10 in 15 cases, 7-8 in 74 cases, 5-6 in 11 cases and <4 was not seen in any cases. 95 cases showed inflammation out of 98 cases which were operated and 3 showed normal study. When comparing these two scoring systems, RIPASA score has high sensitivity (97.5%) than Alvarado score (78.8%) and specificity (80% for RIPASA and 75% for Alvarado score).

Conclusion: The Alvarado scoring system combined with ultrasound can therefore be used as a cheap and inexpensive way of confirming acute appendicitis thus reducing negative appendicectomy rate.

Keywords: Acute appendicitis, Diagnosis, Evaluation, RIPASA, Sensitivity

Introduction

It is a well-known adage that abdomen is a temple of surprises and a magic box as well. Since the abdomen accommodates innumerable viscera and other anatomical compliments, diseases of the abdomen constitute a topic full of clinical curiosity. A meticulous examination of abdomen is one of the most rewarding diagnostic procedures available to the doctor, especially the surgeon to plan an ideal treatment. As had been said by Bailey "A correct diagnosis is the hand maiden of successful operation". Despite the advancements in the fields of diagnosis the surprises never cease [1].

Appendicitis is one of the most common surgical emergencies. Appendicitis can rapidly progress to gangrenous appendicitis which is associated with increased morbidity and mortality [2]. Therefore, surgeons, at times, resort to an early surgical intervention even when the diagnosis is in doubt [3]. This is true when there is non availability of investigation modalities. Early surgery at such instances may lead to a normal appendicectomy whereas delay in surgery in cases of a missed diagnosis will lead to a rise of complication rates [4,5]. It has been shown that the delay in presentation is the contributing factor for the development of complications rather than delay from the physician's end [6]. Furthermore, recent reports have suggested that the early management of acute appendicitis with fluid and antibiotic treatment is safe [7]. Approximately 6% of the population will suffer from acute appendicitis during their lifetime, therefore much has been directed towards early diagnosis and intervention. This effort has lowered the mortality rate to less than 0.1% for non-complicated appendicitis, 0.6% in gangrenous appendicitis and 5% for perforated cases [8].

Appendicitis is the inflammation of the appendix. It is a disease of the young, with 40% of cases occurring between the ages of 10 and 29 years. In 1886, Fitz reported the associated mortality rate of appendicitis to be at least 67% without surgical treatment.

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Sir Heneage Ogilive says "*Acute appendicitis is one of the common conditions which the surgeon is called upon to treat as an emergency*". It requires utmost skill and care of the attending doctor, besides good clinical judgement.

Acute appendicitis is the most common surgical cause of acute abdomen. There is no doubt that early diagnosis with prompt surgical intervention is the goal.

In a general hospital most common abdominal operation is appendicectomy. This constitutes about 25% of emergency abdominal surgeries in many hospitals, Meloney and his associates estimated that 1 in 100 of population may be expected to get appendicitis every year. There is no known method of prevention of acute appendicitis.

Despite technologic advances, the diagnosis of acute appendicitis is predominantly a clinical one, many patients present with a typical history and examination findings. The cause of acute appendicitis is unknown but is probably multifactorial- luminal obstruction, dietary and familial factors have all been suggested. Prompt diagnosis and surgical referral may reduce the risk of perforation and complications. Appendicectomy is the treatment of choice

This study involves to correlate the acute appendicitis between clinically diagnosed and histopathologically examined specimen and the role of total count, differential count and ultrasound in early diagnosis of acute appendicitis in patients admitted

Materials and Methods

Study population for this study was obtained from patients admitted to Stanley Medical College Hospital from January 2014 to July 2014. This study was conducted in 100 consecutive patients who underwent emergency appendicectomy in our unit who satisfied the inclusion and exclusion criteria. All the studied cases were subjected to clinical examination using symptoms, signs and lab investigations, and details were documented in the proforma. USG abdomen is done if required.

Patients of all age groups presenting with RIF pain and suspicion of acute appendicitis were included in the study. Patients presenting with non RIF pain, admitted for other complaints and subsequently developing RIF pain during hospital stay and patients referred from other hospitals with imaging studies and other investigations were excluded from the study.

Data were collected by interview, clinical examination and relevant investigation. Relevant sociodemographic and clinical details were collected. All subjects were evaluated as per the study protocol. Upon admission, both the The Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) and Alvarado scores will be performed by completion of the score sheets. Scoring was performed at every review or at the next morning rounds until a decision was made for either appendicectomy or continued conservative treatment. Data regarding patient's admission and discharge dates, date of appendicectomy postoperative complications and radiological investigations used were recorded in the score sheet. Histological confirmations of all appendicular specimens obtained from the emergency appendicectomy were collected. The per operative findings were noted with particular importance to features of inflammation of

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

appendix. The final diagnosis of acute appendicitis was confirmed by histopathology report. The appendicular specimen was sent to pathology department in Stanley Medical college and hospital, Chennai for histopathological study by pathologists. After processing, the sections of the specimen were stained with Hameotoxylin and eosin stain, followed by microscopic examination.

Ethical clearance: Ethical clearance and approval for conducting this study was obtained from the ethical committee of Burdwan Medical College and Hospital, Burdwan. Informed verbal consent was obtained from the patients participating in this study after full explanation of the study objectives.

Statistics : Standard statistical methods for data compilation and analysis. Software package SPSS is applied for statistical analysis. The cases are analyzed using the mean value, the S.D, t-test and proportion test. It will be compared with 5% and 1% level of significances for corresponding degrees of freedom. Sensitivity and specificity (formula mentioned below) was calculated for each objective. Chi-square test, Cross-tabs procedure, Independent student 't' test, and sensitivity and specificity calculation was also done.

Results :

Table – 1: Table showing the age, gender distribution, family history, diet and obstructing element of patients of the study population

Age in years	Number of patients	Percentage
1-10	3	3.0
11-20	37	37.0
21-30	26	26.0
31-40	25	25.0
41-50	6	6.0
51-60	3	3.0
Total	**100**	**100.0**
Gender		
Male	62	62.0
Female	38	38.0
Total	**100**	**100.0**
Family history		
Nil	100	100.0
Type of diet		
Veg	4	4.0
Non-veg	96	96.0
Obstructing element		

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Faecolith	24	24.0
Adhesions	12	12.0
Adhesions and faecolith	2	2.0

In the present study maximum incidence is found in the age group of 11-40 years amounting to 88%, with maximum between 11-20 years accounting to 37% and the incidence reduced after the age of 40yrs. Acute appendicitis is more common in males (62%) than females (38%). Male to female ratio is 3.9:2.4. In our study we did not have any patient with a positive family history. In our study appendicitis in vegetarians was present in 4% of patients and mixed diet was noted 96%. In our study fecolith was present in 26 % and adhesions of appendix with the surrounding or kink was noted in 12 cases. (Table 1)

Table 2: Distribution according to type of pain and symptoms of patients studied

Type of pain	**Number of patients (n=100)**	**%**
• RIF	54	54.0
• RIF,UMB	42	42.0
• RIF, Epigastric	1	1.0
• RIF, lumbar region	2	2.0
• UMB	1	1.0
Shifting pain		
• Negative	58	58.0
• Positive	42	42.0
Character		
• Colicky	80	80.0
• Dull aching	16	16.0
• Dragging	2	2.0
• Pricking	2	2.0
Symptoms		
Vomiting	76	76.0
Fever	37	37.0
Anorexia	88	88.0
Constipation	2	2.0
Diarrhoea	4	4.0
Urinary disturbance	5	5.0

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

In this study 42% of patients presented with pain around umbilicus, which later shifted to right iliac fossa. Majority of the patients had colicky type of pain which was noted in 80 % of the patients. The commonest symptom is anorexia (88%) followed by vomiting (76%) and fever (37%). (Table 2)

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Table 3: Distribution of USG findings of patients studied

USG findings	Total (n=100)		Male (n=62)		Female (n=38)	
	No	%	No	%	No	%
Normal study	16	16.0	9	14.5	7	18.4
Probe tenderness	26	26.0	17	27.4	9	23.7
Inflammed Appendix visualized	45	45.0	29	46.8	16	42.1
Perforated appendix	2	2.0	1	1.6	1	2.6
Minimal free fluid	2	2.0	1	1.6	1	2.6
sluggish bowel movement	1	1.0	0	0.0	1	2.6
Colitis	1	1.0	1	1.6	0	0.0
with fecolith, fibroid	1	1.0	0	0.0	1	2.6
Not done	6	6.0	4	4.0	2.0	2.0

In our study 94 people had undergone USG examination and 6 had not got their scanning done. Out of these Acute appendicitis in the form of inflamed appendix in 45 cases and perforated appendix in 2 and sluggish bowel movement in one, and equivocal findings like probe tenderness, with fecolith, were present in 32 patients and normal study was given in 16 cases. This has a sensitivity of 88%. It also helps us to rule out other causes like fibroid uterus, bulky ovarian swellings. (Table 3)

Table 4: Distribution of Alvardo's score of patients studied

Alvardo's score	Total		Male		Female	
	No	%	No	%	No	%
<4	0	0.0	0	0.0	0	0.0
5-6	11	11.0	5	8.1	6	15.8
7-8	74	74.0	44	70.9	30	78.9
9-10	15	15.0	13	20.9	2	5.3
Total	100	100.0	62	100.0	38	100.0

In the present study, Alvarado Score was 9-10 in 15 cases, 7-8 in 74 cases, 5-6 in 11 cases and <4 was not seen in any cases. Out of 100 cases, 89 cases were with Alvarado Score of 7 and more than 7. 11 cases had a score of less 7 out of which 4 cases had a score of 5 and 7 cases had a score of 6. (Table 4)

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Table –5 : Showing the distribution of Histopathological examination reports

Histopathology	Total (n=100)		Male (n=62)		Female (n=38)	
	No	%	No	%	No	%
AA	45	45.0	27	43.5	18	47.4
ASA	36	36.0	25	40.3	11	28.9
Acute on chronic appendix	4	4.0	3	4.8	1	2.6
Early Appendicitis	4	4.0	1	1.6	3	7.9
GA	2	2.0	2	3.2	0	0.0
EA	2	1.0	1	1.6	1	2.6
Necrotizing appendicitis	1	1.0	1	1.6	0	0.0
AS appendicitis with Meckels diverticulum	1	1.0	1	1.6	0	0.0
NA	3	3.0	0	0.0	3	7.9
Not operated	2	2.0	1	1.6	1	2.6

In our study 95 cases showed inflammation out of 98 cases which were operated and 3 showed normal study. (Table 5)

Table-6: Comparison of RIPASA and Alvarado score,

	Sensitivity	Specificity
RIPASA score	97.5%	80%
Alvarado score	78.8%	75%
	PPV	NPV
RIPASA score	95.1%	88.9%
Alvarado score	92.6%	46.9%

At the end of the study, the above mentioned values of specificity sensitivity, positive predictive value and negative predictive value for each of the scoring system were derived. When comparing these two scoring systems, RIPASA score has high sensitivity (97.5%) than Alvarado score (78.8%) and specificity (80% for RIPASA and 75% for Alvarado score). Positive predictive value for RIPASA score is 95% and Alvarado score is 92.6%. Negative predictive value for RIPASA score is 88.9% and Alvarado score is 46.9%, which means we can't rule out acute appendicitis on the basis of low Alvarado score. (Table 6)

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

Discussion

In the present study maximum incidence is found in the age group of 11-40 years amounting to 88%, with maximum between 11-20 years accounting to 37% and the incidence reduced after the age of 40yrs. Levis et al [9] series of 1000 cases, the incidence of acute appendicitis was found to occur most commonly in the age group of 20-30 years in both males and females. According to Bailey [10], acute appendicitis reaches peak incidence in the teens and early 20s. The incidence is equal among males and female before puberty. In teenagers and young adults, the male to female ratio increases to 3:2 at the age of 25, in the middle age the incidence decreases. In Levis et al series [9] male to female ratio was 3:2.

In this study 42% of patients presented with pain around umbilicus, which later shifted to right iliac fossa. Majority of the patients had colicky type of pain which was noted in 80 % of the patients. The commonest symptom is anorexia (88%) followed by vomiting (76%) and fever (37%). According to study by D. Mike Hardin nausea accounts for 90% and vomiting is present in 75% [11].

In our study appendicitis in vegetarians was present in 4% of patients and mixed diet was noted 96%. In our study fecolith was present in 26 % and adhesions of appendix with the surrounding or kink was noted in 12 cases. Commonest cause is fecolith which accounts for 40% of acute appendicitis and 65% of gangrenous appendicitis without rupture and nearly 90% of gangrenous appendicitis with rupture [12].

In the present study 94 people had undergone USG examination and 6 had not got their scanning done. Out of these Acute appendicitis in the form of inflamed appendix in 45 cases and perforated appendix in 2 and sluggish bowel movement in one, and equivocal findings like probe tenderness, with fecolith, were present in 32 patients and normal study was given in 16 cases. This has a sensitivity of 88%. It also helps us to rule out other causes like fibroid uterus, bulky ovarian swellings.

In the present study, Alvarado Score was 9-10 in 15 cases, 7-8 in 74 cases, 5-6 in 11 cases and <4 was not seen in any cases. Out of 100 cases, 89 cases were with Alvarado Score of 7 and more than 7. 11 cases had a score of less 7 out of which 4 cases had a score of 5 and 7 cases had a score of 6. Bhattacharjee et al and Sudhir Kumar Mohanty et al showed percentage of Alvarado Score 7 or > 7 [13,14].

In our study 95% cases showed inflammation out of 98 cases which were operated and 3 showed normal study. Bhatacharjeee et al, Sudhir Kumar Mohanty et al and Geryk B et al reported 82.7%, 94.44 and 78.2% inflammation respectively [13-15].

When comparing RIPASA and Alvarado scoring systems, RIPASA score has high sensitivity (97.5%) than Alvarado score (78.8%) and specificity (80% for RIPASA and 75% for Alvarado score). Positive predictive value for RIPASA score is 95% and Alvarado score is 92.6%. Negative predictive value for RIPASA score is 88.9% and Alvarado score is 46.9%, which means we can’t rule out acute appendicitis on the basis of low Alvarado score

Conclusion

Alvarado score with less than 6 leads to more than 30.3% negative appendicectomy rate. If the

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

scoring is above 7, the overall accuracy of diagnosis of acute appendicitis gives up to 90%. History and clinical examination was more diagnostic. Ultrasonography increases the diagnostic accuracy in patients with suspected acute appendicitis to the tune of 90-95%.

Acknowledgements
Authors would like to acknowledge the patients who participated in this research study.
Funding: No funding sources
Conflict of interest: Authors declare no conflicts of interest

References

1. Ellis BW, Brown SP. Hamilton Bailey's Emergency Surgeries. 12th Edition. Bombay: K.M. Varghese Company;1995:438-451.
2. Gupta A, Regmi S, Hazra NK, Panhani ML, Talwar OP. Clinically monitored delay - A valid option in cases with doubtful diagnosis of acute appendicitis. Original article Indian J Surg 2010 May-Jun;72:215-19.
3. Hoffmann J, Rasmussen OO. Aids in the diagnosis of acute appendicitis. Br J Surg1989 ; 76:774-79.
4. Ditillo MF, Dziura JD, Rabinovici R. Is it safe to delay appendectomy in adults with acute appendicitis? Ann Surg2006;244(5):656-660.
5. Andersson RE, Hugander A, Thulin JG. Diagnostic accuracy and perforation rate in appendicitis: Association with age and sex of the patient and with appendectomy rate. Eur J Surg1992;158:37-41.
6. Eldar S, Nash E, Sabo E et al. Delay of surgery in acute appendicitis. Am J Surg 1997;173:194-98.
7. Hansson J, Korner U, Khorram M A, Solberg A, Lundholm K. Randomized clinical trial of antibiotic therapy versus appendicectomy as primary treatment of acute appendicitis in unselected patients. Br J Surg 2009;96(5):473-81.
8. A sound approach to the diagnosis of acute appendicitis[editorial]. Lancet 1987;1:198-200.
9. Lewis FR, Holeroft JW et al. Appendicitis: A critical review of diagnosis and treatment in 1000 cases. Ach Surg 1975;110:677-684.
10. Williams NS, Bulstrode CJK, O' Connell PR editor. Bailey & Love's Short practice of surgery.25thed. London: Hodder Arnold publishers Ltd ; 2008;1204- 18.
11. Hardin DM. Acute appendicitis Review and update. Am Fam Physician 1999 No 1 ; 60(7):2027-2034.
12. Brunicardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, et al, editors. Schwartz's principles of surgery. 9th ed. New York: Mc Graw Hill; 2010;1073-91.
13. Bhattacharjee Pk , chowdary T, Roy D. Prospective Evaluation of modified Alvarado Score for diagnosis of acute appendicitis . Journal of Indian Medical Association

ISSN:0975-3583,0976-2833 VOL13,ISSUE05,2022

2002;100.

14. Sudhirkumar Mohanty, Kaushik Si. Evaluation of modified Alvarado score in decreasing negative appendicectomy rate-our experience I J S 2000;.62(5):342-343.

15. Geryk B, Kubikova E, Jakubovsky J. clinical histopathologic picture of acute appendicitis in children. Rozhchir 2000;79(5):211-214.