ISSN:0975-3583,0976-2833 VOL14, ISSUE08,2023

Original research article

Appendicitis inflammatory response score in evaluating suspected cases of acute appendicitis

[1]Dr.Amarendra Dharwar ,[2]Dr.S M Uppin
[1]Assistant Professor, Department of Surgical Oncology, VTSM Peripheral Cancer Centre, Kalaburagi, Karnataka, India
[2]Professor, Department of Surgery, JN Medical College, Belagavi, Karnataka, India

Corresponding Author:
Dr.Amarendra Dharwar

Abstract
In a young male patient of typical right lower quadrant pain and tenderness with signs of inflammation, a CT scan is unnecessary, wastes valuable time, may be misinterpreted, and exposes the patient to risks for allergic contrast reaction, nephropathy and ionizing radiation. The ionizing radiation carries increased risk in children with the rate of radiation-induced cancer estimated at 0.18% following an abdominal CT scan. In this study, over a period of one year,100 patients presenting with pain in the right lower quadrant of abdomen, who after clinical examination were provisionally diagnosed to have acute appendicitis and warranting surgery for the same were evaluated using the scoring system –Appendicitis Inflammatory Response Score. The study was conducted on the patients presenting with clinical features suggestive of acute appendicitis admitted in surgical wards. AIR diagnosed 84 patients as acute appendicitis (at score >4) of which 4 were false positive cases. It ruled out acute appendicitis (at score ≤4) in 16 individuals of which 9 were false negative ones. AIR could diagnose 11 cases of acute appendicitis (at score >8) with no false positive cases.
Keywords: Appendicitis inflammatory response score, acute appendicitis, right lower quadrant pain

Introduction
A calcified appendicolith is visible on plain films in only 10-15% of patients of acute appendicitis. Plain abdominal radiographs may be useful for detection of ureteric calculi, small bowel obstruction, perforated ulcer. Barium findings include-inability of the appendix to fill has been associated with appendicitis, but lacks sensitivity and specificity.
Sonography has been suggested as a fairly accurate way to establish the diagnosis of appendicitis. Sonographic findings consistent with acute appendicitis include an appendix of 7 mm or more in anteroposterior diameter, a thick-walled, noncompressible luminal structure seen in cross section, referred to as a target lesion, or the presence of an appendicolith.
In advanced cases, periappendiceal fluid or a mass may be found[1].
Advantages of sonography being a noninvasive modality requires no patient preparation, also avoids exposure to ionizing radiation. It is commonly used in children and in pregnant patients with equivocal clinical findings suggestive of acute appendicitis.
Sensitivity of sonography in diagnosing appendicitis-55 to 96% and specificity of 85 to 98%.
Disadvantages of sonography includes operator-dependent accuracy and difficulty interpreting the images by those other than the operator[2].
Computed tomographyis commonly used in the evaluation of adult patients with suspected acute appendicitis. The use of 5-mm sections, have resulted in increased accuracy of CT scanning, which has a sensitivity of approximately 90% and a specificity of 80% to 90% for the diagnosis of acute appendicitis in patients with abdominal pain[3].
CT findings of acute appendicitis increase with severity of the disease. Classic findings include a distended appendix more than 7 mm in diameter and circumferential wall thickening and enhancement, which may give the appearance of a halo or target .
As inflammation progresses, periappendiceal fat stranding, edema, peritoneal fluid, periappendiceal abscess may be seen.
CT can detect appendicoliths in approximately 50% of patients with appendicitis.
For older patients CT has proved most valuablein whom the differential diagnosis is lengthy, clinical findings may be confusingand appendectomy carries increased risk.
CT scan may reduce the negative appendectomy rate in patients with atypical symptoms[4].
In a young male patient of typical right lower quadrant pain and tenderness with signs of inflammation, a CT scan is unnecessary, wastes valuable time, may be misinterpretedand exposes the patient to risks for

ISSN:0975-3583,0976-2833 VOL14, ISSUE08,2023

allergic contrast reaction, nephropathy and ionizing radiation. The ionizing radiation carries increased risk in children with the rate of radiation-induced cancerestimated at 0.18% following an abdominal CT scan.

In a small number of patients diagnosis of appendicitis remains elusive. Such patients benefit from diagnostic laparoscopy. It provides a direct examination of the appendix and a survey of the abdominal cavity for other possible causes of pain. Women of childbearing age in whom preoperative pelvic ultrasound or CT fails to provide a diagnosis are most benefited from diagnostic laparoscopy[5].

Most patients with acute appendicitis are managed by prompt surgical removal of the appendix. Preoperative antibiotics cover aerobic and anaerobic colonic flora. For patients with nonperforated appendicitis, a single preoperative dose of antibiotics reduces postoperative wound infections and intra-abdominal abscess formation[6].

For patients with perforated or gangrenous appendicitis, continued postoperative IV antibiotics is advised until the patient is afebrile.

Single-agent therapy, typically with a second-generation cephalosporin, or a quinolone/metronidazole regimen is adequate.

Methodology

In this study, over a period of one year,100 patients presenting with pain in the right lower quadrant of abdomen, who after clinical examination were provisionally diagnosed to have acute appendicitis and warranting surgery for the same were evaluated using the scoring system –Appendicitis Inflammatory Response Score.

The study was conducted on the patients presenting with clinical features suggestive of acute appendicitis admitted in surgical wards.

Inclusion criteria

- Patients with provisional clinical diagnosis of acute appendicitis.

Exclusion criteria

- Patients presenting with non-right iliac fossa pain and those who had been admitted by other specialities for other complaints but subsequently developed right iliac fossa pain.

Sample size

A total of 100 cases of suspected acute appendicitis who were admitted, investigated and treated were taken for the study. After detailed examination and investigations Alvarado score and Appendicitis inflammatory Response Score was applied to each case.

Every year an average of 300 patients of acute appendicitis get admitted and operated on. By stratified random sampling every 3rd patient was selected for the study.

Appendicitis inflammatory response score

This system consists of 2-symptom, 1-sign and 4-laboratory values.

AIR score	
Vomiting	1
Pain in right lower quadrant	1
Muscular defense	
Light	1
Medium	2
Strong	3
Body temperature >38.5 C	1
Polymorphonuclear leucocytes	
70-84%	1
Equal or more than 85%	2
WBC	
10000-14999 cells/cumm	1
Equal or more than 15000/cumm	2
CRP estimation	
10-49 mg/l	1
Equal or more than 50 mg/l	2

Cases with score of 1-4 were observed for development of acute appendicitis.

Cases with score of 5-8 were observed for next 24 hours, reevaluated. If their clinical condition was highly suspicious of acute appendicitis as decided by treating surgeon they were subjected for appendicectomy.

If at any point, surgeon felt that on examination, clinical features were convincing enough to warrant surgery, then irrespective of the scores appendectomy were performed.

ISSN:0975-3583,0976-2833 VOL14, ISSUE08,2023

All patients who were considered for appendectomy underwent ultrasonography of abdomen to rule out other conditions mimicking acute appendicitis.
Scoring systems were compared with final Histopathology analysis report. Sensitivity, specificity, positive predictive value and negative predictive value were determined.

Results

Table 1: Air with HPR

Score	AA	CA	Total
>4	80	4	84
≤4	9	7	16
Total	89	11	100

AIR diagnosed 84 patients as acute appendicitis (at score >4) of which 4 were false positive cases. It ruled out acute appendicitis (at score ≤4) in 16 individuals of which 9 were false negative ones.

Table 2: Air with HPR

Score	AA	CA	Total
>8	11	0	11
≤8	78	11	89
Total	89	11	100

AIR could diagnose 11 cases of acute appendicitis (at score >8) with no false positive cases.

Discussion
Acute appendicitis is one of the commonest surgical emergencies with an incidence of 1.17 per 1000 and lifetime risk of 8.6% in men and 6.7% in women. The incidence is highest in adolescents and young adults. Surgeon's good clinical assessment is considered to be most important requisite in diagnosis of appendicitis. Several other condition can mimics this clinical condition[7].
Management strategy in patients of suspected appendicitis still remains a challenge even after introduction ofUSG, CT and diagnostic laparoscopy.
The use of USG or CT in suspected patients of appendicitis is common. CT should be used selectively to minimize exposure to ionizing radiation. False negative resultsmay delay surgery and increase morbidity[8].
Decisions to operate based solely on physical examination,result in a higher rate of negative appendectomies. A negative appendectomy can lead to severe morbidity and even mortality. Even without complications it is associated with unnecessary disability and costs.
Appendicitis Inflammatory response score can be used to prevent negative appendectomy. It was developed in 2008 in Sweden based on prospectively collected data of variables with independent prognostic value using a mathematically more appropriate method for the construction[9].
A scoring system should be of simple design in order to aid in decision making process for treatment. The goal of scoring system should be to discriminate when there is uncertainty rather than making a diagnosis.
In this prospective study, an attempt was made to evaluate the efficiency of Appendicitis Inflammatory Response Score and compare it with Alvarado score.
Sensitivity of AIR of 89.9% (at score >4) in the present study correlates well with studies of castro*et al*., (93%)[10].
Both AIR and Alvarado (at score >8) demonstrated specificity of 12.3% and 21.3% respectively which were comparable with results obtained by Castro *et al*.,-10% and 29% respectively[10].
Specificity of Alvarado (at score >4) in the present study 54.5% was comparable with studies of Castro *et al*.,(55%)[10].

Conclusion
- At score >4 AIR demonstrated a sensitivity of 89.9% and specificity of 63.6%.
- At score >8 AIR demonstrated a sensitivity of 12.3% and specificity of 100%.

References
1. Teicher I, Larida B, Cohen M. Scoring system to aid in diagnosis of appendicitis. Ann Surg. 1983;198:753-59.
2. Sitter H, HoffmanS. Diagnostic score in appendicitis validation of a diagnosticscore (Eskelinenscore) in patients in whom acute appendicitis is suspected.Langenbecks Arch Surg. 2004;389:213-18.
3. Alvarado A. A practical score for the early diagnosis of acute appendicitis. Ann Emerg.

ISSN:0975-3583,0976-2833 VOL14, ISSUE08,2023

Med.1986;15:557-64.
4. Smith DE, Kirchmer NA, Stewart DR: Use of the barium enema in the diagnosis of acute appendicitis and its complications. Am J Surg.1979:138:829.
5. Douglas CD, Macpherson NE, Davidson PM. Randomised controlled trial of ultrasonography in diagnosis of acute appendicitis, incorporating the Alvarado score. Br Med J. 2000;1:321.
6. Franke C, Bohner H, Yang Q. Ultrasonography for diagnosis of acute appendicitis: Results of a prospective multicenter trial. World J Surg. 1999:23:141.
7. Kaiser S, Frenckner B, Jorulf HK. Suspected appendicitis in children: US and CT-A prospective randomized study. Radiology. 2002;223:633.
8. Weltman DI, Yu J, Krumenacker J. Diagnosis of acute appendicitis: Comparison of 5-and 10-mm CT sections in the same patient. Radiology. 2000;216:172-77.
9. McGory ML, Maggard MA, Kang H. Malignancies of the appendix: Beyond case series reports. Dis Colon Rectum. 2005;48:2264-2271.
10. De Castro SMM,Ünlü C,Steller EPH, Wagensveld BA,Vrouenraets BC. Evaluation of the Appendicitis Inflammatory Response Score for Patients with Acute Appendicitis: World J Surg.2012;36(7):1540-45.