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Original Research Article

Alvarado score in acute appendicitis: revisited

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ABSTRACT

Background: Acute appendicitis is a common surgical emergency and preoperative diagnosis may be difficult. The Alvarado scoring system has been widely used for predicting the probability of acute appendicitis. The aim of this study was to assess the positive predictive value of Alvarado scoring system in acute appendicitis.
Methods: We retrospectively analyzed two hundred and four adult patients who were operated for suspected acute appendicitis between September 2003 and August 2008.
Results: Patients with Alvarado scores more than 6 were most likely to have acute appendicitis. Patients with biopsy confirmed acute appendicitis had a mean score 6.16±1.84 (p=0.0001). Patients with histopathology showing no acute appendicitis had a mean score of 4.15±1.86 (p=0.0001). The overall positive predictive value of the Alvarado scoring is 95 and.
Conclusions: The Alvarado score is useful in diagnosing acute appendicitis and a high score strongly correlates with a definitive operative and histopathological diagnosis of acute appendicitis. We propose that a diagnosis of acute appendicitis can be made with a score of >6 as compared to a score of >8 as described in literature.

Keywords: Alvarado scoring, Acute appendicitis, Positive predictive value

INTRODUCTION

Acute appendicitis is a common cause of abdominal pain. Acute appendicitis is one of the most common surgical emergencies with a life time prevalence of 1 in 7.[1] Surgery for acute appendicitis is the most frequent operation performed, forming about 10 and of all emergency abdominal operations.[2]

A prompt early diagnosis of acute appendicitis before perforation and its consequences is rewarded by a marked decrease in morbidity and mortality.[3-5]

Diagnosis of acute appendicitis may be difficult clinically, sometimes posing a dilemma. Numerous scoring systems have been devised to aid the diagnosis of acute appendicitis of which the Alvarado score has been widely used.[6-8] However in spite of many studies in support of its validity and usefulness in diagnosis of acute appendicitis, there have been reports to the contrary. It has been argued that the Alvarado score is not specific to acute appendicitis and is of lesser predictive value in elderly patients and in women.[9]

The purpose of this study was to evaluate the usefulness and positive predictive value of the Alvarado Score for the confirmation of clinically suspected acute appendicitis.

METHODS

We conducted a retrospective study of five years duration from September 2003 to August 2008 on consecutive

cases of suspected acute appendicitis in adults operated in a single surgical unit in the Department of Surgery at St. John's Medical College Hospital. Patients underwent either conventional open or laparoscopic appendectomy and the appendix specimen was sent for histopathological examination. The source of data was the Hospital Medical Records. Patients undergoing interval appendicectomy were excluded. Incomplete data retrieval from hospital medical records was another exclusion criterion.

We reviewed a total number of two hundred and twenty four (224) Patients. Among these two hundred and four (204) adult patients (age >18 years) were included. These patients consisted of seventy three (73) females and one thirty one (131) males. Twenty (20) patients were excluded due to incomplete data retrieval.

The Alvarado score, the intra operative findings and the histopathology reports were collected and analyzed. Intra operative findings consistent with acute appendicitis included inflamed appendix with increased vascularity, exudates, omental and mesenteric adhesions, gangrenous appendix and frankly perforated appendix. Histopathologic features of acute appendicitis were neutrophilic infiltration of the muscularis mucosae.

The statistical analysis used for correlation was student't' Test. Statistical software used for analysis were MS-Excel, SPSS 10. A p value less than 0.05 were regarded as significant.

RESULTS

We reviewed a total number of 224 patients. Among these 204 patients were included. 131 (64 and) were male and 73 (36 and) were female patients. The age of patients ranged from 18 years to 61 years with a mean age of 24 years. All patients underwent emergency appendectomy; 176 open, 28 laparoscopic. 61 patients had an Alvarado score less than 4, 56 patients had a score of 4 to 6, and 87 patients had a score more than 6.

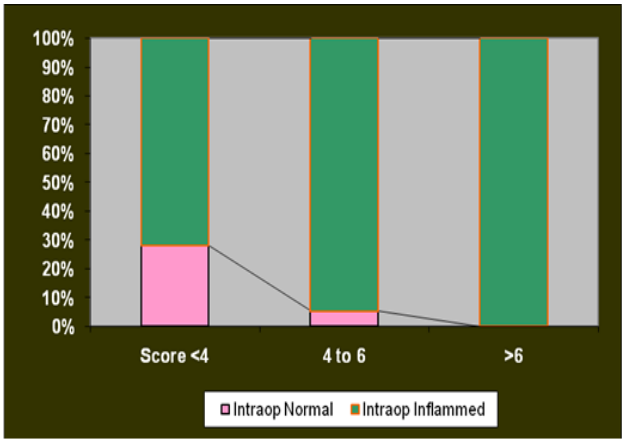

Figure 1: Correlation of Alvarado score and intra operative findings.

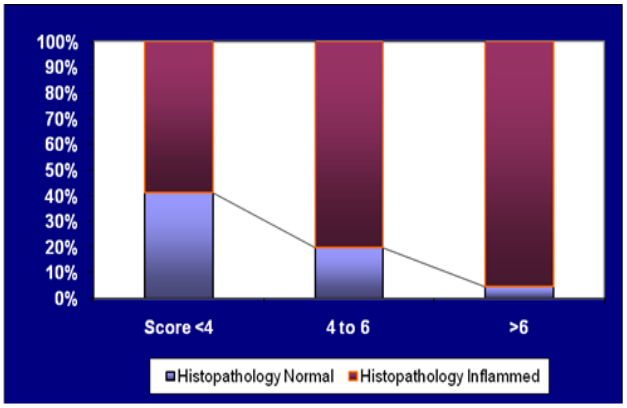

Figure 2: Correlation of Alvarado score and histopathological findings.

Correlating the Alvarado score to intra operative findings a total of 20 patients had a grossly normal appendix reported by the operating surgeon. At a score less than 4, 44 had features consistent with acute appendicitis and 17 had apparently normal appendix (about 30 and). Only 3 of 56 patients of scores 4 to 6 had normal appendixes (<5 and). At scores more than 6; all of the 87 patients had features consistent with appendicitis (Figure 1).

On correlating Alvarado score to the histopathological examination, at a score less than 4, 36 out of 61 patients (59 and) had acute appendicitis whereas 25 (41 and) had no acute appendicitis. In those with Alvarado score between 4 and 6, 45 (80 and) had acute appendicitis whereas 11 (20 and) had no acute appendicitis. Of those patients with scores more than 6, 95and (83 of 87) had acute appendicitis (Figure 2).

Among the 204 patients, 23 had a gangrenous appendix (11.3 and) and 17 (8.3 and) had a perforated appendix (Figure 4). There were 40 appendixes were reported as "no acute appendicitis" on histopathological examination. They had a mean Alvarado score of 4.15 ±1.86. The 164 patients of histopathologically confirmed acute appendicitis had a Mean score 6.16±1.84 (p=0.0001) (Figure 3). The overall positive predictive value of the Alvarado scoring was 95.

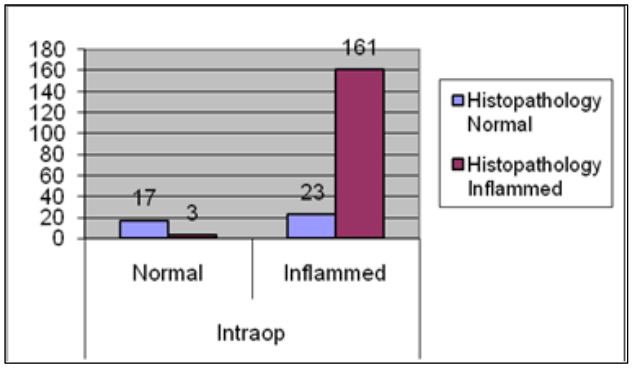

Figure 3: Correlation of intra operative findings and histo pathology.

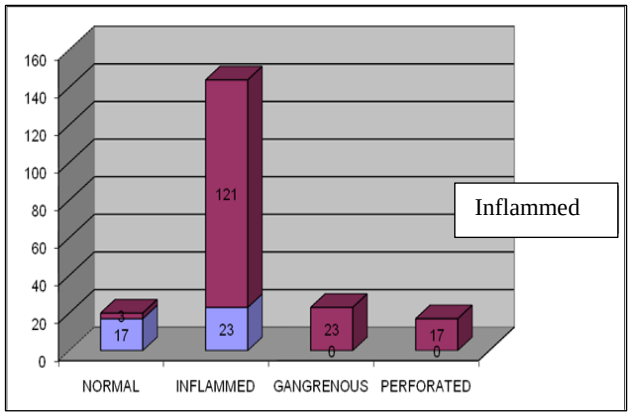

Figure 4: Distribution of various intraoperative findings.

In our study we found an overall negative appendectomy rate of 20 and (41 out of 204). The post op recovery was uneventful in all patients with no mortality.

DISCUSSION

In 1886 Reginald Heber Fitz presented a consolidated surgical philosophy regarding the pathophysiology and treatment of appendicitis.[10] Yet even today suspected appendicitis sometimes presents a challenging dilemma.[2] The risks associated with a perforated appendix far out weighs the near neglible damages from removing a normal appendix, thus leading to high negative appendectomy rates being acceptable. The aim of the surgeon is thus to intervene before perforation.[11-14] The Alvarado score is a widely used clinical scoring system for predicting the probability of acute appendicitis.[6-8] In this study we reviewed the use of Alvarado score for the confirmation of clinically suspected acute appendicitis and assessed the positive predictive value of the Alvarado scoring system.

In this study, we found that in patients with Alvarado scores above 6, more than 95 and had acute appendicitis. All patients with a gangrenous or perforated appendix had a score more than 6. When biopsies were reviewed, patients with acute appendicitis had mean scores around 6 and those without acute appendicitis had a mean score less than 4. The use of the Alvarado score together with the surgical and histopathology findings confirmed that it was sensitive from 6 points upwards for the diagnosis of acute appendicitis.[15,16] Patients with scores below 4 were unlikely to have acute appendicitis.[16, 17]

The overall positive predictive value of 95 and in this study is in accordance to recent reports though higher than previous reports.[17-22] The overall negative appendectomy rate of 20 and is in the acceptable range.[11-13,21]

Jang et al, recently published the findings of a prospective study to investigate and validate the Alvarado score carried out on patients with suspected appendicitis. The diagnosis of acute appendicitis was highly accurate for an Alvarado score above 6 (90.9 and). Patients with a score 4 or less in the ward as well as in the emergency room did not have appendicitis.[16] The findings of our study are similar.

An earlier study by Shrivastava et al had suggested that the original cut-off value given by Alvarado may be changed in the Indian set-up to >or = 6 to increase sensitivity.[21] In this study too we found similar results and hence propose that a diagnosis of acute appendicitis can be made with a score of >6 as compared to a score of >8.

CONCLUSION

In conclusion, the use of the Alvarado scoring for clinical confirmation of suspected acute appendicitis appears validated. The overall positive predictive value of the Alvarado scoring is 95 and. We propose that a diagnosis of acute appendicitis can be made with a score of >6 as compared to the previous studies where confirmed acute appendicitis corresponds to a score of >8.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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