USE OF MODIFIED ALVARADO SCORE IN THE MANAGEMENT OF ACUTE APPENDICITIS

P. Naresh Kumar1, P. Karuppasamy2

1Associate Professor, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital & Research Centre, Ariyur, Pondicheri.
2Assistant Professor, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital & Research Centre, Ariyur, Pondicheri.

ABSTRACT

BACKGROUND AND OBJECTIVES
The aim of the study is to evaluate acute appendicitis using modified Alvarado scoring and reducing the number of negative appendicectomies. The patients with suspected clinical diagnosis were evaluated by modified Alvarado score and depending on the score treatment was done either observation or surgery. The accuracy of modified Alvarado scoring system in diagnosing acute appendicitis was assessed.

METHODS
Patients considered for the study were 65 who presented to Sri Venkateshwaraa Medical College, Ariyur, Pondicheri, between Jan 2015-Dec 2015 with suspected diagnosis of acute appendicitis by normal clinical assessment, all of whom were evaluated by modified Alvarado score. The total number of patients were 65, of which 39 were males in the age group between 10 and 60 years and 21 were females in the age group of 10 and 40 years and 6 children were less than 10 years. The modified Alvarado score is a modification of the original Alvarado scoring system (By Kalan et al, Ann R Coll Surg Engl 1994), where the left shift of neutrophil is omitted, as this is not available on a routine basis, is scored against a total of 9. It is based on 3 symptoms, 3 signs and a laboratory investigation. Patients with score 7 to 9 underwent an appendicectomy, while those with a score of less than 7 were not considered for surgery.

RESULTS
A study of 65 cases of acute appendicitis admitted to Sri Venkateshwaraa Medical College, Ariyur, Pondicheri, between Jan 2015-Dec 2015 was made adopting the Kalan’s modification of Alvarado scoring system. The symptoms commonly found among the patients with acute appendicitis was pain abdomen (100%) with a classical shift of pain from umbilicus to RIF (83%). next observed were nausea and vomiting. While fever was seen in 54% of cases, RIF tenderness was the commonest sign elicited (96%). Rebound tenderness was seen in 57% patients.

INTERPRETATION AND CONCLUSION
Modified Alvarado scoring is a scoring system based on history, clinical examination and a basic laboratory investigation. High scores in males and children were indicative of an inflamed appendix, while in females there was room for other differential diagnosis, as the negative appendectomy rate was 16%. Patients with scores less than 4 did not require subsequent surgery and hence were spared of an unnecessary expenditure. Not all patients with scores between 5 and 6 had inflamed appendix; however, the Negative Appendicectomy Rate (NAR) was found to be lower than the NAR quoted in the surgical literature of 30% (Hoffmann J, Raamsussen O) aids in the diagnosis of acute appendicitis BJS 1989;(76):774-90. In females with doubtful diagnosis, additional diagnostic aid like laparoscopy is needed to confirm the diagnosis and accordingly to manage them.

KEYWORDS
Modified Alvarado Scoring, Appendicitis, RIF Tenderness, Rebound Tenderness.


INTRODUCTION
For a surgeon confronting a patient with suspected acute appendicitis, the decision to operate or not is not always straightforward, because one has to keep in mind the complications associated with negative appendicectomies and at the same time to prevent missed appendicitis leading to complications.

Financial or Other, Competing Interest: None.
Submission 02-01-2016, Peer Review 07-02-2016,
Acceptance 12-02-2016, Published 25-02-2016.
Corresponding Author:
Dr. P. Naresh Kumar,
SVMCH & RC,
Ariyur, Pondicherry.
E-mail: drnk2011@gmail.com
DOI: 10.14260/jemds/2016/185

Negative Appendicectomy Complications
1. Wound infection.
2. Incisional hernia.
3. Intestinal obstruction.
4. Sterility (Fimbrial adhesions).
5. Expense.

Appendicitis Complications
1. Perforations.
2. Peritonitis Abscess.
5. Tubal Infertility.
The modified Alvarado score a modification of the original Alvarado scoring system (By Kalan et al. Ann R Coll. Surg, Engl, 1994) where the left shift of neutrophil is omitted, as this is not available on a routine basis, is scored against a total of 9. It is based on 3 symptoms, 3 signs and a laboratory investigation. The total score in each case was obtained and depending on the total score obtained patients were either operated or observed. Patients with score 7 to 9 underwent an appendicectomy, while those with a score of less than 7 were not considered for surgery, unless on further observation were thought on clinical grounds to undergo surgery.

OBSERVATION AND RESULTS
Age and Sex Distribution
The age group in which acute appendicitis occurred commonly, was between 11 and 30 years. The incidence is less in younger and older age groups with peak incidence in the second and third decades. In this study, males outnumbered females in the ratio of 2:1.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>Males</td>
</tr>
<tr>
<td>11-20</td>
<td>18</td>
</tr>
<tr>
<td>21-30</td>
<td>12</td>
</tr>
<tr>
<td>&gt;30</td>
<td>8</td>
</tr>
</tbody>
</table>

Symptom Distribution
Pain was the commonest presenting symptom and was seen in all patients (100%). The classical shifting of pain from umbilicus to right iliac fossa was found in 83%. Next observed were nausea and vomiting 77% and fever 54%.

AIMS AND OBJECTIVES
The aim of this study is to review the usefulness of modified Alvarado scoring and to evaluate its feasibility as an aid in the surgical decision making of possible appendicitis and in reducing the number of negative appendicectomies.

For this all patients who presented to us with a suspected clinical diagnosis of acute appendicitis were considered for the study. These patients were evaluated by the modified Alvarado score and depending on the score were either operated or observed. The results obtained were studied in relation to the available literature. The accuracy of modified Alvarado scoring system in diagnosing acute appendicitis was assessed.

MATERIALS AND METHODS
Patients considered for the study were 65 who presented to us between 2014 and 2015 with suspected diagnosis of acute appendicitis by normal clinical assessment, all of whom were evaluated by modified Alvarado score. The total number of patients studied were 65, of which 39 were males in the age group between 10 and 60 years and 21 were females in the age group between 10 and 60 years and 21 were females in the age group of 10 and 40 years and 6 were children less than 10 years.
The commonest site of pain was a central abdominal pain shifting to the right iliac fossa.

Physical Signs

<table>
<thead>
<tr>
<th>Site of Pain</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Migratory pain to RIF</td>
<td>83%</td>
</tr>
<tr>
<td>2. RIF pain</td>
<td>10%</td>
</tr>
<tr>
<td>3. Epigastric pain</td>
<td>4%</td>
</tr>
<tr>
<td>4. Diffuse central abdominal</td>
<td>3%</td>
</tr>
</tbody>
</table>

Tenderness at right iliac fossa was the commonest sign elicited followed by rebound tenderness, fever varied between 37.5 deg. and 37.8 deg. cent.

Results of Alvarado Score - Study Conducted by Kalan et al. (Ann R Coll Surg Engl, 1994; 76:418-419)

Routine blood investigations like hemoglobin, bleeding and clotting time, blood sugars, blood urea and serum creatinine, urine routine like for albumin, sugar and microscopy were done. Patients were prepared. Adequate parenteral fluids and broad spectrum antibiotics were given to maintain fluid balance and afford prophylaxis against wound infection respectively. Temperature, pulse, respiratory rate and urine output chart were maintained. Surgery was done under spinal anaesthesia. McBurney's incision was used when diagnosis was certain and right paramedian was used when diagnosis was in doubt. Preoperatively, the appendix was assessed and removed. When the appendix was found to be normal, other pathology as a cause for the clinical presentation was sought. The appendix was sent for histopathological examination.

Thus a study correlating the on table finding, histology and the clinical presentation in each patient was done. Patients with scores >7 were grouped separately, all these patients were subjected to surgery. It was found that patients with score >7 were 18 males, 12 females and 6 children.

In this study, leukocyte count was increased to >10,000 cells per cmm. In 60% and was in the normal range in 40% urine microscopy was normal in 64 patients.

Results of Alvarado Score

<table>
<thead>
<tr>
<th>Total No. of Patients</th>
<th>Score &gt;7</th>
<th>5-6</th>
<th>&lt;4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (38)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (21)</td>
<td>12</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Children (6)</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Total Leukocyte Count

<table>
<thead>
<tr>
<th>Leukocyte Count (cells/cmm)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10,000</td>
<td>40%</td>
</tr>
<tr>
<td>&gt;10,000</td>
<td>60%</td>
</tr>
</tbody>
</table>
All 18 males and 6 children had acute appendicitis confirmed. While only 10 females had acute appendicitis. The negative appendicectomy rate was found to be 16%. One women had ruptured follicular cyst and the other had no finding.

Similarly, patients with score >7 were grouped. They were 15 males and 8 females, all subjected to surgery, out of which 13 males and 5 females had acute appendicitis. A Negative Appendicectomy Rate (NAR) of 13% in males with scores >7 and 37% in females with score <7 was obtained. The 8 members with negative appendicectomy had the following finding. Females– two had follicular cysts, one had urinary tract infection. Males– one had mesenteric adenitis, one had no finding; 6 patients had scores <4, did not require surgery. All the patients had nonspecific abdominal pain. All the six children had scores <7 and all had acute appendicitis confirmed histologically.

Management
In the 59 patients subjected to surgery, the commonly employed incision was McBurney’s incision, which was extended when needed. Right para median was employed when diagnosis was doubtful. Postoperatively, patients were kept nil orally until normal bowel sounds returned; until then were maintained on parenteral fluids, broad-spectrum antibiotics to prevent wound infection. Suture removal was done between the 6th and 8th day.

DISCUSSION
A study of 65 cases of acute appendicitis admitted to SVMCH and RC between 2014-2015 was made, adopting the Kalan’s modification of Alvarado scoring system. Acute appendicitis being a common abdominal emergency, still evades the clinician of a straight forward diagnosis even today. In spite of a lot of advances in the diagnostic field—with the invention of sophisticated investigations like ultrasound, CT, NMR, diagnosis of acute appendicitis is not definite.

These investigations are costly, not always available, require specialized services and are time consuming. So even today a thorough clinical examination with basic investigation like WBC count remains the corner stone in the diagnosing of acute appendicitis. This scoring system acts as a clinical aid in diagnosing and managing acute appendicitis.1,2

The symptom commonly found among the patients with acute appendicitis was pain abdomen (100%) with a classical shift of pain from umbilicus to RIF (83%), next observed were nausea and vomiting.

While fever was seen in 54% of cases, right iliac fossa tenderness was the commonest sign elicited (96%), rebound tenderness was seen in 57%. A comparison of the negative appendicectomy rates obtained in our study with the study conducted by Kalan et al. is as follows:

Males and Females with Score >7 had a negative appendicectomy rates of 6% and 33% respectively (Our study-0% and 16%). In children with scores >7 had a negative appendicectomy rates of 6% and 33% respectively (Our study 0% and 16%). In children with scores >7 negative appendicectomy rate was 0% (Our study –0%), whereas in Males and Females with scores <7, Nar was 33% and 50% respectively (Our study–13% and 37%). However, the usefulness of this scoring system is demonstrated by a fall in the accepted rates of 5-22% in males (In our study it was 6%) 30-50% in Females (In our study it was 25%) 30-46% in children (In our study it was 0%) (Quote rate taken from Hoffmann J, Rasmussen O. Aids in the diagnosis of acute appendicitis, BJ 1989;76:774).3,4,5,6,7

In patients with score >7, appendicectomy was necessary as the appendix retrieved was found to be inflamed and thus perforation was avoided. In patients with score <4, subsequent improvement did not necessitate surgery, thus indicating the usefulness of modified Alvarado scoring system.2

In patient with scores between 5-6, observation for 12-24 hours was done and reassessed in the presence of persisting tenderness and high WBC count, appendicectomy was done. The negative appendicectomy rate in males with scores between 5 and 6 was 13%, while in females of childbearing age group it was high 37%. In this latter group, appendicitis was confused with a lot of gynaecological conditions like ruptured ovarian cyst, pelvic inflammatory disease, twisted ovarian cyst, etc. Thus a diagnostic tool like laparoscopy may be needed to minimize negative appendicectomy.

In children all had scores >7 and all had inflamed appendix. This is important because of the presence of a short omentum, which allows peritonitis to develop early following perforation with its attendant morbidity and mortality. The scoring system is simple to use, easy to apply since it relies on history, clinical examination and a basic laboratory investigation.

SUMMARY
Modified Alvarado scoring is a scoring system based on history, clinical examination and a basic laboratory investigation. High scores in males and children were indicative of an inflamed appendix, while in females there was room for other differential diagnosis as the negative appendicectomy rate was 16%. Patients with scores less than 4 did not require subsequent surgery and hence were spared of an unnecessary expenditure.8,9,10

Not all patients with scores between 5 and 6 had inflamed appendix; however, the Negative Appendicectomy Rate (NAR) was found to be lower than the NAR quoted in the surgical literature on 30% (Hoffmann J, Rasmussen O) Aids in the diagnosis of acute appendicitis BJ 1989;76:774-90. In females with doubtful diagnosis, additional diagnostic aids like laparoscopy is needed to confirm the diagnosis and accordingly to manage them.5

BIBLIOGRAPHY