

Implementation of Newly Proposed Appendicular Scoring System (ASS) for Diagnosis of Acute Appendicitis in Surgical Practice– A Clinical Study

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Accurate clinical diagnosis of acute appendicitis is really a great challenge in everyday surgical practice. Alvarado's (MANTRELS) score is effective to that clinical direction but not effective enough to fulfill the purpose up to a good level. That's why this study was conducted with a view to evaluate a new more effective scoring scale to such relation. The proposed name is Appendicular Scoring System. Both Alvarado's score and the newly proposed scoring system were tried to justified clinically among the 122 patients of suspected acute appendicitis on the basis of acceptability, repeatability, inter and intra observation variation, sensitivity, specificity, predictive value of a positive test, predictive value of a negative test, percentage of false negatives and percentage of false positives and found that using ASS was more fruitful than Alvarado's score in clinical practice to evaluate a more accurate diagnosis. In case of Alvarado's score sensitivity, specificity, predictive value of a positive test, predictive value of a negative test, percentage of false negatives and percentage of false positives were 80%, 48%, 81%, 47%, 20% and 52% respectively, whereas those were 91%, 82%, 91%, 77%, 09% and 18% in case of newly proposed ASS. Alvarado's score could not provide any information about the types or position of appendix in suspected patients of acute appendicitis. On the contrary, proposed ASS could elicit valuable information to such relation and about 64.2% of all diagnosed cases, it was found accurate.

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Introduction

Acute appendicitis is an inflammation of the vermiform appendix.¹ It is the commonest surgical emergency in the Western world. Rare under 2 years, common in second and third decades, but can occur at any age.¹ About 7% of people in Western countries have appendicitis at some time in their lives; 200,000 appendectomies for acute appendicitis are performed each year in the United States.² Symptoms classically include abdominal pain before nausea and vomiting; pain is periumbilical initially, then localizes to right lower quadrant. Signs include right lower quadrant rebound or percussion

tenderness (localized "peritoneal irritation"), mild leukocytosis (10,000 –15,000 /cmm) with left shift.^{2, 3} The diagnosis of appendicitis can usually be made by examining and discussing their symptoms. Blood tests, an ultrasound or other investigations may be done if the diagnosis is less certain. A period of observations in hospital is often more useful than tests. The diagnosis can be more difficult in younger children. Sometimes, the diagnosis isn't suspected until the appendix has ruptured. In a small number of cases, the diagnosis is suspected but the symptoms prove to have another cause.^{4, 5}

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Clinical presentation^{6,7}

Symptoms of appendicitis

- Periumbilical pain.
- Pain shifts to the right iliac fossa (RIF).
- Anorexia.
- Nausea.

Clinical signs in appendicitis

- Pyrexia.
- Localized tenderness in the RIF.
- Muscle guarding.
- Rebound tenderness.

Signs to elicit in appendicitis

- Pointing sign.
- Rovsing's sign.
- Psoas sign.
- Obturator sign.

The diagnosis of acute appendicitis is essentially clinical; however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15-30% of cases. A number of clinical and laboratory based scoring systems have been devised to assist diagnosis. The most widely used is the Alvarado score. A score of 7 or more is strongly predictive to acute appendicitis.^{8,9} Our newly proposed clinical scoring system for diagnosis of acute appendicitis is Appendicular Scoring System (ASS). This study was designed to validate ASS.

Methods

This study was conducted as a cross sectional study from 4 February 2009 to 14 September 2009 with a total number of 122 patients of the general surgery indoor department of Khulna Medical College Hospital (KMCH), Bangladesh (Unit 2, Ward no 11 and 12). Convenient type of purposive sampling was used as the sampling technique in this research study. Data were analyzed by using both analytic as well as descriptive statistics. And report was produced by computer based programme- Microsoft Word, Power point,

Photoshop, Adobe and other accessories. Scores of ASS was as table I. Interpretation of the scores are shown in the table II.

Table I: Newly proposed ASS

| Clinical Features | Score |
|--|-----------|
| Symptoms | |
| Migratory RIF pain. | 1 |
| Anorexia and/or Nausea and/or Vomiting | 1 |
| Signs | |
| Mc Burney's tenderness (MBT) / Murphy's sign (MS) (for high up appendix- Retrocaecal retrocolic appendix) | 2 |
| Muscle Guarding over RIF. | 1 |
| Fever and/or Leucocytosis. | 1 |
| Rebound tenderness. | 1 |
| Rovsing's sign (RS). | 2 |
| Psoas sign (PS) (Retrocaecal appendix)/ Obturator sign (OS) (Pelvic appendix) | 1 |
| Total | 10 |

Table II: Interpretation of ASS

| Score | Possibility |
|------------------------------|--|
| 10 | Highest score |
| 0-5 | Non specific |
| 6-7 | Suspected |
| 8-10 | Strongly suggestive. |
| Suspected score including RS | Strongly suggestive. |
| Score + MBT | Any variety. |
| Score + MS/ (MS+ PS) | High variety, Retrocaecal retrocolic (Most likely) |
| Score + PS | Retrocaecal (Most likely) |
| Score + OS | Pelvic type (Most likely) |

Here, both the Alvarado's score⁴ and ASS are describe in terms of acceptability, repeatability, observer variation, accuracy/ validity, sensitivity and specificity.¹⁰

Results

In case of these 122 patients, both the Alvarado's score⁴ (AS) and the newly proposed scoring systems (ASS) were applied. Sex distribution in different age groups as table III.

Table III: Age and sex distribution of the study cases.

| Age in years | Male | % | Female | % |
|--------------|------|------|--------|------|
| 0 – 14 | 0 | 13.8 | 7 | 10.9 |
| 15 – 29 | 31 | 51.7 | 41 | 64.1 |
| 30 – 44 | 16 | 27.6 | 12 | 18.8 |
| 45 – 59 | 2 | 6.9 | 4 | 6.3 |
| Total | 49 | 47.5 | 64 | 52.5 |

In case of validity the results observed by using the both Alvarado's score and ASS clinically are as follows (Table IV and V)

Table IV: Alvarado's score as a diagnostic tool

| Alvarado's score | Surgical diagnosis | | |
|------------------|---------------------------|---------------------------|----------|
| | Diagnosis positive | Diagnosis negative | |
| Positive | True positive (TP) 36 | False positive (FP) 07 | Positive |
| Negative | False negative (FN) 03 | True negative (TN) 01 | Negative |

Among the 72 patients of experimental group, 53 patients (73.6%) underwent surgical management and in this study group, the results those were recorded are as follows:

Table V: ASS as a diagnostic tool

| ASS | Surgical diagnosis | | |
|----------|---------------------------|---------------------------|----------|
| | Diagnosis positive | Diagnosis negative | |
| Positive | True positive (TP) 43 | False positive (FP) 05 | Positive |
| Negative | False negative (FN) 02 | True negative (TN) 03 | Negative |

Alvarado's score could not provide any information about the types or position of appendix in suspected patients of acute appendicitis. On the contrary, proposed ASS could elicit valuable information to such relation and about 64.2% (52 patients out of diagnosed 81 patients) of all diagnosed cases; it was found accurate.

Among these 81 diagnosed cases, 64.2% (52) cases, ASS was found effective to elicit the accurate position of inflamed appendix and in case of 27.2% (22) cases, it gave complete wrong ideas followed by in 8.6% (7) cases, it could provide a very hazy or no idea at all.

Comparisons and contrasts

On the basis of acceptability, repeatability, inter and intra observation variation¹⁰ for the both scoring system, the result that was observed is tried depicted in table VI.

Table VI: Acceptability, repeatability, inter and intra observation variation in AS and ASS

| Diagnostic tools | AS | ASS |
|-------------------|-------|-------|
| Acceptability | 96.7% | 96.7% |
| Repeatability | 96.7% | 97.5% |
| Inter observation | 96.7% | 95.9% |
| Intra observation | 96.7% | 97.5% |

Table VII: Comparison the results between AS and GSS

| Diagnostic tools | AS | ASS |
|-------------------------------------|-----|-----|
| Sensitivity | 80% | 91% |
| Specificity | 48% | 82% |
| Predictive value of a positive test | 81% | 91% |
| Predictive value of a negative test | 47% | 77% |
| Percentage of false negatives | 20% | 09% |
| Percentage of false positives | 52% | 18% |

Both Alvarado's score and the newly proposed scoring system were tried to be justified clinically among the 122 patients of suspected acute appendicitis on the basis of acceptability, repeatability, inter and intra

observation variation, sensitivity, specificity, predictive value of a positive test, predictive value of a negative test, percentage of false negatives and percentage of false positives and found that using ASS was more fruitful that Alvarado's score in clinical practice to evaluate a more accurate diagnosis. In case of Alvarado's score sensitivity, specificity, predictive value of a positive test, predictive value of a negative test, percentage of false negatives and percentage of false positives were 80%, 48%, 81%, 47%, 20% and 52% respectively, whereas those were 91%, 82%, 91%, 77%, 09% and 18% in case of newly proposed ASS (Table VII).

Discussion

In our surgical practice, Alvarado's score is quite established as well as effective tool for clinical diagnosis of acute appendicitis for many years. This scoring system has been modified several times. The sensitivity and specificity of this assessment scoring system is reasonably adequate and quite acceptable for its purpose, but a major drawback of it is that it cannot specify the correct anatomical position or clinical type which is very important for surgical approach. In our newly proposed ASS, the sensitivity and specificity is even higher than the conventional Alvarado's scoring and it can also tell the correct position as well as clinical type in majority of the cases. We received a number of patients of acute appendicitis from different parts of the nearby districts admitted in KMCH and conducted this study to assess the effectiveness of this new scoring system in contrast to Alvarado's scoring system on the basis of acceptability, repeatability, inter and intra observation variation, sensitivity, specificity, predictive value of a positive test, predictive value of a negative test, percentage of false negatives and percentage of false positives and found that using ASS was more fruitful that Alvarado's score in our common surgical practice to evaluate a more precise

diagnosis. In this study, majority of the study population was female (52.5%) and most of them was in 15-29 years of age group (64.1%) which is depicted in table III.

In case of Alvarado's score sensitivity, specificity, predictive value of a positive test, predictive value of a negative test, percentage of false negatives and percentage of false positives were 80%, 48%, 81%, 47%, 20% and 52% respectively, whereas those were 91%, 82%, 91%, 77%, 09% and 18% in case of newly proposed ASS (table VII). Moreover, repeatability was found slightly higher in case of ASS (97.5%) in contrast to AS (96.7%). But in terms of acceptability, intra and inter observational variation there found no significant difference between the both scoring systems. Another very important finding of this research study was that our newly proposed ASS could elicit valuable information about the exact position of appendix in approximately 64.2% of all diagnosed cases, whereas Alvarado's score could not provide any such information in any suspected patients of acute appendicitis.

Conclusion

It is time to reconsider the drawbacks of conventional Alvarado's scoring system for diagnosis of acute appendicitis and ASS is aimed at that direction as a future tool for the surgeons in clinical practice.

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References

1. Pierce A. Grace, Neil R. Borley: Surgery at a Glance; Acute appendicitis; 2nd edi: 2002: 96

2. Gerard M. Doherty, MD: Current Essentials of Surgery; Appendicitis, Acute: 2005: 76
3. Anderson RE et al: Repeated clinical and laboratory examinations in patients with an equivocal diagnosis of appendicitis. World J Surg 2000; 24:479.
4. Bailey and Love's; Short practice of surgery; The vermiform appendix; 24th edn: 2005: 1207-1211.
5. Berry, J and Malt, R. A. Appendicitis near its centenary; American Journal of Surgery; 200: 567-75.
6. Reiser. S. J, World health Forum; 2nd; 1980; 99-103.
7. WHO, early detection of handicap in children, EURO reports and studies no 30; 1980.
8. Cochrane A. L and Holland, Br. Med. Bull; 27th; 1971; 3.
9. Iomqvist, P. G., Anderseon, R. E. Granath, F. et al; Mortality after appendectomy in Sweden; Annals of surgery: 233: 455-60
10. K. Park, preventive and social medicine, screening for disease; 17th: 2003; 108-114.