INTRODUCTION

The classical signs and symptoms of acute appendicitis were first reported by Reginald Haber Fitz (America) in 1886. Since then it has remained the most common diagnosis for hospital admission requiring laparotomies. Approximately 6% of the population will suffer from acute appendicitis during their lifetime; therefore, much effort has been directed toward early diagnosis and intervention. This effort has successfully lowered the mortality rate to less than 0.1% for non complicated appendicitis, 0.6% where there is gangrene and 5% for perforated cases. The diagnosis of appendicitis can be difficult, occasionally taxing the diagnostic skills of even for the most experienced surgeon. Equivocal cases usually require inpatient observation. This delay in diagnosis may increase the morbidity and costs. Attempts to increase the diagnostic accuracy in acute appendicitis have included computer aided diagnosis, imaging by ultrasonography, laparoscopy and even radioactive isotope imaging. Various scoring systems have been devised to aid diagnosis.

A negative appendectomy is taken as a surgery performed for a preoperative diagnosis of appendicitis those result in a normal histopathology specimen. Different techniques have been devised to assist in equivocal cases in attempts to decrease negative appendectomy rates (NAR). A number of scoring systems have been used for aiding in early diagnosis of acute appendicitis and its prompt management. These scores make use of clinical history, physical examination and laboratory findings. The diagnosis of acute appendicitis is based on history, clinical examination and a few laboratory investigations and patients with equivocal signs can present a diagnostic challenge. In all cases, however, a definitive diagnosis can only be obtained at surgery and after pathological examination of the surgical specimen. Prior to surgery the diagnostic accuracy of acute appendicitis remains unsatisfactory, ranging from 25 to 90% and being worse in females than in males. Also a NAR of 20-40% has been documented and many surgeons would accept a rate of 30% as inevitable. Removing a normal appendix is an economic burden on both the patients and health resources. Misdiagnosis and delay in surgery can lead to complications like perforation and finally peritonitis. Difficulties in diagnosis often arise in very young, elderly and female patients of reproductive age because they usually have an atypical presentation. Many conditions may also mimic acute appendicitis; in fact, significant numbers of all adults on exploration have diseases other than appendicitis. In spite of their shortcomings, scoring systems are valid instruments and invaluable in discriminating acute appendicitis from non-specific abdominal
pain. Of the many scoring systems currently available, the Alvarado scoring system is the most widely employed, because of its convenience, better accuracy. Studies show that patients with a low Alvarado score (<4) do not have acute appendicitis and Owen et al. (1992) reported that there was no perforated appendicitis in patients with a score below 6 and recommended the use of the score by general practitioners. Therefore the utility of the Alvarado scoring system cannot be denied.

A study done by Dr. N. Baidya et al. reveal Alvarado score had an overall sensitivity of 88.8% and specificity of 75%. The diagnostic accuracy of Alvarado score is found to be helpful in the diagnosis and management of acute appendicitis. Diagnosis of acute appendicitis is virtually confirmed with a score of 7-10 especially in males and they should undergo appendicectomy. Diagnostic laparoscopy is advised to minimize the unacceptable high false negative rate in women. Patients with score 5-6 must be admitted and scored frequently. Score 1-4 can be discharged unless otherwise indicated.

To prevent negative appendectomies modified Alvarado score system (MASS) can be used. The result of the study done by Vandakudri AB et al. showed the overall sensitivity in men with scores ≥7 was 92.3%, with NAR of 7.7%. But in females the negative appendicectomy rates were quite high in groups with score of 5 to 6 as well as 7 to 9. The negative appendicectomy rate in the above groups is 50% and 27.3% respectively. A delay in performing an appendicectomy in order to improve its diagnostic accuracy increases the risk of appendicular perforation and sepsis, which in turn increases morbidity and mortality. The opposite is also true, where with reduced diagnostic accuracy, the negative or unnecessary appendicectomy rate is increased and this is generally reported to be approximately 20%-40%. Diagnostic accuracy can be further improved through the use of ultrasonography or computed tomography imaging. However, CT is a costly and may not be easily available when it is required. Making arrangements for these diagnostic modalities may lead to further delays in diagnosis and surgery. Several scoring systems have been developed to aid in the diagnosis of acute appendicitis. The Alvarado score and the modified Alvarado score are the two most commonly used scoring systems. The reported sensitivity and specificity for the Alvarado and the modified Alvarado scores range from 53%-88% and 75%-80%, respectively. However, these scoring systems were developed in western countries, and several studies have reported very low sensitivity and specificity when these scores are applied to a population with a completely different ethnic origin and diet. Thus, new diagnostic appendicitis scoring system that is more effective is required to develop.
One study was carried by Ahmed and et al\textsuperscript{1} in Saudi Arabia. The study included 125 patients between the ages of 16 and 76 years. They were prospectively evaluated on admission using the Modified Alvarado Score system (MASS) to determine whether or not they had acute appendicitis. The MASS was correlated with the operative and histopathological findings. One hundred and ten patients (88\%) had appendicectomy of which 30 patients (27.3\%) had normal appendices on histopathology examination. Overall the MASS showed a sensitivity of 53.8\% and a specificity of 80\%. For males, the sensitivity was 56.4\% and the specificity was 100\%. For females, the sensitivity and specificity were 48\% and 62.5\%. From the results, the MASS is not sufficiently sensitive adopted as a method of diagnosing of acute appendicitis in adults in their environment. Further, requirements may be needed to improve its sensitivity and specificity. It clearly suggests that surgeons have many challenges about diagnosis of acute appendicitis\textsuperscript{6}.

Another one study was carried by Nazir Ahmad Lone et al\textsuperscript{7} from India. The study was conducted on 240 patients who were operated for acute appendicitis. Preoperatively, Alvarado score was assigned to all and the results were compared with operative and histopathological diagnosis. Alvarado score works well in men with more than seven score. However, high negative appendectomy rates were observed in females even with a score exceeding 7.

Although typical, uncomplicated cases of acute appendicitis are easy to diagnose and manageable but in atypical clinical presentation of it is a difficult job and a hard challenge to even experience surgeon\textsuperscript{8}. In spite of the advances in the diagnostic and imaging techniques, the rates of the negative findings on appendicectomy have not decreased much. Clinical judgment is still the most important factor in the management of patients with suspected acute appendicitis. The routine use of CT scan or diagnostic laparoscopy for all patients who are suspected to have acute appendicitis is neither cost-effective nor safe. However, the use of these two diagnostic procedures in selected controversial cases can enhance the accuracy of diagnosis; reduce the cost and rate of negative appendicectomy\textsuperscript{9}.

A recent meta-analysis has attempted to address the role of both clinical features and inflammatory markers in the diagnosis of acute appendicitis. The author D Birchley\textsuperscript{10} concluded that: ‘elements of the disease history, clinical findings and results of laboratory tests are weak individual discriminators of appendicitis. However, in combination, they provide high discriminatory power.’ It would, however, be correct to state that, in combination, inflammatory markers appear to have a higher discriminatory capacity.

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Laboratory tests of the white cell count and C-reactive protein are more effective in supporting a clinical diagnosis of acute appendicitis.

A clinical decision to operate leads to the removal of a normal appendix in 15% to 30% of cases. Reductions in the number of “unnecessary” operations should not, however, be achieved at the expense of an increase in the number of perforations. This clearly indicates the need of development of new diagnostic scoring system which one to be easy to apply, have high sensitivity and specificity to reduce negative appendicectomy rate. It is possible to reinforce MASS by adding imaging parameter like USG and inflammatory marker(CRP) and one sign hyperesthesia in Sherren’s triangle to develop new diagnostic scoring system. Efficacy of this scoring system is compared with already trusted modified Alvarado scoring system (MASS).