

Comparison of ultrasonographic diagnosis with 'Tzanakis' Score in acute appendicitis

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Abstract

Introduction: Acute appendicitis is one of the most common acute surgical abdominal conditions requiring surgery. Ever since the inflamed appendix was demonstrated in the 1980's by Ultrasonography, it has been used as an aid to clinically diagnose acute appendicitis. Tzanakis scoring system is a combination of clinical examination, Ultrasonography and inflammatory markers.

Methods: A retrospective non-randomized observational study was conducted from April 2014 to March 2015 on all cases of acute appendicitis, which underwent preoperative ultrasound before appendectomy (open/laparoscopic) at the Department of surgery, Nepal Medical College Teaching Hospital. Ultrasound findings and Tzanaki score were compared in the cases. No studies could be found in literature comparing ultrasound diagnosis with Tzanaki score in appendicitis.

Results: The sensitivity, specificity, positive predictive value and negative predictive value of ultrasound were 73%, 50%, 95% and 12% respectively. The sensitivity, specificity, positive predictive value and negative predictive value of Tzanaki were 87%, 50%, 96% and 23% respectively. Tzanaki score is better than ultrasound alone as a diagnostic test for acute appendicitis.

Conclusion: Tzanaki score is better than ultrasound in diagnosis of acute appendicitis.

Key Words: Appendicitis; Tzanakis score; ultrasonography.

Introduction

Acute appendicitis is one of the most common acute surgical abdominal conditions requiring surgery.¹⁻³ A history of migrating abdominal pain, classically beginning in the periumbilical region and traveling to McBurney's point, combined with leukocytosis and other associated symptoms such as anorexia remains the best diagnostic clue.⁴ Clinical examination is helpful in diagnosis of acute appendicitis in only 70-87% of the cases.⁵ A variety of scoring systems are used for the clinical diagnosis of acute appendicitis.

Ever since the inflamed appendix was demonstrated in the 1980's by ultrasonography, it has been used as an aid to

clinically diagnose acute appendicitis.⁶ Ultrasonographic diagnosis of acute appendicitis is based on various criteria.⁷⁻⁹ Evaluation by meta-analysis suggests that ultrasound is useful for diagnosis of acute appendicitis.⁶ Tzanakis scoring system is a combination of clinical examination, ultrasonography and inflammatory markers.¹⁰ Studies have advocated that Tzanakis score is superior to Alvarado score in diagnosing appendicitis.^{11, 12}

This study was done to compare ultrasonographic diagnosis with Tzanaki score in cases of acute appendicitis.

Methods

A retrospective nonrandomized observational study was conducted from April 2014 to March 2015 on all cases of acute appendicitis, which underwent preoperative ultrasound before appendectomy (open/laparoscopic) at the Department of surgery, Nepal Medical College Teaching Hospital. Ultrasound findings and Tzanaki score were compared in the cases. The Ultrasound machine was nemio (Toshiba) and high frequency probe (6-11MH) was used and all were performed consultant radiologists. The procedure was performed with patient in supine position. Tzanki score of more than 8 was regarded as positive. All cases were diagnosed as appendicitis based upon modified Alvarado scoring (history, clinical examination and investigation). Cases of complications of appendicitis were excluded in the study.

Ultrasonographic diagnosis of acute appendicitis was based on the following criteria⁷⁻⁹:

1. Non-compressible, immobile, blind ended tubular structure with target like appearance in transverse view, with greatest maximal diameter of visualized structure more than or equal to 6 mm.
2. Appendix with muscular wall thickness equal or more than 3mm with a symmetry and edema of the wall.
3. The finding of appendicolith (faecolith).
4. If the appendix is not visualized or if a non-appendicular pathology is discovered, the scan was considered as normal.
5. Findings like localized fluid collection, dilated bowel loops were not considered suggestive of acute appendicitis.
6. Presence of Probe tenderness only was not regarded as a finding for acute appendicitis.

Statistical analysis was done with the help of SPSS V20. McNemar Test was done to compare ultrasonography with Tzanaki score.

Result

Total of 128 cases of suspected appendicitis were examined in the emergency during the study period. Nine cases refused admission/went to another hospital. Twelve cases were excluded upon further pre operative investigations. A total of 107 cases were diagnosed as appendicitis and underwent

appendectomy. Of them, 85 cases underwent preoperative ultrasound, 79 had appendicitis on histopathological examination and 6 cases did not. Six cases, which did not undergo ultrasound, also showed a normal appendix but were not included in the study.

Out of the 85 cases 52(62%) were male and 33(38%) were female. The age ranged from 9-52 years with mean age of 25.61(73%) had a positive ultrasound finding and 72(85%) had a positive Tzanaki score. Comparing Tzanaki with ultrasound finding as a diagnostic test which shows a significant *p* value of 0.007.59(69%) cases had both Tzanaki positive and ultrasound finding of appendicitis. Also a majority of Tzanaki positive cases had a positive ultrasound finding (59/72). (Table 1)

The sensitivity, specificity, positive predictive value and negative predictive value of ultrasound were 73%, 50%, 95% and 12% respectively. The sensitivity, specificity, positive predictive value and negative predictive value of Tzanaki were 87%, 50%, 96% and 23% respectively.

Out of the 79 cases of histological positive for appendicitis, ultrasound was positive in 58(73%) and Tzanki in 69(87%).

The frequency of the individual variables of Tzanaki score in descending order was as follows, Mc burney's tenderness seen in 78(92%), rebound tenderness seen in 69(81%), positive ultrasound in 61(73%) and leucocytosis in 56(65%).

Modified Alvarado score was positive for acute appendicitis in 67(78%). However, 60(70%) had both Modified Alvarado and Tzanaki score positive for acute appendicitis where as 48(56%) had both Modified Alvarado and ultrasound positive. (*p* <0.0001).

Discussion

Our study showed that appendicitis prevails mostly in young males. The age and gender statistics are in accordance with local and international studies.¹³⁻⁵

Ultrasound has been widely used as an aid to clinical diagnosis of acute appendicitis since the 1980s. The diagnosis is on basis of specific morphological criteria.⁷⁻⁹ Visualization of the inflamed appendix is operator dependent and depends on the position of appendix, gas filled bowel loops, body build, obesity and presence of guarding/rigidity of abdomen.^{6, 16} In the evaluation of acute appendicitis, the visualization rate varies from institution to institution, from a high of 98% to a low of 22%.¹⁷ In this study the rate was 73% which is similar to other studies reported from Nepal

and Pakistan.^{13,16} Studies have advocated the superiority of ultrasound diagnosis to clinical decision making while others have supported it as a useful aid in diagnosis.^{14, 19, 20, 21} The sensitivity of ultrasound has varied from 49% to 98%; specificity from 58% to 100%.^{13,14,16,18-24} The low specificity in our study may be due to the low sample size and low false positive cases. The positive predictive value has ranged from 65% to 100% and negative predictive value from 6.7% to 95%.^{13,14,20,22-24} The low predictive value in this study is probably due to a low sample size as those with a large sample size all had high values of negative predictive value.

Tzanakis introduced a scoring system for diagnosis of appendicitis, which is a quantitative combination of the clinical evaluation with Ultrasound imaging and a marker of inflammatory response.¹⁰ Studies have compared Tzanakis score with Alvarado score for diagnosis of appendicitis and have shown Tzanakis score to be an effective if not superior modality for diagnosis.^{11, 12} In our study too, Tzanakis score was a superior scoring system than Alvarado score. The diagnostic accuracy, sensitivity, positive predictive value and negative predictive value are similar though two studies done in India had a higher specificity.^{11,12,25,26}

In this study Tzanakis score was superior to ultrasound for diagnosis of appendicitis ($p < 0.007$). This is probably due to added parameters of clinical evaluation (tenderness and rebound tenderness) and leucocytosis. A majority of Tzanakis positive cases however had a ultrasound diagnosis of appendicitis.

Tzanakis score is applied for diagnosis of appendicitis only but if applied to other acute abdominal conditions, it could show positive scores due to tenderness, rebound tenderness and leucocytosis. There could be a possibility of false positive results but no studies have been found in this regard.

No studies could be found comparing ultrasound diagnosis with Tzanaki score in appendicitis. In this study we found Tzanaki score to be superior to that of ultrasound diagnosis alone.

Conclusion

Tzanaki score is superior to that of ultrasound alone for the diagnosis of acute appendicitis.

Table 1: Comparison of ultrasonography abdomen with Tzanaki score

Positive	Ultrasonography		McNemar Test	
	Negative	p-value		
Tzanki Score	Positive	59	13	.007 ^a
	Negative	2	11	
Total		61	24	

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