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# Correlation of the Results of Pediatric appendicitis Score (Pas) with the Results of the Ultrasonography (Usg) Appendix in Children's Appendicitis Patients

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**Abstract : Introduction:** Appendicitis is the most common cause of surgery in children in the emergency unit. Diagnosis of appendicitis in children is difficult, the diagnosis of appendicitis is based on clinical symptoms, physical examination, laboratory and investigation, namely radiological imaging, To help in establishing a diagnosis of acute appendicitis in children, there is a scoring system that has been proposed and until now the one used is the Pediatric Appendicitis Score (PAS), Ultrasound is the most commonly used diagnostic procedure because it does not cause pain in its use and the results can be known directly. **Method:**This study is a prospective analytical study with cross sectional design to see the relationship between the results of the Pediatric Appendicitis Score (PAS) with the results of Ultrasound (USG) preoperative appendix in children. The target population is pediatric patients with complaints of abdominal pain and clinically diagnosed appendicitis. Affordable population was pediatric patients with complaints of abdominal pain and appendicitis diagnosed with treatment at General Hospital Haji. Adam Malik and USU Hospital in Medan.Data will be analyzed descriptively to see the frequency distribution of research subjects based on the characteristics and types of appendicitis using the Chi square test, the results are significant with a significance value of <0.05. **Result:**Majority of the study samples were 19 women (57.6%) with a median age of 13 years. The results of the PAS calculation showed that 63.5% entered into the simple category while the USG results of 84.8% stated suggestive of appendicitis. There is not significant relationship between PAS with ultrasound examination results with p> 0.05, p = 0.076. **Conclusion:** We have shown patients of appendicitis by using Ultrasonography and compared it with PAS the final result, there is no significant value, we conclude that USG and PAS could be the main tools for diagnostic but there is no relatonship between USG and PAS.

**Keywords:** Pediatric appendicitis Score, Pas, Ultrasonography (Usg), Appendix, Children's Appendicitis.



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## Introduction

Appendicitis is the most common cause of surgery in children in the emergency unit. Diagnosis of appendicitis in children is difficult. Children usually present with abdominal complaints, but history is difficult to do with children, this is a challenge for a doctor to make a diagnosis efficiently and effectively from the little information obtained from patients (Victor Y, Kong, Bulajic B, et al. 2012).

The diagnosis of appendicitis is based on clinical symptoms, physical examination, laboratory and investigation, namely radiological imaging. However, the enforcement of the diagnosis of appendicitis is not easy, even up to 50% of patients in hospitals with suspected appendicitis have unclear clinical symptoms, so a good supporting examination is needed (Kessler.2003).

Technological developments in the field of radiology such as ultrasonography (USG), CT Scan and MRI can help establish the diagnosis of acute appendicitis. Ultrasound examination is the initial radiological step in the diagnosis of appendicitis, but this tool has limited sensitivity. CT scan and MRI have better imaging features than ultrasound. Despite concerns about high CT scan radiation, the use of a low dose CT scan has a negative appendectomy level and there is no difference in the degree of perforation. (Shogilev; 2014) However, the problem that occurs especially in developing countries is the limited facilities at the emergency department which are the spearhead in the diagnosis of patients with acute appendicitis in children. Therefore, another method is needed to help diagnose by using a clinical scoring system.

To help in establishing a diagnosis of acute appendicitis in children, there is a scoring system that has been proposed and until now the one used is the Pediatric Appendicitis Score (PAS). Our need to assess PAS relationships and so far, doing Ultrasonography Appendix to children have not been proven to date, so researchers intend to make and select this research and this research has never been done before in our institution.

The Pediatric Appendicitis Score (PAS) is relatively simple, an accurate diagnostic tool for assessing acute abdomen and diagnosing appendicitis in children. (Journal of Pediatric Surgery. Elsevier Science USA (2002).

Ultrasound examination is a non-invasive examination, inexpensive, easy to do and the time needed is short, received minimal / no radiation exposure so it is safe for pregnant women and children and the potential for examination of cases including abdominal pain. (Jacob; 2005). Ultrasound is the most commonly used diagnostic procedure because it does not cause pain in its use and the results can be known directly, also widely considered safe to use (Abramowicz, 2013). Ultrasound examination in appendicitis is useful because we can visualize the appendix in the patient so that we can identify whether the appendix is normal or abnormal (Kessler N.2004).

Radiology modalities in the diagnosis of appendicitis have a large role, including examinations that have high accuracy, namely CT scan and ultrasound. Recently ultrasound examination to visualize the appendix is needed, although there are some disadvantages, including ultrasound examination depends on the skill of the examiner (examination technique), the location of the appendix that is difficult to reach by the transducer, the patient's condition, intestinal air that obscures the examination and so on. (Jacob; 2006)

Removal of normal tissue of the appendix occurs in about 10-20% of all cases of appendicitis in children. For this reason, additional examination is needed in the form of imaging or laboratory examination. Diagnostic imaging is used to increase the incidence of appendicitis diagnosis, but it has several limitations such as exposure to radiation ionization, availability of skilled examiners at all times, and high examination costs (Chen Chunu. 2013).

In general, the normal findings of the appendix when an appendectomy is a misdiagnosis error (Dikovsky Elizabeth, 2016). Delay in diagnosis can cause perforation and peritonitis. This proves the importance of accurate diagnostics for the speed of diagnosis and for reducing the number of unnecessary appendectomy (Emily E. K, Loren. 2014)bacteria in urosepsis patients at the H. Adam Malik Central General Hospital in Medan.

## Methods

This research was conducted in the Surgical Department of the Division of Pediatric Surgery at Haji Adam Malik Hospital and USU Hospital Medan. Haji Adam Malik General Hospital Medan is the highest referral hospital in North Sumatra and teaching hospital with adequate facilities and infrastructure to carry out research, while Medan USU Hospital is the closest Network Hospital from Adam Malik Haji Hospital Medan. This study is a prospective analytical study with cross sectional design to see the relationship between the results of the Pediatric Appendicitis Score (PAS) with the results of Ultrasound (USG) preoperative appendix in children.

Patients of children aged 5-18 years with complaints of abdominal pain diagnosed with suspect appendicitis based on Pediatric Appendicitis Score (PAS) and preoperative ultrasound examination was included in this study.

## Results

This study was followed by 33 patients who had a median age of 13 years. The majority of the research subjects were 19 women (57.6%) and 14 men (42.4%). Based on the Pediatric Appendicitis Score (PAS) score, as many as seven people (21.2%) patients had a low risk with a score of ≤5, 21 patients (63.5%) were simple appendicitis with a score of 6-8, and ≥9five research subjects (15.2%) have a high risk. Based on the results of an ultrasound examination, as many as 28 people (84.8%) patients were suggestive of appendicitis and five patients (15.2%) were non appendicitis.

**Table 1.Sample Characteristics**

| | |
|---|---|
| Age (Year), Median (Min-Max) | 13 (7 -18) |
| Sex, n (%) | |
| Male | 14 (42,4%) |
| Female | 19 (57,6%) |
| PAS Score | |
| ≤ 5 (Low Risk) | 7 (21,2%) |
| 6-8 (Simple) | 21 (63,5%) |
| ≥9 (High Risk) | 5 (15,2%) |
| Ultrasonography (USG) | |
| SugestiveAppendicitis | 28 (84,8%) |
| Non Appendicitis | 5(15,2%) |

PAS relations and USG results were analyzed using the fisher exact test as an alternative to Chi Square test analysis. Based on the results of the analysis, it was found that there was no significant relationship between PAS scores and USG examination results with a value of p> 0.05 (p = 0.076).

**Table 2.Correlation of Pediatric Appendicitis Score (PAS) with Ultrasound (USG) Examination**

| | | **USG** | | ***p*** |
|---|---|---|---|---|
| | | **Positif** | **Negatif** | |
| PAS | Low Risk | 5 (17,9%) | 2 (40,0%) | |
| | Simple | 20(71,4%) | 1 (20,0%) | 0,076* |
| | High Risk | 3 (10,7%) | 2 (40,0%) | |
| | Total | 28 (100,0%) | 5 (100,0%) | |

## Discussion

The diagnosis of appendicitis is based on clinical symptoms, physical examination, laboratory and investigation, namely radiological imaging. However, the enforcement of the diagnosis of appendicitis is not easy, even up to 50% of patients in hospitals with suspected appendicitis have unclear clinical symptoms, so a good supporting examination is needed (Kessler.2003).

Diagnosis of appendicitis in children often experience many difficulties due to symptoms symptoms that complained resemble the symptoms of other common diseases that can heal themselves. Children rarely show symptoms of appendicitis symptoms that are typical of adults, this causes challenges for medical personnel, especially doctors. to make a timely diagnosis (Parveen KZ et al., 2017). To assist in establishing a diagnosis of acute appendicitis in children, there is a scoring system that has been proposed and until now the Pediatric Appendicitis Score (PAS) has been used.

In a study by Kim et al in 2015 with a sample of 285 patients (51.9% boys) aged 3 to 17 years [(average (SD): 13.2 years (3.0)] included among them 92 (32.3%) underwent surgery (6 patients (6.5%) had normal histology and were included in the non-Acute Appendicitis group). And grouped, 86 patients (30.2%) were included in the Acute Appendicitis group and 199 patients (69, 8%) were included in the non- Acute Appendicitis group. The Acute Appendicitis group had PAS significantly higher than the non-Acute Appendicitis group ($P < 0.01$). Results were found where appendicitis findings on positive abdominal CT were more frequent in the Acute Appendicitis group than in the non- Acute Appendicitis group. Acute Appendicitis ($P < 0.01$) (Kim et all, 2015).

In a study conducted by Obinna O. Adibe et al. In 4 months, 112 patients were enrolled in this study (median age 10.5, range 1-18). Of 69 patients who underwent appendix surgery with early laparoscopy. For patients in group A, 75% had simple appendicitis and 5% were complex. For patients in group B, 68.4% of patients had simple appendicitis and 26.3% complex. For patients in group C, 27.3% were simple and 63.6% were complex, the results showed that the average hospital stay increased from $1.63 \pm 0.34$ to patients in group A to $5.9 \pm 1.37$ for patients in group C. This shows an association between the assessment of Pediatric appendicitis Score (PAS) and the severity of a case of appendicitis. (Obinna O Adibe, et al. 2010). In the research conducted by Parveen KZ et al. of 26 pediatric patients who underwent surgery and performed appendix biopsy (15) (58.1%) with PAS $\geq 7$, positive appendicitis results were obtained for biopsy examination. Good correlation was also found between PAS assessment and biopsy results, but no correlation was found good between PAS and USG results, and this study concludes that PAS is an assessment tool for diagnosing appendicitis. (Parveen KZ et al., 2017).

This study was attended by 33 patients who had a median age of 13 years. Most of the research subjects were women as many as 19 people (57.6%) and men 14 people (42.4%). Results obtained from 7 patients with low risk PAS results found 5 patients with suggestive appendicitis, from 21 patients with simple risk PAS results found 5 patients with suggestive appendicitis, and from 5 patients with high risk PAS results, 3 patients with suggestive appendicitis were found.Based on the results of the analysis of this study, it was found that there was no significant relationship between PAS scores and USG examination results with a value of $p > 0.05$ ($p = 0.076$).

The ultrasound used includes transabdominal, transrectal ultrasound and Color Doppler ultrasound, Transducers (5-12 MHz high frequency transducers, 2-4 MHz low frequency convex transducers for obese patients or deep appendix positions). Examiner skills, including experience and good knowledge on examiners of appendicitis (experience and skills lacking in examiners can reduce diagnostic accuracy in appendix visualization). The examination technique used includes a stepwise anterior compression technique (Puylaert; 1986), a gradual compression technique towards the top, manual technique posterior, the technique of positioning the transducer, which is placed in the most painful area felt by the patient (local), the transducer is placed lateroposterior to visualize the appendix located in the pelvic cavity (deep pelvic, retrocecal) or suprapubic to facilitate visualization of the appendix with the natural acoustic window filled urine full patient positioning technique (position of lateral decubitus left oblique helps imaging the retrocecal appendix), this is because rotating the patient from the supination position to the left oblique lateral decubitus causes the cecum and terminal ileum to move medially in front of the psoas muscle so that the depth of the retrocecal coli area and retroileum area above the psoas muscle will be reduced.

## Conclusion

Most of the study samples were 19 women (57.6%) with a median age of 13 years. The results of the PAS score calculation showed that 63.5% entered the simple category while the USG results of 84.8% stated suggestive of appendicitis.There was no significant relationship between PAS scores with ultrasound examination results p> 0.05, p = 0.076.

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