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Analysis of the Accuracy of Clinical Diagnosis and PA Diagnosis in Appendectomy Patients at AN-NISA Tangerang Hospital Period 2019-2024

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ABSTRACT: Appendicitis is inflammation of the vermiform appendix caused by a blockage in the lumen of the appendix. Anatomic pathology examination is considered the gold standard in confirming the diagnosis of appendicitis, but this examination not always carried out. Method: in this study used descriptive cross-sectional with the aim of comparing the clinical diagnosis and Pathology Anatomy diagnosis of 80 cases of appendectomy at AN-NISA Tangerang Hospital during the period 2019-2024. This study also aims to look at the incidence of malignancy in appendectomy. The results of the 80 cases carried out showed that 7 cases were malignant, 8 cases of appendicitis tuberculosis, 4 cases of malignancy which were initially clinically diagnosed as non-malignant, and 4 cases of tuberculosis which were initially diagnosed as non-tuberculosis. This study found that age was associated with the incidence of malignancy in the appendix ($P<0.05$). This study also found that patients aged >40 years had a 1,233 times higher risk of experiencing malignancy in the appendix than patients aged <40 years. Conclusion: In a number of cases, clinically significant impacts were found if Pathology Anatomy examination was not carried out. This study recommends pathology anatomy examination during appendectomy, especially in the age group >40 years.
Keywords: characteristics of appendicitis diagnosis, histopathological examination

INTRODUCTION

Inflammation that occurs in the vermiform appendix due to a blockage in the lumen of the appendix is called appendicitis. This process can occur acutely or chronically (Cruz & Mayasari, 2022). Inflammation of the appendix or appendicitis occurs through blockage of the lumen caused by submucosal lymphoid hyperplasia, hardening of the feces, foreign objects, and parasites (Wibawa, Prajitno, Wulandhari, & Suanjaya, 2023). Other risk factors that can cause appendicitis are age and gender. In later life, lymphoid tissue first appears in the lumen of the appendix approximately two weeks after birth. The amount of lymphoid tissue tends to increase with age, especially after puberty, and stabilizes over the following decades before decreasing with age. After reaching the age of 60, this decline becomes more pronounced. And in terms of gender, sex hormones have an important role in regulating the function of immune cells, especially in responding to inflammation. Androgen and estrogen are the two main hormones involved in this process. Androgen hormones are known to have anti-inflammatory properties, while estrogens can exhibit pro-inflammatory or anti-inflammatory properties depending on the type of immune response induced or the estrogen receptor involved (Muhamad, 2019). Appendicitis usually causes pain in the right lower quadrant of the

abdomen. Dull pain that radiates to the right lower quadrant of the abdomen from the epigastric or periumbilical area is the patient's first symptom. In addition, nausea and vomiting often occur several hours after the onset of pain, which often causes a decrease in appetite which can lead to anorexia. A mild fever is also common. The symptoms of appendicitis can be similar to the symptoms of other diseases so that a misdiagnosis can occur. Appendicitis is classified into acute appendicitis, acute suppurative appendicitis, gangrenous appendicitis, chronic appendicitis, and early acute appendicitis. This classification is based on histopathological images (Fransisca, Gotra, & Mahastuti, 2019). The classification of appendix tumors includes carcinoid tumors, adenocarcinoma, intestinal parasites, and lymphatic tissue hypertrophy. Although the incidence of appendicitis is high, diagnosis is still difficult. Difficulty in diagnosis results in an increased risk of negative appendectomies and delays in diagnosis, both of which lead to increased rates of morbidity, complications, length of hospital stay, and higher costs (Patmasari, Herizal, & Muhammad, 2021). To avoid misdiagnosis, apart from anamnesis and physical examination, supporting examinations are also needed in the form of histopathological examination which is the gold standard for appendicitis examination.

Due to the high prevalence of appendicitis in every country, appendicitis is a disease of concern. According to data from the World Health Organization (WHO) in 2010, the death rate due to appendicitis in the world reached 21,000 people (Hidayat, Sari, & Kartiningrum, 2023). The incidence of appendicitis in Europe is relatively high, namely around 16% compared to 7% in America, 4.8% in Asia, and 2.6% of the total population in Africa. The prevalence of acute appendicitis in Indonesia is around 24.9 cases per 10,000 population. Appendicitis can attack both men and women with a risk of developing appendicitis during their lifetime reaching 7-8%. The highest prevalence occurs at the age of 20-30 years (Kheru, Sudiadnyani, & Lestari, 2022). In 2006, the Indonesian Ministry of Health reported that with a total of 28,040 inpatients, appendicitis was the fourth most common disease in Indonesia, after dyspepsia, ulcers and duodenitis, as well as other digestive system diseases (Depkes, 2009).

According to Iftina Amalia's research conducted at South Tangerang City General Hospital, the prevalence of acute appendicitis was 111 cases with the results obtained by the distribution of acute appendicitis sufferers based on place of residence, the majority were domiciled in Pamulang District with 46 patients (41.4%), the distribution The number of sufferers of acute appendicitis based on age is the highest in the age group. 17-25 years (34.2%), and the distribution of female patients was 64 patients (57.7%) more than male patients (Amalia, 2016). Based on the results of research conducted by Arif Emre, it was found from the histopathological images of 1255 patients who underwent appendectomy, 94% were positive for appendicitis. Among them, 880 were cases of phlegmonous appendicitis, 148 were gangrene with perforation, and the remaining 88 showed unusual histopathological findings (carcinoid tumor, encheliophis vermicularis parasite infection, granular inflammation, appendicular endometriosis, and 1 sample each showed mucocele, eosinophilic infiltration, Taenia saginata parasite infection, and appendicular diverticulitis), and 6% did not show supporting pathology (Emre et al., 2013).

In another study conducted by Kulkarni, it was found that 100% of cases suffered from acute appendicitis with or without periappenditis. Acute appendicitis with perforation is 46.70%, and acute gangrenous appendicitis is 1.52% (Kulkarni, Sulhyan, Barodawala, & Yadav, 2017). In another study of 238 cases diagnosed with appendicitis, 211 cases were found to be positive for appendicitis and 27 cases were in normal condition (Omiyale & Adjepong, 2015). Based on the background that has been described, seeing the high prevalence of appendicitis in Indonesia, especially in the Tangerang area, the author felt interested in conducting

research, namely to find out the suitability of clinical diagnosis and diagnosis of PA in appendicitis patients who suffer from appendicitis. underwent appendectomy at AN-NISA Hospital, Tangerang.

This study aims to determine the level of concordance between clinical diagnosis and histopathological (PA) diagnosis in patients suffering from appendicitis who underwent an appendectomy at AN-NISA Hospital, Tangerang. Additionally, the study seeks to evaluate the histopathological outcomes of these patients and how these results impact clinical management and patient outcomes.

The novelty of this research lies in its specific focus on comparing the clinical diagnosis with histopathological results in appendicitis patients in the Tangerang area, a subject that has not been widely explored in prior studies. This study provides a deeper comparative approach between clinical and histopathological diagnoses in appendicitis cases, with the aim of reducing diagnostic errors and enhancing the accuracy of clinical management.

This research is expected to make a significant contribution to the medical field by improving the accuracy of clinical diagnosis in appendicitis cases. With valid data on the concordance between clinical and histopathological diagnoses, the study can serve as a foundation for clinicians to optimize treatment approaches, reduce complication rates, and lower the number of negative appendectomies. Furthermore, the results of this study may provide valuable insights for hospitals to evaluate and improve their healthcare services related to appendicitis diagnosis.

RESEARCH METHODOLOGY

The design of this research is descriptive analytical, by taking sample data of histopathological images from all patients who have undergone examinations at the AN-NISA Tangerang Hospital during the period 2019-2024. And regarding data collection, this study used secondary data collection taken from the anatomical pathology laboratory register book which contains information regarding clinical diagnosis and histopathological features of acute appendicitis at AN-NISA Tangerang Hospital. Then data processing is carried out. After all the data is collected, classification is carried out which is divided into tuberculosis infection, non-tuberculosis infection, neoplasm, malignant neoplasm, and malignancy. After that, the cases were analyzed using bivariate analysis. This bivariate analysis is a statistical method to see how two variables relate to each other, usually used in correlation, association and 2-group experimental research designs. In this study, Fisher's exact test can be used to calculate the p value precisely in testing the independence hypothesis in small samples. Constraints arise when there are structural zeros in the contingency table; in this case, a generalization of Fisher's exact test allows its use for situations where some entries in a table are restricted to zero.

RESULT AND DISCUSSION

In this study, secondary data was used, namely data collection from the laboratory register book of the An-Nisa Hospital Tangerang PA Laboratory and carried out using a total sampling method with a total of 80 patients who had taken part in a histopathological examination. The characteristics of the subjects studied were age, gender, initial diagnosis and diagnosis of PA.

Table 1. The distribution of appendicitis patients based on gender

Gender	No
Male	37 (46%)
Female	43 (54%)

Based on the results of the research, there were 80 patients who took part in the appendicitis examination, it was found that the gender of women who underwent the examination was 43 (54%) with men namely 36 (46%). Based on this distribution data, the number of female patients is greater than male patients

Table 2. Distribution of appendicitis patients based on age

Age	**No (y)**
<17	8 (10%)
17-25	20 (25%)
26-35	7 (9%)
36-45	17 (21%)
>45	28 (35%)

Based on the research results, there were 80 patients who underwent anatomical pathology examination during appendectomy, with the largest number of patients in the age group over 36 years, namely 56%. The initial diagnosis of appendectomy is classified into non-tuberculous infection, tuberculosis infection and neoplasm.

Table 3. Initial diagnosis of appendectomy

Diagnosis	**No.**
Non Tuberculosis infection	64 (80%)
Tuberculosis Appendicitis	7 (8,25%)
Neoplasm	9 (11,25%)

Based on the research findings, patients undergoing PA examinations were categorized into different infection groups. In the non-tuberculosis infection group, 78.75% of cases (64 patients) were identified. Specifically, in the Tuberculosis infection category, 7 patients were diagnosed with Tuberculosis Appendicitis. Regarding neoplasm classification, 2 patients were suspected of having malignancy. These results provide insights into the distribution of infections and neoplastic conditions among the studied patient population.

Table 6. Result Histopathology Examination

Diagnosis	**No**
Non Tuberculosis Infection	63 (78,75%)
Tuberculosis Infection	9 (11,25%)
Non-Neoplasm	3 (3,75%)
Malignant Neoplasm	5 (6,25%)

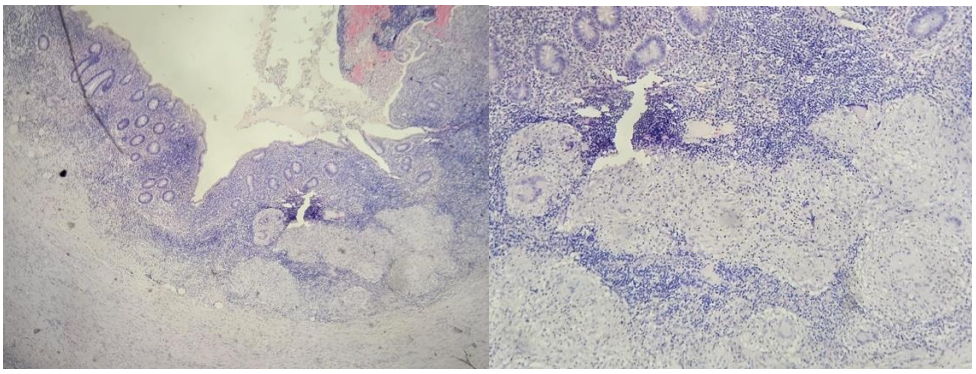

Figure 1 tuberculous appendicitis and Tubercle with epithelioid proliferation

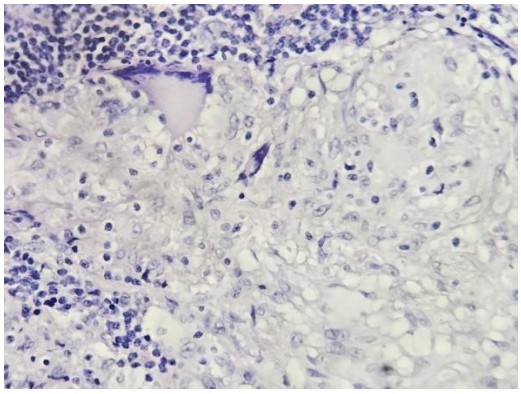

Figure 2 Langhans giant cell

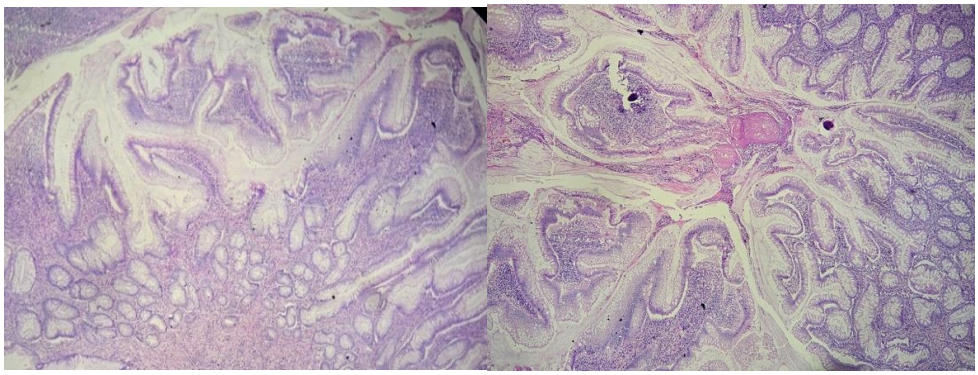

Figure 3 Low-grade appendiceal mucinous neoplsm

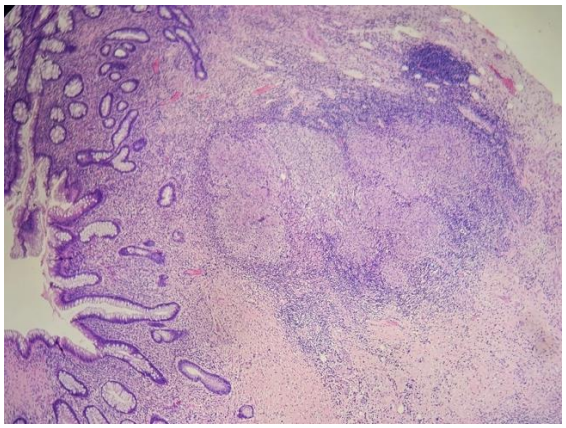

Figure 4 Low-grade appendiceal mucinous neoplsm with ruberculosis

Based on the research results, all patients who underwent PA examination were grouped into non-tuberculous infections and found 63 cases (78.75%). Tuberculosis Appendicitis was identified in 11,25% of cases, comprising 9 patients within the tuberculosis infection group. Additionally, non-neoplastic infection cases such as early acute appendicitis acellular mucin on the serosal appendix, appendix endometriosis, and pseudomyxoma peritonei were recorded in 3 patients (3,75%).In the malignant neoplasm infection group, a total of 5 patients (6,25%) were diagnosed, with the most common neoplasm being LAMN in 3,75% of cases. These findings reflect the distribution of patients based on PA results in the study.

Table 10. Age grouping based on the incidence of appendiceal malignancy

Age	Malignant	Benign	P
<40	0	44	0,003%
>40	7	29	

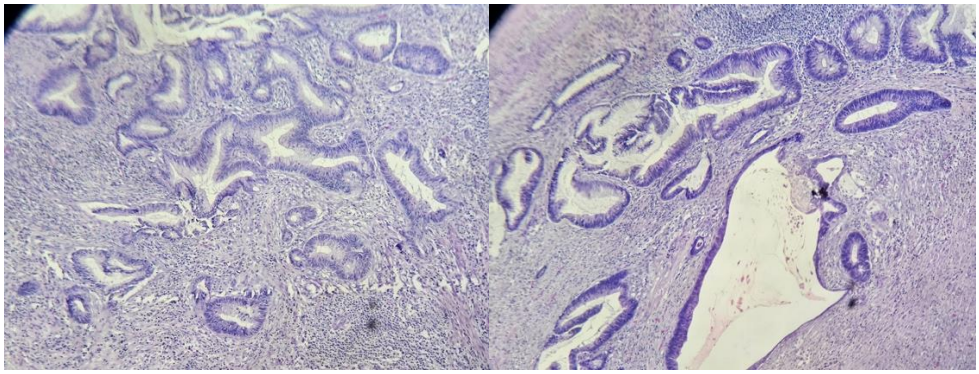

Fig. 5 Adenocarcinoma

Based on the results of research on age grouping based on the incidence of malignancy, it was found that those aged >40 years suffered more malignancies, namely 7 patients compared to patients in the age group <40 years. Based on the Fisher exact test statistical analysis, the P value was 0.003 (P <0.05). So it can be concluded that there is a significant relationship between age and the incidence of malignancy in the appendix.

Discussion

The distribution of appendicitis patients based on gender from the research results presented in table 1 shows that the largest number of patients suffering from appendicitis are women, 43 (54%) compared to men, 36 (46%), the results of this study are in accordance with research conducted by Amalia Iftina where the research results included the gender of women, 64 patients (57.7%) were higher than male patients.

This is due to the fact that the peak incidence of appendicitis often occurs at the same time as The maturity of sex hormones plays an important role in the pathogenesis of inflammation of the appendix. Differences in estrogen and androgen levels between men and women also influence the incidence of appendicitis. In women, levels of the hormone estrogen (E2/17β-estradiol) tend to be higher than in men. The hormone estrogen has been shown to increase the expression of inflammatory mediators by macrophages by activating lipopolysaccharide (LPS) production through estrogen receptor signaling. LPS activation triggers a macrophage response that depends on TLR (Toll-like receptor), which then increases the production of cytokines such as IL-1β, IL-6, and TNF-α.

The age distribution was divided into 5 groups and age grouping was carried out according to the incidence of malignancy in the appendix. From the research results presented in table 2, it was found that appendicitis sufferers were more common in the age group >45 years with 28 cases (35%). In second place there were 20 cases (25%) in the 17-25 year age group, and 17 (21%) cases in third place were in the 36-45 year age group. This is different from research conducted at Dr. Adjidarmo Hospital, Lebak Regency. The age distribution of patients diagnosed with appendicitis was divided into 9 groups and it was found that the 17-25 year age group occupied the top position in appendicitis patients, namely 93 patients (31.7%), then the order the second was in the 26-35 year age group with 55 (18.8%), and the last was in the 0-5 year age group with 1 patient (0.3%) (Sukmahayati, 2020). This is different

from research that has been carried out due to increasing life expectancy and the increase in the elderly patient population, so there is an increase in the number of appendicitis cases in the elderly group (Lapsa, Ozolins, Strumfa, & Gardovskis, 2021).

This is also the background to the relatively high incidence of malignancy in this study, and it was found that the incidence of malignancy in appendicitis increases at ages above 40 years (Naar et al., 2020).

And from the results of the research presented in table 10, statistical tests were carried out using the Fisher exact test, it was found that age influences the incidence of malignancy in the appendix. Looking at the results of the risk estimate in the risk calculation, it is known that patients aged over 40 years have a risk of suffering from malignancy in the appendix. 1,233 compared to ages under 40 years (Magnalena & Krisanti, 2019).

Of the total of 80 cases, there were 64 cases (80%) of the initial diagnosis that matched the diagnosis of PA, while 16 cases (20%) were inconsistent. In an inappropriate case distribution, there were 2 cases of tumor, namely adenocarcinoma whose initial diagnosis was gangrenous appendicitis and 1 more case of mucinous adenocarcinoma whose initial diagnosis was acute appendicitis with mucin. In other studies, it was also found that Adenocarcinoma cases in appendicitis only accounted for 0.2%, this could happen because the clinical picture is not specific and not all appendectomy cases undergo PA examination. However, adenocarcinoma can appear as an abdominal mass which is detected through physical examination, namely palpation and imaging examination (Rojas, Sachdeva, Neychev, & Pandalai, 2018).

Meanwhile, there were 5 cases of LAMN, 3 of which had an initial diagnosis of suspected appendix tumor and 2 of which had an initial diagnosis of acute appendicitis and perforated appendicitis. In other studies, it was also found that LAMN cases only accounted for 0.3% of appendectomy specimens. Meanwhile, in this study, out of a total of 80 cases of LAMN, 5 cases (6%) were found, this high percentage could be caused by not all appendectomy cases having a PA examination, and this could happen because in this LAMN the clinical symptoms overlap with other clinical symptoms so that sometimes LAMN is not always identified from the start (NICHAT, RANA, PARIHAR, MISHRA, & RAO, 2020).

Then in this study there were 7 cases of tuberculous appendicitis, of which the initial diagnosis was appropriate in 3 cases, while there were 4 cases where the initial diagnosis was not appropriate, consisting of acute appendicitis, chronic appendicitis and appendicitis with fibrinogen. In another study, it was found that cases of tuberculous appendicitis were a rare event of 0.1% -3% (Haddad et al., 2024), and in another study conducted by Purnama, the incidence of tuberculous appendicitis was found to be 0.08% (Purnama & Wibawa, 2020). Meanwhile in this study the incidence was higher because not all appendectomies underwent PA examination. The difficulty of determining the initial diagnosis of tuberculous appendicitis can be due to the absence of a specific clinical picture, so it requires a histopathological examination (Haddad et al., 2024). In research conducted by Grat Hubbard stated that in his research even though tuberculous appendicitis was suspected, a definitive diagnosis could only be made. carried out after considering various clinical data and histopalogical examination results (Hubbard & Chlysta, 2021).

CONCLUSION

On research. It was found that 80 cases of appendectomy underwent PA examination, there was a match between the initial diagnosis and the PA diagnosis in 80% of cases and 20% of cases were inconsistent. There were 2 cases of adenocarcinoma that did not match the initial

diagnosis, namely gangrenous appendicitis and 1 case of mucinous adenocarcinoma, then there were 5 cases of LAMN, 3 of which were appropriate and 2 of which did not match the initial diagnosis, namely acute appendicitis and perforated appendicitis. And there were 4 cases of tuberculosis that did not match the initial diagnosis, consisting of acute appendicitis, chronic appendicitis and appendicitis with fibrinogen. In the statistical test results for age grouping based on the incidence of malignancy in the appendix, it is known that patients aged over 40 years have a risk of malignancy in the appendix of 1,233 compared to those aged under 40 years.

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