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ORIGINAL ARTICLE

Correlation between Clinical Diagnosis and Histological Confirmation of Acute Appendicitis

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ABSTRACT

Background: Acute appendicitis is among the most frequent causes of acute abdominal pain and remains a common indication for emergency surgery. While diagnosis is primarily clinical in many settings, histopathological examination remains the gold standard for confirmation.

Objective: To determine the frequency of histologically confirmed acute appendicitis among patients who underwent appendectomy based on clinical suspicion alone.

Methodology: This descriptive cross-sectional study conducted at Department of General Surgery, University College of Medicine & Dentistry University of Lahore from 1st April 2023 to 30th September 2023. Sixty patients confirmed on histopathological of acute appendicitis were included with non-probability consecutive sampling was used. The sample size was calculated with 95% confidence level Z=1.96, an expected proportion of 80% and 10% margin of error. All patients of either gender, age between 10-60 years presenting with clinical features suggestive of acute appendicitis, underwent emergency appendectomy based solely on clinical diagnosis and provided informed consent for participation were included. Clinical diagnosis was made by the attending surgical team based on history (e.g. pain in right iliac fossa, nausea, vomiting), physical examination (e.g. tenderness at McBurney's point, rebound tenderness), and supporting laboratory tests (e.g. leukocytosis). Imaging (ultrasound or CT) was used only selectively, primarily in atypical or complicated cases. Data were entered and analyzed using SPSS-26.

Results: The mean age of patients was 27.6±9.3 years. Among the 60 patients, 36 (60%) were male and 24 (40%) were female. Histopathological examination confirmed acute appendicitis in 51 patients (85.0%), while 9 patients (15.0%) had a normal appendix, indicating negative appendectomy. Acute suppurative appendicitis was the most common histological subtype (63.3%), followed by gangrenous (15.0%) and perforated appendicitis (6.7%). The negative appendectomy rate was higher among female patients compared to males (20.8% vs. 11.1%).

Conclusion: A significant majority of clinical diagnoses of acute appendicitis were histologically confirmed. However, a 15% negative appendectomy rate underscores the limitations of clinical assessment alone.

Keywords: Acute appendicitis, Histopathology, Clinical diagnosis, Appendectomy, Negative appendectomy

INTRODUCTION

Acute appendicitis is one of the most frequent causes of acute abdominal pain and remains a leading indication for emergency abdominal surgery worldwide.[1] It is believed that younger people have a chance of about 7-10 percent of having appendicitis by the end of their lives, and between the second and third life decades, people are most likely to have appendicitis. Although this condition is common and much has been done already in its diagnosis, acute appendicitis still presents a major challenge to clinicians, especially in areas where healthcare facilities do not have access to sophisticated imaging.[2]

Historically, the assessment of acute appendicitis has been more of a clinical process involving the history of the patient, physical clues, such as right lower cavity tenderness, and rebound tenderness, as well as simple blood tests, e.g., type of leucocytosis.[3] To enhance the level of diagnostic accuracy, the formulation of clinical scoring systems like Alvarado score and Modified Alvarado Score has led to the development of clinical predictive scoring approaches, whose applications are nonetheless associated with limitations, particularly when it comes to atypical cases, or populations like children, females of reproductive age, and aging individuals. The misdiagnosis is not unseen even with the assistance of ultrasonography or computed tomography (CT).[4]

Another issue of great significance in the treatment of suspected appendicitis is the number of negative appendectomies, which is understood as the surgical excision of an appendix only after being found to be normal during the process of histopathological analysis.[5] Although surgical treatment of suspected appendicitis is frequently adopted to prevent life-threatening complications of perforation and peritonitis, the negative aspect of the surgical treatment is the occurrence of additional surgery in patients with no appendicitis, concomitant dangers, and financial expenses of the treatment[6]. Research in different parts of the world gives negative appendectomy rates of anything between 10 and 30 percent, based on the population being investigated, access to the means of diagnosis, and baseline in which surgical intervention is considered.[7]

Histopathological examination of removed appendices is the gold standard to diagnose the case of acute appendicitis. It is an absolute criterion of inflammation and it enables one to diagnose other seldom-pathological pathologies like carcinoid tumors, parasitic infections, or granulomatous diseases.[8] Thus, it is of paramount importance to establish the prevalence of histologically verified acute appendicitis in patients diagnosed clinically and operated on as a measure of auditing the clinical diagnostic accuracy and improvement of the surgical decision-making pathways.[9] The use of clinical diagnosis in resource-limited environments, such as most hospitals in South Asia, including Pakistan, is even higher since not all of them have high-resolution imaging, and due to the high cost of CT, it is not feasible to scan every suspect.[10] That is why it is even more needed to assess the degree of compatibility of clinical diagnoses with histological ones because it demonstrates the efficiency of the entire process of diagnosis and affects patient safety, health care spending, and level of surgical care.[11]

MATERIALS AND METHODS

This was a descriptive cross-sectional study conducted at Department of General Surgery, University College of Medicine & Dentistry University of Lahore from 1st April 2023 to 30th September 2023. A total of 60 patients confirmed on histopathological of acute appendicitis were included with non-probability consecutive sampling was used. The sample size was calculated with 95%

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confidence level Z=1.96, an expected proportion of 80% and 10% margin of error. All patients of either gender, age between 10-60 years presenting with clinical features suggestive of acute appendicitis, underwent emergency appendectomy based solely on clinical diagnosis and provided informed consent for participation were included. Those patients managed conservatively without surgery, prior history of appendectomy, histopathological reports were inconclusive or unavailable and cases where imaging suggested an alternative diagnosis before surgery were excluded.

Clinical diagnosis was made by the attending surgical team based on history (e.g., pain in right iliac fossa, nausea, vomiting), physical examination (e.g., tenderness at McBurney's point, rebound tenderness), and supporting laboratory tests (e.g., leukocytosis). Imaging (ultrasound or CT) was used only selectively, primarily in atypical or complicated cases. All included patients underwent open or laparoscopic appendectomy. The resected specimens were sent for histopathological examination to confirm the diagnosis. The histopathology reports were reviewed to determine the presence or absence of acute inflammation, thereby confirming or refuting the diagnosis of acute appendicitis. Data were entered and analyzed using SPSS-26.

RESULTS

The mean age of patients was 27.6 ± 9.3 years, with a range from 12 to 52 years, and the majority were males (60%). Most patients presented within 1–2 days of symptom onset. Common symptoms included nausea/vomiting (75%), anorexia (70%), and fever (50%). Leukocytosis was noted in 80% of cases, and ultrasound findings supported appendicitis in 65%. Histologically, 63.3% had acute suppurative appendicitis, while 15% had gangrenous, 6.7% had perforated, and 15% had a normal appendix (Table 1).

Among males, 88.9% had histologically confirmed appendicitis compared to 79.2% in females. The rate of negative appendectomy (normal appendix on histology) was higher in females (20.8%) than in males (11.1%) [Table 2].

Across all age groups, the majority of patients had confirmed appendicitis. The highest confirmation rate was seen in the 21–30 age group (88.5%), followed by >40 years (87.5%) and <20 years (83.3%). The 31–40 group had the lowest confirmation rate at 78.6% (Table 3).

Table 1: Demographic and baseline characteristics of patients (n = 60)

Variable	Value
Age (years)	27.6±9.3
Gender	
Male	36 (60%)
Female	24 (40%)
Duration of Symptoms (days)	1.8±0.7
Fever Present	30 (50%)
Nausea/Vomiting	45 (75%)
Anorexia	42 (70%)
Leukocytosis (>11,000 /mm³)	48 (80%)
Ultrasound suggestive of appendicitis	39 (65%)
Histological diagnosis	
Acute suppurative appendicitis	38 (63.3%)
Gangrenous appendicitis	9 (15.0%)
Perforated appendicitis	4 (6.7%)
Normal appendix (negative cases)	9 (15.0%)

Table 2: Gender-wise histopathological findings (n = 60)

Histopathological outcome	Male (n = 36)	Female (n = 24)	Total (n = 60)
Confirmed appendicitis	32 (88.9%)	19 (79.2%)	51 (85.0%)
Normal appendix (negative case)	4 (11.1%)	5 (20.8%)	9 (15.0%)

Classic symptoms of appendicitis showed strong correlation with histological confirmation. Rebound tenderness had the highest predictive value (89.5%), followed closely by nausea/vomiting (88.9%), and RIF pain (85.0%). Fever and anorexia also had relatively high confirmation rates (80% and 83.3%, respectively), validating their diagnostic utility in acute appendicitis (Table 4, Fig. 1).

Table 3: Histopathological outcome by age groups of patients

Age (Years)	No. of Patients	Confirmed appendicitis	Negative appendectomy
< 20	12	10 (83.3%)	2 (16.7%)
21 - 30	26	23 (88.5%)	3 (11.5%)
31 - 40	14	11 (78.6%)	3 (21.4%)
> 40	8	7 (87.5%)	1 (12.5%)
Total	60	51 (85.0%)	9 (15.0%)

Table 4: Comparison of clinical symptoms with histopathological confirmation

Clinical symptom	Present in patients	Confirmed histologically	Confirmation rate
Right iliac fossa pain	60	51	85.0%
Nausea/Vomiting	45	40	88.9%
Rebound tenderness	38	34	89.5%
Fever	30	24	80.0%
Anorexia	42	35	83.3%

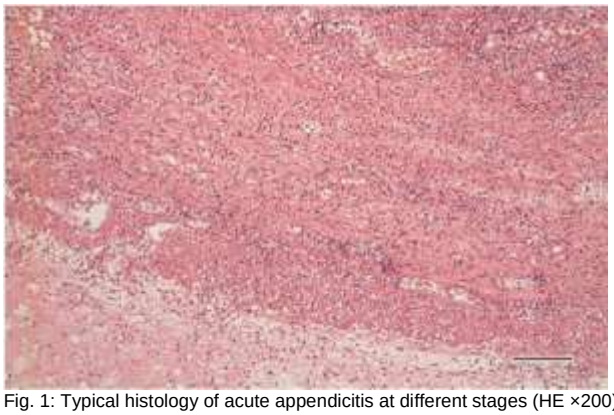

Fig. 1: Typical histology of acute appendicitis at different stages (HE ×200)

DISCUSSION

This study aimed to evaluate the frequency of histologically confirmed acute appendicitis among patients who underwent appendectomy based on clinical diagnosis alone. Our results showed that 85 percent of our patients had histologically proved appendicitis, and 15 percent had no appendicitis on post-operative pathological examination, representing the negative appendectomy rate. These findings are comparable to the available literature with behind appendectomy rates being negative at between 10 -30 percent depending on the location as well as the application of the diagnostic measures put in place. In a study done in Pakistan, there were negative appendectomy influences of 17.3 percent which is compared to what is in our results. But with all the progress in the field of diagnostic algorithms, even 15 percent of the unneeded surgeries should be a concern.[12] Even the high level of histologically proven appendicitis indicates the need to follow the clinical decision-making approach in emergency care, particularly, in resource-constrained healthcare systems. The fact that 9 of patients with anatomically normal appendices raises tensions, however, on the limitation of clinical management where characteristics make it difficult nowadays, given the atypical manifestation in these cases or in populations where the symptoms could also be found in gynecological or gastrointestinal diseases.[13] In our study, a bit higher rate of negative appendectomy was observed in female (20.8 %) than male patients (11.1 %), a result consistent with that previously reported and indicating that although rare, misdiagnosis is more frequent in women of reproductive age because of the availability of gynecologic differentials like ovarian cysts, pelvic inflammatory disease, or ectopic pregnancy.[14] It was also revealed in our study

that clinical manifestations, including pain in the right iliac fossa, nausea, rebound tenderness, and anorexia, were highly correlated with the histologically proven cases. These were most predictive with rebound tenderness and nausea/vomiting being able to exceed confirmation rates of 85%.[15]

The importance of traditional clinical signs is stressed by the fact that such signs interpreted with consideration of history and laboratory tests are valuable. In 80 percent of the positive cases, leukocytosis was identified as a supporting cardinal sign of acute appendicitis; it is a useful, however, a nonspecific supporting exam.[16] The greatest confirmation rate was observed among those in 21-30-year age category, which is quite consistent with the fact that appendicitis peak incidence is observed in this age group.[17] What is important is that the negative appendectomy rate did not differ radically with age classes, though it was a little bit bigger in the 31-40-year bracket, it may have been caused by the coincidence of the symptoms with other abdominal pathologies. One of the implications of such study is the necessity of the diagnosis improvement in cases which are borderline or ambiguous.[18]

Although CT imaging has established a significant positive effect in reducing negative rates of appendectomies, it is not commonly utilized in developing countries because of the financial costs and logistical factors.[19,20] In this respect, the possibility to combine clinical scoring systems with selective imaging and laboratory parameters as an effective triage tool to streamline surgical decision-making cannot be overlooked. The study is associated with a number of limitations. First, a relatively small sample was used, and the present study results could therefore not be generalized to large populations. Secondly, study was carried out in one tertiary care center and the findings may not indicate the diagnostic practice or outcomes in the other environments, particularly in rural or low-resource centers. Thirdly, even though an attempt to cover all the clinically identified cases was made, a lack of standardized clinical scoring scales such as the Alvarado score could have contributed to the effect of variation in the diagnostic measures.

CONCLUSION

The high proportion (85%) of patients clinically diagnosed with acute appendicitis was histologically confirmed following appendectomy, supporting the continued value of clinical assessment in emergency surgical settings. However, the presence of a 15% negative appendectomy rate highlights the limitations of relying solely on clinical judgment, especially in resource-limited environments. Integration of clinical scoring systems with selective imaging and laboratory support may help improve diagnostic accuracy and reduce unnecessary surgeries.

REFERENCES

1. Abeysinghe AHMGB, Samarasinghe NR, Abeysinghe AHMCD, Wmalasena GADNB. Acute appendicitis: clinical decision and histopathological correlation. Int Clin Med Case Rep J 2023;2(12):1-9.
2. Sirpaili S, Rajthala L, Banmala S, Gautam P, Ranabhat S, Ghatani SR, et al. Efficacy of modified Alvarado score combined with ultrasound in the diagnosis of acute appendicitis: a prospective analytical study. Ann Med Surg (Lond) 2023; 86(5):2586-90.
3. irmani S, Prabhu PS, Sundeep PT, Kumar V. Role of laboratory markers in predicting severity of acute appendicitis. Afr J Paediatr Surg 2018;15(1):1-4.
4. Mishra A, Kumar SS, Sinha A. Diagnosis of acute appendicitis using modified alvarado score and abdominal ultrasound. J Clin Diagn Res 2018;12:PC08-11
5. Abdelaal A, El Ansari W, Al-Bozom I, Khawar M, Shahid F, Aleter A, et al. Frequency, characteristics and outcomes of appendicular neuroendocrine tumors: A cross-sectional study from an academic tertiary care hospital. Ann Med Surg (Lond) 2017;21:20-24.
6. Agarwal R, Agarwal A, Kumar A, Kumar M. The validity and utility of combining ultrasonography with different clinical scores in diagnosis of acute appendicitis. Int Surg J 2019;6(4):1084-92.
7. Mathew G, Agha R, Albrecht J, Goel P, Mukherjee I, Pai P, et al. STROCSS 2021: Strengthening the reporting of cohort, cross-sectional and case-control studies in surgery. Int J Surg 2021;96:106165.
8. Gongidi P, Bellah RD. Ultrasound of the pediatric appendix. Pediatr Radiol. 2017; 47:1091-100.
9. Kondoju SK, Thota C, Bhagat R. Efficacy of Modified Alvarado Scoring in Acute Appendicitis. IJSS J Surg. 2020;6:1-3.
10. Jb N, Thakkannavar V. Comparative study of modified Alvarado score and ultrasonography in the diagnosis of acute appendicitis. IOSR J Dent Med Sci 2016;15:14-7.
11. Pipal D, Kothari S, Shrivastava H, Shrivastava H. To evaluate the diagnostic accuracy of Alvarado score, C-reactive protein, ultrasonography and computed tomography in acute appendicitis and to correlate them with operative and histological findings. Int Surg J 2016;4(1):361.
12. Al-Wageeh S, Alyhari QA, Ahmed F, Altam A, Alshehari G, Badheeb M. Evaluating the diagnostic accuracy of the alvarado score and abdominal ultrasound for acute appendicitis: a retrospective single-center study. Open Access Emerg Med 202416:159-66.
13. Sirpaili S, Rajthala L, Banmala S, Gautam P, Ranabhat S, Ghatani SR, et al. Efficacy of modified Alvarado score combined with ultrasound in the diagnosis of acute appendicitis: a prospective analytical study. Ann Med Surg (Lond) 2023;86(5):2586-90.
14. Podda M, Pisanu A, Sartelli M, Coccolini F, Damaskos D, Augustin G, et al. Diagnosis of acute appendicitis based on clinical scores: is it a myth or reality? Acta Biomed 2021; 92(4):e2021231.
15. Lietzén E, Salminen P, Rinta-Kiikka I. The accuracy of the computed tomography diagnosis of acute appendicitis: does the experience of the radiologist matter? Scandinavian J Surg 2018;107(1):43-7.
16. D'Souza N, Hicks G, Beable R, Higginson A, Rud B. Magnetic resonance imaging (MRI) for diagnosis of acute appendicitis. Cochrane Database Syst Rev 2021;12(12):Cd012028.
17. Hosseini A, Omidian J, Nazarzadeh R. Investigating diagnostic value of ultrasonography in acute appendicitis. Adv Biomed Res 2018;7(1):113.
18. Bouali M, El Berni Y, Moufakkir A, El Bakouri A, El Hattabi K, Bensardi F, et al. Value of Alvarado scoring system in diagnosis of acute appendicitis. Ann Med Surg Lond 2022;77:103642.
19. Gupta S, Kolli VS, Da Costa K, Javed S, Ammar A, Rasheed A. A systematic review and meta-regression for validation of the Alvarado score as a tool for predicting acute appendicitis. Ann Med Surg 2023;85(2):111-21.
20. Noori IF, Jabbar AS, Noori AF. Clinical scores (Alvarado and AIR scores) versus imaging (ultrasound and CT scan) in the diagnosis of equivocal cases of acute appendicitis: a randomized controlled study. Ann Med Surg 2023;85(4):676-83.

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