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Original Research Article

Clinico-sonological and histopathology findings in patients with right iliac fossa pain who underwent appendectomy: a retrospective observational study in a tertiary care hospital

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ABSTRACT

Background: Appendicitis being the one the most common cause of right iliac fossa pain that leads to emergency abdominal surgery. The existence of non-perforating or non-acute forms of appendicitis is doubted to this day despite clinical, intraoperative, radiological and histo-pathological findings. Appendectomy though being curative, yet the decision on its timing is still controversial especially in non-acute variants of appendicitis.
Methods: A retrospective observational study on 200 consecutive cases of suspected appendicitis who underwent appendectomy in department of General surgery, Adichunchangiri Hospital and Research Centre during a period between January 2020 and January 2021. The data was accrued from patient data base retrospectively and analysed.
Results: We found in our study that the ultrasonographic findings had a sensitivity of 100% and a specificity of 44.44% as compared to the clinical diagnosis of appendicitis. The histopathological studies revealed chronic inflammatory cells in 63% of the resected specimens, suggestive of chronic appendicitis and acute inflammatory cells in 37% of the specimens, suggestive of acute appendicitis.
Conclusions: We conclude that the clinical findings, ultrasonological findings and the histopathological findings correlate with one another ($p<0.001$). The diagnostic accuracy of ultrasonogram was reported to range from 71 to 97% when used in the right setting (acute forms) and it is user dependent. When clinical findings compliments radiology, the existence and diagnostic accuracy of such conditions (acute and non-acute) increase drastically and can be confirmed on histopathology.

Keywords: Acute appendicitis, Chronic appendicitis, Radiological findings, Histopathological findings

INTRODUCTION

Acute perforated appendicitis was described in 1554 by Jean Fernel, appendicitis soon became the most common reason for emergency abdominal surgery. The diagnosis could be wrongly made or initially overlooked in cases of acute appendicitis, resulting in unnecessary operation or an unintentional delay.[1,2]

This has led to an overuse of appendectomy without improvement in patient symptoms, leading to a gradual discrediting of chronic and recurrent appendicitis.[3] In addition, non-perforating variants are rarely diagnosed

and more subjects to case reports and journals. Acute appendicitis, perhaps becomes challenging at times to diagnose even though being the most common surgically correctable cause of right iliac fossa pain. Some of the signs and symptoms can be overlooked by both the clinician and the patient, or may not be present in all. Arriving at a correct diagnosis is essential as a delay may result in a progression to perforation and significantly increase morbidity and mortality.[4]

There also has been studies classifying appendicitis as acute and non-acute based on clinical, histopathological findings.[5,6] The presence of Chronic and recurrent appendicitis is denied by many but the condition is not uncommon.

Chronic and recurrent pain in the right iliac fossa is a challenging problem worldwide leading to an inconclusive clinical assessment and numerous diagnostic tests and procedures without identifying the cause of pain.[7]

The diagnosis of acute appendicitis is essentially clinical, however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15-30% cases.[8] It has been suggested, that perforating and non-perforating appendicitis are separate entities and resolving episodes represents attacks of non-perforating appendicitis. A recent study of treatment of appendicitis with antibiotics alone found that 95% resolved but 35% re-presented with appendicitis within a period of 17 months.[9]

Our current study aimed to correlate clinical findings, ultrasonological findings and the histopathological findings among different acute and non-acute (chronic) forms of appendicitis.

METHODS

A retrospective observational study conducted on 200 consecutive cases of suspected appendicitis who underwent appendectomy in department of general surgery Adichunchanagiri Hospital and Research Centre during period between January 2020 and January 2021.

All patients presenting with right iliac fossa pain undergoing appendectomy were included in the study. Pregnant ladies and those over 60 years of age were excluded.

Procedure

All patients with right iliac fossa pain and suspected appendicitis were operated under spinal / general anesthesia as deemed required. All surgeries were performed by a senior / associate surgeon with post-operative antibiotic cover.

The data was accrued from patient data base retrospectively and was entered in Microsoft excel version 16 (for windows).

Statistical analysis

Data was collected and tabulated with Microsoft Excel 2016. Mean and standard deviation (SD) were used for continuous data and for Categorical data, frequency and percentages were calculated. A chi-square test was used for categorical data to find statistical significance. A p-value is considered statistically significant if it is ≤0.05. Further logistic regression was analyzed using odds ratio (OR) with 95% confidence interval (CI). The Statistical Package for the Social Sciences (SPSS) version 11 was used for analysis.

Ethical clearance

Institutional ethical committee clearance was obtained for the study.

RESULTS

More number of cases (both males and females) was found in 21-30 years age group (102 cases) followed by 11-20 years age group (52 cases) and 31-40 years age group (30 cases) with Mean±SD of 25.39±9.0. (Table 1)

Table 1: Depicting the age distribution among the study group.

Age (years)	No of cases	No of Males	No of Females
01-10	6	2	4
11-20	52	30	22
21-30	102	48	54
31-40	30	16	14
41-50	8	2	6
51-60	2	0	2
Mean± SD	25.39±9.0		

Table 2: Sex distribution among the study group.

Sex	No of cases
Male	98
Female	102

In the study group, female patients were more than the male patients. (Table 2)

In the study group, 162 patients had past history suggestive of acute appendicitis while 38 patients had no such history.

Ultrasonographic probe tenderness was present in 144 cases while it was absent in 56 cases. (Table 4)

Table 3: Distribution history suggestive of acute appendicitis (AA) among the study group.

Past history suggestive of AA	No of Cases
Absent	38
Present	162

Table 4: Frequency of ultrasound probe tenderness in right iliac fossa among the study group.

Ultrasonographic probe tenderness	No of cases
Absent (-)	56
Present (+)	144

Table 5: Distribution of HPR among the study group.

Histopathology Report	No of Cases
Acute	74
Chronic	126

Table 6: Relation between tenderness and ultrasound probe tenderness distribution among the study group.

Tenderness	Ultrasound probe tenderness present	Ultrasound Equivocal (probe tenderness absent)	Total
Mild (+)	56	54	110
Moderate (++)	62	2	64
Severe (+++)	26	0	26
Total	144	56	

X^2=27.01; p<0.001; HS, Sensitivity - 100%; Specificity - 44.44%

Table 7: Association of past history suggestive of AA with HPR findings among the study group.

Past history suggestive of AA	Histo-pathology Report		Total
	Acute	Chronic	
Absent	36	2	38
Present	38	124	162
Total	74	126	

X^2=30.5, p<0.001; HS

Histopathology report stated acute disease in 74 cases while in 126 cases it was chronic. (Table 5)

It was found in this study that the ultra-sonographic findings had a sensitivity of 100% and a specificity of 44.44% as compared to the clinical diagnosis of appendicitis.

Table 8: Association between tenderness and histopathological findings among the study group.

Tenderness	Histo-pathology Report		Total
	Acute	Chronic	
Positive (++,+++)	74	16	90
Negative (+)	0	110	110
Total	74	126	200

X^2=71.78; P<0.001 HS, Sensitivity=100; Specificity=87.30

This low specificity was found among chronic cases who exhibited no probe tenderness (equivocal) in 49% of the total 110 cases. This over all low specificity was due to high prevalence of non-acute forms in which ultrasonogram mainly serves to exclude pathology of other pelvic organs and not classically point towards appendicitis as in acute forms. Using the X2 test, the P value was found to be highly significant. (Table 6)

Patients with history suggestive of appendicitis in the past were compared with the histopathology findings which were considered as gold standard for the final diagnosis.

Among 38 patients with no previous history suggestive of appendicitis, 36 patients showed associated acute inflammation of the appendix while 2 patients showed chronic inflammation.

Among 162 patients with previous history suggestive of appendicitis, 38 patients showed associated acute inflammation of the appendix while 124 patients showed chronic inflammation.

Using the X2 test, the P value was found to be highly significant. (Table 7)

The patients with rebound tenderness were compared with histopathology findings which were considered as gold standard for the final diagnosis.

Among the 90 patients with moderate rebound tenderness denoted by "++" or severe tenderness in the right iliac fossa, denoted by "+++", 74 patients showed associated acute inflammation of the appendix while 16 patients showed inflammation of the appendix.

Among the 110 patients with mild rebound tenderness in the right iliac fossa, denoted by "+", no patients showed associated acute inflammation of the appendix while all 110 patients showed associated chronic inflammation of the appendix. In this study it was found that the surgeon's

findings had a sensitivity of 100% and a specificity of 87.30%.

Using the X2 test, the P value was found to be highly significant (Table 8).

DISCUSSION

In this study, a small number 16 of patients reported episodic bouts of right lower abdominal pain in the absence of an acute febrile illness. Between attacks these patients were free of symptoms and the physical examination was normal. They were found to have appendicoliths or evidence of enlarged appendiceal diameter on pathological examination. Most of these had both surgical and pathological evidence of chronic inflammation of appendix and relief of symptoms after appendectomy. These findings support the notion that appendicitis represents a spectrum of inflammatory changes that may in rare cases wax and wane.[10]

When talking about Acute appendicitis it means - Grossly congested and swollen appendix; luminal pus/faecolith; mucosal hyperaemia, ulceration; polymorphinuclear, eosinophilic or histiocytic infiltration of appendiceal wall; fibrinopurulent exudate on serosa; and partial necrosis or appendiceal infarction.[11] Some authors have proposed a criteria for chronic appendicitis - persistence of symptoms for more than two weeks; no alternative diagnosis, confirmation of chronic appendices inflammation on pathological exam; relief of symptoms following appendicectomy.[3,6] The signs and symptoms of chronic are same as that of acute appendicitis with a more prolonged duration and reduced intensity.[3] Histological findings suggestive of chronic inflammation includes - immune competent T lymphocyte; scarring / fibrosis, activated; degranulating eosinophils; increased neural cells; increased size of follicles.[3,5-7,11-15]

The premise that it is better to remove a normal appendix than to delay diagnosis doesn't stand up to close scrutiny, particularly in the elderly.[8]

Ultrasonogram using graded compression method described by Puylaert markedly enhances diagnostic accuracy.[2] In prospective studies ultrasonogram had excellent performance with a mean sensitivity of 86% and a median specificity of 96% in diagnosing appendicitis.[16] In one study conducted by Rao et al, the diagnostic accuracy of ultra-sonogram was reported to range from 71 to 97%.[17] A meta-analysis of 14 prospective studies showed ultrasonogram to have a sensitivity of 0.86 and a specificity of 0.81,18 as compared our retrospective study ultrasonographic findings had a sensitivity of 100% and a specificity of 44.44% as compared to the clinical diagnosis of appendicitis. This low specificity among chronic cases who exhibited no probe tenderness (equivocal) was 49% of the total 110 cases. However ultrasonogram has the limitation of variable reliability and is well known operator dependency. It appears that ultrasonogram may be most useful in excluding potential pelvic abnormality in equivocal cases.[16]

Ultrasonographic findings- appendiceal diameter if >6mm; non compressible appendix; presence of peri-appendiceal fat infiltration / peri-appendiceal fluid; para-appendeceal node of >3 nodes and >5 mm in their short axis / right lower quadrant adenopathy; abscess.[6,7,11]

To sustain a diagnosis of chronic appendicitis the resected appendicular specimen must demonstrate-fibrosis in the appendiceal wall; partial to complete obstruction of the lumen; evidence of old mucosal ulcer and scarring; infiltration of the appendicular wall with chronic inflammatory cells.[19]

Correlation of ultrasound findings with histopathological findings suggested among 90 patients with moderate to severe rebound tenderness in the right iliac fossa, 74 patients showed associated acute inflammation of the appendix while 16 patients showed inflammation of the appendix. Among the 110 patients with mild rebound tenderness in the right iliac fossa, all 110 patients showed associated chronic inflammation of the appendix. Similar study conducted by Prabhu et al depicted 69 patients with probe tenderness and 25 patients with negative probe tenderness out of 173 patients with Alvarado score >7 showed positive histopathological findings (acute appendicitis). While 32 patients with USG probe tenderness and 9 with negative probe tenderness out of 64 patients with Alvarado score <7 showed positive histopathological findings.[20]

Elective appendectomy to be advised in patients if they show presence of fecolith on abdominal radiograph; non-filling of appendix on Barium enema or partial filling with indentation of the caecal apex, both of which has been seen in acute, chronic, recurrent appendicitis.[11] Filling of the lumen is also the most significant barium enema criteria for excluding appendicitis according to a study. Repeated examinations during an attack provides evidence of recurrent appendicitis.[21]

Limitation of the study is that since it is a retrospective study, it has inferior level of evidence compared with prospective study, prone to selection bias and recall bias and is subject to confounding with temporal relationships being often difficult to assess.

CONCLUSION

It has been suggested by others, as in our study that perforating and non-perforating types of appendicitis are separate entities and that resolving episodes represent attacks of non-perforating appendicitis. Recognition of non-acute / non-perforating variants is important because a surgical intervention while being curative, failing to do so this may result in prolongation of symptoms, perforation and unnecessary interventions for alternative

diagnosis. Diagnosis of non-acute variants is difficult if the clinician is unaware of this entity. The use of sonography which though being a user dependent investigation, is still the most widely accessible and available radiological investigation to explore the abdominal and pelvic cavity to rule out differentials and has shown to be an important tool in diagnosis as well as predictor of outcome. There is clinical, pathological, radiological proof of the existence of conditions discussed. Due to the study being a retrospective study on a small group of individuals, we suspect that the true incidence of non-acute forms of appendicitis would be significantly greater as depicted by other studies.

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