CORRELATION OF CLINIC-HISTOPATHOLOGICAL FINDINGS IN DIFFERENT FORMS OF APPENDICITIS

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ABSTRACT

BACKGROUND
The existence of recurrent and chronic appendicitis is still doubted by many. This study is intended to study correlation of clinical findings, operative findings and the histopathological findings among the different (acute and chronic (recurrent)) forms of appendicitis, to study the recurrence of appendicitis in patients with acute appendicitis who were treated non-surgically at first presentation, to compare the operative and histopathological findings in acute and chronic (recurrent) forms of appendicitis.

MATERIALS AND METHODS
A total of 100 consecutive cases of suspected appendicitis who were admitted, investigated and treated were taken up for the study. Data related to the objectives of the study were collected. After detailed examination and investigations the clinical, sonological, operative and histopathological findings were correlated.

RESULTS
1. Age group of patients ranged from 5 yrs. to 60 yrs. with a mean age of 25.35 yrs. with an S.D. of 9.3 yrs.
2. The sex distribution was almost equal with 49% males and 51% females.
3. Maximum occurrence of appendicitis was in the age group of 21 - 30 yrs.
4. There was history suggestive of acute appendicitis in the past, which was managed non-surgically was present in 81% of the patients.
5. Right iliac fossa tenderness was the predominant sign present in 100% of patients. It was mildly tender in 55% of patients suggestive of a chronic (recurrent) form and moderate-to-severely tender in 45% of patients suggestive of an acute form of appendicitis.
6. Per-operatively, the appendix appeared non-inflamed in 57% of patients suggestive of a chronic (recurrent) form and inflamed in 43% of patients suggestive of an acute form of appendicitis.
7. 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.

CONCLUSION
We conclude that the Clinical findings, Operative findings and the Histopathological findings correlate with one another (P < 0.001). The surgeon’s clinical and operative findings have specificity of around 87.30% and 90.47% respectively. Hence, the diagnostic accuracy of the surgeon is directly dependent on the surgeon’s expertise and there is no substitution for an experienced surgeon’s judgement.

KEYWORDS
Acute Appendicitis, Chronic Appendicitis, Recurrent Appendicitis, Recurrence, Operative Findings, Histopathological Findings.

Objectives
1. To correlate the clinical presentation of chronic (recurrent) appendicitis with the sonological findings, operative findings and confirmed with histopathological studies.
2. To study the recurrence of appendicitis in patients with acute appendicitis who were treated non-surgically at first presentation.
3. To correlate the clinical presentation of acute appendicitis with the sonological findings, operative findings and confirmed with histopathological studies.
4. To compare the operative and histopathological findings in acute and chronic (recurrent) appendicitis.

Inclusion Criteria
1. Patients with classic history of migratory pain (which is initially in the periumbilical/epigastric region, which later localises to the right lower quadrant) with other constitutional symptoms of nausea/vomiting, anorexia, who are provisionally diagnosed as appendicitis (acute forms).
2. Patients presenting with recurrent attacks (chronic forms) of right lower abdominal pain in whom other pathologies are excluded.
3. Patients provisionally diagnosed as appendicitis and who are fit for surgery.
4. Patients who are willing for surgery.

Exclusion Criteria
1. Right lower abdominal pain due to involvement of other viscera like urinary tract infection, ureteric stone, acute gastroenteritis, Meckel's diverticulitis, disease of the urogenital systems, intussusception, Crohn's enteritis, caecal typhilitis, gynaecological disorders – pelvic inflammatory disease, ruptured ectopic, torsion of ovarian cysts.
2. Patients not fit for surgery due to various causes like appendicular mass, appendicular abscess and patients with generalised peritonitis due to appendicular perforation.
3. Patients not willing for surgery.

RESULTS
Collection of Data
A total of 100 consecutive cases of suspected appendicitis who were admitted, investigated and treated were taken for the study. After detailed examination and investigations the clinical, sonological, operative and histopathological findings were correlated.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No. of Cases</th>
<th>No. of Males</th>
<th>No. of Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>001 - 10</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>011 - 20</td>
<td>26</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>21 - 30</td>
<td>51</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>31 - 40</td>
<td>15</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>41 - 50</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>51 - 60</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean +/- SD 25.35 +/- 9.3

Interpretation
In our study, the patient’s age group ranged from 5 to 60 yrs. The mean age was 25.35 yrs. with an S.D. of 9.3. The youngest was a 5-year-old male, while the oldest patient was a 60-year-old female. The highest occurrence (51%) was seen in age group of 21 - 30 years.

<table>
<thead>
<tr>
<th>Sex</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>49</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 2. Depicting the Sex Distribution among the Study Group

Interpretation
Among males the highest occurrence (24%) was seen in age group of 21 - 30 years. Among females the age group affected most (26%) was 21 - 30 years.

<table>
<thead>
<tr>
<th>Pain</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>37</td>
</tr>
<tr>
<td>+</td>
<td>42</td>
</tr>
<tr>
<td>++</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 3. Depicting the Distribution of Pain in Right Iliac Fossa according to the Severity among the Study Group

Interpretation
The predominant symptom seen in the present study was pain in the right iliac fossa. Pain was present in 100% of cases, but its degree varied from mild-to-severe.

<table>
<thead>
<tr>
<th>Vomiting</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>43</td>
</tr>
<tr>
<td>+</td>
<td>47</td>
</tr>
<tr>
<td>++</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 4. Depicting the Frequency of Vomiting among the Study Group

Interpretation
The 3rd predominant symptom seen in the present study was fever. It was present in 57% of cases and absent in 43% of cases.

<table>
<thead>
<tr>
<th>Past History Suggestive of AA</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>19</td>
</tr>
<tr>
<td>Present</td>
<td>81</td>
</tr>
</tbody>
</table>

Table 6. Depicting the Distribution History Suggestive of Acute Appendicitis (AA) among the Study Group

Interpretation
In our study, there were 81% of patients with history suggestive of AA and 19% of patients presented with complaints of pain abdomen for the first time.

<table>
<thead>
<tr>
<th>Tenderness</th>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>55</td>
</tr>
<tr>
<td>++</td>
<td>32</td>
</tr>
<tr>
<td>+++</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 7. Depicting the Distribution of Tenderness in Right Iliac Fossa among the Study Group
Conclusion

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

Specificity: 90.47%; Sensitivity: 100%. $X^2 = 71.78; P < 0.001$

**DISCUSSION**

Appendicitis is the most common reason for abdominal surgery. The diagnosis may be wrongly made or initially overlooked in case of acute appendicitis. The first error leads to an unnecessary operation and the second to delay.

The existence of recurrent and chronic appendicitis is still doubted by many. A recent study of treatment of appendicitis presenting with antibiotics alone found that 95% resolve, but 35% represented with appendicitis within 17.2 months.

It is a clinical scenario in which a patient with pathologically confirmed acute appendicitis relates to one or more prior episodes of identical symptoms that resolved without surgical intervention.

In our study, the patient’s age group ranged from 5 to 60 yrs. The mean age was 25.35 yrs. with an S. D. of 9.3. The youngest was a 5-year-old male patient, while the oldest patient was a 60-year-old female. The highest occurrence (51%) was seen in age group of 21 - 30 years. The next age group affected (26%) was 11 - 20 years. Overall, (77%) of the cases were seen in the age group 11 - 30 years.
In our study the sex distribution was with 49% males and 51% females, while in the study conducted by Addiss DG, Shaffer N, Fowler BS et al, there was a slight male-to-female predominance (M:F 1.2 to 1.3:1). 6, 7

The predominant symptom was pain in the right iliac fossa. Though pain was present in 100% of the cases, their degree varied from mild, moderate and severe.

The 2nd predominant symptom was vomiting, which was present in 63% of the cases.

Fever was 3rd predominant symptom present in 57%. The history suggestive of previous acute appendicitis was present in 81% cases, who had not undergone surgical treatment at that initial setting for various reasons. The shortest history was 6 weeks and the longest history was 6 yrs. In previous studies the recurrence was estimated at 35%, but the duration was within 17.2 months. 8 In the present study, the duration being longer up to 6 yrs. The recurrence is being reported at 81%. The past history suggestive of acute appendicitis was correlated with HPR using chi square test ($X^2 = 30.5; P < 0.001$) and was found to be statistically significant.

The rebound tenderness was present in 100% of the cases, but the degree varied from mild, moderate and severe tenderness in the right iliac fossa. Tenderness was mild in 57% of the cases and they were categorised as chronic (recurrent) form of appendicitis and the moderate-to-severe tenderness present in 43% were categorised as acute form of appendicitis.

The cases were then sonologically examined and 72% of them had probe tenderness to graded compression suggestive of appendicitis. In the remaining 28%, sonography was equivocal.

It was found in our study that the ultrasonographic findings had a sensitivity of 100% and a specificity of 44.4% as compared to the clinical diagnosis of appendicitis. This low specificity is attributed to the low specificity among chronic cases who exhibited no probe tenderness (equivocal) in 49% of the total 55 cases. Ultrasonography has the limitation of variable reliability and well known operator dependency. It appears that ultrasonogram may be most useful in excluding potential pelvic abnormality in equivocal cases. 8 Furthermore, in other studies only acute cases were taken in for the study purpose, while in our study majority of the cases belonged to the chronic (recurrent) appendicitis. In one study conducted by Rao PM and Colleagues, the diagnostic accuracy of ultrasonogram was reported to range from 71 to 97%. 9

However, ultrasonogram has the limitation of variable reliability and has a well-known operator dependency and it is frequently unable to visualise the normal appendix. 10

The correlation of ultrasonographic findings with the clinical findings using the chi $^2$ test ($X^2 = 27.01; P < 0.001$) was found to be statistically significant.

The gross per-operative findings were 43% inflamed appendix suggesting an acute form, while 57% of the Appendices were found to be not inflamed suggesting a chronic form of appendicitis.

The histopathological reports of these operated specimens showed acute inflammation in 37% of the cases and chronic inflammatory cell infiltrate in 63% of the cases.

The patients with rebound tenderness were correlated with the gross findings per-operatively.

Among 55 patients with mild rebound tenderness denoted by "*" in the right iliac fossa 5 patients showed associated inflammation of the appendix, while 50 patients showed no inflammation.

Among 32 patients with moderate rebound tenderness denoted by "++" in the right iliac fossa, 25 patients showed associated inflammation of the appendix, while 7 patients showed no inflammation.

The rebound tenderness was very severe in 13 patients and all showed inflammation of the appendix.

Using the $X^2$ test, the value $P < 0.001$ was found to be statistically significant.

The clinical finding of rebound tenderness were compared with the histopathology findings, which were considered as gold standard for the final diagnosis.

Among 45 patients with moderate rebound tenderness denoted by "++" or severe rebound tenderness denoted by "+++" in the right iliac fossa, 37 patients showed associated acute inflammation of the appendix, while 8 patients showed chronic inflammation of the appendix.

Among 55 patients with mild rebound tenderness denoted by "*" in the right iliac fossa, no patients showed associated acute inflammation of the appendix, while all 55 patients showed associated chronic inflammation of the appendix. It was found that the surgeon’s findings had a sensitivity of 100% and a specificity of 87.30%. Using the $X^2$ test, the P value was found to be highly significant.

The per-operative gross appearance of the appendix was compared with the histopathology findings, which was considered as gold standard for the final diagnosis.

Among 43 patients with grossly inflamed appendix 36 patients showed associated acute inflammation of the appendix, while 6 patients showed chronic inflammation.

Among 57 patients with grossly non-inflamed appendix 0 patients showed associated acute inflammation of the appendix, while 57 patients showed chronic inflammation. It was found that the surgeon’s findings had a sensitivity of 100% and a specificity of 90.47%. Using the $X^2$ test, the value $P < 0.001$ was found to be statistically significant.

CONCLUSION

Our study included 100 patients who were diagnosed to have appendicitis, who underwent surgical intervention. From the present study, we conclude that the Clinical findings, Operative findings and the Histopathological findings correlate with one another. The surgeon’s clinical and operative findings have specificity of around 87.30% and 90.47% respectively. The surgeon was better in diagnosing the chronic forms both clinically and per-operatively 100%, while the acute forms were clinically diagnosed at 86% and per-operatively at 82%. Hence, the diagnostic accuracy of the surgeon is directly dependent on the surgeon’s expertise and there is no substitution for an experienced surgeon’s judgement. Ultrasonography of abdomen is a useful tool in avoiding negative appendicectomy rates, particularly in females and should be used in equivocal clinical findings as ultrasonography has the limitation of variable reliability and has a well-known operator dependency.

REFERENCES