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To Study the Diagnostic Value of Individual Ultrasonographic Findings in Acute Appendicitis

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ABSTRACT

Aim and Objectives: To study the diagnostic value of individual ultrasonographic signs in acute appendicitis
Background and Purpose: This study aims to assess the diagnostic value of individual sonographic signs in acute appendicitis, primarily looking at the indirect signs. The secondary objectives are to look at the diagnostic value of direct signs, to provide an ultrasound probability criteria for appendicitis and also to retrospectively look at clinical scoring, Mantrel's score in those cases where it is available.
Materials and Methods: 1) Analytical study. 2) The study will be conducted for 12 months at the Department of Radio-diagnosis, ASRAM Hospital, Eluru. 3) Phillips affinity 70G Ultrasound machine
Results: Out of 62 cases referred to radiology for emergency Ultrasound Abdomen prior to emergency appendectomy At least one indirect sign was positive in 98.4% (61) of the cases. At least 2 indirect signs were positive in 95.2% of the cases. At least 3 indirect signs were positive in 77.4 % of the cases. Only 1 case had no indirect sign positive. All 8 signs were positive in no cases. At least 1 direct sign was positive in 91.9 % of the cases and at least 2 direct signs were positive in 90.3 % of the cases. At least 3 direct signs were positive in 66.1% of the cases.
Conclusion: This study showed more than 90% of the cases referred to radiology for emergency Ultrasound Abdomen prior to emergency appendectomy had at least 1 Indirect and 1 Direct signs positive on Ultasound abdomen.

Key Words: *Appendicitis, Ultrasound, Surgery, Direct signs, indirect signs*

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INTRODUCTION

Acute appendicitis is one of the commonest causes for acute abdomen. Overall incidence reported is 107.76 per 100,000 per year in a study in Taiwan and 23.3 per 10,000 population per year in US (age group 10-19 years).

- Since the 1980s, ultrasound is being used in the diagnosis of appendicitis. It is a diagnostic modality which is readily available, inexpensive and has no risk of radiation. It also does not require any patient preparation prior to the study.
- This study aims to assess the diagnostic value of individual sonographic signs in acute appendicitis, primarily looking at the indirect signs. The secondary objectives are to look at the diagnostic value of direct signs. Subjects include patients with suspected acute appendicitis who present to Emergency department, general surgery OPD or pediatric, surgery OPD and who undergo emergency surgery for acute appendicitis.

MATERIALS & METHODS

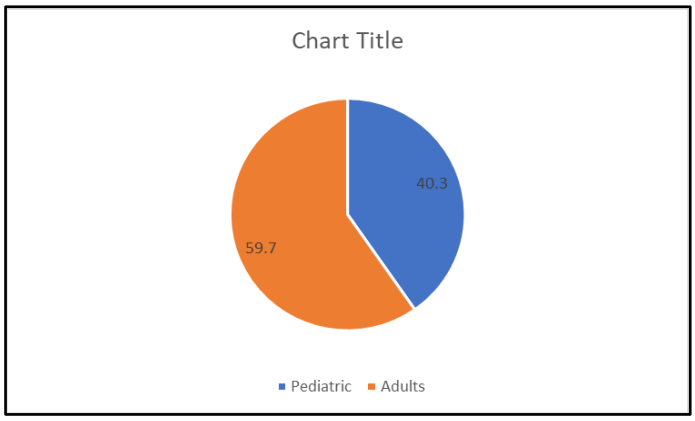
This analytical was carried out in the department of Radiology and, ASRAM Medical College and Hospital, Eluru, during the period of May 2022 to March 2023.

- USG of Abdomen was performed using Philips Affinity 70g on 65 patients referred for evaluation of abdomen to the emergency department / general surgery OPD / paediatric surgery OPD with suspected acute appendicitis

RESULTS AND DISCUSSION

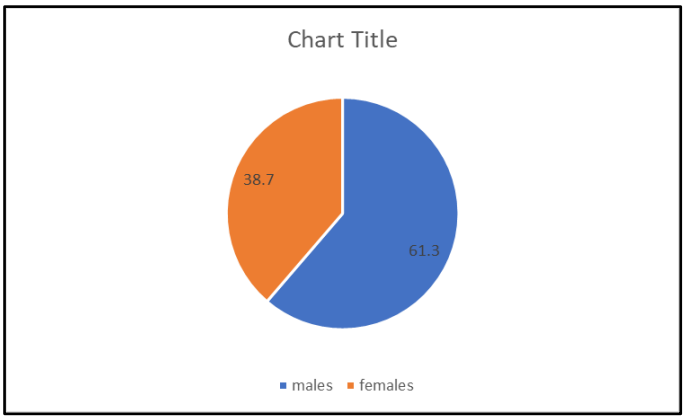
1a Age Distribution

40.3 % (25) was in the paediatric age group (<18 years) and 59.7 % (37) was in the adult age group (> or = 18 years)Mean age was 23 years and median age was 21 years.



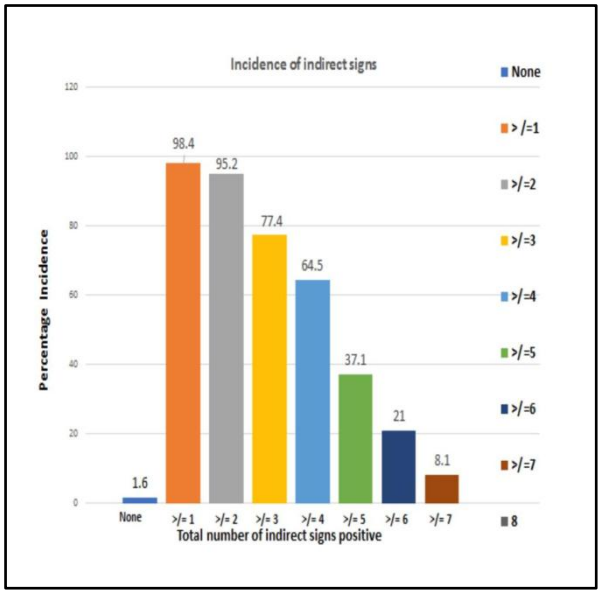
61.1b Gender

3 % (38) of the study population were male and 38.7 % (24) were female.



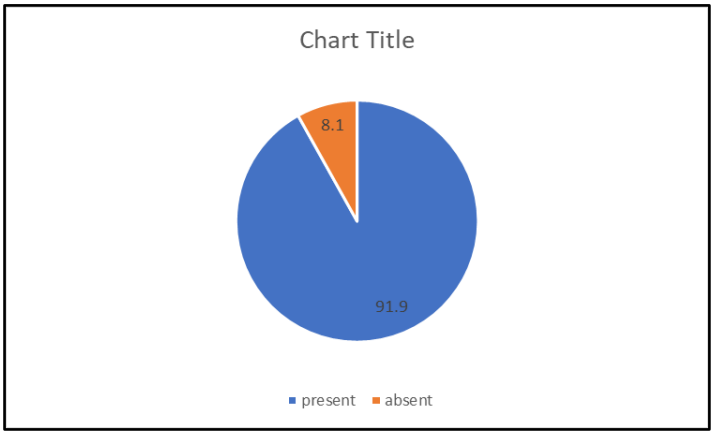
2. Incidence of indirect ultrasonographic signs in the study population

At least one indirect sign was positive in 98.4% (61) of the cases. At least 2 indirect signs were positive in 95.2% of the cases. At least 3 indirect signs were positive in 77.4 % of the cases. Only 1 case had no indirect sign positive. All 8 signs were positive in no cases

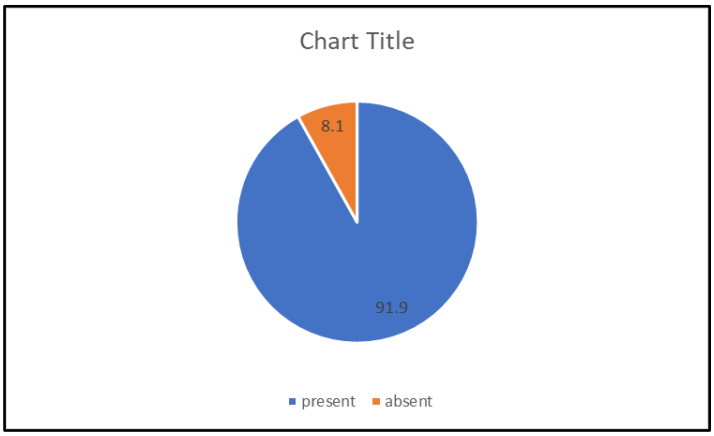


4.a Incidence of enlarged appendix

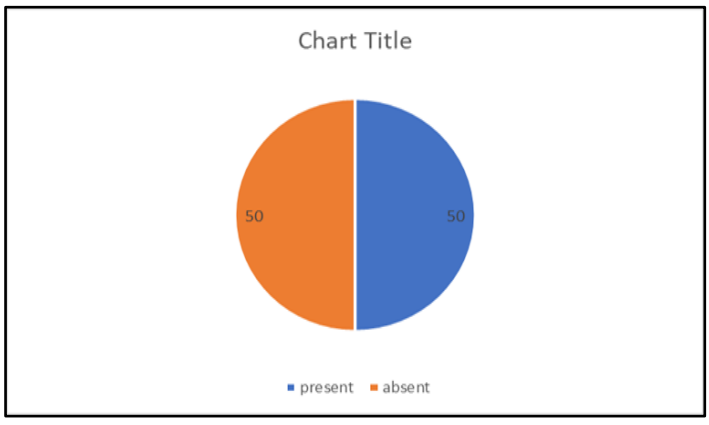
Enlarged appendix (diameter >/=6 mm) was seen in 91.9 % (57) of cases



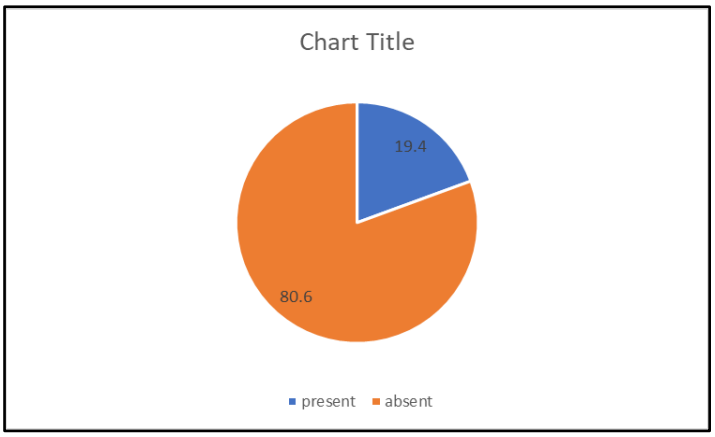
4.b Incidence of non-compressibility of appendix
Non-compressible appendix was seen in 91.9 % (57) of the cases.



4c Incidence of hyperaemia of wall of appendix
Hyperaemia of appendicular wall was seen in 50% (31) of the cases.



4d Incidence of loss of wall stratification of appendix
Loss of wall stratification was seen in 19.4 % (12) of the cases



Incidence of indirect signs

In our study, there were 62 cases of pathologically proven acute appendicitis. At least one indirect sign was present in 98.4% (61) of the cases, at least 2 were present in 95.2% of cases and at least 3 were present in 77.4 % of cases. The indirect signs with the maximum incidence was probe tenderness in RIF (95.2 %) and increased echogenicity and thickness of mesenteric fat in RIF (91.9%).The other indirect signs in decreasing order of incidence were free fluid in RIF (51.6%), increased vascularity in RIF (50%), hypoperistalsis of regional bowel (48.4%), mesenteric lymphadenopathy in RIF (35.5 %), thickened caecal wall (19.4 %) and focal fluid collection (8.1 %).

A prospective study done by Kessler et al, published in 2004 found that the secondary sign with maximum diagnostic accuracy is inflammatory fat change (NPV of 91 % and PPV of 76 %) (9). They had 57 cases of pathologically proven acute appendicitis. The incidence of inflammatory fat change was 91.2 %, caecal wall thickening was 24.5%, lymphadenopathy was 31.5% and free fluid was 50.8%. These percentages are similar to what was found our study.

Furthermore, retrospective study done by N. Kouamé et al found that the most specific indirect sign is hypertrophy of mesenteric fat in RIF (96.7 %) and the sign with the maximum negative predictive value is probe tenderness (83.3 %). Both these signs were the ones with maximum incidence in our study.

Incidence of direct signs

At least 1 direct sign was positive in 91.9 % of the cases, at least 2 were positive in 90.3 % of the cases, at least 3 were positive in 66.1% of the cases. The direct signs with maximum incidence was enlarged appendix (91.9%) and lack of compressibility of appendix (91.9%). All cases where appendix was enlarged, it was also non-compressible. The other direct signs in decreasing order of incidence were hyperaemia of appendicular wall (50%), presence of appendicolith (21%) and loss of appendicular wall stratification (19.4%).

Kessler et al reported appendicular diameter of more than or equal to 6 mm to be the direct sign with maximum accuracy (Sn, Sp, NPV & PPV of 98%)(9).The incidence of appendicular diameter > / = 6mm was 94.7% which is comparable to 91.9% in our study. The incidence of non-compressibility of appendix was 92.9%, which is similar to 91.9% seen in our study. Hyperaemia of appendicular wall was seen in 49.1% of cases which is also similar to 50% seen in our study.

A review article by Reddan et.al said hyperaemia to the wall has a specificity of 96 %, but a sensitivity of only 52%. Also the incidence of appendicolith to be 50% in children.

CONCLUSION

1) There was a high incidence of indirect ultrasonographic signs; probe tenderness had the highest incidence of 95.2%, followed by increased echogenicity of mesenteric fat in the RIF seen in 91.9%. Other useful indirect signs in decreasing order of incidence are free fluid in RIF (51.6%), increased vascularity in RIF (50%), hypoperistalsis of regional bowel (48.4%), mesenteric lymphadenopathy in RIF (35.5 %), thickened caecal wall (19.4 %) and focal fluid collection (8.1 %).
2) At least one indirect sign was present in in 98.4% of the cases, at least 2 were present in 95.2% of cases and at least 3 were present in 77.4 % of cases.
3) In the absence of direct signs, the indirect signs with maximum incidence were probe tenderness in RIF (80%) and increased echogenicity& thickness of mesenteric fat in RIF (80%). The other indirect signs in decreasing order of incidence were free fluid in RIF, increased vascularity in RIF, hypoperistalsis of regional bowel and mesenteric lymphadenopathy in RIF.

4) The direct signs with maximum incidence were enlarged appendix (91.9%) and lack of compressibility of appendix (91.9%). The other direct signs in decreasing order of incidence were hyperaemia of appendicular wall, presence of appendicolith and loss of appendicular wall stratification. At least 1 direct sign was positive in 91.9% of the cases, at least 2 were positive in 90.3% of the cases, at least 3 were positive in 66.1% of the cases. Hence direct signs are very useful in diagnosing acute appendicitis

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