

COMPARATIVE STUDY OF INTRA OPERATIVE AND ULTRASOUND FINDINGS OF THE POSITION OF APPENDIX IN ACUTE APPENDICITIS

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Abstract- Acute appendicitis (AA) is among the most common causes of lower abdominal pain. There are lots of controversies regarding the various positions of appendix and also clinical presentation of appendicitis, in relation to different positions. In order to improve the diagnostic accuracy different aids were introduced like computer aided programs, different scoring systems, GIT contrast studies, CT scan, Ultrasonography, MRI and laparoscopy. Here we present a comparative study of intra operative and ultrasound findings of the position of appendix in acute appendicitis in our medical college at the outskirts of Udaipur city in the state of Rajasthan, India during the two-year study period from January 2021 to January 2023, a total of 95 cases were included with history of pain in lower abdomen with radiological findings of appendicitis. From this study, it is concluded that Retrocaecal position of appendix was found in majority of cases on USG, clinical examination and intraoperatively. There was no significant difference between USG findings and intraoperative findings of positions of the appendix.

Keywords: Appendix, Acute appendicitis, Ultrasound

I. INTRODUCTION

Acute appendicitis (AA) is among the most common causes of lower abdominal pain leading patients to attend the emergency department. The global risk of suffering appendicitis is 8.6% for men and 6.7% for women in all age groups. This pathology occurs more frequently during the second and third decade of life, with a peak age of 22 years.^{[1][2]} The variation of incidence is due to variations in ethnicity, sex, age, obesity and season of the year. The most common position of the appendix is variously described by many authors Wakeley et al as retrocaecal (65.3%),^[3] Collins et al as pelvic (78.5%)^[4] and Pickens G et al as postileal.^[5] Varshney et al have concluded that the retrocaecal position of the appendix is less prone to infection,^[6] whereas Collins et al have described higher incidence of perforation and serious complications in retrocaecal position of acute appendicitis.^{[7][8]} Hence there is a need for the study of the various positions of appendix in patients with appendicitis. In order to improve the diagnostic accuracy different aids were introduced like computer aided programs, different scoring systems, GIT contrast studies, CT scan, Ultrasonography (USG), MRI and laparoscopy. Among these modalities, Ultrasonography is simple, easily available, noninvasive, convenient and cost effective.^[9] In graded compression technique, where a uniform pressure is applied in RIF (Right iliac fossa) by a hand held USG transducer. Inflamed appendix being incompressible is thus optimally seen as a blind ended tubular structure with laminated wall arising from the base of caecum. It is aperistaltic, noncompressible and its diameter should be more than 6mm. Appendicoliths appear as bright echogenic foci with distal acoustic shadowing, and their visualization is another contributory finding. Similarly there may be increased echogenicity of the periappendiceal fat. Ultrasonic probe tenderness can be elicited and patient himself can localize the most tender point and hence the site of inflamed appendix.^[10]

II. METHOD

A total of 95 patients were included over 18 years of age with history of pain in lower abdomen with radiological findings of appendicitis ending up in surgery admitted to Pacific Institute of Medical Sciences (PIMS), Udaipur between January 2021 to January 2023, a period of 2 years. Patients excluded are pediatric population, pregnant females, inflammatory bowel disease, Appendicular mucocele, Appendicular abscess, Appendicular mass, Appendicular perforation, Carcinoid appendix and patient not giving consent. A detailed history and clinical examination were documented for each patient. Basic laboratory investigations were performed. Ultrasound whole abdomen was done in each patient and findings of probe tenderness, position of appendix, length of appendix, maximum diameter of appendix and additional findings like free fluid around appendix were documented. If necessary CT scan abdomen were performed. Intra-operative findings like position of appendix, base of appendix, length of appendix, changes in appendix and any inflammatory signs around appendix were documented. The data will be entered in MS Excel software version 17 and analyzed using Statistical Packages for Social Sciences (SPSS). Descriptive data are given as the mean standard deviation (SD) or as the median and range. The quantitative data will be analyzed using Independent Student's T test, Pearson's correlation test, ANOVA test. The associations of clinical and laboratory features with the outcome were analyzed by univariate and multivariate logistic regression and 95% confidence intervals (95% CI) were calculated. A two sided p-value of 0.05 or less was considered statistically significant for all tests.

III. DISCUSSION

Although appendicitis is common at all ages, it is one of the most common causes of acute abdominal pain in children and adolescents. Various factors such as age, sex, race, geographical location, diet, and appendix position can affect appendicitis-related mortality. The most important symptoms of appendicitis are abdominal pain, nausea, vomiting, and fever. Pain is the most common symptom and occurs in 50 to 100% of cases. Nausea and vomiting are usually followed by pain.^[11] The pain is usually somatic and is felt around the umbilical region. In abdominal examination, in addition to tenderness and guarding, rebound tenderness is of great importance in diagnosis.^[12] The problem is further compounded by the variations in the position of the appendix and the associated varied clinical picture of the appendicitis. The most widely studied new diagnostic modalities are CT scan, Ultrasonography and Laparoscopy.^[13] We have selected the Ultrasound because of its wide availability, simplicity, low cost, and non-invasiveness. When Puyllart first introduced his graded compression method, he reported sensitivity of 89% and specificity of 100%.^[14] In our study we found that majority 37.8% patients were of age group 31-40 years followed by 35.7% patients of 21-30 years of age. The mean age for our study was 35.5 years. We found that 63.1% male and 36.8% female patients were present in our study. A study by Patel K G et al^[15] found that out of 100 patients in the study; 57 were Male and 43 were female. Appendicitis was more common during the 3rd decade (36%), followed by the 4th decade (23%). In our study we found that 100% patients had lower abdominal pain followed by 62.1% patients with loss of appetite while vomiting was seen in 49.47% patients. Patel K G et al^[15] found that all the patients with acute appendicitis had pain and most of the patients had pain in the right iliac fossa. Anorexia was seen in 66% of the cases, while nausea is less constant is seen in 46% of the cases. Lewis et al^[16] in his analysis, found anorexia, nausea or vomiting to be present in 66% of the cases. Fever is commonly encountered among patients in our study, being present in 52% of our patients; the fever was usually mild degree except in cases of abscess and generalized peritonitis. Anupama et al^[17] found that all patients presented with abdominal pain in combination with other symptoms. In our study we found that majority 70.89%, 3.8%, 15.1%, 6.3% patients with USG finding were of Retrocaecal, paracaecal, pelvic, post-ileal position while 60%, 7.37%, 20% and 6.32% patients with intra-operative finding. There was no significant difference found between these group finding as p value was >0.05. There was no significant difference found between these group finding as p value was >0.05. Patel K G et al^[15] found that a total of 62 cases presented with clinical features suggestive of retrocaecal appendicitis, out of which 51 had typical presentation & 11 had atypical presentation with overall sensitivity of 72.9%, followed by pelvic position which had a sensitivity of 15.29% in which 8 patients had typical presentation & 5 had atypical presentation. The clinical presentation of retrocaecal type has sensitivity of 87.09% as compared with the pelvic type which has sensitivity of 76.47% [P value >0.05]. Varshney et al^[6] have described that advanced appendicitis (perforation or gangrene) is more common in those with retrocaecal appendicitis. They have given the explanation that some early cases may have been misdiagnosed, as urinary tract infection, leading to delay in the diagnosis, and increased incidence of complications. Iqbal Z et al^[18] found that comparison between clinical and intraoperative retrocecal position of the appendix chi square test was applied on the data and $X = 0.502$, $DF = 1$, $P \text{ value} = 0.478$ which is showing that there is no significant difference between clinical and intraoperative diagnosis of retrocecal position of the appendix. For similar comparison between subcaecal position of the appendix, again chi square test was applied on the data and $X = 0.442$, $DF = 1$, $P \text{ value} = 0.506$ which shows it to be insignificant. Likewise for pelvic position, chi square test was applied on the data and $X = 0.110$, $DF = 1$, $P \text{ value} = 0.741$. Similarly for paracaecal position of the appendix, chi square test was applied on the data and $X = 0.082$, $DF = 1$, $P \text{ value} = 0.774$ that again shows the difference to be insignificant. And finally for Subhepatic, chi square test was applied on the data and $X = 0.116$, $DF = 1$, $P \text{ value} = 0.733$ which is showing that there is no significant difference between clinical and intraoperative diagnosis of subhepatic position of the appendix. In a local study appendix position was retrocecal in 65% and pelvic in 16% cases and 2.5% patients had sub hepatic appendix.^[19] While in a study by Zarandi NP et al^[20] on preoperative clinical examination, retrocecal position of the appendix made in 51% cases, pelvic position in 25% cases, subcaecal position in 13% cases, paracaecal position in 07% cases and subhepatic position of appendix in 04% cases. The fact that retrocecal position is the most common was further confirmed in our study where intraoperative findings revealed that retrocecal position of the appendix was in 56% cases, pelvic position was in 23% cases, subcaecal position was in 10% cases, paracaecal position was in 07% cases and subhepatic position was made in 04% cases.

IV. RESULT

We studied 95 patients with appendicitis confirmed on Ultrasound whole abdomen. Patients presented with symptoms like lower abdominal pain, loss of appetite, nausea, vomiting and fever.

Presenting Complaints	No. of Patients	Percentage
Lower Abdominal Pain	95	100.00
Loss of Appetite	59	62.11
Vomiting	47	49.47
Nausea	41	43.16
Fever	15	15.79

Table 1- Distribution of cases according to Presenting Complaints

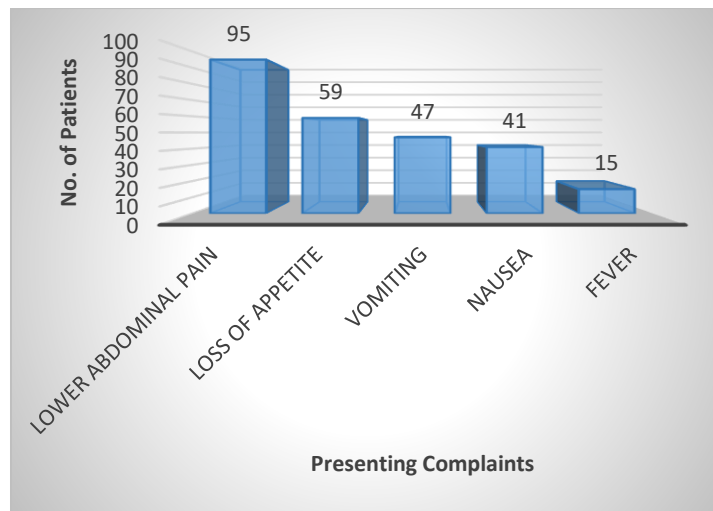


Figure 1- Graph showing distribution of cases according to Presenting Complaints

We found that majority 70.89%, 3.8%, 15.1%, 6.3% patients with USG finding were of Retrocaecal, paracaecal, pelvic, post-ileal position while 60%, 7.37%, 20% and 6.32% patients with intra-operative founding.

Position of Appendix	USG Finding		Intra-operative	
	No. of Patients	Percentage	No. of Patients	Percentage
Retrocaecal	56	70.89	57	60
Paracaecal	3	3.8	7	7.37
Post-ileal	5	6.33	6	6.32
Pre-ileal	2	2.53	3	3.16
Pelvic	12	15.19	19	20
Sub-hepatic	0	0	2	2.11
Subcaecal	1	1.27	1	1.05
Total	79	100	95	100

Table 2: Comparison of Position of Appendix between USG finding and intra-operative finding

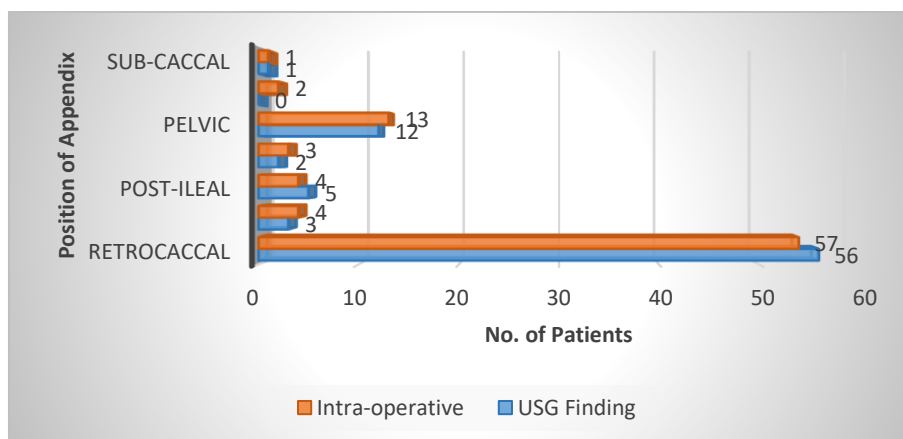


Figure 2- Graph showing Comparison of Position of Appendix between USG finding and intra-operative finding

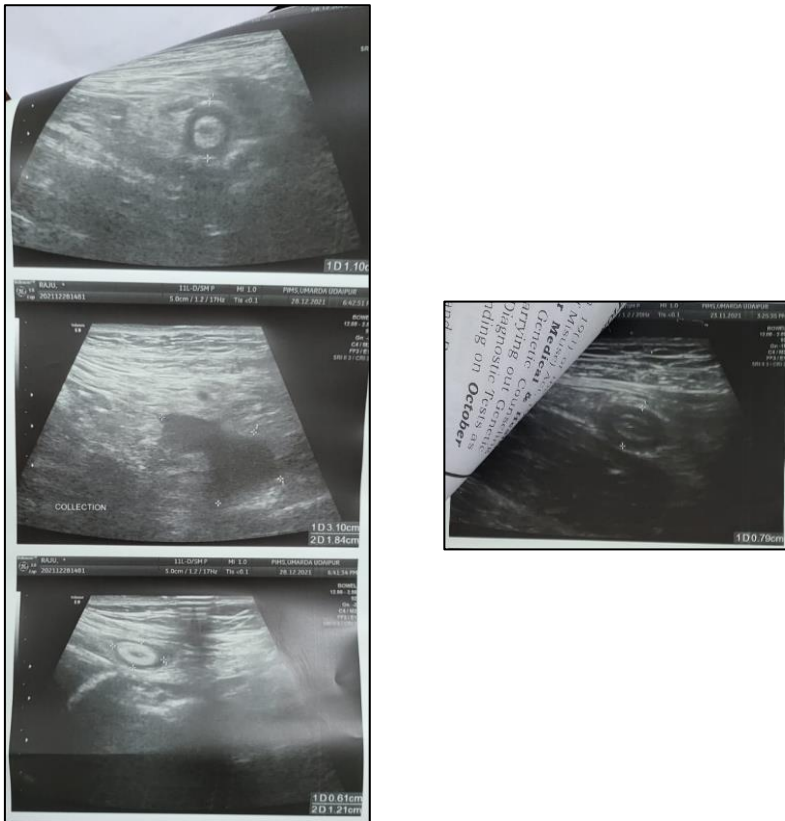
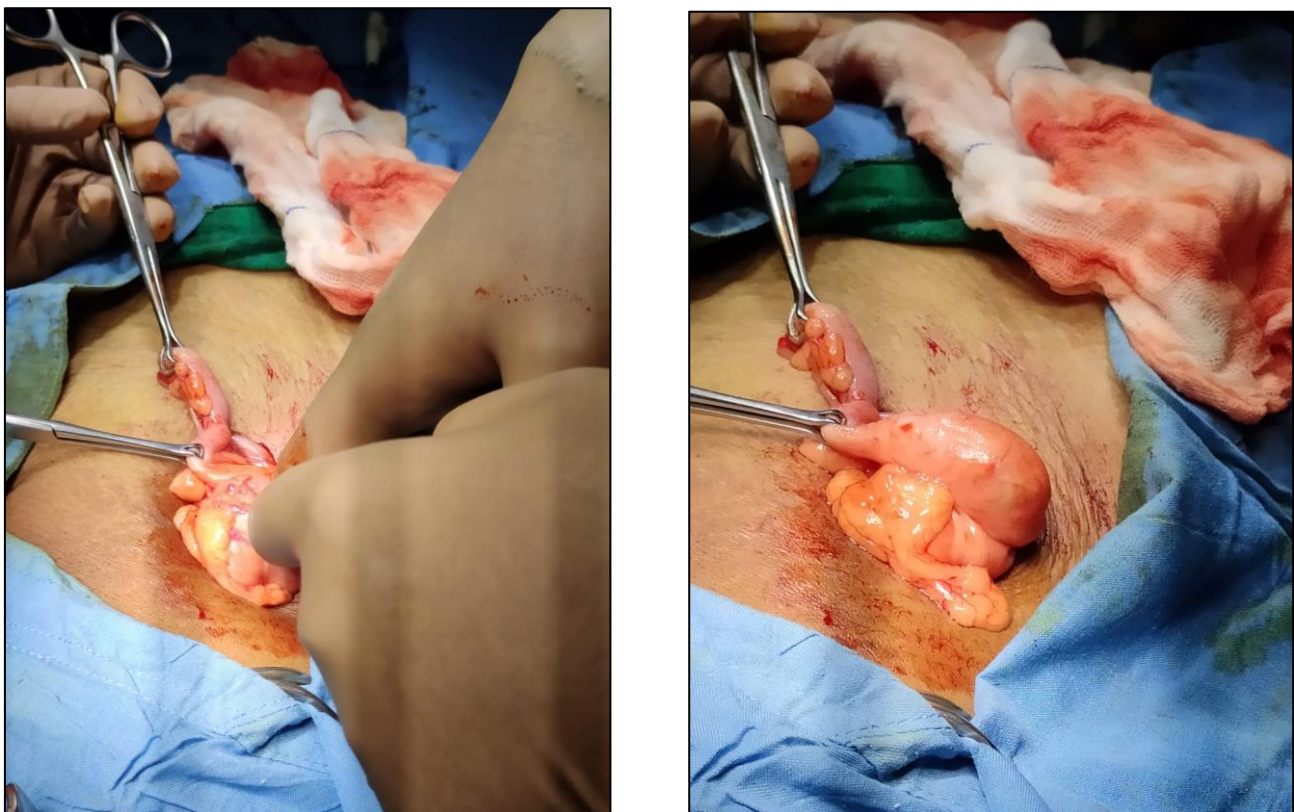


Figure 3: Ultrasonography findings showing acute appendicitis with target sign and minimal periappendicular collection



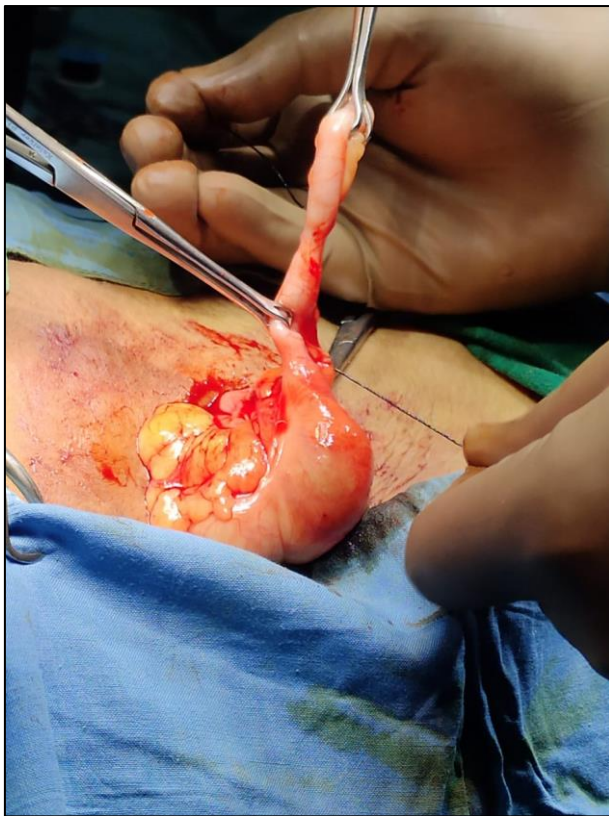
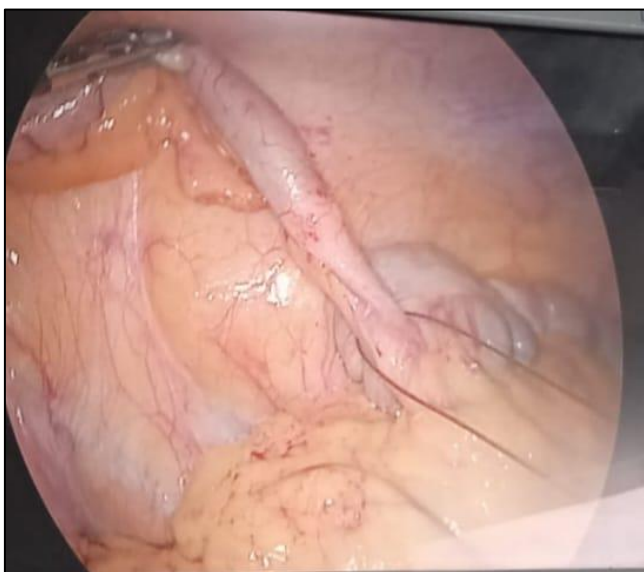
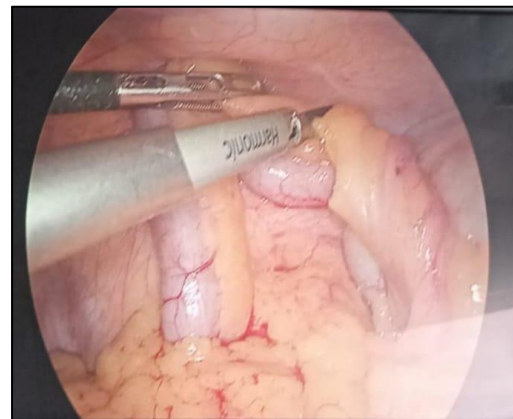
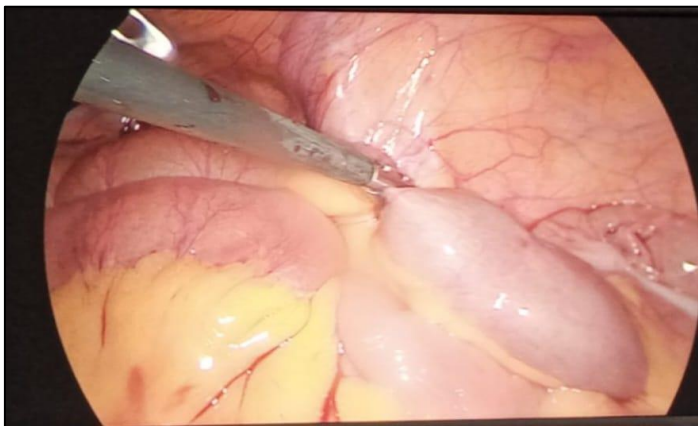


Figure 4: Intra operative images of Open appendectomy



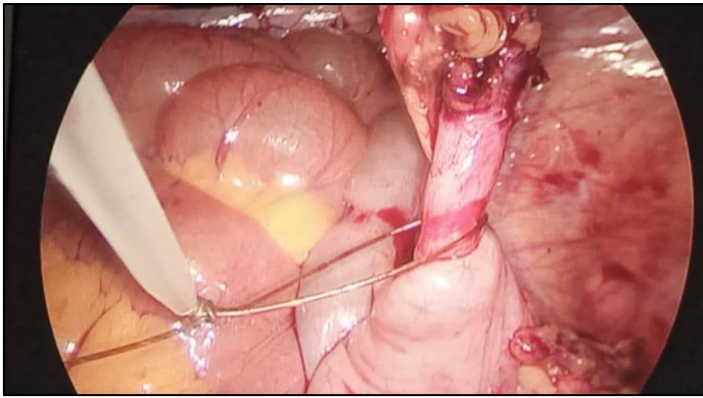


Figure 5: Intra operative images of laparoscopic appendectomy

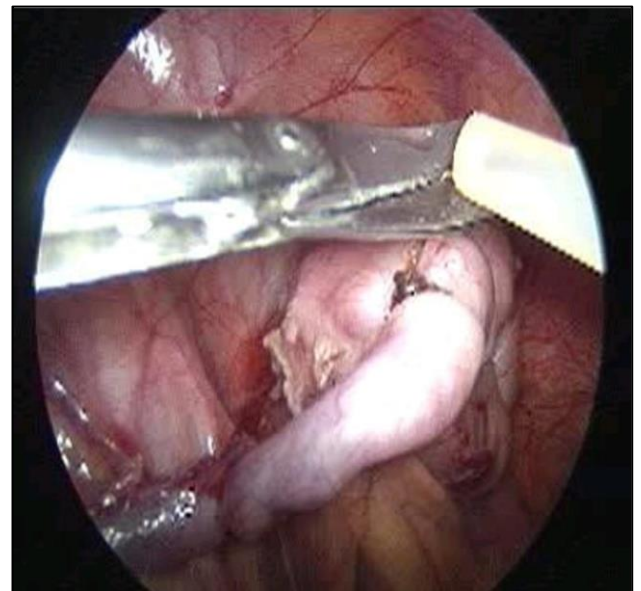
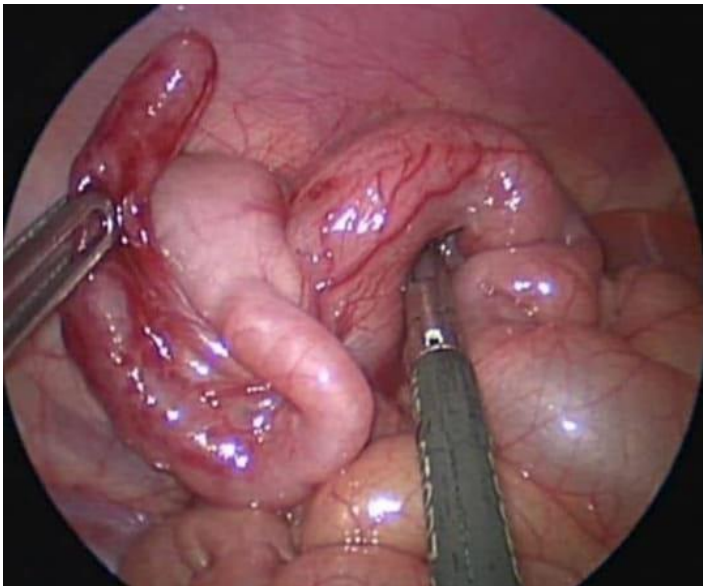
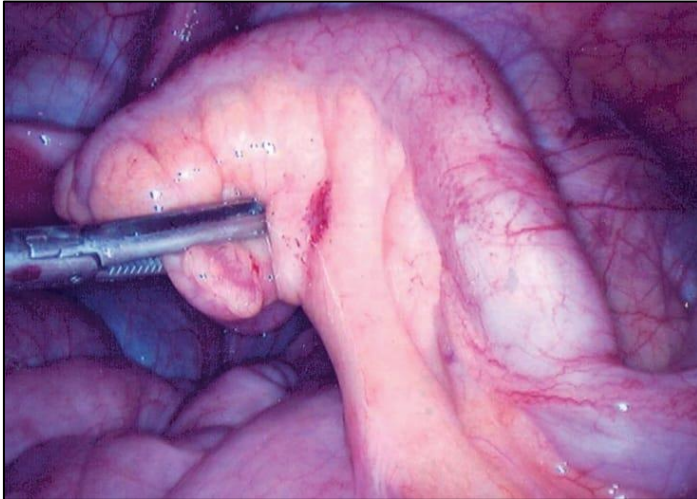


Figure 6: Intra operative images of laparoscopic appendectomy

V.CONCLUSION

Appendicitis is a very common surgical entity. The accurate diagnosis of appendicitis still remains a challenge for the surgeon and the rate of negative appendectomy with post appendectomy symptoms are increasing due to inaccurate diagnosis. Retrocecal position of appendix was found in majority of cases on USG, clinical examination and intraoperatively while statistically there was no significant difference between USG findings and intraoperative findings of positions of the appendix.

An experienced surgeon can make clinical diagnosis of position of the appendix with the help of a thorough clinical examination. USG helps in confirming diagnosis and position of appendix. So the accurate diagnosis of position of appendix & appendicitis is a combination of all the modalities and not just dependent on one basis.

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