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Comparative Study of Treatment of Acute Appendicitis: Laparoscopic Versus Open Appendectomy

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Abstract:
Introduction: *Appendicitis is the most common surgical emergency with the incidence rate of 6-10%. Treatment of appendicitis is Appendectomy, either Laparoscopic or open procedure.*
Although several studies have compared the two approaches of open appendectomy (OA) and laparoscopic appendectomy (LA), the technique of choice is still a matter of controversy. ***Objective:*** *Our main objective is to evaluate the efficacy of Laparoscopic Appendectomy over Open Appendectomy for treating Appendicitis.*
Method: *This study was a retrospective observational study which was conducted in North East Medical College, Sylhet, Bangladesh and the total sample size was 144. According to patients preference 98 patients underwent Laparoscopic Appendectomy and 46 patients underwent Open Appendectomy. The duration of study period was one and half years from 1st January 2017 to 30th June 2018. The secondary data were collected from many journal articles and cases. Pre-operative diagnosis was done using history, clinical examination coupled with laboratory findings and imaging studies. Patients who gave their informed consent were randomized to either LA or OA groups. During the study data were analyzed using standard statistical method and SPPS software. Results: I Our study found that Laparoscopic appendectomy was associated with a shorter hospital stay (2.5 ± 1day in LA and 3.5 ± 1 day in OA), with a less need for analgesia and with a faster return to daily activities (11.6 ± 3.2 days in LA and 16.2 ± 3.4 in OA). Operative time was significantly shorter in the open group (30 ± 10 min in OA and 45 ± 10 min in LA). Total number of complications was less in the LA group with a significantly lower incidence of wound infection (<1 % vs 3 %,* P *<0.001).*

Keyword: Laparoscopy, Open Appendectomy, Appendicitis

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I. Introduction

The appendix is a small, tube-like organ attached to the first part of the large intestine. It is located in the lower right part of the abdomen. It has no known function. A blockage inside of the appendix causes appendicitis. The blockage leads to increased pressure within the wall, decreased blood flow and causes inflammation. If it is not treated, the appendix can perforates and spread infection inside the abdominal cavity. This causes a condition called peritonitis. Appendicitis is inflammation of the appendix. It may be acute or recurrent appendicitis. Appendicitis can happen at any time, but it occurs most often between the ages of 10 and 30. It is more common in males than in females. If appendicitis left untreated, this can be serious and sometimes fatal. The main symptom is abdominal pain starts around umbilicus later shifts to the right iliac fossa. It is usually sudden and gets worse over time. Other symptoms may include nausea and low-grade fever. Acute appendicitis seems to be the end result of a primary obstruction of the appendix. Surgery is the main stay of treatment. This can be done by either open or laparosco pic procedure. [1]


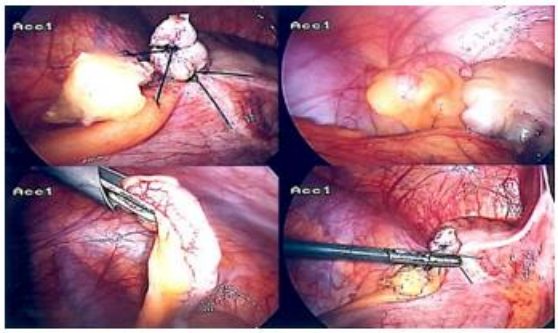

Figure-1a and 1b: Inflamed appendix removal by open surgery and laparoscopy [2]

The traditional operation of choice was the open appendectomy (OA) pioneered by McBurney in 1894 and in 1981, the laparoscopic technique was introduced by Kurt Semm and since then, laparoscopic appendicectomy (LA) is increasingly being performed in place of OA. Numerous studies have compared OA with LA, but the role of laparoscopy is still a controversial issue. For over a century, laparotomy (open appendectomy) was the standard treatment for acute appendicitis. This procedure consists of the removal of the infected appendix through a single large incision in the right iliac fossa. The incision in a laparotomy is usually 2 to 3 inches (51 to 76 mm) long. Whereas laparoscopic appendectomy has become an increasingly prevalent intervention for acute appendicitis since its introduction in 1981. This surgical procedure consists of making three to four small incisions in the abdomen, each 0.25 to 0.5 inches (6.4 to 12.7 mm) long. Laparoscopic surgery has gained acceptance in many centers worldwide. It proved, by several studies and meta-analysis, to be a feasible and safe procedure, with numerous clinical advantages, such as thorough abdominal survey, precise dissection, minimize chance of bleeding, deals with co-morbid pathology in female (e.g. Ovarian cyst), shorter postoperative ileus, less postoperative pain, lower incidence of wound infection, no chance of incisional hernia, reduced hospital stay and faster return to normal activities. As because laparoscopic appendectomy (LA) is associated with reduced risk of surgical complications, it may provide a better alternative for the management of acute appendicitis than open surgery. But in the specific age group of younger children, there are no reports that compare laparoscopic surgery with open surgery and the incidence of postoperative complications.[3] In this study our optimal goal is to evaluate the efficacy of laparoscopic appendectomy over open appendectomy for treatment method of appendicitis by comparing among them.

II. Objective

General Objective:

- To examine the efficiency of laparoscopic appendectomy and Open Appendectomy for treating appendicitis.

Specific Objective:

- To evaluate advantages of laparoscopic appendectomy over open appendectomy method.
- To identify the better treatment option for appendicitis.

III. Methodology

Study Type:

- This study is a retrospective observational study.

Sample Size: The total sample size is 144. The sample was selected by purposive sampling. Among the sample 98 were under treatment of laparoscopic appendectomy and 46 were underwent for open appendectomy as per patient's preference.

Study Place and Period:

- This comparative study including patients' information during treatment period was done at indoor patient basis in North East Medical College, Sylhet. The duration of study period was 1.5 years from 1st January 2017 to 30th June 2018.

Inclusion Criteria:

- Female
- Male
- Age: 11-50 years
- Typical clinical presentation
- Supportive investigations

Method:

144 patients were analyzed for appendectomy. Pre-operative diagnosis was made using history, clinical examination coupled with laboratory findings and imaging studies. Patients who gave their informed consent were selected to either LA or OA groups as per their . During the study all of the patients received prophylactic ceftriaxone and metronidazole. The same surgeon performed all of the surgeries. The OA surgeries were performed through a McBurney's muscle-splitting incision. For the LA patients, the classic three port technique was performed through two 10 mm (umbilical and left iliac fossa) and one 5 mm (suprapubic) ports. All of the removed appendices were sent for histopathological study. After the operation all patients were NPO for 24 hours and received antibiotics for 48 hours. The routine analgesic used for patients was pethidine. In the study Patients' data such as operation time, hospital stay and per-operative complications were collected from their hospital files.

Data analysis:

➢ Data were analyzed using standard statistical method and SPPS software. Descriptive statistical analysis including mean, median, standard deviation, percentages were used to describe study population on all variable [4]

IV. Results

In Table-1 shows that, 31-40 year patients were highest 38.8% for LA and 41.30% for OA among both group. The following table shows the age of the patients in details:

Table 1: Age of the Patients

		LA		OA	
Year		Frequency	Percent	Frequency	Percent
Valid	11 - 20	8	8.16	4	8.69
	21 - 30	31	31.63	14	30.43
	31 - 40	38	38.8	19	41.30
	41- 50	19	19.39	8	17.39
	51- 60	2	2.04	1	2.17
	Total	98	100.0	46	100.00

In table-2 shows that male was higher than female in both LA and OA. The following table is given below:

Table 2: Gender of the Patients

Sex		LA		OA	
		Frequency	Percent	Frequency	Percent
Valid	Female	24	24.49	11	23.92
	Male	74	75.51	35	76.08
	Total	98	100.0	46	100.0

Our study found that Laparoscopic appendectomy was associated with a shorter hospital stay (2.5 ± 1day in LA and 3.5 ± 1 day in OA), with a less need for analgesia and with a faster return to daily activities (11.6 ± 3.2 days in LA and 16.2 ± 3.4 in OA). Operative time was significantly shorter in the open group (30 ± 10 min in OA and 45 ± 10 min in LA). Total number of complications was less in the LA group with a significantly lower incidence of wound infection (<1 % vs 3 %, P <0.001).

Table 3: Comparative Analysis of LA and OA

Description		LA	OA	P value
	Hospital Stay	2.5 ± 3	3.5 ± 4.5	
	Return to daily activities	11.6 ± 3.2	16.2 ± 3.4	
	Operative time	45 ± 10 min	30 ± 10 min	
	Cost of treatment	High	Moderate	
	Complications	1.5 %	10.7 %	<0.001
	Chance of Infection	<1 %	3%	

The total cost of treatment was higher in the laparoscopic group.

In Table-4 Shows the complaints of the patients for right lower abdominal pain. Among the patients with right lower abdominal pain in several hours and 24 hours were more common. The following table is given below:

Table 4: Patients with lower abdominal pain in LA

Duration		Frequency	Valid Percent
Valid	Several hours	31	44.3
	24 Hours	30	42.9
	(1-10) day	9	12.9
	Total	70	100.0

In figure shows Complaints of the patients for lower abdominal pain where patients faced it several hours. The following figure is given below:

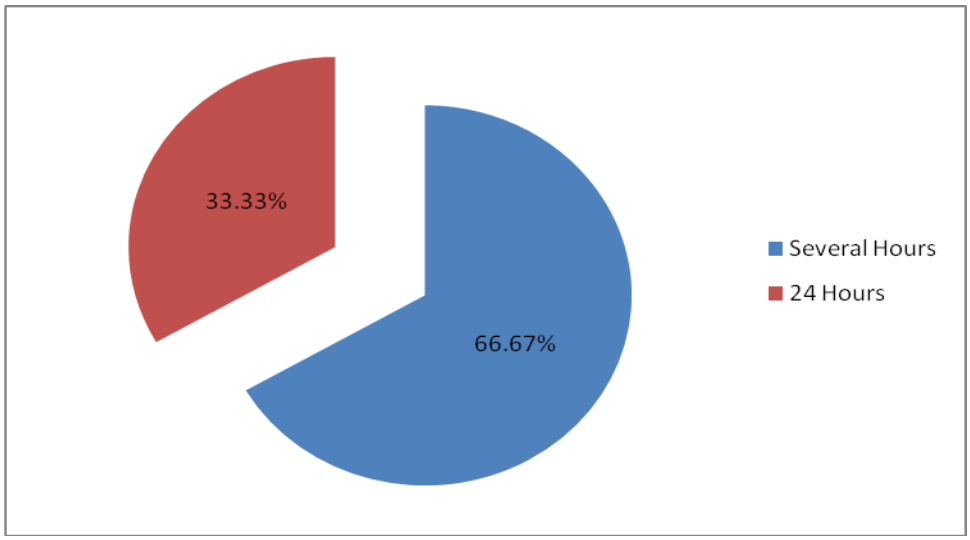

Figure 2: Complaints of the patients for lower abdominal pain

In figure-3 shows Complaints of the patients for fever where patients faced it several hours mostly. The following figure is given below:

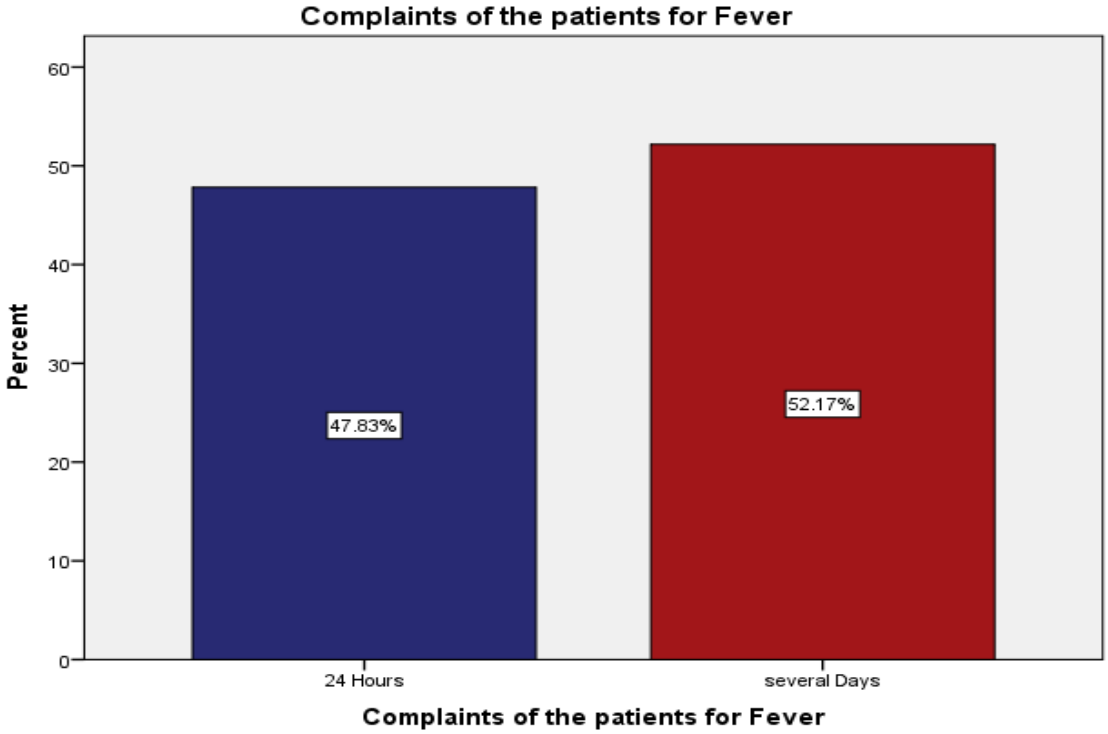

Figure 3: Complaints of the patients for fever

In figure 4 shows General examination of patients for pulse where most of the patients pulse was between 81-90. The following figure is given below:

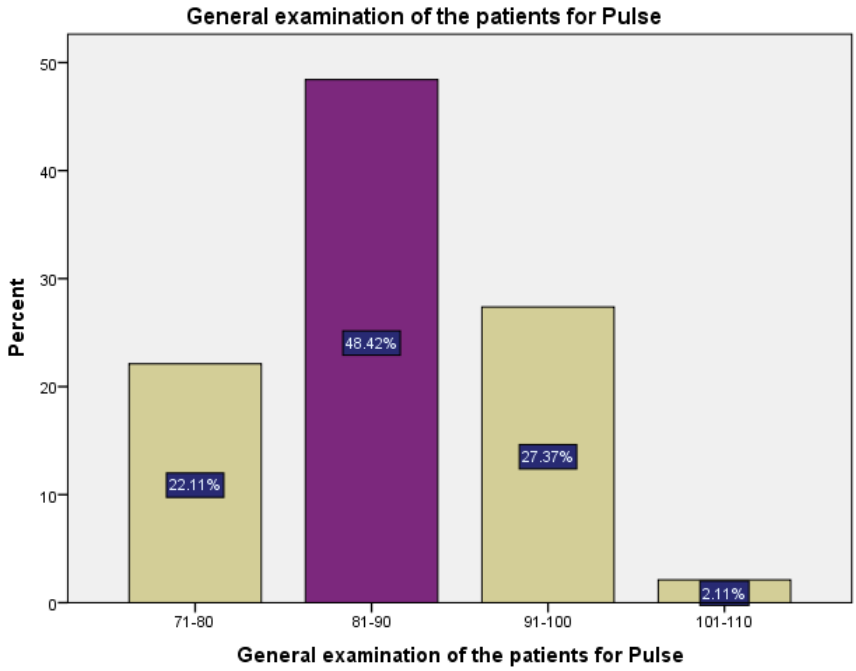

Figure 4: General examination of patients for pulse

In Table 5 shows laboratory investigations in Right Iliac Fossa Pain. The tenderness of right iliac fossa shows rebound tenderness in 70% cases WBC is more than 11000/mm^3 and in 30% cases its lower than 11000/mm^3. Neutrophils more than 75% available in the case of 70% to 80% plus and Neutrophils less than 75% available in the 40% to 70% cases.

Table 5 laboratory investigations in Right Iliac Fossa Pain.

Parameter	Appendicitis
WBC > 11,000/mm^3	70%
WBC <11,000/ mm^3	30%
Neutrophils>75%	70% to 80%+
Neutrophils< 75%	40% to 70%

In figure 5 shows Investigations about WBC under CBC of the patients where mean was 2.81 . The following figure is given below:

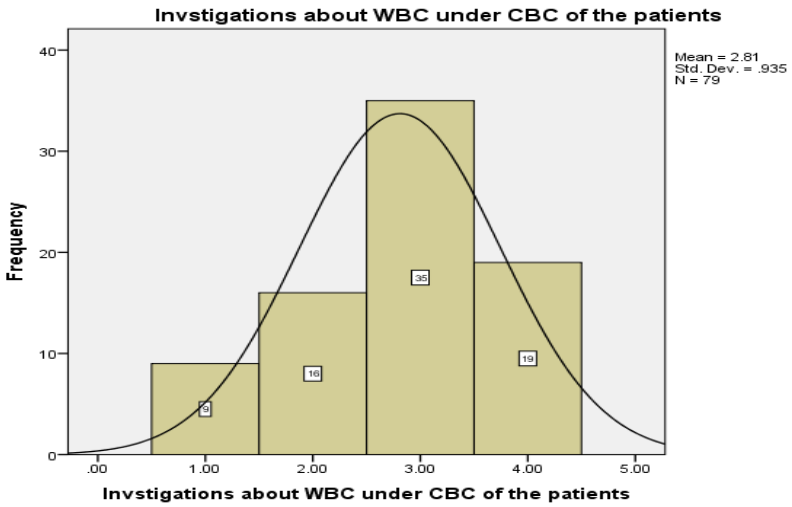

Figure 5: Investigations about WBC under CBC of the patients

In Figure 6 shows Investigations about Nutrophils under CBC of the patients where mean was 8.14. The following figure is given below:

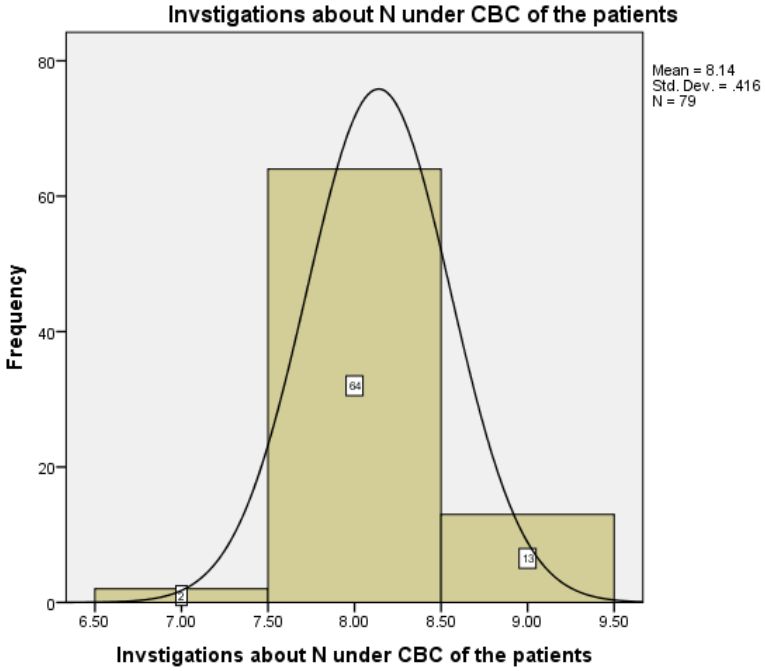

Figure 6: Investigations about Nutrophils under CBC of the patients

In Figure 7 shows Investigations about URINE R/M/E of patients where mean was 2.14. The following figure is given below:

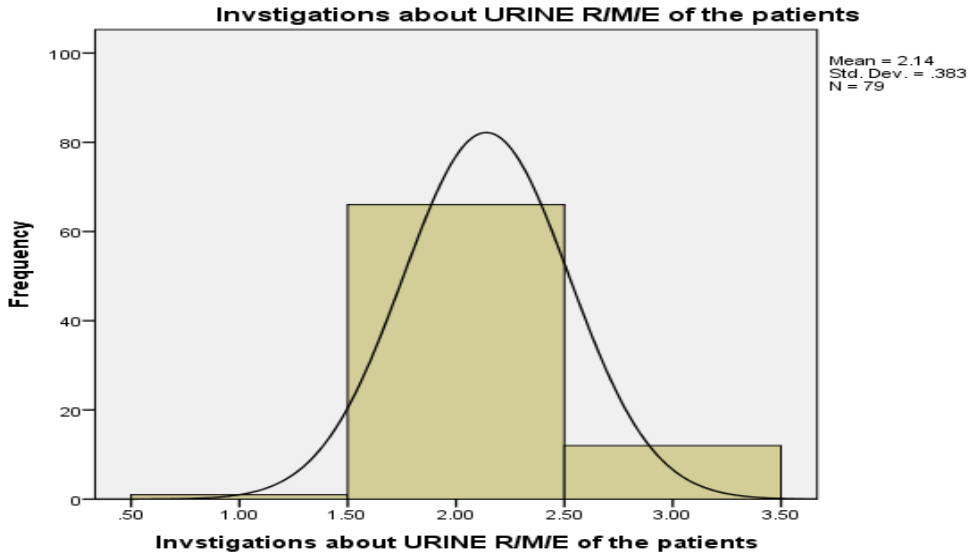

Figure 7: Investigations about URINE R/M/E of patients

In Figure 8 shows investigations about UGS where mean was 1.33. The following figure is given below:

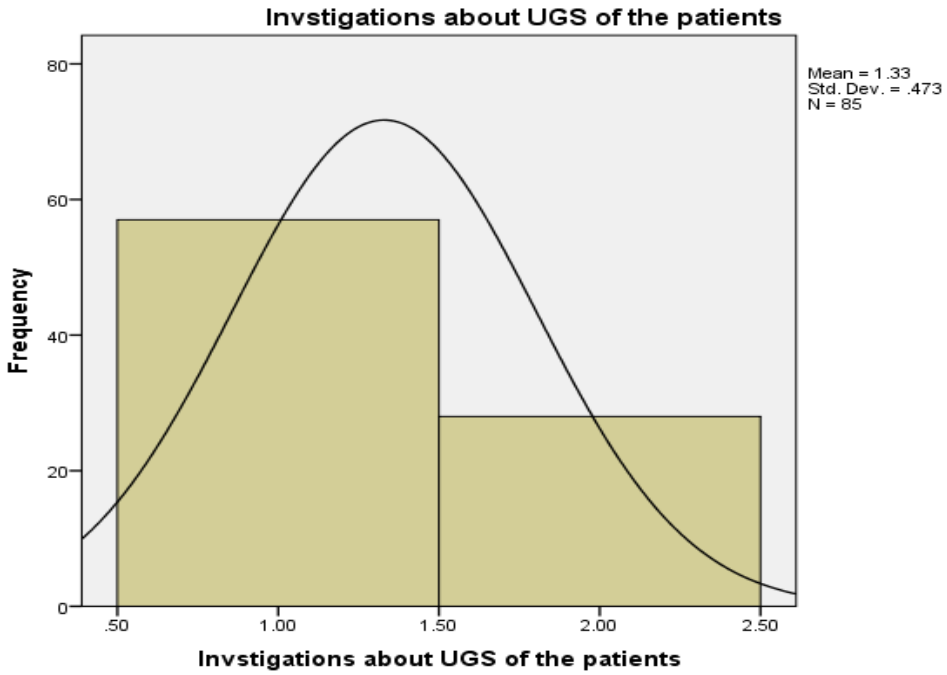

Figure 8: Investigations about UGS

In Figure 9 shows Investigations about X-ray where mean was 1.12. The following figure is given below:

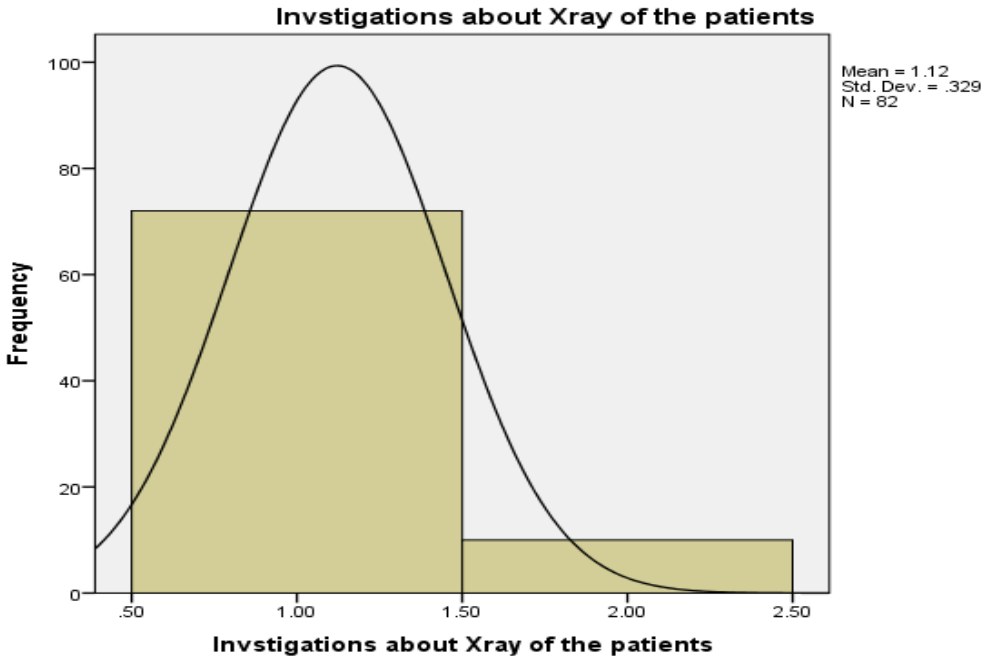

Figure 9: Investigations about X-ray

In Figure 10 shows pre operative findings of the patients where most suffered inflammation. The following figure is given below:

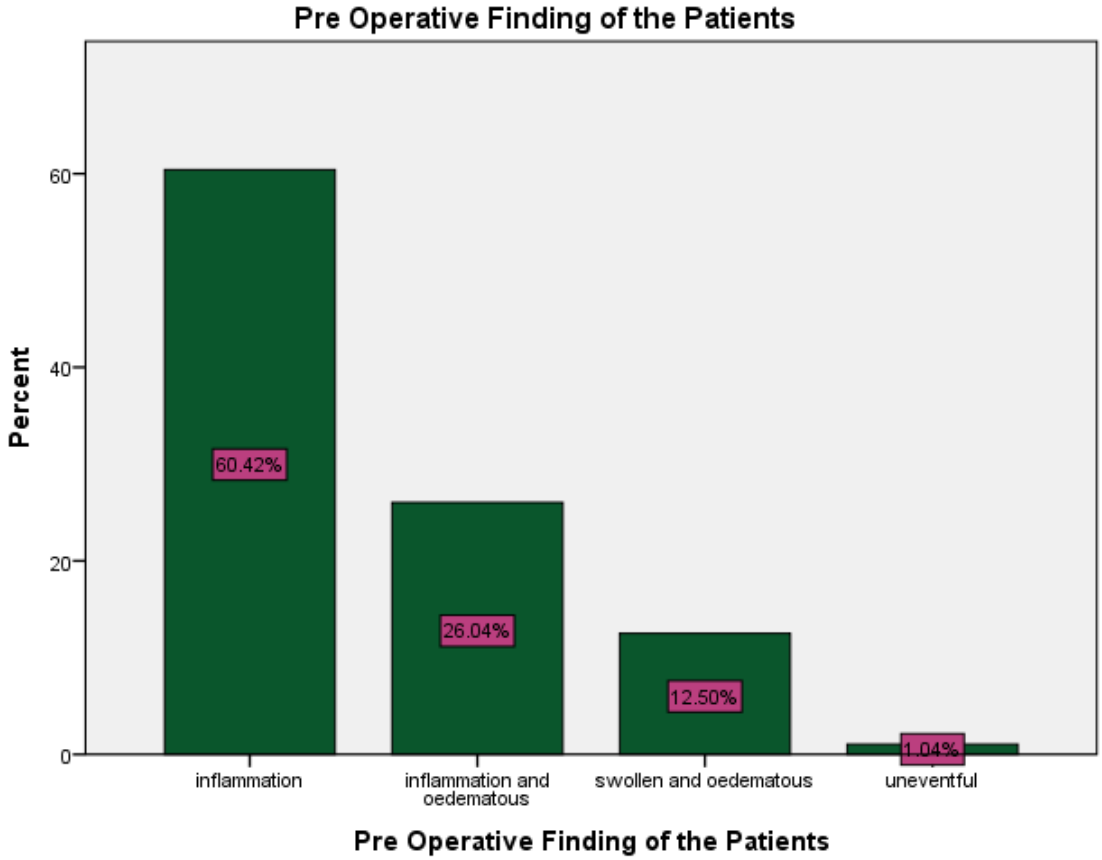

Figure 11: Pre operative findings of the patients

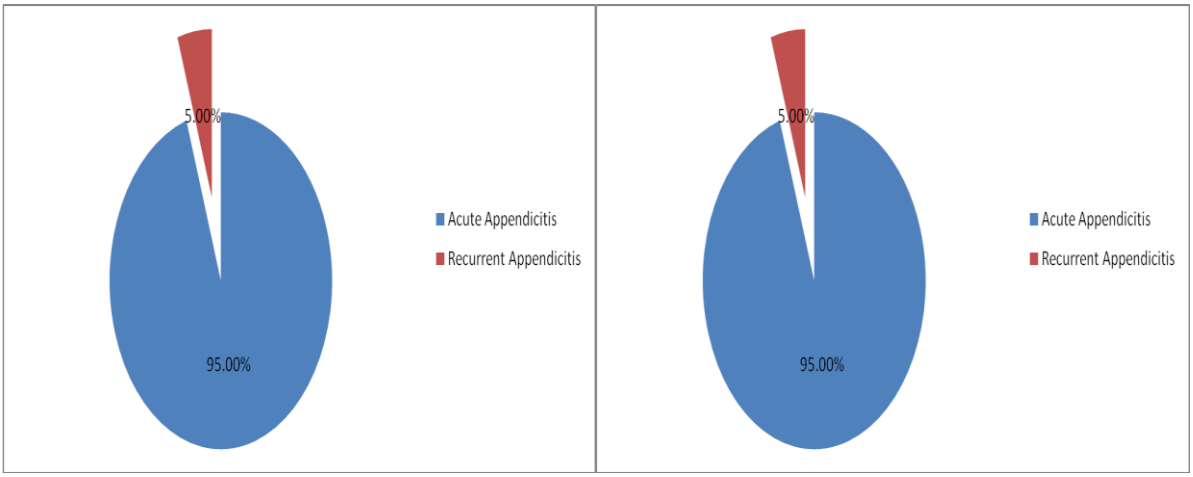

Figure 11: Preoperative diagnosis LA Vs OA

V. Discussion

Our study found that laparoscopic appendectomy is an effective and safe procedure irrespective of age and sex of the patient. LA has added advantage of early return of bowel movement, less post-op hospital stay and less requirement of narcotic analgesic. LA in pregnancy is associated with a significantly higher rate of fetal loss compared to open appendicectomy.Laparoscopic appendectomy is an effective and safe option and the procedure of choice for most patients regardless of age, sex and BMI. Though it requires more operative time but has minimal complications and less hospital stays and has the advantage of managing concomitant pathologies .Where as for open appendectomy is a fairly simple and common procedure but there are some risks associated with the surgery, including bleeding, infection, injury to nearby organs, paralytic ileus etc. In

case of female patients ovarian pathology like ovarian cyst can be deal with LA. There is no chance of incision hernia in the LA.

In many report shows that LA has more impact and beneficial effect on appendicitis treatment rather than open.[5] In other report stated that duration of surgery was significantly longer in LA compared with OA but patients who received LA faces less wound infection and postoperative complications. [6] In many other study it was found that patients with OA group had higher post-operative complication rate .[7] In other study reported LA was feasible and effective for appendicitis upon presentation with an abscess and associated with beneficial clinical effects, such as postoperative gastrointestinal function recovery and reduced postoperative complications. LA should be seriously considered as the first line procedure of choice. [8] In clinical practice, despite of obvious advantages described for LA, the open method appears to be still broadly used due to concerns about possible longer operative time, higher costs, and in some institutes, the unavailability of instruments and skilled surgeon for LA.[9]

VI. Recommendation

- Need larger sample size collection of open appendectomy data for better comparison.

VII. Conclusion

From many study we can conclude that Laparoscopic appendectomy is equally safe, and can provide less postoperative morbidity in experienced hands than open appendectomy for treating appendicitis. Laparoscopic appendectomy is a useful method for reducing hospital stay, complications and return to normal activity.

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