

**A STUDY ON LAPAROSCOPIC VERSUS OPEN
APPENDICECTOMY A COMPARATIVE STUDY**

A Dissertation Submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

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In partial fulfillment of the regulations for the award of the degree of

**MASTER OF SURGERY (GENERAL SURGERY)
BRANCH-I**

REG. NO. 221711212



DEPARTMENT OF GENERAL SURGERY

THANJAVUR MEDICAL COLLEGE

THANJAVUR

MAY 2020

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This is to certify that the dissertation titled “**A STUDY ON LAPAROSCOPIC VERSUS OPEN APPENDICECTOMY A COMPARATIVE STUDY**” submitted by **DR.S.VIGNESWARAN**, Post Graduate student (2017-2020) in the Department of General Surgery, Thanjavur Medical College and Hospital, Thanjavur appearing for M.S. degree (General Surgery) Branch- I degree examination May 2020 is a bonafide record of work done by him, in partial fulfillment of the regulations of The Tamilnadu Dr.M.G.R. Medical University, Chennai. I forward this to the Tamilnadu Dr.M.G.R. Medical University, Chennai, Tamil Nadu, India.

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I, **Dr. S.VIGNESWARAN**, solemnly declare that the dissertation “**A STUDY ON LAPAROSCOPIC VERSUS OPEN APPENDICECTOMY A COMPARATIVE STUDY**” a bonafide and genuine research work done by me in the Department of General Surgery, Thanjavur Medical College, Thanjavur under the guidance of **PROF.Dr.S.JEGATHEASAN M.S., D.Ortho.**, Professor of Department of General Surgery, Thanjavur medical college, Thanjavur.

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(DR.S.VIGNESWARAN)

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CHART NO	TITLE
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2.	AGE DISTRIBUTION
3.	NAUSEA AND VOMITING
4.	FEVER
5.	RIF PAIN
6.	PAST HISTORY OF PAIN
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9.	POST OP WOUND INFECTION
10.	POST OP FEVER
11.	HOSPITAL STAY
12.	RETURN TO WORK
13.	DURATION OF TME OF SURGERY IN MINS

LIST OF ABBREVIATIONS

Vs	Versus
CT	Computerized tomography
USG	Ultrasound
W.B.C	White blood count
IgG	Immunoglobulin
RIF	Right iliac fossa
CO2	Carbon dioxide
PA View	Posterior anterior view
ECG	Electrocardiogram
HIV	Human immunodeficiency virus
HbsAg	Hepatitis B surface antigen
N	Number

INTRODUCTION

Appendicitis is most common intra abdominal condition requiring emergency surgery.

The life time rate of appendicectomy is 12% for men and 25% in women, with approximately 7% of all people undergoing appendicectomy for acute appendicitis during their lifetime. It has been observed that males had higher rates of appendicitis than females for all age groups with an overall ratio of 1.2:1.3

Even though modern diagnostic facilities, surgical skills, antibiotic therapy have brought down the mortality from 50% (before 1925) to less than 1/1,00,000 persons, still the morbidity is around 5-8% mainly due to wound infection because of delayed diagnosis and treatment

In acute appendicitis however, a treatment delay of even a few hours may result in catastrophic complication. With the exploration of the laparoscopic technique it provided an opportunity to explore new method of therapy in the management of suspected acute appendicitis.

Laparoscopic appendicectomy combines the advantages of treatment and diagnosis in one procedure with the least morbidity. Patients are likely to have less post operative pain and to be discharged from hospital and return to regular activities quicker than those who underwent an open appendicectomy.

Other are decreased wound infection, ability to explore the entire peritoneal cavity for diagnosis of other conditions and effective peritoneal toileting without the need for extending the incision.

Laparoscopic appendicectomy is increasingly being used particularly in young females of child bearing age where the differential diagnosis of right lower quadrant pain is extensive including gynecologic pathology.

Major disadvantage of laproscopic procedure is increased cost of the surgical equipments. Despite these concerns however the cost effectiveness for the laparoscopic appendicectomy is easily realized once the decreased hospital stay and entire patient covalence period are accounted.

The modern era of laparoscopic surgery has evoked remarkable changes in the Approach to surgical diseases. The trend towards minimally invasive surgery has prompted general surgeons to scrutinize nearly all surgical procedures for possibility of conversion to the laparoscopic technique.

AIM AND OBJECTIVES

The Aim of the study is the comparison between the outcomes of Laparoscopic appendicectomy and open appendicectomy in terms of

1. Post operative pain
2. Duration of surgery
3. Post operative complications and wound infection
4. Duration of surgery in minutes
5. Length of the hospital stay
6. Resumption of diet

REVIEW OF LITERATURE

Leonardo da Vinci, clearly depicted the organ in his anatomical Drawings. He called it “Orchid” literally ear to denote the auricular appendage of the caecum in 1492.

Berengario Dacarpi who first described the organ in 1521

Vidovidius was named the worm- like organ as the vermiform appendix in 1530.

Great scholar Erasmus was the one to record a case of appendicitis with Abscess formation in 1530

Andreas Vesalius who illustrated the normal appendix in his ‘De Humanicorporis Fabrica’ in 1543

Zeanfernel French physician described a case of perforated appendix after an autopsy on 7 year girl who had suffered from diarrhea and was given large Quince to stop her bowels in 1554

Hiden, a leading German surgeon gave detailed account of diseased inflamed appendix, after autopsy on a young man who died after several years of progressive intestinal pain in 1652. The appendix was shrunken and drawn

into the small bowel completely filling it, so that no contents could be forced into the colon, therefore such pain. Appendix was inflamed and swollen throughout.

Verneys who was the first to coin the term appendix vermiformis, the first description of appendicitis in 1710.

Lorenz Hester who gave the first good description of a case of acute appendicitis –a postmortem on an executed criminal in 1711.

Morganin (1719) illustrated beautifully in his *Adversaria anatomica*.

Claudis Amyand, a surgeon to West minister and St. Georges hospitals and sergeant surgeon to George performed the first appendicectomy in 1736. He operated on a boy of 11 years who had a right scrotal hernia accompanied by fistula, within the scrotum was found appendix perforated, the appendix was ligated and all or a part of it was removed with recovery of the patient.

Heister recognized that the appendix might be the site of acute primary inflammation in an autopsy on the body of a criminal who had been executed in 1755.

The first textbook that gave the description of the symptoms of inflammation and perforation of the appendix was by Bright and Addison in 1839.

Reginald Fitz coined the term “Appendicitis” and recommended early surgical intervention for the disease in 1886.

Charles McBurney presented a report on early operative intervention for acute appendicitis to the New York surgical society in 1889. 5 years later, he formalized the procedure and described the McBurney's incision.

Murphy clearly described the appropriate sequence of symptoms of pain followed by nausea and vomiting with fever and exaggerated local tenderness at the position occupied by the appendix in 1905.

One of the most recent trends in the surgical therapy involves the use of minimal invasive laparoscopic procedure.

A German gynecologist Kurt Semm, introduced laparoscopy as a method for the removal of a diseased appendix which was incidentally picked up during a gynecologic procedure in 1983.

Pier A, Gotz F, Bacher C., published the first large series of laparoscopic appendectomies for acute appendicitis and , demonstrated that the procedure could be applied to most cases of appendicitis with a high degree of success, a low complication rate, operative speed comparable to a traditional open appendectomy in 1991.

Attwood sehill and et al in his study concluded that laparoscopic appendectomy is superior to open appendectomy in terms of hospital stay ,post operative complication and return to normal activities and is recommended as a approach of choice in case of acute appendicitis in 1992.

Gurbas at, Peetz me et al concluded in pregnant women that laparoscopic appendicectomy does not increase in maternal and fetal morbidity or mortality as compared to open appendicectomy in 1997.

Heikkinen T. J. et al compared of outcome and cost benefit of laparoscopic appendicectomy Vs open appendicectomy. 19 patients underwent lap appendicectomy and 21 underwent open appendicectomy in 1998. They found that median operating time of laparoscopic appendicectomy was 91 min and open was 82 min.

No difference in post operative pain or fatigue was noted. Return to normal activities was 14 days in case of lap. Appendicectomy compared to 26.5 days in case of open and the hospital cost for lap. Appendicectomy was \$8538 compared to open \$6788.

And so concluded that laparoscopy appendicectomy was as safe as open, the hospital cost are higher but laparoscopic appendicectomy offers significant cost saving to the payer for working patient because of early resumption of work.

A prospective evaluation of laparoscopic surgery for acute appendicitis over a 6 month period is reported. 65 patients with signs & symptoms of appendicitis Necessitating surgery were assigned to the open or laparoscopic modality. The result suggested that emergency laparoscopic appendicectomy

should be explored further as an alternative to open surgery for acute appendicitis.

A comparative study concluded that laparoscopy is a useful adjunct to the management of patients with a presumed diagnosis of appendicitis.

A meta-analysis of 35 randomized controlled trials revealed that the operating time was significantly longer for laparoscopy and hospital stay was shorter.

Operating time reduced markedly for laparoscopy on subgroup analysis. The risks of postoperative ileus and wound infection are lower for laparoscopy. The risk of intraabdominal abscess development is considerably raised after laparoscopy with an odds ratio of 2.26 ($P=0.0002$). It concluded that laparoscopic appendectomy is a safe and effective method of treating acute appendicitis.

A study comparing the two procedures concluded that patients who underwent laparoscopic appendectomy have a shorter duration of analgesic use and an earlier return to full activities postoperatively when compared to patients who underwent open appendectomy. 253 patients with acute appendicitis were randomized into three groups.

Laparoscopic appendectomy with an endoscopic linear stapler (LAS) on 78 patients, laparoscopic appendectomy with catgut ligatures (LAL) on 89, and open appendectomy (OA) on 86. It concluded that, laparoscopic

appendicectomy has distinct advantages. The laparoscopic procedure produces less pain (2.01) and allowed more rapid return to normal work, and LAS required a shorter hospital stay. The disadvantage of laparoscopic approach is the increased operative time compared to open method.

A meta-analysis of randomized control trials concluded that, laparoscopic appendicectomy offers significant improvement in postoperative outcome at the cost of a longer duration of operation.

In a randomized control trial involving 583 consecutive patients, 301 patients were allocated to open appendicectomy and 282 to laparoscopy, 65 of who required conversion to open appendicectomy. It concluded that hospital stay was equally short. Laparoscopic appendicectomy was associated with fewer wound infections, faster recovery, earlier return to work and improved cosmesis.

A study of randomized control trials, concluded that the therapeutic outcomes favoring laparoscopic appendicectomy include reductions in wound infection rate, post operative pain on day 1, hospital stay in days , return to normal activity in days , earlier return of normal bowel function and overall cost.

A retrospective study of 43,757 patients concluded, laparoscopic appendicectomy has significant advantages over open appendicectomy with

respect to length of hospital stay, rate of routine discharge, and post operative in-hospital morbidity.

A prospective, randomized clinical trial found that, the laparoscopic procedures produce less pain, required a shorter duration of hospital stay and allowed a more rapid return to full activities.

Laparoscopic appendicectomy presents as a safe and an effective alternative to open surgery when utilized in a competent manner. Advantages including a shortened hospital stay, reduced incidence of wound infection, and hastened convalescence justify a moderately increased operating room expense secondary to advanced instrumentation.

In another study done, laparoscopy had the distinct advantage of picking up additional pathology which included intra-abdominal bowel adhesions, ovarian cysts, Meckels diverticulum, & a sigmoid perforation in one instance. S.Laine a Rantal et al concluded that younger women with right iliac fossa pain laparoscopic can give precise diagnosis and reduce the rate of negative appendicectomy. Utpal de concluded in his study that laparoscopic appendicectomy was associated with increase clinical comfort in terms of fever, lower wound infection, faster recovery earlier return towards and improved cosmesis.

In 2007 Yong JL, Law WL, Lo CY, et al during their study period 82 patients underwent LA (Group A) and 119 underwent OA (Group B). The

median durations of surgery in Group A and Group B were 80 minutes (range, 40 to 195) and 60 minutes (range, 25 to 260), respectively ($P < 0.005$). Postoperative complication rates were comparable between the 2 groups (13.4% in Group A versus 15.8% in Group B). The median hospital stay for patients in Group A and Group B were 3.0 days (range, 1 to 47) and 4.0 days (range, 1 to 47), respectively ($P = 0.037$). Hence they conclude that routine laparoscopy and LA for suspected acute appendicitis is safe and is associated with a significantly shorter hospital stay compared to open appendicectomy. Other intra-abdominal pathologies can also be diagnosed more accurately with the laparoscopic approach.

Shaikh AR, Sangrasi AK, Shaikh GA in their study provides certain advantages over open appendicectomy, includes short hospital stay, decreased requirement of postoperative analgesia, early food tolerance, and earlier return to normal activities. Where feasible, laparoscopy should be undertaken as the initial procedure of choice for most cases of suspected appendicitis.

The mean post-operative stay in days was relatively shorter for laparoscopic appendicectomy (1.97 ± 2.3) compared to open appendicectomy (3.1 ± 1.8). The average time for the return of bowel movement was remarkably lesser for laparoscopic appendicectomy (10.6 ± 8.2) hours than open appendicectomy (21 ± 13) hours. Hence, our study found that

laparoscopic appendectomy, although relatively expensive, is a safe and effective procedure for the removal of appendix over open appendectomy.

In 2009 Getha K R. AnnappaKundvaBhavatej concluded that laparoscopic appendectomy which was better than open appendectomy with respect to wound infection rate ,early resumption of oral feeds, postoperative pain , lesser use of analgesics , postoperative hospital stay and return to normal activities. Although above mentioned advantage were at the cost of slightly increased duration of surgery and cost of surgery.

LAPAROSCOPIC VERSUS OPEN APPENDICECTOMY

In 2010 Ingraham and colleagues analyzed results from 222 hospitals comparing laparoscopic versus open appendectomy using the American College of Surgeons National Surgical Quality Improvement Program. In all, 24,969 laparoscopic and 7714 open procedures were included in the analysis. Although the data were limited by the retrospective nature, the investigators observed that laparoscopic appendectomy was associated with lower risk of wound complications and deep surgical site infection in uncomplicated appendicitis. In complicated appendicitis, laparoscopic appendectomy was associated with fewer wound complications but a slightly higher incidence of intra-abdominal abscess. The overall conclusion, however, was that the laparoscopic approach was associated with an overall lower incidence of

complications than the open procedure. The conclusions evident from a number of studies indicate that both approaches are acceptable and that the advantages with laparoscopy, although small, were a lower overall morbidity, reduced wound complications, reduced postoperative pain, and perhaps a slightly shorter recovery time. The slightly higher risk of intra-abdominal abscess formation after laparoscopic appendectomy in cases of complicated appendicitis was a negative aspect of laparoscopic appendectomy, although the authors acknowledged that this has not been observed in all studies.

We prefer the laparoscopic approach for several reasons. Laparoscopy allows examination of the entire peritoneal space, making it exceptionally useful to exclude other intra-abdominal disease that may be manifested in a similar fashion, such as diverticulitis or tubo-ovarian abscess, whereas visualization of these structures would not be possible through a right lower quadrant incision. We find it to be technically simpler in most patients, particularly the obese, and have been impressed with our ability to discharge patients within several hours of the operation.

The debate about the superiority of laparoscopic versus open appendectomy will likely continue as a clearly superior choice has not been conclusively demonstrated. What does appear clear, however, is that regardless of the surgeon's preferred approach, the most important aspect of appendectomy is that it be done promptly and safely.

EMBRYOLOGY

Appendix develops during the descent of colon as a narrow diverticulum from the distal end of the caecal bud, which appears at about 6th week as a small conical dilation of caudal limb of the midgut. At an early embryonic stage it has the same caliber as the caecum and is in line with it. It is formed by excessive growth of the right wall of the caecum which pushes the appendix to the inner side.

Sometimes Rarely the caecum does not migrate during development to its normal position in the right lower quadrant of abdomen .In such cases we came across a sub hepatic appendix or situsinversustotalis, in which the appendix is in left iliac fossa, causing diagnostic difficulty if appendicitis develops.

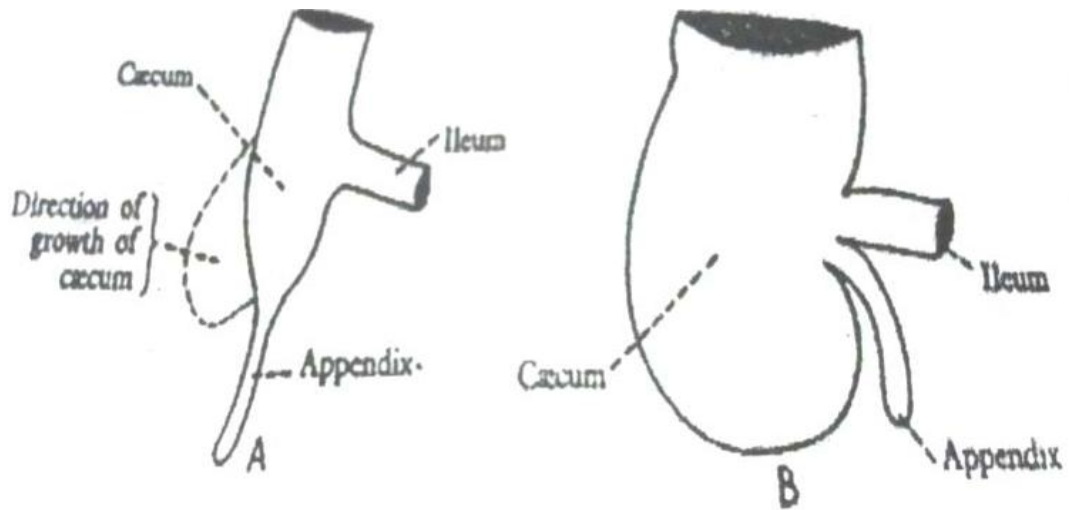


FIGURE .1 EMBRYOLOGY OF APPENDIX
Figure 1: Development of appendix

POSITIONS OF THE APPENDIX

- | | |
|----------------|--------|
| 1. Retrocaecal | (64%) |
| 2. Pelvic | (32%) |
| 3. preileal | (1%) |
| 4. Postileal | (0.5%) |
| 5. Paracaecal | (2%) |
| 6. Subcaecal | (1.5%) |
| 7. Subhepatic | |

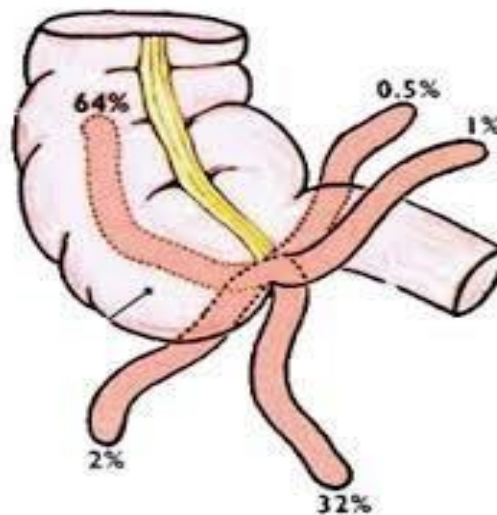


FIGURE 2 VARIOUS POSITION OF THE APPENDIX

ANATOMY OF APPENDIX

- Vermiform appendix is the narrow, vermiform (worm-shaped) tube which arises from the posterior medial caecal wall, 2cm below the end of the ileum. It may occupy one of several positions
- On the base of the appendix the three taeniae coli of the caecum join into its longitudinal muscle.
- The appendix can be traced by identifying anterior taenia coli.
- Length of the appendix 2 to 20 cm (average 9cm).
- Diameter of the appendix 5-7mm.
- The appendix is connected by short mesoappendix to the ileocecal junction.

VASCULAR SUPPLY

The **main appendicular artery**, a branch of ileocolic artery, runs behind terminal ileum and enters the mesoappendix. There it gives off a

recurrent branch, which anastomosis at the base of the appendix with a branch of the posterior caecal artery.

Often accessory artery (artery of seshachalam) may be present.

Appendicular veins drain into the posterior caecal or ileocolic vein and then drain into the superior mesenteric vein

LYMPHATICS

Abundant lymphoid tissue present in the wall of the appendix. All lymphatic's join to form three larger vessels which drain into the lymphatic's draining the ascending colon and end in the inferior and superior ileocolic chain of nodes.

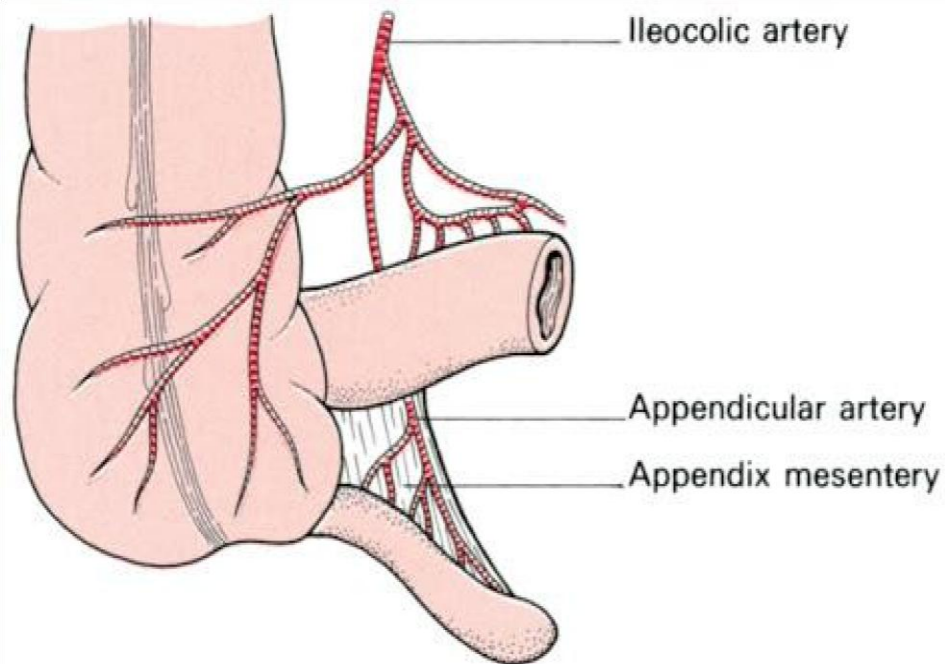


Figure 3 BLOOD SUPPLY OF APPENDIX

NERVE SUPPLY

The parasympathetic and sympathetic nerves from the superior mesenteric plexus supply the appendix.

APPENDICITIS –AETIOLOGY

- Reduced fiber diet causes appendicitis
- It is more common among young males , white races
- Common in May and August-seasonal variation –epidemic appendicitis
- Family history relevant in 30% cases
- Viral infection causes mucosal edema and later infected by bacteria leads to appendicitis
- Distal colonic obstruction
- Abuse of purgatives
- Faecolith
- Obstruction of lumen of appendix due to stricture, roundworm and foreign body.

ORGANISMS CAUSING APPENDICITIS

- E.coli (86%)
- Enterococci(30%)
- Streptococci

- Anaerobic
- Clostridium welchii
- Bacteroides.
- Mixed growth of aerobic and anaerobic is usual

ETIOPATHOGENESIS AND CLINICAL FEATURES

Acute non obstructive appendicitis is caused by mucous membrane inflammation with secondary infection without obstruction causes. This may lead into resolution, fibrosis, recurrent appendicitis, or even into the obstructive appendicitis.

Luminal obstruction leads to mucus and inflammatory fluid collects inside the lumen which increases intraluminal pressure leads to blockage of lymphatic and venous drainage resulting in increased edema of mucosa and causes mucous ulceration and ischemia, along with bacterial spread through submucosa and muscularispropria leads into the acute obstructive appendicitis.

After perforation, localization by greater omentum and dilated ileum occurs leads to suppuration and pus inside –appendicular abscess

Localization can occur by omentum and dilated ileum without pus inside- appendicular mass At sometimes obstruction of lumen leads to mucus collects inside resulting in mucocele of the appendix.

RISK FACTORS FOR PERFORATION OF THE APPENDIX

- Immunosuppression and extremes of age
- Diabetes mellitus, previous abdominal surgery
- Faecolith, pelvic appendix

ACUTE NON OBSTRUCTIVE CATARRHAL APPENDICITIS

Inflammation of mucous membrane leads into the

- Resolution
- Ulceration and Suppuration
- Fibrosis
- Recurrence
- Gangrene
- Peritonitis

ACUTE OBSTRUCTIVE APPENDICITIS

Lumen of appendix blocked along with pus collects inside leads into gangrene and perforation of the appendix at tip or base leads into appendicular abscess Thrombosis of the appendicular artery associated.

RECURRENT APPENDICITIS

Recurrent attacks of non obstructive type leads to fibrosis, adhesions causing recurrent appendicitis

SUBACUTE APPENDICITIS

This is the milder form of acute appendicitis.

STUMP APPENDICITIS

It is retained long stump of inflamed appendix. Occurs mostly commonly after laparoscopic appendicectomy.

APPENDICEAL FECOLITH

Fecal material is commonly present in both the normal and the inflamed appendix, and this should be differentiated from the true fecolith, which is ovoid, about 1 to 2 cm in length, and fecal colored. Unlike ordinary feces, the true fecolith shows well-ordered lamination in section. The great majority of these fecolith are radiopaque and, in 10% of cases of acute appendicitis. Contain sufficient calcium to be demonstrated on a plain X-ray film of the abdomen.

MACROSCOPIC

- The external appearance often depends on the underlying pathology. The appendix size and serosa may normal.
- From a normal shiny appearance of the serosa, the spectrum ranges through patchy hyperemia to continuous congestion.
- Diameter of the appendix extends up to 1 cm as the process extend to later severe stage.
- Focal gangrene necrosis of the wall. Frank perforated area seen.

CLINICAL PRESENTATION

SYMPTOMS

- Peri umbilical pain
- Pain shift to right iliac fossa
- Anorexia
- Nausea and vomiting

MURPHYS TRIAD

- Pain
- Vomiting
- Temperature

SIGNS OF APPENDICITIS

- Pyrexia
- Localized tenderness in right iliac fossa
- Muscle guarding
- Rebound tenderness

SIGNS TO ELICIT APPENDICITIS

COPE'S PSOAS TEST

Right thigh pain on extension:—retroperitoneal retrocaecal appendix.

OBTURATOR TEST

Right thigh pain on internal rotation:—pelvic appendix

ROVSING SIGN

Pain in the right iliac fossa on pressing the left iliac fossa, due to shifting of intestinal loops causing irritation of the parietal peritoneum.

DUNPHYS SIGN

Increased right iliac fossa pain on coughing.

AARON SIGN

A sensation of epigastric pain and distress on pressure over Mcburney s point.

BLUMBERG SIGN

Release sign, due to the presence of an inflamed organ underneath it.

ALDER'S SIGN (DIAGNOSE APPENDICITIS IN PREGNANCY)

First mark the most tender point, then on turning the patient to left side, tenderness of uterine origin will shift, while appendix pain remain in the same point.

FEATURES ACCORDING TO THE AGE

ACUTE APPENDICITIS IN INFANCY

Appendicitis is rare, Because the appendix has a relatively wide lumen in infants, before the age of 2 years. it has got 85% chances of perforation with high mortality (55%)

ACUTE APPENDICITIS IN CHILDREN

From the age of 2 years, the incidence of appendicitis rises to a peak at about 11 years of age and then declines gradually 15 years before dropping rapidly thereafter. Both the mortality and morbidity rates for appendicitis are higher in preschool children than in children >5 years of age. The most likely explanation is that, because delays in diagnosis are more likely in infants, a higher proportion is admitted to the hospital with established peritonitis. It is important to recognize that the clinical picture of acute appendicitis in young children is often atypical. Rather than a story of a shift of pain, there is frequently only the complaint of generalized abdominal pain

ACUTE APPENDICITIS IN ELDERLY

Appendicitis is undoubtedly a more serious situation in elderly patients than in younger ones. Peltokallio and Juuhianen showed that the clinical features of patients more than 60 years of age with acute appendicitis are similar to those of younger age groups in the pattern and duration of symptoms, the temperature changes and the leukocyte responses. However, at operation both gangrenous changes and perforation had occurred five times as often in the older age group. These findings suggest that poorer localization of

the infection and diminished blood supply of the appendix are important factors in allowing rapid progression of the disease.

ACUTE APPENDICITIS IN PREGNANCY

This is not an infrequent occurrence, because the pregnant woman is neither more nor less prone to appendicitis than a non pregnant young adult. Back analyzed 373 such cases and noted that the incidence was equally distributed through the three trimesters. Diagnosis is undoubtedly more difficult in the pregnant woman. In the first trimester, the history of amenorrhea and the local physical signs may lead to a diagnosis of ruptured ectopic pregnancy. The nausea and vomiting may be thought to be physiologic "morning sickness," consequently delaying accurate diagnosis

APPENDICITIS IN THE APPENDICEAL STUMP

Francis pointed out that not even a clear history of a previous appendectomy invariably rules out the diagnosis of acute appendicitis. He described a woman, 44 years of age, who had undergone a previous appendectomy for acute appendicitis and who subsequently had perforation of an appendix stump 1 cm in length

DIFFERENTIAL DIAGNOSIS
GASTRO-INTESTINAL

- Cholecystitis
- Diverticulitis
- Meckel s diverticulitis
- Enteritis
- Duodenal ulcer
- Intussusception
- Mesenteric lymphadenitis
- Necrotizing entero colitis
- Torsion of the Omentum
- Acute Pancreatitis
- Perforated bowel volvulus
- Neoplasm (carcinoid, carcinoma, lymphoma)

GYNECOLOGICAL

- Ectopic pregnancy
- Endometriosis
- Ovarian torsion
- Pelvic inflammatory disease
- ovarian cyst is ruptured
- Tubo ovarian abscess

SYSTEMIC CAUSE

- Diabetic keto acidosis
- Porphyria
- Sickle cell anemia
- Pleurisy

GENITO-URINARY

- Kidney stone
- Prostatitis and Pyelonephritis
- Urinary tract infection
- Parasitic infestation
- Psoas abscess
- Hematoma
- Testicular torsion

INVESTIGATIONS

LAB INVESTIGATIONS

Total count markedly increased around 10,000/ mm³ (range from 8000 to 14000/mm³). Increase in count of neutrophils (Shift to left) CRP- Elevated implies inflammation. Urine analysis to rule out genito urinary cause.

PLAIN X-RAY FLIM

- To find the cause of abdominal pain
- Sentinel loop – A fluid level in ileum with dilated atonic ileum

- Caecum is dilated and Appendix calculus about 0.5 – 6 cm
- Right lower quadrant haze due to fluid and the edema
- Scoliosis present and concave to right
- Widening of the pre peritoneal fat
- Right lower quadrant mass indenting the caecum
- Right psoas outline is blurring
- Gas in the appendix

ULTRASOUND

In 1986, Julian puylaert developed the graded compression technique for ultra sound examination.

7MHZ Probe used over the point of maximum tenderness in the right iliac fossa, pressure is gradually increased over the area in order to displace the bowel loops, appendix may then be seen overlying the psoas muscle.

ULTRASOUND FINDINGS

- Blind –ending tubular structure at the point of tenderness
- Non-compressible
- Diameter 7 mm or greater
- No peristalsis
- Appendicolith casting acoustic shadow

- High echogenicity non-compressible surrounding fat
- Surrounding fluid or abscess
- Oedema of caecal pole

A sensitivity of around 90% has been claimed. It should be remembered that there are pitfalls in the ultrasound diagnosis of appendicitis. Scenarios leading to false-negative examinations include appendicitis of the appendiceal tip, retrocaecal appendicitis, gangrenous or perforated appendicitis, or gas filled appendix.

COMPUTED TOMOGRAPHY (C.T) IN APPENDICITIS

The spiral CT is more accurate than axial CT scan. Scanning with oral and I.V contrast is more accurate than non contrast CT scan.

C.T FINDINGS IN APPENDICITIS

- Appendicolith is present
- Diameter of appendix is more than 6mm
- The oral contrast or air fails to fill the appendix
- The wall of the appendix is enhanced with IV contrast

Fluid, appendicular mass, thick caecum, attenuation of fat, gas in the extra luminal space, lymph nodes enlarged.

- Arrow head sign: - Caecal lumen pointing towards the opening to the appendix which is obstructed 100%

Specificity and sensitivity.



Figure 4 APPENDIX IN CT ABDOMEN

DIAGNOSTIC LAPROSCOPY

It is useful in equivocal cases.

Avoid unwanted appendicectomy

Useful in young females along with gynecological conditions

ALVARADO SCORE:

A number of clinical and laboratory – based scoring systems have been devised to assist diagnosis. The most widely used is the Alvarado score.

Score

Symptoms

Migratory RIF pain	-	01
Anorexia	-	01
Nausea and vomiting	-	01

Signs

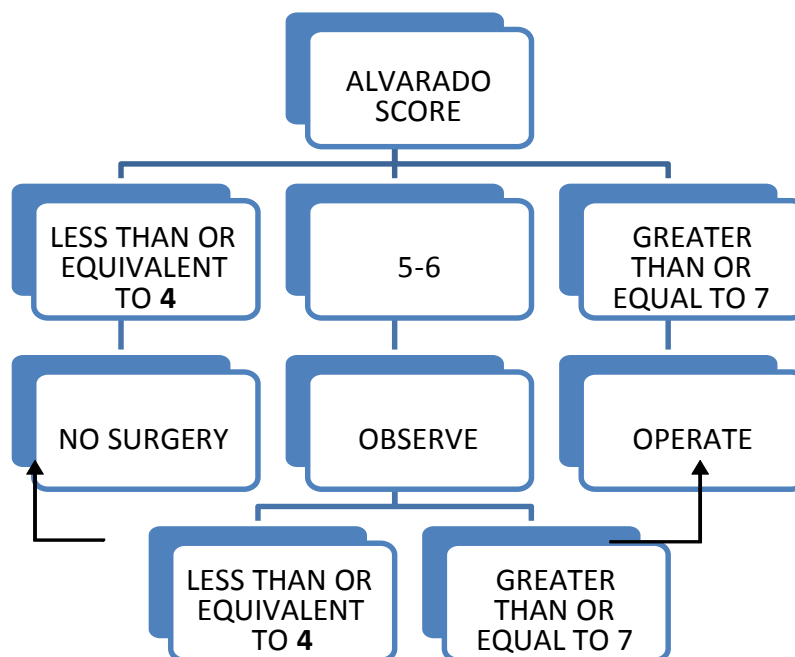
Tenderness (RIF)	-	02
Rebound Tenderness	-	01
Elevated temperature	-	01

LABORATORY

Leucocytosis	-	02
Shift to left	-	01

Total: A score of 7 or more is strongly predictive of acute appendicitis

ALVARADO SCORE



TREATMENT OF ACUTE APPENDICITIS

NON OPERATIVE MANAGEMENT

TREVES – Even prior to the advent of antibiotics. He Advocate early non operative management of acute appendicitis, COLDREY –471 patients with appendicitis treated with antibiotics and presented his study series. This treatment failed in 57 patients, 48 requiring appendicectomy, 9 requiring drainage of appendicular abscess. ERIKSSON –High rate of recurrence treated non surgically. Non operative management of appendicitis cannot be recommended based on the high failure rates. Antibiotic measure is only temporary.

OPERATIVE MANAGEMENT

The treatment for appendicitis is appendicectomy

Proper preoperative work up should done

1. Intravenous fluid should be begun. Monitoring of urine output, blood pressure, pulse. Electrolyte abnormalities should be corrected.
2. Antibiotics should be given before 30 minutes of induction of anesthesia
3. Antibiotic should cover both gram negative bacteria and anaerobes

4. There should not be any delay in surgery to minimize the chances of perforation
5. Severe peritonitis, electrolyte abnormalities are present.

INCISIONS IN APPENDICECTOMY

APPROACHES

GRID IRON INCISION (MCBURNEY S INCISION)

This incision was described by McARTHUR. Incision made at right angle to right spine –umbilical line at the mcburney s point. Advantages: muscle separated along its fibres and hence wound strength does not depend on stitches and prevent incisional hernia. Disadvantages: inadequate exposure in retrocaecal appendicitis and cosmetic appearance is not good.

RUTHERFORD MORRISONS INCISION

Muscle cutting incision, muscles are cut upwards and medially. It is useful when appendix is paracaecal or retrocaecal and fixed. Advantages- better exposure than mc burney s and can be extended in either way. Disadvantages- More bleeding, more painful in post op, time consuming. Developed by fowler in 1884 and modified by Rutherford Morrison and grey turner in 1901.

Similar to grid iron incision except internal oblique and transverse abdominis are cut at right angle to its fibres.

LANZ CREASE INCISION

Transverse skin crease incision has become more popular, as the exposure is better and extension, when needed, is easier. The incision, appropriate in length to the size and obesity of the patient, is made approximately 2 cm below the umbilicus centered on the patient, is made approximately 2cm below the umbilicus centered on the mid clavicular – mid inguinal line.

RIGHT LOWER PARAMEDIAN INCISION

Organ is comparatively inaccessible in this approach. Possible to contaminate the peritoneum medially in cases where the infection was localized .Valuable when the diagnosis in doubt. Useful in elderly when other conditions co exists.

FOWLER –WEIR APPROACH

Incision made by cutting muscle medially over rectus, it made just below umbilicus at the level of mid clavicular line. Advantages are exposure is good, cosmetically good scar, useful in obese patients. Disadvantages are dissemination of infection and peritonitis.

LOWER MIDLINE INCISION

When the diagnosis is in doubt, particularly in the presence of intestinal obstruction.

BATTLE INCISION

Rectus sheath is incised and the rectus muscles are retracted and medial inferior epigastric vessels are avoided. Incision of peritoneum limited to prevent injury to segmental nerves. Bloodless approach and exposure is good.

Disadvantages are infection of the rectus sheath common, incision cannot be extended.

LAPROSCOPIC

It is becoming popular and better now.

PRINCIPLES OF OPEN APPENDICECTOMY

The Caecum is the most lateral structure in the abdominal cavity and is the surgical target. The skin incision is chosen to suit the surgical target. First make an adequate skin incision; properly closed, the cosmetic blemish is not related to the length. A small incision is only permissible if the caecum and appendix can be fully delivered so that the operation is conducted outside the abdomen. If intra peritoneal procedure is to be done, then access must be much more generous.

There must be no hesitation in opening the rectus sheath medially to improve the exposure. The incision should be enlarged at first; it should be possible to remove the appendix without dragging or pulling. If the exposure

proves inadequate it is often only the muscular and fascial layers that need to be further incised as the skin wound is relatively mobile.

STEPS OF OPEN APPENDICECTOMY

The skin is incised in the chosen line and hemostasis secured. The external oblique is then nicked, and the cut end picked up with a hemostat on each side and enlarged 3cm or so in either direction. The medial hemostat is now drawn toward the midline and the areolar tissue on the inner aspect of the aponeurosis cleared. The internal oblique muscle will now be seen at its insertion into the rectus sheath, the junction of the muscle at the lateral border of the rectus is the thinnest part of the abdominal wall. A toothed dissecting forceps picks up the fibrous sheath at this point and the knife makes a small incision, carried down to the peritoneum.

The lateral fibres of the rectus are just seen medially and the internal oblique and the transverse muscle can now split laterally with the fingers both in the same line. The peritoneum is picked by two hemostats, one above and one below and incised in the line of the deep muscle split.

TECHNIQUE OF APPENDICECTOMY

After opening the peritoneum, the caecum nearly always presents. If there is free fluid a specimen is obtained for culture. In the event, the caecum

does not offer its anterior wall into the wound, the terminal ileum is packed away under the medial edge of the incision and the caecum sought higher and more laterally.

The caecum is next grasped by the anterior taenia between finger and thumb and then drawn first downwards and inwards and then upwards over the medial portion of the wound.

As it was delivered it is seized with a moist pack and progressively turned towards the left. The appendix comes into view. The right index finger may be inserted in to the wound to aid the gentle delivery of the organ, but only under vision. It is advisable to use the tissue holding forceps (Babcock's) to grasp the appendix. A more generally applicable maneuver is to seize the mesoappendix in a curved artery forceps.

The next step is to divide any bloodless peritoneal attachments to the right of the mesoappendix, allowing this structure to be more easily seen. The mesoappendix may be serially clipped and cut until its base is reached or if the mesoappendix is well defined, a single ligature may be passed around it and tied. The appendix is now free and unencumbered by instruments except for one forceps at its tip. A hemostat is applied across its base, then moved distally one diameter, applied again and finally applied for a third time the same distance along the appendix. The organ is ligated across the first crush and will be cut through the second.

Residual appendiceal stump should be no longer than 3cm to minimize the possibility of stump appendicitis in the future. Much debate has gone for years about whether or not to invaginate the appendix stump.

Appendicular stump abscess in the caecal wall is so rare that it should not be regarded as a contraindication to invagination. In that the gut heals best by the formation of granulation tissue and collagen from serosal layers, it seems rational to invaginate.

Invagination is done using either purse string or Z-stitch suture placed at least 1.5 cm away from the stump. If the Caecal wall is edematous, one must not attempt invagination. The appendix base is cut with knife.

The tension on the caecum is now relaxed and the line of the mesoappendix checked for bleeding. If all is well the caecum is allowed to fall back into the wound. The following is carried out if the appendix is with doubt.

- I. In a female, palpate right ovary and tube. The glove is examined for blood.
- II. The last meter of the ileum is withdrawn to
 - See for mesenteric nodes.
 - Meckel's Diverticulum
 - Reasonably certain that there are no other lesions.

III. A finger is passed to the left and downwards to seek the inflamed loop of sigmoid colon which is a seat of diverticular disease.

PROBLEMS

1. The caecum cannot be found.

- Either not descended fully or malrotation of the intestine.
- Extension of the incision upward.

2. Caecum cannot be delivered.

- Make an adequate access and vision. The peritoneal reflection around the lower pole may be divided bearing in mind, that gonadal vessels and ureter lie medially just deep to the peritoneum.

3. **Appendix cannot be found:**

- Make certain that it is the caecum that has been delivered.
- Transverse colon recognized by attachment of greater omentum, Sigmoid colon by appendices epiploicae.
- Trace the taenia coli of the caecum, leads to the base of the appendix. Back or undersurface of the caecum palpated, the appendix may be buried in the caecal wall.
- If previous appendicectomy excluded, only possibility is organ has become inverted or intussuscepted.

4. Appendix has sloughed off:

- The mesoappendix anchors the organ in the field of operation. It may be in portions if a faecolith has perforated through the wall. Both portions must be removed and the faecolith retrieved usually from the pelvis.

5. The appendix lies buried Retrocaecally:

- First enlarge the wound. Caecum is retracted to the left. Reflection of the peritoneum on the lateral aspect of the caecum is in view a hockeystick shaped incision is made in the parietal peritoneum, after a little blunt dissection, in the retroperitoneal space the caecum can be retracted still further to the left rendered far more mobile and rotated, the combined effects of which result in bringing the greater portion of a hidden appendix.

6. Appendix clothed with adherent greater omentum.

- Try not to disturb the adherent omentum, when within it lies a gangrenous or perforated appendix.
- Greater omentum divided between hemostats at a convenient distance from the appendix and then appendicectomy conducted.

7. Appendix is gangrenous near its junction with caecum

- Possibility of sudden gush of liquid faeces from the caecum, to avoid this, if the caecum is ballooned, deflated the caecum before appendicectomy.
- The method of closing the stump is, by two sutures transfixing the caecal wall. These must be inserted before the appendix is amputated and are later oversewn by interrupted seromuscular sutures.

8. The mesoappendix is gangrenous and cuts out.

- If a ligature will not hold, a stitch applied directly beneath a spurting vessel may stop the bleeding.

RETROGRADE APPENDICECTOMY

INDICATION

- Base of the appendix is accessible and difficulty is experienced in identifying or delivering the distal part of the organ completely.
- In retrocaecal appendicitis.

TECHNIQUE

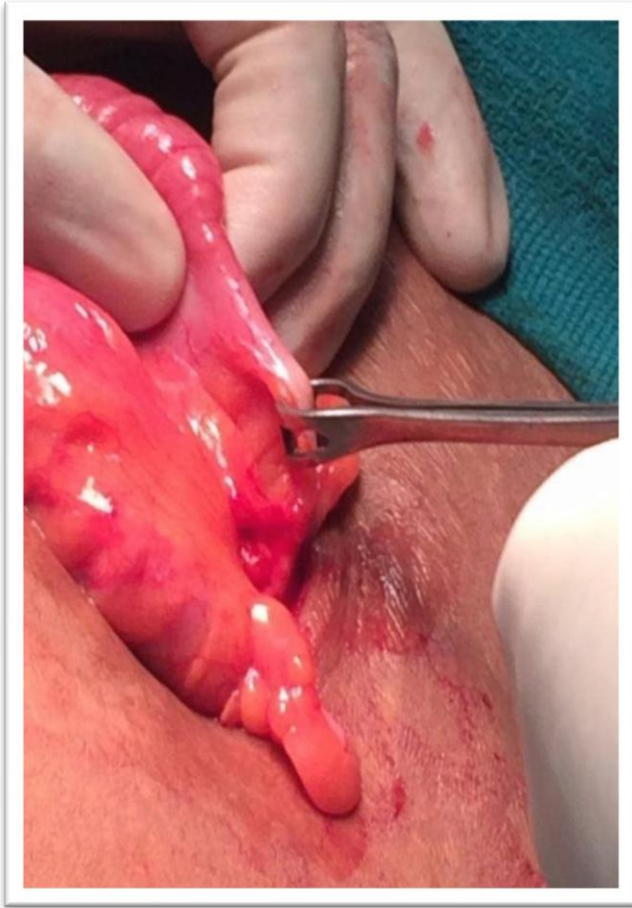
- Base of appendix is held between finger and thumb so that its junction with caecal wall apparent.
- Fine hemostat passed between caecum and appendix to create a space and 2 similar instruments are applied across the appendix, which is divided between them.
- The mesoappendix is then clamped and divided working distally.
- Purse string suture is inserted with the hemostat grasps the stump.
- Appendicular stump ligated.
- Base of the appendix buried.
-

CLOSURE

- There is no absolute need to close the peritoneum separately.
- Transverse slit in the peritoneum and deep muscle may be closed as one layer with either continuous or interrupted absorbable '0' gauge or nil gauge.
- A muscle cutting incision should be closed with continuous or interrupted absorbable monofilament sutures.
- Skin closed with fine, interrupted monofilament sutures or clips.



MC BURNEYS INCISION



RETROGRADE



WOUND CLOSURE

Figure 5 APPENDICECTOMY

LAPAROSCOPIC APPENDICECTOMY

The first description of laparoscopic appendicectomy was in 1983 by Semm in Germany.

PRINCIPLES AND JUSTIFICATION

Indication of laparoscopic appendicectomy are same as open appendicectomy. Systemic review and Meta analysis of literature have revealed following

1. Less operating time in open appendicectomy
2. Less post op pain and analgesic requirement in laparoscopic appendicectomy
3. Less wound complications in laparoscopic appendicectomy
4. Less intra abdominal pus collection in open appendicectomy
5. Open appendicectomy is more economical
6. Faster return to work in laparoscopic appendicectomy

The definitive indication of laparoscopic appendicectomy is in young females of reproductive age group where diagnosis is in doubt and laparoscopy gives diagnostic advantages and avoids unnecessary laparotomy.

Laparoscopic appendicectomy is actually more challenging than open. It needs more training than open surgery. It has yet to be demonstrated that whether laparoscopic appendicectomy will decrease the long term complications like pelvic adhesion and small bowel obstruction.

CONTRAINDICATIONS

ABSOLUTE CONTRAINDICATIONS

- Generalized peritonitis
- Advanced intestinal obstruction
- Bleeding disorders
- Portal hypertension
- Lack of surgical experience
- Inability to tolerate general anesthesia
- Intra abdominal abscess

RELATIVE CONTRAINDICATIONS

- Previous abdominal surgery
- Suspicion of malignancy
- Advanced pregnancy
- Evidence of localized abscess formation
- Severe co morbid illness

ADVANTAGES OF LAPAROSCOPIC APPENDICECTOMY

It allows more thorough exploration of the abdominal cavity. This is important in those patients presenting with evidence of lower abdominal peritonitis who appear to have a normal appendix.

It gives definite treatment of other abdominal or pelvic pathology. Conversion to a midline laparotomy may be avoided if the entire abdomen examined laparoscopically.

Finally, the incidence of post op wound complications is reduced. Contamination of the wound is assumed following removal of a inflamed or perforated appendix through a right lower quadrant or midline incision. During laparoscopic surgery the appendix can be removed without coming into direct contact with the fascia or subcutaneous tissue.

DISADVANTAGES OF LAPAROSCOPIC APPENDICECTOMY

The appendix stump may be difficult to mobilize and secure. With the availability of ENDO GIA stapler, base of the appendix can be easily tackled.

The presence of extensive inflammation, dense adhesions, or abscess may necessitate abandoning the laparoscopic surgery in favor of an open approach. It needs general anesthesia but open surgery can be done under spinal or epidural anesthesia.

EQUIPMENTS AND INSTRUMENTS OF LAPAROSCOPIC APPENDICECTOMY

1. **Light Source:** A high intensity light source such as Xenon with variable intensity and a light filter provides adequate visualization of

abdominal cavity at various distances. It can be equipped and a flash generator for film photography.

2. **Fibre optic light guide cable** - A 5mm thick, 225cm long cable is desirable. A thick cable carries more light and a long cable is more convenient and less likely to be stretched.
3. **Video camera** - To maximize the visualization of structure, single chip and viewing camera having 480 lines / inch resolution is the minimum requirement. It is attached to the scope and cable hooked to a processor that transmits the image to video monitor. The chip cameras (700 lines / inch resolution) are expensive, but provide the best image. All cameras require white balancing.
4. **Telescope**– It is based on the Hopkins rod lens system. It is available in many sizes, 10mm, 7mm, 5mm and the new 2mm. It may have forward views or 300/450 angled views. Telescope tips fog due to temperature differences outside and inside the patient. This is aggravated by the cold insufflations. Warming the telescope in warm water before use and touching the tip to the liver surface avoids fogging.
5. **Endoflator (CO2 insufflator)** – It is used to insufflate carbon dioxide to create pneumoperitoneum. As a safeguard, it also monitors the IAP constantly to stop the flow once 12 to 16mm Hg of pressure is achieved

and also has indicators for rate for flow and total volume of gas delivered. A rate of 4-5L/min delivery is ideal. But at least 6L/min is the minimum required. Carbon dioxide is the standard gas used for creation of pneumoperitoneum. It can be insufflated directly into the blood stream in volume up to 100L/min without serious metabolic effect. It suppresses combustion and appears to be innocuous to the tissues of peritoneum.

6. **High resolution video monitor** – 480 Hz lines /inch for one chip camera and 700 Hz lines / inch for three chip camera. Monitors should be at least 13 inch in size for adequate visibility and must be grounded. For teaching and documentation, printers and video recorders are invaluable.
7. **Irrigation device** – A pressure of 300 mm Hg is usually used to irrigate the abdomen – either manual or powered. The irrigation aspiration probes may have a single channel for both these functions or separate channels. Heparin 1000/UL may be added to the irrigation fluid to minimize clot formation.
8. **Electro-cautery** – It is used to dissect mesoappendix from the appendix and achieve adequate haemostasis. It uses electrons to produce heat and to dissect and coagulate tissues.

INSTRUMENTS:

It involves highly specialized and innovative device used to ensure safety of the procedure.

1. **Veresss needle** – It is used to insufflate abdomen. A metal sheath covers the needle tip and retracts as the needle penetrates the abdominal wall and springs to over the tip once the needle is in the abdomen. It prevents the laceration of abdominal organs during insufflation. It is connected to the tubing from insufflator to establish pneumoperitoneum.
2. **Trocars and cannulas** – trocars for introduction of telescope and instruments are in two sizes ie. 11 mm and 5.5mm. The trocar has metal tube with a sharp conical or pyramidal tipped obturator. The outer surface of the cannula has a dull finish to minimize reflection of light in the abdomen. Gas escape is prevented by a flap gate or trumpet valve. All trocars have stop cocks through which carbon dioxide can be insufflated or smoke evacuated.
3. **Retractors / Graspers**-it is useful for grasping and retracting thick walled structures of extracting gall bladder from the abdomen. They are 5.5mm in diameter with jaws at the tip and handles with ratchets. They are inserted through two lateral cannulas and retract gall bladder and fundus.

4. **Dissectors and scissors** - they are used for dissecting tubular structures, passing ligatures and pin point diathermy. They have thin elongated jaws. Maryland dissector has jaws bent at the tip. Hook scissors can cut and grasp tissues with tip and pull them out. Straight scissors or micro scissors are used for division for cystic duct and cholangio-catheter placement.
5. **Occlusion applicators** – They come in 3 sizes – medium, medium large and large. These are used to clip cystic artery and cystic duct.
6. **Coagulators** – These are used to cut or coagulate. Hook or spatula is used for dissection or coagulation.

PRE OP PREPARATION The patient should be adequately hydrated with intravenous fluids Before 30 minutes of the surgery the second generation cephalosporin antibiotics should be given. To decompress the stomach a nasogastric tube should be put. To decompress the urinary bladder, a Foley catheter is needed .



**LAPAROSCOPIC
OPERATIVE SETUP**



**TROCARS AND
CANNULA**



LAPAROSCOPIC HAND INSTRUMENTS

FIGURE 6. LAPAROSCOPIC INSTRUMENTS

LAPAROSCOPIC APPENDICECTOMY TECHNIQUE

After induction of general anesthesia the patient is supine positioned on the theatre table with the left arm tucked at the side. Antibiotics are routinely started at the time of diagnosis of acute appendicitis and are not duplicated in

the operating room unless otherwise needed based on the time interval since the last dose.

A Foley catheter is placed under the sterile conditions for decompression of the bladder. Deep venous thrombosis prophylaxis is by sequential compression devices. On the right side of the patient a monitor is placed. On the left side of the patient, the Surgeon and first assistant both stand.

Pneumoperitoneum is created with the closed technique using a Veress needle or the open Hasson cannula technique. Closed technique is preferred in all except in patients with perforation peritonitis or with distended bowel loops.

The umbilicus is the preferred site for insertion of the Veressneedle . An alternative site may be chosen or an open insertion technique may be used. Alternative sites for the insertion of Veress needle include the right or the left midsubcostal regions, right and the left iliac fossae and the supraumbilical region along the lineaalba.

The needle (and subsequent trocar) should be inserted at 45° angle towards the pelvis and away from the aorta and inferior vena cava. One frequently appreciates a click of a spring loaded Veress needle as it enters through the fascia.

Confirmation of the intraperitoneal location of Veress needle is done by:

- a. Needle is aspirated to demonstrate the absence of return of blood or bowel contents or a free flow of fluid.
- b. Saline drop test: the needle is filled with saline and fluid is demonstrated to flow freely by gravity into the peritoneal cavity as negative pressure is generated by lifting the abdominal wall.

There are several methods of gaining safe access to the peritoneal cavity including the open Hassan technique, use of the Veress needle, and use of an optical view trocar under laparoscopic visualization, among others.

A 10-mm port is inserted, secured, and pneumoperitoneum with carbon dioxide established. Visualization is obtained for the duration of the operation using an angled 10-mm laparoscope. The patient is then placed in Trendelenburg and left lateral decubitus position.

Two additional ports, usually of 5-mm diameter are inserted in the right lumbar position and the left lower position, in the abdomen. Try to avoid injury to the bladder and the epigastric vessels as well as other underlying visceral organs care must be taken. This port arrangement allows for adequate visualization and comfortable ergonomics while maintaining excellent cosmesis.

A thorough inspection of the entire peritoneal cavity is performed first, and then the operation begins by mobilizing a small bowel loops out of the RLQ, thereby exposing the caecum and terminal ileum.

The base of the appendix can be readily found by following the tenia coli on the ascending colon proximally to the confluence of the caecal tenia. The base of the appendix can also be found by following the fat pad located between the terminal ileum and the base.

The appendix is gently manipulated to bring it into view. Oftentimes, this required some blunt dissection away from surrounding visceral organs where inflammatory adhesions have formed.

With a retrocaecal appendix, some mobilization of the caecum using Sharp dissection off the retroperitoneum, Is needed for adequate visualization.

Once the appendix is dissected free and elevated, the mesoappendix containing The appendiceal artery becomes readily apparent, blunt dissection is performed to made the window between the appendix and the mesoappendix. The appendix is then divided at its base using extracorporeal suturing. Care must be taken to divide as close to the base as possible. If the base of the appendix is acutely inflamed, dilated, or perforated, Then the stapler must be placed such that a cuff of the normal caecum is removed as well. Alternatively, the appendix can be divided with scissors after suture ligation using an endoloop.

Next the mesoappendix is divided using the linear stapler. A cartridge with 2.5-mm staple height is used to ensure hemostasis. In some cases, multiple cartridges are required to completely divide the mesoappendix. Alternatively, isolation of the appendiceal artery and ligation with clips or use of an energy device such as an ultrasonic dissector or bipolar cautery can be performed.

The appendiceal stump and mesoappendix are then irrigated and carefully inspected for leak or hemorrhage. The appendix is placed into a bag and removed through the umbilical port site.

It is important to examine the specimen on the back table to be certain that the appendix, and not merely an inflamed mesoappendix, has been removed.

Any areas of contamination are thoroughly irrigated. This is critical for preventing postoperative abscess formation and should not be skipped or rushed.

The port sites are then inspected, the pneumoperitoneum is evacuated, and the ports are removed. The absorbable suture is used for the closing fascial defect at the umbilical port site. Subcuticular absorbable suture used to close the skin.

EXCISION OF APPENDIX - Single-Incision Technique

Many successful single-incision techniques for laparoscopic appendicectomy have now been reported. The earliest approaches involved identification of the appendix using a laparoscope placed over the appendix, grasping the appendix through a working channel in the scope, then externalizing it and performing an appendicectomy using the open technique.

More recent techniques involve multiple ports placed through a single incision in the periumbilical or usage of a multichannel port device. Single-incision technique for appendicectomy has been shown in multiple small retrospective studies to be safe and effective in certain patient populations, although placement of additional ports is often necessary to complete the operation. Proposed benefits of single-incision technique over the conventional laparoscopy had yet to be validated by the prospective randomized trial.

POST OPERATIVE COMPLICATIONS

INTRA PERITONEAL COMPLICATIONS EARLY

Appendix stump blow out – spillage of colonic contents into the peritoneal cavity
Generalized peritonitis- perforated or gangrenous appendix, virulent organisms and late presentations
Abscess- local, pelvic, subhepatic, subphrenic. Retained faecolith causing chronic local infection

EARLY OR LATE (EVEN MANY YEARS LATER)

COMPLICATIONS

Intestinal obstruction due to adhesions

LATE COMPLICATIONS

Infertility due to tubal occlusion following pelvic infection.

INTRA ABDOMINAL COMPLICATIONS - EARLY

Superficial and deep wound infection Dehiscence

COMPLICATIONS AFTER APPENDICECTOMY

Paralytic ileus, Reactionary hemorrhage, Portal pyaemia, Right inguinal hernia due to injury to ilio inguinal nerve, Faecal fistula Respiratory problems, Deep vein thrombosis.

INCIDENTAL APPENDICECTOMY

Here removal of appendix is done at laparotomy for other conditions. It is done in vague abdominal pain of doubtful severity. It is a useful procedure to tackle MUNCHAUSEN SYNDROME (psychological benefit). It is done for malrotation(ladd procedure). It is also done during on table colonic lavage (DOODLEYS LAVAGE).

METHODOLOGY

SOURCE OF THE DATA

Patients admitted in surgical wards of Thanjavur Medical College, Thanjavur, with clinical diagnosis of acute or recurrent appendicitis from Sep 2018 to Oct 2019.

METHOD OF COLLECTION OF DATA

This prospective study from Sep 2018 until Oct 2019 involved 99 Cases that was consecutively selected, where the investigator was a part of the Surgical team managing the patients, by using random sampling technique.

INCLUSION CRITERIA

Patients presenting with acute appendicitis or recurrent appendicitis

EXCLUSION CRITERIA

Patients with delayed presentation leading to appendicular mass, abscess. Patients who do not consent for the study. Pregnant women, Interval appendicectomy, Patients less than 12 years of age.

In spinal or general anesthesia Open appendicectomy was performed, through the muscle splitting incision in the right iliac fossa. The base of the appendix was crushed and ligated and the stump of the appendix was not invaginated

In general anesthesia, Laparoscopic technique performed using the Standardized approach involving the closed technique for the trocar insertion and by 3- port technique. The appendix is divided after double ligation of the base. Extraction of the appendix was performed using trocar sleeve to protect the wound from Contamination during removal. All cases were followed in the postoperative period till they were discharged and then later followed for a period of 4 weeks in the outpatient department.

The following parameters were observed between the two procedures.

1. Duration of procedure
2. Postoperative pain
3. Duration of surgery in minutes
4. Postoperative complications and wound infection.
5. Post operative length of hospital stay in number of days .
6. Resumption of diet

OBSERVATION AND RESULTS

Statistical analysis:

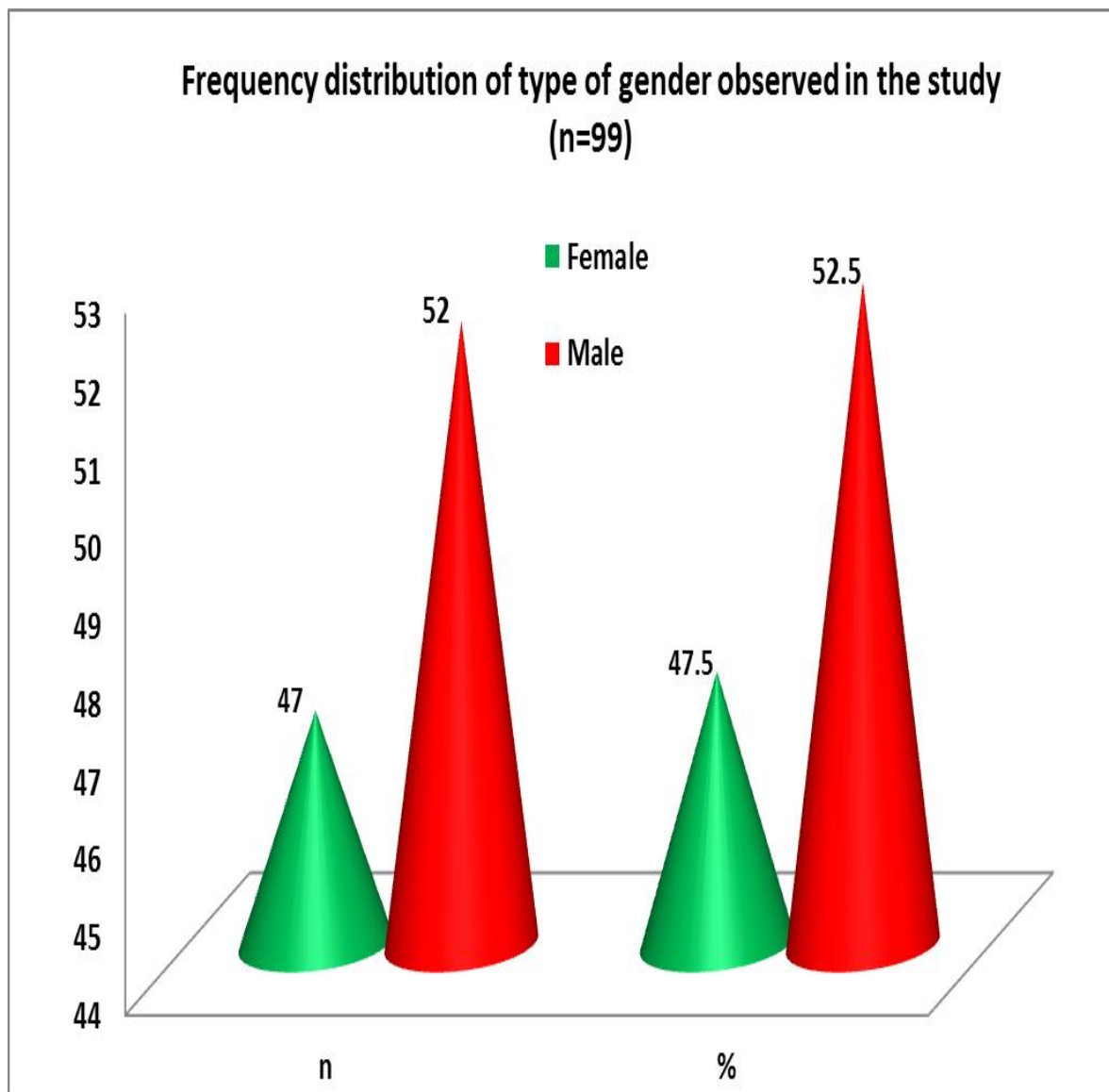
Data were entered in the excel spread sheet and variables were coded accordingly. The statistical analyses were performed using Graph pad Prism version 5 software. Data were presented as mean with Standard deviation for normal distribution/scale data. Data were presented as frequency with proportion n(%) for categorical data. Fisher's exact test was used to compare

the frequencies between the groups. Unpaired 't' test was used to compare the means between the groups. $p < 0.05$ were considered statistically significant.

Table 1. Frequency distribution of type of gender observed in the study.

S.No	Gender	n	%
1	Female	47	47.5
2	Male	52	52.5

Data are expressed as n with %. The total N=99



In The study Gender distribution female gender underwent appendicectomy about 52.5% male gender about 47.5%. in this study gender distribution is almost equivocal

TABLE 2. Frequency distribution of duration of age category observed in the study.

S.No	Age category	n	%
1	<20 years	42	42.4
2	21 – 30 years	32	32.3
3	31 – 40 years	10	10.1
4	41 – 50 years	11	11.1
5	>50 years	4	4.04

Data are expressed as n with %. The total N=99.

In this study less than 20 years of age is most commonly affected followed by 20 to 30 years of age. On increasing age the incidence of appendicitis is decreasing.

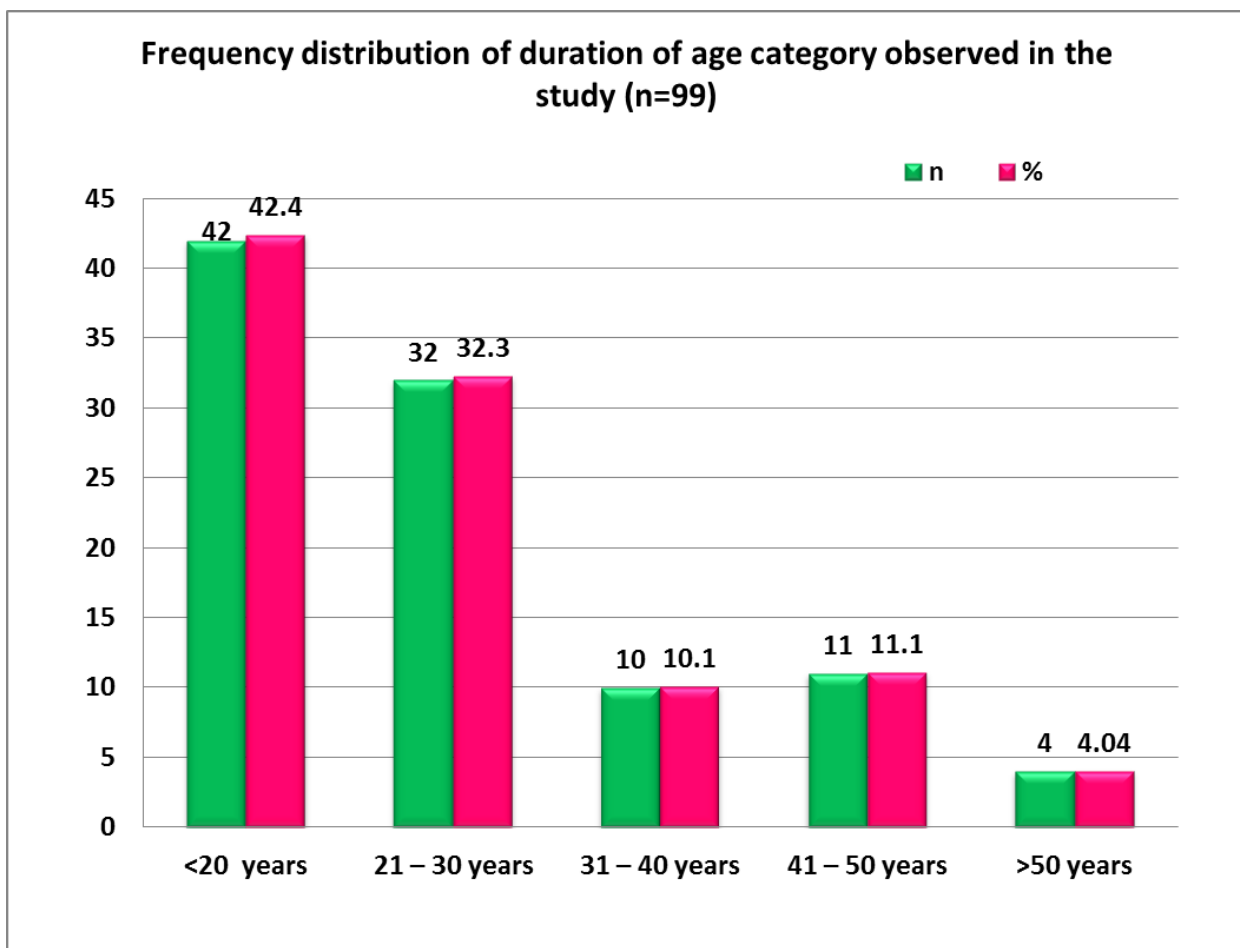


Table 3. Frequency distribution of occurrence of fever observed in the study.

S.No	Occurrence of fever	n	%
1	Yes	51	51.5
2	No	48	48.5

Data are expressed as n with %. The total N=99

In this study preoperative evaluation fever was present in 51.5% of patients

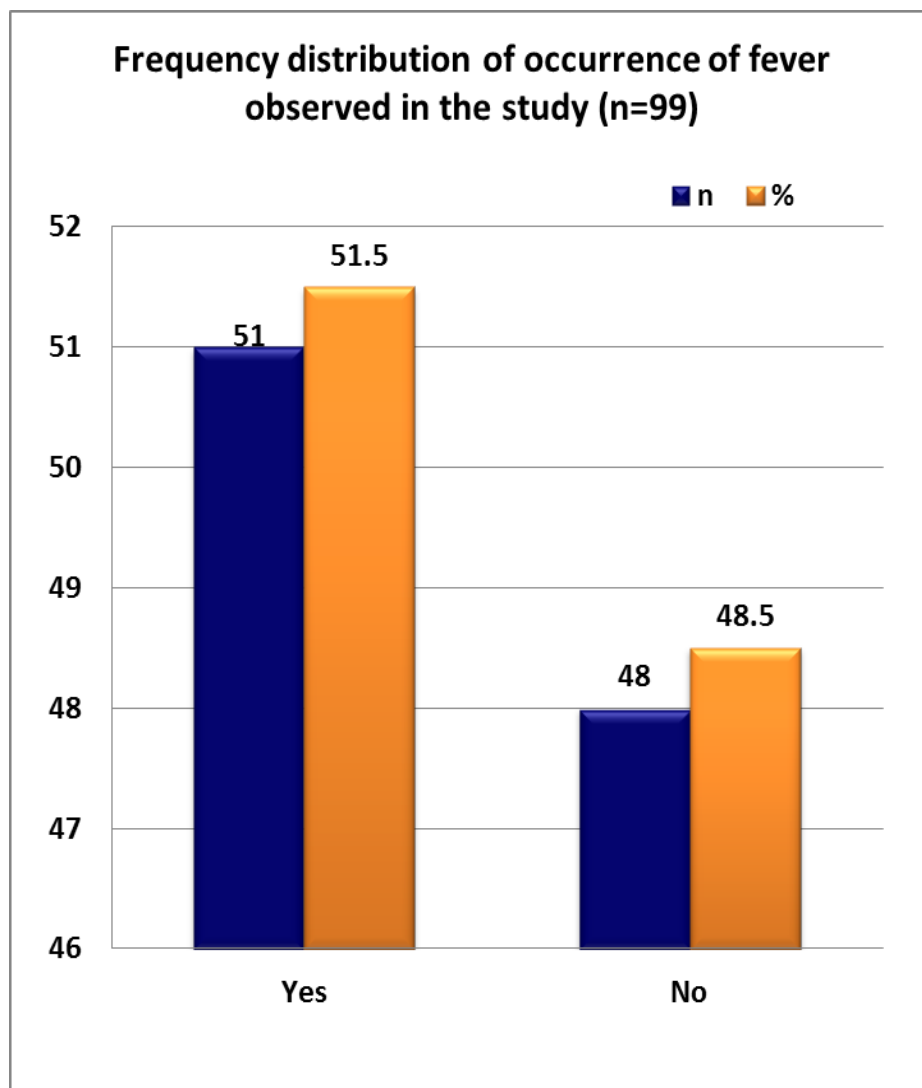


Table 4. Frequency distribution of occurrence of vomiting observed in the study.

S.No	Occurrence of vomiting	n	%
1	Yes	62	62.6
2	No	37	37.4

Data are expressed as n with %. The total N=99

In this study during preoperative evaluation vomiting was present in about 62.6% of cases.

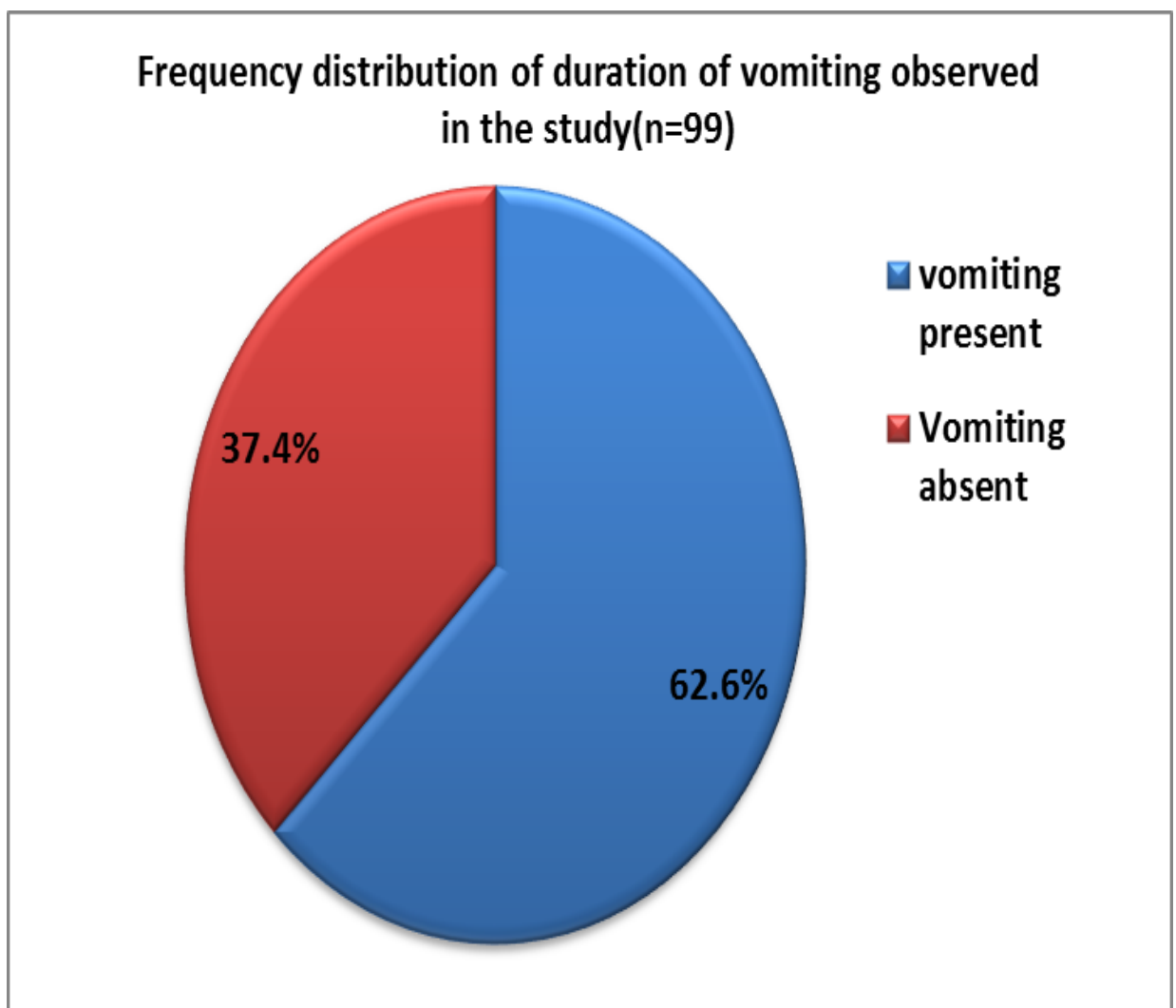


Table 5. Frequency distribution of type of surgery performed in the study.

S.No	Type of surgery	n	%
1	Open appendicectomy	49	49.5
2	Laparoscopic appendicectomy	50	50.5

Data are expressed as n with %. The total N=99

In this study in total of 99 cases out of which 51% cases managed with laparoscopic appendicectomy and 49% patients managed with open appendicectomy

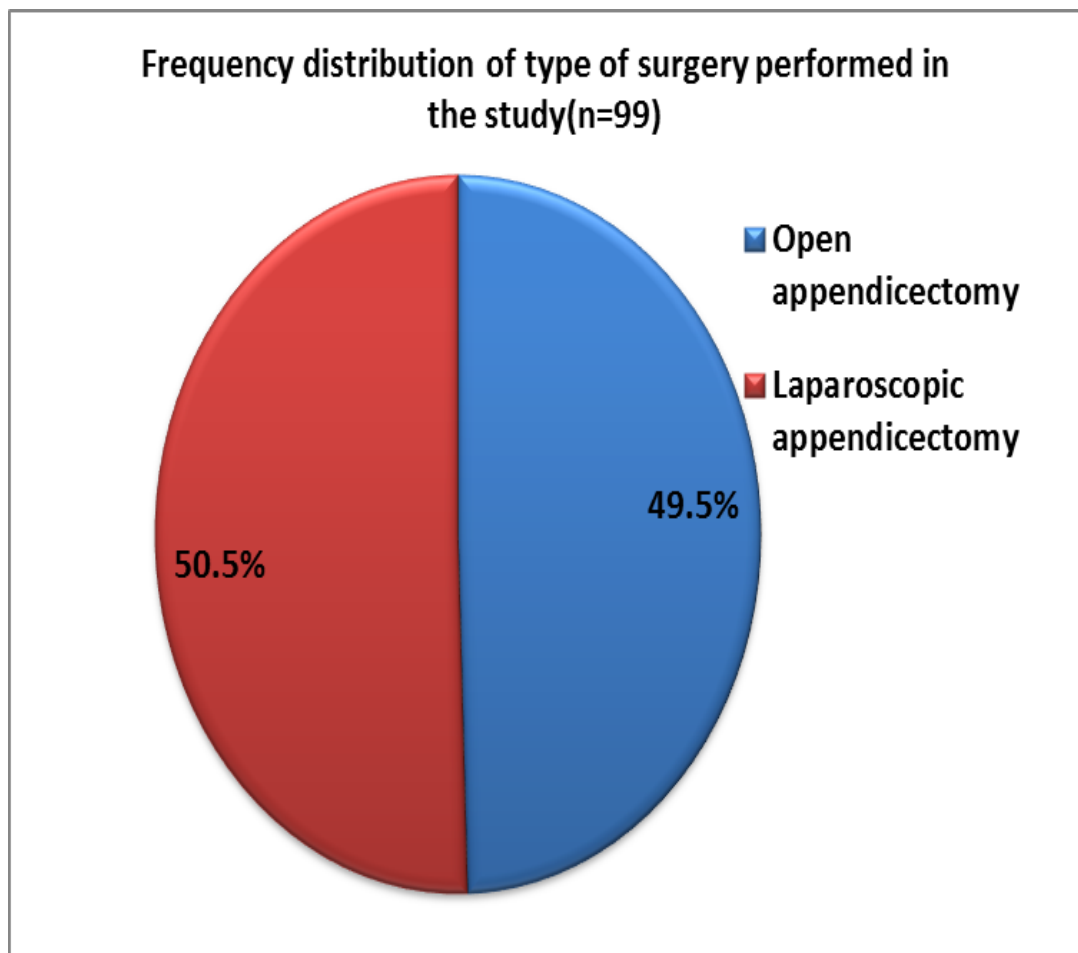


Table 6. Comparison of frequency distribution of age distribution with respect to the type of appendicectomy done in the patients.

S.No	Age distribution	Laparoscopic appendicectomy (n=50)		Open appendicectomy (n=49)		Chi square value	df	P value
		n	%	n	%			
1	<20 years	19	38	23	46.9	3.18	4	0.527 (NS)
2	21 – 30 years	20	40	12	24.5			
3	31 – 40 years	5	10	5	10.2			
4	41 – 50 years	4	8	7	14.3			
5	>50 years	2	4	2	4.1			

Data are expressed as n with %. Fisher's exact test was done to compare the frequencies. NS = Not significant.

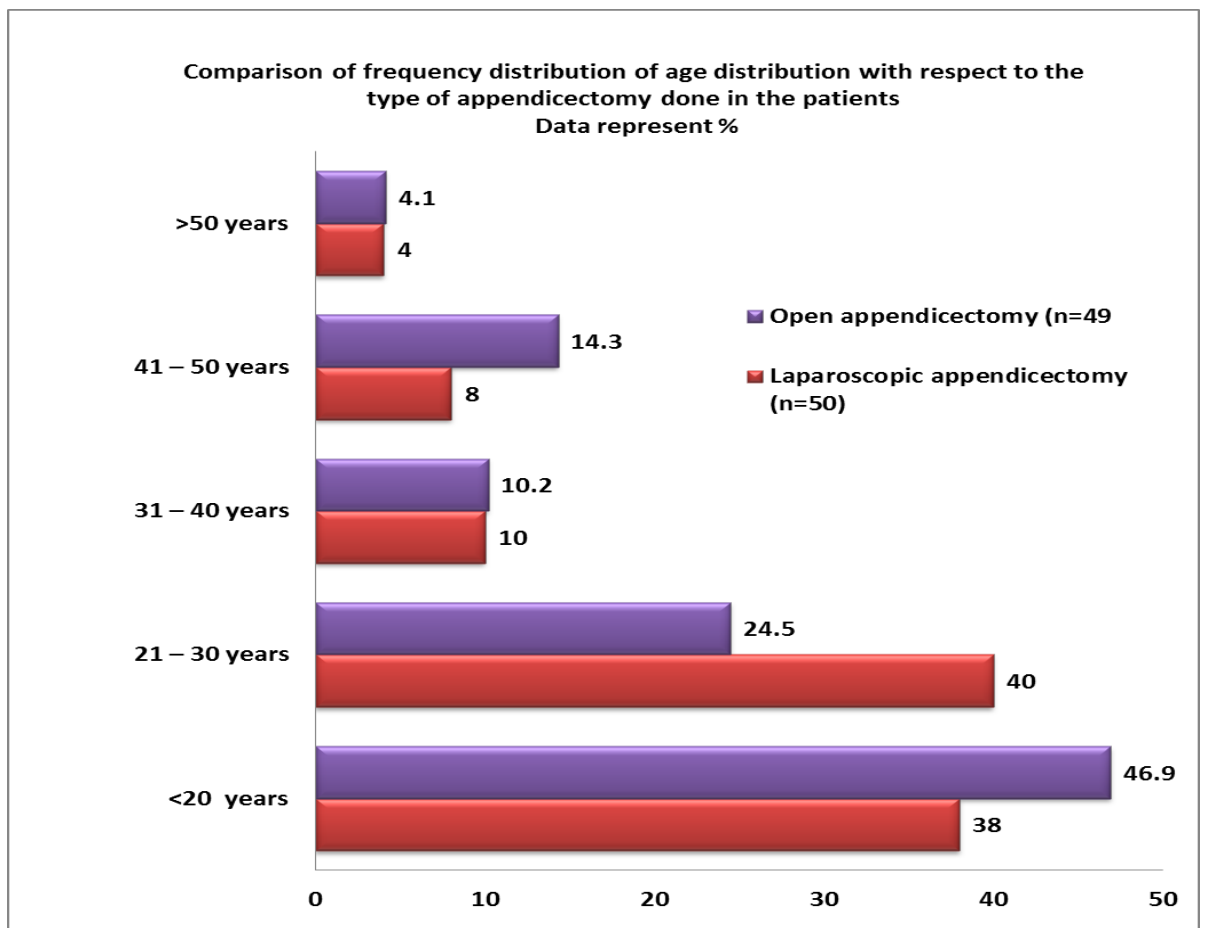


Table 7. Comparison of frequency distribution of age distribution with respect to the type of appendicectomy done in the patients.

S.No	Gender	Laparoscopic appendicectomy (n=50)		Open appendicectomy (n=49)		Chi square value	df	P value
		n	%	n	%			
1	Female	24	48	23	46.9	0.011	1	0.999 (NS)
2	Male	26	52	26	53.1			

Data are expressed as n with %. Fisher's exact test was done to compare the frequencies. NS = Not significant.

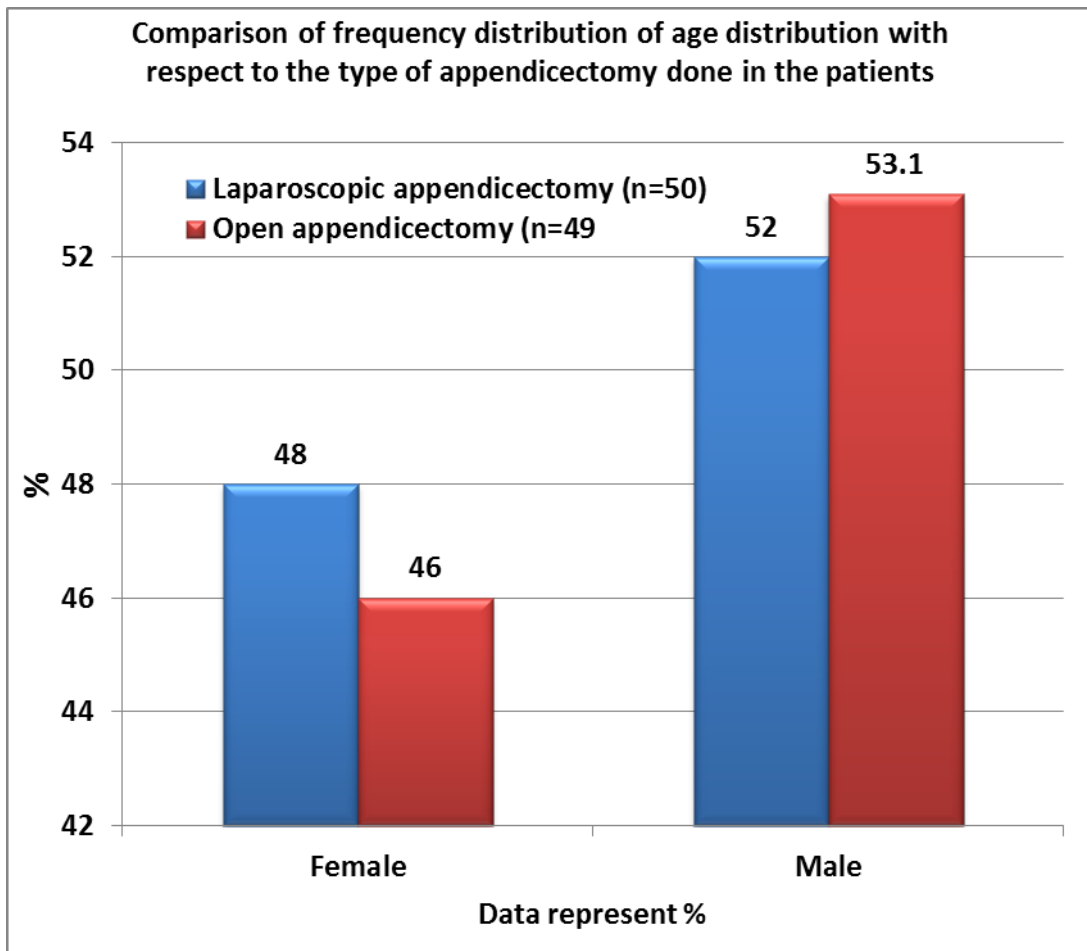


Table 8. Comparison of frequency distribution of occurrence of symptoms with respect to the type of appendicectomy done in the patients.

S.No	Presence of symptoms before surgery	Laparoscopic appendicectomy (n=50)		Open appendicectomy (n=49)		Chi square value	d f	P value
		n	%	n	%			
1	Vomiting	9	18	28	57.1	16.2	1	<0.0001 *
2	Fever	14	28	37	75.5	22.3	1	<0.0001 *

Data are expressed as n with %. Fisher's exact test was done to compare the frequencies.*indicates $p < 0.05$ and considered statistically significant.

In this study open appendicectomy group of patients had vomiting(57%) and fever (75%) which is higher compared to laparoscopic appendicectomy group.

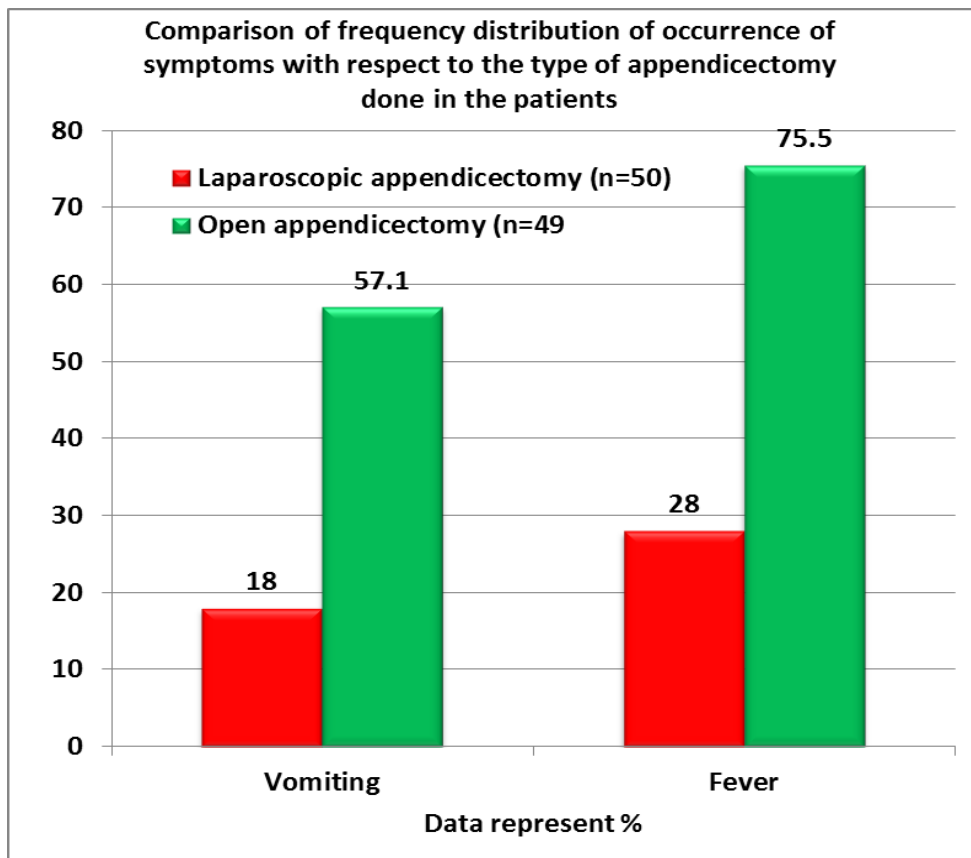


Table 9. Comparison of frequency distribution of post-operative resumption of diet with respect to the type of appendicectomy done in the patients.

S.No	Resumption of diet after surgery	Laparoscopic appendicectomy (n=50)		Open appendicectomy (n=49)		Chi square value	df	P value
		n	%	n	%			
1	First POD	50	100	2	4.1	91.3	2	<0.0001*
2	Second POD	0	0	42	85.7			
3	Third POD	0	0	5	10.2			

Data are expressed as n with %. Fisher's exact test was done to compare the frequencies between the groups. * indicates $p < 0.05$ and considered statistically significant.

In this study laparoscopic appendicectomy patients resumption of diet was earlier than open appendicectomy, all most all patients underwent laparoscopic appendicectomy diet was started on post operative day -1.

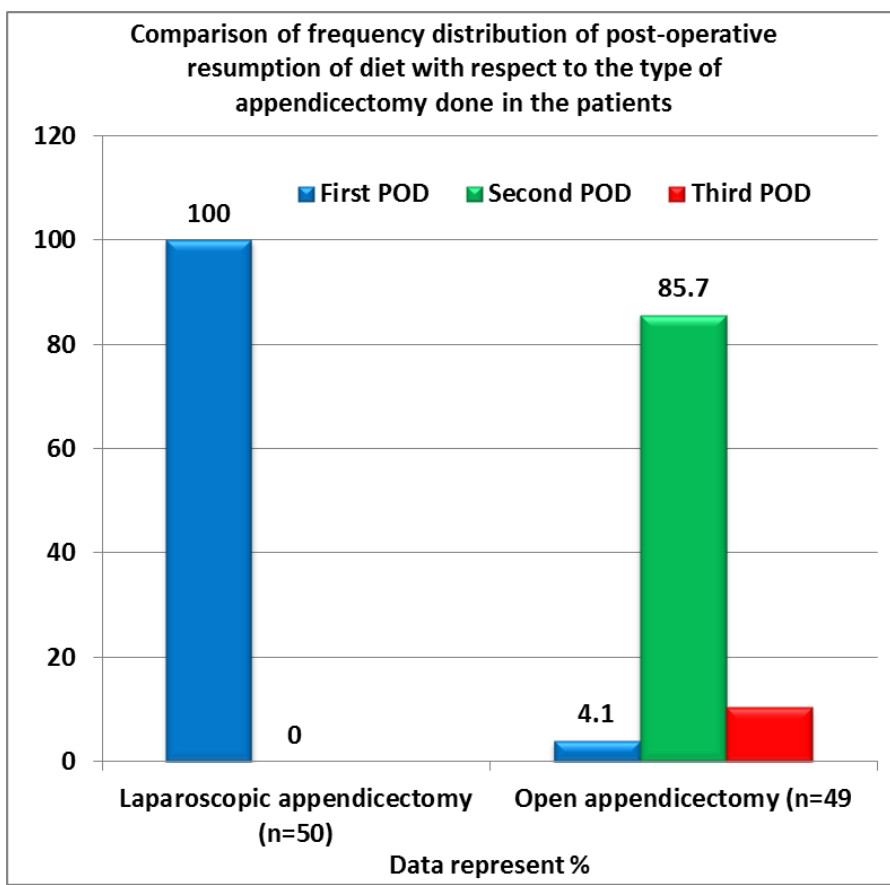


Table 10. Comparison of frequency distribution of post-operative pain with respect to the type of appendicectomy done in the patients.

S.No	Post-operative pain	Open appendicectomy (n=49)		Laparoscopic appendicectomy (n=50)		Chi square value	df	P value
		n	%	n	%			
1	Present	44	89.8	13	26	41.2	1	<0.0001*
2	Absent	5	10.2	37	74			

Data are expressed as n with %. Fisher's exact test was done to compare the frequencies between the groups. The relative risk was 6.4 with 95% confidence interval of 2.8 to 14.5. * indicates $p < 0.05$ and considered statistically significant.

In this study post operative pain was seen in 90% patients in open appendicectomy group where as in laparoscopic appendicectomy group post operative pain was seen in 26 % of patients. This result shows better post operative outcome amongst laparoscopic appendicectomy.

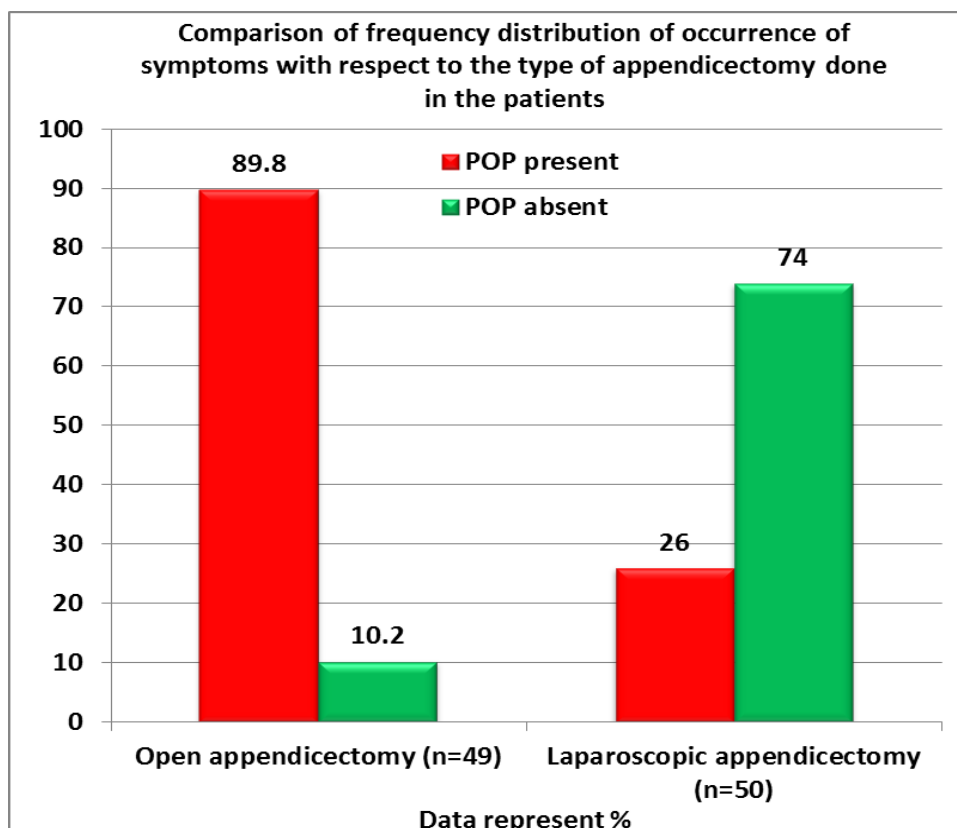


Table 11. Comparison of frequency distribution of post-operative wound infection with respect to the type of appendicectomy done in the patients.

S.No	Post-operative wound infection	Open appendicectomy (n=49)		Laparoscopic appendicectomy (n=50)		Chi square value	df	P value
		n	%	n	%			
1	Present	14	28.6	0	0	16.4	1	<0.0001 *
2	Absent	35	71.4	50	100			

Data are expressed as n with %. Fisher's exact test was done to compare the frequencies between the groups. The relative risk was 2.42 with 95% confidence interval of 1.8 to 3.13. * indicates $p < 0.05$ and considered statistically significant.

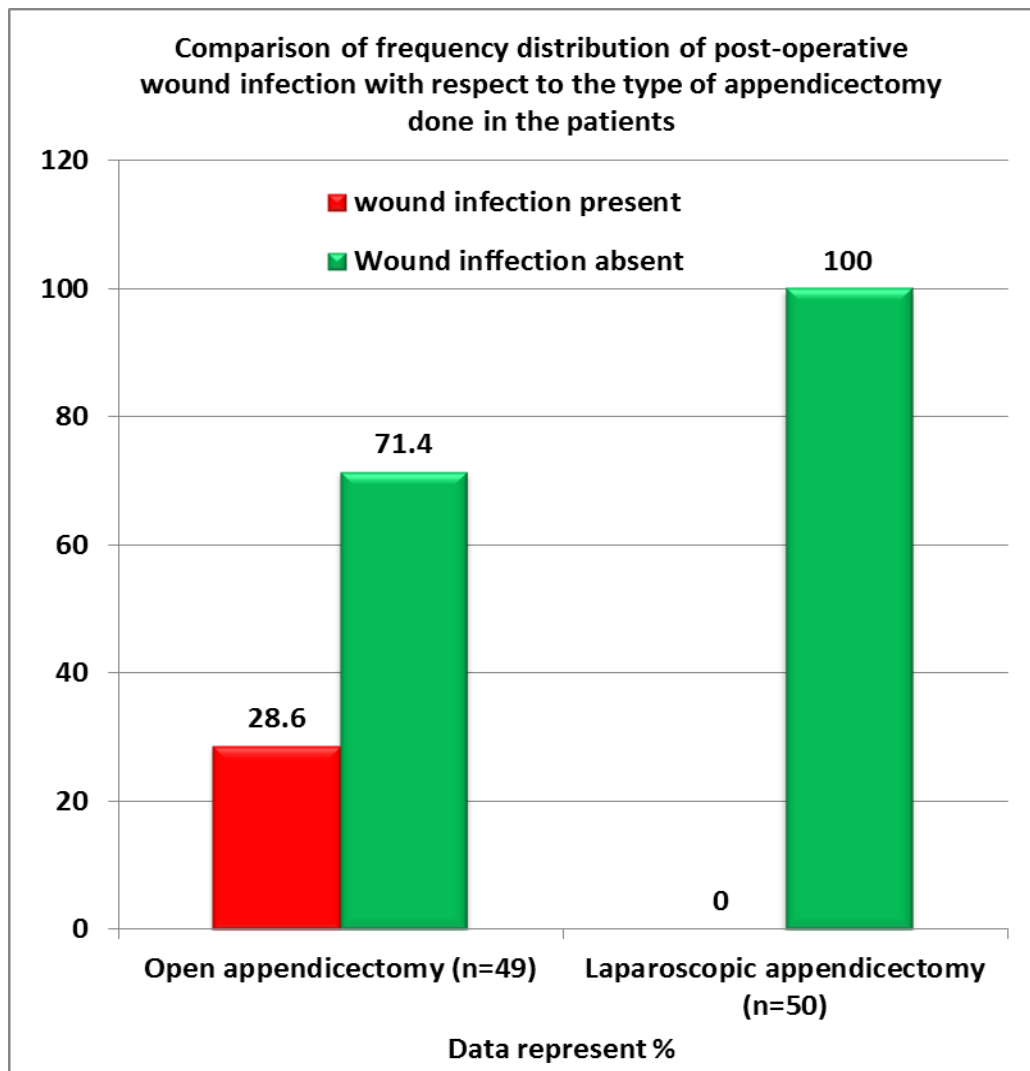


Table 12. Frequency distribution of type of wound infection observed in patient with operated by open appendicectomy in the study.

S.No	Type of wound infection in open appendicectomy patients	n	%
1	Purulent wound infection	12	85.7
2	EC fistula	1	7.2
3	Wound infection with induration	1	7.2

Data are expressed as n with %. The total N=14

This study shows that laparoscopic appendicectomy group had nil post operative wound infection as compared to open appendicectomy group.

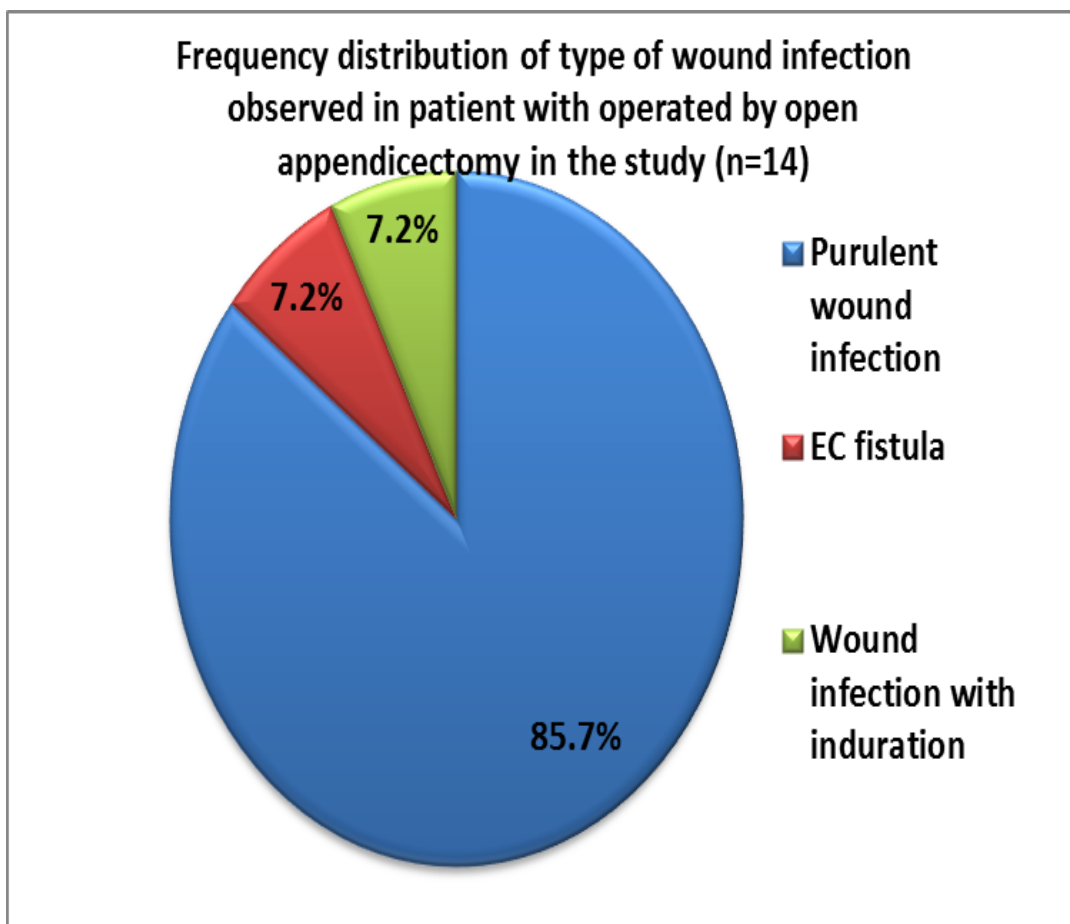
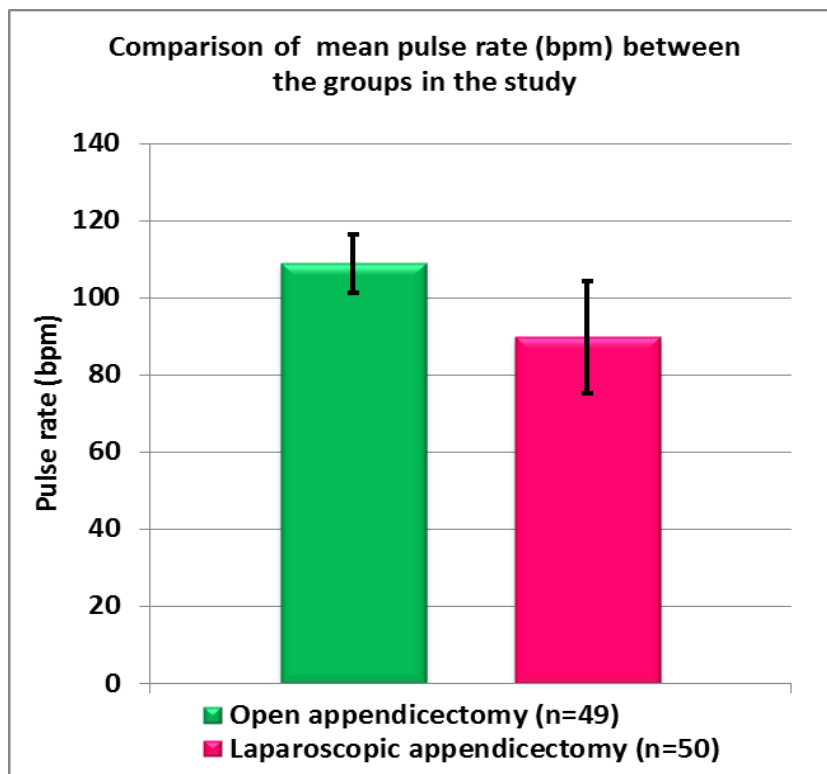


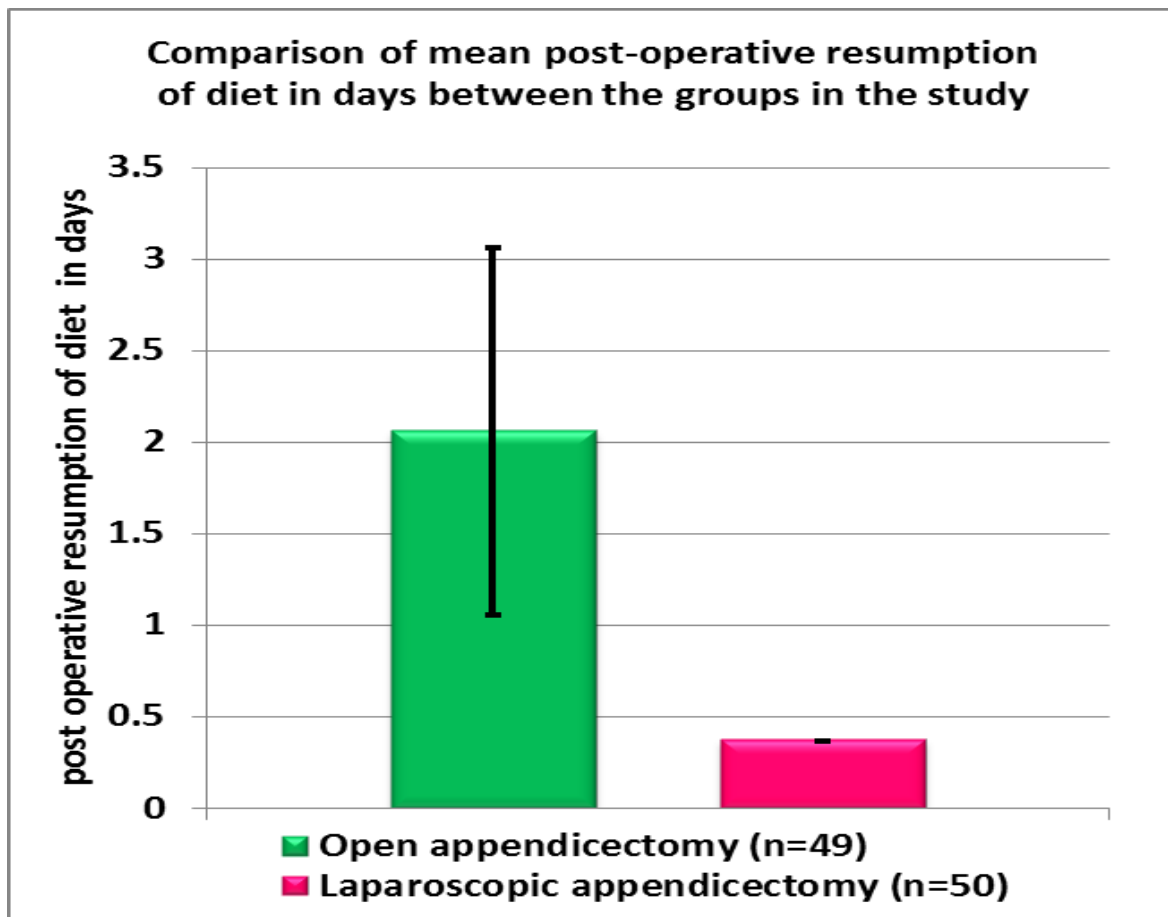
Table 13. Comparison of mean values of various parameters with respect to the type of appendicectomy done in the patients.

S. No	Parameters	Open appendicectomy (n=49)		Laparoscopic appendicectomy (n=50)		t value	df	P value
		Mean	SD	Mean	SD			
1	Age in years	26.7	12.9	25.5	11.1	0.525	97	0.601 (NS)
2	Pulse rate	108.9	7.6	89.7	5.2	14.5	97	<0.0001*
3	Duration of abdominal pain before surgery (days)	2.71	0.84	1.64	0.59	7.33	97	<0.0001*
4	Duration of surgery (mins)	41.7	4.5	53.2	4.49	12.6	97	<0.0001*
5	Post-operative resumption of diet (days)	2.06	0.37	1	0	19.9	97	<0.0001*
6	Hospital stay (days)	6.55	1.02	4.22	0.71	13.2	97	<0.0001*

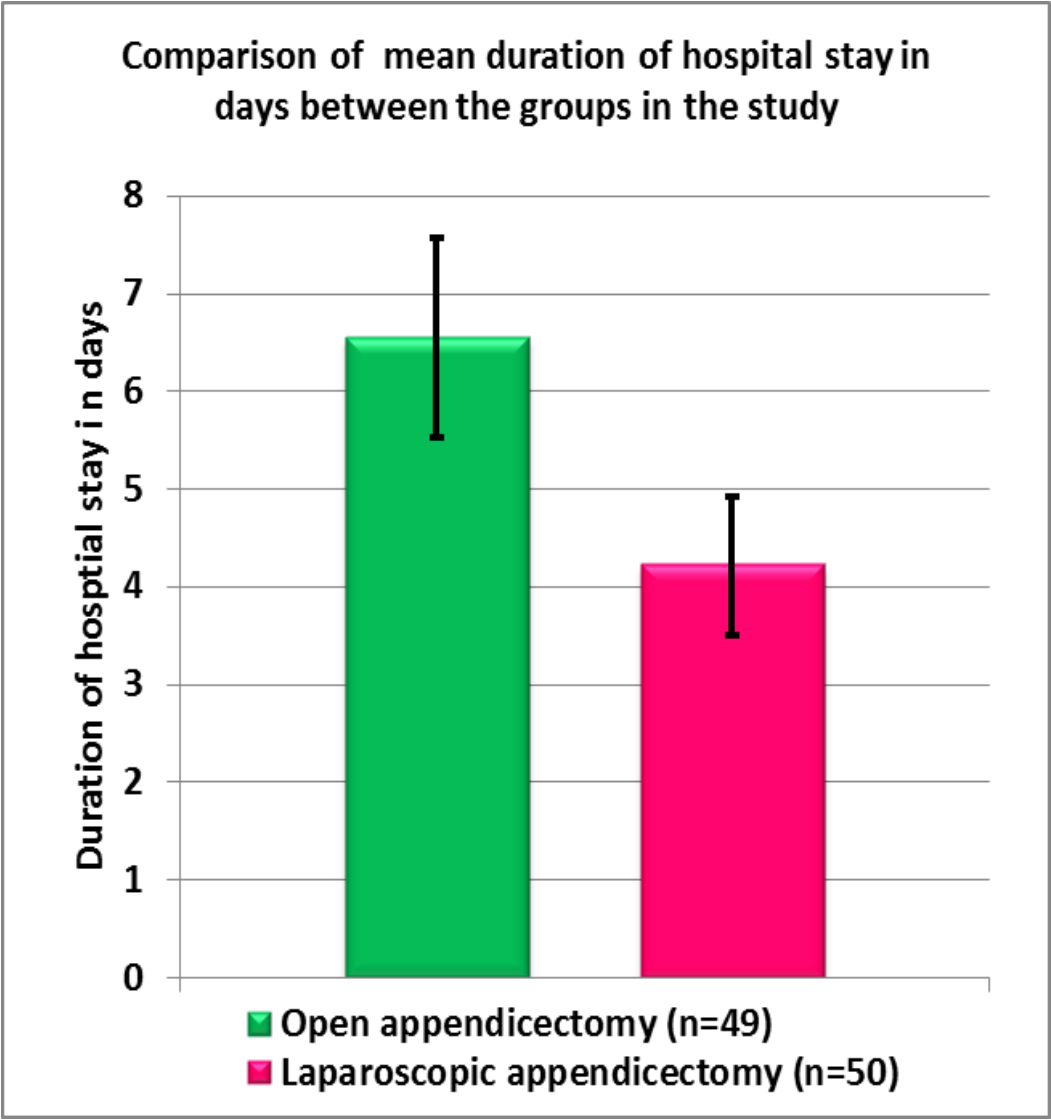
Data are expressed as n with %. Unpaired 't' test was done to compare the frequencies between the groups. *indicates $p < 0.05$ and considered statistically significant.



In this study, the preoperative evaluation of pulse rate and duration of abdominal pain of the patient who underwent open appendicectomy was higher when compared to those who underwent laparoscopic appendicectomy.



In this study the mean duration of laparoscopic appendicectomy procedure is higher compared to open appendicectomy procedure .The postoperative resumption of diet is much earlier in laparoscopic appendicectomy when compared to open appendicectomy procedure



In this study the duration of hospital stay is much less in laparoscopic appendicectomy when compared to open appendicectomy procedure

DISCUSSION

The gold standard treatment for acute appendicitis is appendicectomy. Though open appendicectomy remains gold standard, nowadays laparoscopic appendicectomy has gained a lot of importance now. However the role of laparoscopy in appendicectomy, commonest indications remains controversial. Several studies have been conducted around the world, some have supported and favored laparoscopy and some others are not.

Most cases of acute appendicitis can be treated by laparoscopy. Laparoscopic appendicectomy is equally safe and less postoperative pain and morbidity as compared to open appendicectomy. Laparoscopic appendicectomy is a useful procedure for reducing the hospital stay, return to work early, less complications encountered. With better training now in minimal access surgery now, laparoscopy has been popular now.

Laparoscopic procedures decrease the loss of earning days by an early return to work and shorter hospital stay. Hence it's useful in India where most of them are daily wages workers. Hence laparoscopic appendicectomy may replace open appendicectomy.

CONCLUSION

On analysing the data, we found a definite difference in outcome between open and laparoscopic appendicectomy in consecutively selected patients.

The laparoscopic appendicectomy was better than the open appendicectomy with respect to pain , postoperative complications like vomiting, and wound infection rate. Postoperative recovery was good in respect with duration of hospital stay, resumption of diet.

The only drawback of laparoscopic appendicectomy was with the duration of surgery. However with the above mentioned advantages outweighs the time drawback for laparoscopic appendicectomy.

Overall laparoscopic appendicectomy is better than open appendicectomy in selected patients with acute or recurrent appendicitis

SUMMARY

Appendicitis is the most common intra-abdominal condition requiring emergency surgery; appendicectomy is the commonest procedure in general surgery. Although a number of trials have analyzed the appendicitis is not established

This study from SEPT 2018 to Oct 2019 was done on 99 (50 lap and 49 open) patients with clinical diagnosis of acute or recurrent appendicitis admitted in surgical wards of Thanjavur Medical College. The patients were consecutively selected. All patients were followed every day postoperative period till they were discharged .The following parameters were observed during follow – up in comparison between two procedure with duration of surgery, postoperative pain and analgesics used, postoperative complication, postoperative recovery and recorded in protested proforma.

After analyzing the data using chi-square test and student‘t’ test we noticed that, there are significant differences between the two procedures with laparoscopic appendicectomy being better in respect to postoperative pain perception ,postoperative complications like vomiting, wound infection , postoperative duration of hospital stay days and resumption of diet.

Only duration of surgery is more among laparoscopic surgery compared to open appendicectomy.

In spite of drawback of the increase in duration of surgery, we conclude that laparoscopic appendicectomy is better than the open method for acute or recurrent appendicitis, with less postoperative pain, with lesser incidences of postoperative complications, shorter duration of hospital stay and resumption of diet.

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ஆராய்ச்சிக்கான ஒப்புதல் கடிதம்

ஆராய்ச்சி தலைப்பு : “

LAPAROSCOPIC VS OPEN APPENDICECTOMY”

அறுவைசிகிச்சைக்கான ஒப்புதல் கடிதம்

புறநோயாளி எண் : தேதி:

பெயர் : வயது:

இனம் : ஆண் / பெண்

இந்த ஆய்வின் நோக்கம் மற்றும் விவரங்கள் எனக்கு தெளிவாக அறிவிக்கப்பட்டது. எனக்கு விளக்கப்பட்ட விஷயங்களை நான் புரிந்துக்கொண்டு நான் என் விருப்பத்தினைத் தெரிவிக்கிறேன்.

இந்த ஆய்வில் நன்மைகளைப் பற்றி மருத்துவர் மூலம் தெரிந்துக்கொண்டேன்.

இந்த ஆய்வில் பிறரின் நிர்பந்தமின்றி என்னுடைய சொந்த விருப்பத்தின்பேரில் பங்கு பெறுகிறேன் மற்றும் நான் இந்த ஆய்விலிருந்து எப்போது வேண்டுமானாலும் விலகிக் கொள்ளலாம் என்பதனையும் அறிந்துக்கொண்டேன்.

நான் என்னுடைய விருப்பத்தின்பேரில் முழு ஒப்புதலுடன் இந்த மருத்துவ ஆய்வில் என்னை சேர்த்துக்கொள்ள சம்மதிக்கிறேன்.

மருத்துவர் கையொப்பம் பங்கேற்பாளர் கையொப்பம்

நாள் :

இடம் : தஞ்சாவூர்

PROFORMA

DEPARTMENT OF GENERAL SURGERY

THANJAVUR MEDICAL COLLEGE &HOSPITAL

**“COMPARATIVE STUDY OF OPEN APPENDECTOMY VERSUS LAPARASCOPIY
APPENDECTOMY”**

PATIENT NAME::

AGE/SEX:

IP NO:

DOS:

DOD:

PROCEDURE:

DURATION OF STAY:

POST OPERATIEV WOUND INFECTION:

POST OPERATIVE COMPLICATION:

RESUMPTION TO DIET:

HISTORY OF PRESENTING ILLNESS:

PAST HISTORY:

GENERAL EXAMINATION:

CLINICAL EXAMINATION:

OTHERS:

INVESTIGATIONS:

WBC:

SERUM UREA:

HB%

SERUM CREATININE:

RBS

OTHERS

PLATELET COUNT:

KEYWORDS TO MASTER CHART

S.NO	-	SERIAL NUMBER
IP.NO	-	INPATIENT NUMBER
SEX	-	MALE , FEMALE
PAIN	-	RIGHT ILIAC FOSSA PAIN (NO-ABSENT, YES-PRESENT)
VOMITING	-	VOMITING (NO-ABSENT, YES- PRESENT)
FEVER	-	(NO-ABSENT, YES- PRESENT)
PAST H/O PAIN		(NO-ABSENT, YES- PRESENT)
TYPE OF SURGERY		(1-LAPAROSCOPY, 2-OPEN SURGERY)
POST OP PAIN	-	POST OPERATIVE PAIN (YES / NO)
WI	-	POST OPERATIVE WOUND INFECTION (NO-ABSENT, YES- PRESENT)
STAY	-	DURATION OF HOSPITAL STAY IN DAYS
DURATION	-	DURATION OF SURGERY IN MINUTES
DOS	-	DATE OF SURGERY
DOD	-	DATE OF DISCHARGE
POD	-	POST OPERATIVE DAY

MASTER CHART

SI. NO	NAME	AGE	SEX	IP NO	DOS	FEVER	VOMIT	pulse	DURATI ON OF PAIN	DOD	TYPE OF SURGERY	DUR ATION	RESU MPTI ON OF DIET	PO ST OP PAI N	WO UN D INF EC TION	HOS PITA L STAY
1	ARUN KUMAR	25	M	6364 1	5.10.1 9	YES	YES	108	2 DAYS	12.10.19	OPEN APPENDICECTO MY	45	POD 2	YES	NO	7 DAY S
2	AJITH	19	M	6470 4	13.10. 19	YES	NO	100	4 DAYS	18.10.19	OPEN APPENDICECTO MY	35	POD2	YES	NO	5 DAY S
3	PARTHI BAN	19	M	6136 2	28.9.1 9	YES	NO	106	3 DAYS	8.9.19	OPEN APPENDICECTO MY	40	POD2	YES	YES	10 DAY S
4	SURIYA	32	M	6397 8	10.10. 19	NO	NO	112	1 DAY	16.10.19	OPEN APPENDICECTO MY	30	POD2	YES	NO	6 DAY S
5	TAMILA RASAN	14	M	6365 4	8.10.1 9	YES	NO	97	1 DAY	15.10.19	OPEN APPENDICECTO MY	35	POD2	YES	NO	7 DAY S
6	PREMK UMAR	25	M	6392 1	10.10. 19	NO	NO	108	2 DAYS	17.10.19	OPEN APPENDICECTO MY	45	POD2	YES	NO	7 DAY S
7	SHANT HI	40	F	6157 7	31.8.1 9	YES	YES	110	2 DAYS	6.9.19	OPEN APPENDICECTO MY	40	POD2	YES	NO	6 DAY S
8	JEYACH ITRA	23	F	6149 6	30.9.1 9	YES	NO	120	3 DAYS	5.10.10	OPEN APPENDICECTO MY	44	POD1	YES	NO	5 DAY S
9	AMUTH A	45	F	6132 4	29.9.1 9	NO	NO	98	2 DAYS	5.10.19	OPEN APPENDICECTO MY	30	POD2	YES	NO	6 DAY S
10	ABI	18	F	6140 1	29.9.1 9	NO	NO	110	2 DAYS	5.10.19	OPEN APPENDICECTO MY	40	POD2	YES	NO	6 DAY S
11	PUNNIY AMOO RTHY	32	M	6159 8	1.10.1 9	NO	YES	97	3 DAYS	7.10.19	OPEN APPENDICECTO MY	45	POD2	YES	NO	6DA YS
12	SELVI	41	F	5779 0	17.9.1 9	YES	NO	88	1 DAY	21.9.19	LAP APPENDICECTO MY	50	POD 1	NO	NO	4 DAY S

13	SATHISH KUMAR	32	M	59546	23.9.19	NO	NO	92	2 DAYS	27.9.19	LAP APPENDICECTOMY	60	POD1	NO	NO	4 DAYS
14	SATHYA	20	F	52045	21.8.19	YES	NO	84	2 DAYS	25.8.19	LAP APPENDICECTOMY	55	POD1	NO	NO	4 DAYS
15	RUBASHREE	15	F	52138	21.8.19	NO	YES	96	3 DAYS	25.8.10	LAP APPENDICECTOMY	45	POD1	NO	NO	4 DAYS
16	MAHADEVI	44	F	51943	18.8.19	YES	NO	120	1 DAY	25.8.19	OPEN APPENDICECTOMY	40	POD2	YES	NO	7 DAYS
17	ARUNKUMAR	20	M	50091	10.8.19	YES	YES	105	4 DAYS	16.8.19	OPEN APPENDICECTOMY	44	POD2	YES	YES (INDURATION)	6 DAYS
18	YOGESWARAN	15	M	50368	12.8.19	YES	YES	98	2 DAYS	20.8.19	OPEN APPENDICECTOMY	45	POD3	YES	YES (PULULENT)	8 DAYS
19	RAJU	37	M	42507	16.7.19	NO	NO	90	1 DAY	21.7.19	LAP APPENDICECTOMY	55	POD1	YES	NO	4 DAYS
20	EDWIN PRABHU	31	M	42755	16.7.19	NO	NO	88	2 DAYS	21.7.19	LAP APPENDICECTOMY	50	POD1	NO	NO	4 DAYS
21	VENITHA	19	F	44756	19.7.19	YES	YES	120	3 DAYS	26.7.19	OPEN APPENDICECTOMY	40	POD2	YES	YES (PULULENT)	7 DAYS
22	SHIVASATHI	15	M	44766	18.7.19	NO	YES	115	3 DAYS	24.7.19	OPEN APPENDICECTOMY	45	POD 2	YES	NO	6 DAYS
23	SUVARAJ	22	M	48394	9.8.19	NO	NO	96	1 DAY	13.8.19	LAP APPENDICECTOMY	45	POD1	NO	NO	4 DAYS
24	ARIVUZHAGAN	50	M	40896	2.8.19	NO	NO	94	2 DAYS	7.8.19	LAP APPENDICECTOMY	50	POD1	NO	NO	5 DAYS
25	KANAGALAKSHMI	35	F	47006	6.8.19	YES	NO	86	2 DAYS	12.8.19	LAP APPENDICECTOMY	55	POD1	NO	NO	5 DAYS
26	ISHWARAYA	22	F	46863	2.8.19	NO	NO	84	1 DAYS	6.8.19	LAP APPENDICECTOMY	50	POD1	NO	NO	4 DAYS

27	MURUGESAN	23	M	49443	6.8.19	NO	YES	87	2 DAYS	11.8.19	LAP APPENDICECTOMY	45	POD1	NO	NO	4DAYS
28	ABIRAMI	22	F	46265	26.7.19	YES	NO	90	1 DAY	31.7.19	LAP APPENDICECTOMY	50	POD1	NO	NO	4DAYS
29	CHANDRA	30	F	6549	1.2.19	YES	YES	94	2 DAYS	6.2.19	LAP APPENDICECTOMY	50	POD1	NO	NO	5DAYS
30	SHANTHI	50	F	53982	11.10.18	YES	YES	102	3 DAYS	17.10.18	OPEN APPENDICECTOMY	40	POD2	YES	YES (PURULENT)	6DAYS
31	VINITHA	21	F	47132	31.8.18	NO	YES	98	1 DAY	5.9.18	LAP APPENDICECTOMY	50	POD1	NO	NO	4DAYS
32	NANDINI	15	F	52581	5.10.18	NO	NO	82	2 DAYS	8.10.18	LAP APPENDICECTOMY	55	POD1	NO	NO	3DAYS
33	MADUBALA	23	F	54632	9.10.18	YES	NO	88	2 DAYS	12.10.18	LAP APPENDICECTOMY	50	POD1	NO	NO	3DAYS
34	ARUNRAJ	18	M	67183	31.1.19	YES	YES	90	3 DAYS	7.2.19	OPEN APPENDICECTOMY	50	POD3	YES	YES (PURULENT)	7DAYS
35	SELVAM	20	M	54901	16.10.18	NO	NO	86	2 DAYS	20.10.18	LAP APPENDICECTOMY	55	POD1	NO	NO	4DAYS
36	NELAVATHY	57	F	54313	22.10.18	NO	YES	90	1 DAY	25.10.18	LAP APPENDICECTOMY	60	POD1	NO	NO	3DAYS
37	MURUGESAN	20	M	49839	17.9.18	NO	NO	82	2 DAYS	20.9.18	LAP APPENDICECTOMY	50	POD1	NO	NO	3DAYS
38	GAYATHRI	17	F	44083	16.7.18	YES	NO	120	3 DAYS	23.7.19	OPEN APPENDICECTOMY	45	POD2	YES	YES (PURULENT)	7DAYS
39	NIVENTHA	19	F	71062	29.12.18	NO	NO	84	1 DAY	2.1.19	LAP APPENDICECTOMY	55	POD1	NO	NO	4DAYS
40	DIVYA	22	F	71815	29.12.18	NO	NO	82	2 DAYS	3.1.19	LAP APPENDICECTOMY	55	POD1	NO	NO	5DAYS

41	ANBAL AGAN	50	M	6790 0	13.3.1 8	NO	YES	86	1 DAY	17.12.18	LAP APPENDICECTO MY	50	POD1	NO	NO	4 DAY S
42	APRAN A	17	F	6920 4	14.12. 18	YES	NO	90	3 DAYS	17.12.18	LAP APPENDICECTO MY	50	POD1	NO	NO	3 DAY S
43	KARTHI CK	23	M	7143 0	27.12. 18	NO	NO	92	1 DAY	31.12.1 8	LAP APPENDICECTO MY	55	POD1	NO	NO	4 DAY S
44	CATHE RINE THERAS A	38	F	7025 2	19.12. 18	NO	NO	88	2 DAYS	23.12.18	LAP APPENDICECTO MY	60	POD1	NO	NO	4 DAY S
45	ARAVIN D	24	M	6816 8	12.12. 18	YES	NO	96	2 DAYS	16.12.18	LAP APPENDICECTO MY	55	POD1	NO	NO	4 DAY S
46	SIVA SAKTHI	15	M	4476 6	18.7.1 9	YES	YES	110	3 DAYS	24.7.19	OPEN APPENDICECTO MY	40	POD2	YES	NO	6 DAY S
47	VINITH A	19	F	4475 6	19.7.1 9	YES	YES	106	2 DAYS	25.7.19	OPEN APPENDICECTO MY	35	POD2	YES	NO	6 DAY S
48	SREEDI VYA	22	F	6366	30.1.1 9	YES	NO	120	4 DAYS	6.2.19	OPEN APPENDICECTO MY	40	POD2	YES	YES (PU RU LE NT)	7 DAY S
49	DEEPA	30	F	4937	24.1.1 9	NO	YES	115	3 DAYS	2.2.19	OPEN APPENDICECTO MY	50	POD3	YES	YES (PU RU LE NT)	9 DAY S
50	VEERA MANIK ANDAN	16	M	4477 6	18.7.1 9	YES	YES	106	2 DAYS	24.7.19	OPEN APPENDICECTO MY	40	POD2	NO	NO	6 DAY S
51	JOSHU A	21	M	7274 5	4.1.19	NO	NO	92	1 DAY	8.1.19	LAP APPENDICECTO MY	55	POD1	NO	NO	4 DAY S
52	SASIKU MAR	45	M	3591 6	22.7.1 9	YES	NO	108	4 DAYS	31.7.19	OPEN APPENDICECTO MY	50	POD3	YES	YES (EC FIS TU LA)	9 DAY S
53	SHANT HI	50	F	5898 2	11.10. 18	YES	YES	115	4 DAYS	17.10.19	OPEN APPENDICECTO MY	40	POD2	NO	NO	5 DAY S
54	RAMES H KUMAR	18	M	5260 0	27.9.1 8	YES	NO	102	2 DAYS	3.10,18	OPEN APPENDICECTO MY	43	POD2	YES	NO	6 DAY S

55	BALALU MARA N	13	M	5393 6	3.10.1 8	YES	NO	110	3 DAYS	9.10.18	OPEN APPENDICECTO MY	40	POD2	NO	NO	6 DAY S
56	ARAVIN TH	19	M	4693 6	30.8.1 8	YES	YES	120	4 DAYS	6.11.18	OPEN APPENDICECTO MY	44	POD2	YES	YES	7 DAY S
57	CHAND RU	18	M	3512	21.1.1 9	NO	NO	86	2 DAYS	25.1.19	LAP APPENDICECTO MY	55	POD1	NO	NO	4 DAY S
58	ARULM OZHI	29	M	5938	30.1.1 9	YES	NO	92	3 DAYS	5.2.19	LAP APPENDICECTO MY	50	POD1	YES	NO	6 DAY S
59	RAJKU MAR	27	M	4300	23.1.1 9	NO	NO	98	2 DAYS	27.1.19	LAP APPENDICECTO MY	55	POD1	NO	NO	4 DAY S
60	BABU	16	M	4795 7	11.9.1 8	NO	NO	90	1 DAY	15.9.18	LAP APPENDICECTO MY	50	POD1	NO	NO	4 DAY S
61	KATHIR AVAN	20	M	5698 0	23.10. 18	NO	NO	86	2 DAYS	28.10.18	LAP APPENDICECTO MY	60	POD1	YES	NO	5 DAY S
62	KIRUBA	16	F	1268 1	28.8.1 8	YES	NO	102	3 DAYS	4.9.18	OPEN APPENDICECTO MY	40	POD2	YES	NO	7 DAY S
63	GOWT HAM	13	M	3232 4	27.5.1 9	YES	yes	106	3 DAYS	4.6.19	OPEN APPENDICECTO MY	45	POD2	YES	YES (PU RU LE NT)	8 DAY S
64	RAJESH	21	M	3207 20	25.5.1 9	YES	NO	100	3 DAYS	1.6.19	OPEN APPENDICECTO MY	45	POD2	YES	NO	6 DAY S
65	PUGAZ HENTHI	27	M	3038 2	24.5.1 9	NO	YES	108	2 DAYS	31.5.19	OPEN APPENDICECTO MY	40	POD2	NO	NO	7 DAY S
66	GAYAT HRI	14	F	2121 9	21.2.1 9	YES	NO	116	2 DAYS	26.5.19	OPEN APPENDICECTO MY	45	POD2	YES	NO	5 DAY S
67	VEERA MANI	40	M	9656	14.2.1 9	NO	YES	110	3 DAYS	20.2.19	OPEN APPENDICECTO MY	40	POD2	YES	NO	6 DAY S
68	SATHYA RAJ	24	M	4753 9	9.9.19	NO	NO	100	1 DAY	14.9.19	LAP APPENDICECTO MY	50	POD1	YES	NO	5 DAY S
69	MALLIG A	60	F	3907 1	7.8.18	NO	NO	108	2 DAYS	12.8.18	LAP APPENDICECTO MY	55	POD1	YES	NO	5 DAY S

70	ARUNRAJ	18	M	6418	31.1.19	YES	YES	120	3 DAYS	8.2.19	OPEN APPENDICECTOMY	42	POD3	YES	YES (PURULENT)	8 DAYS
71	DEEPA	30	F	4997	24.1.19	YES	YES	110	2 DAYS	30.1.19	OPEN APPENDICECTOMY	40	POD2	NO	NO	6 DAYS
73	SREEDIVYA	22	F	6366	30.1.19	NO	YES	100	2 DAYS	5.2.19	OPEN APPENDICECTOMY	45	POD2	YES	NO	6 DAYS
74	RAJIV	23	M	12050	14.10.18	YES	YES	106	3 DAYS	20.10.18	OPEN APPENDICECTOMY	35	POD2	YES	NO	6 DAYS
75	PARVATHI	50	F	14766	30.9.18	YES	YES	120	4 DAYS	7.10.18	OPEN APPENDICECTOMY	40	POD2	YES	YES (PURULENT)	7 DAYS
76	ARAVINDH	19	M	17663	7.10.18	NO	YES	110	2 DAYS	14.10.18	OPEN APPENDICECTOMY	43	POD2	YES	NO	7 DAYS
77	KUMARASAMY	45	M	44168	24.8.18	YES	NO	90	1 DAY	30.8.18	LAP APPENDICECTOMY	60	POD1	YES	NO	6 DAYS
78	PRABUDEVA	21	M	57798	26.10.18	NO	NO	92	1 DAY	30.10.18	LAP APPENDICECTOMY	55	POD1	NO	NO	4 DAYS
79	MOHAMMEDFAJAR	20	M	58725	1.11.18	YES	NO	82	2 DAYS	5.11.18	LAP APPENDICECTOMY	65	POD1	NO	NO	4 DAYS
80	PRABU	25	M	48644	16.9.18	NO	NO	90	1 DAY	20.9.18	LAP APPENDICECTOMY	55	POD1	NO	NO	4 DAYS
81	KALAISELVI	25	F	5218	3.2.19	NO	NO	92	2 DAYS	7.2.19	LAP APPENDICECTOMY	60	POD1	YES	NO	4 DAYS
82	GOWSALYA	16	F	17215	5.9.18	YES	NO	100	4 DAYS	11.9.18	OPEN APPENDICECTOMY	40	POD2	YES	NO	6 DAYS
83	KANNAGI	57	F	53702	26.8.19	NO	YES	104	2 days	2.9.19	OPEN APPENDICECTOMY	45	POD2	YES	NO	6 DAYS
84	PREAVEN	17	M	54369	29.8.19	YES	NO	116	3 DAYS	4.10.19	OPEN APPENDICECTOMY	35	POD2	YES	NO	7 DAYS
85	DHIVYA	13	F	52115	29.8.19	NO	NO	84	2 DAYS	2.8.19	LAP APPENDICECTOMY	45	POD1	NO	NO	4 DAYS

86	SIVARA J	22	M	4835 4	5.8.19	NO	NO	89	1 DAY	9.8.19	LAP APPENDICECTO MY	50	POD1	NO	NO	4 DAY S
87	RANJIT H	27	M	5020 5	11.8.1 9	NO	YES	90	2 DAYS	15.8.19	LAP APPENDICECTO MY	50	POD1	YES	NO	4DA YS
88	TRISHA	17	M	5219 3	21.8.1 9	NO	NO	92	1 DAY	26.8.19	LAP APPENDICECTO MY	50	POD1	YES	NO	5 DAY S
89	RUBAS RI	15	F	5213 8	21.8.1 9	NO	YES	94	1 DAY	24.8.19	LAP APPENDICECTO MY	55	POD1	YES	NO	4 DAY S
90	SATHYA	22	F	5204 5	21.8.1 9	YES	NO	92	2 DAYS	24.8.19	LAP APPENDICECTO MY	50	POD1	YES	NO	4 DAY S
91	ANNAP ATTU	60	F	5587 4	5.9.19	YES	YES	110	4 DAYS	11.9.19	OPEN APPENDICECTO MY	45	POD2	YES	NO	6 DAY S
92	SANGE ETHA	18	F	5365 4	28.8.1 9	NO	NO	84	1 DAY	2.9.19	LAP APPENDICECTO MY	55	POD1	YES	NO	5 DAY S
93	DHIVYA	13	F	5211 5	29.8.1 9	NO	YES	86	2 DAYS	5.9.19	LAP APPENDICECTO MY	50	POD 1	YES	NO	6 DAY S
94	PRASAT H	24	M	5562 8	4.9.19	YES	YES	106	3 DAYS	10.9.18	OPEN APPENDICECTO MY	40	POD2	YES	NO	6 DAY S
95	SHANT HI	40	F	6157 7	29.9.1 9	YES	NO	115	2 DAYS	5.10.19	OPEN APPENDICECTO MY	45	POD 2	YES	NO	6 DAY S
96	AUMUT HA	45	F	6132 3	29.5.1 9	YES	NO	120	2 DAYS	6.10.19	OPEN APPENDICECTO MY	50	POD 1	YES	NO	7 DAY S
97	JEYACH ITRA	23	F	6149 6	29.9. 19	YES	YES	110	3 DAYS	5.10.19	OPEN APPENDICECTO MY	45	POD 2	YES	NO	6 DAY S
98	AKALYA	14	F	5301 6	8.10.1 8	YES	NO	92	2 DAYS	13.10.18	LAP APPENDICECTO MY	55	POD 1	NO	NO	5 DAY S
99	GOKUL	18	M	5166 3	1.10.1 8	YES	NO	90	1 DAY	5.10.18	LAP APPENDICECTO MY	55	POD 1	NO	NO	4 DAY S