A Thesis in General Surgery

"A COMPARATIVE STUDY OF RIPASA SCORE AND ULTRASOUND IN THE DIAGNOSIS OF ACUTE APPENDICITIS"

Submitted in partial fulfillment of the

requirements for the

DEGREE OF M.S GENERAL SURGERY (BRANCH I)

KILPAUK MEDICAL COLLEGE & HOSPITAL,

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

CHENNAI, TAMILNADU

MAY 2020

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled "**A COMPARATIVE STUDY OF RIPASA SCORE AND ULTRASOUND IN THE DIAGNOSIS OF ACUTE APPENDICITIS"** is a bonafide and genuine research work carried out by me under the guidance of **Prof. Captain. Dr.S.Nedunchezhian, M.S., D.Ortho., MCA.,** Professor, Department of General Surgery, Kilpauk Medical College,Chennai.This dissertation is submitted to The Tamilnadu Dr.M.G.R. MEDICAL UNIVERSITY, CHENNAI in partial fulfillment of the requirements for the degree of M.S. General Surgery examination to be held in May 2020.

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Place: **Dr. T.NIVEDHA**

CERTIFICATE BY THE GUIDE

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BONAFIDE CERTIFICATE

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CERTIFICATE – II

This is to certify that this dissertation work titled "**A COMPARATIVE STUDY OF RIPASA SCORE AND ULTRASOUND IN THE DIAGNOSIS OF ACUTE APPENDICITIS"** of the candidate **Dr. T.NIVEDHA** with **Registration Number 221711157** for the award of Masters in Surgery in the branch of Branch I- General Surgery. I personally verified the www.urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows **23%** of plagiarism in the dissertation.

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The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval " A COMPARATIVE STUDY OF RIPASA SCORE AND ULTRASOUBD IN THE DIAGNOSIS OF ACUTE APPENDICITIS". Submitted by Dr. T.Nivedha, M.S. Post Graduate, Dept of General Surgery, Government Kilpauk Medical College,Chennai-10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

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Instances where selected sources appear:

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LIST OF ABBREVIATIONS

CRP	C-Reactive Protein.
USG	Ultrasonography.
MALT	Mucosa Associated Lymphoid Tissue.
RIF	Right IliacFossa.
PPV	Positive predictive value.
LR-	Negative predictive value.
WBC	White Blood Cell
CT	Computed Tomography
IV	Intravenous.
KUB	Kidney, Ureter, Bladder.
HPE	Histopathological examination

TABLE OF CONTENTS

INTRODUCTION

The appendix was first described in 1521 and inflammation of the appendix has been known to be a clinical problem since 1759.The term 'appendicitis', was used by Reginald Fitz in the year1886.

Appendicitis can rapidly progress to gangrenous appendicitis which is associated with increased morbidity and mortality.Therefore surgeons resort to an early surgical intervention even when the diagnosis is in doubt .Early surgery at such instances may lead to a normal appendicectomy whereas delay in surgerywill lead to a rise of complication such as perforation and abscess formation. It has been shown that the delay in presentation is an important factor for the development of complications rather than delay from the physician's end . Approximately 6% of the population are at the risk of developing appendicitis during their lifetime, therefore much has been directed towards early diagnosis and intervention.

Acute appendicitis is essentially a clinical diagnosis. Though appendicitis is a common general surgical emergency, in some patients appendicitis remains a difficult diagnosis to establish.Various investigations used to assist in the diagnosis of appendicitis include ultrasonography,scoring

systems, computed tomography, magnetic resonance imagingand laparoscopy.

Ultrasonography has been reported to have an accuracy of 71% to 95%, but doubts have been raised about the influence of ultrasonography on patient outcomes.Furthermore, it has been argued that findings at sonography should not supercede clinical judgment in patients with a high probability of appendicitis.This raises questions about whether sonography should be performed at all in patients at high risk and whether there is some reliable means of selecting those who can benefit fromimaging.

In 2010,a new scoring system for appendicitis was proposed by the department of general surgery in Raja IsteripengirsnAnakSaleha (RIPAS) Hospital,comprising 14 parameters.The scoring system showed a sensitivity and specificity of 97.5% and 81.8% respectively. The present study is therefore planned to compare the RIPASA scoring and ultrasound in the diagnosis of acute appendicitis to reduce negative appendicectomy rate and to reduce the economic burden on patients.

AIM OF THE STUDY

To compare the accuracy of RIPASA scoring system and ultrasound in the diagnosis of Acute Appendicitis

OBJECTIVE OF THE STUDY

To compare sensitivity, specificity, positive predictive value, negative predictive value of RIPASA scoring system and ultrasound in the diagnosis of acute appendicitis to reduce negative appendicectomy rate and to reduce the economic burden on patients

REVIEW OF LITERATURE

The existence of the appendix was known even when the pyramids were being built, because certain Coptic jars containing bowel, inscribed with references to the "WORM OF THE BOWEL" and hermetic books of Thoth and `Books of the Dead', contain statements which probably refer to the appendix.

Claudius Amyandin the year 1736 performed the first appendectomy. When he operated on a 11year old boy suffering from inguinal hernia, at St. George's Hospital. The appendix was found in the hernial sac and the fecal fistula was traced to a perforation ofthe appendix by a pin. Claudius Amyand excised the appendix during operation, and the case was reported in the Royal Society in1736.

The condition now called 'appendicitis' became a surgical problem once it was obvious that the starting point of the disease is the vermiform appendix. The first to clearly recognize this was **Reginald Heber Fitz** (1843-1913), a professor of pathologic anatomy at Harvard. He pointed out that the frequent abscesses in the right iliac fossa were not due to typhilitis, perityphilitis or epityphilitis but due to perforation of appendix. He gave the condition the name'Appendicitis'.

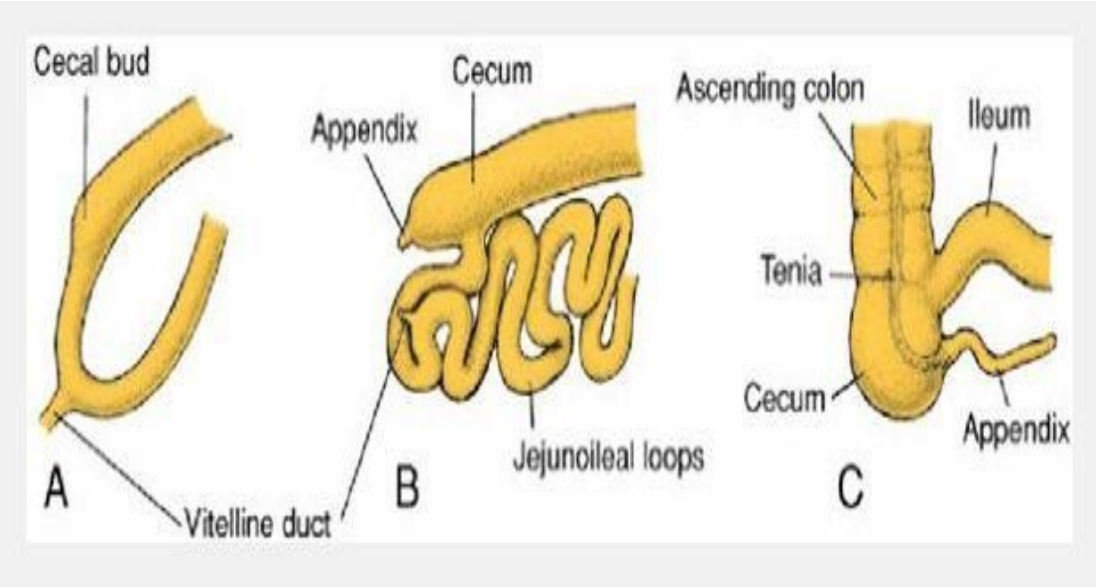
Charles McBurney (1845-1913) was one of the surgeons pioneering the diagnostics and operative treatment of appendicitis. McBurney's classic report on early operative interference in cases of appendicitis was presented before the New York Surgical society in 1889. In it he described the area of greatest abdominal pain in the disease process, now known as McBurney'spoint.

John Benjamin Murphy ,US surgeon introduced and popularized the technique of early removal of appendix in all the cases of suspected appendicitis

EMBRYOLOGY AND DEVELOPMENT

The appendix and ceacum develops from caecal bud around the beginning of the sixth week of development of embryo, arises from the antimesenteric borders of the caudal limb of the mid gut loop. Until fifth month the out pouching maintains a conical shape , after which the tip begins to elongate and develops into the vermiform appendix and proximal portion expands to form caecum

The lymphoid tissue first appears in human appendix by about two weeks after birth. Between the age of twelve and twenty the number of lymph follicles gradually increases to a peak of about 200



CONGENITAL ABNORMALITIES:

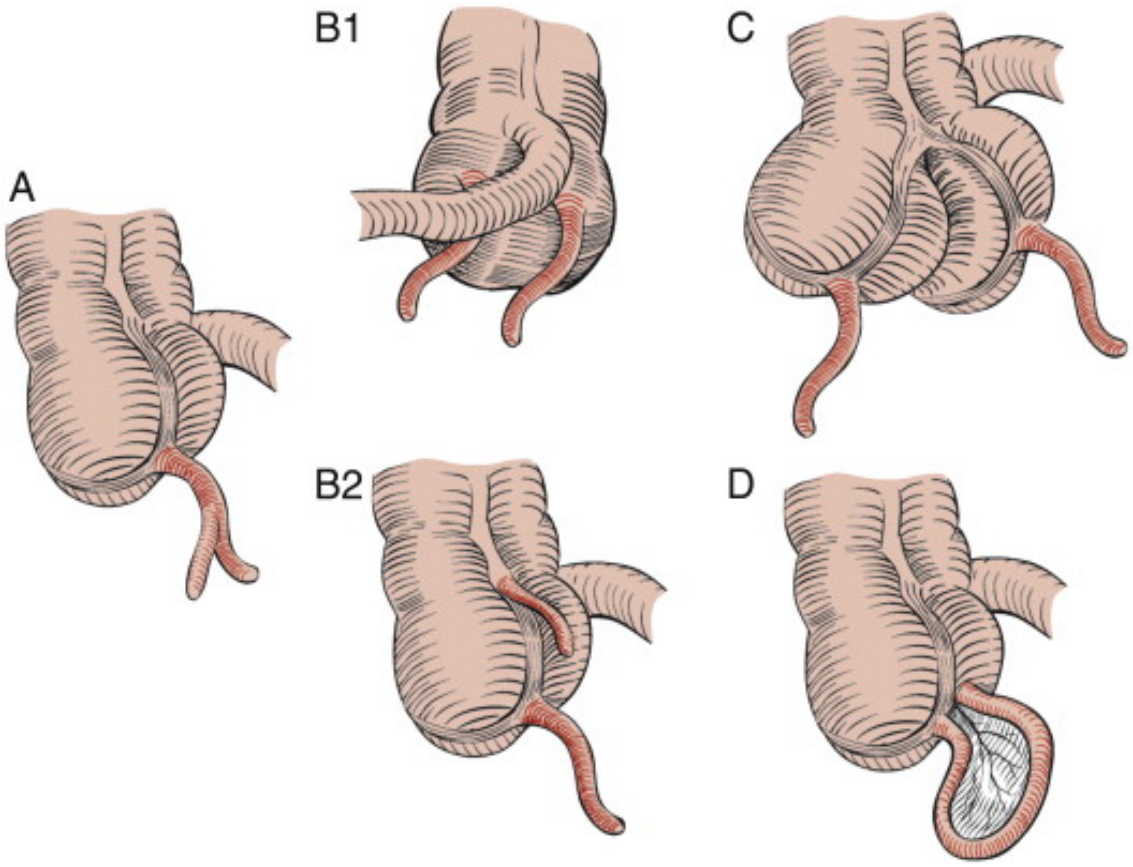
Congenital abnormalities of the appendix are:

1. Congenitalabsence

2. Duplication ortriplication

3. Variation inpositions

4. Congenital diverticulum / band ofappendix

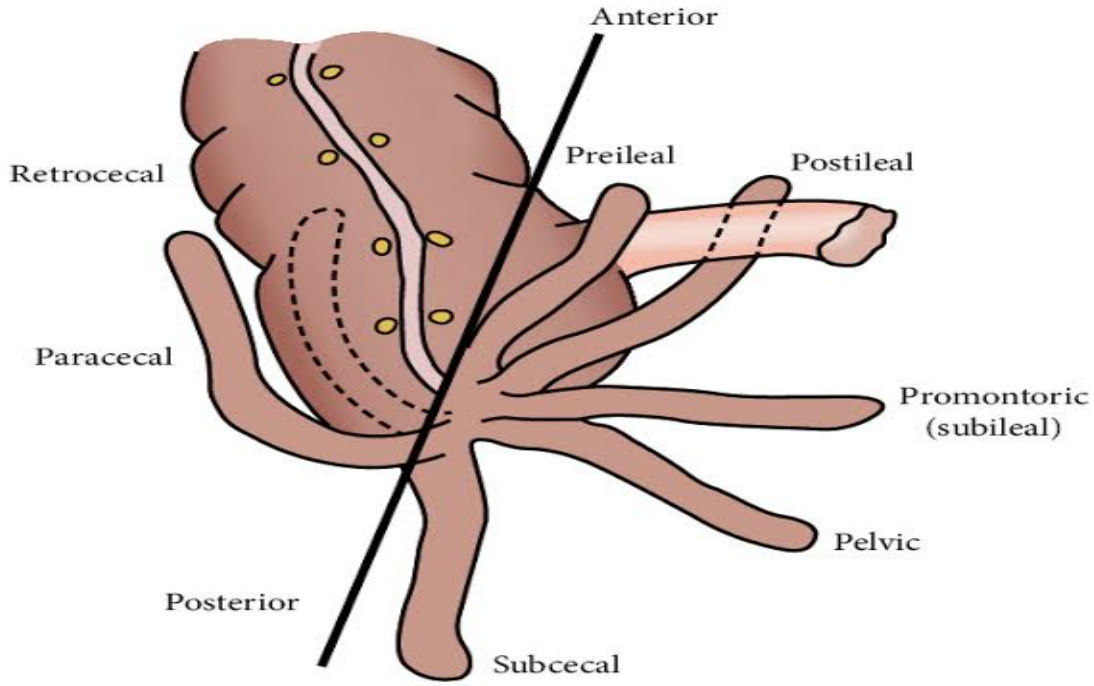


Variations in position

Due to incomplete downward descent of cecum, the appendix may remain in sub hepatic position. Due to overgrowth of the ascending colon, appendix may sometimes descend down to pelvic position along with the cecum.

Due to incomplete or non-rotation of the mid gut loop, appendix may assume a position on the left side of the abdomen. This may be associated with transposition of viscera of thorax and abdomen in cases of situs inversus viscerum.

Cecum may have a mesentery, and be mobile in 10 to 20% of people. Because of its mobility, appendix may assume a variable position in the abdomen.



ANATOMY OF VERMIFORM APPENDIX

The vermiform appendix is a narrow, vermian (worm-shaped) tube which arises from the posteromedial caecal wall, 2 cm below the end of the ileum. It may occupy one of severalpositions.

Sir Frederick described the various positions of the appendix comparing the position with the face of a clock.

- Para colic(0.2%) (lies in the sulcus on the lateral aspect of the caecum

- Retrocaecal(65.28%) (lies behind the caecum and may be totally or partially retroperitoneal)

- Pre-ileal(1%)
- Postileal(0.2%)
- Promonteric(0.05%) (the tip of the organ points towards the promontory of thesacrum).
- Pelvic(31.01%) (Appendix dips into thepelvis).
- Subcaecal or midinguinal or mid Poupart(2.26%)

The three taeniae coli on the ascending colon and caecum converge on the base of the appendix, and merge into its longitudinal muscle. The anterior caecaltaenia is usually distinct and can be traced to the appendix

The appendix varies from 2 to 20 cm in length.Iit is often relatively longer in children and may atrophy and shorten after mid-adult life. It is connected by a short mesoappendix to lie in lower part of the ileal mesentery. This fold is usually triangular, extending almost to the appendicular tip along the whole viscus.

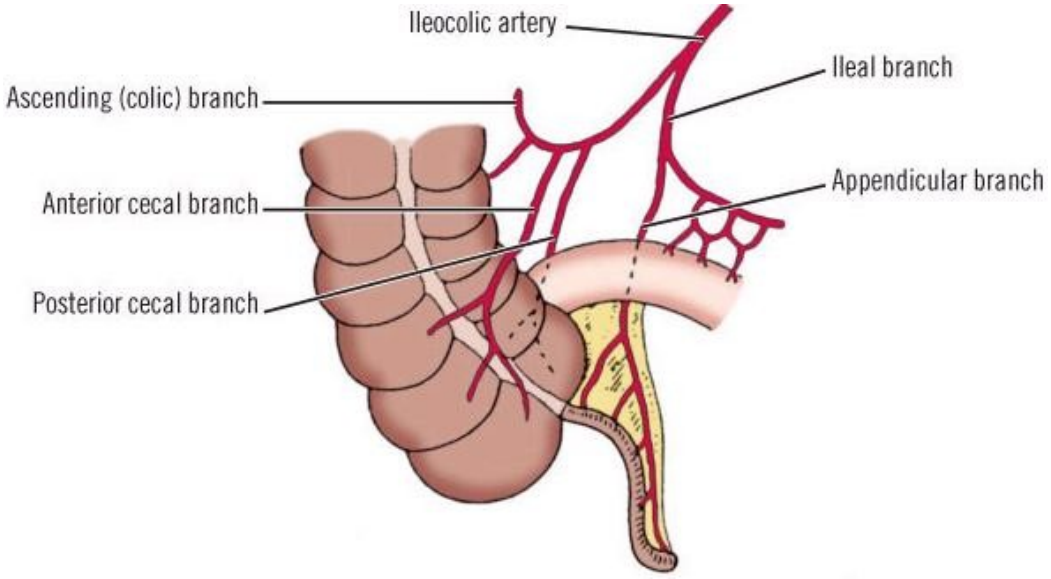
The lumen of the appendix is small, not more than 6 mm in diameter and opens into the caecum by an orifice lying below and slightly posterior to

the ileocaecal opening. The orifice is sometimes guarded by a semilunar mucosal fold forming a valve. The lumen may be widely patent in early childhood and is of tenpartially or wholly obliterated in the later decades of life.Theappendix usually contains numerous patches of lymphoid tissue although these tend to decrease in size from early adulthood

Vascular Supply

The main appendicular artery, a branch from the lower division of the ileocolic artery, runs behind the terminal ileum and enters the mesoappendix a short distance from the appendicular base. The main appendicular artery approaches the tip of the organ, at first near to, and then in the edge of the mesoappendix. The terminal part of the artery lies on the wall of the appendix and may be thrombosed in appendicitis, which results in distal gangrene or necrosis

BLOOD SUPPLY OF APPENDIX



Appendicular Veins

The appendix is drained via one or more appendicular veins into the posterior caecal or ileocolic vein and thence into the superior mesenteric vein.

Lymphatic drainage

Lymphatic vessels in the appendix are abundant in its walls.Thelymphatics from the appendix drain into the lymphatic vessels draining the ascending colon, and end in the inferior and superior nodes of the ileocolic chain.

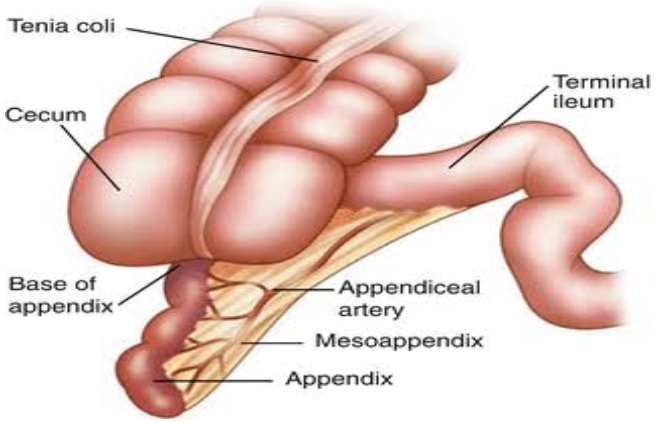
Innervation

The superior mesenteric plexus innervates the appendix and overlying visceral peritoneum by sympathetic and parasympathetic nerves from the superior mesenteric plexus. Visceral afferent fibres carrying sensation of distension and pressure mediate the symptoms of pain felt during the initial stages of appendicular inflammation

Mesoappendix:

The mesentery of the appendix is a triangular fold of peritoneum around the vermiform appendix. It is attached to the posterior surface of the lower end of the mesentery of the small intestine close to the ileocaecal junction. It usually reaches the tip ofthe appendix but some times fails to reach the distal third, in which case a vestigial low peritoneal ridge containing fat is present over the distal third. It encloses the blood vessels, nerves and lymph vessels of the vermiform appendix, and usually contains a lymph node

MESOAPPENDIX

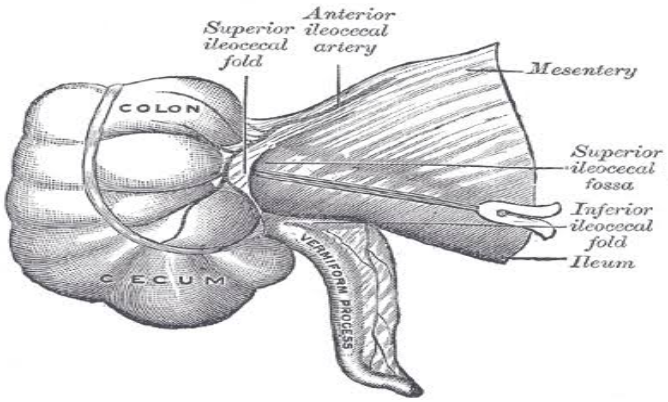


CAECAL RECESS:

Several folds of peritoneum may exist around the caecum and form recesses. Paracaecal recesses are common sites for abscess formation following acute appendicitis.

Others include, Superior ileocaecal recess, Inferior ileocaecal recess andRetrocaecal recess

CAECAL RECESS:



HISTOLOGY:

Mucosa:

The mucosa is lined by a columnar epithelium, and M cells are present in the epithelium that overlies the mucosal lymphoid tissue.

Sub-Mucosa:

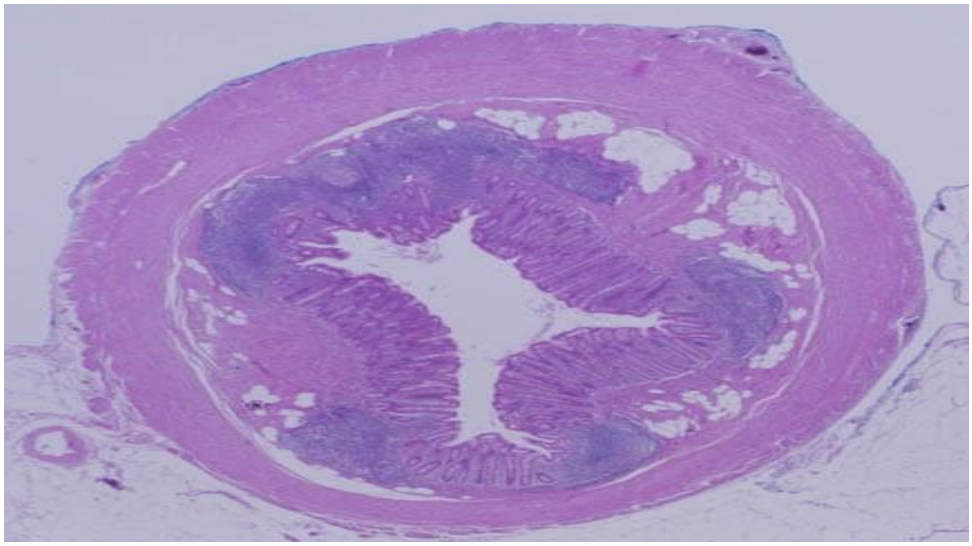
The submucosa typically contains many large lymphoid aggregates that extend from the mucosa and obscure the muscularis mucosae layer:. These aggregates also cause the mucosa to bulge into the lumen of the appendix, so that it narrows irregularly .

MuscularisExterna:

The muscularisexterna has outer longitudinal and inner circular layers of smooth muscle. At the base of the appendix, the longitudinal muscle thickens to form rudimentary taeniae that arecontinuous with those of the caecum and colon

Serosa

The serosa forms a complete covering, except along the mesenteric attachment.



FUNCTIONS OF THE APPENDIX

The human vermiform appendix is usually referred to as a vestigial organ with no known function. On the contrary currently available evidences suggest that the appendix is highly specialized part of alimentary tract.

Postulated functions of theappendix:

1.Exocrine: There have been suggestions that the appendix in human has an exocrine function, assisting in digestion of plant foods. However the 2 ml of clear fluid secreted containing mucin, amylase and proteolytic enzymes per day in low concentrations cannot have any effect on food stuffs in the caecum and food stuffs wouldn‟t ideally enter the appendix for processing.

2.Endocrine: The neuroendocrine cells and their secretory products in the appendix have not shown to have any selective endocrinefunctions.

3.Neuromuscular: It has been suggested that, the appendix may be the pacemaker for synchronized contraction and emptying that side of the bowel.

4.Lymphoid: The amount of the lymphoid tissue in the appendix is equal tothat in the ascending, transverse and descending colon. There is a

relative increases in IgM, IgA and IgG containing lymphocytes in the lamina propria of theappendix.

SURFACE MARKING:

The base of the appendix corresponds to the Mc Burney's point, which is situated at the junction of the lateral one third and medial two thirds of the line joining the anterior superior iliac spine andumbilicus.

ETIOLOGY:

The etiological factors still remain unknown and obscure although appendicitis is a common disease. It is rare in rural communities in economically less developed countries and its incidence is rising with economic development, migration to urban area and emigration to western countries. No individual with an appendix seems immune from the risk of developing appendicitis, but many contributory factors may beresponsible.

Age andSex:

It is rare under the age of four year and after the age of 50 yrs. About 65% of the patients are under the age of 30 yrs and only 2% are 60 yrs and above. The incidence of appendicitis is maximum between 20

to30yrs[3].the incidence of appendicitis is approximately 1.4 times greater in men than in women.

Familialsusceptibility:

There are instances of appendicitis occurring in families, suggesting an inherited susceptibility

Seasonalfactors:

There is, particularly in children, a possible association between seasonal respiratory tract infection and acute appendicitis. The lymphoid tissue in the appendix and tonsils may be simultaneously affected.

Race andDiet:

In general, appendicitis is associated with the consumption of a high proportion of meat. Racial distribution may be related to diet, as many of those races said to escape appendicitis may develop the disease of civilization. It is common in highly industrialized countries, but we find that in Indians it is notuncommon.

Faecoliths

Non-calcified inspissatedfaecal masses are a common finding in a large proportion of appendices removed for acute disease. Ulceration orperforation usually occurs at or near a faecoliths may turn diffuse inflammatory lesion into gangrene.

Constipation and Purgation:

Constant and frequent use of purgation for constipations leads to violent peristaltic action, which results, favours and determines the perforation of inflamed appendix.

Parasites:

Parasites like round worm,thread worm may injure mucus membrane or at times cause obstruction of the lumen of the appendix and cause acute inflammation of theappendix.

Bacterialfactors:

The appendicular flora remains constant throughout life with the. This bacterium is seen only in adults.[40] The bacteria cultured in cases of appendicitis are therefore similar to those seen in other colonic infections such as diverticulitis. The principal organisms seen in the normal

appendix, in acute appendicitis, and in perforated appendicitis are *Escherichia coli* and *Bacteroidesfragilis.*

Bands and Adhesions:

Various abnormal peritoneal attachments of congenital origin have been described and if these cause kinking of the appendix, it results into obstruction. Inflammatory or acquired adhesions due to repeated attacks of appendicitis may induce acute obstructivepicture.

Strangulation within a hernialSac:

Diffuse inflammation of an appendix in hernial sac may be aggravated by the obstructive effect at the neck of the sac.

Trauma

This is a very rare cause of acute appendicitis, if the attack of acute appendicitis follows within 24 hrs after a blunt injury to right iliac region the probable cause of appendicitis is due to the displacement of faecoliths by trauma to the abdomen

Acute appendicitis secondary to metastaticcarcinoma:

Metastatic carcinoma of the appendix due to the encroachment of the growth presents as acute obstructive appendicitis leading to perforation and other complications.

Vascularfactors:

The appendicular artery is an end artery. It is possible that extramural ischemia may play a role in this disorder. Any thing that compromises the external blood supply could therefore contribute to ischemia, inflammation and hence secondary infection in the appendix.

PATHOGENESIS:

The proximal obstruction of the lumen of the appendix produces a closed loop obstruction. The appendix secretes 2-3ml of mucus daily. The luminal capacity of normal appendix is only 1ml. Secretion of as little as 0.5 ml, leads to increase of pressure of approximately 45 mm hg.

Distension stimulates nerve endings of visceral afferent pain fibres and leads to dull diffuse pain in the mid abdomen. Distension continues from rapid multiplication of bacterial flora of the appendix.

Increasing pressure leads to occlusion of the capillaries and venules, but the arteriolar inflow continues. This results in vascular congestion. Characteristic shift in pain to the right lower quadrant is seen when the serosa of the appendix and the parietal peritoneum is involved. The impaired blood supply leads to a compromise of the appendiceal mucosa, allowing for the bacterial invasion. The intra luminal pressure exceeds the arteriolar pressure leading to ellipsoidal infarcts in the anti mesenteric border. Finally perforation occurs, through the infracted area resulting in peritonitis.

Alternatively, the greater omentum and loops of small bowel walls adhere to the inflamed appendix, resulting in phlegmonous mass or paracaecal abscess. Rarely appendiceal inflammation resolves leading to distended mucus filled appendix called mucocele of theappendix.

CLASSIFICATION OF APPENDICITIS

1.Catarrhal appendicitis.

2.Acute suppurative

3.Gangrenous

4.Recurrent

5.Chronic

Catarrhal appendicitis:

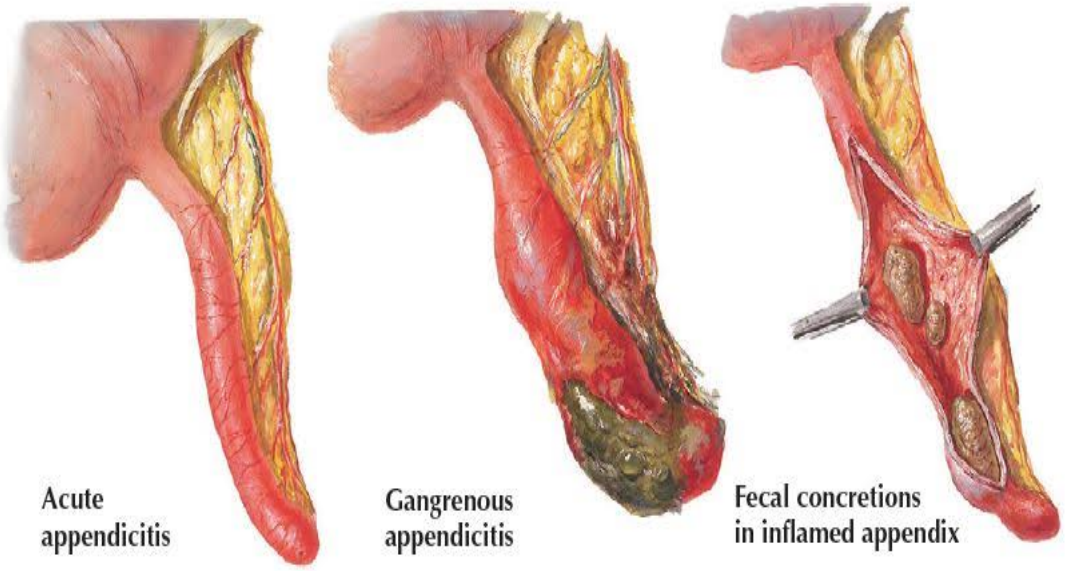
Inflammation and symptoms are mildGross- the serosa looks infected a dull granular red membrane. Mucosa and sub mucosa are inflamed. The lumen is not obstructed.Microscopy- Scanty, neutrophilic exudation throughout the mucosa, sub mucosa and muscularis. Scanty perivascular neutrophilic emigration.

Acute suppurative appendicitis

Inflammation is more severe and purulent. The infection begins at the bottom of the crypts.Gross- Appendix is swollen and elongated. fibrous or purulent exudates is present over the surface.The tip is usually swollen and the whole process is likely to be more marked in the distal than the proximal part. An obstructive element is usually present and is of the dangerous type

Gangrenous appendicitis

It is merely a further stage of acute appendicitis. There is necrosis and putrefaction of tissues of appendix either local or general, due to interference with blood supply due to kinking of the structure of the appendix or thrombosis of the vessel that is transversingin the mesoappendix



Recurrentappendicitis

The appendix is usually thickened; fibrosed and lumen may be narrowed or completely obliterated.Large numbers of lymphocytes infiltrate the mucosa and sub mucosa. Most of the appendices labeled as showing chronic appendicitis are really healing, after an acute attack

Chronic appendicitis:

Divergence of opinion exists regarding the entity of chronic appendicitis, as a cause of recurrent pain in right iliac fossa. This always requires investigations to exclude inflammatory bowel disease and gynaecology disorders in the females.The appendix is usually long, fibrotic and contains faecolith. Histopathological examination shows chronic inflammation

SYMPTOMS

A patient with acute appendicitis may present with the triad of pain, vomiting and fever (Murphy's triad), but it is not always so. Atypical presentations are common.

Pain:

Because of inflammation of the organ and increase in the intraluminal pressure, the sympathetic nerves are stimulated. This visceral pain is first felt in the umbilical and lower epigastricregions.This type of pain lasts for about 1-12 hours and as the inflammation extends to involve the serosa, the somatic nerves of the peritoneum are stimulated and then a constant and dull aching pain is felt in the right iliac fossa.If obstructive element is present, colicky pain is experienced. In gangrenous appendicitis, pain is felt only initially, as the nerve endings are destroyed later.Once perforation occurs, and infection is not controlled by local or systemic factors, constant severe and general abdominal pain of diffuse peritonitis ensues.

Vomiting, Nausea, Anorexia:

vomiting generally occurs in the early stages of the attack, but usually a few hours after the initial pain due to protective pylorospasm. Many

patients do not vomit but instead complain of nausea. Dyspepsia occurs in majority of the cases. Loss of appetite and repulsion for food can be regarded as a lesser degree of the same sensation and of equal value indiagnosis.It may be taken as an important general rule that the severity and frequency of nausea and vomiting in a patient at the onset of an attack indicate the degree of distension of appendix and consequently, the immediate risk to the patient that perforation might occur. Persistent regurgitent vomiting occurs with diffuse peritonitis.

Bowel disturbance:

Constipation is common. Diarrhoea can occur in pre or post- ileal positions of appendix, due to irritation of the distal ileum. Pelvic abscess may irritate the distal bowel, leading to frequent evacuation of the bowel and tenesmus.

Urinary disturbance:

Irritation of the ureters by a retrocaecal appendix may give rise to pain mimicking right ureteric colic. Increased frequency of micturition, haematuria or dysuria can occur due to the irritation by the inflammed pelvic appendix.

SIGNS OF APPEDICITIS:

Tenderness: Usually elicitable over the McBurney'spoint.

Guarding and Rigidity: guarding is an involuntary, protective process, preventing palpation.. Rigidity occurs when peritonitis sets in. Muscular rigidity occurs when the inflammed organ is in contact with themuscle.

Systemic signs

Low grade fever is common. If fever precedes the onset of abdominal pain, the diagnosis of acute appendicitis is questionable. Mild coating of the tongue is present. Tachycardia and mild dehydration may also be seen. In perforated appendix, a full-blown picture of peritonitis results.

CLINICAL TESTS DESCRIBED WITH RESPECT TO APPENDICITIS

McBurney's sign: tenderness on deep palpation over the McBurney's point, which corresponds to base of the appendix.

Rovsing's sign: pressure over the left iliac fossa causes pain in the rightlower abdomen, due to the shift of the coils of ileum form the left iliac fossa to the right

Blumberg's sign: demonstration of rebound tenderness in the right iliac fossa, after deep palpation.

Psoas test: due to the irritation of psoas muscle in the inflammation of a retroceacal appendix, extension of the right thigh, patient lying on his left side, elicits pain.

Cope's obturator test: on flexing and internally rotating the right thigh, if the inflammed appendix is in contact with the obturator muscle, pain is felt in the hypogastric region.

Hyperaesthesia in Sherrens's triangle: Sherren's triangle is formed by the lines joining the umbilicus, right anterior superior iliac spine and pubic symphysis. Gently picking up a fold of skin and subcutaneous fat and drawing it away from the abdominal wall, or by stroking with a pin, elicits pain. Positivity of this sign is regarded by some clinicians as a good guide in the diagnosis of acute appendicitis before perforation.

Baldwin's test: The patient is asked to lift his right leg few inches off the bed, keeping the knee stiff. If the patient promptly complains of pain, or drops off his leg with pain, the test is positive. It indicates retroceacalappendix.

Pointing test: a patient with acute appendicitis will point to the right lower abdomen on coughing, pointing to the site of inflammation. This is due to the irritation of parietal peritoneum.

VARIATIONS IN CLINICAL PRESENTATION DUE TO VARIOUS POSITIONS OF THE APPENDIX

Retrocaecal appendix: In this position, due to caecum intervening between the inflammed appendix and the abdominal wall, rigidity is not marked. Tenderness may be elicited over the right flank, as also is rigidity (Baldwin's test). Psoas test may bepositive.

Subcaecal appendix: Appendix is curled up below the caecum and is in contact with the iliacus muscle. So, the extension of hip becomes painful due to iliacus spasm, and pain is felt in thehypogastrium.

Pelvic appendix: when the appendix is almost entirely in the pelvis, the clinical signs may be absent over the anterior abdominal wall. Often, even the McBurney's sign may be negative. Pelvic examination detects differential tenderness on the right side. Obturator spasm may be present rarely. Patient may have symptoms of strangury or dysuria due to bladder irritation

DIFFERENTIAL DIAGNOSIS:

The differential diagnosis of appendicitis can include almost all causes of abdominal pain, as described in the classic treatise “Cope’s Early diagnosis of the Acute Abdomen”

Attic (Naso-pharynx andthorax):

*Tonsillitis: In children abdominal colic may arise from the swallowed exudates “Tonsil Tummy”

*Pneumonia and pleurisy: Especially involvement of base of the right lung give risetorightsidedabdominalpain, but they are associated with an increased respiratory rate

*Perforated peptic ulcer: It is associated with history of dyspepsia and a very sudden onset of pain which starts in the epigastrium and the escaping contents travel down the right para-colic gutter and give rise to all the signs of inflammation of the appendix.. Radiography may show gas under thediaphragm.

*Acute cholecystitis: Pain, vomiting , fever and local tenderness on the right side of abdomen is present in both conditions. In cholecystitis pain is high up and referred to the right subscapular region and associated with

jaundice.

*Torsion of omentum: Torsion and strangulation of the whole or of a portion of the omentum may simulate appendicitis. If the affected fat becomes adherent to the abdominal wall there may be superficial hyperesthesia.pain due to torsion of omentum is relieved when the patient lies down.

*Cyclical vomiting:The patient is an infant or young child and there is history of previous similar attacks. Rigidity is absent and acetone is found in the urine, but acetonuria may be present in starvationalso.

The ground floor(i.e umbilicus to the brim of thepelvis)

*Entero-colitis: vomiting and diarrhoea is associated with intestinal colic but localizedtenderness does not usually occur.

*Non-specific mesenteric lymphadenitis: The patient is usually a child,. Associated with enlarged cervical lymphnodes and raised lymphocyte counts .Shifting tenderness when the child turns on to his left side if present is a convincingevidence.

Intestinal obstruction: Is associated with persisting colicky pain around the umbilicus with vomiting first of the stomach contents then of the

intestinal contents. The bowel sounds are noisy and plain erect x-ray shows fluid levels

*Regional ileitis: In its acute form may be indistinguishable from acute appendicitis unless a doughy mass of inflamed ileum can befelt.

*Carcinoma of caecum: When obstructed may mimic appendicitis in elderlyperson.

*Meckel's diverticulitis: The symptoms resemble acute appendicitis and the diagnosis is impossible beforeoperation.

The basement(i.e pelvis)

This is particularly applied in a women of the child bearingage

*Salphingitis:it is associated with vaginal discharge,menstrual irregularities and dysmenorrhoea and burning micturition

Ectopic gestation:* right sided tubal abortion and right sided unruptured tubal pregnancy present as acute appendicitis except that the pain starts in the right side and stays there. It is associated with history of missed periods, urine for pregnancy test will be positive.

Ruptured ovarian follicle (Mittelschmers):Usually common in early womenhood and usually occurs on 14-16th day and does not progress. This occurs at regular cycles and at times they have similar pain on left iliacfossa.

*Twisted right ovarian cyst: Here the pain is severe and is referred to the loin and made worse when patient rolls over. The pulse rate rises with no rise intemperature.

*Diverticulum of caecum(solitary): This is rare , when occurs is usually undistinguishable from acuteappendicitis.

The backyard (i.e retroperitonealstructures)

*Right ureteric colic: This is the commonest differential diagnosis . In typical ureteric colic, pain commences in the loin and passes to groin, and is usually associated with urinary symptoms .

Right sided pyelonephritis:* Is preceeded by increased frequency of micturition. Presents with tenderness confined to the loin , fever and possible rigors and pyuria

The electrical installation (Central nervoussystem):

*Pre-herpetic pain in the right tenth and eleventh dorsal nerves: Is located over the same area as that of appendicitis . It does not shift and is associated with marked hyperaethesia..

*****Tabes crises: Are now rare. Severe abdominal pain and vomiting usher in the crisis. Other signs of tabes confirm thediagnosis.

COMPLICATIONS

*****Local peritonitis- when the infection spreads through the entire thickness of the wall of the appendix up to the serosa, the peritoneum gets inflamed locally leading on to local peritonitis. As long as the infection gets locally controlled, no further spread occurs, otherwise diffuse peritonitisresults.

*Diffuse peritonitis- the entire peritoneal cavity may get inflamed by one of the followingways

1.Acutely inflamed appendix perforates or bursts before localizing factors can localize the spread ofinfection

2.When the general condition of the patient is poor or he is immunosuppressed.

3.When the organisms are virulent, the infection will spread to the general peritonealcavity.

*Appendicular mass- a walled off perforated appendix will form an inflammatory mass. Usually there is history of up to 4-5 days.

*Appendicular abscess- failure of the appendicular mass to resolve leads to the formation of theabscess.

*Ileal obstruction- paralytic ileus is common during inflammatorystage.

*Sometimes adhesions around the distal ileum lead to organic obstruction.

*Mesenteric vein thrombosis- the thrombosis of the appendicular vein may progress to involve the mesenteric vein. This may result in hemorrhage and gangrene of the distal ileum, requiringresection.

*Pyelophlebitis and liver abscess- Pyelophlebitisis septic thrombophlebitis of the portal venous system. Infection of the appendix can spread retrograde to the liver, due to portal pyemia. This complication can occur during an acute attack or in 3 to 6 wks of an acute attack or even after 6 weeks of the attack. This is characterized by high fever, rigors, jaundice, and abnormal liver functiontests.

*External or internal fistula- when the appendicular abscess ruptures through the skin, an external fistula occurs. When the appendix perforates into a viscous, depending on the viscous, it can form appendicovesical fistula, appendicoileal fistula, appendicojejunal fistula or appendic osigmoidfistula

LABORATORY INVESTIGATIONS AND SCORING

Total WBC count and differentialcount:

The leukocyte count is usually elevated to the range of 10,000 to 18,000 mm^3. In addition, an increase in the percentage of neutrophils (The "left shift") with a normal total white cell count supports the clinical diagnosis of appendicitis.If the count is more than 18,000 cells/mm^3, perforated appendicitis with or without an abscess isprobable.

URINE ANALYSIS:

Minimal albuminuria and some WBC in the urine are present in 20% of male patients with acute appendicitis , microscopic pyuria in 19% (15-20 cells/HPF) and haematuria in 5% (30-50 cells/HPF). The incidence of urinary findings was more in patients over 40 years of age

C-REACTIVE PROTEIN:

C-reactive protein (CRP) is an acute-phase reactant synthesized by the liver in response to infection or inflammation. A rapid assay is widely available

IMAGING MODALITIES

Plain Radiography.

Plain radiography has been used for the diagnosis of the acute abdomen since 1906. However, there is no single sign that is pathognomonic of acute appendicitis in a plain film. Brooks et al, in 1975, described several signs in a case of acute appendicitis.

1. Presence ofappendicolith.

2. Sentinel loop-dilated, atonic bowel loop containing fluid level, present in the right iliacfossa.

3. Dilatedcaecum.

4. Widening and blurring of pre-peritoneal fatline.

5. Haziness of right lowerquadrant.

6. Scoliosis, concave to theright.

7. Right lower quadrant mass indenting thecaecum.

8. Blurring of the (right) psoas outline.

9. Gas in the appendix – rare.

II.Barium meal follow through:

This involved a slightly higher (0.2 rad) radiation exposure as compared to a barium enemaThe signs of acute appendicitis are:Non-visualization of the appendix.Mass effect on thecaecum.

III.Barium Enema:

Barium enema examination is based on the rationale that the lumen of the

normal appendix can be demonstrated with barium enema, and appendiceal luminal obstruction represents acute appendicitis, with extrinsic pressure effects **(reverse 3 sign)** on the caecum.

X RAY ABDOMEN **BARIUM ENEMA**

IV.ULTRASOUND

In 1986, Puylaert described a graded compression technique for evaluating the appendix with transabdominalsonography.Objectives of ultrasound are

- To identify the patients with acuteappendicitis
- To identify the patients without appendicitis
- To identify an alternate explanation for the right lower quadrant pain in patients who do not haveappendicitis.

The sensitivity and specificity of USG in the diagnosis ofappendicitis depends on a number of factors including patient size and body habitus, and the skill of the examiner. Another technical factor that may make visualization of the normal and abnormal appendix difficult is overlying bowel gas.

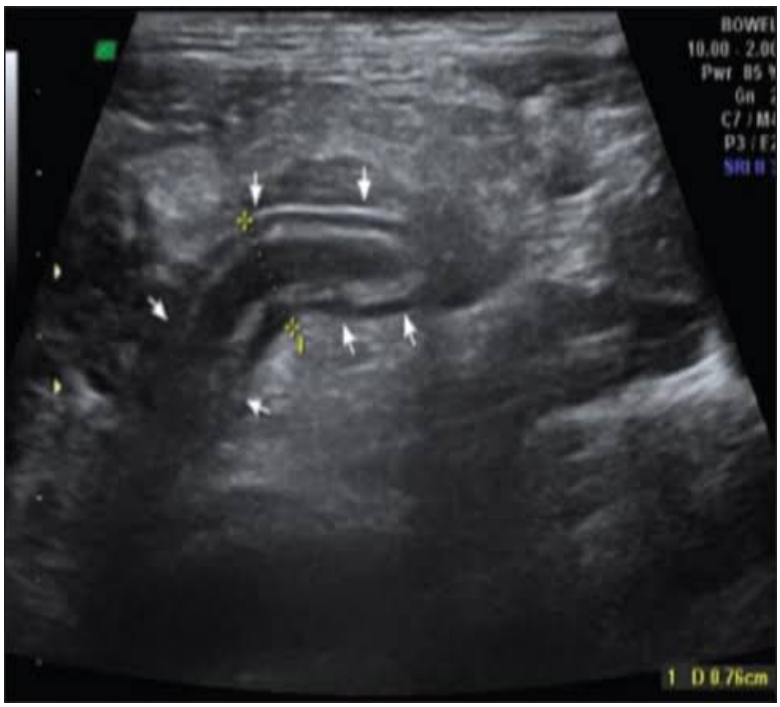
The graded compression technique of USG is performed with a higher resolution, linear-array transducer of 5 to 10 MHz. Graded compression sonography primarily consists of anterior forced compression to reduce the distance between the pathologic process and the transducer and to displace or compress bowel structures to eliminate artifacts.

The cecal tip where the appendix arises is approximately 1 to 2 cm below the terminal ileum. The examination can be expedited by asking the patient to point to the area of maximal tenderness. This can also aid in locating a retrocecal appendix.Most studies of graded compression demonstrate a sensitivity of more than 85% and specificity of more than90%.

The normal appendix presents as a small, easily compressible, concentrically layered, mobile, blind ending, and sausage-like structure. The diameter is usually less than 7mm, but is incidentally large. The normal appendix is mobile, may have a collapsed lumen, but may also

contain air or some fecal matter, and rarely a little fluid. Power Doppler reveals scarce or no vascular signal and there is no hyper echoic, non compressible inflamed fat around the appendix.Features suggestive of appendicitis in USG are as follows:

APPENDICITIS IN USG:



- Blindending,immobile,non-compressible,aperistaltic,tubularstructure.

- Cannot be displaced onpressure.

- Bull's eye or target lesion visualized in the transverse plane with diameter <6mm

- Faecolith in thelumen.

- Peri-appendiccalcollection.

- Hypo or Hyper-peristaltic loops in the right iliacfossa.

- Miscellaneoussigns:'Cockade'aroundtargetlesion.Tubularstructure>50mm in length.

V.COMPUTED TOMOGRAPHIC SCANNING:

Typically CT reserved for patients, atypical presentation ,equivocal history and those presented late with phlegmon or abscess with contrast improves the recognition of normal or abnormal appendix.

The common findings of acute appendicitis on C.T. as:

- Peri-caecal inflammation. (68%) (Dirtyfat)
- Abscess formation.(55%)
- Calcified appendicolith(23%)
- Abnormal appendix(18%)

APPENDICITIS IN CT:

Balthazar analyzed 100 consecutive cases with both, ultrasound and C.T, and found the accuracy of C.T. to be 93% as contrasted to 84% by ultrasound. The sensitivity of C.T. was found to be 96%. C.T. was found to be more useful in detecting location, nature and extent of the disease process. Normal C.T. does not rule our acute appendicitis without peri-appendicealinflammation.

DIAGNOSTIC PERITONEAL ASPIRATION CYTOLOGY /LAVAGE:

Peritoneal lavage as a diagnostic modality for non-traumatic, acute abdomen has been investigated by Evans et al in 1975 and its utility was confirmed by Hoffman et al in 1988.

Complications reported were 2 cases of colonic perforation during the procedure. This procedure is also contraindicated in the presence of a sub-umbilical midline scar.Performance of this procedure was found to be difficult in the presence of paralytic ileus or obesity. Caldwell et al reported that a negative result does not definitely rule our significant intrabdominal pathology. However, leukocyte rich pus in the peritoneal aspirate of a young male is almost diagnostic of acute appendicitis.

DIAGNOSTIC LAPAROSCOPY

Kelling et al introduced diagnostic laparoscopy as early as 1902, but its use in the acute abdomen was reported only as late as 1970.

Deutsch et alhighlighted its utility at laparotomy in reducing the negative laparotomy rates for appendicitis. The negative appendectomy rates reduced from 30% to 1-2%.

Hoffman summed up the signs of acute appendicitis on laparoscopy.

1. Partial or complete visualization of the inflamedappendix.
2. Pus in the right iliacfossa.
3. Omentum adherent to the structures of the right iliacfossa.
4. Inflammation of peri-caecaltissues.
5. The advantage of laparoscopy

- positive visualization and the
- exclusion of differential diagnosis such as salpingitis, terminalileitis, typhilitis, ectopic pregnancy, endometriosis, ruptured corpus luteum cysts, tumor infiltrates, paraovarian cysts and mittelschmerzsyndrome

SCORING SYSTEMS :

1. Alvarado Score:

The classical signs and symptoms of acute appendicitis were first reported by Fitz in 1886. The Alvarado score was described in 1986 and has been validated in adult surgical practice. The classical Alvarado score

ALVARADO (MANTRELS) SCORE		SCORE
SYMPTOMS	MIGRATORY RIF PAIN ANOREXIA NAUSEA AND VOMITING	1 1 1
SIGNS	TENDERNESS RIF REBOUND TENDERNESS ELEVATED TEMPERATURE	2 1 1
LAB INV.	LEUCOCYTOSIS SHIFT TO LEFT	2 1
	TOTAL	10

included left shift of neutrophil maturation yielding a total score of 10.

- Those patients with scores of 7-10: ProbablyAppendicitis.
- Those patients with scores of 5-6: May beAppendicitis.
- Those patients with scores of 1-4: Unlikely to beAppendicitis

2. MODIFIED ALVARADOSCORE:

Kalan et al omitted the left shift of neutrophil maturation parameter and produced a modified score.

The modified Alvarado score yields a total of 9. Patients with a score of 1 – 4 are considered unlikely to have acute appendicitis.

Patients with a score of 5 – 6 have possible diagnosis of acute appendicitis, not convincing enough to have urgent surgery.

Those with a score of 7 – 9 are regarded as patients with acuteappendicitis.

Teicher scoring system:

Teicher et al described a scoring system, after retrospectively studying 100 cases of acute appendicitis.

A score greater than 3 was taken as a positive predictor of acute appendicitis. This system, if applied, would have prevented negative laparotomies in 38% of the patients and 5% would have been kept for observation.

TEICHER SCORING SYSTEM			
SCORE	POSITIVE PREDICTORS	NEGATIVE PREDICTORS	SCORE
+2	MALE	FEMALE	-1
+3	AGE > 50	20- 39 YRS	-1
+2	DURATION 1/2 DAY	DURATION > 3 DAYS	-3
+1	DURATION 2 DAYS	GENITOURINARY SYMPTOMS	-3
+3	INVOLUNTARY RIGHT LOWER QUADRANT SPASM	NO SPASM RECTAL MASS RT SIDE TC > 10,000 CELLS/CUM	-3

TZANAKIS SCORING SYSTEM:

In 2005 a new scoring system was developed by tzanaki et al ,which is based on combination of clinical evaluation ,marker of inflammatory response with USG findings.

Signs and sypmptoms	score
Features of appendicitis in USG	6
Right iliac fossa pain	4
Rebound tenderness	3
Counts >12000	2

RIPASA SCORING SYSTEM:

In 2010 a RIPASA, a new scoring system has been developed by RIPAS hospital (raja isteripengirananaksaleha) especially for mddle eastern and Asian population.

1	Male Female	1.0 0.5
2	Age < 39.9 yrs Age > 40 yrs	1.0 0.5
3	RIF pain	0.5
4	Migration of RLQ pain	0.5
5	Anorexia	1.0
6	Nausea & Vomiting	1.0
7	Duration of symptoms < 48 hrs Duration of symptoms > 48 hrs	1.0 0.5
8	RIF tenderness	1.0
9	RIF guarding	2.0
10	Rebound tenderness	1.0
11	Rovsing's Sign	2.0
12	Fever	1.0
13	Raised WCC	1.0
14	Negative urinalysis	1.0

TREATMENT

The one and only answer to treatment for acute appendicitis and its complications, is surgery, and the only dilemma it carries with it is, the timing of surgical intervention.

There is a general agreement on the timing of the operation for the three categories of appendicitis already mentioned – acute appendicitis without rupture, ruptured appendix with local peritonitis or phelegmon formation, and ruptured appendix with spreading peritonitis, when appendectomy should be done immediately.

There has been a difference of opinion, however, concerning the optimal timing of the operation for ruptured appendicitis with frank peri-appendiceal abscess formation. Expectant treatment was advocated by Ochsner in 1901. If progression occurs, the abscess is drained. If the patient improves, conservative treatment is continued. With these measures, the majority of appendiceal abscesses resolve satisfactorily, although many days of hospitalization are required. An elective appendectomy 6 weeks to 3 months later is strongly advised, since the recurrence rate is veryhigh.

Prompt surgery for all categories of appendicitis is especially important in children, since expectant treatment of ruptured appendicitis has been less successful than in adults.

Pre-Operative preparation:

All patients, but especially those in whom perforation and peritonitis are suspected, should receive intensive pre-operative preparation. This rarely requires more than 3-4 hrs and often can be accomplished in an hour or less. Patients with palpable peri-appendiceal mass may, in selected cases, be managed, initially, without an operation.

Antibiotics:

These are administered pre-operatively to help control any local or generalized sepsis that may be present, and to reduce the incidence of post-operative wound infection. These are especially useful in patients who have gangrenous or perforatedappendicitis.

It seems reasonable, therefore, to give antibiotics to all patients suspected of having appendicitis, continuing such treatment intra-operatively and post- operatively, and not just for those patients who are found to have complicated appendicitis at the time ofoperation.

Examination under anesthesia:

With the patient under the effect of anesthesia, the abdomen should be carefully and systematically palpated once more. On occasion, such examination will show the gallbladder to be the real cause of the patient'ssymptoms

Incisions:

There are a number of choices for an incision, each of which has its advantages and disadvantages. The incision should be one that gives sufficient exposure, permits the needed exposure with the least amount of tissue injury, and allows easy extension, should it become necessary. Also to be considered is the likelihood of complications directly attributable to the incision, such as dehiscence, incisional hernia, denervation of skin and muscle, and scar given by the incision itself.

There are few standard incisions that may be applied to appendectomy. Transverse incision of **Elliot-Rockey-Davis (so called Rockey-Davis), McArthur, Mc Burney's** grid-iron incision, with or without the medial **Harrington-Weir- Fowler** extension (so called Weirs extension), or vertical **Rutherford –Morrisons**extension, **Lanz**incision, vertical right **paramedian or a pararectus (Battle)** incision and midline vertical incision.

The Mc Burney's incision is undoubtedly the most popular, but it is the transverse or Rockey-Davis incision that most closely meets the criteria for an appropriate incision. It is particularly useful in retro-ceacal appendices & in those patients who are obese.

Transverse OrRockey-Davis Incision:

Centered on the midclavicular-midingunial line, usually made at a level 1-2 cm inferior to the umbilicus, depending on the size of the patient's abdomen and the location of maximum tenderness. The length of the incision should be 1-2 cm longer than the width of the surgeon's hand.

This approach gives rapid access to the right lower portion of the abdomen. If the incision is appropriately placed (i.e. not too low), the exposure of the caecum and the appendix is excellent. This incision produces minimal trauma to the muscle and other tissue and is easily extended medially by further incising the rectus sheath and rarely, the rectus muscle itself, converting it into a proper transverse abdominal incision.

However, there is a theoretical objection to the transverse incision. The medial end of the incision is relatively close to the midline, so that if localized pus is present and spillage occurs, there is a danger

ofdissemination.

It is the time-tested, muscle splitting incision that probably is the most widely used today for appendectomy. Its advantage, like that of the Rockey-Davis incision, is that the separation of the muscles in line with their fibers produces a wound that does not entirely depend on sutures for establishment of tissuecontinuity.

Nevertheless, a post-operative hernia can occur with both incisions. The Mc Burney's incision provides good exposure when the appendix lies free in the peritoneal cavity. However, if the appendix is in different positions such as retrocaecal, exposure can be cumbersome. This incision can be extended medially by partially transecting the rectus sheath as described by Weir[(2)], but produces a hockey stick type of skin incision. Perhaps the greatest disadvantage of Mc Burney's incision is that it follows an oblique course in the right lower quadrant, cutting across the skin lines. The scar widens with time thus producing a cosmetic result that is less thanoptimal.

The incision (7 to 10 cms) in length lies at right angles to the line joining the anterior superior iliac spine and the umbilicus, entered at Mc Burney's point i.e., at the junction of the lateral and middle-thirds of that line

External oblique aponeurosis is split in the line of its fibers and the underlying muscles split, to expose the transversalis fascia and peritoneum. Both these are picked up as one layer and are incised. If more access is required in a medial direction, the incision is extended, as described by Weir. Under desperate circumstances, a Grid-iron incision can be extended vertically by dividing the oblique muscle at right angles to its fibers. This method destroys the rationale of this incision, but is occasionally necessary to expose a retro-caecalappendix.

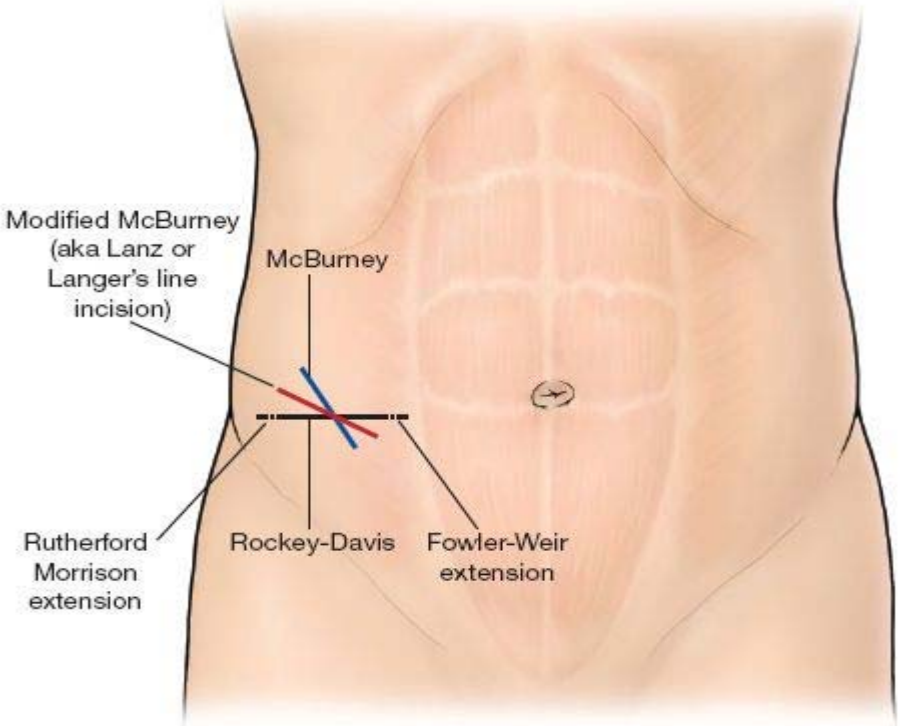
The Lanz incision:

This is a minor modification of the Grid-iron incision. The skin incision is made more or less transversely and curves so that it lies in the interspinous crease. Thereafter, the muscles are divided as in the classical Grid-iron approach. The

method has a definitive cosmetic value in producing an almost invisible scar, but difficulties are encountered if the incision is to be enlarged.

Other incisions:

Although some surgeons continue to use vertical, right paramedian incision or a pararectus (Battle) incision, neither of these provides a good access to the appendix as that achieved through either the Rockey-Davis or the Mc Burney's incision. The Battle incision is particularly susceptible to disruption, either acutely as dehiscence or subsequently as a ventral hernia. It is likely to denervate substantial segments of the rectus muscle as well a to interrupt its blood supply and exposure given is also notideal.



APPENDICECTOMY :

After the incision is deepened through fat and Scarpa's fascia, the aponeurosis of the External oblique muscle is exposed and incised in the line of the fibers. The fibers of Internal oblique muscle, which are now exposed, are muscular and having normally distinct fibers, which are now separated, followed by separation of the fibers of the Transversusabdominis, which laterally becomes aponeurotic.

The peritoneum is picked up and split in the line of incision. The caecum and the base of the appendix are drawn out into the wound, and the appendix delivered. The mesoappendix is serially clipped with artery forceps, divided and subsequently ligated. Approximately 5mm distal to the base of the appendix, the organ is crushed and the forceps applied 7 to 8mm further distally. A 1-0 chromic catgut ligature is applied to the crushed area and the organ transected. The exposed mucous membrane is then swabbedwithasterilespiritgauzepiece. Thestumpisinvaginated (buried).Some surgeons do not advocate burying of the stump, if the appendix is oedematous and turgid.

Wound closure

After removal of the appendix, (the operated area is irrigated in gangrenous or perforated appendix) each fascial layer is closed with a non- absorbable suture material or 2-0 chromic catgut. Skin is closed using non-absorbable sutures.

Advantages of invagination of the ligated stump

a. Better control of hemorrhage from thestump.

b. Doubly secure closure of the caecalwall.

c. Less chances of peritoneal contamination due to burial of infected stumpand

d. Reduced risk of post-operative adhesions by minimizing the extent of exposed, raw surface.

Disadvantages

a. Internal abscessformation.

b. Intussusception of the caecum following stumpinvagination.

c. Peritonitis resulting from rupture of an intramuralabscess.

High incidence of adhesions following rupture of intramuralabscess

Retrograde appendicectomy

It is the retrograde removal of the appendix by dividing the appendix at its base and thereafter dissecting till the tip.

It is indicated if the exposure of the appendix is difficult either because it is excessively long, or it occupies the retro-caecal position, or if the appendix is densely adherent and inflamed distally.

Appendicectomy-en-passant (Incidental appendicectomy)

This is the resection of a normal appendix during the course of an abdominal operation for another condition, eg. Cholecystectomy, ovarian cystectomy or caesarian section.**Delaney** and **Varco,** 1983, **Curse** and **Foord,** 1973, **Andrew** and **Roty**1987, **Fisher** and **Ross,** 1990, in their studies(2), suggested that this can be safely performed on those less than

50 years of age, not because of the increased life expectancy of these patients, but because of the decreased risk of infection

METHODS TO BE ADOPTED IN SPECIAL CIRCUMSTANCES:

1) ***The caecum cannot be found:*** caecum has not descended fully or malrotation of the intestine is present. An extension of the incision in an upward direction is indicated.

2) ***The appendix cannot be found:*** make certain that the caecum has been delivered and then trace one of the taenia coli downwards, this must lead to the appendix. The appendix may be buried in the caecal wall or has become inverted or intussussepted.

3) ***The appendix lies buried retrocaecally:*** the wound has to be enlarged. The caecum is retracted to the right. Once the reflection of the peritoneum on the lateral aspect of the caecum is visible, make a hockey-stick shaped incision on the parietal peritoneum. After blunt dissection in the retroperitoneal space, the caecum is made more mobile and can be retracted still further, bringing the previously hidden appendix into fullview.

4) ***The appendix is clothed with adherent omentum:*** adherent omentum should not be disturbed, it should be divided between haemostats at a convenient distance from theappendix.

5) ***The base of the appendix is inflammed:*** the base should not be crushed for fear of spreading infection by way of blood or lymph. It should be ligated close to the caecal wall, just tightly enough to occlude thelumen.

6) ***The base of the appendix is gangrenous:*** neither crush nor ligature should be applied. Two stitches are placed through the rectal wall close to the gangrenous base of the appendix, which is amputated flush with caecal wall, after which these stitches are tied. Further closure is effected by means of a second layer of interrupted seromuscularsuture.

7) ***The appendix has sloughed off:*** the mesoappendix anchors the organ in the field of operation. It may however be in 2 portions if a faecolith has perforated through the wall. In such a case both portions must be removed and the faecolith retrieved usually from thepelvis.

8) ***The mesoappendix is gangrenous and cuts off:*** if ligature does not hold, a stitch applied directly beneath a spurting vessel may stop bleeding. If the artery has retracted, it must be sought behind theileum

9) ***The caecal wall is oedematous:*** Invagination should not be attempted, the stump should be ligated and cut surface touched with diathermy in an attempt to reduce infection

10) ***The appendix is lying against the mesentery and inflammation has implicated the latter:*** It is highly important to observe the ileum in the immediate neighbourhood of the affected portion of mesentery. If the intestine is devitalized, it is necessary and wiseto resect the affectedsegment.

LAPAROSCOPIC APPENDICECTOMY

The surgeon typically stands on the left of the patient, and the assistant stands on the right. The anesthesiologist and the anesthesia equipment are placed at the patient's head, and the video monitor and instrument table are placed at the feet.Although some variations are possible, 3 cannulae are placed during the procedure. Two of them have a fixed position (ie, umbilical and suprapubic). The third is placed in the right periumbilical region, and its position may vary greatly depending on the patient'sanatomy.

According to the preferences of the surgeon, a short umbilical incision is made to allow the placement of a Hasson cannula or Veress needle that is secured with 2 absorbable sutures.

Pneumoperitoneum (10-14 mm Hg) is established and maintained by insufflating carbon dioxide. Through the access, a laparoscope is inserted to view the entire abdomen cavity.

A 12-mm trocar is inserted above the pubic symphysis to allow the introduction of instruments (eg, incisors, forceps, stapler). Another 5-mm trocar is placed in the right periumbilical region, usually between the right costal margin and the umbilicus, to allow the insertion of an atraumatic grasper to expose the appendix. The appendix is grasped and retracted upward to expose the mesoappendix. The mesoappendix is divided using a dissector inserted through the suprapubic trocar.Then, a linear Endostapler, Endoclip, or suture ligature is passed through the suprapubic cannula to ligate the mesoappendix. The mesoappendix is transected using a scissor or electrocautery. To avoid perforation of the appendix and iatrogenic peritonitis, the tip of the appendix should not be grasped.

The appendix may now be transected with a linear Endostapler, or, alternately, the base of the appendix may be suture ligated in a similar

manner to that in an open procedure. The appendix is now free and may be removed through the umbilical or the suprapubic cannula using a laparoscopic pouch to prevent wound contamination.

Peritoneal irrigation is performed with antibiotic or saline solution. Completely aspirate the irrigant. The cannulae are then removed and the pneumoperitoneum is reduced.

The fascial layers at the cannula sites are closed with absorbable suture, while the cutaneous incisions are closed with interrupted subcuticular sutures or sterile adhesive strips.

Advantages:

1. It is a diagnostic as well as therapeutictool.
2. It is minimally invasivesurgery.
3. Less post-operativepain.
4. Hospital stay isminimized.
5. Fewer post –operativeadhesions.
6. Superior cosmeticresults.
7. Early return to normalactivities.
8. If the appendix is found normal, other organs can bevisualized.

9. This is the procedure of choice in obesepatients

10. This procedure offers distinct technical advantages over the conventional approach.

Disadvantages:

1. It is expensive compared to the conventionalmethod.

2. Expertise in technique isneeded.

3. Procedure is not useful if perforation or peritonitis ispresent.

4. Operative time required is more compared to openappendectomy.

5. Setting up of instruments and team is difficult for emergencyappendectomy.

In summary, laparoscopic appendectomy is a safe alternative to open appendectomy.

POST OPERATIVE MANAGENT:

- Oral feeds are withheld till the bowel sounds return and flatus ispassed.

- I V fluids and electrolytes are given till oral feeds areallowed.

- Broad spectrum antibiotics are given to cover against mixed intestinal flora, till culture report of the peritoneal exudate isobtained.

- TPR chart ismaintained.

- Analgesics andsedatives.

- Drain if placed in the peritoneal cavity, is removed by 24-48hrs.

- Sutures removed by 7-10days.

COMPLICATIONS OFAPPENDICECTOMY

Early Complications:

1) Sepsis- Local wound abscess, pelvic abscess, subphrenicabscess.

2) Paralytic ileus – invariably accompanies generalperitonitis.

3) Rupture of the stump or caecal wall. This is very rare, but occurs when a portion of the caecal wall or the appendicular stump gives way in the first few days appendectomy, resulting in Faecalfistula.Haemorrhage: Sudden abdominal pain and shock at any time during the first 2 hrs after surgery means either leakage from the stump or a slipped arterial ligature, both of which are nowrare.

Late complications are:

1) Intestinal obstruction due to local adhesivebands.

2) Incisional hernia and Right InguinalHernia

3) Infertility, as a complication of perforated appendicitis in young Women – rare.

4) Portal pyaemia (pylephlebitis) – rare but seriouscomplication.

TREATMENT OF APPENDICULAR ABSCESS

Two types of appendicular abscess have been described:

Recent abscess: immediate or early operation with or without appendicectomy is the treatment of choice for recent abscess and the mobile appencicular mass.

Established abscess: abscess walled off from surrounding structures, or an abscess resolving withantibiotics.

Conservative management is contra-indicated in children, pregnant women and the elderly. Drainage is to be done as soon as the patient isfit.

In infants, appendicectomy should always be done with drainage. In adults, appendicectomy should be done without breaking the walling off adhesions. If not done at the time of drainage, interval appendicectomy should be done 6-8 weeks later. Systemic antibiotic coverage should be given.

TECHNIQUE OF DRAINAGE:

a) Precaecal, pre-ileal and post ileal abscess:

Relevant anaesthesia is administered Swelling located bypalpation

Incision made over the most prominent part Transperitoneal approach

Index finger is inserted into the wound, abscess wall opened, pus drained

If appendix readily comes to the finger, it is excised Drain placed and wound closed.Drain is left undisturbed for 72 hrs.After this time, it is rotated and shortened daily and Removed by the end of 1 week, if there is no further discharge

Retrocaecal abscess:

- Drained by retroperitoneal approach
- Transverse incision immediately medial to ASIS
- Lateral edge of peritoneum exposed and medially stripped with finger Mass can thus be reached
- After drainage, further course similar as in other abscess

b) *Pelvicabscess:*

- Felt on rectal examination

- If pointing through proctoscope, drained with artery forceps Rubber tube drain is kept in the cavity

- If pointing through vagina, posterior colpotomy done

CONSERVATIVE REGIMEN OF OSCHNER AND SHERREN INDICATIONS:

- When the diagnosis is in doubt and delay is inevitable

- When the patient cannot stand surgical or anaesthetic risk due to medical condition

- When an abscess has formed in a relatively safe area (like pelvis) with less chance of spread ofinfection

- When no facility to operate or transport patient to highercentre

- When a well-defined appendicular mass has developed

- When patient refusessurgery.

This regimen should be undertaken only in a hospital where constant care and observation is possible. It is not a substitute for or mere postponement of surgery, but a preparation for it. One should be ready to abandon the regimen in favour of surgery when need arises.

THE REGIMEN:

Clinical history of the patient with particular note made of the time of onset of symptoms and diagrammatic recording of physical signs.

- A chart with temperature, pulse and respiratory rate ismaintained.
- Patient is kept nil orally, parenteral fluids and electrolyte supplementationgiven.
- Nasogastric aspiration is instituted to keep the stomachempty.
- Broad spectrum antibiotic isstarted
- Sedation iswithheld
- If bowels do not act normally by 4th or 5th day, a glycerine suppository may be given

CRITERIA FOR ABANDONING THE REGIMEN:

- Rising pulse rate in the earlystages
- Persistent fever over 36hrs
- Copious gastric aspirate, or persistentvomiting
- Persistent pain, Increasing or spreading abdominaltenderness
- Increase in the size of theabscess
- Fluctuation, oedema, redness ofskin
- Unrelenting intestinalobstruction

CONTRAINDICATIONS TO CONSERVATIVE MANAGEMENT:

- When diagnosis of acute appendicitis is in doubt and other acute abdominal conditions requiring emergency surgical intervention cannot be ruledout
- The signs of inflammation are still confined to theappendix
- Age of patient <10 yrs or >65yrs
- Pregnantwomen

Oschner and Sherren suggested that interval appendicectomy should be done after 3 months. But present consensus is that operation should be performed as soon as possible, after complete resolution of mass has been achieved. Today, owing to use of antibiotics and other supplementary medication, the general opinion is that appendix should be removed as soon as the patient can be preparedadequately.

MATERIALS AND METHODS

SOURCE OF DATA:

This is a study of 100 patients with provisional diagnosis of acute appendicitis were admitted in surgery department of GovtRoyapettah Hospital for a period of 6 months

STUDY DESIGN:

Hospital based cross sectional study

STUDY PERIOD:

6 months

STUDY AREA:

GovtRoyapettahHospital ,Chennai.

STUDY POPULATION:

Patients presented with clinical features suggestive of appendicitis attended in opd ,casualty and surgical ward at GovtRoyapettah Hospital, Chennai

SAMPLE SIZE:100

SAMPLE SIZE CALCULATION:

$n=(z^2p(1-p))/d^2$

z- normal standard variant

p- prevalence of acute appendicitis

d- absolute error of precision

z taken as 1.96

p taken as 50%

Assuming 95% confidence interval & 10 %absolute error

Sample size calculated using the above mentioned formula,

$4xpx\ (100-p)/10^2$

=4x50x50/100

=100

DATA COLLECTION

INCLUSION CRITERIA

Any patients irrespective of sex admitted with age more than 18 years presented with right iliac fossa pain suspected to be acute appendicitis

EXCLUSION CRITERIA*:*

Patients with age less than 18 years

Patients with right iliac fossa mass

Patients with previous history of urolithiasis

Patients with pelvic inflammatory disease

METHODOLOGY:

- Patients above 18 years of age presenting with features of acute appendicitis were included in the study.
- All patients presented to emergency room with clinical features suggestive of appendicitis were screened and subjected to RIPASA score evaluation
- Following this all the patients underwent ultrasonography to look for features suggestive of appendicitis
- Patients were started on antibiotics and analgesics until surgery
- Patients with RIPASA SCORE of >7.5 or when the ultrasound report showing features suggestive of appendicitis were taken up for surgery

- The accuracy in the diagnosis of acute appendicitis with RIPASA score and ultrasound findings were correlated with the biopsy specimen that sent for histopathology following surgery

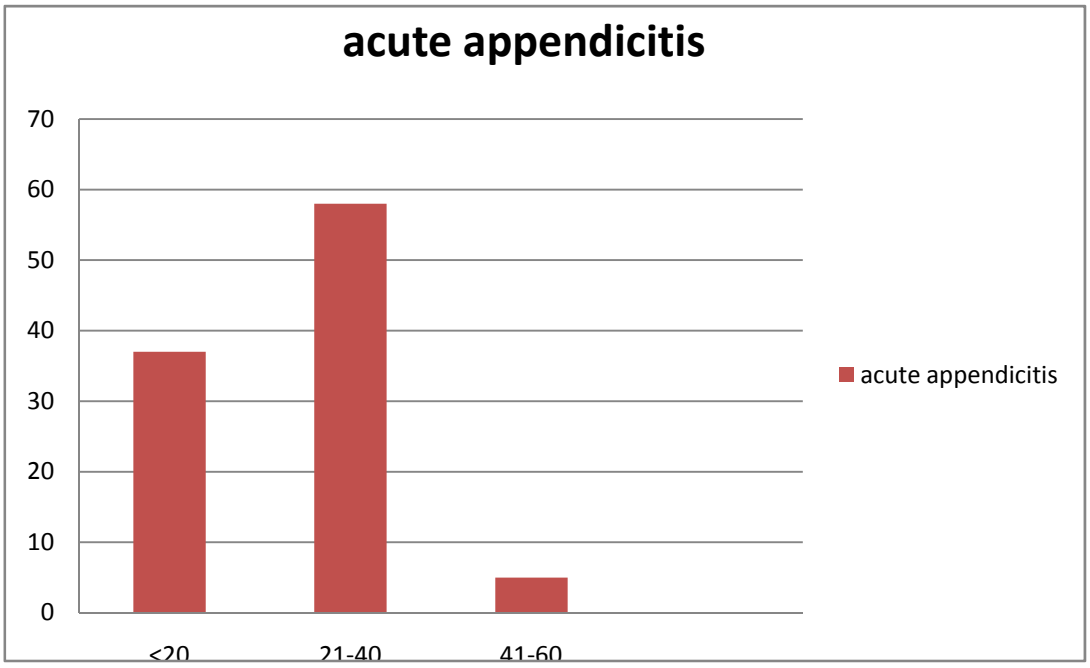
At the end of the study , sensitivity ,specificity ,positive predicitve value and negative predictive value of the RIPASA score and ultrasound were calculated

OBSERVATION AND RESULTS

In our study ,100 cases of acute appendicitis were diagnosed using RIPASA SCORE and ultrasonography and operated

Age incidence:

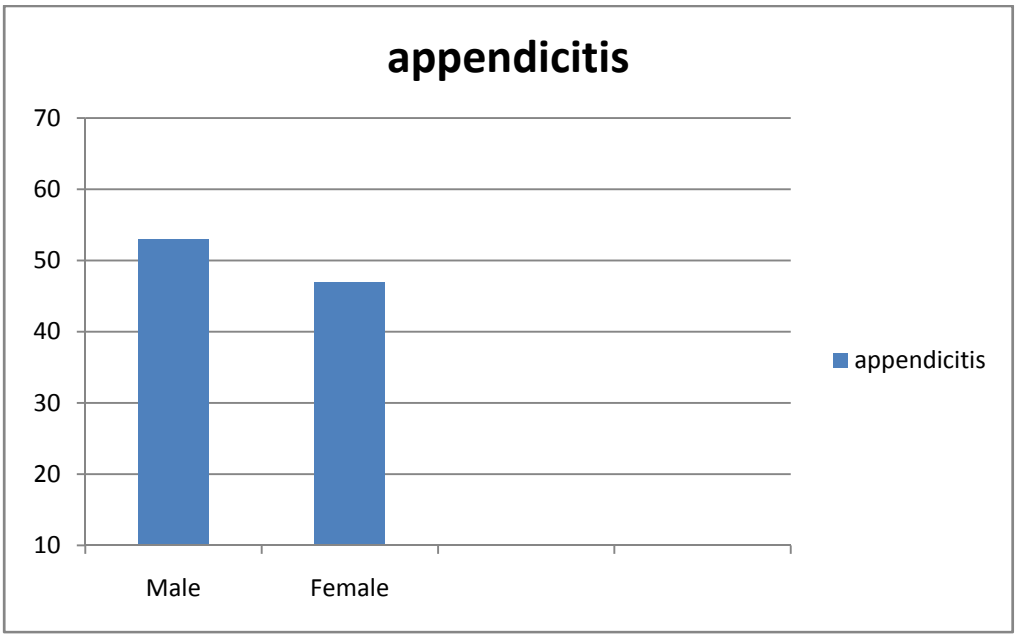
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< = 20 YEARS	37	37.0	37.0	37.0
	21 - 40 YEARS	58	58.0	58.0	95.0
	41 - 60 YEARS	5	5.0	5.0	100.0
	Total	100	100.0	100.0	



In our study, 37 patients were found in the age group of <20 yrs(37%),58 patients were found in the age group of 21-40 years(58%),5 patients were found in the age group of 41 -50 years(5%).

Sex incidence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	53	53.0	53.0	53.0
	FEMALE	47	47.0	47.0	100.0
	Total	100	100.0	100.0	



In this study 53 patients were male and 47 patients were female

FREQUENCY TABLE:

RIPASA SCORE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	> 7.5	73	73.0	73.0	73.0
	< = 7.5	27	27.0	27.0	100.0
	Total	100	100.0	100.0	

According to RIPASA score ,out of 100 patients,73 patients were diagnosed as having appendicitis, 27 patients were found to be normal

ULTRASONOGRAPHY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	APPENDICITIS	68	68.0	68.0	68.0
	NORMAL	32	32.0	32.0	100.0
	Total	100	100.0	100.0	

According to ultrasound ,68 patients were diagnosed as having appendicitis,32 were found to be normal

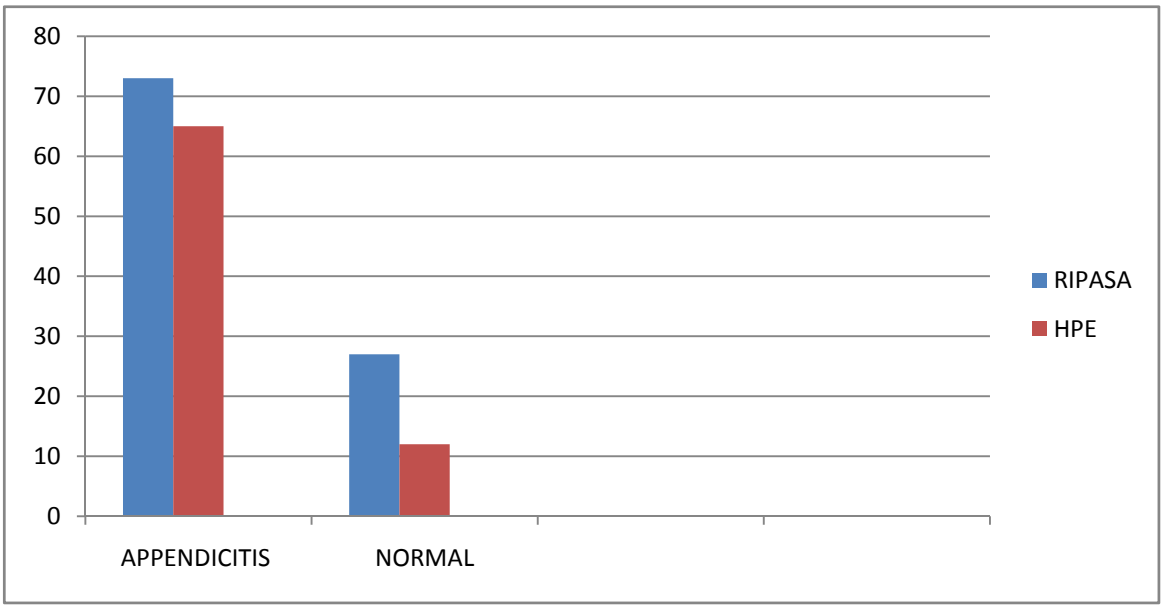
HISTOPATHOLOGY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	APPENDICITIS	80	80.0	80.0	80.0
	NORMAL	20	20.0	20.0	100.0
	Total	100	100.0	100.0	

According to histopathologicalexamination ,out of 100 patients diagnosed from RIPASA SCORE and ultrasound examination ,80 patients were diagnosed as having appendicitis

RIPASA SCORE WITH HPE FINDINGS

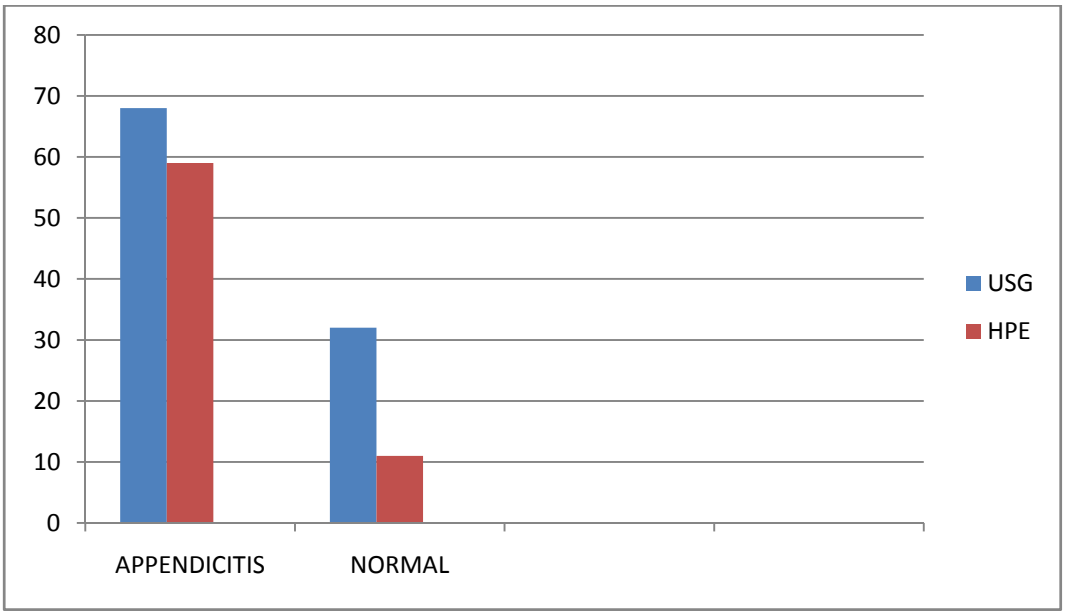
			HPE		
			APPENDICITIS	NORMAL	Total
RIPASA SCORE	> 7.5	Count	65	8	73
		% within RIPASA SCORE	89.0%	11.0%	100.0%
	< = 7.5	Count	15	12	27
		% within RIPASA SCORE	55.6%	44.4%	100.0%
Total		Count	80	20	100
		% within RIPASA SCORE	80.0%	20.0%	100.0%



According to the table 65 % of the patients who are diagnosed to have appendicitis by RIPASA score truly had appendicitis by HPE and 8% of the patients who were diagnosed to have appendicitis by RIPASA score were normal by HPE.This accounted for 89% and 11% of total patients respectively.

USG WITH HPE FINDINGS

			HPE		
			APPENDICITIS	NORMAL	Total
USG	APPENDICITIS	Count	59	9	68
		% within USG	86.8%	13.2%	100.0%
	NORMAL	Count	21	11	32
		% within USG	65.6%	34.4%	100.0%
Total		Count	80	20	100
		% within USG	80.0%	20.0%	100.0%



In our study 59 % of the patients who were diagnosed to have appendicitis by USG truly had appendicitis by HPE and 9% of the patients who were diagnosed to have appendicitis in USG were found to be normal in HPE examination, this accounts for 86.8% and 13.2% of total patients respectively

CHI SQUARE TESTS FOR RIPASA SCORE

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.813[a]	1	.000		
Continuity Correction[b]	11.799	1	.001		
Likelihood Ratio	12.519	1	.000		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	13.675	1	.000		
N of Valid Cases	100				

CHI SQUARE TESTS FOR USG

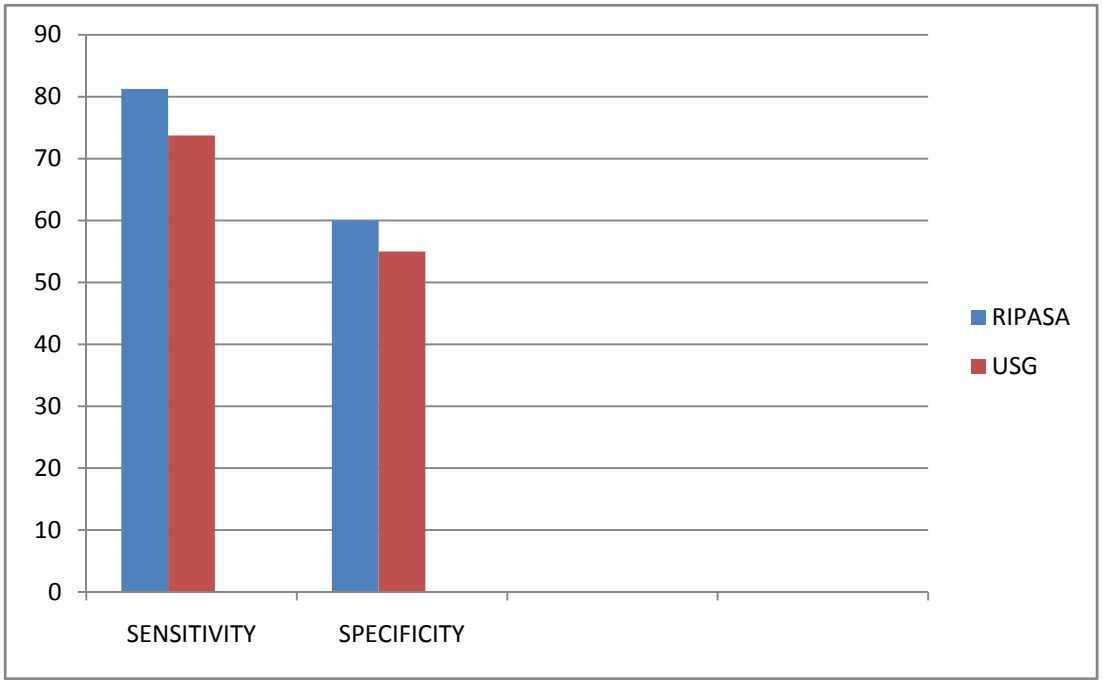
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.078[a]	1	.014		
Continuity Correction[b]	4.828	1	.028		
Likelihood Ratio	5.743	1	.017		
Fisher's Exact Test				.030	.016
Linear-by-Linear Association	6.017	1	.014		
N of Valid Cases	100				

In this study analysis of chi square tests of both RIPASA score and USG were at significant level,(p=0.000 and 0.014 respectively).

COMPARISON OF RIPASA AND USG

COMPARING SENSITIVITY AND SPECIFICITY

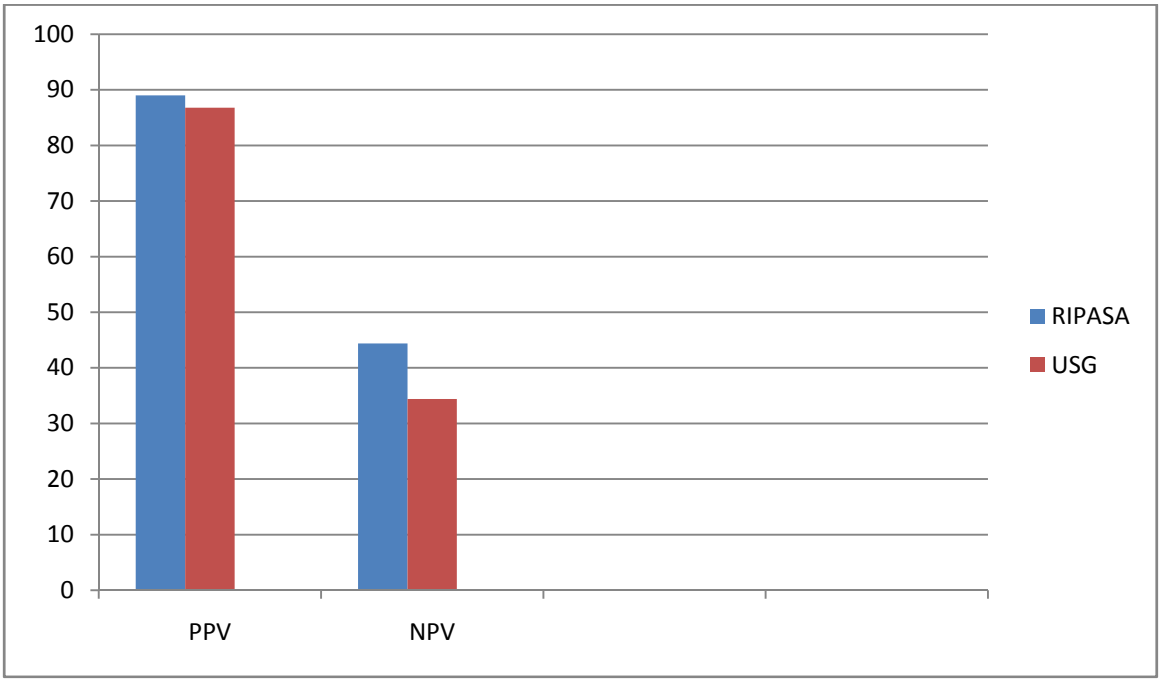
	Sensitivity	Specificity
RIPASA	81.25	60
USG	73.75	55



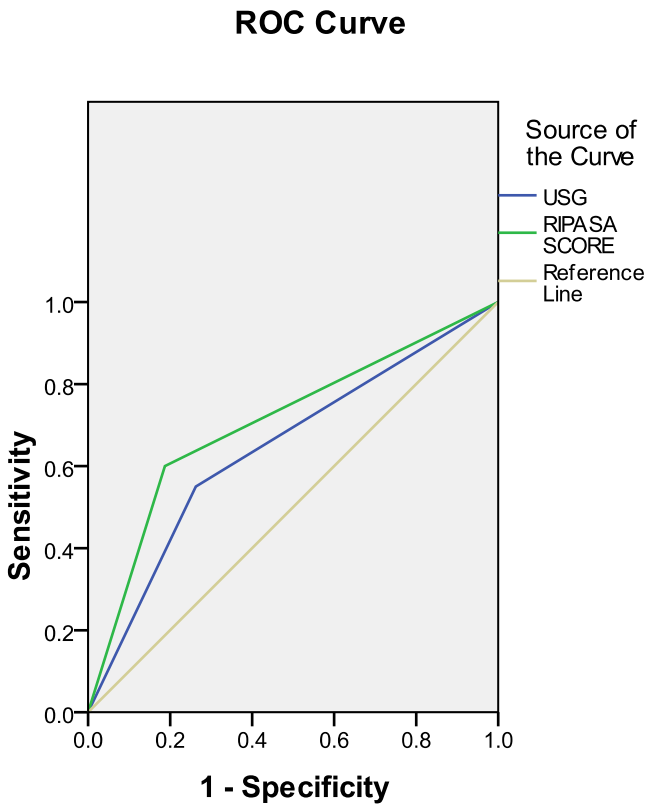
In this study the sensitivity of RIPASA score and USG were 81.25 and 73.75 respectively and specificity of RIPASA score and USG were 60% and 55% respectively.

COMPARING PPV AND NPV OF RIPASA SCORE AND USG

	PPV	NPV
RIPASA SCORE	89%	44.4%
USG	86.8%	34.4%



In this study the PPV for RIPASA score and USG were 89% and 86.8% respectively .NPV for RIPASA score and USG were 44.4% and34.4% respectively



Diagonal segments are produced by ties.

Area Under the Curve

Test Result Variable(s)	Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
USG	.644	.072	.047	.503	.785
RIPASA SCORE	.706	.070	.004	.569	.844

The test result variable(s): USG, RIPASA SCORE has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

RESULTS

Of the total 100 patients above the age of 40 were 5 and below the age of 40 were 95 .Of the total patients involved in the study 53were male and 47 were female.48 patients had presented to the hospital within 48 hrs of onset of symptoms while 52% presented after 48 hours

All the patients involved in the study were subjected to RIPASA score evaluatio. A total score of more than 7.5 indicated that the chances of appendicitis is more likely ,while a score of more than 7.5 indicated that the chances of appendicitis is less likely. 27% had a score of <7.5 while 73% had score of >7.5

All the patients were underwent ultrasonography out of which 68 patients had features suggestive of appendicitis ,while 32 patients were labeled as having normal appendix

The sensitivity and specificity of RIPASA score were 81.25% and 60% respectively at a cut off value of 7.5 ,the positive predictive value and negative predictive value were 89% and 44.4% respectively at a cut off of <7.5

The sensitivity of ultrasound was 73.75% while the specificity was 55%.The positive predictive value of ultrasound was86.8% while negative predictive value was 34.4%

All the patients had undergone appendicectomy.The total number of patients diagnosed using RIPASA score and USG were proved to have appendicitis as per histopathological examination were 80 while 20 patients were reported to have normal appendix.

Of the total number of patients diagnosed by RIPASA score, 89% were confirmed as having appendicitis by HPE examination ,only 11% were in the negative group.

DISCUSSION

Appendicitis is still one of the most misdiagnosed of all abdominal emergencies, although acute appendicitis is one of the most common surgical emergencies worldwide .

The diagnosis of acute appendicitis is mainly based on clinical findings and history .Scoring system is a non invasive and inexpensive method to diagnose appendicitis. Alvarado score is the most commonly used scoring system but it has low sensitivity in oriental population in comparison to western population.

To overcome this limitation ,in 2010 a new scoring system named RIPASA has been developed consisting of clinical and laboratory parameters

The sensitivity and specificity achieved for RIPASA score were 81.25% and 60% respectively .The positive predictive value obtained was 89% while the negative predictive value was found to be 44.4%.Out of 100 patients who had undergone surgery 80 patients were confirmed as having appendicitis by histopathologicalexamination.,the observed negative appendicectomy rate was 17%.

In this study ,there is a significant difference between the positive predictive value and negative predictive value for diagnosing acute appendicitis by ultrasonography ,which emphasizes that positive USG for appendicitis strongly favours appendicitis ,while negative USG findings is not sufficient to rule out appendicitis.

RIPASA scoring system is based on easily obtainable parameters for accurate and rapid diagnosis of appendicitis.It is a simple scoring system in reducing the negative appendicectomy rate and cost of radiological investigation .Thereby reducing the unnecessary morbidity and economic burden of the patients.

CONCLUSION:

The present study showed a sensitivity and specificity of RIPASA scoring as of 81.25and 60% respectively while ultrasounography had a sensitivity of 73.75%and specificity of 55%

Since ultrasonography low sensitivity,It may be used as a complimentary tool for diagnosis of appendicitis to rule out other causes of right iliac fossa pain.

RIPASA scoring system appears to be a promising tool for diagnosis of acute appendicitis .

It is based on simple and easily available parameters for accurate and rapid diagnosis of appendicitis and in reducing the negative appendicectomy rate and cost of radiological investigations ,thereby reducing the economic burden and unnecessary morbidity of the patients.

Therefore ,it can be concluded that the RIPASA scoring is clinically and statistically a better scoring system conducted for better evaluation of appendicitis compared to ultrasonography.

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PROFORMA

1. Name of the patient
2. Age
3. Sex
4. Occupation
5. Address
6. OP No/IP NO
7. Date of admission
8. Date of operation
9. Date of discharge
10. Complaints

a. Pain

b. Vomiting

c. Fever

d. Anorexia

e. Diarrhea/constipation

f. Others

11. History

a. Similar complaints in the past

b. Any surgical illness in the past

c. Any medical illness in the past

12. Examination

a. General physical examination

i. Built

ii. Consciousness

iii. Pallor/icterus/cyanosis/clubbing/lymphadenopathy/edema

iv. Pulse

v. Blood pressure

vi. Temperature

vii. Others

b. Systemic examination

i. Per abdomen

1. Inspection

2. Palpation

3. Percussion

4. Auscultation

ii. Respiratory system

iii. Cardiovascular system

iv. Central nervous system

13. Investigations

a. Hemoglobin

b. Total count

c. Differential count

d. Urine-albumin

-Sugar

-Microscopy

e. Ultrasound Abdomen

f. Others

14. Management

15. Operative notes

16. Post op recovery

17. Histopathology report

18. RIPASA score

1	Male Female	1.0 0.5
2	Age < 39.9 yrs Age > 40 yrs	1.0 0.5
3	RIF pain	0.5
4	Migration of RLQ pain	0.5
5	Anorexia	1.0
6	Nausea & Vomiting	1.0
7	Duration of symptoms < 48 hrs Duration of symptoms > 48 hrs	1.0 0.5
8	RIF tenderness	1.0
9	RIF guarding	2.0
10	Rebound tenderness	1.0
11	Rovsing's Sign	2.0
12	Fever	1.0
13	Raised WCC	1.0
14	Negative urinalysis	1.0

19.Inference

சுயஒப்புதல்படிவம்:

- **ஆய்வுசெய்யப்படும்தலைப்பு“ A COMPARATIVE STUDY OF RIPASA SCORE AND ULTRASOUND IN THE DIAGNOSIS OF ACUTE APPENDICITIS”**
- **பங்குபெறுபவரின்பெயர் :**
- **பங்குபெறுபவரின்வயது :**
- **பங்குபெறுபவரின்எண் :**

மேலேகுறிப்பிட்டுள்ளமருத்துவஆய்வின்விவரங்கள்எனக்குவிளக்கப்பட்டது. நான்இவ்வாய்வில்தன்னிச்சையாகபங்கேற்கிறேன். எந்தகாரணத்தினாலோஎந்தசட்டசிக்கலுக்கும்உட்படாமல்நான்இவ்வாய்வில்இருந்துவிலகிக்கொள்ளல்லாம்என்றும்அறிந்துகொண்டேன். இந்தஆய்வுசம்பந்தமாகவோ,

இதைசார்ந்துமேலும்ஆய்வுமேற்கொள்ளும்போதும்இந்தஆய்வில்பங்குபெறும்மருத்துவர்என்னுடையமருத்துவஅறிக்கைகளைபார்ப்பதற்குஎன்அனுமதிதேவையில்லைஎனஅறிந்துகொள்கிறேன்.

இந்தஆய்வின்மூலம்கிடைக்கும்தகவலையோ,

முடிவையோபயன்படுத்திக்கொள்ளமறுக்கமாட்டேன்.

இந்தஆய்வில்பங்குகொள்ளஒப்புக்கொள்கிறேன்.

இந்தஆய்வைமேற்கொள்ளும்மருத்துவஅணிக்குஉண்மையுடன்இருப்பேன்என்றும்உறுதியளிக்கிறேன்.

பங்கேற்பவரின்கையொப்பம் :

இடம் :

தேதி :

ஆய்வாளரின்கையொப்பம் :

ஆய்வாளரின்கையொப்பம் :

MASTER CHART

S.NO	AGE	SEX	USG	RIPASA SCORE	HPE
1	26	M	APPENDICITIS	12	APPENDICITIS
2	18	M	APPENDICITIS	11	APPENDICITIS
3	19	M	APPENDICITIS	12	APPENDICITIS
4	45	M	APPENDICITIS	10	APPENDICITIS
5	24	F	NORMAL	6.5	NORMAL
6	35	M	APPENDICITIS	9.5	APPENDICITIS
7	20	M	APPENDICITIS	8.5	APPENDICITIS
8	32	F	NORMAL	8	APPENDICITIS
9	22	M	APPENDICITIS	8	APPENDICITIS
10	20	F	APPENDICITIS	10	APPENDICITIS
11	19	F	NORMAL	6	NORMAL
12	46	M	APPENDICITIS	9.5	APPENDICITIS
13	25	F	NORMAL	5.5	NORMAL
14	18	F	APPENDICITIS	8	APPENDICITIS
15	19	M	APPENDICITIS	7.5	APPENDICITIS
16	32	M	NORMAL	8	APPENDICITIS
17	18	M	NORMAL	7	APPENDICITIS
18	27	F	APPENDICITIS	11	APPENDICITIS
19	30	F	APPENDICITIS	10	APPENDICITIS
20	35	F	APPENDICITIS	8.5	APPENDICITIS
21	33	F	NORMAL	6	NORMAL
22	24	M	APPENDICITIS	9	APPENDICITIS
23	22	F	APPENDICITIS	10	NORMAL
24	38	F	NORMAL	7.5	APPENDICITIS
25	34	M	APPENDICITIS	8.5	APPENDICITIS
26	19	M	NORMAL	5	NORMAL
27	26	F	APPENDICITIS	8	APPENDICITIS
28	28	F	APPENDICITIS	10	APPENDICITIS
29	32	F	APPENDICITIS	10	APPENDICITIS
30	34	M	APPENDICITIS	10	APPENDICITIS
31	32	M	NORMAL	9	APPENDICITIS
32	25	M	NORMAL	5.5	NORMAL
33	30	F	APPENDICITIS	9.5	APPENDICITIS
34	18	M	APPENDICITIS	11	APPENDICITIS
35	33	M	APPENDICITIS	10	APPENDICITIS
36	27	M	NORMAL	6	NORMAL
37	27	M	NORMAL	10.5	APPENDICITIS
38	19	F	APPENDICITIS	10	APPENDICITIS
39	40	F	APPENDICITIS	8.5	APPENDICITIS
40	33	F	APPENDICITIS	8	APPENDICITIS
41	35	M	APPENDICITIS	7.5	APPENDICITIS

42	20	F	APPENDICITIS	9	APPENDICITIS
43	33	F	NORMAL	9	NORMAL
44	24	F	NORMAL	7	APPENDICITIS
45	23	F	APPENDICITIS	7.5	NORMAL
46	24	M	NORMAL	6.5	APPENDICITIS
47	29	F	APPENDICITIS	10	APPENDICITIS
48	36	M	APPENDICITIS	6	APPENDICITIS
49	20	M	NORMAL	11	APPENDICITIS
50	19	M	APPENDICITIS	11.5	APPENDICITIS
51	24	M	APPENDICITIS	11	APPENDICITIS
52	20	M	APPENDICITIS	9	NORMAL
53	22	M	APPENDICITIS	9.5	APPENDICITIS
54	26	F	NORMAL	10	APPENDICITIS
55	21	F	APPENDICITIS	8	APPENDICITIS
56	41	F	APPENDICITIS	8	NORMAL
57	30	F	NORMAL	6.5	APPENDICITIS
58	26	F	APPENDICITIS	7.5	APPENDICITIS
59	30	F	APPENDICITIS	8	APPENDICITIS
60	22	F	APPENDICITIS	7.5	APPENDICITIS
61	20	M	APPENDICITIS	9.5	NORMAL
62	24	M	NORMAL	6	APPENDICITIS
63	18	F	NORMAL	10	APPENDICITIS
64	19	M	APPENDICITIS	12	APPENDICITIS
65	20	M	APPENDICITIS	8	APPENDICITIS
66	25	F	APPENDICITIS	9.5	APPENDICITIS
67	20	M	APPENDICITIS	8.5	NORMAL
68	20	M	NORMAL	5	APPENDICITIS
69	19	F	NORMAL	11	APPENDICITIS
70	20	F	APPENDICITIS	12	APPENDICITIS
71	22	F	APPENDICITIS	8.5	APPENDICITIS
72	60	M	APPENDICITIS	9	APPENDICITIS
73	30	M	APPENDICITIS	8.5	NORMAL
74	28	M	APPENDICITIS	11.5	APPENDICITIS
75	18	F	NORMAL	7.5	APPENDICITIS
76	22	F	APPENDICITIS	10	APPENDICITIS
77	25	M	NORMAL	5	NORMAL
78	18	F	APPENDICITIS	9.5	APPENDICITIS
79	18	M	NORMAL	8	APPENDICITIS
80	19	F	NORMAL	6.5	NORMAL
81	18	F	APPENDICITIS	10.5	APPENDICITIS
82	23	F	APPENDICITIS	13	APPENDICITIS
83	25	F	NORMAL	8.5	APPENDICITIS
84	29	M	APPENDICITIS	10	APPENDICITIS

85	22	M	NORMAL	5.5	NORMAL
86	55	M	APPENDICITIS	9	APPENDICITIS
87	18	M	NORMAL	7.5	APPENDICITIS
88	25	M	APPENDICITIS	11	APPENDICITIS
89	20	M	APPENDICITIS	8.5	APPENDICITIS
90	28	F	APPENDICITIS	10.5	NORMAL
91	20	F	APPENDICITIS	12	APPENDICITIS
92	18	M	APPENDICITIS	9	APPENDICITIS
93	19	M	NORMAL	7.5	APPENDICITIS
94	19	M	APPENDICITIS	10.5	APPENDICITIS
95	25	M	NORMAL	10	APPENDICITIS
96	22	M	APPENDICITIS	10	APPENDICITIS
97	38	F	APPENDICITIS	7	NORMAL
98	20	F	APPENDICITIS	8.5	APPENDICITIS
99	18	M	APPENDICITIS	11	APPENDICITIS
100	20	M	APPENDICITIS	10	APPENDICITIS