A Dissertation on

" TO DETERMINE VALIDATION OF RIPASA SCORE IN DIAGNOSIS OF SUSPECTED ACUTE APPENDICITIS AND HISTOPATHOLOGICAL CORRELATION"

A DISSERTATION SUBMITTED TO THE TAMIL NADU

DR MGR MEDICAL UNIVERSITY

CHENNAI.

In partial fulfilment of the requirement for the degree of

M.S.(GENERAL SURGERY)

BRANCH – I

DEPARTMENT OF GENERAL SURGERY
GOVT VELLORE MEDICAL COLLEGE
MAY 2020

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This is to certify that the dissertation entitled **"TO DETERMINE VALIDATION OF RIPASA SCORE IN DIAGNOSIS OF SUSPECTED ACUTE APPENDICITIS AND HISTOPATHOLOGICAL CORRELATION AT GOVT VELLORE MEDICAL COLLEGE AND HOSPITAL"** is a bonafide research work submitted by **DR. PRITHIVI RAJA.K,**

Postgraduate student in Department of General Surgery, govt Vellore Medical College and Hospital, to the Tamil nadu Dr MGR Medical University, Chennai, in partial fulfillment of the requirement for M.S. Degree (Branch - I) in General Surgery.

DR. K.V. SARAVANAN , M.S.,
Senior assistant Professor,
Department of General Surgery,
Govt Vellore Medical College,
Vellore.

Date:

Place:

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PROF. DR. D. LOGANATHAN , M.S.,

Professor and HOD of General Surgery

Government Vellore Medical College,

Adukamparai

CERTIFICATE BY THE HEAD OF THE INSTITUTION

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Postgraduate student in Department of General Surgery, govt Medical College and Hospital ,Vellore.

DR. R.SELVI M.D

DEAN

Govt Vellore Medical College

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I hereby declare that the dissertation titled **"TO DETERMINE VALIDATION OF RIPASA SCORE IN DIAGNOSIS OF SUSPECTED ACUTE APPENDICITIS AND HISTOPATHOLOGICALCORRELATION AT GOVT VELLORE MEDICAL COLLEGE AND HOSPITAL"** is a bonafide and genuine research work carried out by me at govt Vellore Medical College hospital, Vellore under the guidance of DR.K.V.SARAVANAN ,M.S., senior assistant Professor , Department of General Surgery, Vellore Medical College, Vellore.

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Place:

Dr.PRITHIVI RAJA.K

Postgraduate Student,

M.S.General Surgery,

GovtVellore Medical College.

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CERTIFICATE – II

This is certify that this dissertation work titled **"TO DETERMINE VALIDATION OF RIPASA SCORE IN DIAGNOSIS OF SUSPECTED ACUTE APPENDICITIS AND HISTOPATHOLOGICALCORRELATION AT GOVT VELLORE MEDICAL COLLEGE AND HOSPITAL"** of the candidate **DR . PRITHIVI RAJA.K , REG NO : 221711659** for the award of **M.S.** Degree in the branch of **GENERAL SURGERY.** I personally verified the 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 **12percentage** of plagiarism in the dissertation.

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Title of the Study	-	TO DETERMINE VALIDATION OF RIPASA SCORE IN DIAGNOSIS OF SUSPECTED ACUTE APPENDICITIS AND HISTOPATHOLOGICAL CORRELATION AT GOVT. VELLORE MEDICAL COLLEGE AND HOSPITAL.
Principal Investigator	-	Dr.Prithivi Raja.K, M.S., Post Graduate
Guide	-	Dr.D.Loganathan, MS Professor of General Surgery

The request for an approval from the Institutional Ethical and Scientific Committee (IEC) was considered on the IEC meeting held on 03.11.2018 at the Conference Hall, Govt. Vellore Medical College, Vellore-11.

The Convenor, Chairperson, Member Secretary and committee members decided to approve the proposed work mentioned above submitted by the Principal Investigator.

The Principal Investigator is instructed to submit the status of this project periodically to this College Office.

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MEMBER SECRETARY
Institutional Ethics Committe
Government Vellore Medical College & Hos
Vellore-632 011.

Convenor
Dean
Govt. Vellore Medical College, Vellore
DEAN
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VELLORE - 11.

Chairperson
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Senior Professor
120TT Biomedical Genetics Research Lab (I)
Dept of Biomedical Sciences
School of Biosciences & Technolo
Vellore Institute of Technology
(Deemed to be University under section 3 of the UGC A
Vellore - 632 014

CONTENTS

INTRODUCTION

Appendicitis is the most common emergent surgical operation performed with incidence of about 6 – 7% in general population. It is mostly common in second decade of life .diagnosis of acute appendicitis is challenging and needs high index of suspicion by operating surgeon to reduce morbidity and mortality. It is less common in under developed countries which suggests low fiber diet , high fat intake may play a role in disease.

There are various scoring system used till now in diagnosing appendicitis which are Alvarado, modified Alvarado scoring system till now which has poor sensitivity and specificity.

RIPASA score has been developed for the diagnosing acute appendicitis . This score is focussed on 14 clinical parameters .

Presenting symptoms.(5 symptoms)

patient demographic(age and gender)

clinical signs(5 signs)

laboratory investigations (elevated wbc count and negative urinalysis)

.

This study was to evaluate RIPASA score in diagnosing acute appendicitis and correlating histo pathologically .

AIM OF THE STUDY

To evaluate RIPASA score in diagnosis of acute appendicitis and correrlating histopathologically .

REVIEW OF LITERATURE

ANATOMY AND EMBRYOLOGY

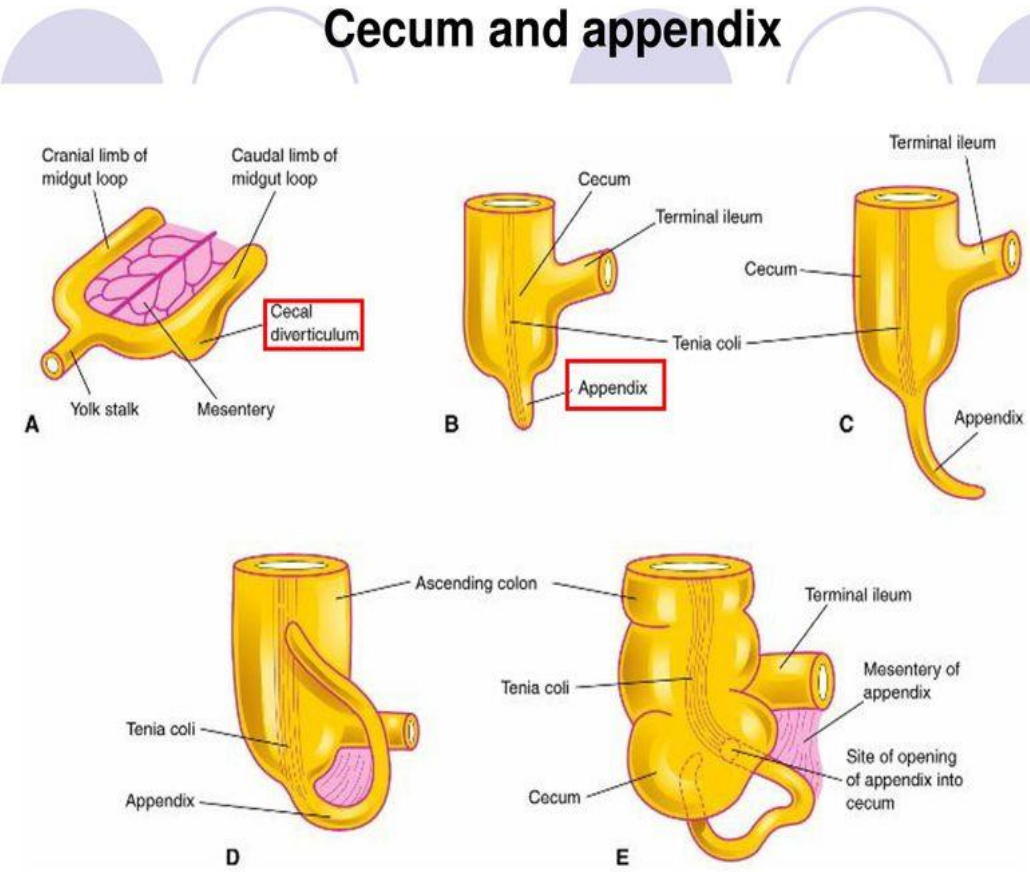
Appendix and caecum appear as small out pouchings from the midgut caudal limb in 6th week of gestation. In 8th week appendiceal outpouching occurs and in 5th month it elongates to for vermiform appearance .appendix find its adult position on the posterior medial wall just below the ileo caecal valve when growth of lateral wall of caecum occurs.

Base of appendix Is located by following taenia coli to confluence of caecum with tip located at any position in right lower quadrant of abdomen , pelvis or retroperitoneum.

In midgut malrotation , it incompletely rotates or fails around the axis of superior mesentry artery and appendix placed in unusual left lower quadrant.

Average length of appendix is 6 to 9 cm with maximum length upto 30 cm. outer diameter is 3 – 8mm with inner diameter 1-3 mm. appendix receives blood supply from ileo colic artery which originates posterior to terminal ileum and entering meso appendix close to base of appendix. Appendix is innervated by superior mesenteric plexus (T 10 – L 1) and vagus nerve supply afferents.

EMBRYOLOGY OF APPENDIX

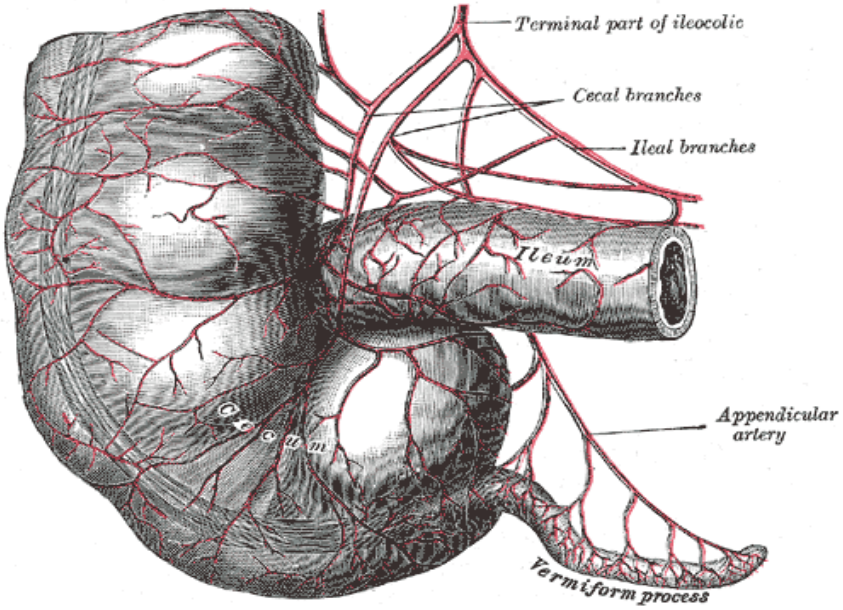


APPENDICULAR VEINS

The venous drainage is by one or more appendicular veins and drain to posterior caecal or ileocolic vein which then drain into the superior mesenteric vein.

LYMPHATICS

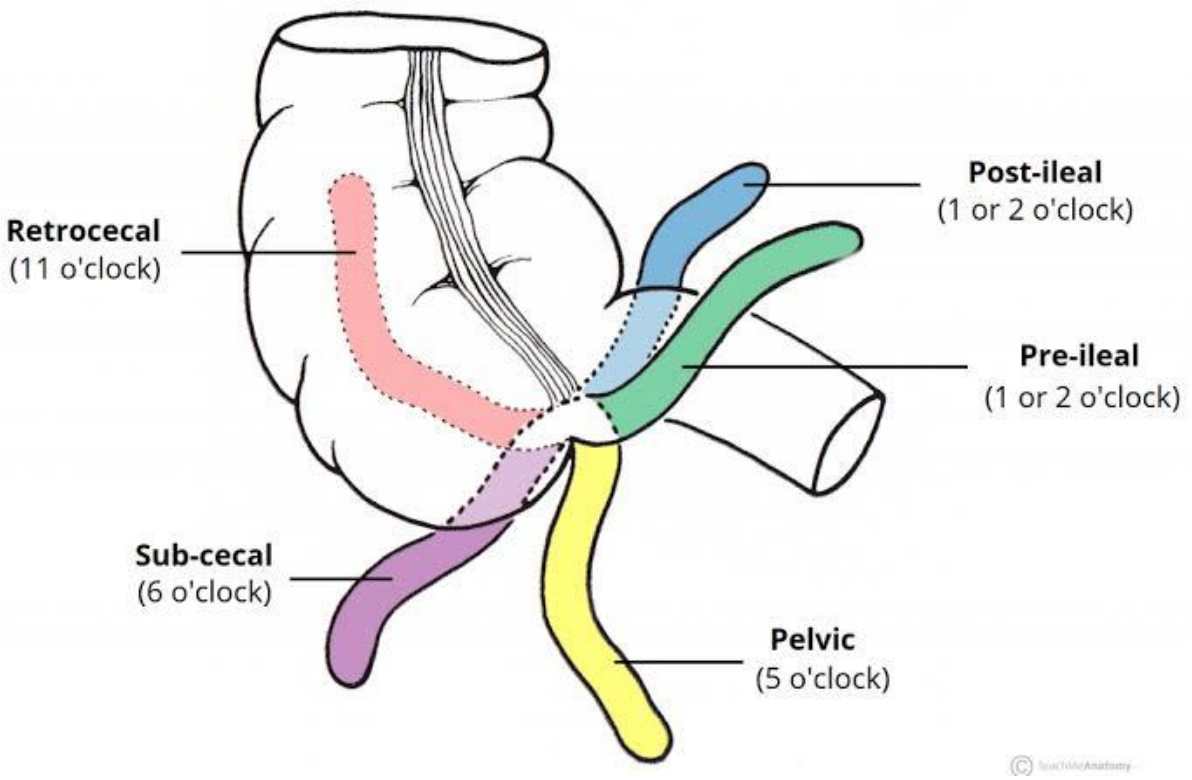
The appendicular wall has high lymphatic tissue and drain through numerous (about 8-15 in number) lymphatic vessels into the mesoappendix. They unite to form three or four larger vessels and ultimately drain into the lymphatic vessels of the ascending Colon and drains to the superior and inferior ileocolic chain of nodes.



DIFFERENT POSITION OF APPENDIX

1. Retrocaecal – 60 %
2. Pelvic – 30%
3. Preileal
4. Post ileal
5. Paracaecal
6. Subcaecal
7. Subhepatic(2)

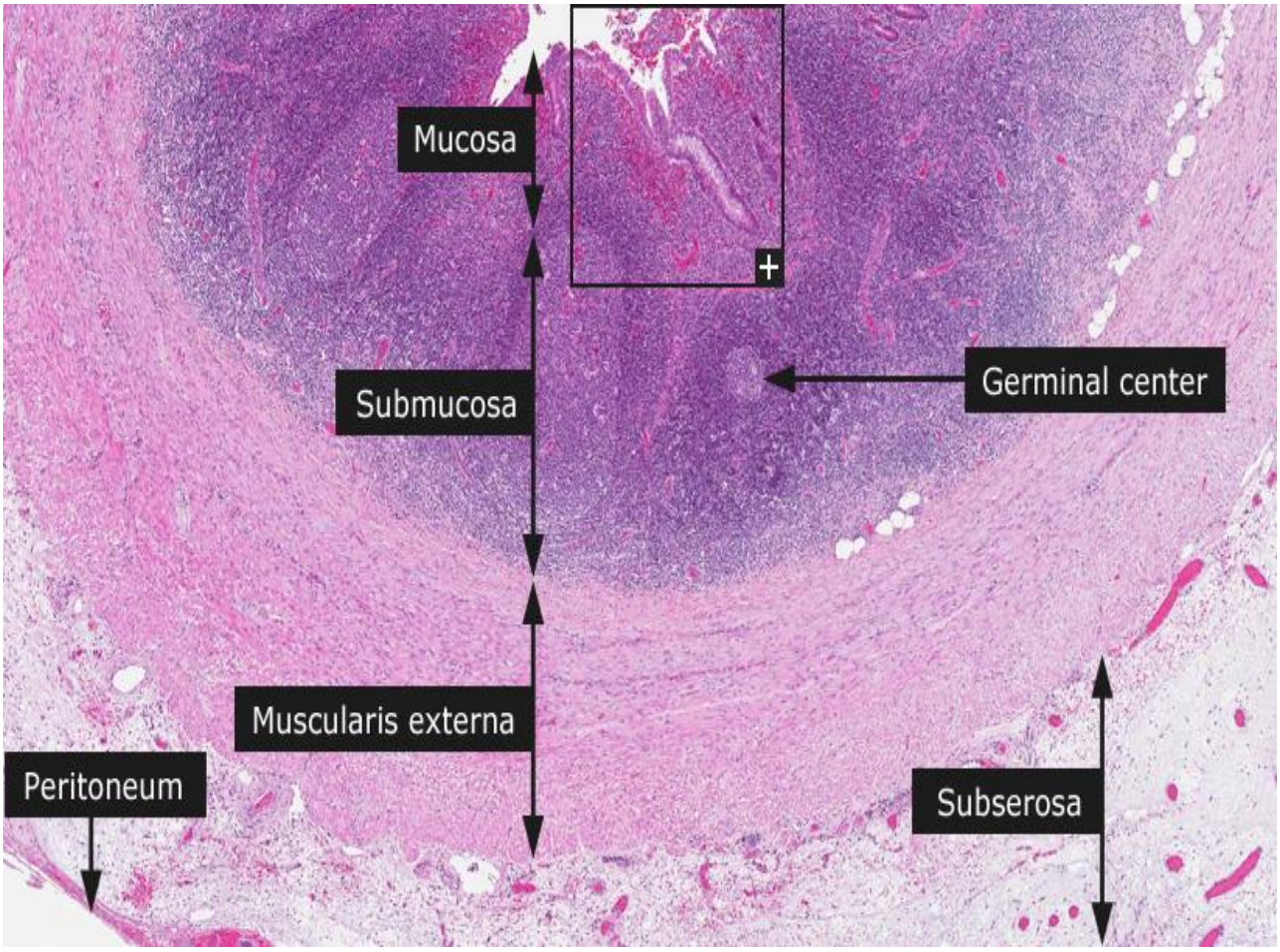
DIFFERENT POSITIONS OF APPENDIX



MICROSCOPIC ANATOMY

- Histology of appendix are contained within 3 following layers
    1. Outer serosa – extension of peritoneum
    2. Muscularispropria – not well defined and absent in certain locations
    3. Submucosa and mucosa
- Lymphoid aggregates occur in submucosa and extends to muscualrispropria .
- Mucosa is like that of large intestine with high density of lymphoid follicles.
- Crypts are irregularly sized and shaped in contrast to uniform crypts in colon
- Ganglion cells, schwann cells, neural fibres and neuro secretory cells are present below crypts

HISTOLOGY OF APPENDIX



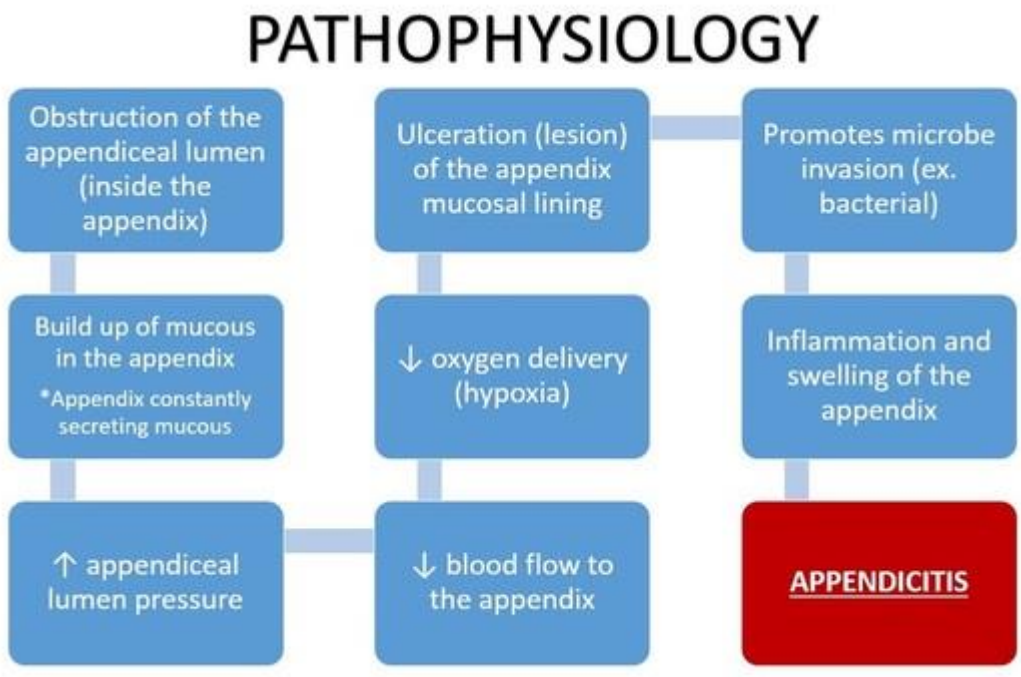
HISTORY

- First appendectomy was reported in 1735 by a French surgeon , Claudius amyand , who identified in 11 yr old boy in inguinal sac .(4)
- First formal description of disease process , including the common clinical features and recommendation for prompt surgical removal was in 1886 by Reginald Heber fitz of Harvard university.
- Mcburney's description of his classic muscle splitting incision and technique for removal of appendix was done in 1894.
- First laparoscopic appendectomy was performed in 1982 by kurtsemm.

CLAUDIUS AMYAND

PATHOPHYSIOLOGY

- Lymphoid hyperplasia narrows appendicular lumen which results in luminal obstruction.
- Once obstruction occurs there is increased mucus secretion followed by inflammatory exudation which increase intraluminal pressure and causes lymphatic obstruction.(5)
- When bacteria invades submucosa there is inflammation and edema begins
- Appendix when distended may cause obstruction to venous channels and wall ischaemia occurs.
- When bacteria invades muscularis propria and submucosa produces acute appendicitis
- gangrenous appendicitis occurs due to ischaemic necrosis in later stage.
- With disease progresses it causes greater omentum and loops of small intestine to adhere with inflamed appendix forming phlegmonous mass or paracaecal abscess



INFLAMMED APPENDIX

APPENDICULAR MASS WITH ABSCESS FORMATION

SPECIMEN OF APPENDICULAR PERFORATION

BACTERIOLOGY

ANAEROBIC

- Bacteriodesfragilis
- Bacteroidesthetaiotaomicron
- Bilophilawadsworthia
- Peptostreptococcusspp(6)

AEROBIC

- Escherichia coli
- Viridians streptococcus
- Group D streptococcus
- Pseudomonas aeruginosa.

RISK FACTORS FOR PERFORATION OF APPENDIX

- Older age.
- Immunocompetent
- Diabetes mellitus- type II
- Faecolith
- Appendix in pelvic position
- Previous surgery in abdomen

CLINICAL PRESENTATION

HISTORY

- Classical feature is mid gut visceral discomfort causes poorly localized colicky pain in inflamed appendix
- Pain frequently noticed around periumbilical region .
- pain is associated with loss of appetite , nausea and vomiting.
- Loss of appetite is common feature in children.
- parietal peritoneum in right iliac fossa becomes irritated in progressive inflammation causing more intense and localized pain .
- Inflamed appendix in pelvis cause discomfort in suprapubic region and tenesmus.
- tenderness is elicited usually on per rectal examination in pelvic position.(8)
- temperature fluctuation can be seen in first 6 hrs. After that there is slight pyrexia (37.2- 37.7 ‘c) with increase in pulse rate is common
- syndromes of acute appendicitis
    1. Acute catarrhal
    2. Acute obstructive

SIGNS

POINTING SIGN

- Patient asked to point pain started area and where it moved.

ROVSINGS SIGN

- palpation in left lower quadrant cause pain in right iliac fossa

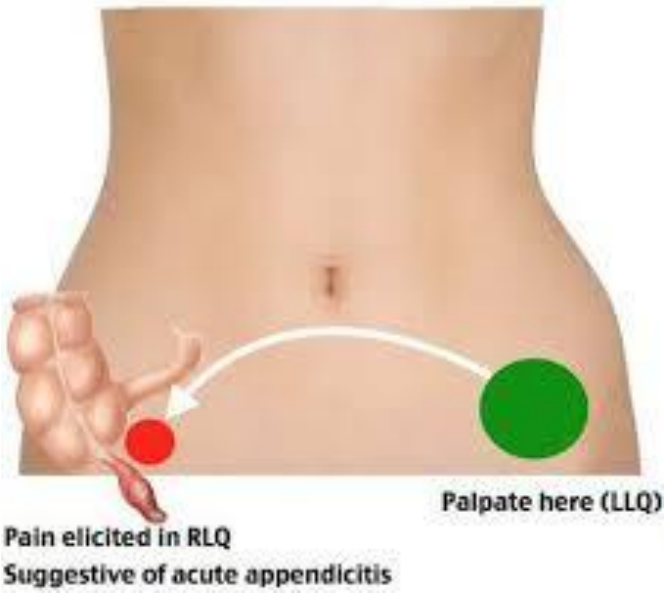
PSOAS SIGN

- Due to irritation of iliopsoas patient usually lies with right hip flexed for pain relief

OBTURATOR SIGN

- hip flexed with internal rotation causes pain in right iliac fossa

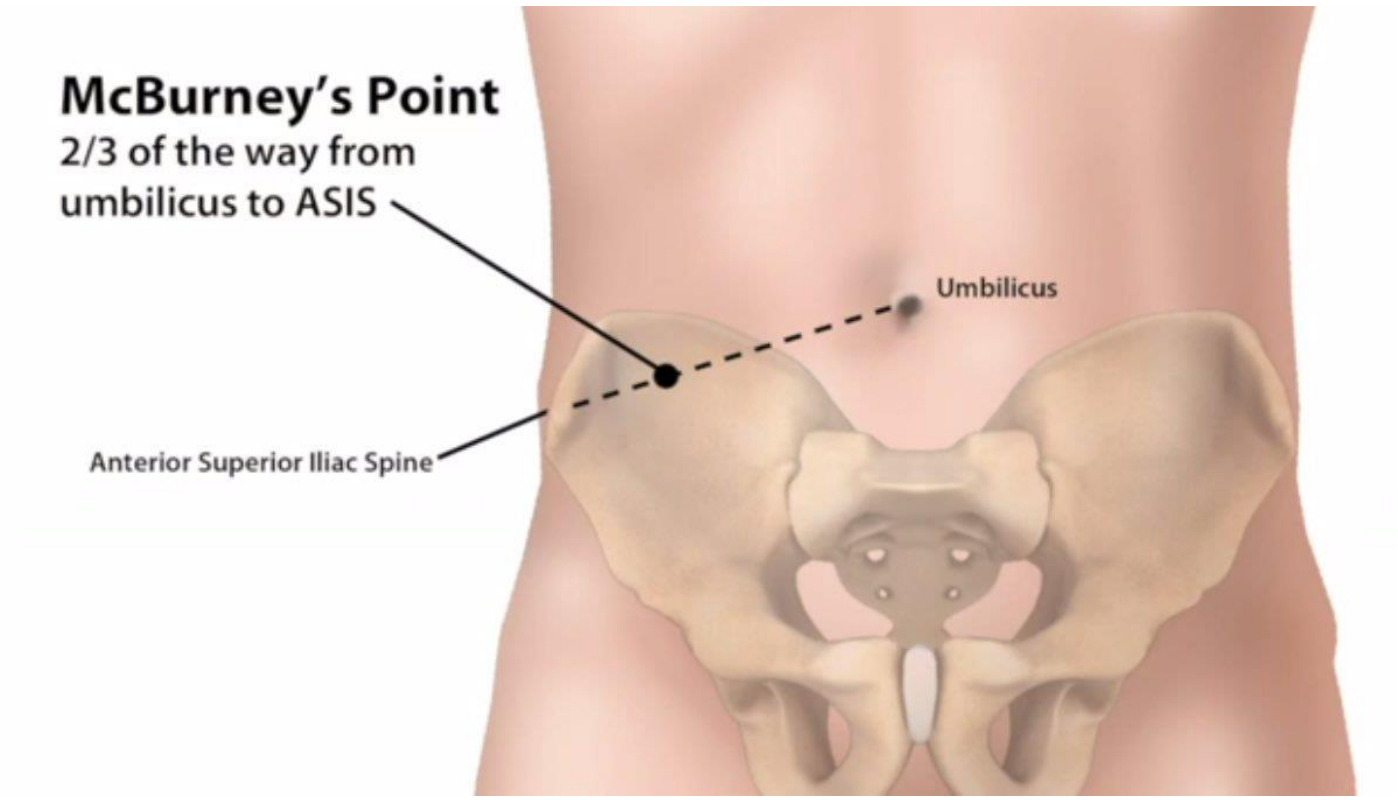
ROVSING'S SIGN



Other signs

- **Psoas sign** – Hip extension
- **Obturator sign** – Rotation of right flexed hip

Pointing sign


McBurney's Point
2/3 of the way from
umbilicus to ASIS
Umbilicus
Anterior Superior Iliac Spine

DIFFERENTIAL DIAGNOSIS

IN CHILDREN

- Gastroenteritis
- Mesenteric adenitis
- Meckles diverticulitis
- Intussusception
- Henoch – schonleinpurpura
- Lobar pneumonia

ADULTS

regional enteritis

ureteric colic

perforated peptic ulcer

torsion of testis

pancreatitis

rectus sheath hematoma(9)

DIFFERENTIAL DIAGNOSIS

ADULT FEMALES

Mittelschmerz

Pelvic inflammatory disease

Pyelonephritis

Ectopic pregnancy

Torsion/rupture of cyst

endometriosis

ELDERLY

diverticulitis

intestinal obstruction

colonic carcinoma

mesenteric infarction

ACUTE APPENDICITIS IN PREGNANCY

- very less incidence with one in 500 to one in 635 pregnancies per year
- mostly common in 1st and 2 nd trimester with increased perforation in 3rd trimester
- diagnosis is difficult due to abdominal discomfort and gastrointestinal complaints and anatomical changes of appendix
- classical signs may not be evident
- Total count is usually very high with neutrophilia
- premature labour is high with 15% chance
- Foetal death is usually low in early period but high once appendix perforate in pregnancy
- After 6 months of antenatal life , maternal mortality rate increases by 10 folds which invariably causes prematre delivery

- Appendicitis is most common non gynaecological surgical emergencies during pregnancy.

FIGURE 50-9 MRI scan with T1-weighted axial image of the abdomen in a gravid woman. The *arrow* highlights the thickened appendix. (From Parks NA, Schroeppel TJ: Update on imaging for acute appendicitis. *Surg Clin North Am* 91:141–154, 2011.)

APPENDICITIS IN ELDERLY

- Appendicitis should be in differential diagnosis in elderly patient when patient presents with acute abdominal pain .
    - Other differential diagnosis in elderly are diverticulitis, malignant disease, intestinal ischemia, ischemic colitis, urinary tract infection and perforated ulcer.
    - Laparoscopic appendectomy is safe in elderly and procedure of choice.

APPENDICITIS IN IMMUNOCOMPROMISED PATIENT

- It is managed in same manner as of other immunocompetent patient with appendectomy.
- Due to immune competent there is no fever, increased WBC count and peritonitis.
- CT imaging in early period is advisable.
- CT helps in early identification of appendicitis and to rule out other differential diagnosis mostly typhlitis

SEQUALAE OF ACUTE APPENDICITIS

- Relapse
- Resorption
- Recurrent attack
- Mass formation
- Abscess formation
- Appendicular perforation
- Perforation peritonitis
- Portal pyaemia and septicaemia

INVESTIGATIONS

- Diagnosis is usually clinical and decision with it alone can lead to removal of normal appendix in upto 30% of patients.
- Leukocytosis with left shift often present in 90% of cases.
- Urinalysis is typically normal as well, although finding of trace leukocyte esterase or pyuria is not unusual.(10)
- Pregnancy test is mandatory in case of women in childbearing age
- C – reactive protein is neither sensitive nor specific in diagnosing appendicitis

PLAIN RADIOGRAPHS

- May be helpful in presence of calcified fecalith .

CT SCAN

- Has a sensitivity of 90 % to 100% and a specificity of 91 to 99%
- IDSA (infectious diseases society of America) recommends administration of intravenous contrast.
- Appendix is typically more than 7mm in diameter with a thickened, inflamed wall and mural enhancement or target sign
- Periappendiceal fluid or air is also highly suggestive of appendicitis

ULTRASONOGRAM

- Sensitivity is 83 to 93%

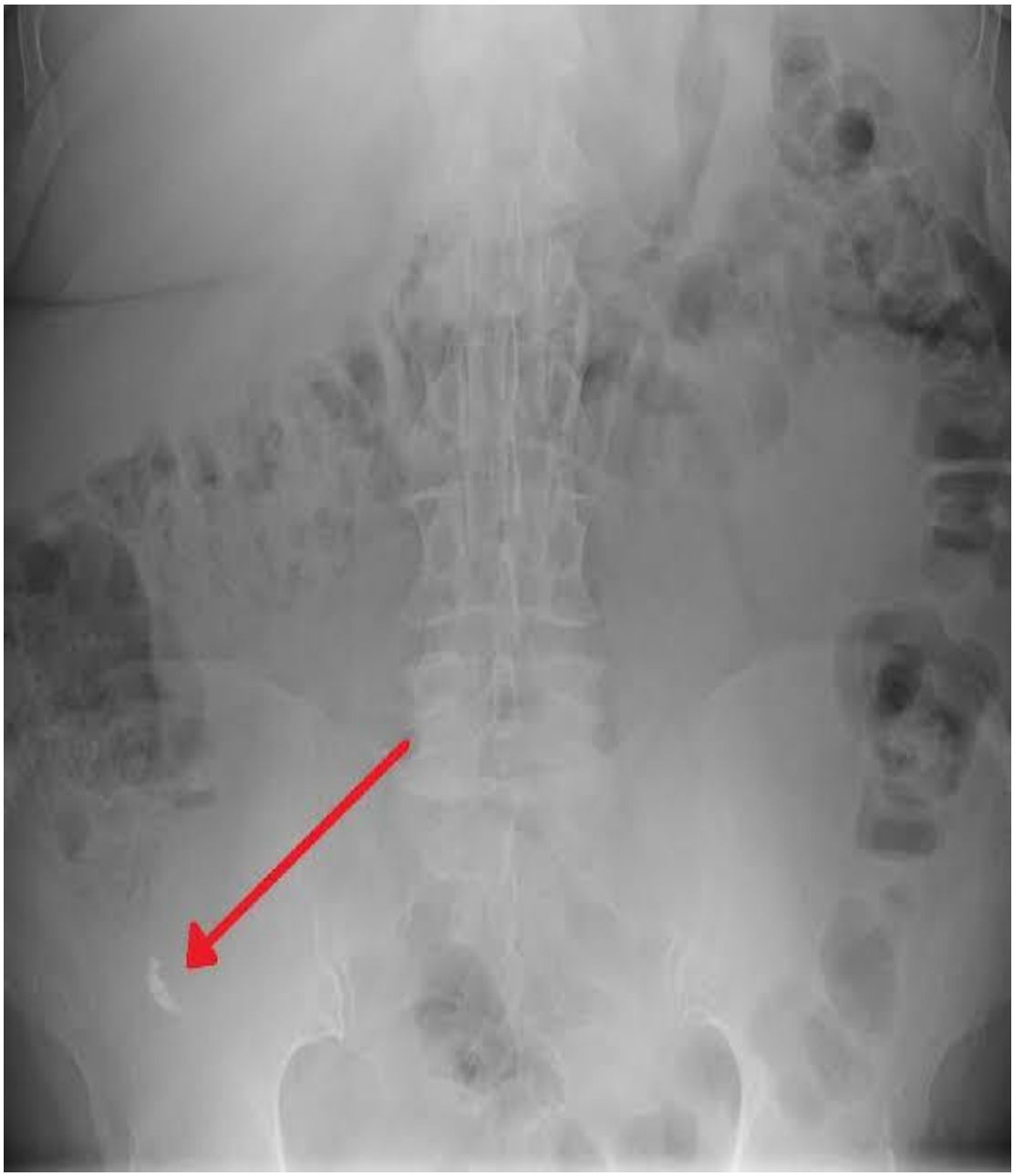
MRI

- Reserved for pregnant patients without contrast agents
- **Criteria for diagnosing appendicitis**

1. Appendiceal enlargement > 7mm
2. Thickening > 2mm
3. Presence of inflammation

- Sensitivity is 100%(11)

FAECOLITH IN XRAY ABDOMEN



ULTRASONOGRAM FINDING IN INFLAMMED APPENDIX

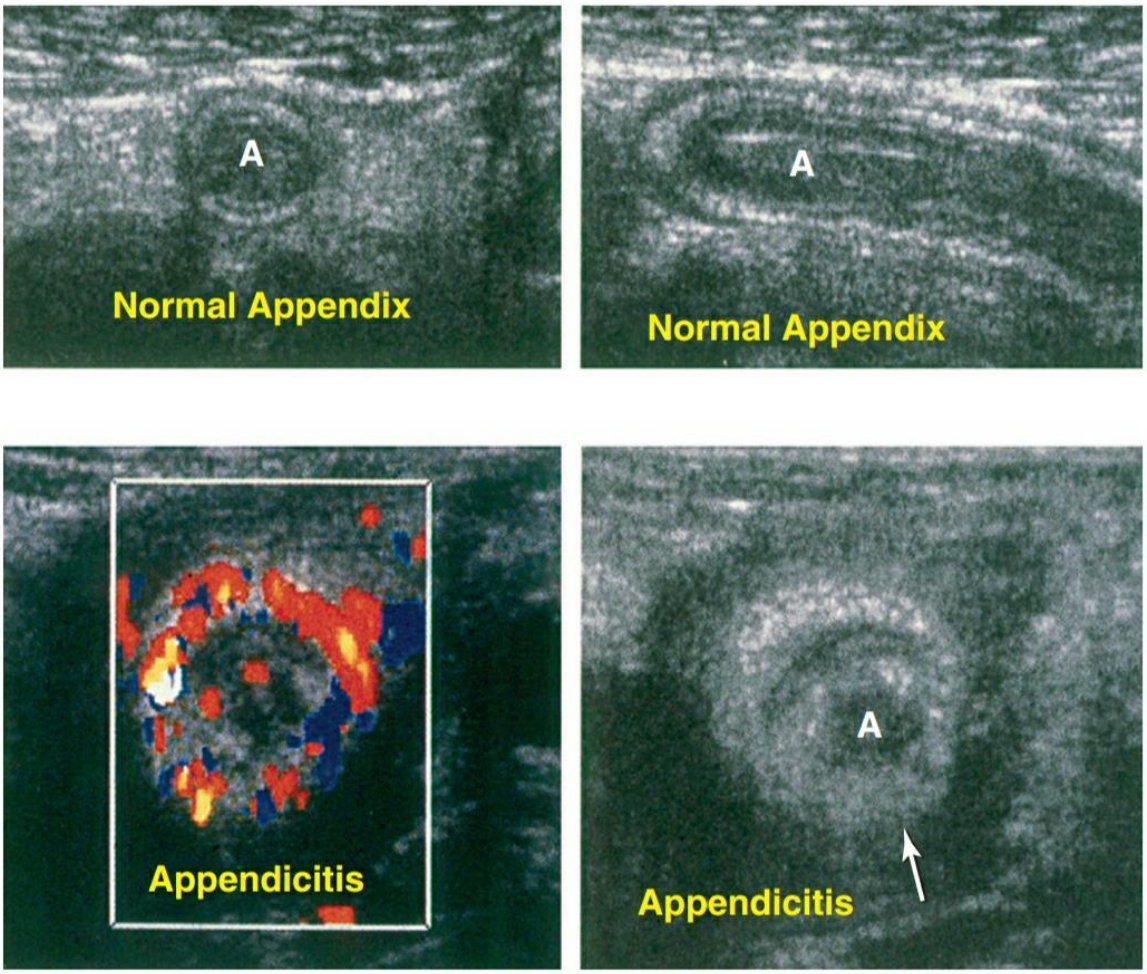


FIGURE 50-3 Ultrasound image of a normal appendix *(top)* illustrating the thin wall in coronal *(left)* and longitudinal *(right)* planes. In appendicitis, there is distention and wall thickening *(bottom, right)*, and blood flow is increased, leading to the so-called ring of fire appearance. *A*, Appendix.

CT FINDINGS IN INFLAMMED APPENDIX

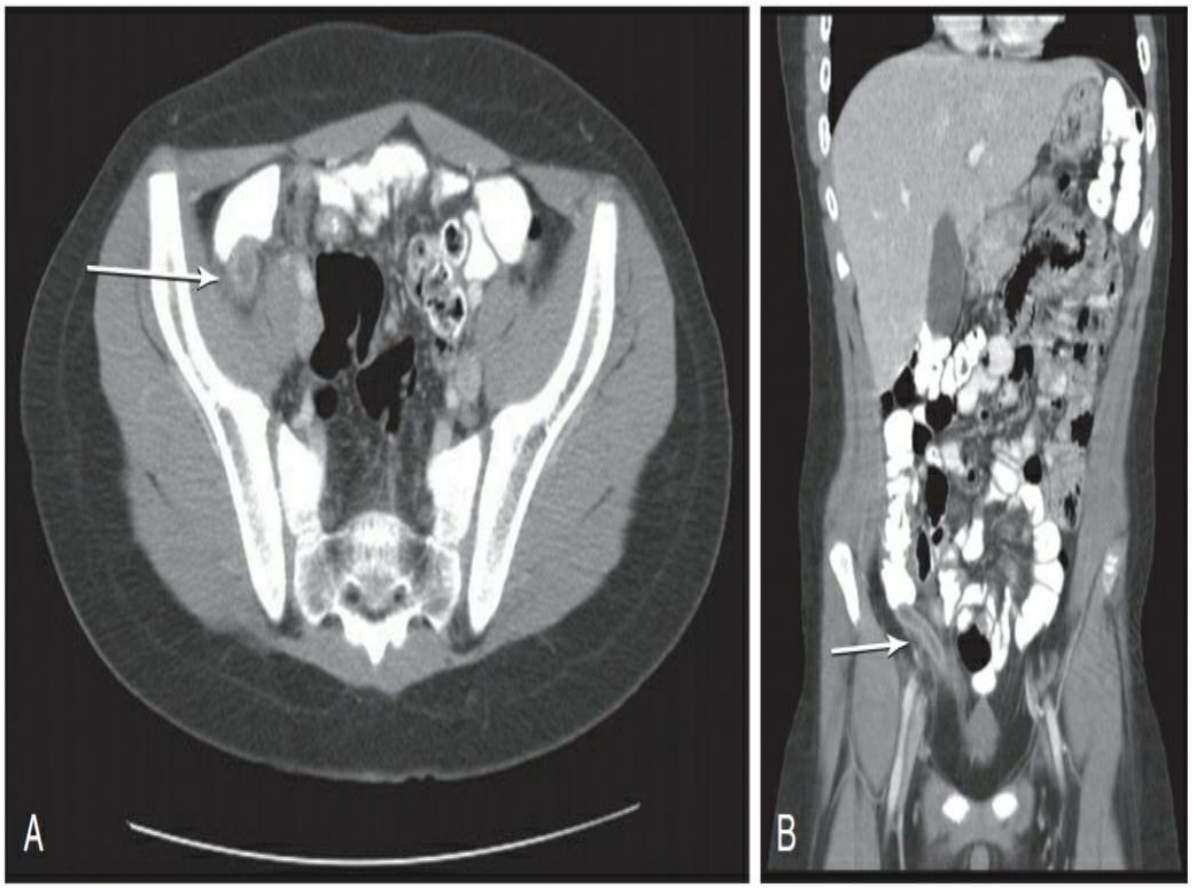


FIGURE 50-2 CT scan of the abdomen demonstrating classic findings of acute appendicitis. **A,** Sagittal view with *arrow* demonstrating a thickened, inflamed, and fluid-filled appendix (target sign). **B,** Coronal view of same patient. The *arrow* points to the thickened, elongated appendix with periappendiceal fat stranding and fluid around the appendiceal tip.

DIFFERENT SCORING SYSTEM USED

ALVARADO SCORING

SCORE

- Migratory pain - 1
- Loss of appetite (anorexia) - 1
- Nausea and vomiting - 1
- Tenderness in RIF - 2
- Rebound tenderness - 1
- High temperature - 1
- Leukocytosis (> 10,000) - 2
- Shift to left with neutrophilia in smear - 1

TOTAL SCORE = 10

Score less than 5 : not sure

Score between 5-6 : compatible

Score between 6-9 : probable

Score more than 9 :confirmed

- Kalam modified alvarado scoring system (1994) where shift to left is removed.
- Tzanakis scoring system 2005 –

  − lower abdominal tenderness -4 ;

  −rebound tenderness – 3

  −total count > 12,000/cm – 2 ;

  −USG features – 6

- Anderson scoring system – 8 parameters(12)

RIPASA SCORING SYSTEM (2010) –

with 15 parameters

- < 5.0 — acute appendicitis is unlikely
- 5-7 – acute appendicitis is in low probability range
- 7.5- 11.5- acute appendicitis probability is high
- > 12 - definitive acute appendicitis(13)

RIPASA SCORING

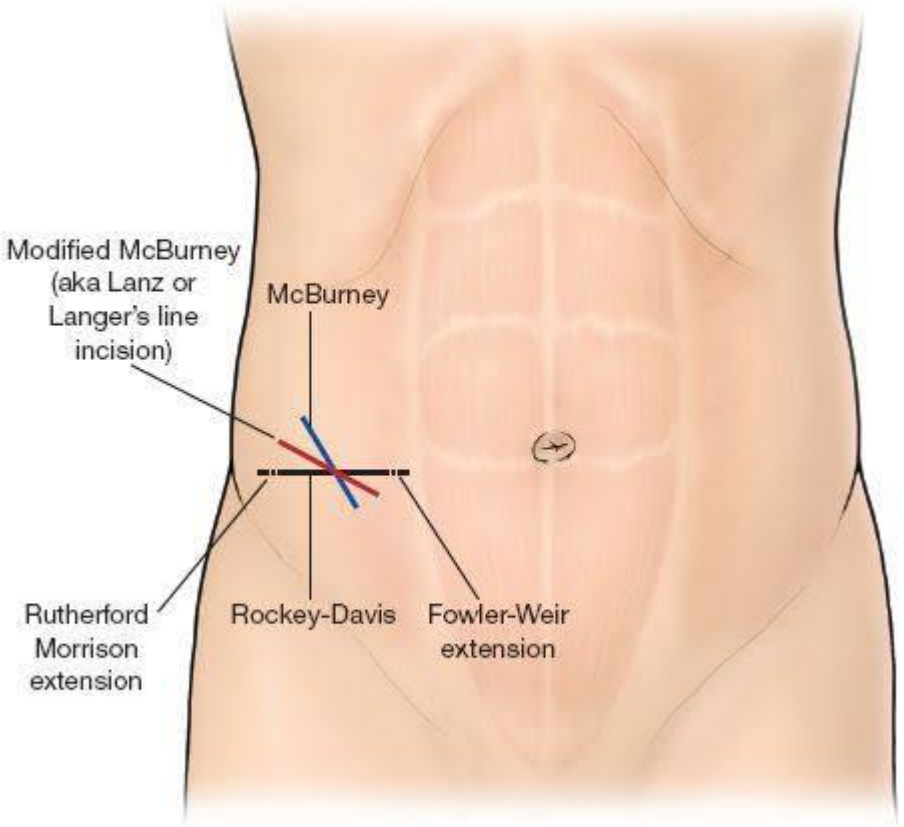
1	Demography	Score
	Female	0.5
	Male	1
	Age <39.9 years	1
	Age >40 years	0.5
2	Symptoms	
	RIF pain	0.5
	Pain migration to RIF	0.5
	Anorexia	1
	Nausea & vomiting	1
	Duration of symptoms <48 hrs.	1
	Duration of symptoms >48 hrs.	0.5
3	Signs	
	RIF tenderness	1
	Guarding	2
	Rebound tenderness	1
	Rovsing sign	2
	Fever >37° C <39° C	1
4	Investigation	
	Raised WBC counts	1
	Negative urine analysis	1
5	Additional score	
	Non Asian	1
	Total score	17.5

RIF: Right Iliac Fossa; WBC: White Blood Cell.

DIFFERENT INCISIONS FOR APPENDICECTOMY

- Mcburney
- Modified mc burney (aka lanz or langer line)
- Rockeydavis
- Rutherford Morrison
- Fowler – weir(14)

DIFFERENT INCISIONS IN OPEN APPENDICECTOMY



OPEN APPENDECTOMY

- Patient is positioned in supine position
- If patient has recently voided , a urinary catheter may not be necessary; however, if a long operation is anticipated, a urinary catheter should be placed.
- Nasogastric tube may also not be necessary if the patient has had nothing per os for an adequate length of time; but nasogastric or orogastric decompression may be usedful if the patient has recently eaten
- If appendix is located in the right lower quadrant , the surgeon has the following choices for the incision: mcburney, modified mcburney, rockeydevis,Rutherford Morrison, fowler weir or low midline.
- Incision is taken to the external oblique aponeurosis , which is divided to expose the internal oblique muscle.
- Internal oblique and transverse abdominis muscles are split with clamps at right angles to each other until the peritoneum is exposed.
- Peritoneum is open and the abdomen entered.
- If purulent fluid is encountered and bacterial cultures desired, now is the time to sample the fluid for cultures.
- Appendix can be identified by palpation of a firm, tubular structure
- If appendix is mobile , it can be delivered into the wound. If appendix is fixed or retrocaecal the taenia of the caecum are followed to the base of caecum and appendix can be identified.
- Once the appendix is delivered, mesoappendix is identified and divided

- mostly the inflammation is in distal end of the appendix so the base of the appendix at the caecum is crushed with the straight clamp, divided and ligated with 2-0 or 3-0 absorbable suture
- Mucosa of the appendiceal stump is obliterated with electrocautery. Alternatively , the stump can be
- inverted and secured with a purse – string suture of 3-0 suture
- Abdominal wall is closed in layers with running or interrupted 2-0 absorbable suture
- Skin can be closed as per the surgeon's preference , unless the extent of contamination mandates that the skin be left open.(14)

LAPAROSCOPIC APPENDECTOMY

- Patient is positioned supine , however in female for whom concern about pelvic pathology exists, a lithotomy position is used.
- Abdomen is entered through an infra umbilical incision either with a veress needle or under direct visualization with a hasson cannula , as per surgeon's preference.
- Abdomen is insufflated with CO2 gas to a pressure of 15mmhg
- Second port is placed in suprapubic region with 12mm trocar.
- Third port is usually a 5mm trocar , can be placed in one of two alternate position , either in right anterior axillary line at the level or just superior to the umbilicusor in the left lower quadrant
- At this point, a general diagnostic laparoscopy is done to confirm appendicitis , or seek other pathology if the appendix is normal or if periappendicitis is present
- Appendix mobilized with laparoscopic graspers with care taken not to rupture the appendix

- Mesoappendix divided with the endoscopic stapling device using 2.5 mm " vascular" staples , and then divide the appendix at its base with the 3.5 mm " bowel " staples.
- If surgeon prefers , the base of the appendix can be secured with endoloop suture.
- Once the appendix and mesoappendix are divided, it is placed in an endoscopic extraction bag and delivered , usually through the suprapubic port
- Fascia of larger port sites should be closed with an absorbable suture and skin closed as per the surgeons preference(15)

POST OPERATIVE CARE

- In uncomplicated acute appendicitis, a single preoperative dose of antibiotics is all that is necessary.
- Urinary catheter and , if present , the naso/ orogastric tube should be removed.
- Once recovered from anaesthesia, the patient may be given liquids and, eventually food .
- In patients with gangrenous or perforated appendicitis , prolonged antibiotic treatment may be necessary
- Duration of antibiotic depends on patient response. Although some surgeons advocate for specific durations such as 7 or 10 days , a more logical approach is continuation of antibiotics until the patient is afebrile ,with a normal white blood cell count and normal white blood cell differential for 24 hrs, and then discontinuation of antibiotics.
- While the patient is hospitalized , veno thrombosis prophylaxis is necessary.
- While the patient is still nothing per os, stress ulceration prophylaxis be considered.(16)

POST OPERATIVE COMPLICATIONS

Surgical site infection

Surgical site infection is common complications in appendicectomy .It occurs in around 10% of patients with warmth, tenderness, purulent discharge in wound site. drainage of pus, dressing and antibiotic coverage is treatment of choice.

Intra abdominal abscess

Intra abdominal abscess is a complication of acute appendicitis. Has low incidence (8%) persons undergoing appendicectomy. After 5 days of surgery it present as fever , nausea and vomiting . The investigation of choice is ultrasonogram which can identify the site of abscess.ultra sounded guided percutaneous aspiration is initial treatment modality and laparotomy if abscess persists

Ileus

In gangrenous appendicitis a ileus can occur and mostly settle in 4-5 days. If it persists for more than 5days it is mostly due to intra abdominal sepsis. It sepsis persists needs an emergency surgical intervention. Richter hernia type can cause ileus and CT abdomen is needed for the diagnosis.

Respiratory

Respiratory tract infection is less common. If patient is already having any respiratory illness it may precipitate .chest physiotheraphy with antibioticsis given.

Deep vein thrombosis

Deep vein thrombosis is usually rare in appendicectomy. Females on oral contraceptive pills can develop deep vein thrombosis and appropriate prophylactic measures should be taken.

Portal pyemia

It is rare complication in acute appendicitis. Patient presents with high fever , rigor and jaundice. Hepatic abscess is main complication and drained percutaneously. Portal pyaemia is treated by systemic intravenous antibiotics.

Fecal fistula

Faecal fistula can occur due to

1)stump leak

2) highly inflamed caecum

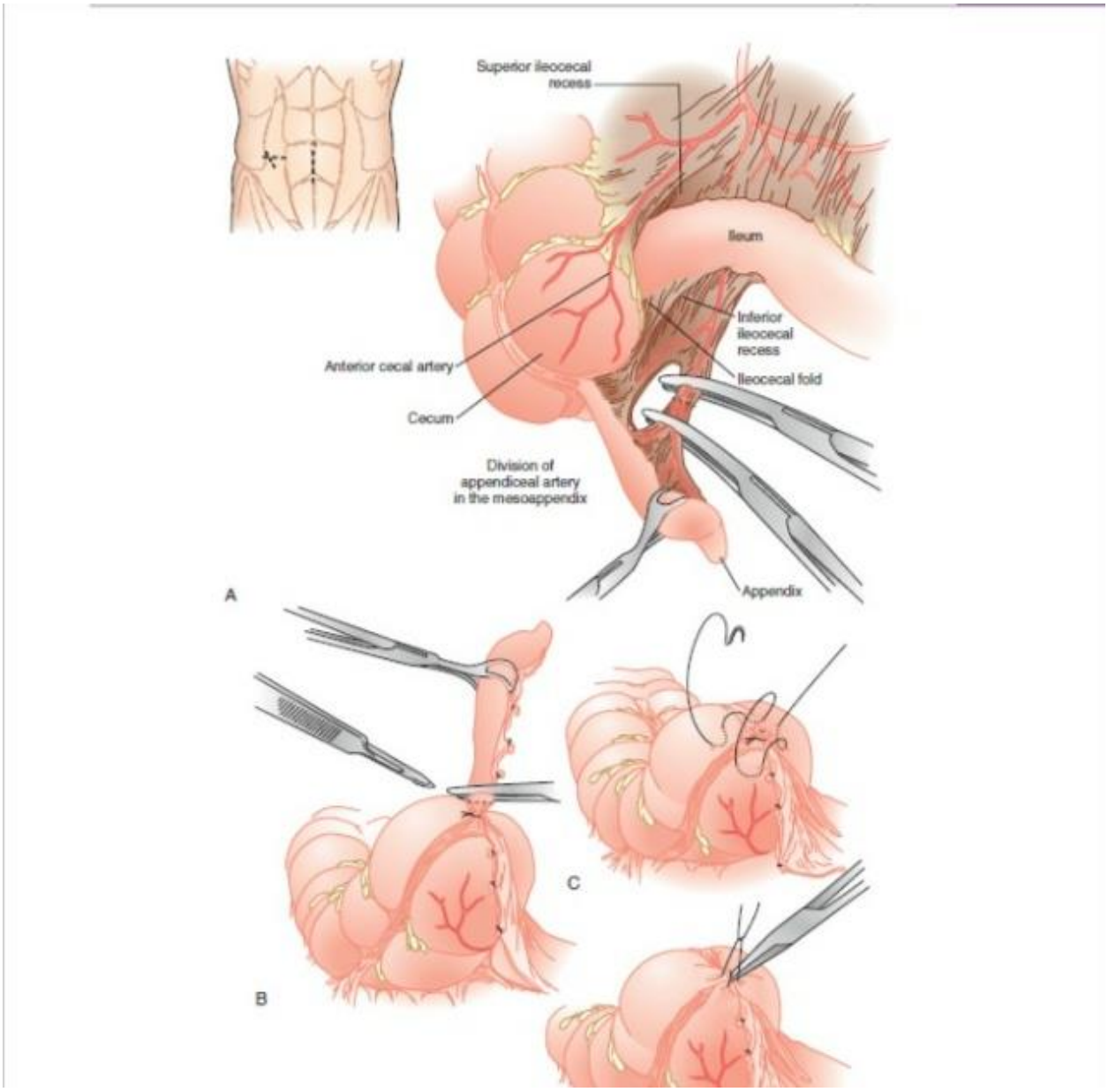
3) in chrons patients

Conservative management is usually needed.

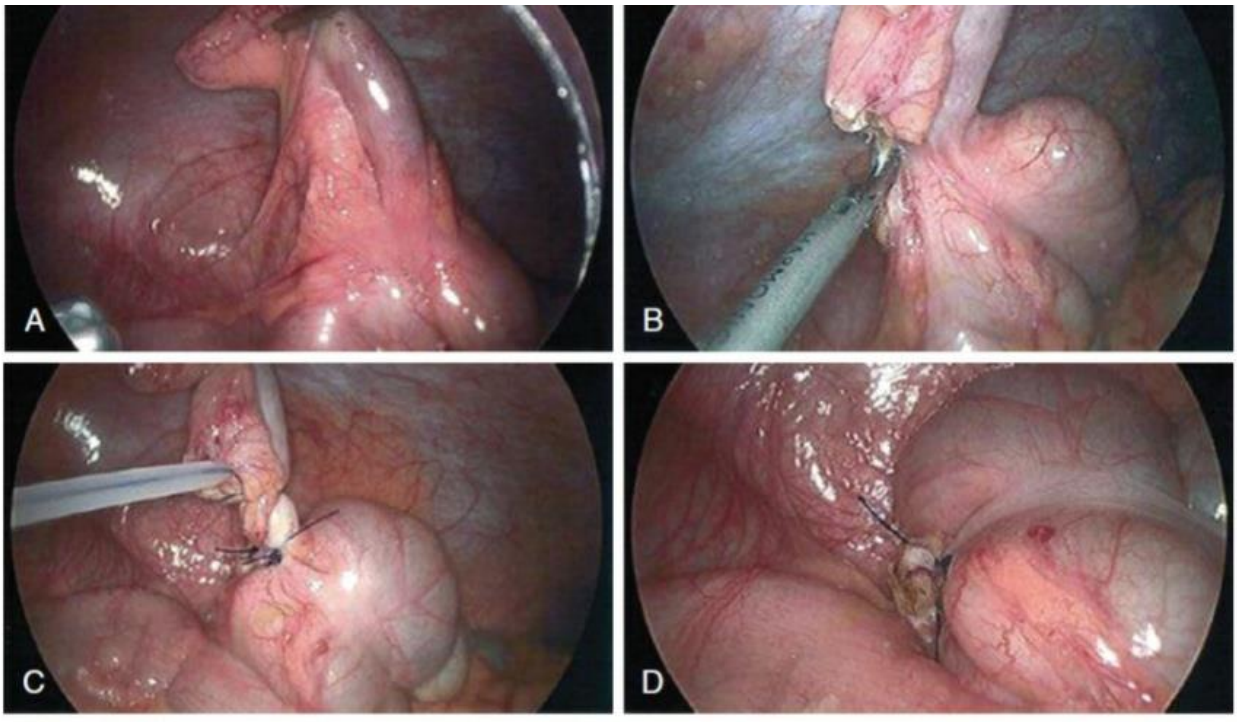
Adhesive intestinal obstruction

It is another late complication following surgery. intestinal bands following surgery may present in right iliac fossa and present with abdominal pain. Adhesiolysis is done by laproscopy.

OPEN APPENDICECTOMY



LAPAROSCOPIC APPENDECTOMY



APPROACH TO SUSPECTED APPENDICITIS

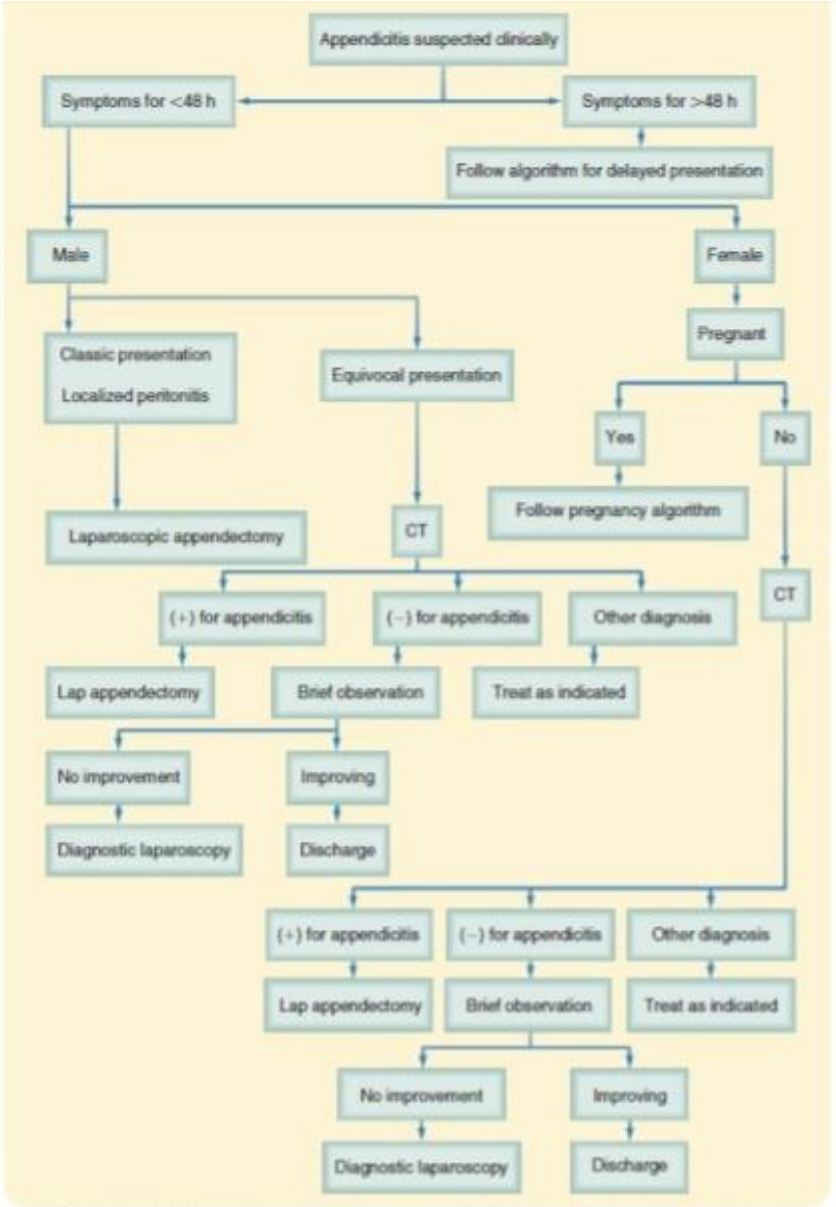


FIGURE 50-1 Suggested algorithm for the approach to the patient with possible appendicitis.

APPROACH TO DELAYED PRESENTATION

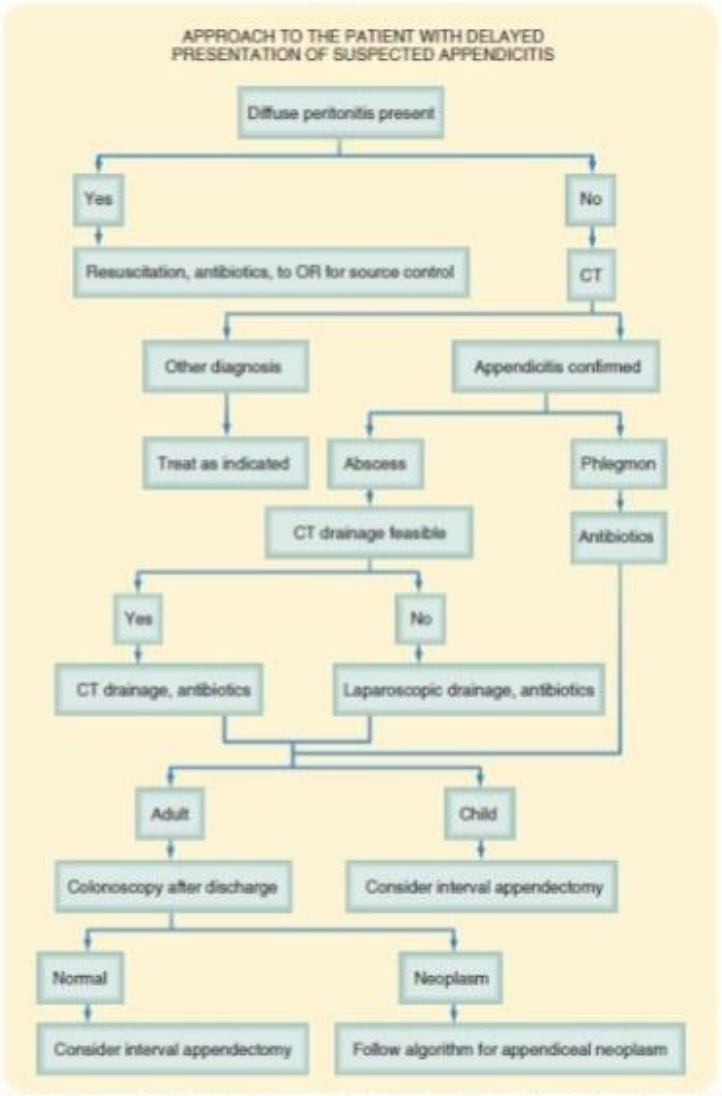
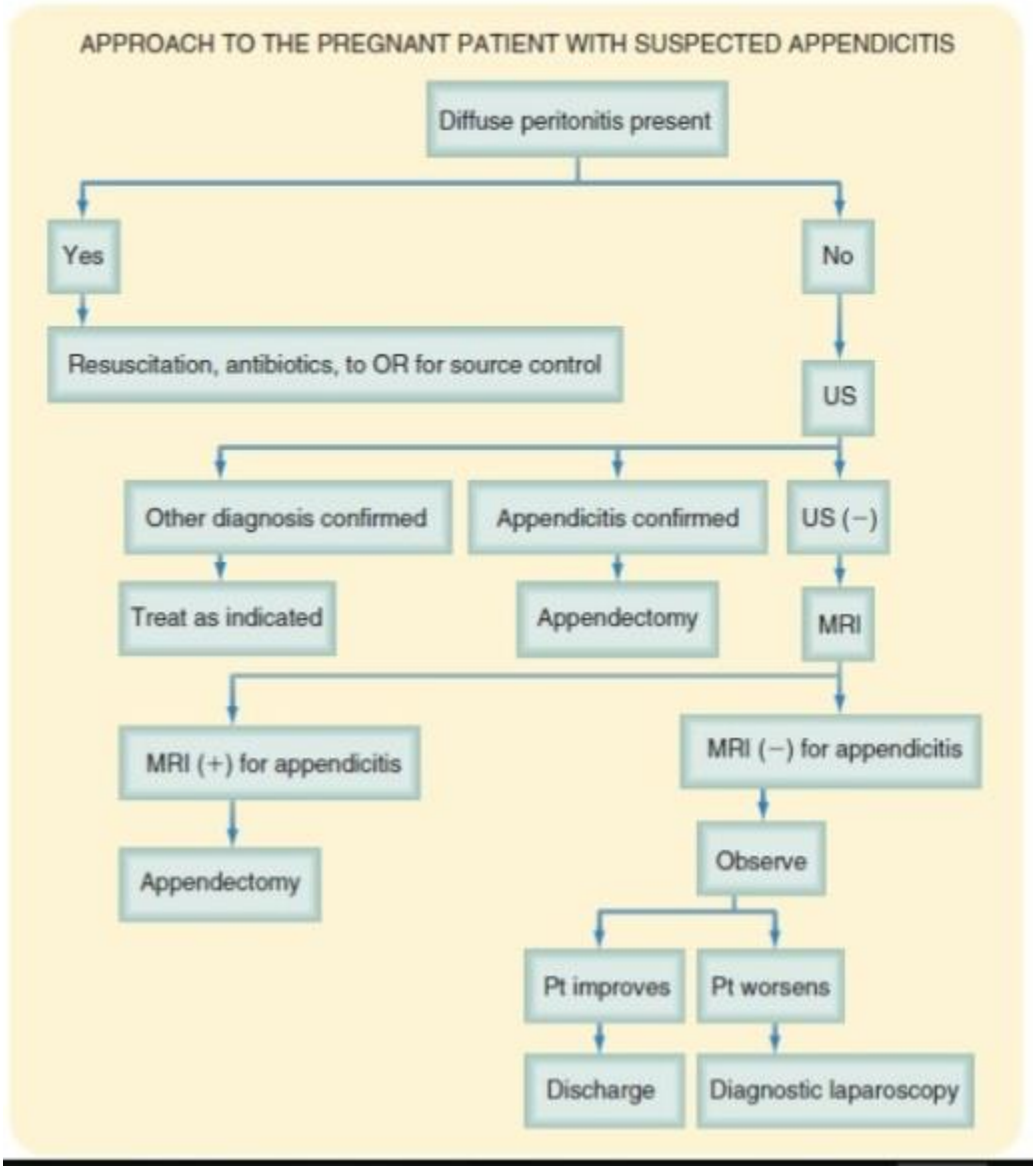


FIGURE 50-6 Suggested algorithm for managing the patient with delayed presentation of appendicitis.

APPROACH TO PREGNANT PATIENT WITH SUSPECTED APPENDICITIS



MATERIALS AND METHODS

METHODOLOGY

A prospective study was conducted in government Vellore medical college , department of general surgery from October 2018 to September 2019 .one hundred patients presented with right iliac fossa pain in emergency or in out patient department and suspected to have acute appendicitis were included.

Assessment was started and patients who met inclusion criteria admitted and started clinical examination, hematological examination, urine routine , x ray chest and abdomen and ultrasonogram

abdomen and CT scan .

Patient were assessed by RIPASA score but surgical intervention done on the basis of clinical assessment and decision of duty surgeon and histo pathological correlation done with a score .A value of 7.5 has increased probability of acute appendicitis.

Proforma was filled for all 100 patients which includes general information of patients , eight variables based on RIPASA score. Score was calculated divided into four groups.

Diagnosis was confirmed by intra op finding and histopathological assessment . Reliability of RIPASA score is assessed by calculating sensitivity , specificity, positive predicitive value and negative predictive value.

INCLUSION CRITERIA

1. Patients presenting to emergency department with signs and symptoms suggestive of acute appendicitis.

2. Age 15-59.

3. Both sex.

EXCLUSION CRITERIA

Age below 15 yrs and above 60 yrs.

Lump in right iliac fossa

Trauma history

Pregnant females.

Urolithiasis patients and females with pelvic inflammatory disease .

Total score - <5.0 : chances appendicitis are very less (almost nil) . patient observed in ward and recalculate score after 1 or 2 hr .

Total score -5.0-7.0- appendicitis probability is very low, patient observed in ward and repeat scoring after 1 or 2 hr or perform radiological investigation .

Total score – 7.5-11.5- appendicitis probability is very high. Patient admitted and repeat score after 1 or 2 hr and if it remains surgery is indicated. In females patients usg done to exclude gynaecological causes of RIF pain

Total score >12- appendicectomy .

RESULTS

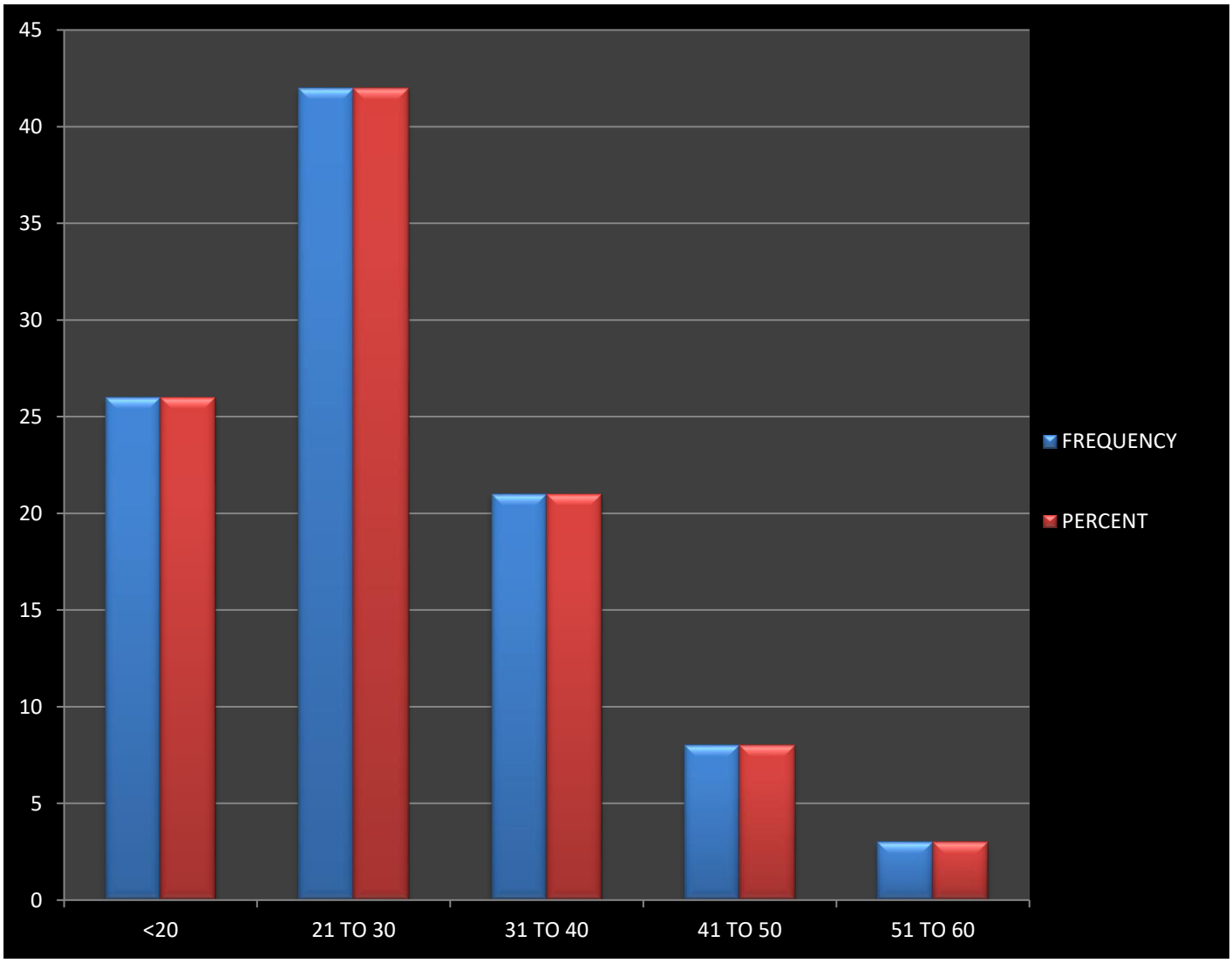
TOTAL SCORE	TOTAL PATIENTS
< 5	6
5-7	17
7.5-11.5	69
>12	8

STATISTICAL ANALYSIS

AGE DISTRIBUTION

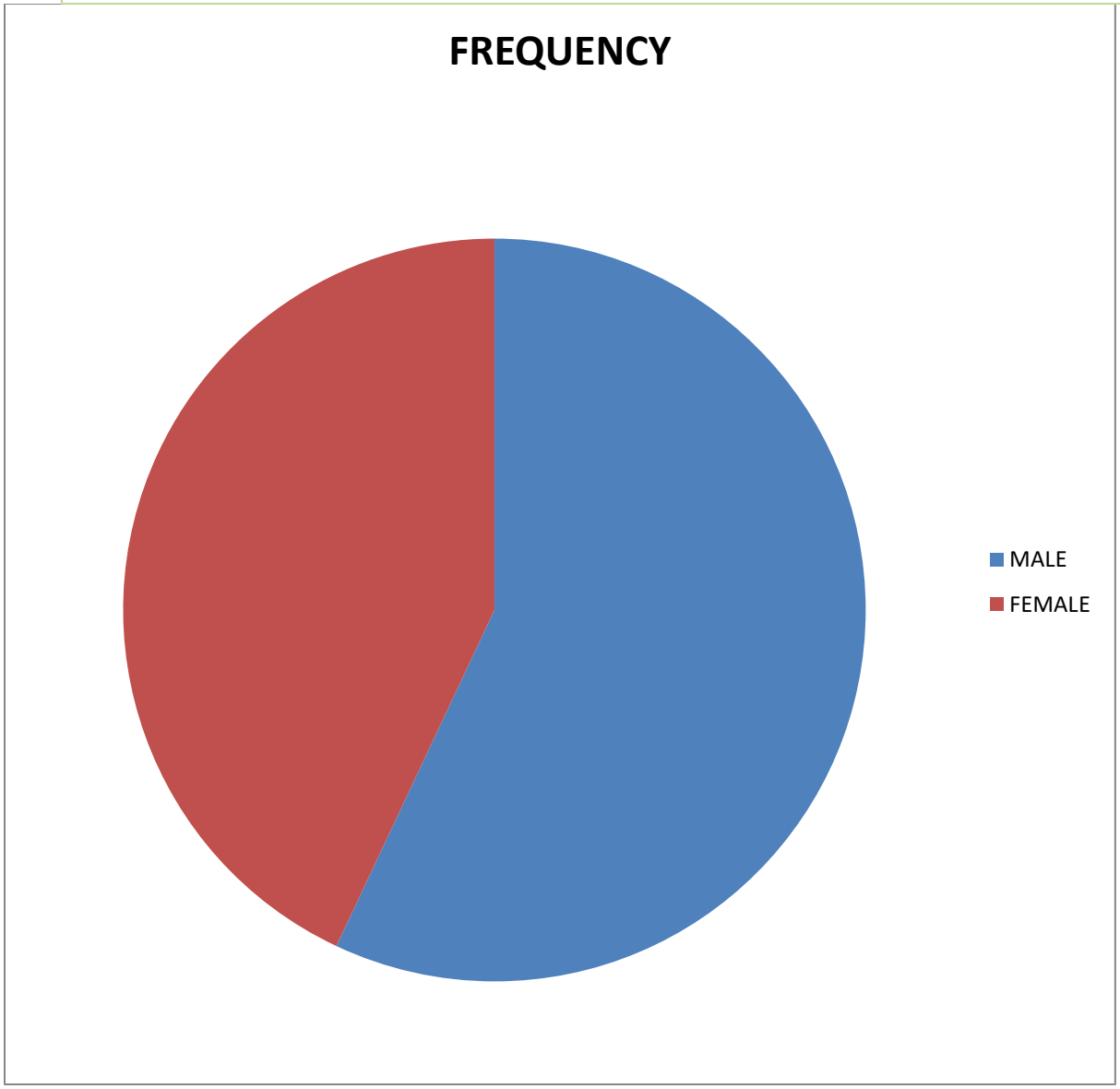
AGE	FREQUENCY	PERCENT
<20	26	26
21 TO 30	42	42
31 TO 40	21	21
41 TO 50	8	8
51 TO 60	3	3

AGE DISTRIBUTION CURVE



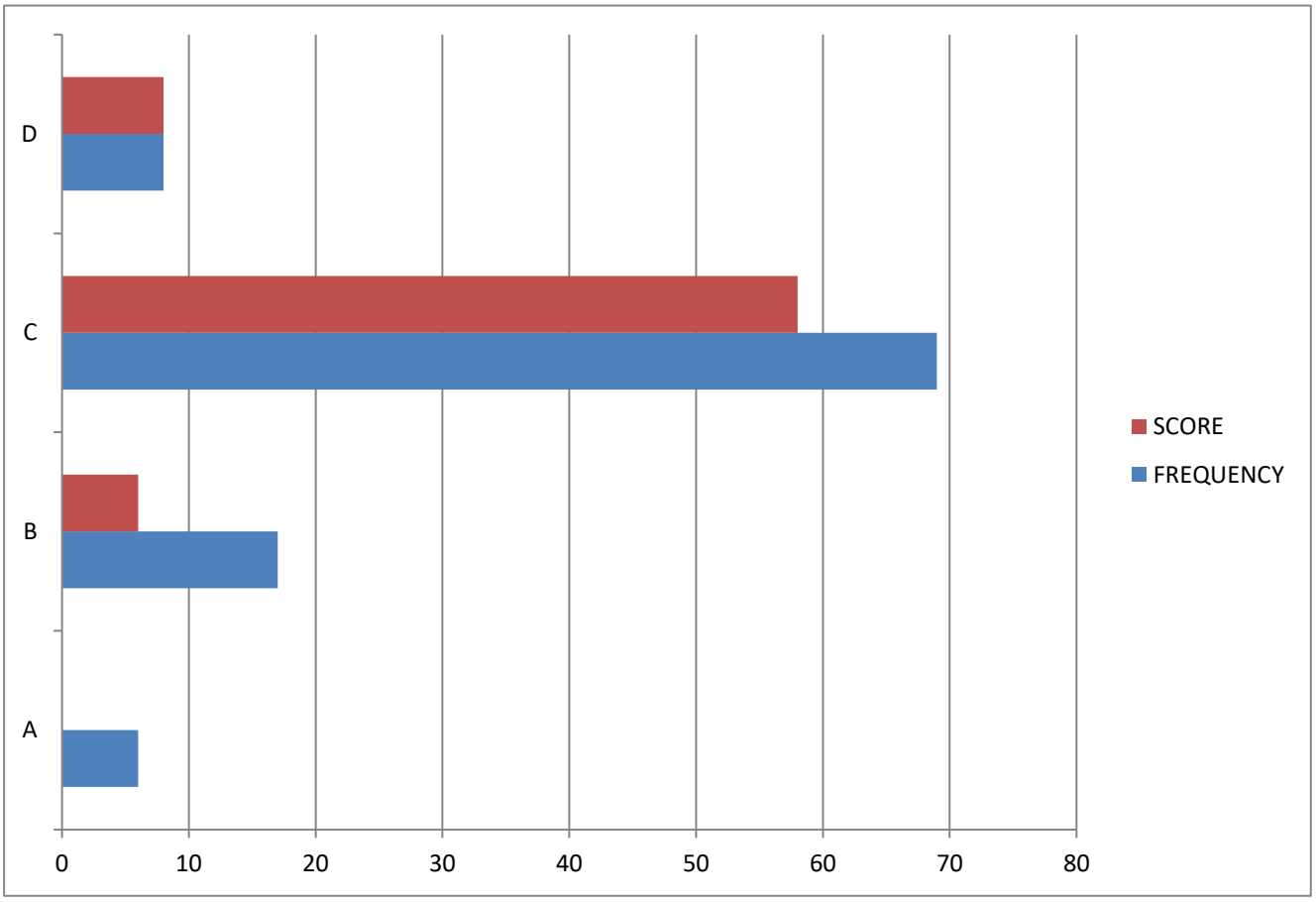
GENDER DISTRIBUTION

GENDER	FREQUENCY	PERCENT
MALE	57	57
FEMALE	43	43



SCORE GROUP

GROUP	FREQUENCY	SCORE
A	6	0
B	17	6
C	69	58
D	8	8



KEYS TO MASTER CHART

A - female patients

B - male patients

C – age < 39.9 yrs

D – age > 40 yrs

E – RIF pain

F – pain migration to RIF

G – anorexia

H – nausea and vomiting

I – duration of symptoms < 48 hrs

J – duration of symptoms > 48 hrs

K – RIF tenderness

L – guarding

M – rebound tenderness

N – rovsings sign

O –fever > 37’C < 39’C

P – raised WBC counts

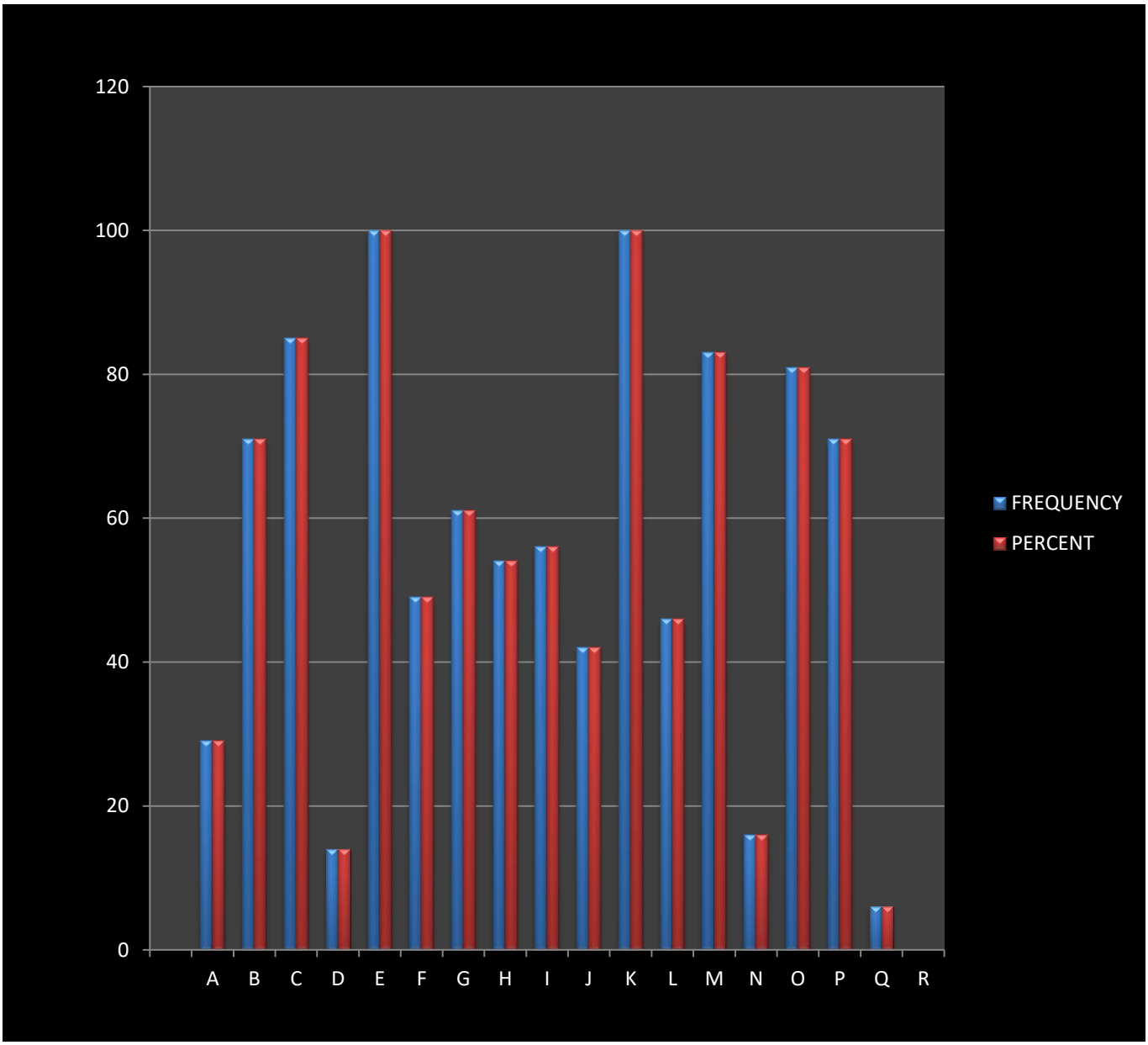
Q – negative urine analysis

R – non asian

SYMPTOM DISTRIBUTION

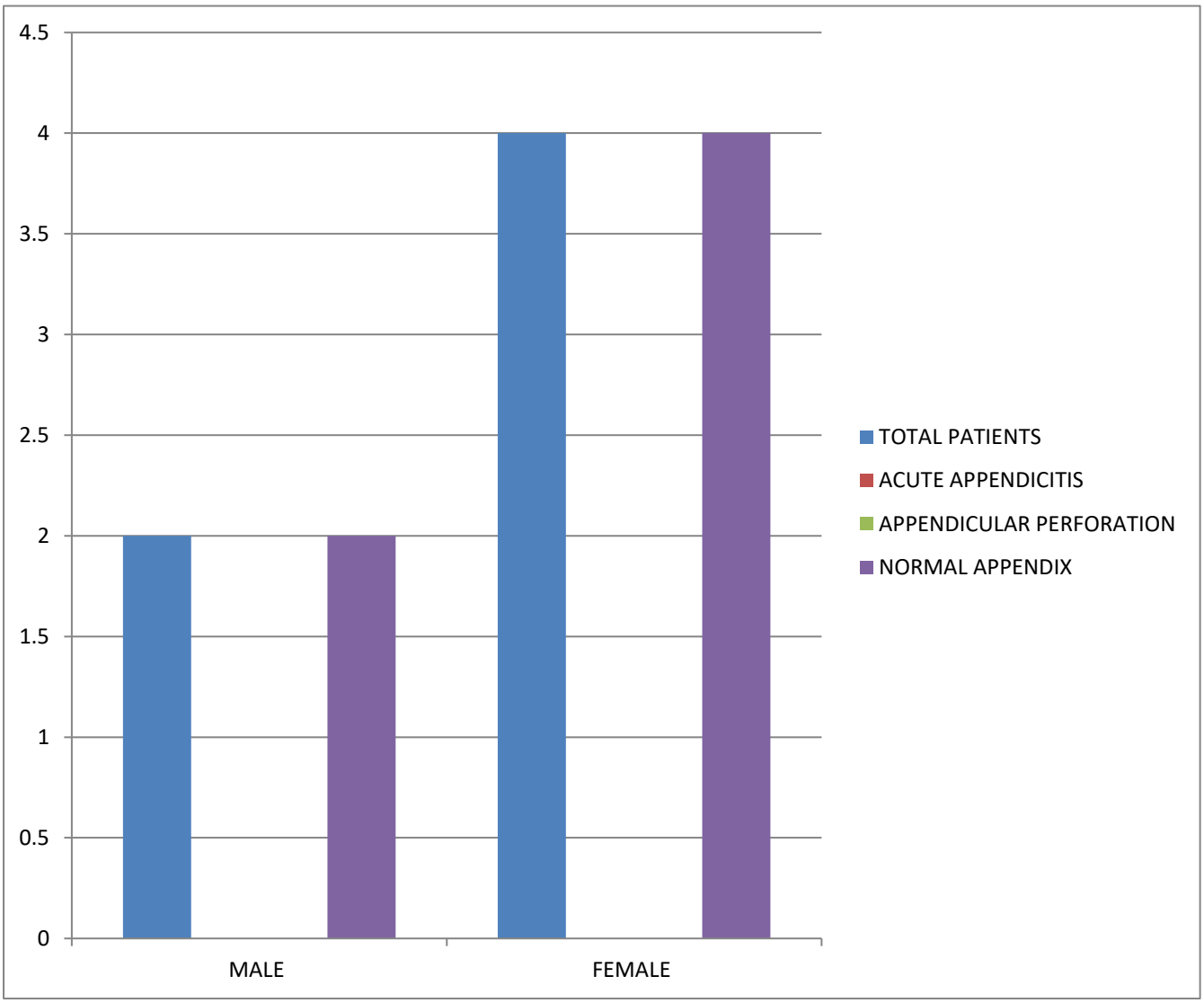
SCORE	FREQUENCY	PERCENT
1	0	0
2	0	0
3	1	1
4	1	1
5	7	7
6	3	3
7	1	1
8	13	13
9	21	21
10	20	21
11	14	14
12	16	16

SYMPTOM DISTRIBUTION

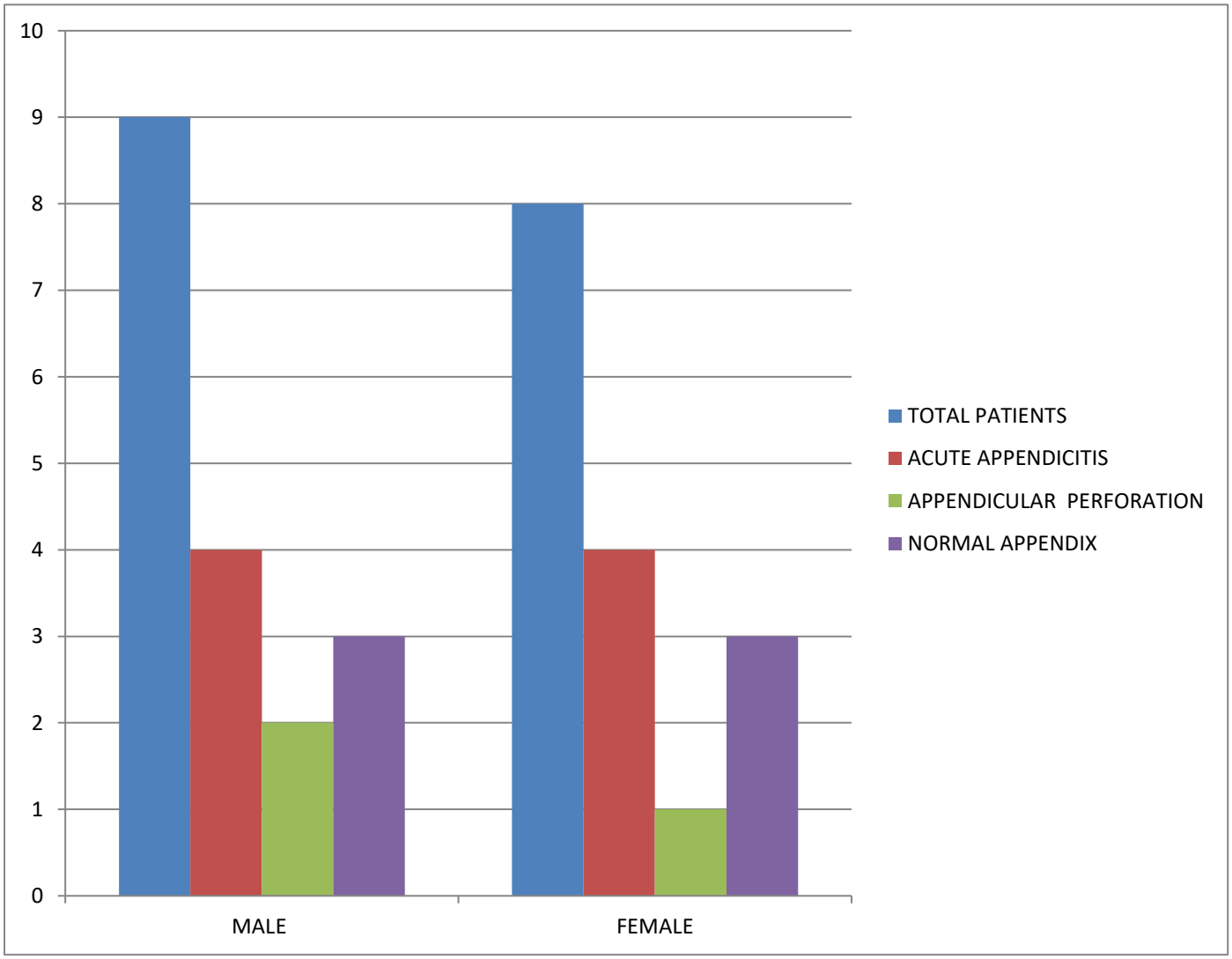


GROUP DISTRIBUTION

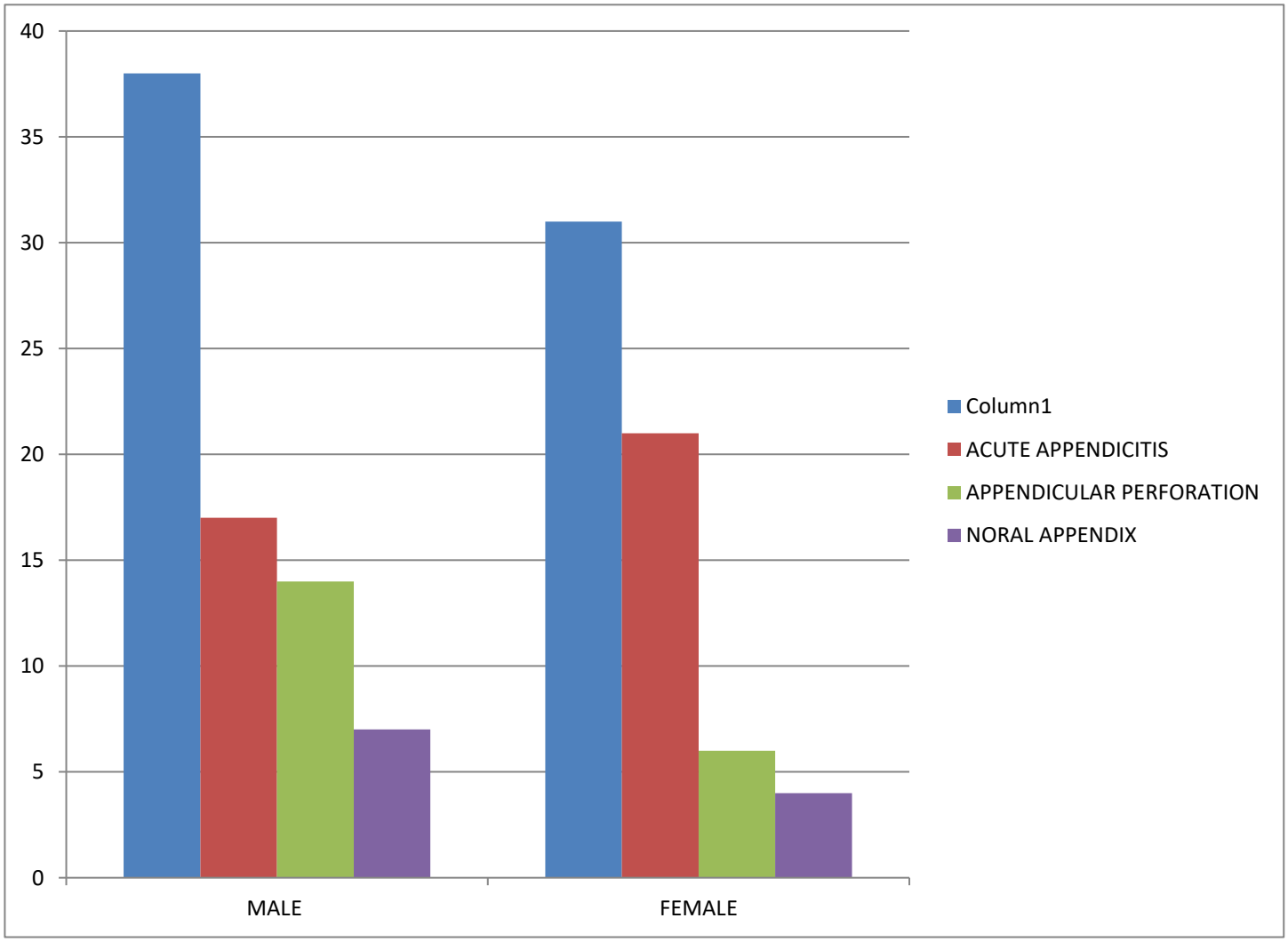
GROUP A	TOTAL PATIENTS	ACUTE APPENDICITIS	APPENDICULAR PERFORATION	NORMAL APPENDIX
MALE	2	0	0	2
FEMALE	4	0	0	4



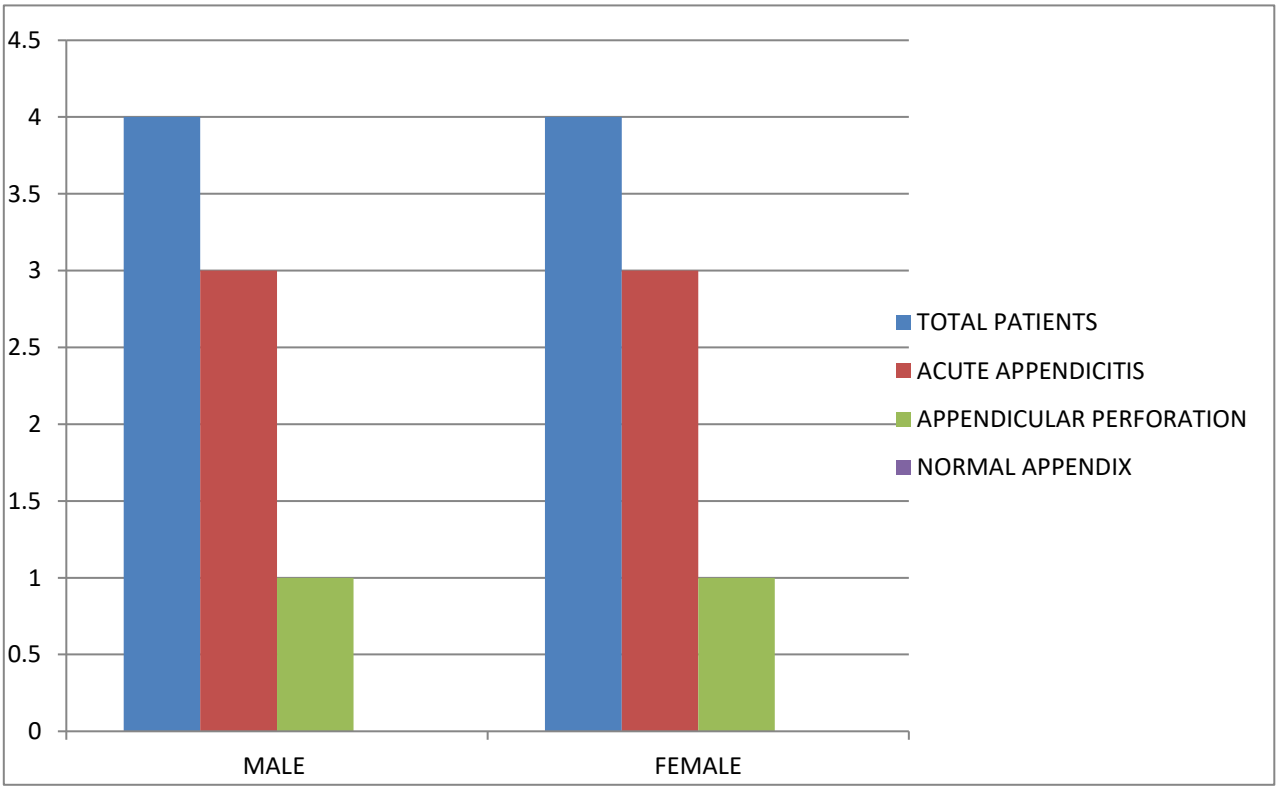
GROUP B	TOTAL PATIENTS	ACUTE APPENDICITIS	APPENDICULAR PERFORATION	NORMAL APPENDIX
MALE	9	4	2	3
FEMALE	8	4	1	3



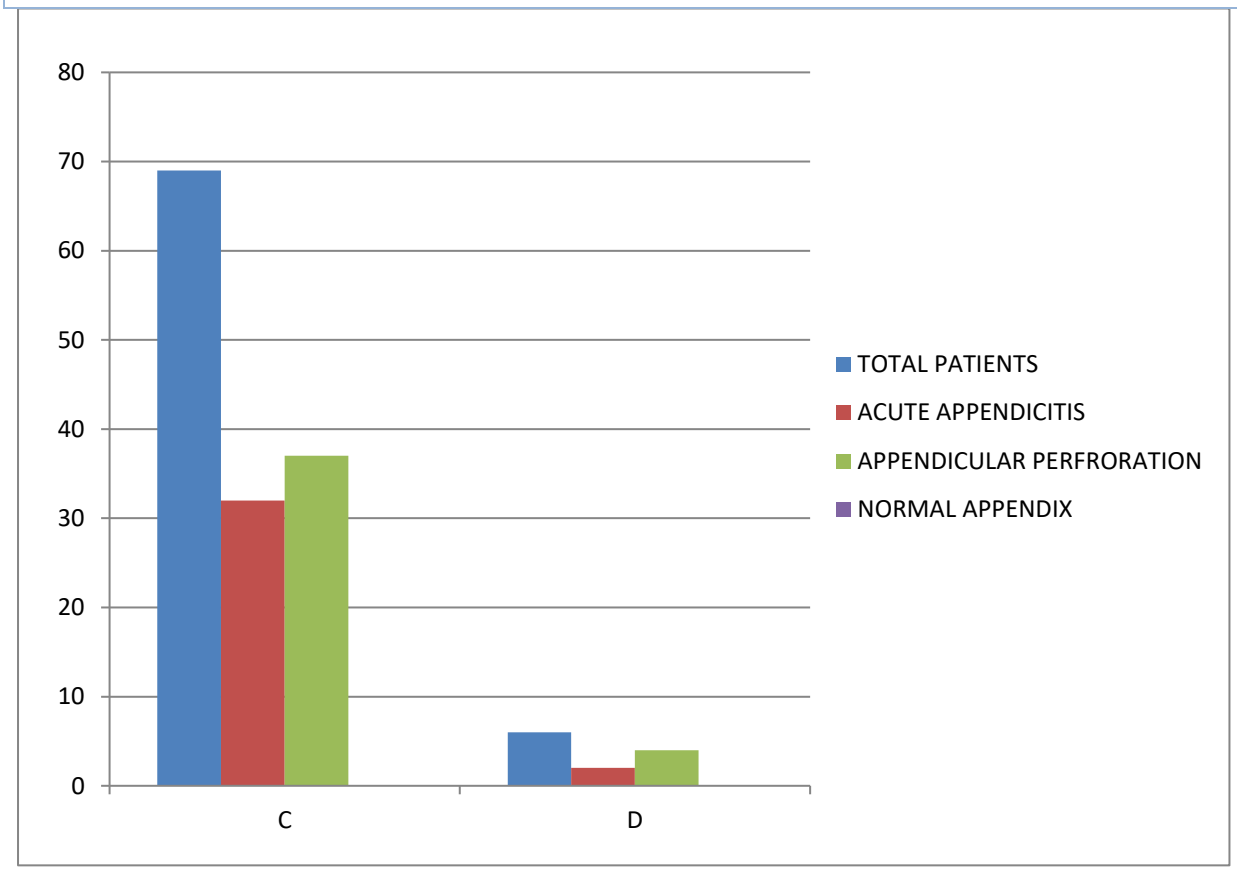
GROUP C	PATIENTS	ACUTE APPENDICITIS	APPENDICULAR PERFORATION	CONSERVATIVE
MALE	5	3	2	0
FEMALE	4	3	1	0



GROUP D	TOTAL PATIENTS	ACUTE APPENDICITIS	APPENDICULAR PERFORATION	NORMAL APPENDIX
MALE	4	3	1	0
FEMALE	4	3	1	0



GROUP	TOTAL PATIENTS	ACUTE APPENDICITIS	APPENDICULAR PERFRORATION	NORMAL APPENDIX
C	69	23	34	0
D	8	2	6	0



CHISQUARE

CALCULATION	C	D	SUM
TOTAL POSITIVE CASES			
	69	8	77
	58	8	66
SUM	127	16	143

OBSERVED	EXPECTED	(O-E)2	(O-E)2 /E
69	68.38	0.49	0.0071
8	8.61	0.37	0.04
58	58.61	0.37	0.006
8	7.38	0.38	0.051
			0.1041

		CRITICAL VALUE 3.841	
LOS = 5%			
DEGREE OF FREEDOM			
(R - 1)	(C-1)		
(2 - 1)	(2-1)		
1	1		
DOF = 1			

		BIOPSY	
	.	POSITIVE	NEGATIVE
	POSITIVE	66	11
RIPASA SCORE	NEGATIVE	6	17

TRUE POSITIVE	TRUE NEGATIVE	FALSE POSITIVE	FALSE NEGATIVE
66	6	11	17

POSITIVE PREDICTIVE VALUE = 85%

NEGATIVE PREDICTIVE VALUE = 73%

SENSITIVITY 91%

SPECIFICITY 60%

RESULTS

- M: F ratio was 1.12 : 1
- More number of patients were noticed in the age group of 21 – 30 yrs and less number in 51 – 60 yrs.
- Pain in right iliac fossa was mostly observed symptom and RIF tenderness was most common sign observed.
- RIPASA SCORE of <5 is observed in 6 patients, 5-7 in 17 patients , 7.5-11.5 in 69 patients , > 12 in 8 patients.
- 77 patients were operated with duty surgeons decision and out of which 26 patients had acute appendicitis and 38 patients had appendicular perforation and 12 had normal appendix on histopathologicalreport .
- Sensitivity of RIPASA score was about 91% and specificity is 60%
- Positive predictive value is 85 % and negative predictive value is 73 %.
- Negative appendectomy rate was about 11%

DISCUSSION

Acute appendicitis is most common surgical emergency with 8% incidence and seen in early adult life.. In this study, the highest incidence was observed in 21–30 years. Appendicitis was diagnosed with difficulty in the young females of reproductive age and in whom several gynecological conditions can resemble acute appendicitis . In this study of 100 (53males and 47 females) patients were noted with no higher variation in gender distribution.

In achieving diagnostic accuracy, if surgery is delayed, there are high chances of complications like appendicular perforation and sepsis with high mortality and in contrast with reduced diagnostic accuracy rate of negative appendectomy increases which is generally reported to be approximately 20–40% .

Diagnostic tool like ultrasonography, CT scan accuracy can be improved but availability and cost of these diagnostic tools are major burden to reach the poor people who are in rural and belongs to middle and low socio economic class which results in delay of diagnosis and surgery which drastically increase morbidity and use of CECT in high socio economic class population for the diagnosing may lead to early identification of low grade appendicitis and appendectomy that can be managed conservatively with antibiotics .

In this era, numerous scoring system are available to improve diagnostic accuracy in acute appendicitis. Alvarado and modified Alvarado are most popular for western population with reported sensitivity and specificity of both are 53 to 88% and 75 to 80%, respectively.

But above mentioned scores have shown low sensitivity and specificity when applied to Asian population. Recently, Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score has been developed for the diagnosis of acute appendicitis in the Asian population by CheeFui Chong, Department of Surgery in RIPAS Hospital Darussalam. Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score is a qualitative scoring system which is based on 14 parameters [two demographic, five clinical symptoms, five clinical signs, and two clinical investigations and one additional parameter FNRIC (Foreign National Registration Identity Card)] each parameter is scored individually with a maximum total score of 17.5.

In addition to history and physical examination, two laboratory investigations (urinary analysis, total leucocytes count) are included in RIPASA score, so patient can easily be assigned in high or low probability group on the basis of score and quick decision can be taken for surgery.

In this study, sensitivity of RIPASA score was 91 % and specificity is 60%. positive predictive value(PPV)is 85%, and negative predictive value (NPV) is 73 % . In this study , rate of negative appendectomy was 11% .

CONCLUSION

RIPASA score is a simple, safe , easy and non-invasive new diagnostic tool in diagnosing acute appendicitis especially in rural population who are in low and middle socioeconomic class where radiological diagnostic tools are not easily available .Also has higher sensitivity , specificity and diagnostic accuracy in comparing to alvardo and modified alvardo score.

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CONSENT FORM

சுய ஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு :

VALIDATION OF RIPASA SCORE AND ITS HISTOPATHOLOGICAL CORRELATION

ஆராய்ச்சி நிலையம் : பொது அறுவை சிகிச்சைத் துறை

பங்கு பெறுபவரின் பெயர் : வயது :

பங்கு பெறுபவரின் எண். :

பங்கு பெறுபவரது இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களைப் பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வின் தன்னிச்சையாகத்தான் பங்கேற்கிறேன். எந்தக் காரணத்தினாலோ எந்தக் கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக் கொள்ளலாம் என்று அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்மந்தமாகவோ, இதைச் சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும்போது இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளைப் பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான முடிவுகளையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும் அதைப் பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்குக் கூறப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன், இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத நோய்க்குறி தென்பட்டாலோ உடனே அதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் .....இடம் ..... தேதி
கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம் ..... தேதி

ஆய்வாளரின் பெயர் .....

PROFORMA

- **Patient Name :**
- **Age/ sex :**
- **Ip. No :**
- **SYMPTOMS : RIF pain -**

  Migratory pain-

  Anorexia-

  Nausea and vomiting-

  Duration of symptoms-

- **SIGNS : RIF tenderness –**

  Guarding-

  Rebound tenderness -

  Rovsings sign-

  Fever > 37’c < 39’c-

INVESTIGATIONS – total count -

urinalysis-

TOTAL SCORE -

TREATMENT PLAN –

HPE REPORT -

S NO	NAME	AGE	SEX	IP NO	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	TOTAL	GROUP	HPE CORRELATION
1	DILLIGANESH	18	M	11256		1	1		0.5		1	1		1	1		1		1	1			9.5	C	Acute Appendicitis
2	VIJAYALAKSHMI	24	F	11289	0.5		1		0.5		1	1		0.5	1	2	1		1	1			10.5	C	Appendicular perforation
3	ROHINI	45	F	11265	0.5			0.5	0.5		1	1	1		1		1	2	1				9.5	C	
4	NACHIYAMMAL	30	F	11302	0.5		1		0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
5	NEETHITHEVAN	18	M	11456		1	1		0.5			1	1		1		1			1			7.5	C	Appendicitis
6	SRIDHAR	24	M	11562		1			0.5	0.5	1			0.5	1	2	1		1	1			9.5	C	
7	GOWRI	50	F	11685	0.5			0.5	0.5	0.5	1	1		0.5	1	2	1	2	1	1			12.5	D	Appendicular perforation
8	SUNDARI	35	F	11789	0.5		1		0.5					0.5	1								3.5	A	
9	TAMILARASI	18	F	11865	0.5		1		0.5		1	1	1		1		1	2	1				10	C	Acute Appendicitis
10	SUMITHRA	18	F	11856	0.5		1		0.5				1		1						1		5	B	
11	ESHWAR	39	M	12015		1	1		0.5				1		1					1	1		6.5	B	
12	SHRYA	22	F	12245	0.5		1		0.5	0.5	0	1	1		1		1		1	1			8.5	C	Acute Appendicitis
13	GNANA KUMAR	17	M	12369		1	1		0.5		1	1	1		1		1		1	1			9.5	C	
14	SONA	21	F	12486	0.5		1		0.5				1		1								4	A	
15	RAMESH	28	M	12456		1	1		0.5				1		1						1		5.5	B	
16	KARTHICK	42	M	12458		1		0.5	0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
17	NANDHA KUMAR	21	M	12462		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			11.5	C	Appendicular perforation
18	MARIYAMMA	40	F	12432		1		0.5	0.5		1		1		1		1		1	1			8	B	Acute Appendicitis
19	HARINI	21	F	12822		1	1		0.5			1	1		1		1		1				7.5	C	Acute Appendicitis
20	SARANYA	21	F	12685	0.5		1		0.5	0.5	1	1		0.5	1	2	1	2	1	1			13	D	Appendicular perforation
21	RAMYA	58	F	12950		1		0.5	0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
22	SIVAKUMAR	20	M	12965		1	1		0.5		1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
23	HARISH	22	M	13015		1	1		0.5				1		1								4.5	A	
24	SHALIK AHAMED	35	M	13158		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			11.5	C	Appendicular perforation
25	MOHANA	19	F	13256		1	1		0.5		1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
26	SHANKAR	44	M	13365		1		0.5	0.5	0.5	1	1	1		1		1		1				8.5	C	
27	IMRAN	34	M	13456		1	1		0.5	0.5	1	1		0.5	1		1		1	1			9.5	C	Appendicular perforation
28	RITHIKA	22	F	13489	0.5		1		0.5				1		1								4	A	
29	MAHALAKSHMI	15	F	13600	0.5		1		0.5				1		1		1		1	1	1		8	B	Acute Appendicitis
30	PRIYA	23	F	13756		1	1		0.5				1		1								4.5	A	
31	AJITH	17	M	13895		1	1		0.5	0.5			1		1		1		1	1			8	C	
32	RAMESH	34	M	13962		1	1		0.5		1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
33	KEERTHANA	24	F	14125		1	1		0.5	0.5			1		1					1			6	B	
34	MOGESHWARI	16	F	14259	0.5		1		0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
35	NAGESH	52	M	14369		1		0.5	0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
36	SURYA	15	F	14486		1	1		0.5		1	1		0.5	1		1		1	1			9	C	
37	KEVIN	34	M	14589		1	1		0.5	0.5	1	1		0.5	1	2	1		1				10.5	C	Appendicular perforation
38	AJITH KUMAR	18	M	14621		1	1		0.5		1		1		1		1		1	1			8.5	C	
39	DHANYA	25	F	14796		1	1		0.5	0.5			1		1		1	2	1		1		10	C	Acute Appendicitis
40	BHARATHI	23	F	14862		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			11.5	C	Appendicular perforation
41	DHANUSH	25	M	14951		1	1		0.5		1	1		0.5	1	2	1		1				10	B	Appendicular perforation
42	MANI	40	M	14596		1		0.5	0.5				1		1								4	A	
43	CHANDRA	55	F	11589	0.5			0.5	0.5	0.5	1	1	1		1		1	2	1	1	1		12	D	Acute Appendicitis
44	AJAY KUMAR	15	M	15036		1	1		0.5	0.5		1	1		1		1		1	1			9	C	Acute Appendicitis
45	RAHAMAD ALI	29	M	15026		1	1		0.5				1		1		1		1	1			7.5	C	
46	JASMINE	19	F	15126	0.5		1		0.5	0.5	1	1	1		1		1		1	1			9.5	C	Acute Appendicitis
47	PRIYA	18	F	15269	0.5		1		0.5		1	1	1		1		1	2	1				10	C	Acute Appendicitis
48	YUVARAJ	24	M	15347		1	1		0.5	0.5	1	1		0.5	1	2	1		1				10.5	C	Appendicular perforation
49	VISHALI	21	F	15489		1	1		0.5	0.5		1	1		1		1		1				8	C	
50	UDHAYA	25	M	15569		1	1		0.5		1	1		0.5	1	2	1		1				10	C	Appendicular perforation
51	ASHWINI	18	F	15698	0.5		1		0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
52	DHINESH KUMAR	17	M	15689		1	1		0.5		1		1		1	2	1	2	1	1			12.5	D	Acute Appendicitis
53	ARUL KUMAR	25	M	15756		1	1		0.5		1	1		0.5	1	2	1						9	C	Appendicular perforation
54	RAJESHWARI	29	F	15896		1	1		0.5				1		1		1		1	1	1		8.5	C	
55	JEEVA	31	M	15862		1	1		0.5		1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
56	MADHAN KUMAR	15	M	15961		1	1		0.5	0.5	1	1		0.5	1	2	1			1			10.5	C	Appendicular perforation
57	SUBIKSHA	17	F	16011	0.5		1		0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
58	TOPULI	29	F	16158		1	1		0.5	0.5			1		1					1			6	B	
59	EZHUMALAI	27	M	16254		1	1		0.5		1	1		0.5	1	2	1	2	1	1			13	D	Appendicular perforation
60	PERIYASAMY	25	M	16387		1	1		0.5				1		1					1			5.5	B	
61	GOVINDHAN	45	M	16478		1		0.5	0.5	0.5	1		1		1		1		1				7.5	C	
62	ELAVARASI	18	F	16598		1	1		0.5	0.5	1	1		0.5	1		1		1	1			9.5	C	Appendicular perforation
63	PADMA	36	F	16632	0.5		1		0.5	0.5	1	1		0.5	1	2	1		1	1			9	C	Appendicular perforation
64	RUFUS KUMAR	31	M	16679		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			10	C	Appendicular perforation
65	RANJITH	27	M	16723		1	1		0.5					0.5	1	2	1	2	1	1	1		12	D	Appendicular perforation
66	PRABHAKARAN	28	M	16895		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			11.5	C	Appendicular perforation
67	TAMILARASI	32	F	16912	0.5		1		0.5	0.5			1		1		1		1	1			7.5	C	
68	GAJENDIRAN	32	M	16145		1	1		0.5		1	1		0.5	1	2	1		1				10	C	Appendicular perforation
69	MAYIL	27	F	16321		1	1		0.5	0.5	1	1		0.5	1		1		1	1			9.5	C	Appendicular perforation
70	ANNAMALAI	43	M	16315		1		0.5	0.5					0.5	1	2	1		1	1			8.5	C	Appendicular perforation
71	PREMA	18	F	16312		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			9	C	Appendicular perforation
72	KESAVAN	34	M	16536		1	1		0.5	0.5	1		1		1		1		1	1			9	C	Acute Appendicitis
73	SEETHA	37	F	16596	0.5		1		0.5		1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
74	DERAN	30	M	16659		1	1		0.5		1		1		1		1	2	1	1			10.5	C	Acute Appendicitis
75	PREETHI	27	F	16695	0.5		1		0.5	0.5		1		0.5	1	2	1	2		1			11	C	Appendicular perforation
76	JAISUNDAR	16	M	16852		1	1		0.5				1		1	2	1		1				8.5	C	Acute Appendicitis
77	DHARANIVASAN	24	M	16852		1	1		0.5	0.5			1		1		1		1	1			8	C	Acute Appendicitis
78	VIJAY	21	M	17012		1	1		0.5	1	1	1	1		1	2		2		1			12.5	D	acute Appendicitis
79	HARINI	27	F	17116	0.5		1		0.5	0.5	1	1		0.5	1	2	1		1	1			11	C	Appendicular perforation
80	SUMITHRA	34	F	17198		1	1		0.5	0.5			1		1								5	B	
81	RAJA	21	M	17285		1	1		0.5		1		1		1	2	1		1				9.5	C	Acute Appendicitis
82	SANGEETH KUMAF	32	M	17395		1	1		0.5	0.5	1	1		0.5	1	2	1		1	1			11.5	C	Appendicular perforation
83	DHARANI	25	F	17398		1	1		0.5		1		1		1		1	2	1	1			10.5	C	Acute Appendicitis
84	SANTOSH	24	M	17465		1	1		0.5	0.5			1		1		1		1	1			8	C	Acute Appendicitis
85	PHILIP JOHN	34	M	17589		1	1		0.5	0.5					1				1	1			6	B	
86	MUNIRAJ	43	M	17698		1		0.5	0.5				1		1		1		1	1			7	B	Acute Appendicitis
87	SASI	20	F	17782		1	1		0.5	0.5	1	1	1		1		1		1		1		10	C	Acute Appendicitis
88	ABDUL REHMAN	24	M	17832		1	1		0.5	0.5	1		1		1		1	2	1	1			11	C	Acute Appendicitis
89	LAKSHMI	22	F	17921	0.5		1		0.5		1	1	1		1	2	1		1	1			11	C	Acute Appendicitis
90	PARVATHI	40	F	17923	0.5			0.5	0.5	0.5	1	1		0.5	1	2	1		1	1			10.5	C	Appendicular perforation
91	GUNA SUNDARI	26	F	17982	0.5		1		0.5		1		1		1	2	1		1				9	C	Acute Appendicitis
92	SARATH	17	M	18021	0.5		1		0.5				1		1		1		1	1			7	B	Acute Appendicitis
93	SURESH	28	M	18156		1	1		0.5	0.5			1		1		1						6	B	
94	MUSAAM	15	F	18256	0.5		1		0.5	1	1	1	1		1	2		2		1			12	D	acute Appendicitis
95	BALAKUMAR	47	M	18365		1		0.5	0.5	0.5			1		1		1	2	1				8.5	C	Acute Appendicitis
96	KARTHIKA	31	F	18425	0.5		1		0.5				1		1		1		1	1			7	B	
97	DIVAKAR	35	M	18569		1	1		0.5	0.5	1		1		1	2	1		1	1			11	C	Acute Appendicitis
98	GANESH	19	M	18653		1	1		0.5				1		1		1		1				6.5	B	
99	VICKY	22	M	19007		1	1		0.5		1	1	1		1	2	1		1	1			11.5	C	Acute Appendicitis
100	BAVYA	26	F	19023		1	1		0.5				1		1				1	1			6.5	B	Acute Appendicitis

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