"A COMPARATIVE STUDY OF APPENDICITIS INFLAMMATORY RESPONSE SCORE AND TZANAKIS SCORE FOR DIAGNOSIS OF PATIENTS WITH ACUTE APPENDICITIS AT KLE DR. PRABHAKAR KORE HOSPITAL AND MEDICAL RESEARCH CENTRE, BELGAUM-A ONE YEAR PROSPECTIVE STUDY"

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ABSTRACT

Aim and Objectives:

Acute appendicitis still remains one of the most common abdominal emergency, demanding surgery. No perfect diagnostic evaluation tool exists to detect appendicitis if symptoms are ambiguous. Various scoring systems are being used to aid the diagnosis of acute appendicitis. Appendicitis Inflammatory Response Score and Tzanakis Score are the new diagnostic scoring system based on extensive yet simple parameters. The present study evaluated its accuracy in the diagnosis of acute appendicitis.

Methodology:

The Department of General Surgery at KLES Dr. Prabhakar Kore Hospital and Medical Research Centre in Belgaum performed From 1st January 2021 to 31st December 2021, 60 patients with right Iliac fossa pain were enrolled. The patients were assessed for all factors necessary to calculate the Appendicitis Inflammatory Response Score and Tzanakis Score. The scores were tallied and compared with final histopathology report. The study was conducted for a period of one year.

Results:

An almost equivocal gender ratio in incidence was found with peak incidence at 2nd to 3rd decade of life Appendicitis Inflammatory Response Score demonstrated a higher sensitivity and specificity compared to Tzanakis score (82.5% vs 75%) and (75% vs 40%) respectively. Appendicitis Inflammatory Response Score has a superior diagnostic accuracy (80% vs 63.33%).

Conclusions:

Appendicitis Inflammatory Response Score outperformed Tzanakis score . Such a scoring system based on simple clinical signs and easily available biomarkers is required for better and faster diagnosis, also to avoid negative appendectomies.

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INTRODUCTION

Acute appendicitis (AA) has established itself amongst one of the most prevalent pathologies to manifest as pain in the area around the right iliac fossa of the abdominal region, while simultaneously being a leading aetiology for an acute abdomen and accounting for 1% of all operative procedures [1,2].

With a lifetime risk of 8.6% and 6.7% in males and females respectively, only 12% of men and 25% of women would have underwent an appendectomy [3,4]. With an incidence highest amongst individuals aged 10 to 30 years with a gradual decline till it stabilises at approximately the demographical group of 50 years and above [5,6]. Recent statistic data reveals that an approximate of 250,000 cases of appendicitis is being diagnosed in the United States of America while also keeping Appendectomy as the most common performed surgery in an emergent scenario [7,8]. In the South East Asian Regions it has been shown with a more reduced incidence of appendicitis, which could be attributed by the regional dietary habits/rituals.

Establishing a diagnosis of AA has through the ages evolved with the aid of more sound understanding of the disease's etiopathology. Yet a Surgeon's clinical impression backed up by time tested, physical signs and presenting history, is still a deciding factor in initiating a management plan for acute appendicitis. As for the ambiguous presenting patients of acute appendicitis it most notably can mimic most if not all acute abdomen conditions / abdominal surgical emergencies [9].

Looking at the above scenario of AA, a surgeon is now placed "between a rock and a hard place". On one side due to delay in diagnosis there is a considerable risk of perforation leading to a increase in morbidity and loss of quality of life. While on the other side the justification of a high negative appendectomy rate of

approximately 10% - 15% with an emphasis on females of reproductive age having a high rate of approximately 26% cases with negative appendectomy [10].

Although today, there have been leaps and bound in the understanding of the pathophysiology of appendicitis, the most accurate modality for diagnosing acute appendicitis still remains to be a subject of debate for the medical fraternity. A plethora of complaints, demonstrable signs, radiological investigation modalities, specific and non specific bio markers are being utilised in the arsenal of a clinician to come to a diagnosis of acute appendicitis, with clinical examination being the keystone for coming to a diagnosis of acute appendicitis while having an overall accuracy of 70% to 87% 954% to 70% in children and 50%-70% in women in the reproductive age group [11,12]. With this in mind a surgeon is challenged on "Does this patient's malady commence from the appendix ? ".

A vast array of scoring systems has been formulated to quantify and diagnose acute appendicitis, like the Ohmann, Alvarado, Tzanakis score, Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score among the more well-known scores [13]. The formulation of Appendicitis Inflammatory Response (AIR) score contributes to diagnosis through associating easily applicable clinical criteria and two simple laboratory tests it is attributed the score which classifies the patients regarding the probability of diagnosis [14]. It uses the ALVARADO scoring system as a scaffold by also incorporating C- reactive protein, It was formulated by Andersson and Andersson in 2008[15]. Tzanakis et al. in 2005 proposes a new system for appendicitis utilises four factors and complete score of 15 for analysis of acute appendix. However on closer observation at the diagnostic strength of each scoring system, through its sensitivity and specificities, stark contrast in these values were observed if applied to a demographical cohort outside the intended group over which it was created [13].

The Appendicitis Inflammatory Response Score was developed with the specific goal of improving upon the Alvarado score by addressing the following issues:

a. The Appendicitis Inflammatory Response Score was developed with the explicit goal of correcting the deficiencies of the Alvarado score ie) a. Its development was based on a retrospective examination of patients who had been operated on with suspicion of appendicitis.

b. It is not known if each variable is statistically and independently related to acute appendicitis and legitimate as an inflammatory response variable.

c. The score does not include C-reactive protein (CRP) as a variable, despite several studies demonstrating its usefulness in assessing appendicitis patients.[15,16].

The AIR scoring system takes into account a number of different indicators, such as clinical characteristics, hematological and biochemical markers (such CRP), and others. While Tzanakis Score being highly reliant on USG findings reduces its objectiveness However, due to the fact that AIR is a relatively new scoring system, not a great deal of study has been conducted to test its accuracy in the evaluation of acute appendicitis specially among the Indian population. To help speed up the process of making a correct diagnosis of acute appendicitis, the current research set out to assess the reliability of the AIR scoring system.

OBJECTIVES

The purpose of this study is to evaluate the diagnostic strength of the Appendicitis Inflammatory Response Score with the Tzanakis Score in assessing suspected cases of Acute Appendicitis.

OBJECTIVES:

- To calculate the sensitivity and specificity of Appendicitis Inflammatory Response Score and Tzanakis Score.
- To compare accuracy of each score with Histopathological examination.
- To assess the diagnostic power of each component of both scoring systems.
- To compare the accuracy of both scoring system amongst each other.

REVIEW OF LITERATURE

The inflammation of the vermiform appendix has synonymously been accredited as Appendicitis. The appellation of any part or object added at the end is designated as appendix more over any object resembling a worm has been denoted as Vermiform. A human's Vermiform Appendix is a blind hollow trough bearing these histological layers: mucosa, submucosa, muscularis and serosa. This fascinating structure has been demonstrated appart from humans in a few anthropoid apes and the wombat.[17]

HISTORICAL OVERVIEW:

The history of appendicitis could probably as old a civilisation with Byzantine era mummies having adhesions in their right lower abdomen. Berengario DaCarpi of Pavia and Bologna was the first to describe "additmentum" of the caecum, ie)the vermiform appendix in 1521.[18] Although distinct illustrations of Leonardo Da Vinci made in 1492 does show the presence of the appendix (Fig.1). Andreas Vesalius's work- "De Humani Corporis Fabrica" though not describing the entity, it does show well crafted drawings of the human appendix[19] (Fig. 2) yet it had no work in resolving the debate of its period between caecum and appendix. Several autopsies by the likes of John Hunter in 1767, John Parkinsons in 1812, Louyer-Villermay in 1824 have shed light on this entity of 'gangrenous appendices'.[20,21] Treves in 1888 mentions of the possibility of varying positions of the appendix, each position resembling that of a clock face.[22] A momentous event for Appendicitis comes on June 18th 1886 when at the Association of American Physicians at Washington DC, Dr. Reginald H. Fitz read his paper entitled 'Perforating Inflammation of the Vermiform Appendix' which for the first time used the moniker 'APPENDICITIS' a Latin stemmed word with a Greek suffix[19] (Pic. 1).

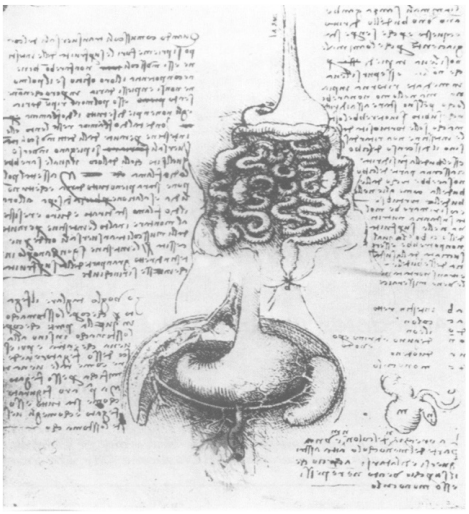


Fig.1: Leonardo Da Vinci's Illustration of Human Alimentary Tract showing the Appendix.

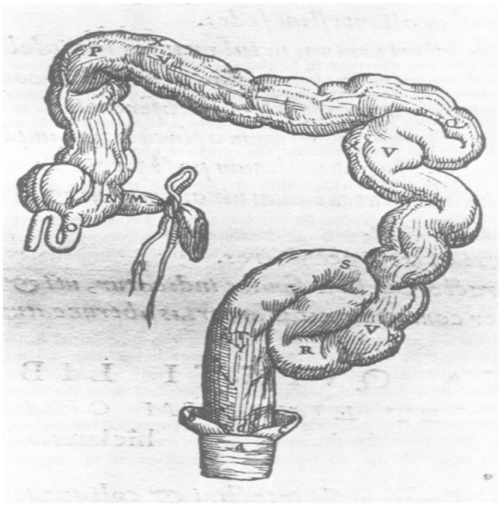
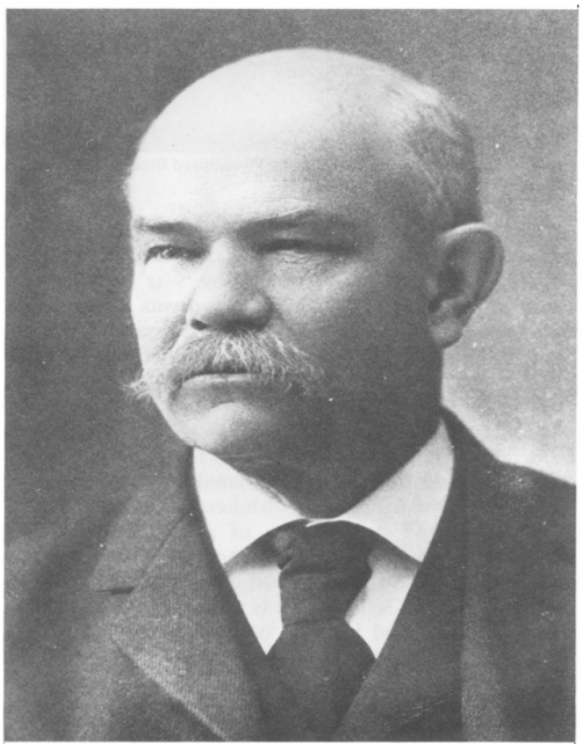


Fig.2: Vermiform Appendix as Representated in "De Humani Corporis Fabrica" by Andreas Vesalius.

Hippocrates's aphorism "Suppuration upon a protracted pain of the parts abouth the bowel is bad" has led many physicians and surgeons to believe that he spoke on appendiceal abscess, Peter Lowe in. 1612 is quoted saying "Hippocrates did die of this disease" in the Lonicerius [23]



Picture 1: Portrait of Dr. Reginald Heber Fitz.

When looked back, the first known surgical procedure for an appendix as per Richardson RG's accounts in 'The Surgeons Tale' was carried out on December 1735 by Claudius Amyand on a 11 year old boy who presented with a long standing scrotal hernia and faecal fistula of the thigh.[24] Abraham Groves of Fergus, Ontario in 1883 is credited to have performed the first elective appendectomy on a 12 year old boy (Pic. 2).

Picture 2: Abraham Groves of Fergus, Ontario.

Probably the greatest contributor or shall it be called the avant – gardist of appendicitis would none other be 'Dr. Charles McBurney of New York. In 1889 his work in the New York Medical Journal describe a point of maximum tenderness when examined with ones fingertips at a site on the right lower abdomen, one half to two inches inside to the right anterior spinous process of the ileum onto a line joining the spinous process and the umbilicus[25], gaining its namesake 'McBurney's Point / McBurney's Tenderness'. He subsequently released a paper on descriptions of the operative procedure that bears his name in 1894 prior to Dr. Lewis L McArthur of Chicago on a similar 'Muscle splitting incision', McBurney did concede priority to

McArthur both in a letter and publicly, still the use of 'McBurney's incision' has continued[26].

In 1905 the classic triad of Appendicitis was describes as a sequence of pain followed by nausea and vomiting which finally led to the onset of fever. This triad is commonly referred by its author as Murphy's triad.[27]

ANATOMY OF APPENDIX:

Embryology: It is from the Post Arterial segment of Mid- Gut that our Caecum and Vermiform Appendix get developed or one can say as an under-developed end of the caecum during the 6th week of intra uterine life (Fig 3). both the caecum and appendix arise from a primordial bud known as the 'Caecal Bud' with its distal part persisting to being narrow to be known for the rest of its life a 'Appendix'. An interesting fate of the position of the appendix, which is postulated to be governed by the rate of growth of the sides of caecal bud. Most commonly it's the lateral wall that outgrows the medial wall, to give the appendix its classical posteromedial relation to the caecum.[28]. Due to the fusion of the mesenteries to the abdominal wall, duodenum, ascending colon and descending colon become retroperitoneal, while the small bowel, transverse colon, sigmoid colon and the appendix remain free. [29]

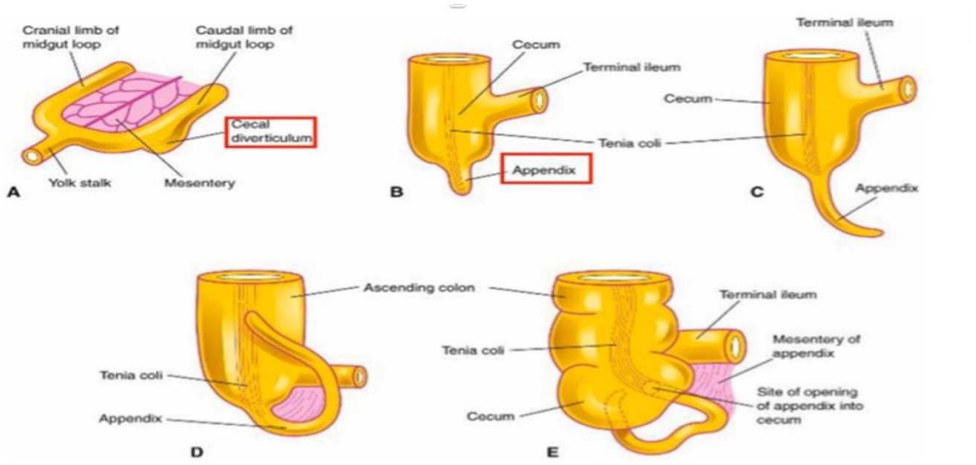


Fig. 3: Development of Vermiform Appendix and Rotation of Gut in Intrauterine Life.

Congenital variations: A bizarre report by Tinkler in 1968 of his appendectomy on a Chinese male child of 12 months age to have "Triple Appendix", with other various congenital variations. The appendix can remain in the 'subhepatic' position due to failure in downward descent of the caecum. during malrotation of gut (non/incomplete) appendix can be found on the left side of lower abdomen (Fig. 4).

Wall Bridge in 1962 is credited for classifying duplication of Appendix as (Fig. 5)-

Type A- one caecum and one appendix having partial duplication only.

Type B-1 – single caecum with bud like 2 appendices that are symmetrically placed on either side of ileo caecal valve

Type B-2 – single caecum with 'taenia colic 'type, ie) one from normal site and other from the caecum above lining of taenia at varying distance from the first.

Type C- double caecum each bears an appendix.

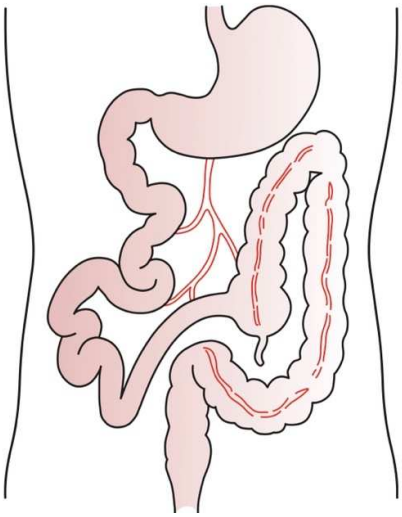


Fig 4: Position of Appendix during Non-Rotation of Gut

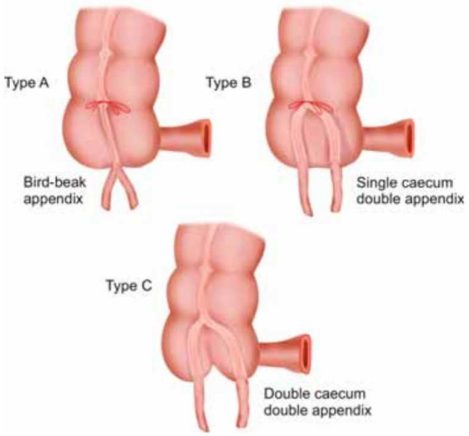


Fig 5: Duplication of Appendix - Types

Gross Anatomy: The Appendix is situated within the abdominal cavity as an intra-peritoneal structure consisting of a blind ending hollow, tubular structure that arises from the caecum more adjacent to the ileo-caecal junction. It is surgically identified at the convergence of three 'Taeniae Coli' over the caecum.[30] It is characterised having a narrow, worm-shaped, blind ending tube arising at the Posteromedial side of the caecum at just 2cm below the ileocecal junction. This fascinating origin with having variable growth rates the appendix can present as (Fig. 6)-

- Retrocaecal/ retro colic, behind the caecum or lower ascending colon (65%)
- Pelvic / Descending, hanging dependently over the pelvic brim in close relation to right salpinx and ovary (31%)
- Sub caecal, below the caecum in 2% cases. [31]
- Other less common positions include those, Pre/Post illeal.[30]

Appendix normally has an outer diameter of 3-8 mm with its lumen having a diameter ranging from 1-3 mm, its average length measuring 9cm[1] though variations hail from 2-20cmit is seen that the appendix is relatively longer in children and may atrophy and shorten as one's age progresses. [32]

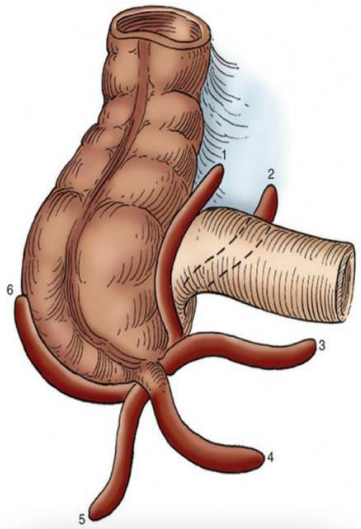


Fig. 6 – Variable Positions of Vermiform Appendix.

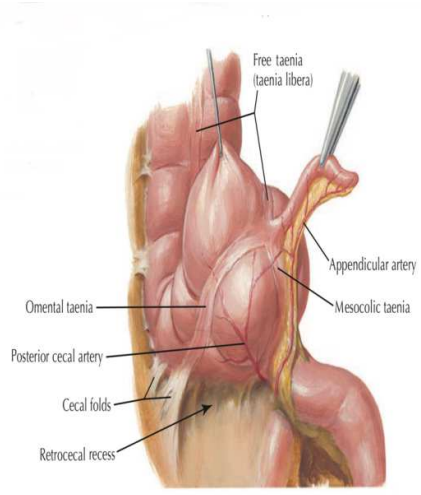


Fig. 7 – Gross Appearance of Mesoappendix Housing Appendicular Artery.

The Mesoappendix a highly variable structure both in origin and shape is usually triangular in shape while encompassing the whole viscous of appendix and extending almost till its tip [33] (Fig 7). Its relevance comes due to the fact that it houses all the arterial and venous supply of the appendix and occasionally a lymph node. Luminal surface of Appendix is uneven while being covered in its entire length by longitudinal folds of mucous membrane, opening into the caecum at a point slightly posterior to the ileocecal opening (Fig. 8), it is seldom guarded by a valve that is semilunar and formed by a mucosal fold of the caecum (Pic. 3)

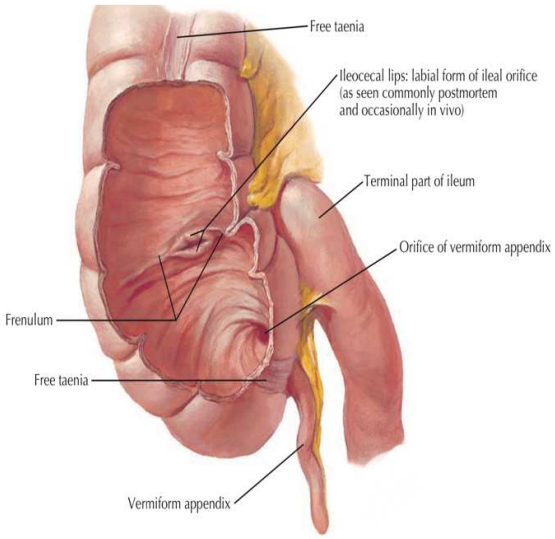
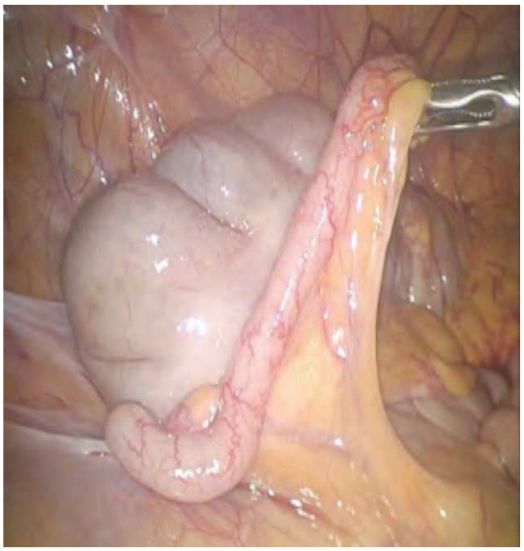


Fig. 8 – Valve of Gerlach (Internal View)



Pic. 3 – Laparoscopic View of Normal Appendix.

Arterial Supply (Fig. 9): its main supply is from the 'Appendicular Artery'. It being a branch of the ileocolic artery's lower division. The artery most commonly runs behind the terminal ileum to pierce the mesoappendix and lay within it at a site near to the base of appendix. Few branches offshoot from this artery, most notably the recurrent branch, this artery anastomoses with a branch of the posterior caecal artery. The main vessel approaches the tip of appendix. Cases have been reported of the presence of multiple arteries supplying the appendix[33]. 'Sheshachalam's artery' a branch of posterior caecal artery is also noteworthy while mentioning accessory blood supply of the appendix.

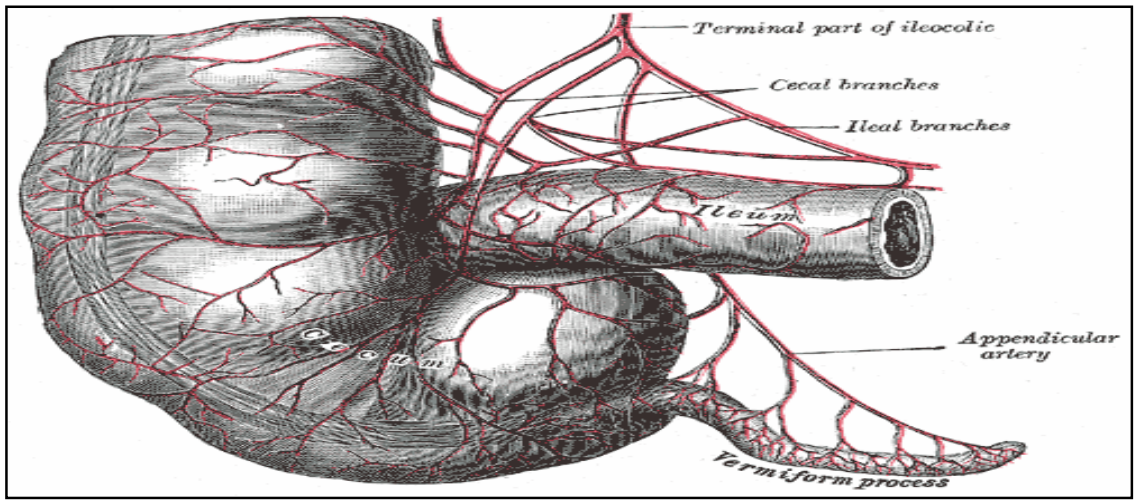


Fig. 9 – Arterial Blood Supply of The Human Vermiform Appendix.

Venous Supply: this is carried out by one, sometimes several appendicular veins situated within the mesoappendix to drain into the posterior caecal or ileocolic vein to be then drained into 'superior mesenteric vein' [30,33].

Lymphatic supply: A vast plexus of lymphatics drain a human appendix due to its characteristic feature of housing numerous lymphoid follicles in its tissue wall. Approximately 8-15 vessels ascend withing the mesoappendix to dain the appendix

and are usually intercepted by one or more lymph nodes. These converge to finally drain into the 'inferior and superior' nodes of the 'ileocolic chain' [34].

Innervation: Both the visceral peritoneum and appendix are supplied by nerves of the superior mesenteric plexus. The visceral afferent that have to carry sensation of distention and pressure play a key role in mediating *'PAIN'* during initial stages of appendicitis. In accordance with its origin from midgut, this pain initially is poorly described around 'umbilicus'. Only when parietal and adjacent tissue to appendix get involved due to spread of inflammatory process from the appendix, shall pain be at right iliac fossa, due to stimulation of somatic nociceptors [30,33].

Caecal Recesses: Formed by peritoneal folds around the caecum, these sites act of great clinical importance due to its potential in harbouring an abscess. Few surgically important recesses to bear in mind are (Fig 10)-

a. Superior ileocecal recess- most found and well developed in children. Bounding its opening are the ileal mesentery posteriorly, terminal ileum below, on its right by ileocecal junction and in front by a vascular fold

b. Inferior ileocaecal recess- well marked in young individuals but can be obliterated in obese individuals due to fat. Formed by the ileocecal fold it gets its moniker 'Bloodless Fold of Treves'. Being a misnomer as occasionally blood vessels do run here, it also is often mistaken for mesoappendix due to retrocecal appendix.

c. Retrocaecal recess- lying behind the caecum it remains quite large, capable of permitting a whole finger behind the ascending colon. the appendix occupies this recess in its retrocecal position

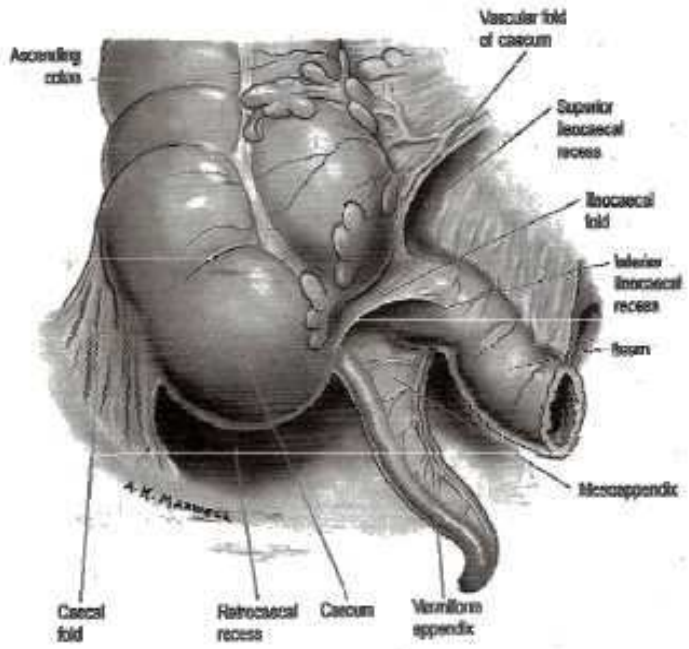


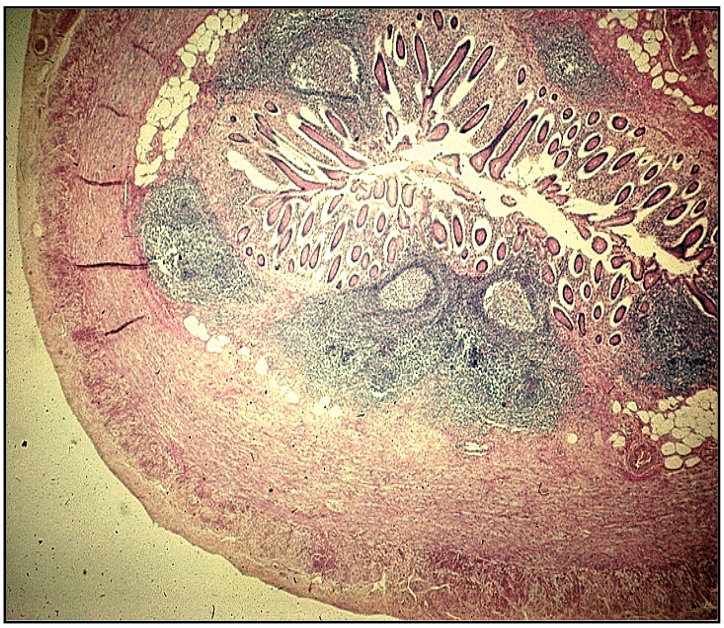
Fig. 10: Caecal Recesses and its Relation to Vermiform Appendix.

Histology[35] *(Pic. 4):* On microscopic examination the appendix, just like its counterpart 'Large intestine' consists of four layers.

- Mucosal: Having its luminal surface lined by columnar epithelium and M cells over the lymphoid tissue, the mucosa of appendix is formed. Crypts are scantily found and those that do penetrate deep into lymphoid tissue of mucosal lamina propria.
- Sub-Mucosa: Typically containing large lymphoid follicles that obscure the muscularis mucosa layer. These also cause the mucosa to bulge irregularly into the lumen. These aggregates of lymphoid tissue are considered as part of the 'Mucosal Associated Lymphoid Tissue' (MALT). Being absent at birth and almost maturing by the age of 10 years, in a normal adult there is loss of the layered structure of appendix and these lymphoid aggregates are replaced by collagen tissue. In elderly this is again replaced by fibrous tissue.
- Muscularis Externa: Consisting of an outer and inner smooth muscle layer that is

longitudinal and circular respectively. At its base the longitudinal muscle thickens to continue with the Taenia coli of the caecum. Between each taenia the longitudinal muscle is thinner, less than half in thickness to the circular muscle.

- Serosa: Covering almost in its entirety of the appendix, except at the mesenteric border.



Pic.4: Histological appearance of Vermiform Appendix.

PHYSIOLOGY OF APPENDIX:

While the function of our appendix still eludes most students of the disease, several proposals have been put forwards regarding the appendix's function. Most notably that the 'Human Appendix' is a vestigial organ. Recent advances have recognized its role in production of IgA, IgM, IgG types of immunoglobulins granting it a part of the gut – associated lymphoid tissue [10]. While others have theorized that it is an organ the immune system's sensory- perception organ, prior to more sophisticated systems being evolved [36]. These speculations have been put forward due to the location of the appendix near the ileo-cecal valve and the presence of lymphoid tissue within it. Due to its well-developed vascularity and abundant

lymphatic presence, the appendix has recently been put to use in a few modalities, ie) its role as a conduit for permanent continent urinary diversion and its role in on table lavage of large dowel [30].

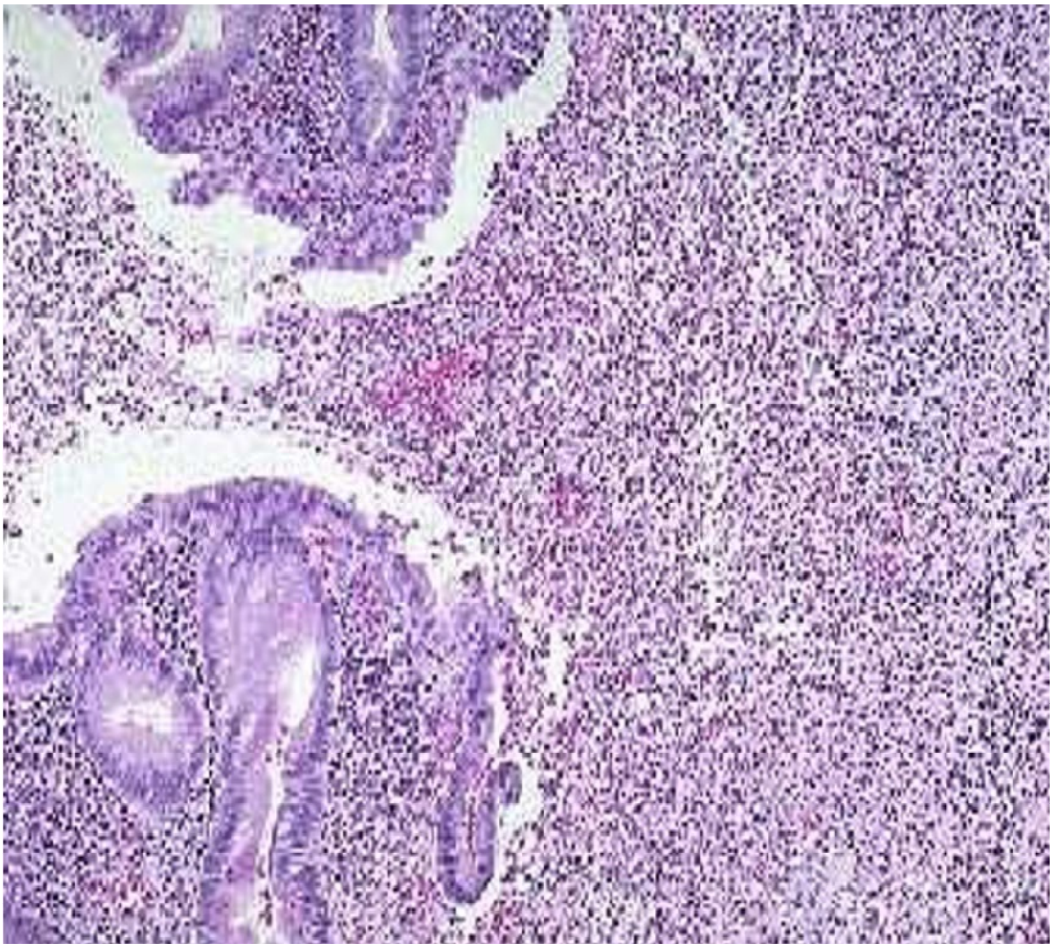
EPIDEMIOLOGY OF APPENDICITIS:

AA being one of the most stereotyped surgical emergencies, in light of statistical data hinting at approximately 7 percent of the population to have appendicitis in their lifetime, with its peak incidence ages of 10 to 30 years of age [37]. Its incidence taking a considerable step at approximately 11 cases per 10,000 population annually and a figure of 16% of population undergoing appendectomy [38]. Being most common, it is estimated at around 250,000 cases being reported in The United States alone and 40,000 patients in England in each year to come [39,40]. On closer analysis of all the available epidemiological and demographic reports on appendicitis, no common consensus regarding incidence based on age, sex, genetic race, socioeconomic strata, dietary habits and seasonal variance [41- 44]. This disease shows a slight propensity toward male with a ratio of 1.4:1 between men and women respectively, it afflicts most frequent between the second to fifth decade of one's life having a mean age of 31.3 years and a median age of 22 years [45]. In 2008 reports claimed that California, USA was burdened with the incidence of appendicitis at 137.5 cases per 100.000 population in Caucasian males while this was more for Hispanics at in 162.7 cases, including 98.0 cases among the Asian communities and 70.7 cases attributed to blacks. The same was true in female patients [46]. Regarding admission due to acute appendicitis one peculiar trend due to seasonal variation having highest in summer and lowest in winter, has been noticed [47]. Even with limited data on epidemiological trends of appendicitis in India, a similar picture of highest incidence between 11-20 years of age, males and females being afflicted

almost equally and more cases among non–vegetarians has been reported by Lohar HP et. al in 2014 [48].

AETIOLOGY AND PATHOPHYSIOLOGY:

Though a common consensus for a single etiology of appendicitis is not yet achieved, several conditions, ie) fecoliths (most common) or lymphoid hyperplasia (Pic 5) or edema followed by secondary bacterial invasion, causes eventually the obliterations of appendiceal lumen and progressing to congestion and gangrenous changes prior to perforation[49].

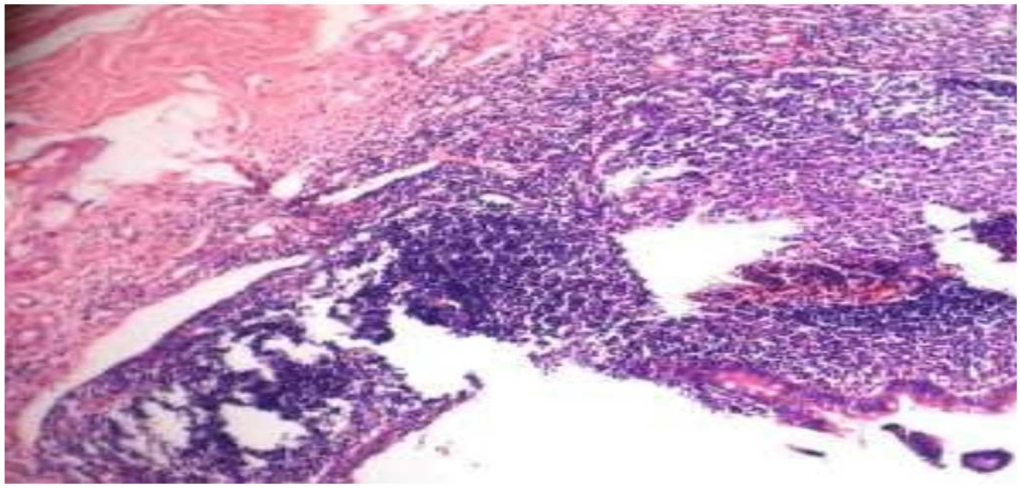


Pic. 5: Histopathological Appearance of Acute Appendicitis with dense Neutrophil Infiltrates.

Speculations/ Hypothesis have been many at times proposed, yet these have only to been recognized as contributary factors. Most notably, reduced intake of dietary fiber, increased consumption of refined carbohydrates, special mention regarding helminthic infestations such as Oxyuris vermicularis (synonym: pinworm) [50] Being the inflammation of appendix, two contrasting forms of pathogenesis have been explained:

- *Obstructive Appendicitis-* due to any cause of luminal obstruction, may it be from the more common cause of fecal stasis to the more rare such as foreign body or neoplasia, is followed by an unopposed secretion of mucin within the appendix, resulting in an increase in luminal pressure also growth of pathogenic microorganisms within these secretions leading to an inevitable reduction in venous flow followed by arterial occlusion. These mentioned environments promote necrosis and bacterial translocation into the appendiceal walls to form the titular gangrenous appendicitis[33]. In a lack of timely intervention these appendices will rupture to turn into abscesses, leading to localized leading to generalized peritonitis [51].
- *Catarrhal Appendicitis:* an ailment confined only to the mucosal layer of the appendix. This is a milder version of an attack of appendicitis having a much lower incidence of perforation thus lower complication rates. It is postulated towards an infective agent possibly viral in origin to be the cause of such an appendicitis[52]. During its initial development the appendix would appear normal or hyperemic, yet its mucosa is thickened and edematous. On progression patchy ulcers over the mucosal surface start to ulcerate (Pic. 6) causing the appendix to swell and have its serosa become roughly coated with exudative collection. In most instances this form of appendicitis resolves spontaneously and rarely enters

into gangrenous transformation. One must still bare head to the fact that repeated such episodes may form strictures, kinks on the appendix which can precipitate into obstructive appendicitis [50,51].



Pic. 6: Microscopic Appearance of Ulcerated Mucosal Layer of Appendicitis during Acute Appendicitis.

BACTERIOLOGY OF APPENDICITIS:

In a non-inflamed appendix the microbial environment resembles that of its colon hosting a vast array of facultative aerobic and anaerobic organisms. Hence *E.coli* being the most common aerobic organism and *Bacteroides fragilis* being the most common anaerobe. Other culpable organisms being *Klebsiella spp., Proteus spp., Clostridium perfringes, Streptococcus faecalis*[33]. One must take note that in obtaining positive cultures from peritoneal cavity, stage of the appendicitis is a key factor ie) approximately 85% of positive cultures are obtained in perforated appendicitis while fewer than half turns positive in non-perforated appendicitis [52].

But on daily practice, the use of routine use of peritoneal culture is of limited value due to its duration in obtaining results and a well grounded knowledge pre existing

regarding culpable organisms in any hollow viscous perforation, but most importantly it plays no role in changing the course of management for perforated appendicitis [33].

SYMPTOMATOLOGY:

From the ages of McBurney and Murphy acute appendicitis has been a diagnosis based on clinical examination and interpretations. Some the most noteworthy complaints associated with acute appendicitis include;

- *Abdomen Pain –* Almost the universal symptom of appendicitis, it classically arises from around the umbilicus with a dull aching character that is poorly localized by the patient. It can also arise from the lower epigastrium. Within half a day this pain shall be more classically oriented towards the right lower quadrant, more specifically at the 'right iliac fossa'. The primary site of the discomfort always fluctuates depending on the appendix's anatomical special orientation. This being best seen in retrocecal appendix presenting with a more localized pain in the right flank. In patients with malrotation of gut the pain shall now be more affiliated with the left side.
- *Anorexia –* This is another classic presentation for appendicitis that its absence must question the clinician on the presence of the ailment. It commonly follows pain , this lineage has a sensitivity of 84% and specificity of 66% [53].
- *Nausea -* In 90% of people with appendicitis, it is present, at least to some extent. Children and teens can vomit in a variety of ways, but it usually happens when pain first arises, this is associated with a 58-68% sensitivity and a low specificity of 37-40%[39]. The clinician is thrown a curve ball if nausea precedes pain
- *Constipation / Diarrhea -* As the appendicitis worsens, paralytic ileus might set in, which would cause constipation or at the very least, reduced bowel movements than usual. Apart from those individuals with postileal appendix and missed

appendicitis, diarrhea in contrary is not a prevalent component. Compared to adult patients, children may experience diarrhea more frequently[54]. On a more progressed disease diarrhea return due to local irritation of the caecum from an inflamed appendix or its evolution into a pelvic abscess, this diarrhea is characteristically mucoid, persistent and tenesmus would make it easy to misinterpret for gastroenteritis.

PHYSICAL SIGNS:

Only through a well systematic and comprehensive clinical examination of the patient from head to toe can at times the diagnosis of appendicitis be made with the highest certainty. These include;

- *Fever* - Increased temperature is infrequent with simple appendicitis, but appendicitis itself can induce a state of pyrexia. Elevated temperatures are typically limited to 90 or 100 ^{o}F (39 ^{o}C). Even in cases of severe appendicitis, the temperature is frequently normal. Temperature may rise rapidly in the event of generalized peritonitis following appendix rupture.
- *Pulse* - In most cases, the pulse rate is normal or slightly raised. Having a high pulse rate should make the clinician suspect alternate pathological process. But patient's temperature has a direct relationship to the patient's pulse rate. If peritonitis spreads after a rupture, the heart rate might increase to 100 beats per minute.
- A clinician will notice that these patients appear apprehensive and anxious, early signs of dehydration would have already set in and on extremely sharp observation a subtle limitation on inspiration can be noted.

Perhaps the most historic aspect of appendicitis would be in its named palpatory signs, mostly relating towards the variations in the intra-abdominal position of the appendix. This pain being produced due to an inflamed visceral peritoneum and its hollow viscera. A few of the renowned signs include:

- *McBurney's Point –* In the right lower quadrant, at or near the junction of proximal 2/3rd and distal 1/3rd, a systemic gentle palpation will reveal a region of maximum tenderness that corresponds to the location of the appendix [55].
- *Guarding and Rigidity* - Guarding from palpation or resistance to it generally correlates with the intensity of the inflammatory process. Early on in the illness, voluntary guarding makes up the majority of resistance, should it last. Voluntary muscle guarding rises with peritoneal irritation and is finally replaced by reflex involuntary stiffness. One must make an effort to distinguish between voluntary guarding and involuntary stiffness. As with voluntary guarding, involuntary stiffness does not loosen up upon expiration of air [55].
- *Hyperesthesia* - Lightly touching the skin of the right and left sides of the abdomen might reveal cutaneous hyperesthesia. Over Sherren's triangle (bounded by the anterior superior iliac spine laterally, the symphysis pubis inferiorly, and the umbilicus medially) hyperesthesia is seen in acute appendicitis This is often painful and not a very dependable indicator.
- *Rovsing's sign* - Pain in the right iliac fossa is complained of when deep pressure is put on the left iliac fossa. When present, it is also known as "referred rebound tenderness," and it is very useful in confirming the diagnosis (sensitivity 68%, specificity 58%). This sign's likely cause is the retrograde displacement of intestinal gas, which impacts the base of the inflamed appendix [57,53].
- *Psoas test* - The patient is made to lay on his left side when this test is conducted.

The examiner then gradually stretches the patient's right thigh, extending the iliopsoas muscle. To declare the test positive, there will be discomfort that worsens on stretching. This demonstrated the existence of an irritable, inflamed appendix adjacent to the psoas muscle. In retrocecal appendicitis, this is conceivable (sensitivity 16%, specificity 95%) [53].

- *McBurney's sign* - When the patient is asked to indicate the location of their discomfort, it often aligns with the McBurney's point, which is the intersection of the lateral third and medial two thirds of the spino-umbilical line [53].
- *Dunphy's sign* - It is observed that a patient has right lower quadrant pain when they cough loudly and hold their abdomen at the right lower region while doing so or refuse to cough due to pain.
- *Blumberg's sign (Release sign)* – It is the presence of immense pain on release of deep pressure being applied on the right iliac fossa, suggesting a localized peritonitis.
- *Cope's obturator test* - As the appendix lays above the obturator internus muscle, flexion and internal rotation of the hip in a case appendicitis will cause discomfort.
- *Baldwin's sign* - The right lower limb of the patient is instructed to be raised while the knee is extended with a hand placed over the right flank. This causes discomfort in retrocaecal appendicitis.
- *Ligat's sign* - Gangrenous appendicitis is sometimes accompanied by hyperesthesia in Sherren's triangle (bound by the lines connecting the umbilicus, right anterior superior iliac spine, and symphysis pubis).

In the event of early appendicitis, light percussion on Mc Burney's point will cause discomfort. An abdominal auscultation will demonstrate little or no bowel movement on the right iliac fossa ie) Abdomen remains completely silent having no bowel sounds audible while peritonitis develops proceeding appendix rupture.

The accuracy (likelihood ratio) of the history and physical examination in the diagnosis of appendicitis in adults and children is as shown below (Table 1) [56].

Table 1: Likelihood ratio of symptoms and signs.

Clinical finding	**Adults**	**Children**
Right lower quadrant pain	8.4	–
Migration (periumbilical to right lower quadrant)	3.6	1.9–3.1
Initial clinical impression of the surgeon	3.5	3.0–9.0
Psoas sign	3.2	2.5
Fever	3.2	3.4
Pain before vomiting	2.7	–
Rebound tenderness	2	3
Rectal tenderness	–	2.3

SPECIAL CONSIDERATIONS WITH REGARD TO POSITION:

- *Retrocecal* - Due to the caecum's tendency of being gas-filled and distended, which prevents the hand's pressure from reaching the inflamed appendix while also producing an uncommon gurgling, rigidity is frequently missed (a silent appendix) and even on deep pressure discomfort may be lacking. But the loin frequently exhibits severe soreness, and the quadrates lumborum remains stiff.

Hip flexion and aches could result from psoas spasm, which is brought on by the inflamed appendix coming into touch with the muscle.

- *Pelvic -* The rectum and an infected appendix can occasionally come within close proximity, causing early diarrhoea. Abdominal stiffness is typically completely absent when the appendix is wholly within the pelvis, and Mc Burney's point discomfort is frequently absent as well. Interestingly an examiner can elicit just above and to the right of the symphysis pubis, in certain cases an intense soreness. In all scenarios, a rectal examination reveals discomfort, especially on the right side (located within the rectovesical pouch or Pouch of Douglas). The presence of psoas spasm is also possible while the appendix is in this position; another structure being involved would be the obturator internus going into spasm when the hip is flexed and internally rotated, thus causing pain at the hypogastric region of the abdomen. Increased frequency of micturition can also be an accompanying symptom, being associate with an acutely inflamed appendix irritating the urinary bladder.
- *Post Ileal -* Despite being an uncommon position, this is the cause of some "missing appendix" instances. The pain may not change, diarrhoea may be present, severe retching may occur, and any form of tenderness could be elicited. If any, there can be a poorly localised ache present exactly next to the umbilicus. Typically, the patient produces scanty, loose stools shortly after eating or drinking because of the appendix irritating the lower ileum.
- *Subhepatic/Maldescended –* A sharp pain on palpation can be demonstrated at the right hypochondriac region, causing doubt and altering the diagnosis toward a gall bladder pathology.

SPECIAL CONSIDERATIONS WITH REGARD TO PROGRESSION OF AGE:

- *Infants -* In fact, when acute appendicitis strikes within the first year of life, only 50% of the patients survive to see their first birthday. In babies under 36 months of age, the frequency of perforation is over 80%, and the mortality is significantly greater than the overall mortality. The greater omentum, being relatively short and underdeveloped, hence is unable to help much in localising the infection, which contributes to the diffuse peritonitis' in developing rapidly. The challenge of making an early diagnosis, particularly in separating the illness from enteritis, is even more significant. Acute appendicitis can exacerbate enteritis. Additionally, an exanthem or an acute respiratory infection may coexist with acute appendicitis.
- *Children –* Pre schoolers are usually underdiagnosed due to their inability in presenting n accountable history which is escalated by a low suspicion index among primary physicians. Almost as if imperative vomiting is the first symptom followed by fever and pain. An association of small bowel obstruction is found to be high among children due to the extensive peri appendiceal inflammation. A surgeon must also note on the typical finding of a perforated appendix among children [56].
- *Pregnancy -* The vermiform appendix moves to the upper abdomen during pregnancy, increasing the risk of peritonitis; the closer to term, the greater the risk, even in instances without perforation being almost ten times higher than that in the first trimester, maternal mortality after the sixth month of gestation is twenty percent. Pregnancy-related pain increases in intensity and laterality. Urine samples examined will help rule out pyelonephritis, although it is advisable to have an early appendectomy in situations of uncertainty. Fifty percent of pregnant patients

with acute perforated appendicitis abort or give birth early, compared to 30% of patients with acute non-perforated appendicitis [57]

- *Elderly* - Elderly people are considerably more likely to develop gangrene and perforation. Older persons are more likely to self-medicate with laxatives, and elderly patients with flexible abdominal walls or obesity may conceal a gangrenous appendix with little indication of it. In addition, if enemas are administered, peritonitis may develop further, and the image may mimic subacute intestinal obstruction. One must bear in mind as age progresses, the immune systems deteriorate. All of these above factors contribute to the greater mortality rate of acute appendicitis in the elderly.

HEMATOLOGICAL AND BIOCHEMICAL INVESTIGATIONS:

It is possible to evaluate the inflammatory response by a number of haematological and biochemical tests that are connected to appendicitis. They do, however, strongly correlate with appendicitis when combined with clinical symptoms and signs. The existence or absence of appendicitis cannot be predicted by any laboratory test, either on its own or in conjunction with other tests. It is common practise to employ the total WBC count, CRP value, and neutrophil percentage in cases of probable appendicitis, however many additional variables have also been researched and are included in this study [58,59].

- *Total White Blood Cell Count –* The measurement of WBC Counts being part of routine evaluation for all acute abdomen cases, asserts its role for predicting any infection, in appendicitis there is an approximately 79-90% chance of having raised white blood cell counts[60,61]. While being quite sensitive these counts are quite low in specificity [62]. Rather these counts gain more significance for their

persistent rise during acute appendicitis as compared to that in patients with non-specific abdominal pain [63]. Initial elevated counts may occur in up to 60% of patients with simply generalised abdominal discomfort [64]. Compared to a single high count, the sequential rise in total white blood cell counts offers a higher diagnostic acuity as seen with a sensitivity of 92% and specificity of 100% to that of 69% and 83%respectivly [65]. High total white blood cell counts with differential count has been linked to more severe appendicitis and indicates a more advanced stage, according to some reports. However, other studies have found that it is a very poor predictor of the disease's severity [58, 66-67]. As the total white blood cell count grows over the upper normal limit, the rate of infection rises, this shows that increased counts have some role of prognostic kind [68].

- *Neutrophils –* The neutrophil percentage is also essential in diagnosing appendicitis. More than 78% of patients with acute appendicitis show neutrophilia of varying degrees [69]. Furthermore, 95% of patients exhibit neutrophilia, and an increased band count larger than 6% has been demonstrated to have a significant prognostic value for appendicitis in the elderly. However, because to their limited specificities, the WBC count and differential are only modestly useful in confirming the diagnosis of appendicitis [51].
- *C – Reactive Protein (Fig. 11) -* The acute phase protein CRP, which is produced in the liver in response to bacterial infection, is elevated in response to continuous inflammatory processes inside the body. Within 6 to 12 hours of acute tissue inflammation, serum levels start to increase. Physically, CRP increases chemotaxis, activates platelets, and encourages phagocytosis to improve cell-mediated immunity. It is a general indicator of inflammation. There has been substantial research done on the usefulness of elevated CRP in the diagnosis of

acute appendicitis [62,70]. Determining the quantity of CRP has recently been recommended as a laboratory test. Although investigations on the sensitivity and specificity of the CRP have produced conflicting results, high levels (more than 0.8 mg per dL) are prevalent in appendicitis [71,72]. The diagnostic accuracy of CRP has shown a wide range of variations in different studies with sensitivity ranging from 40-99% and specificity of 27-90% [73,74]. Yet this assessment can not differentiate appendicitis from any other bacterial infection. The most significant laboratory reports in acute appendicitis would include a high level of CRP (>0.8 mg/dl) accompanied with leukocytes, and neutrophilia [75].

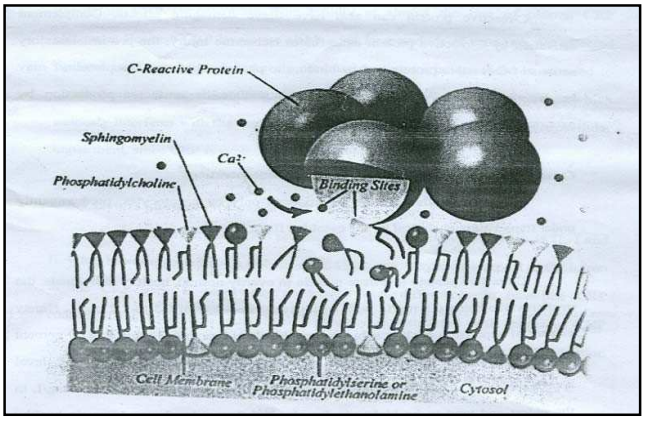


Fig. 11: Pentameric C- reactive Protein over Cell Membrane Receptor

- Other inflammatory markers examined in acute appendicitis include interleukin-6 tumour necrosis factor, and acid 1-glycoprotein. In one study, interleukin-6 was found to have higher sensitivity, specificity, and diagnostic accuracy than C-reactive protein and total white cell count for predicting acute appendicitis [76].
- *Urine analysis* - Patients with lower abdomen pain frequently undergo a urine test to rule out urinary tract pathologies. While not directly assisting in supporting or disproving the diagnosis of acute appendicitis, few observations need to be considered prior to appendectomy, such as Graham reported that 10 out of 62

individuals with acute appendicitis had abnormal urine results [77]. In 40% of individuals with acute appendicitis, haematuria, pyuria, and proteinuria might be present [78]. Pyuria can be attributed to a pelvic appendix or retrocaecal appendix irritation of the ureter or bladder, respectively. The presence of urological symptoms or an abnormal urinalysis should not be used to rule out the diagnosis of appendicitis. Urine human chorionic gonadotropin levels in women of reproductive age should be considered for testing in order to inform the doctor of any potential ectopic or concurrent pregnancies. Right lower quadrant pain can also be caused by ectopic pregnancy, which necessitates an immediate diagnosis and course of action.

RADIOLOGICAL ASSESSMENT FOR APPENDICITIS:

In recent years, there have been more choices for radiologic testing of patients with suspected appendicitis, sometimes augmenting and sometimes replacing earlier evaluation tests. For the purpose of identifying acute appendicitis, imaging modalities are becoming crucial. Nowadays, imaging is even seen as being obligatory prerequisite at many institutions when appendicitis is suspected [78,79]. Few of the conventional imaging modalities being used for appendicitis include;

- *Plain Radiograph [80]*- It is not well understood how important plain abdominal x-rays are in the diagnosis of acute appendicitis. Almost no part is played by an abdominal radiograph in the diagnosis of acute appendicitis. However, it could be helpful to screen out other mimicking illnesses such ureterolithiasis when the patient exhibits unusual symptoms. Supine and erect films of the abdomen are frequently included in plain abdominal radiographs taken for the assessment of

patients with acute abdomen. The following radiological symptoms for AA are listed by Brooks and Killen; Fluid levels localized to the caecum and terminal ileum, indicating inflammation in the right lower quadrant, Localized ileus with gas in the caecum (Pic. 7), ascending colon and terminal ileum, Increased soft tissue density of the right lower quadrant, Blurring of the right flank stripe and presence of a radiolucent line between the fat of the peritoneum and tansversus abdominis, a gas filled appendix alternatively intraperitoneal gas, Fecolith in the right iliac fossa, deformity in caecal gas shadow and blurring of psoas shadow on right side.

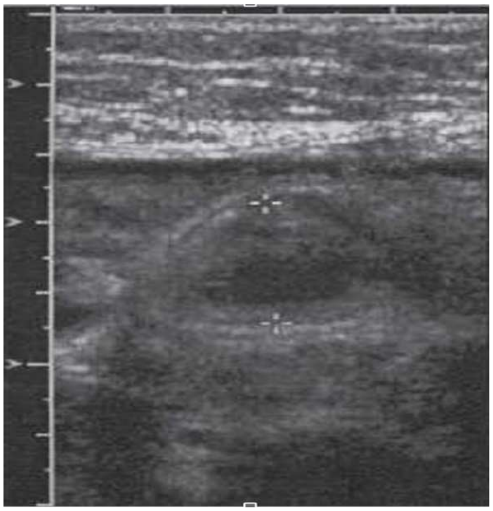
Pic. 7: X ray Erect Abdomen, with Air-Fluid levels localized to Caecum and Ileum.

- *Barium Studies* - Barium enema's historical use in assessing potential appendicitis has been investigated. In order to diagnose acute appendicitis, caecal spasm, extrinsic compression of the cecum, no visualization of the appendix, and partial visualisation of the appendix appear to be helpful signs [80]. Due to the invasiveness of the test, the length of time needed to complete the procedure, the low diagnostic yield, the necessity for specific preparation, and the availability of high-resolution ultrasonography and Computed tomography scan, barium enema

is no longer used to diagnose acute appendicitis. When identifying mucosal lesions of the cecum and appendix, barium enema is a useful supplement to ultrasonography and Computed tomography scans. When there is persistent or recurring stomach discomfort, it should be considered. Ultimately barium contrast radiographs are placed for the niche group of patients having the highly unlikely predisposing factors preventing use of Computed tomography or ultrasoun

- *Ultrasonography -* Being a rapid, inexpensive, non-invasive, and requiring no patient preparation or administration of contrast medium. Operator skill is a crucial component of all US exams, but it is especially crucial when examining a patient who has pain in their right lower quadrant. In the hands of skilled practitioners, USG has documented acute appendicitis with sensitivities of 75%-90%, specificities of 86%-95%, accuracies of 87%-96%, positive predictive values of 91%-94%, and negative predictive values of 89%-97% [81,82]. An USG image of the appendix shows it to be a lamellated, elongated, blind-ending structure (Pic. 8). The inflamed appendix is fixed, non-compressible, and looks spherical on transverse imaging, in contrast to normal bowel. Appendix measurements are taken when fully compressed. When the compressed appendix is more than 6 mm in diameter, appendicitis is traditionally diagnosed. Contrarily, when inflamed, the thick-walled and non-compressible appendix (Pic. 9) will exhibit circumferential colour doppler while being held in a fixed position by the compressing transducer. When the appendix exhibits an abnormal shape or when periappendiceal fluid collections are seen,

Pic. 8: Lamellated Structure of appendix on ultrasound



Pic. 9: Thick, Non Compressible Appendix.

appendiceal perforation might be detected [81-84]. Increased vascularity in and around the acutely inflamed appendix is typically found during a Doppler US examination. This test is helpful as an additional indicator of appendicitis when the appendiceal measurement is ambiguous, thus earning its name 'ring of fire sign' [9,84]. Ultrasonography is a cost-effective supplement to the clinical assessment and is useful in the diagnosis of appendicitis cases that are questionable [85]. Ultrasonography is extensively used, affordable, and safe. It is advised that children, young women, and pregnant women get ultrasonography as their initial imaging investigation since it uses no ionising radiation and is excellent at displaying acute gynaecologic ailments. The standard method for sonographic assessment of acute appendicitis is the graded compression technique proposed by Puylaert. varying compression with gradual and mild pressure that is sustained, ultrasonography enables a thorough and successful examination of the region of interest and reveals a congested appendix as a noncompressible loop [86,87]. Baldisserotto has proposed an excellent protocol for the practical US examination of the right lower quadrant, which has been shown to be

quite beneficial in everyday routine. The examination of the right lower quadrant using ultrasonography should begin in the transverse plane at the tip of the liver and go towards the pelvic brim. Typically, the ascending colon is valued for its gas content and haustral pattern. In the area of the cecum, perienteric fat and the appendix should be closely monitored for inflammatory changes. After obtaining sagittal and oblique images, the whole area of interest should be scanned. Detailed photos of the appendix, should exist, are captured. In general, the examination begins with a patient-specific transducer: a 3.5-MHz transducer for bulky patients and a 5-MHz transducer for lean individuals. Subsequently, the linear transducer is utilised for a more comprehensive investigation. The optimum method for examining retrocecal appendicitis is via the right side, the being proposed as the non-compressive technique [88]. The inflamed appendix is characterised as a blind-ended, aperistaltic, noncompressible tubular structure with a diameter larger than 6 mm that emerges from the base of the cecum. The presence of a fecoliths may help in making a good diagnosis. The ovoid shape of the appendix in transverse section on USG along the whole appendiceal length consistently excludes acute appendicitis, while acute inflammation produces a rise in the outer appendiceal diameter and rounding of the form [89]. There are five layers in early acute appendicitis (catarrhal stage).

1. A central, thin hyperechoic line depicting the collapsed lumen and superficial lining of the appendix's mucosa.

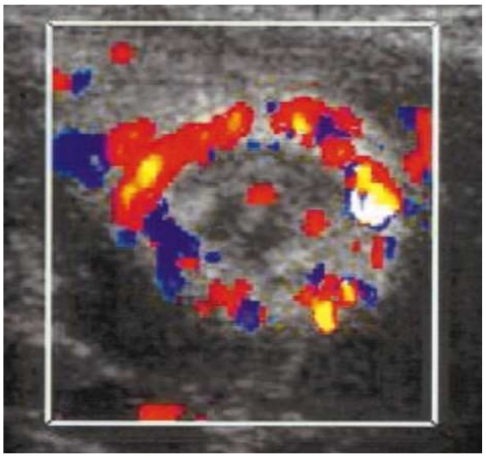
2. Hypoechoic layer (2-3mm thick) including edematous lamina propria and muscularis mucosa.

3. Submucosa hyperechoic (2-3 mms).

4. Muscular layer hypoechoic (2-3-mms).

5. The serosa is shown by the outside thin hyperechoic line.

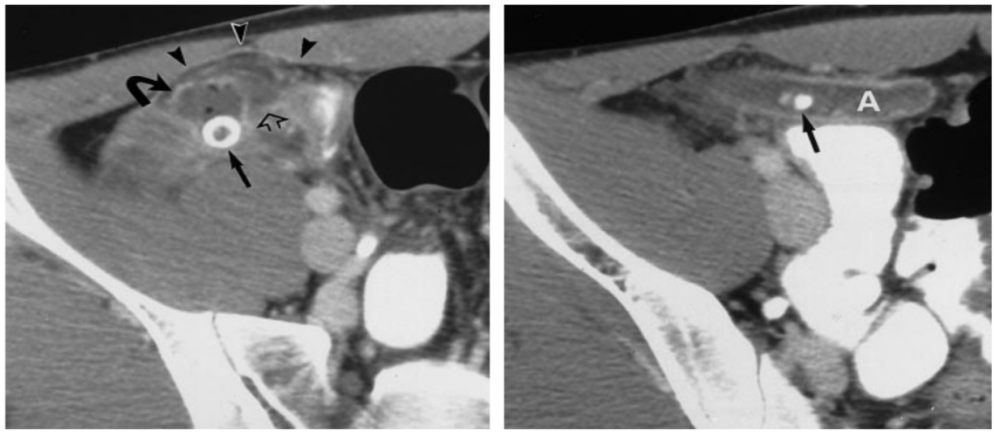
In the late (suppurative) stage, the lumen of the appendix is enlarged from the presence of pus or fluid, and there is an increase in the thickness of the submucosa and muscle wall in the range of 3-6 millimetres. On colour Doppler USG imaging, the presence of circumferential colour in the wall of an inflamed appendix provides strong evidence supporting the presence of active inflammation (Pic. 10). The presence of lobulated pericecal fluid, phlegmon or abscess, visible pericecal fat, and circumferential loss of the appendix's submucosal layer have all been attributed to appendiceal perforation [87]. Sonography relies heavily on the skill and experience of the individual doing the test, which is one of its primary drawbacks. The identification of a normal appendix, which is required in order to exclude the possibility of acute appendicitis, is another one of the challenges associated with ultrasonography. It is more difficult to see a normal appendix in individuals who have a big body habitus and who also have an associated ileus. This is because an associated ileus generates shadowing as a result of gas-filled loops of intestine that lie atop the appendix. In this scenario, ultrasound may not be able to discern between an appendiceal phlegmon and an abscess. If this is the case, a CT scan may be of assistance.



Pic. 10: Doppler Imaging showing Ring of Fire Sign

- *Computed Tomography* – Computed Tomography has picked up on being a popular modality in the investigation of acute abdominal pain and has shown good sensitivity and specificity for identifying and distinguishing appendicitis, allowing for an accurate and early identification [90]. Contrast-enhanced computed tomography (CECT) has been described as an accurate tool for the diagnosis of AA while its availability and resolution improve. The CT typically has been reserved for patients with ambiguous medical history, physical exam, and laboratory results. CT scans are useful for these unusual individuals. In patients with acute abdominal discomfort, Tomography is advised if the findings of the ultrasound are deemed to be suboptimal, indeterminate, or normal. Computed tomography is complimentary to USG and is used in situations when Ultrasonography results are deemed to be normal. Ultrasound is also complimentary to CT and may be particularly beneficial in thin women in whom the findings of first computed tomography, regardless of how it is obtained, are inconclusive. This is especially the case if the patient has a history of breast cancer. The comparison of the data obtained from Computed tomography and untrasonography demonstrated that Computed tomography had a greater sensitivity (96% vs. 76%), accuracy (94% vs. 83%), and negative predictive value (95% vs. 76%) than ultrasonography [81,83,91]. It has been documented that the sensitivity of helical CT ranges from 90 to 100%, while its specificity ranges from 91 to 99%, its accuracy ranges from 94 to 98%, its positive predictive values range from 92 to 98%, and its negative predictive values range from 95 to 100%. [92,93]. An inflamed appendix often displays as an inflated tubular structure that terminates as a blind ending loop. This condition is commonly coupled with inflammatory stranding in the surrounding fat. In the past, a diameter of 6

millimeters was considered to be the cutoff point for diagnosing appendicitis. Studies conducted on healthy individuals, on the other hand, found that the usual range of appendiceal size in an adult patient is between 3 and 10 millimeters. Therefore, a diagnosis of appendicitis may be made with more precision if the appendiceal threshold size is set at 9 millimeters. When there is acute appendicitis present, a CT scan can show the same radiographic picture of faeces loading inside of a dilated caecum as the x-ray would [94,95]. CT's disadvantages include the possibility of an allergy to iodinated contrast media, patient pain from contrast media injection (particularly when rectal contrast media is administered), exposure to ionising radiation, and expense. However, the expense is far less than that of appendix removal or hospitalization [96].



Pic. 11: Computed Tomographic Images Of Appendicitis with Radio Opaque Fecolith.

- *Magnetic Resonance Imaging [97]:* MRI is becoming a viable CT substitute for individuals who are pregnant or who have an allergy to iodinated contrast media. The usefulness of MR imaging in the evaluation of suspected appendicitis is restricted. Even though MRI avoids ionising radiation, it has several limitations, including high cost, lengthy study durations, and restricted availability in an

emergency. According to some works, MR imaging is reserved for pregnant individuals whose ultrasound results are unclear. The appendix is detected on MR imaging as a tubular structure, appendicitis is identified using CT-sized size criteria. Inflammatory alterations in the periappendiceal fat are observed as T2 hyperintensity. It is possible to make use of post-contrast T1-weighted sequences in addition to T1-weighted and T2-weighted turbo spin-echo sequences, as well as fat-suppressed inversion recovery turbo spin-echo sequences. Inflamed appendixes reveal a clearly hyperintense core on T2-weighted images, as well as a significantly hyperintense thicker wall and notably hyperintense periappendiceal tissue. During the post contrast study, if there is a significant increase in contrast enhancement along the inflamed appendiceal wall, this is evidence of appendicitis. On gadolinium-enhanced T1-weighted fat suppressed spin-echo images, there is also a considerable augmentation of the fat that is around the area of interest. However, a little increase might be noticed in the appendix and the intestines that are normal. The fat-saturation approach allows for a greater appreciation of the contrast variations between both the inflamed appendix and the fat that surrounds it. Nevertheless, MRI has intrinsic limitations when it comes to appendicolith detection. When it comes to the diagnosis of acute appendicitis, fat-suppressed gadolinium enhanced MRI images have a detection rate of 97% and an accuracy rate of 95%.

- *Diagnostic Laparoscopy -* In the process of assessing a patient who may be suffering from acute appendicitis, laparoscopy has been recommended as a diagnostic technique by more than one source. It is important to keep in mind that diagnostic laparoscopy is an invasive operation that requires general anaesthesia and carries risks that are akin to those associated with any major surgery. Because

of this, it is not generally considered to be a reliable diagnostic tool. Whether a normal-appearing appendix should be removed or left in place during diagnostic laparoscopy is the subject of much debate. Regardless of the appendix's external look, many surgeons would rather not leave the operation without removing anything, even if there isn't any other sign of disease. This is particularly true in cases when there isn't any other disease found. Although standard extraction of a normal appendix is not a risk-free practice, even with laparoscopy, many students of the disease recommend doing so regardless of how the appendix appears since they think not all appendices with a normal appearance are infected and the inflammation may just affect the mucosa (endo-appendicitis) [98]. Kraemer et. al. conducted a literature analysis covering the years 1978 to 1998 in order to determine the negative appendectomy rates, complication rates, the accuracy of laparoscopic appendix evaluation, and the occurrence of erroneous negative diagnosis of appendicitis at surgical and gynaecological laparoscopy. In his analysis, they came to the conclusion that, despite widespread belief, the presumption that the morphological diagnosing of appendicitis is an incorrect method is not supported by sufficient data. There is some evidence that endo-appendicitis does not have much of an impact on clinical practise since there is a high prevalence of specimens with disputed diagnosis. At the moment, the laparoscopic method of appendectomy has much greater percentages of successful removal of the appendix than the open method does. It is necessary to rethink the function of diagnostic laparoscopy in cases when appendicitis is suspected. It might be helpful in treating some subgroups of patients, but it is in no way intended to replace sound clinical judgement [99]. For instance, a prospective research conducted 109 diagnostic laparoscopies on patients with suspected

appendicitis and found that 100 of those patients had appendices that seemed normal throughout the procedure. After a follow-up period that averaged 4.4 years, only two individuals were found to have acute appendicitis, whereas nine patients had some recurrence pain. When a diagnostic laparoscopy for suspected appendicitis is conducted, it is safe to keep an appendix in situ that seems normal, based on this study. This is true even if another diagnosis cannot be identified at the time of the laparoscopy [100]. Laparoscopy should not be recommended as a regular diagnostic procedure to replace the traditional pre-operative work-up often conducted for clinically suspected appendicitis since it has its own morbidity and typically necessitates general anaesthesia. Diagnostic laparoscopy may be beneficial in equivocal instances or in women of reproductive age, whereas therapeutic laparoscopy may be favoured in particular patient subgroups (e.g., women, obese patients, sports) [101].

SCORING SYSTEMS:

Despite its great prevalence, appendicitis remains difficult to diagnose. The prognosis of appendicitis exemplifies the sentiments expressed by Sir William Osler when he said, "Medicine is a science of uncertainty and an art of probability" [102].The clinical manifestations are not always typical, making identification particularly challenging due to the fact that symptoms frequently overlap with those of other illnesses. The decision of whether or not to do surgery on a patient suspected of having appendicitis is the primary clinical decision that must be made. To treat all cases of appendicitis as quickly and effectively as possible, without resorting to unnecessary surgical procedures, is the ideal goal [91]. Diagnostic precision has been

enhanced by the utilisation of imaging modalities. However, some of the drawbacks include a high cost, a lack of accessibility (especially in developing countries), a shortage of radiologists, examiner-dependent efficacy (for example, ultrasound), the possibility of harmful ionisation (for example, computerised tomography), and poor performance in populations with a low or high prevalence [103]. There have been efforts made to construct diagnostic scoring systems that can summarise clinical information and may be of value in countries around the globe where imaging isn't as widely available. Some scores have been calculated by factoring clinical indications and symptoms into an equation that estimates the likelihood of appendicitis. A number of diagnostic scoring algorithms have been constructed using a variety of statistical approaches, a few of which have been validated either internally or externally, whereas others have been employed without validation. The validity of those scores ranges from satisfactory to excellent, depending on how thoroughly they were checked [103]. In the past three decades, a variety of clinical scoring systems (CSSs) have been created to aid clinicians in evaluating patients who arrive with abdominal pain and a suspicion of appendicitis. These CSSs are intended to help determine the likelihood that the patient has appendicitis. While some of these ratings were generated first for adults or mixed groups and were later validated in children, some of these scores were expressly derived and designed for children. Those that are the most well-known and widely used, such as the ‘Alvarado Score’ and the ‘Paediatric Appendicitis score’, have been well researched. The following is a list of some of the less well-known scores, including but not limited to the ‘Kharbanda's Low Risk Score’, the ‘Lindberg Score’, and the ‘Ohmann Sore’. The majority of scoring systems use a mix of symptomatic, clinical, and laboratory measurements [103].

- ***Alvarado Score or MANTRELS Score:*** Alfredo Alvarado created the score in 1986 with the intention of making it easier to diagnose appendicitis in patients. The sample size was calculated using data from 305 patients at Nazareth Hospital in Philadelphia, USA, who were all diagnosed with appendicitis. The charts of these patients were retrospectively reviewed, and the sensitivity and specificity of a number of symptoms, signs, and laboratory variables were evaluated; those with the highest diagnostic value were incorporated into a scoring system. This led in the development of a simple score comprised of three symptoms, three indicators, and two laboratory indicators of inflammation, each of which was assigned a weight of one or two depending on its clinical significance. Using the pneumonic MANTRELS, these variables might be remembered at any time. The greatest possible total score is consequently 10 (Table 2). A score of 5 or 6 is congruent with an acute appendicitis diagnosis, whereas a score of 7 or 8 indicates suspected appendicitis and a score of 9 or 10 indicates very probable acute appendicitis. The score has been offered as a reference for determining which patients deserve more monitoring and which patients require surgery. Those who had a score of 5 or 6 were recommended to be observed, whilst those who received a score of 7 or higher were obliged to have surgery since it was very probable that they suffered from appendicitis. The Alvarado score is the most effective of the currently used clinical scoring systems. However, the score is not based on a rigorous mathematical model that accounts for each variable's capacity to anticipate a diagnosis independently. In addition to that, it was founded on historical evidence. Due to these variables, a slew of authors have proposed several additional scoring systems that include a multitude of other clinical, biochemical, and imaging results [104].

Table 2: The Alvarado Score [105]

	Parameters	Points
Symptoms	Migration of pain to right iliac fossa	1
	Anorexia	1
	Nausea, Vomiting	1
Signs	Tenderness in RLQ	2
	Rebound tenderness	1
	Elevation of temperature	1
Laboratory	Leukocytosis	2
	Shift to the left of neutrophil	1
Total score		10

- ***Ohmann score:*** Using computer-aided diagnosis, researchers in Germany devised the Ohmann score and compared its results before and after an intervention. Tenderness in the right lower quadrant, rebound tenderness, no micturition issues, steady pain, leukocyte count [10.0 9 109/L], age 50 years, displacement of the pain to the right lower quadrant, and stiffness are the criteria that complete the score. The score was generated by an examination of a stepwise logistic regression carried out on a German database, and its accuracy was verified using a Dutch database. Following the implementation of the score over a period of four months, the rates of delayed appendicectomy declined considerably (p 0.02), falling from 8% to 2%, and the rate of delayed discharge fell from 22% to 11%; however, there was no variation in the number of perforation or sequelae.

- ***Modified Alvarado Score:*** Left shift in neutrophil maturation (worth one point) was part of the original Alvarado score, which resulted in a total of 10 points. In contrast, in 1994 Kalan did not take into account this characteristic, which resulted in a changed score (Table 3). Patients with a Modified Alvarado Score of 7 or above will have a higher chance of having acute appendicitis than patients having a Modified Alvarado Score of 6 or below [95]. In the diagnosis of acute appendicitis, the modified Alvarado score is a fast, simple, reliable, noninvasive, repeatable, and safe diagnostic modality without additional expense or complications. Modified Alvarado Score is a simple aid for the diagnosis of acute appendicitis. It comes in quite helpful in hospitals that are located in more remote areas and have fewer backup facilities. The use of this scoring system enhances diagnostic accuracy, which in turn leads to a reduction in the number of unnecessary appendectomies and, as a result, a decrease in the incidence of complications. The researchers at Talukder DB [107] and colleagues discovered that the higher the score, the greater its sensitivity. Accuracy is 95%, 78%, and 0% correspondingly for patients whose Alvarado score ranges are 8-10, 5-7, and 1-4 respectively. Both Fengo et al [108] and others claimed a sensitivity of 73%, with a negative laparotomy rate of 17.5%. Fengo et al78 reported a sensitivity of 90.2%. In this particular study, the sensitivity of the patients who had a score of 7 or above was 89% overall, with males having a 93% success rate and females having an 84% success rate. Whereas it was 73% in males and 60% in females, respectively, and the total sensitivity in patients with a score of less than 7 was 68%. According to the findings of a research conducted by Lone et al79, the sensitivity of patients who had a score of 7 or above was 94% in male patients, 81% in female patients, and the combined sensitivity was 88%. On the other hand,

it was 69% in male patients and 63% in female patients, and the combined sensitivity was 67% in patients who had a score of less than 7.

Table 3: The Modified Alvarado Score

	Parameters	Points
Symptoms	Migration of pain to right iliac fossa	1
	Anorexia	1
	Nausea, Vomiting	1
Signs	Tenderness in RLQ	2
	Rebound tenderness	1
	Elevation of temperature	1
	Extra sign(s), e.g. cough test and/or Rovsing's sign and/or rectal tenderness	1
Laboratory	Leukocytosis	2
Total score		10

Interpretation of the Modified Alvarado score is as follows:

Score 1-4: acute appendicitis very unlikely

Score 5-7: acute appendicitis probable

Score 8-10: acuteappendicitis definite

- ***Lintula score :*** Although the Lintula score was initially developed for use with children, it has since been validated for use with adults [109]. The Lintula score was generated from 35 symptoms and signs that were recorded for 131 Finnish children who were experiencing abdominal discomfort. These symptoms and signs were then modelled using logistic regression in order to determine their predictive value for a diagnosis of acute appendicitis. After that, the score was verified using a group of youngsters who had been systematically collected for the purpose of suffering from abdominal pain. To create the score, gender, severity of pain, relocation of discomfort, vomiting, pain in the lower right quadrant, fever, guarding, bowel noises, and rebound soreness are taken into consideration. If the score is larger than 21, an appendicectomy is recommended [110].
- ***The Christian Score:*** Only five factors are considered in the Christian Score, making it one of the most straightforward of the bunch. If more than or equal to four of the criteria were met, the case group of 58 participants who had a suspected appendectomy had surgical surgery. Fifty-nine appendectomy controls received intervention purely on the basis of the assessment made by the surgical staff. The ages ranged from 7 all the way up to 56. The rate of negative appendectomy was much lower in the group treated based on the score (6.5%) compared to the rate that the controls experienced (17%). This is a fairly straightforward score, however it does not appear to have been verified or evaluated in a group of children and adolescents [111].
- ***The Fenyo-Lindberg Score:*** With many degrees of reaction that can both increase and decrease the final result, this score seems to be one of the most complicated. Fenyo prospectively assessed 259 adult patients who had appendicitis suspicions in 1987. The resulting score was subjected to additional validation in a total of

830 patients, 256 of whom were found to have an appendicitis diagnosis. The sensitivity, specificity, positive predictive value, and negative predictive value were respectively 90%, 91%, 83%, and 95%. Fenyo and Lindberg conducted a prospective validation of their score using a total of 1167 patients who had symptoms consistent with appendicitis. Histological testing revealed that 392 of these patients had appendicitis. The sensitivity and specificity were significantly lower than in the initial trial when appendicitis was predicted using the conventional threshold score of -2, at 73% and 87%, respectively. Notable is the fact that this research was carried out in two distinct locations, namely a district hospital and a university hospital. Children made up thirty percent of the total patients treated at the University hospital [112].

- ***Pediatric Appendicitis Score:*** In 2002, Madan Samuel was the first person to describe the Pediatric Appendicitis Score. It was based on a study of a cohort of 1,170 children ranging in age from 4 to 15 years old that was collected prospectively [113]. It was determined how sensitive and specific the symptoms, indicators, and laboratory findings were, as well as their predictive value and combined probability. It was determined how much of a diagnostic index or weight each clinical feature and investigation should have. After that, a stepwise multiple linear regression analysis was carried out on the best independent predictors in order to formulate a score system that was based on eight different factors. All of the factors received a score of one, with the exception of the physical symptoms, which received a score of two, for a grand total of ten points. Tenderness in the right lower quadrant of the abdomen upon coughing, percussion, or hoping, anorexia, pyrexia, nausea, and emesis, tenderness over the

right iliac fossa, leukocytosis, polymorphonuclear neutrophilia, and migration of pain are the characteristics in order of diagnostic index. After being applied to the cases, the score was validated, and the results showed that it had a sensitivity of 1, a specificity of 0.92, a positive predicted value of 0.96, and a negative predictive value of 0.99 [104]. The PAS has also been analysed using data collected from various groups of paediatric patients. It has been suggested that it is useful in stratifying the clinical risk of acute appendicitis in children who present to the emergency department complaining of abdominal pain. These children can be categorised as having a low, medium, or high risk of acute appendicitis depending on the results of the test. It was shown that a score of less than or equal to 2 had a high validity for ruling out acute appendicitis, whereas a score of higher than or equal to 7 had a high validity for predicting acute appendicitis [114].

- ***Tzanakis Scoring System* [115]:** This scoring system was devised in an effort to establish a simple, dependable scoring system with providing an excellent sensitivity. In 2004, Nikolas E. Tzanakis and his colleagues came up with the idea for it. This score is derived from a combination of the clinical examination, the USG, and a laboratory marker of the inflammatory response. There are a total of four factors and 15 points those being USG positive for acute appendicitis, Tenderness in the right lower quadrant, Rebound tenderness and a leukocyte count[12,000/ul (Table 4), and a score of eight or more is considered to be a threshold value for the diagnosis of acute appendicitis and the requirement of surgical intervention. Patients who have scores lower than eight have a lower risk of having acute appendicitis. The sensitivity of this scoring system is 95.4 percent, while its specificity is 97.3 percent, and its accuracy is 96.5 percent.

Table 4: Tzanakis Score

Variables	Points
Positive USG for AA	6
Tenderness in RLQ	4
Rebound tenderness	3
Leukocyte count>12000/ul	2
Total score	15

1) ***Appendicitis Inflammatory Response Score [15]:*** In 2008, Andersson and Andersson were the first researchers to report the condition in a population sample taken from hospital patients in the Swedish municipalities of Jonkoping and Eksjo. It is in some ways an adaptation of the Alvarado scoring system, with the purpose of addressing a number of deficiencies inherent in the latter, such as, the formulation of it was based on a retrospective examination of patients who each had been operated on for suspicion of appendicitis, the parameters were picked without applying an adequate statistical model to identify the variables having any independent diagnostic value and to establish the scoring weights of those variables. The dichotomization of the variables led to the loss of the ability to discriminate between the two groups. The scores were verified using a group of 229 patients who served as the validation sample. Obtaining two different cut-off points, one with a high sensitivity for advanced appendicitis >8 and another with a high specificity for appendicitis 4. Both of these are desirable. The Appendicitis Inflammatory Response Score was developed using eight independent predictive indicators those being, right lower quadrant pain, rebound tenderness, muscle defence, WBC count, percentage of neutrophils, CRP, body temperature and

vomiting. It performed better than the Alvarado score in a group of 229 patients suspected of having appendicitis (Sensitivity 0.97 vs. 0.92, p=0.0027 and Specificity 0.93 vs. 0.88, p0.0007).

Table 5: Appendicitis Inflammatory Response Score [15]

Vomiting	1
Pain in right lower quadrant	1
Muscular defense	
Light	1
Medium	2
Strong	3
Body temperature >38.5 C	1
Polymorphonuclear leucocytes	
70-84%	1
Equal or more than 85%	2
WBC	
10000-14999 cells/cumm	1
Equal or more than 15000/cumm	2
CRP estimation	
10-49 mg/l	1
Equal or more than 50 mg/l	2

sum 0-4 = low probability, sum 5-8 = intermediate group, sum 9-12 = high probability.

RLQ – right lower quadrant, CRP – C-reactive protein, WBC – white blood cell

DIAGNOSTIC DIFFICULTIES:

The accurate and prompt identification of atypical patients continues to be a clinical challenge and is one of the concerns in emergency room visits that is most often overlooked. In addition to the known postoperative complications, a precaution appendectomy, also known as a misdiagnosis of presumed appendicitis, is a negative outcome that can lead to unnecessary surgery, a significant disruption of the patient's day-to-day activities, and a significant waste of the resources available at the hospital. On the other hand, there is a possibility that a delayed diagnosis may raise both the morbidity and the expense [90]. According to the statistics, one out of every five instances of appendicitis is incorrectly diagnosed. On the other hand, a normal appendix is identified in 15–35% of individuals who undergo an emergency appendectomy. Inconsistency in the clinical manifestations of appendicitis may be attributed to a number of factors, including the location of the appendix, the age of the patient, and the degree of inflammation. Diagnostic challenges arise for females of childbearing age, and the proportion of reproductive-aged women who get an incorrect diagnosis is disproportionately high [116, 117].

Despite the fact that acute appendicitis is the most prevalent abdominal surgical emergency, the diagnosis of this condition may be quite challenging at times. It is prudent to thoroughly assess and, if feasible, exclude a number of prevalent disorders. Patients of varying ages will have a unique differential diagnosis; additional illnesses of female reproductive system will also be considered as a differential diagnosis in female patients.

1) ADULTS:

a) Without the ability to feel a doughy mass of inflamed ileum, acute terminal ileitis may be difficult to differentiate from acute appendicitis. It is likely that the patient has local ileitis instead of just appendicitis based on their prior history of stomach pains, weight loss, and diarrhoea. There is a possibility that the ileitis is non-specific and caused by Crohn's disease or an infection caused by Yersinia. Inflammation of the terminal ileum, appendix, and caecum, as well as adenopathy of the mesenteric lymph nodes, are all caused by Yersinia enterocolitica. In cases when the condition is suspected, diagnostic testing with serum antibody titres and therapy with intravenous tetracycline are both suitable. During an operation, if a Yersinia infection is suspected, a mesenteric lymph node should be removed, separated, and then half of it should be sent for a microbiological culture (including TB), and the other half should be sent for a histological evaluation [1].

b) Since ureteric colic's pain varies from appendicitis' in both intensity and distribution, diagnosing the condition is seldom problematic. Urinalysis is something that should always be done, and if there are any red cells present, then a supine abdomen radiograph should be taken. Diagnostic testing may be accomplished using intravenous urography or renal ultrasonography [1].

c) An increase in the volume and/or frequency of micturition is common in patients who have been diagnosed with right-sided acute pyelonephritis. It may make diagnosis more challenging, particularly in female patients. The most prominent symptoms are localised soreness that is restricted to the loin, fever (temperature of 39 degrees Celsius), and sometimes rigor and pyuria [1].

d) Perforated peptic ulcer is often associated with previous history of dyspepsia and a very abrupt onset of discomfort that begins in the epigastrium and travels down

the right paracolic gutter in a patient with gastroesophageal reflux disease (GERD). The pain that is associated with appendicitis often begins in the umbilical area. Stiffness and soreness in the right iliac fossa are present in both disorders; however, the rigidity in the right hypochondrium is often larger in patients with perforated duodenal ulcer than in patients with other illnesses. When the patient is upright, a radiograph of the abdomen will reveal gas beneath the diaphragm in seventy percent of cases. When there is uncertainty about the diagnosis, a CT scan of the abdomen may be very helpful [1].

e) Testicular torsion in males who are adolescents or young adults is easy to overlook. Pain may be attributed to the right iliac fossa, and reticence on the side of the patient may lead the unwary to assume appendicitis if the scrotum is not checked in all instances. However, this can be avoided by examining the patient's scrotum [1].

2) ELDERLY:

a) In certain individuals with a lengthy sigmoid loop, the colon may lie to the right of the midline, making it difficult to discriminate between diverticulitis and appendicitis. The use of abdominal CT scanning is very beneficial in this context, and it need to be taken into consideration in the treatment of patients older than 60 years old [1].

b) Obstruction of the intestines is often a straightforward diagnosis; the difficulty arises in recognising acute appendicitis as a rare cause in older patients [1].

c) In adults, obstructive appendicitis may be caused by or mistaken for cancer of the caecum if the caecum becomes clogged or locally perforated. An unexplained history of anaemia, changing bowel habits, or prior pain are all reasons to be

suspicious about anaemia. It is possible to palpate a mass, and a barium enema may help diagnose it [1].

3) FEMALE OF REPRODUCTIVE AGE GROUPS:

   a) Pelvic inflammatory disease: A spectrum of disorders that includes salpingitis, endometritis, and tubo-ovarian sepsis are included in the spectrum of diseases known as pelvic inflammatory disease. The occurrence of these disorders is become more common, and a diagnosis has to be considered for every young adult female. Pain levels are often lower than those associated with appendicitis, and both sides of the abdomen are affected. A history of burning sensation during micturition, dysmenorrhea, and vaginal discharge are all essential points to consider when making a differential diagnosis. Adnexal and cervical soreness were found during the vaginal examination, which was one of the physical findings. In cases where suspicion exists, a high-quality vaginal swab should be collected for the culture of Chlamydia trachomatis and Neisseria gonorrhoeae, and the advice of a gynaecologist should be sought. An ultrasound that is performed transvaginal may be of great use in determining the diagnosis. When there is still a significant amount of diagnostic doubt, a diagnostic laparoscopy should be performed [1].

   b) The differential diagnosis of torsion and internal bleeding of an ovarian cyst might be challenging. When abnormalities are detected, a pelvic ultrasound and the advice of a gynaecologist should be obtained [1].

   c) A ruptured ectopic pregnancy with well-defined indications of hemoperitoneum is unlikely to be confused for acute appendicitis, but a right-sided tubal abortion or unruptured tubal pregnancy might be. The symptoms of the latter condition are quite similar to those of acute appendicitis, with the

exception that the pain begins on the right side and remains in that location throughout the condition. The agony is excruciating and does not let up until the procedure is performed. In most cases, a woman will have a history of a missing menstrual period, in addition to a positive result on an urine pregnancy test. When the cervix is manipulated during a vaginal examination, a woman experiences excruciating agony. In most cases, indications of bleeding within the peritoneum become visible, and the patient need to be explicitly questioned about experiencing referred discomfort in the shoulder. In any instance in which a diagnosis of ectopic pregnancy is even a remote possibility, a pelvic ultrasound examination has to be performed [1].

d) Lower abdomen and pelvic discomfort occur during mid-cycle when a follicular cyst ruptures and bleeds, which is commonly at this time of the cycle, referred commonly as Mittelschmerz. Systemic discomfort is very uncommon, a pregnancy test will come back negative, and symptoms will often disappear within a few hours. Laparoscopy for diagnostic purposes may be necessary on occasion. It's possible that retrograde menstruation causes the same symptoms [1].

TREATMENT:

Appendectomy is the intervention that is recommended for acute appendicitis. In the absence of an appendicular mass, the appendix must be removed as soon as possible since the risk of operative mortality is almost non-existent; nevertheless, this risk may rise by a factor of five if the procedure is protracted. The appendectomy may either be performed open or with a laparoscopic technique. Laparoscopic appendectomy, to the contrary has not been able to establish itself as the minimally invasive surgery of choice in either children or adults. This is in contrast to laparoscopic cholecystectomy, which has been successful in doing so [118].

- ***Conservative Approach-*** The appendix is removed surgically from the majority of people suffering from acute appendicitis as soon as possible. Antibiotics are to be used before surgery for both aerobic and anaerobic microorganisms in the colon. Patients who have nonperforated appendicitis benefit from receiving a single dose of antibiotics prior to surgery because it lowers the risk of postoperative wound infections and the development of intra-abdominal abscesses. Postoperative intravenous antibiotic treatment should be maintained for patients who have gangrenous or perforated appendicitis. This treatment should be administered until the patient is no longer feverish. It is sufficient to treat the infection with a single antibiotic, often a cephalosporin of the second generation, or a combination of quinolones and metronidazole. Excluding patients with a strong suspicion of significant perforation or sequelae, a Swedish multicentre research randomised 252 males aged 15 to 50 to surgery or antibiotic therapy alone. According to the results, mild to moderate appendicitis may be successfully treated with antibiotics alone without experiencing any problems if there are any grounds to postpone

surgery. The research revealed that antibiotics may effectively treat acute appendicitis that is not perforated. However, there is a chance of recurrence, which must be weighed against the risk of complications after appendectomy [119]. In the study by Hansson et al., 369 persons with suspected appendicitis were randomly assigned to receive either antibiotics or surgical intervention as their main form of therapy. Antibiotics are a suitable first-line therapy for people with appendicitis who do not exhibit apparent indications of intra-abdominal perforation, according to the conclusion reached by the researchers. However, this did have a few drawbacks, and it would seem that further research is required to determine whether or not antibiotics should be considered a major treatment option for appendicitis that is not difficult [119].

- ***Surgical Approach –***

  a) *Open Technique:* When performing an open appendicectomy, different incisions may be made based on the patient's clinical presentation and the surgeon that would be performing the procedure.The grid iron incision, also known as McBurney's incision, is an incision that is made perpendicular to a right spino-umbilical line with the centre of the incision lying at the McBurney's point. McArthur was the first person to describe this type of incision. Grid iron incisions were first described by McArthur. An incision known as a Lanz incision is a transverse incision that is 2 centimetres below the umbilicus and is centred on the mid-clavicular-mid inguinal line. This incision is less visible when it has healed. An expansion of the muscle-cutting gridiron incision, the Rutherford-Morrison incision may be found in the lateral

part of the body. It is possible that having a fixed appendix that is either para or retro-caecal would be beneficial. d. The right lower paramedian incision is made on a vertical plane that is parallel to the midline and is about 1.25 centimetres distant from it. This incision makes it simple to access the organs in the pelvic region. The least likely kind of incision to dehisce is one that splits a muscle. A parallel cut is made across the external oblique aponeurosis in the direction of its fibres. Until the transversalis fascia is found, the internal oblique fascia and muscle are abruptly divided. The peritoneum and transversalis fascia are recognised and clearly separated. Patients who are very obese or who have a high likelihood of having additional pelvic anomalies may need a lower midline incision. It's possible that the appendix may be located and delivered to the wound with only a finger inserted into the abdominal cavity. In the event that it is necessary, the anterior taenia coli of the cecum may be followed by gently holding the cecum and using it as a guide in order to locate the base of the appendix. In cases where the appendix is located behind the cecum, it is necessary to perform medial mobilisation of the cecum in order to gain access to the appendix. This can be done bluntly using the finger, and then the tissue can be divided along the white line of Toldt using either a sharp instrument or an electrocautery device. Following successful appendix mobilisation, the vascular pedicle is separated using clamps, and the ends are knotted. It is possible to carry out this procedure in a single step at the base of the appendix, or it may be carried out in a stepwise approach along the mesoappendix, allowing for additional mobilisation throughout the length of the appendix until the base is reached. The appendix is then crushed 3 mm from the cecum with a straight artery clamp. The

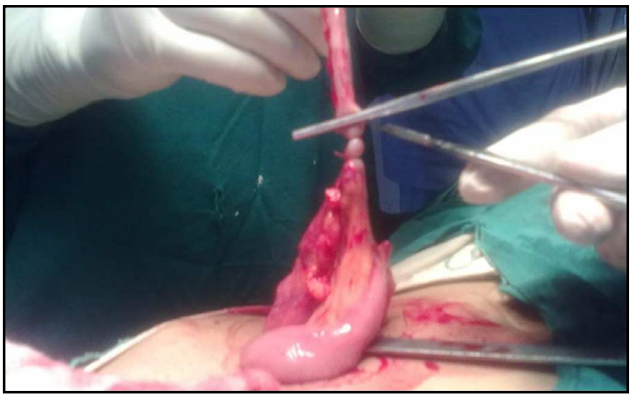
straight artery clamp is then placed to the appendix after being positioned about 3 mm further distally. A 2-0 ligature is then used to bind the appendix. To prevent any appendix spilling, the appendix is transected with a scalpel at the proximal side of the straight clamp. To reduce contamination, the mucosa of the appendiceal stump is cauterised and then removed together with the surgical field samples. While the benefit of inverting the appendiceal stump is debatable [120], it may be done by inserting a purse string or "z" suture through the muscle coat and taking up taenia coli. This is done around 1 cm from the base of the caecum (Pic. 12-15).

Pic 12. Grid Iron Incision

Pic 13. External Oblique Cut

Pic 14. Caecum with anterior Taenia

Pic 15. Appendix with Mesoappendix



Pic 16. Appendix Base Crushed and Ligated

b) *Laparoscopic Technique* [121-123]*:* Laparoscopy's use as a diagnostic tool, in particular for women of childbearing age, is the aspect of the procedure that provides the most benefit to the treatment of suspected appendicitis. In most cases, the surgeon will position himself on the left side of the patient, with the assistant on his right side. The anesthesiologist and the equipment used for anaesthesia will be put at the head end of the patient, and the monitor will be positioned at the patient's feet. In most cases, the surgery will include the placement of three ports. Two of them are immovable, namely the umbilical and suprapubic incisions; the third incision may be made on either the left or right periumbilical area, and its exact location is very variable according on the patient's anatomical make-up. Establishing and maintaining a pneumoperitoneum that has a CO2 pressure of 10-14 mm Hg or 2 litres of CO2 requires the use of insufflation of carbon dioxide. A laparoscope is introduced via this access point in order to examine the patient's whole abdominal cavity. A trocar with a diameter of 5 millimetres is placed just above the pubic symphysis in order to facilitate the entrance of surgical equipment (scissors, forceps, stapler). Another trocar measuring 5 millimetres is inserted into the left or right periumbilical area, often between the left costal border and the umbilicus, to provide room for the insertion of an atraumatic grasper that will be used to seize the appendix. The appendix is retracted upwards while being held in an atraumatic grasper. This exposes the mesoappendix, which is then split and ligated in order to skeletonize the appendix. In most cases, the mesoappendix is secured using either a linear endo-stapler, an endo-clip, an endo-loop, or a suture ligature. Now the base of the appendix is either transected using a linear stapler or ligated with a suture ligature, and it is extracted out of the abdominal cavity using a laparoscopic pouch via an umbilical or suprapubic cannula. Sutures that dissolve

are used to seal the layers of the abdominal wall, and either subcuticular or simple sutures are used to close the skin.

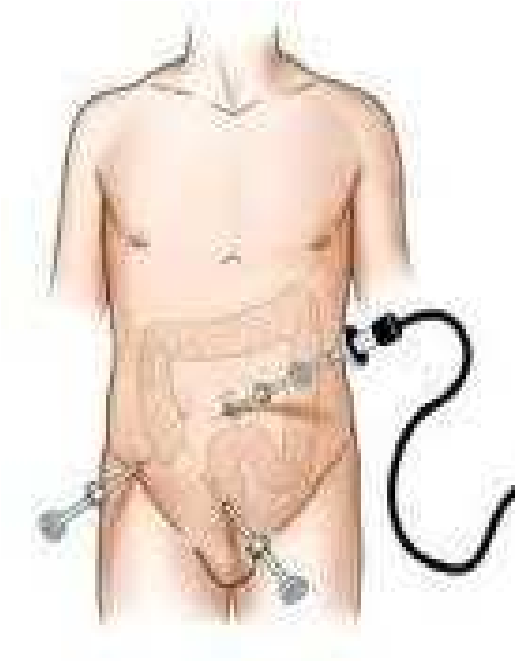
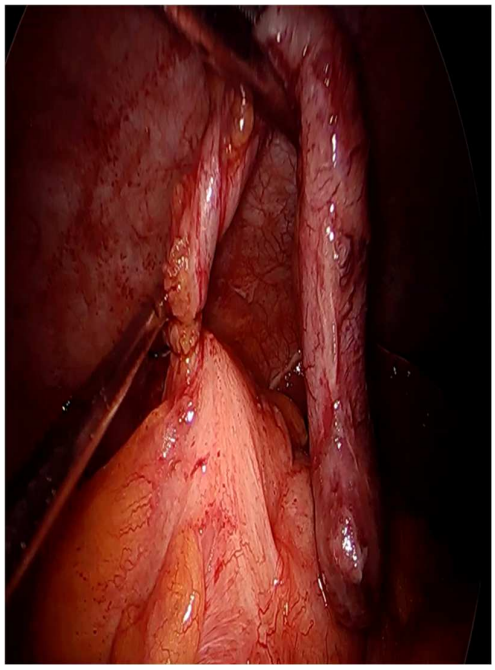


Fig. 12. Port Sites for Laparoscopic Appendectomy



Pic. 17. Laparoscopic View of Ligating Base of Appendix.

MATERIALS AND METHODS

Our study was conducted for a period of one year, from January 2021 up till December 2021, with 60 subjects being enrolled, all of whom had presented with complaints of pain abdomen at either the casualty / emergency room or at OPD of Department of General Surgery. Those subjects who on clinical evaluation were suspected of having Appendicitis were selected and further assessed based on both 'Appendicitis Inflammatory Response Score' and on 'Tzanakis Score' for Appendicitis.

This study was conducted at the Department of General Surgery, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum a teaching hospital attached to KLE Academy of Higher Education and Research's Jawaharlal Nehru Medical College, Belgaum.

STUDY DESIGN - It was an Observational Study

STUDY PERIOD - The present study has been conducted for a period of one year from January 2021 up till December 2021.

SOURCE of DATA – The subjects of this study were acquired from those patients that have either presented to our General Surgery OPD or to the Emergency Room with chief complaint of pain abdomen (towards the right lower quadrant).

SAMPLE SIZE – A total of 60 subjects have been enlisted in the study.

SAMPLE SIZE CALCULATION - Through a pilot study carried out the previous year the minimum required sample size was estimated using the following formula:

$$\mathbf{n = Z^2_{(1-\alpha/2)} \times S_p(1-S_p) / L^2 \times (1-P)}$$

where,

α = false positive

$Z_{(1-\alpha/2)}$ = standard normal deviate corresponding to the specified size of the critical region.

L = absolute precision desired on either side of sensitivity or specificity.

P = prevalence

Hence the values taken; α = 5%, $Z_{(1-\alpha/2)}$ = 1.96, **L** = 5%, **P** = 6.8%

An extra 10% was added to the obtained value, for taking into consideration maximum acceptable error.

A minimum total of 54 subjects were needed and hence 60 cases were enrolled into this study. Using systematic random sampling based on the data available along with the sample size- every second patient in every six patients was chosen with right iliac fossa pain in this study.

INCLUSION CRITERIA - Patients ≥ 8 years of age attending general surgery outpatient department and have been diagnosed and getting admitted for acute appendicitis in KLE, Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi.

EXCLUSION CRITERIA-

- Patient not willing to give consent for the study.
- Received systemic antibiotics within two weeks of proposed surgery
- History of prior intake of steroids
- Patients having perforation of appendix, mass formation
- Patients with a history of previous surgery

- Patients who are not fit for Surgery due to unstable vitals/blood counts or systemic conditions.
- Pregnant and lactating women.

ETHICAL CLEARANCE - The study was approved from the Institutional Ethical Committee, Jawaharlal Nehru Medical College, Belagavi prior to the commencement.

INFORMED CONSENT – All subjects clearing the selection criteria were counseled regarding the study and a written informed consent in the subjects own vernacular language was obtained prior to enrollment into the study. For legal minors (<18 years of age) the subjects parents/legal guardian/ care giver was counseled and their written informed consent on behalf of the minor was obtained.

METHOD OF DATA COLLECTION – Upon selection into the study each subject is individually interviewed to collect demographical data followed by a through detailed history taking for symptoms of; pain in abdomen, fever, nausea and vomiting clinically evaluated for signs of fever, right iliac fossa pain, rebound tenderness. Signs of appendicitis like tenderness at McBurney's point, rebound tenderness, Rovsing's sign, and fever were assessed by the surgeon. The above findings of each subject were recorded onto a special curated and pretested performa

All patients were subjected to the following hematological, biochemical and radological investigations:

- Complete Blood Count with Blood grouping,
- Prothrombin time with INR
- Serum electrolytes
- C- reactive protein (quantitative)
- Ultrasonography of abdomen + pelvis

All patients enrolled in the study had their collected data applied to both scoring systems.

Appendicitis Inflammatory Response Score

This system consists of 2-symptom, 1-sign and 4-laboratory values .

AIR score [15]

Vomiting	1
Pain in right lower quadrant	1
Muscular defense Light Medium Strong	 1 2 3
Body temperature >38.5 ^{o}C	1
Polymorphonuclear leucocytes70-84% Equal or more than 85%	 1 2
WBC 10000-14999 cells/mm^3 Equal or more than 15000/mm^3	 1 2
CRP estimation10-49 mg/l Equal or more than 50 mg/l	 1 2

sum 0-4 = low probability, sum 5-8 = intermediate group, sum 9-12 = high probability.

Tzanakis Score

Variables	Points
Positive USG for AA	6
Tenderness in RLQ	4
Rebound tenderness	3
Leukocyte count>12000/ul	2
Total score	15

Ultrasonography Abdomen and Pelvis had to be carried out by any radiology resident or higher, who were blinded to the physical examination and blood tests, but not to the patient's symptoms. 5MHz linear transducer as the standard probe was chosen to be used. Well established ultrasonography criteria were applied to discriminate an acutely inflamed appendix from a normal one.

Appendix specimen retrieved through any surgical intervention was to be sent in a 10% formalin containing jar for histological examination. Hematoxylin and eosin stain was used for the staining purpose.

Histopathological examination being considered the gold standard was used to compare with both Appendicitis Inflammatory Response score and Tzanakis score to generate specificity, sensitivity and diagnostic predictability of each score.

FOLLOWING DECISIONS WERE TAKEN:

- Subjects scoring 1-4 were observed and initiated on conservative line of management
- Those of the cohort scoring between 5-8 were initiated on conservative management and observed for next 24 hours for re-evaluation.
- For those with scores 9 and above were optimised and planned for appendectomy.
- But at any point if patients clinical condition was suggestive of acute appendicitis, then irrespective of scores obtained. As per the treating surgeons call these patients were subjected to undergo appendectomy

RESULTS

The current hospital research was conducted from January 2021 to December 2021 in the General Surgery Department at the KLES Dr. Prabhakar Kore Hospital and Medical Research Centre in Belgaum. The research included a total of sixty patients who visited the general surgery outpatient department (OPD) or emergency room complaining of discomfort in the right iliac fossa. The clinical signs and symptoms of the patients were examined, and then the Tzanakis Score and the Appendicitis Inflammatory Response score were determined in accordance with those findings.

Descriptive analysis:

Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency, and proportion for categorical variables. Non normally distributed quantitative variables were summarized by median and interquartile range (IQR). Bar charts, pie charts, and box plots were also used to effectively display data.

In order to ensure that all quantitative variables were normally distributed within their respective explanatory variable categories, we used histograms and normality Q-Q plots to do so. Normality was also tested for using the Shapiro-Wilk test. When the Shapiro-Wilk test probability threshold was >0.05, we defined normality.

Categorical outcome / Crosstab:

The Chi square test and Fisher's exact test were used in order to do group comparisons based on categorical results. (The Fisher exact test was used if the total sample size was less than twenty or whenever the predicted number in any one of the cells was less than five.)

Normal 2 group (Independent sample t-test):

For normally distributed Quantitative parameters the mean values were compared between study groups using independent sample t-test (2 groups)

Receiver Operative Curve analysis:

The **Air Score** in predicting **Histopathology Report** was assessed by Receiver Operative curve (ROC) analysis. area under the ROC curve along with its 95% CI and p value are presented. Basing on the ROC analysis, it was decided to consider 5.50 as the cut off value. The sensitivity, specificity, predictive values, and diagnostic accuracy of the screening test with the decided to cut off values along with their 95% CI were presented.

Diagnostic test:

Histopathology Report was considered as gold standard. *AIR Score & Tzanakis score* were considered as test under scrutiny. The sensitivity, specificity, predictive values, and diagnostic accuracy of the screening test along with their 95% CI were presented. Reliability of the screening test was assessed by kappa statistic along with its 95% CI and p Value.

P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis. [124]

Results: A total 60 subjects were included in the final analysis**.**

Table 6: Descriptive analysis of Demographic Parameter of hospital stays in days in study population (N=60)

Demographic Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Age	31.27 ± 14.56	26.5	6.0	72.0	27.5	35.0
Duration of Hospital Stay in Days	5 ± 1.81	5.0	2.0	9.0	4.5	5.5

Table 7: Descriptive analysis of gender in the study population (N=60)

Gender	Frequency	Percentages
Male	31	51.67%
Female	29	48.33%

The present research indicated that there was a modest male preponderance, with 51.67 percent of the participants being male, and it discovered that the largest occurrence of the condition occurred among younger people in their second and third decades of life. All of the patients who took part in this research required a hospital stay that was, on average, between five to six days long.

Graph 1: Bar chart of gender in the study population (N=60)

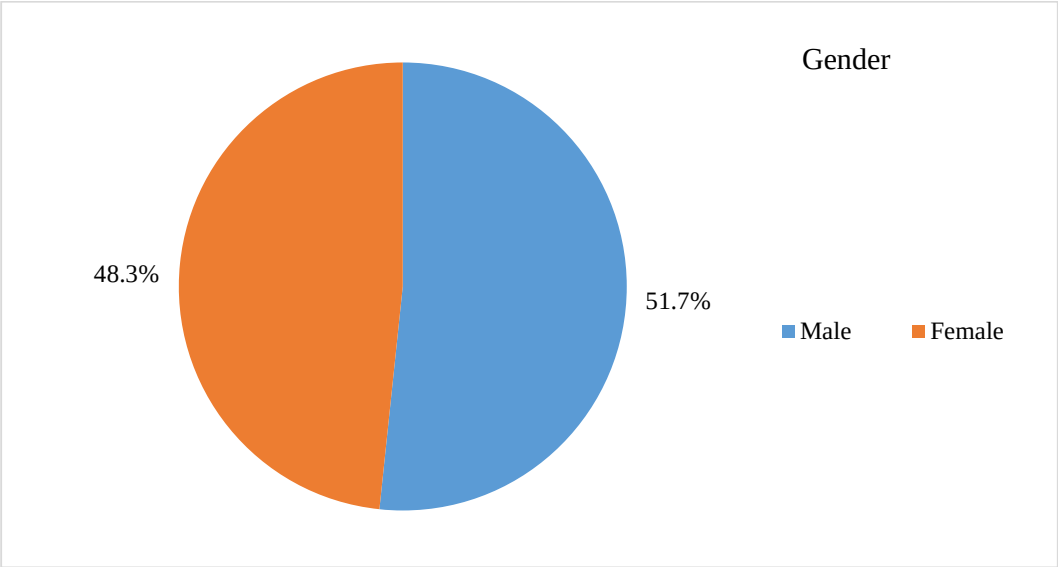
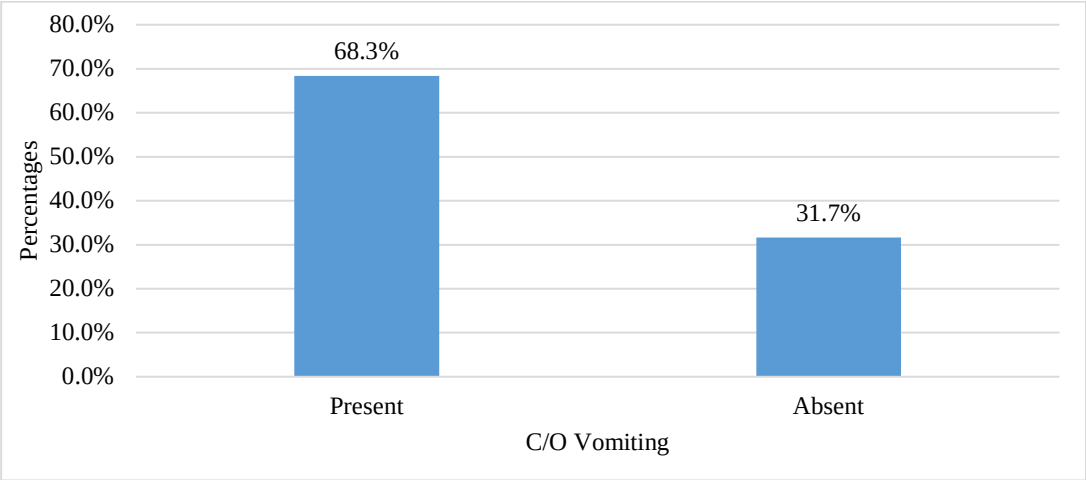


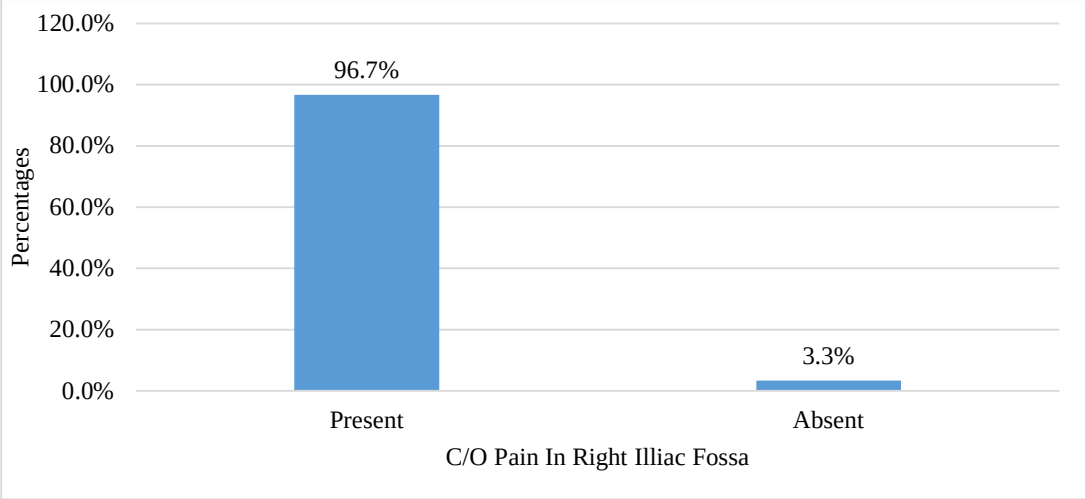
Table 8: Descriptive analysis of c/o vomiting in the study population (N=60)

Symptoms	Frequency	Percentages
C/O Vomiting		
Present	41	68.33%
Absent	19	31.67%
C/O Pain in Right Iliac Fossa		
Present	58	96.67%
Absent	2	3.33%

Graph 2: Bar chart of c/o vomiting in the study population (N=60)



Graph 3: Bar chart of C/O Pain in Right Iliac Fossa in the study population (N=60)



Right iliac fossa discomfort seems to be a nearly universal symptom in all instances, and vomiting is often reported in conjunction with this complaint.

Table 9: Descriptive analysis of rebound tenderness in the study population (N=60)

Rebound Tenderness	Frequency	Percentages
Present	33	55.00%
Absent	27	45.00%

Graph 4: Pie chart of rebound tenderness in the study population (N=60)

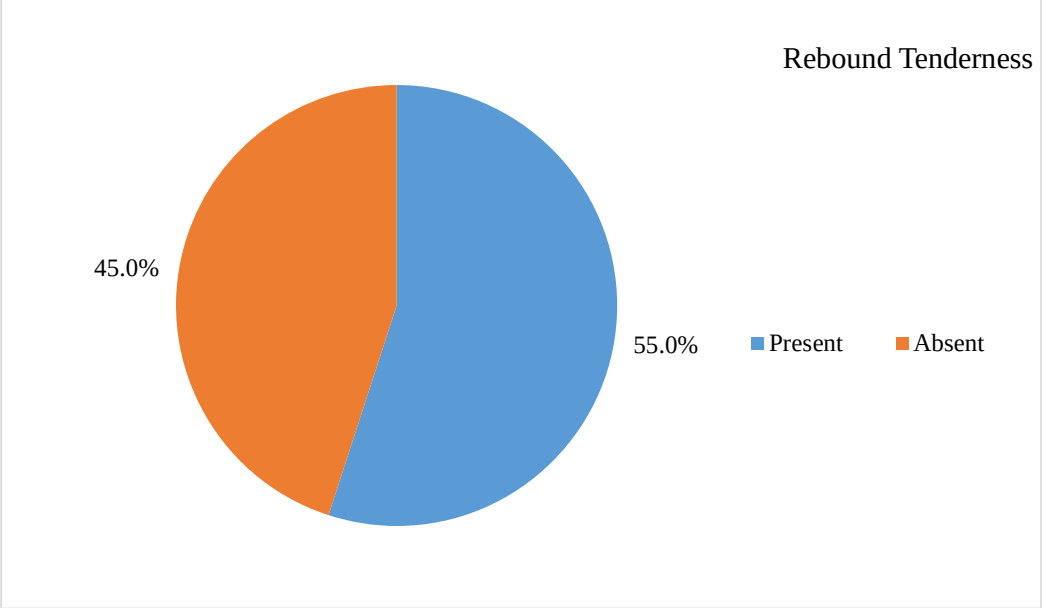


Table 10: Descriptive analysis of temperature in (Celsius) study population (N=60)

Parameter	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Temperature In (Celsius)	38.01 ± 0.48	38.1	36.9	38.8	37.9	38.1

In the population that this study is focusing on, the sign of rebound tenderness, also known as the Bloomberg's sign, presents in a way that is equivocal. Fever being present in the majority of cases, with a temperature of 38 degrees Celsius on average.

Table 11: Descriptive analysis of Laboratory Investigations study population (N=60)

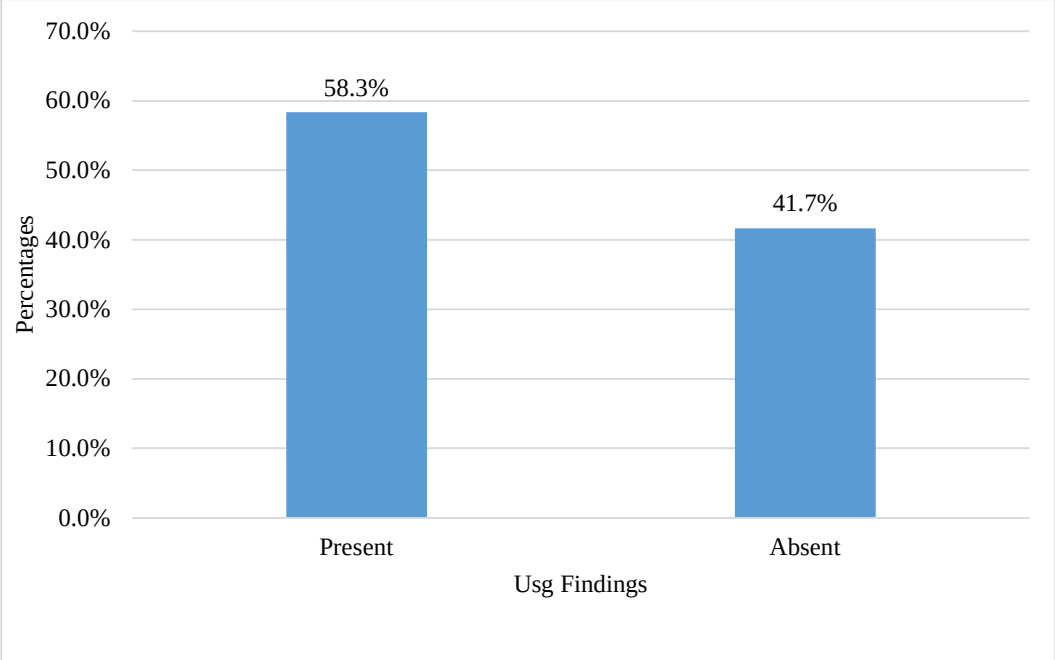
Laboratory Investigations	Mean ± SD	Median	Minimum	Maximum	95% C.I	
					Lower	Upper
Total Leucocyte Count (Per m1)	11734.65 ± 3957.83	11095.0	5470.0	19700.0	10712.2	12757.1
Segmented Neutrophil Per 100 HPF	70.62 ± 12.85	73.0	42.0	94.0	67.3	73.9
C- Reactive Protein	53.75 ± 2.32	35.1	0.3	304.5	35.1	72.4

In vast number of patients, leucocytosis was detected, with an average of 11,734 white blood cells per millimetre cube. There was an increase in C-reactive proteins that measured an average of 53.75 mg/L. Neutrophilia was not a prominent characteristic in any of the blood pictures of the cases that were examined.

Table 12: Descriptive analysis of USG findings in the study population (N=60)

USG Findings	Frequency	Percentages
Present	35	58.33%
Absent	25	41.67%

Graph 5: Bar chart of USG findings in the study population (N=60)

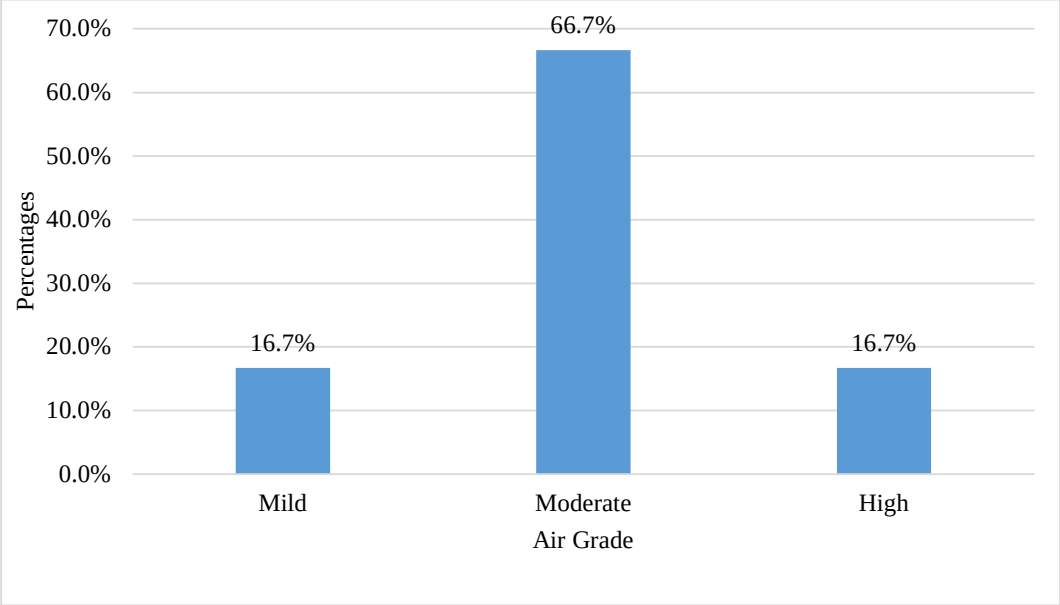


In this analysis, ultrasonography was only able to correctly identify 58.33% of instances with acute appendicitis, while the other cases were either difficult to diagnose or were not identified at all by the single radiological modality that was used for this study.

Table 13: Descriptive analysis of AIR grade in the study population (N=60)

Air Grade	Frequency	Percentages
Mild	10	16.67%
Moderate	40	66.67%
High	10	16.67%

Graph 6: Bar chart of air grade in the study population (N=60)



In this research, the majority of patients, when evaluated according to the appendicitis inflammatory response score, were found to fall into the moderate category.

Table 14: Descriptive analysis of histopathology report in the study population (N=60)

Histopathology Report	Frequency	Percentages
Acute Appendicitis	29	48.33%
Chronic Appendicitis	19	31.67%
Acute On Chronic Appendicitis	8	13.33%
Impending Perforation of Appendices	3	5.00%
Chronic Obliterated Appendices	1	1.67%

On histopathological inspection, acute appendicitis is observed in the largest number of cases, followed by chronic appendicitis, and then acute on chronic appendicitis.

Graph 7: Bar chart of histopathology report in the study population (N=60)

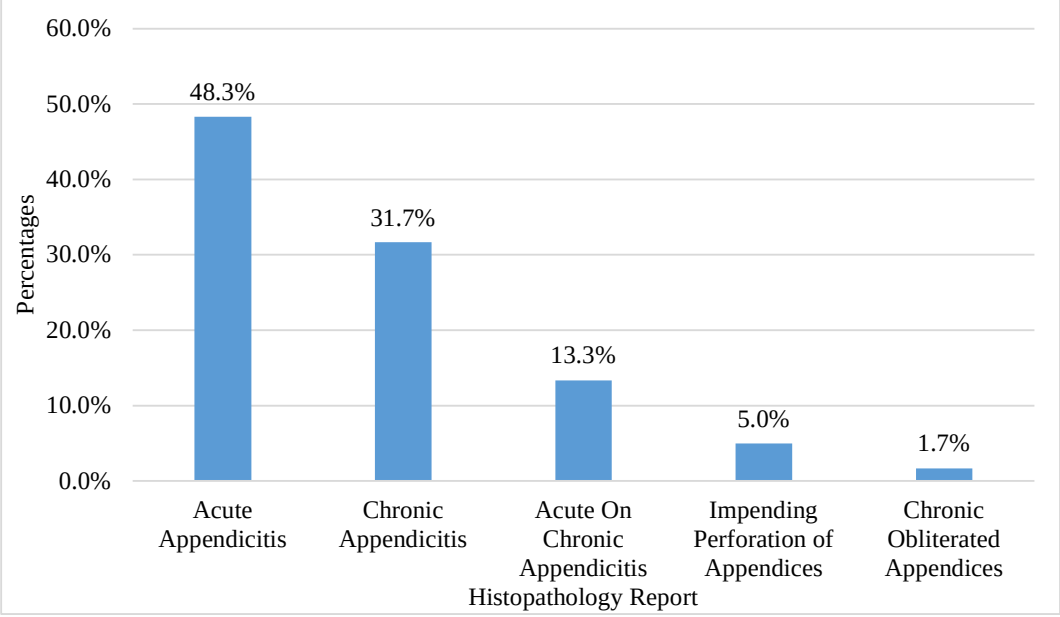
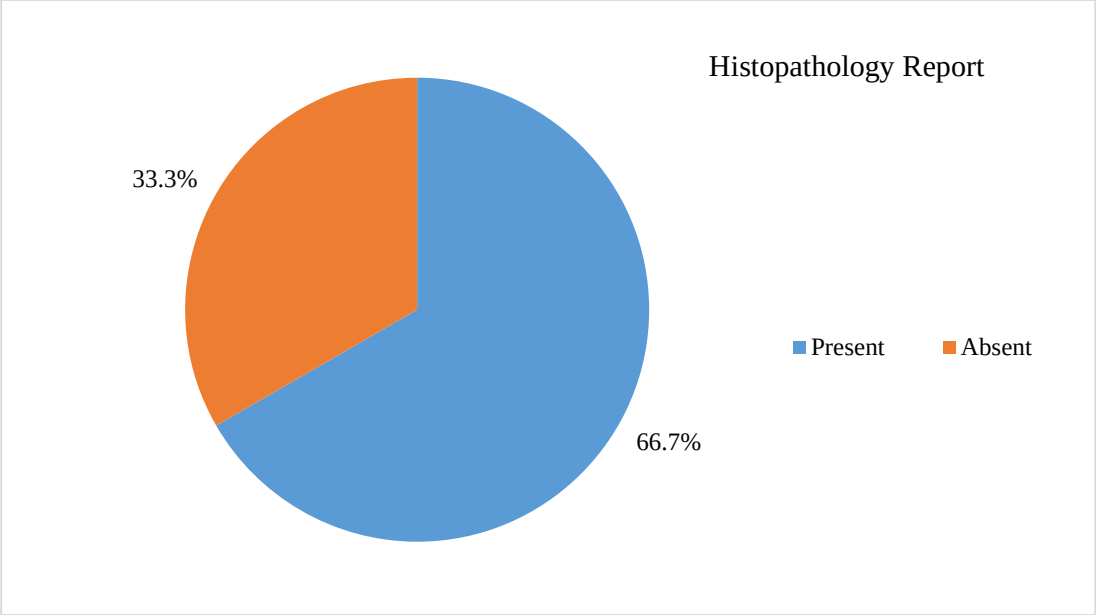


Table 15: Descriptive analysis of histopathology report in the study population (N=60)

Histopathology Report	Frequency	Percentages
Positive	40	66.67%
Negative	20	33.33%

Graph 8: Pie chart of histopathology report in the study population (N=60)



In this research, the maximum number of participants were identified out as acute appendicitis according to HPR, with more than half of the cohort being proven as a diagnosis of acute appendicitis.

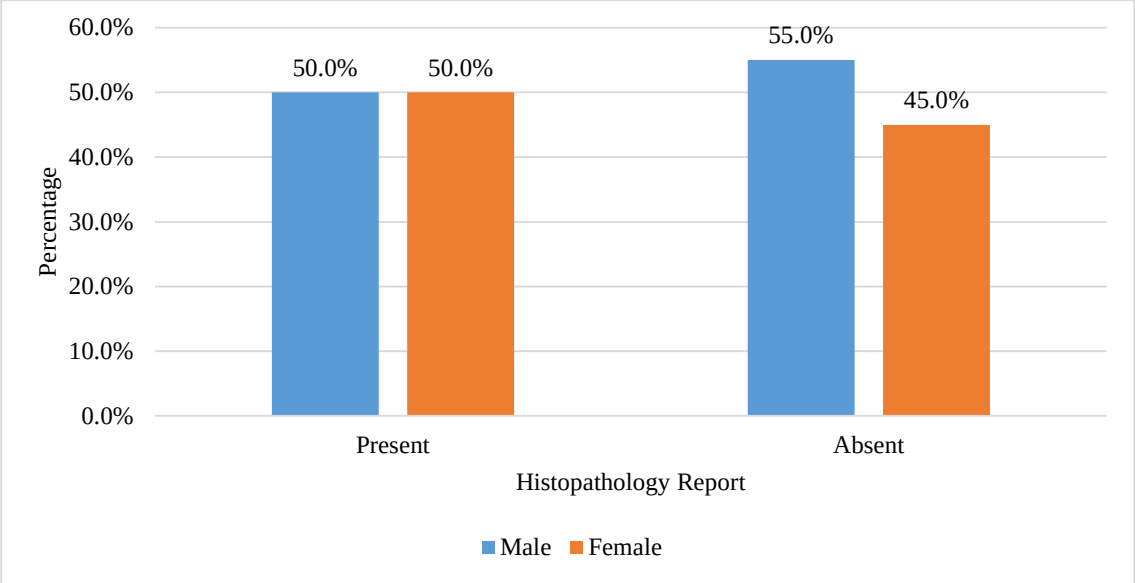
Table 16: Comparison of mean of age & Duration between hospital stay (N=60)

Parameter	Histopathology Report (Mean± SD)		P value
	Present (N=40)	Absent (N=20)	
Age	32.15 ± 13.92	29.5 ± 16	0.511
Duration of hospital stay in days	4.8 ± 1.73	5.4 ± 1.96	0.230

Table 17: Comparison of gender between histopathology report (N=60)

Gender	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
Male	20 (50%)	11 (55%)	0.133	0.715
Female	20 (50%)	9 (45%)		

Graph 9: Cluster bar chart of comparison of gender between histopathology report (N=60)



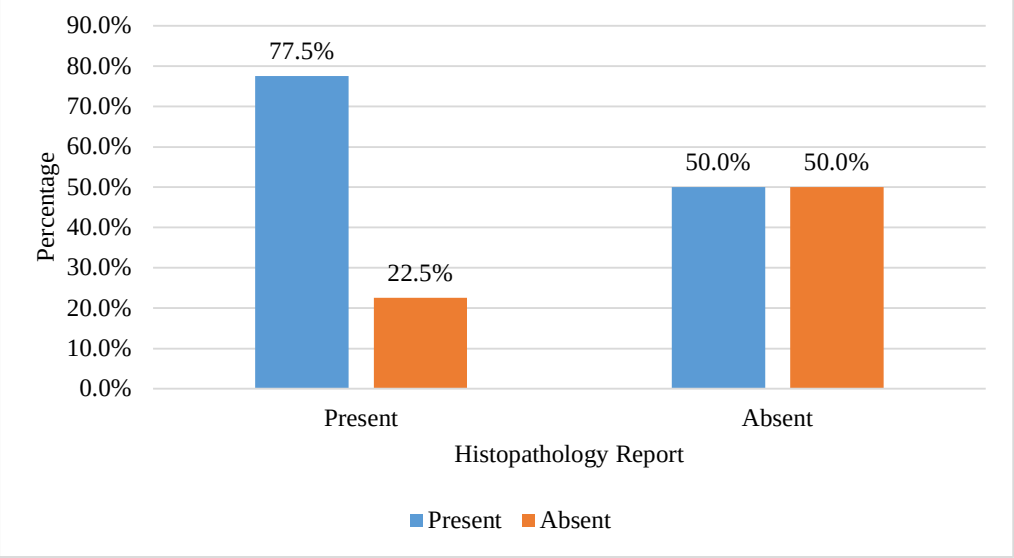
On the basis of patients' ages and genders, there is not observed to be a statistically significant association with the incidence of acute appendicitis

Table 18: Comparison of Symptoms between histopathology report (N=60)

Symptoms	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
C/O Vomiting				
Present	31 (77.5%)	10 (50%)	4.660	0.031
Absent	9 (22.5%)	10 (50%)		
C/o Pain in right iliac fossa				
Present	39 (97.5%)	19 (95%)	0.259	1.000*
Absent	1 (2.5%)	1 (5%)		

Note: *Fisher's Exact P-value

Graph 10: Cluster bar chart of comparison of C/O Vomiting between histopathology report (N=60)



Due to the fact that only patients presenting with pain in right iliac fossa were included in this study, Fishers exact P-value of 1 makes it clear that the null

hypothesis cannot be rejected and that no correlation between pain in the right iliac fossa and acute appendicitis could be established. Additionally, because of its ambiguous distribution, no statistically significant correlation between vomiting and acute appendicitis could be established. In the following data an equivocal response was found amongst rebound tenderness and acute appendicitis.

Graph 11: Cluster bar chart of comparison of C/o Pain in right iliac fossa between histopathology report (N=60)

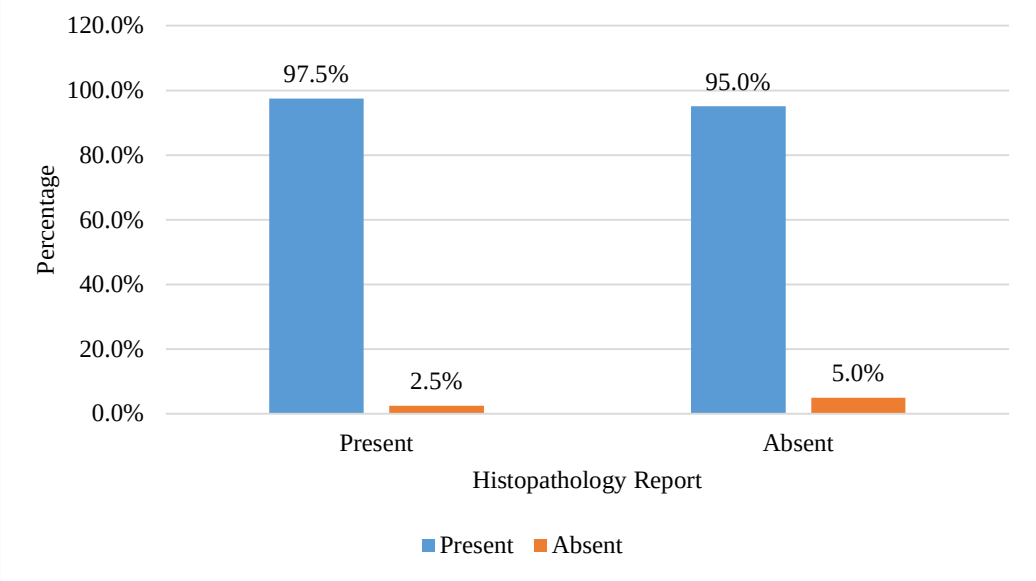


Table 19: Comparison of Rebound Tenderness between histopathology report (N=60)

Rebound Tenderness	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
Present	26 (65%)	7 (35%)	4.848	0.028
Absent	14 (35%)	13 (65%)		

Graph 12: Cluster bar chart of comparison of Rebound Tenderness between histopathology report (N=60)

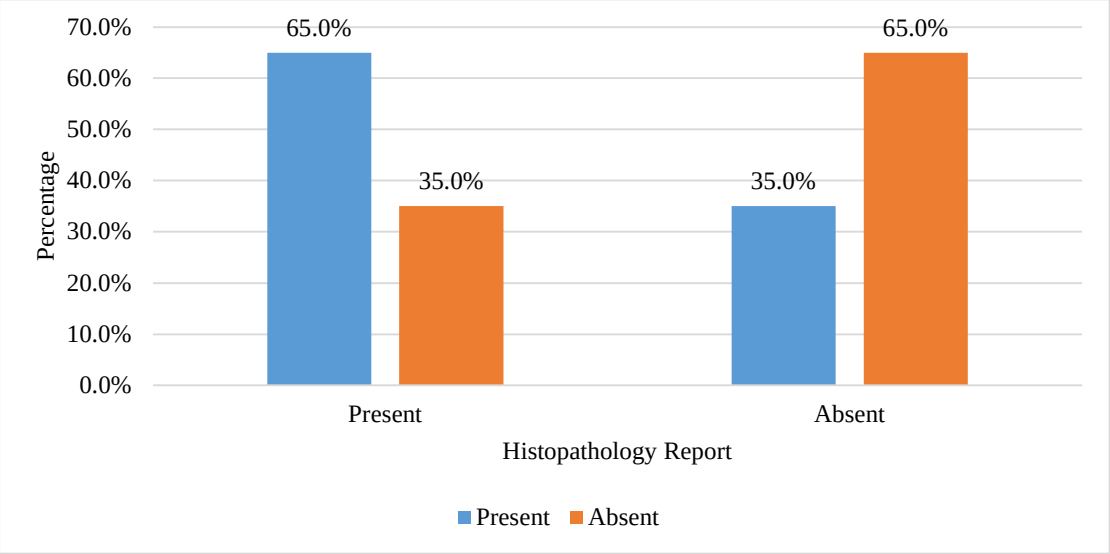


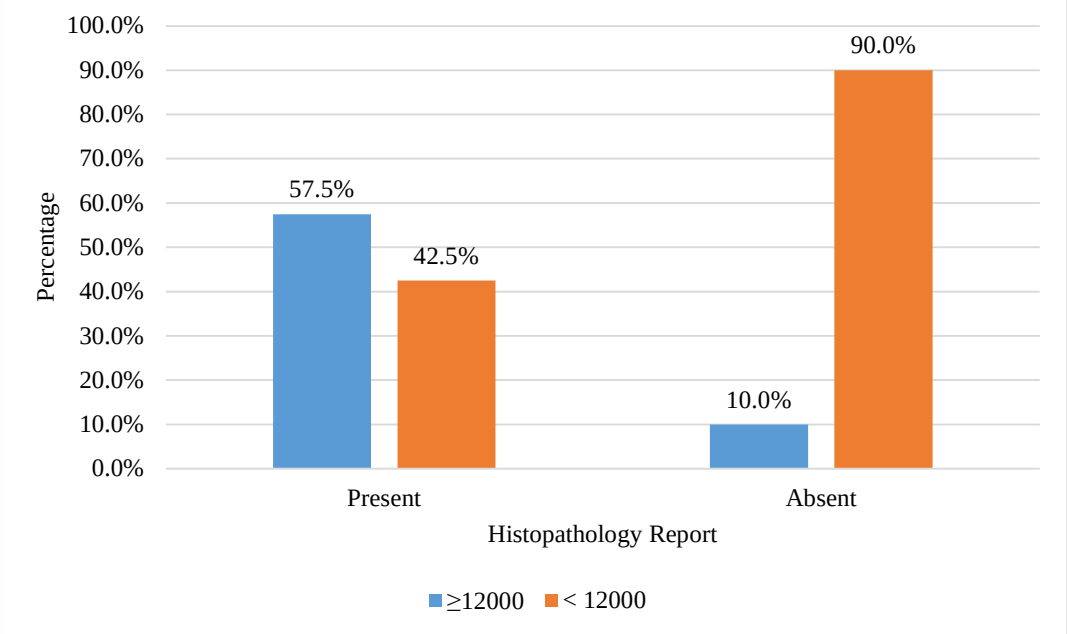
Table 20: Comparison of mean of temperature in (Celsius) & Laboratory investigation between histopathology report(N=60)

Parameter	Histopathology Report (Mean± SD)		P value
	Present (N=40)	Absent (N=20)	
Temperature in (Celsius)	38.09 ± 0.47	37.86 ± 0.48	0.082
Total Leucocyte Count (PER ml)	12913.25 ± 3997.44	9377.45 ± 2658.74	<0.001
Segmented Neutrophil per 100 HPF	72.6 ± 13.44	66.65 ± 10.84	0.091
C- reactive protein	65.22 ± 84.27	30.8 ± 28.91	0.082

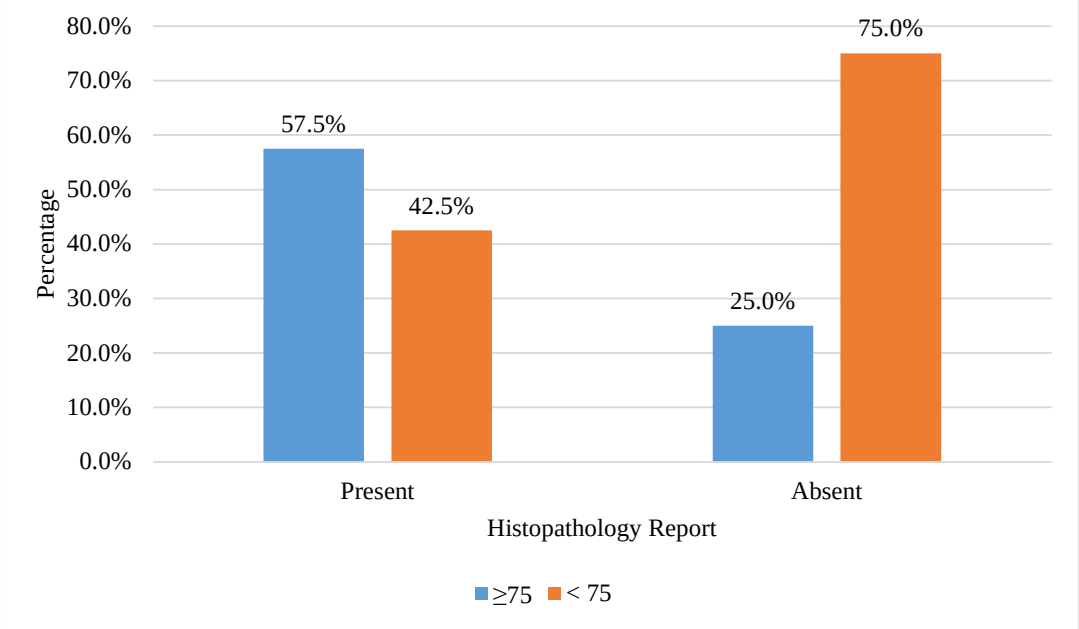
Table 21: Comparison of & Laboratory investigation between histopathology report (N=60)

Laboratory investigation	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
Total Leucocyte Count (per ml)				
≥12000	23 (57.5%)	2 (10%)	12.377	<0.001
< 12000	17 (42.5%)	18 (90%)		
Segmented Neutrophil Per 100 hpf				
≥75	23 (57.5%)	5 (25%)	5.658	0.017
< 75	17 (42.5%)	15 (75%)		
TLC > 12,000cells/mm				
Present	22 (55%)	2 (10%)	11.250	<0.001
Absent	18 (45%)	18 (90%)		

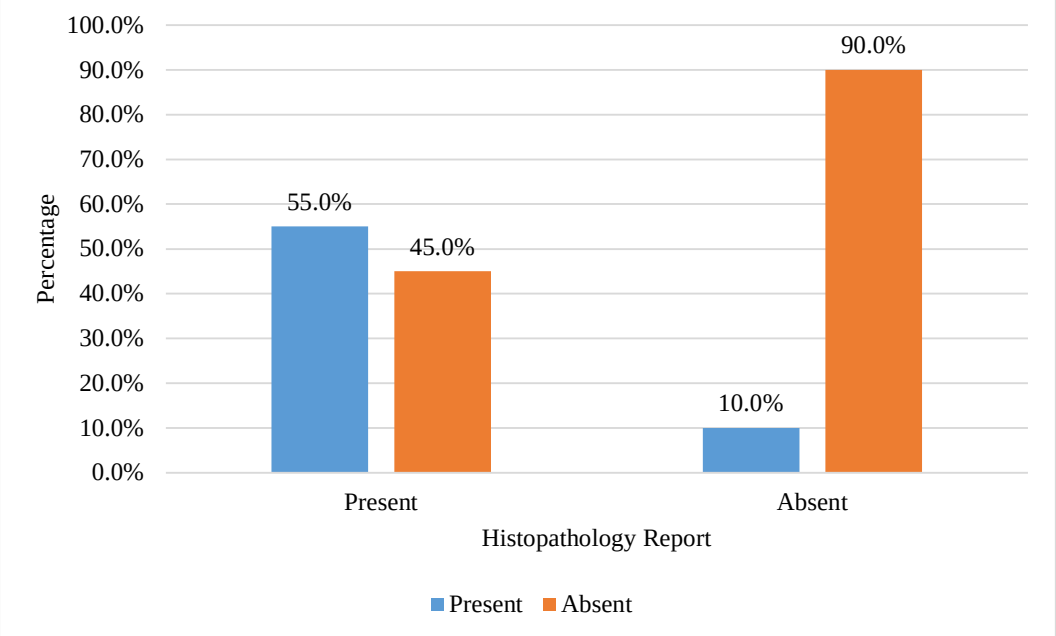
Graph 13: Cluster bar chart of comparison of total leucocyte count (per ml) between histopathology report (N=60)



Graph 14: Cluster bar chart of comparison of segmented neutrophill per 100 hpf between histopathology report (N=60)



Graph 15: Cluster bar chart of comparison of TLC > 12,000cells/mm between histopathology report (N=60)

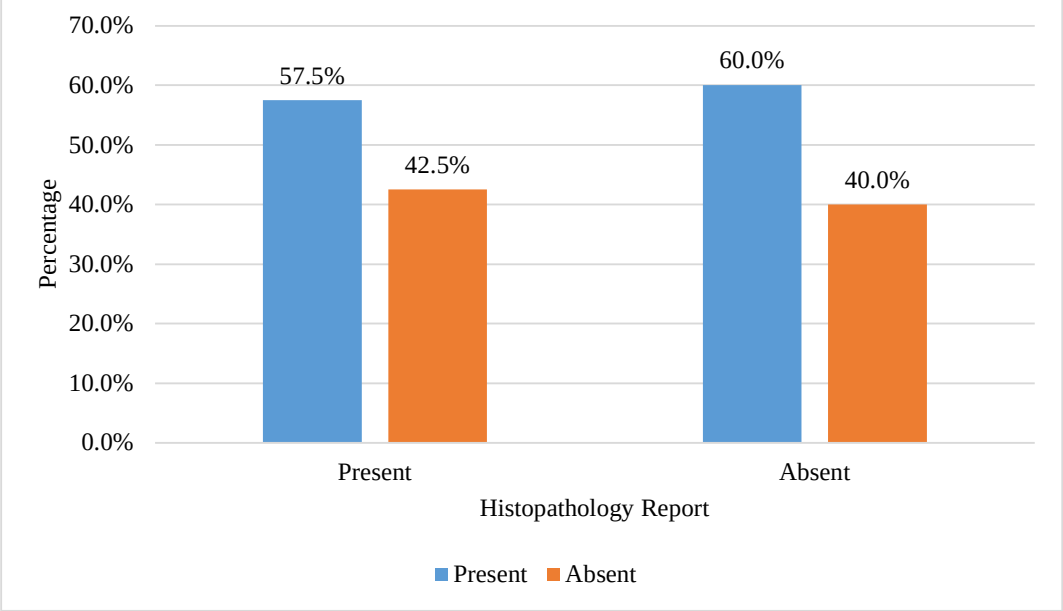


In this study, a predictive relationship between neutrophil count and CRP was not found as a stand-alone marker; however, a total leucocyte count of more than 12,000 cells/mm cube stood out as being statistically significant for a contender as a stand-alone marker for acute appendicitis.

Table 22: Comparison of USG findings between histopathology report (N=60)

USG Findings	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
Present	23 (57.5%)	12 (60%)	0.034	0.853
Absent	17 (42.5%)	8 (40%)		

Graph 16: Cluster bar chart of comparison of USG findings between histopathology report (N=60)



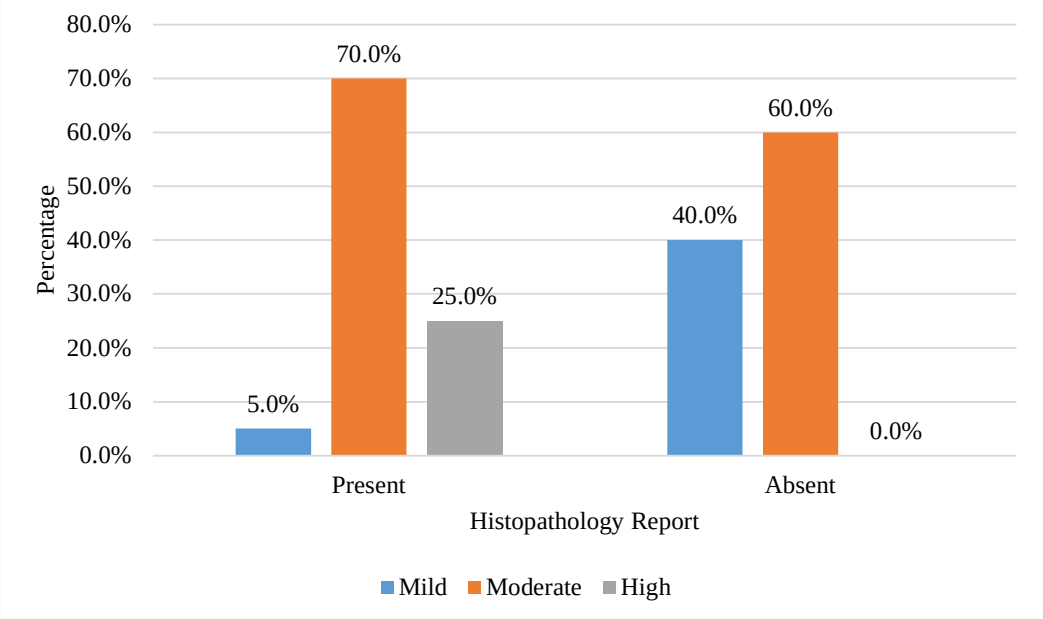
Despite the fact that ultrasonography was able to accurately identify acute appendicitis in the majority of cases, this prediction did not accumulate to any statistically significant consequence.

Table 23: Comparison of AIR grade between histopathology report (N=60)

AIR Grade	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
Mild	2 (5%)	8 (40%)	15.000	<0.001
Moderate	28 (70%)	12 (60%)		
High	10 (25%)	0 (0%)		

The categorization of patients according to the Grades of Appendicitis Inflammatory Response Score demonstrates a potential for application in daily practise, as shown by the findings produced from this study.

Graph 17: Cluster bar chart of comparison of air grade between histopathology report (N=60)



Graph 18: Predictive validity of AIR score in predicting histopathology report (N=60)

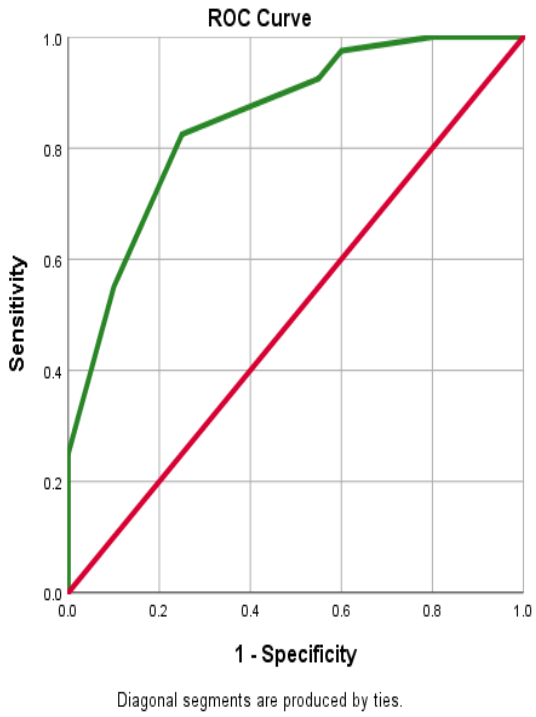


Table 24: Area under the curve for predictive validity of AIR score in predicting Histopathology Report (N=60)

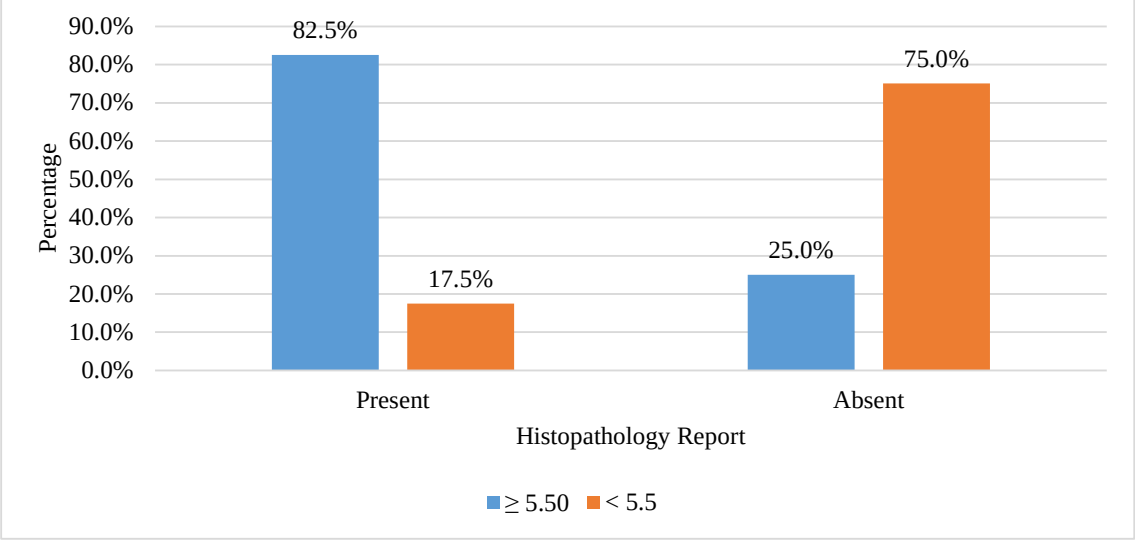
Test Result Variable(s): AIR score				
Area Under the Curve	**Std. Error**	**95% Confidence Interval of AUC**		**P Value**
		Lower Bound	**Upper Bound**	
0.851	0.052	0.750	0.952	<0.001

Table 25: Comparison of air score between histopathology report (N=60)

Air Score	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
Air Score Roc Cut off method				
≥ 5.50	33 (82.5%)	5 (25%)	18.983	<0.001
< 5.5	7 (17.5%)	15 (75%)		
Air Score (Given Method-I)				
> 4	39 (97.5%)	12 (60%)	14.706	<0.001*
≤ 4	1 (2.5%)	8 (40%)		
Air Score (Given Method-II)				
> 8	16 (40%)	1 (5%)	8.044	0.005
≤8	24 (60%)	19 (95%)		

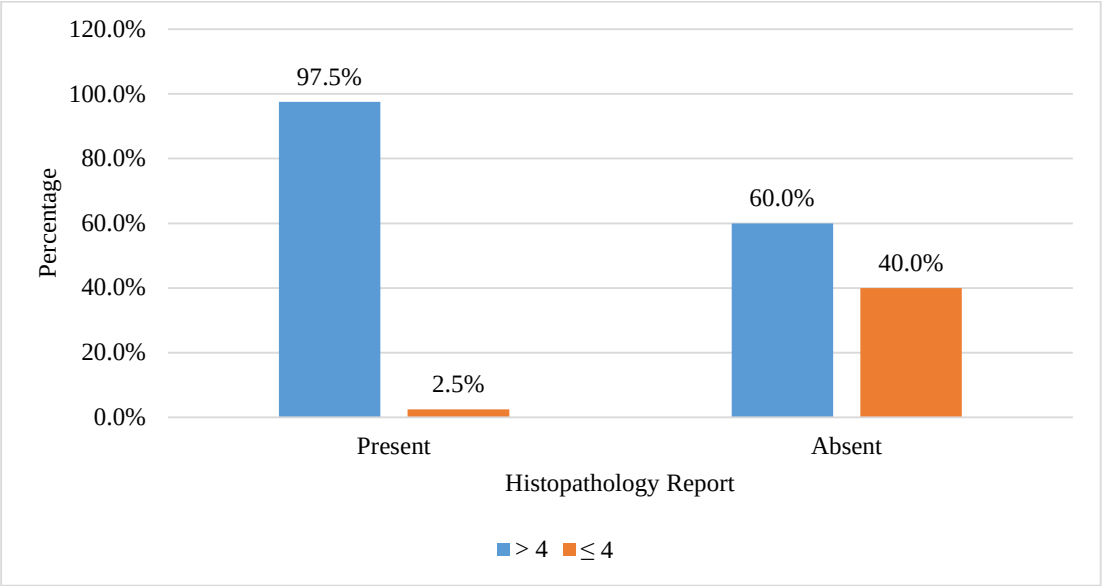
Note: *Fisher's Exact P-value

Graph 19: Cluster bar chart of comparison of Air Score Roc Cut off method between histopathology report (N=60)



After analysing the ROC, a score of 5.5 was determined to be the cut off value for the prediction of acute appendicitis through using study population in this research.

Graph 20: Cluster bar chart of comparison of Air Score (Given Method-I) between histopathology report (N=60)



Graph 21: Cluster bar chart of comparison of Air Score (Given Method-II) between histopathology report (N=60)

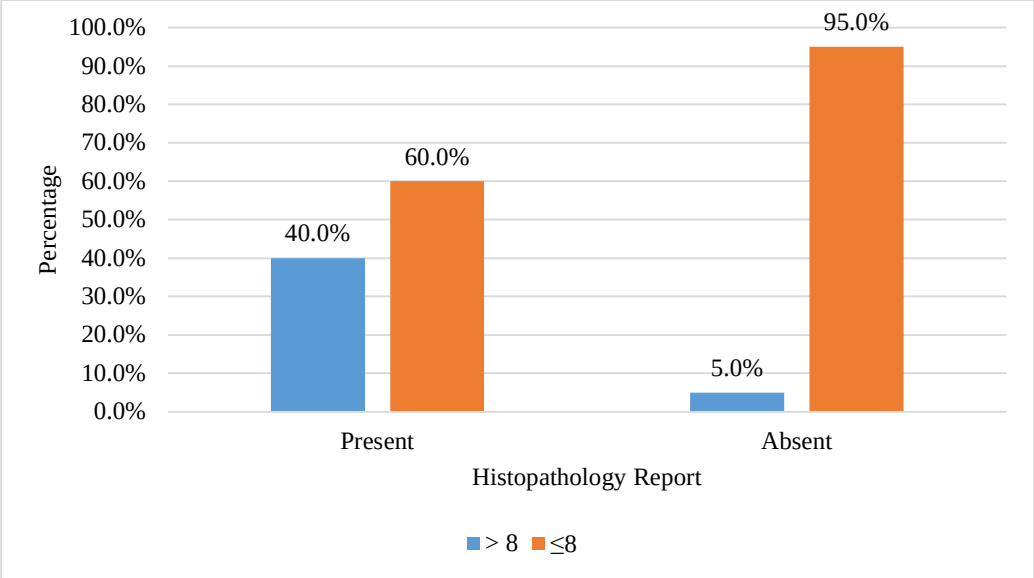


Table 26: Predictive validity of Air Score in predicting histopathology report (N=60)

Parameter	Value	95% CI	
		Lower	Upper
Air Score Roc Cut off method *(≥ 5.50 & <5)*			
Sensitivity	82.50%	67.22%	92.66%
Specificity	75.00%	50.90%	91.34%
False positive rate	25.00%	8.66%	49.10%
False negative rate	17.50%	7.34%	32.78%
Positive predictive value	86.84%	71.91%	95.59%
Negative predictive value	68.18%	45.13%	86.14%
Diagnostic accuracy	80.00%	67.67%	89.22%
Air Score (Given Method-I) (>4 & ≤ 4)			
Sensitivity	97.50%	86.84%	99.94%
Specificity	40.00%	19.12%	63.95%
False positive rate	60.00%	36.05%	80.88%
False negative rate	2.50%	0.06%	13.16%
Positive predictive value	76.47%	62.51%	87.21%
Negative predictive value	88.89%	51.75%	99.72%
Diagnostic accuracy	78.33%	65.80%	87.93%
Air Score (Given Method-II) (>8 & ≤ 8)			
Sensitivity	40.00%	24.86%	56.67%
Specificity	95.00%	75.13%	99.87%
False positive rate	5.00%	0.13%	24.87%
False negative rate	60.00%	43.33%	75.14%
Positive predictive value	94.12%	71.31%	99.85%
Negative predictive value	44.19%	29.08%	60.12%
Diagnostic accuracy	58.33%	44.88%	70.93%

The Appendicitis Inflammatory Response Score has a diagnostic accuracy of 80%, with a sensitivity of 82%, a specificity of 75%, a positive predictive value of 86.84%, and a negative predictive value of 68.18%. When using a cut off score of 4, the highest level of sensitivity is reached, which is 97.50%, and when using a cut off score of 8, the highest level of specificity is seen, which is 95%.

Table 27: Comparison of Tzanaki's Score between histopathology report (N=60)

Tzanaki's Score	Histopathology Report		Chi square	P value
	Present (N=40)	Absent (N=20)		
≥ 8	30 (75%)	12 (60%)	1.429	0.232
<8	10 (25%)	8 (40%)		

Graph 22: Cluster bar chart of comparison of Tzanakis Score between histopathology report (N=60)

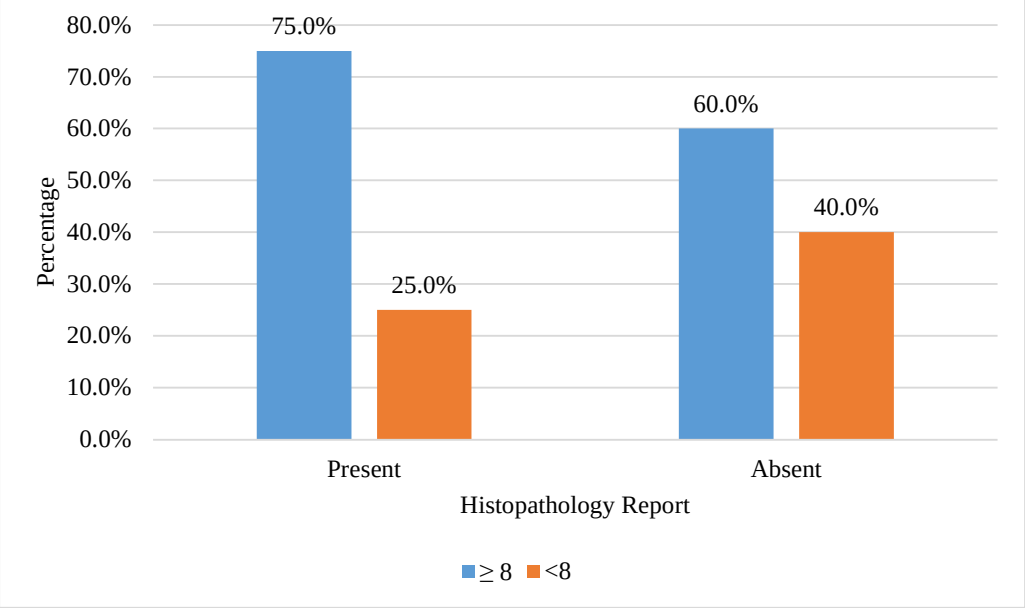


Table 28: Predictive validity of Tzanakis Score in predicting histopathology report (N=60)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	75.00%	58.80%	87.31%
Specificity	40.00%	19.12%	63.95%
False positive rate	60.00%	36.05%	80.88%
False negative rate	25.00%	12.69%	41.20%
Positive predictive value	71.43%	55.42%	84.28%
Negative predictive value	44.44%	21.53%	69.24%
Diagnostic accuracy	63.33%	49.90%	75.41%

Of the total 60 participants, 42 patients were diagnosed as acute appendicitis by the Tzanakis score, which showed a diagnostic accuracy of 63.33 and had a sensitivity and specificity of 75% and 40%, respectively.

Graph 23: Predictive validity of AIR score & Tzanakis score in predicting histopathology report (N=60)

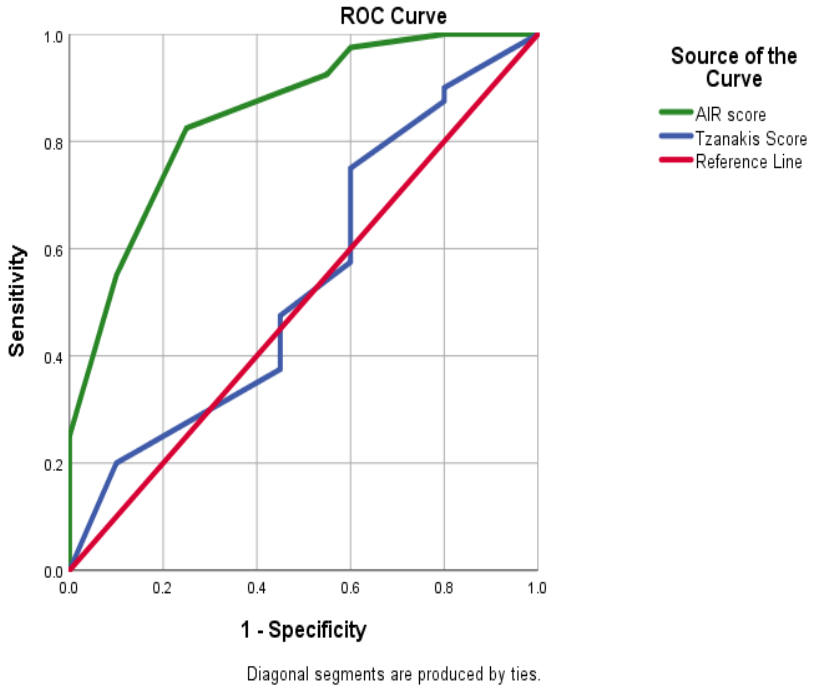


Table 29: Area under the curve for predictive validity of AIR score & Tzanakis score in predicting histopathology report (N=60)

Test Result Variable(s):				
Area Under the Curve	**Std. Error**	**95% Confidence Interval of AUC**		**P Value**
		Lower Bound	**Upper Bound**	
AIR score				
0.851	0.052	0.750	0.952	<0.001
Tzanakis score				
0.542	0.081	0.383	0.701	0.542

Based on a comparison of the ROC curves of both scores that were acquired in this study, the Appendicitis Inflammatory Response score was shown to have superior diagnostic accuracy compared to the Tzanakis Score.

DISCUSSION

Acute appendicitis is a frequent cause of severe abdominal pain that requires surgery. It affects a lot of individuals, but it's hard to diagnose since it might be confused with other ailments. Right lower lobe pneumonia, mesenteric lymphadenitis, gastroenteritis, and plethora of urologic and/or gynecologic illnesses may be misinterpreted as acute appendicitis. It's important to shorten the time between the beginning of acute appendicitis and proper diagnosis and treatment. If the diagnosis is delayed, perforation and consequences increase [125]. Perforated appendicitis has a greater mortality risk than non-perforated appendicitis. A delayed diagnosis might lead to perforation. On the one hand, there is the anxiety that the appendectomy will be negative, and on the other side, the diagnosis may be impeded, emulating a doctor 'being trapped between a rock and a hard place' to continue with care. Even with today's extensive variety of radiological modalities and 200 years of clinical experience, only direct view of the appendix via open laparotomy or any current minimally invasive approach can reliably diagnose appendicitis. Reduce negative appendectomy and rupture rates. Consequently, it is prudent to reduce the negative appendectomy and appendiceal rupture rates. A reduction in the number of needless appendectomies should not result in an increase in perforation rates.

In the past, it was understood that the expense of avoiding appendiceal perforation warranted accepting a larger negative appendectomy rate, ranging from 15 to 25 percent. Negative appendectomy rates as little as 2% and appendiceal perforation rates as high as 9% have been obtained, however, thanks to the utilization of CT scans [126,127]. There is a risk of complications associated with a negative appendectomy. Even if the death rate is low, it is possible for there to be a morbidity rate of 10-15% [4]. When compared with patients who have appendicitis, those who

have a negative appendectomy often have a much longer hospital stay and incur significantly higher overall admission costs. According to reports, the incidence of hospital readmission after appendectomy that is directly attributable to adhesions is 0.9%; as a result, the rate of negative appendectomy should be decreased to as low of a level as feasible [126].

The surgeon's clinical impression is the most important factor in making the diagnosis of acute appendicitis. It has been estimated that the clinical diagnosis of acute appendicitis has an accuracy rate ranging from around 70% to 87% of the time [129]. In order to arrive at a precise diagnosis of acute appendicitis, in addition to clinical examination, several laboratory indices of inflammation such as Total Leucocyte Count and CRP, ultrasonography, CT and laparoscopy are used. This arsenal has unquestionably contributed to an improvement in diagnostic accuracy and helped to bring the incidence of unnecessary appendectomies down. Nevertheless, not everyone has access to these different modalities [130-132].

At the moment, an ultrasound examination and a computed tomography scan are heavily relied on in order to make a diagnosis of acute appendicitis. In addition to being non-invasive, conveniently accessible, and economical, ultrasound scans are capable of doing more than computed tomography (CT) scans. However, its influence on the clinical outcomes of patients cannot be determined with absolute accuracy since it is reliant on the practitioner. In many labs, counting neutrophils as a parameter of the Appendicitis Inflammatory Response scale is not part of the standard operating procedure. Imaging using computed tomography also helps in establishing a definitive diagnosis and has been shown to have excellent sensitivity (94%) and specificity (95%) for identifying acute appendicitis. Both of these metrics are important in determining whether or not a patient has the condition. In addition, none of these

approaches is economical, it takes a significant amount of time to implement them, and they are not easily accessible [133].

In order to improve the accuracy of the diagnosis of acute appendicitis and reduce the Negative appendectomy rate down, several grading systems are being implemented. These include, but are not limited to, Alvarado, Samuel, Tzanakis, Ohmann, Eskelinen, Fanyo, and Lindberg, as well as the logistic score of Kharbanda et al. and so on. The Alvarado score, which was produced in 1986 [134], is the one that has gained the greatest prominence among these. The AIR Sore was conceived of in 2008 in Sweden and functions as a modification of the Alvarado score [135]. Meanwhile, the TS may be applied to avoid a negative appendectomy. It was developed in 2005 in Greece based on information that had been provisionally obtained of components that had their own independent prognostic value, and a numerically increasingly acceptable technique for the development was used [136].

However, these two scoring systems were established in the Western hemisphere, and when used in diverse contexts, such as the Asia and the Middle East the sensitivity and specificity levels that were attained were quite stark. This can be attributed of to the varied surroundings [133].

The present study was carried out on sixty patients who had been clinically diagnosed with acute appendicitis. The research was carried out in the Department of General Surgery at the Dr. Prabhakar Kore Hospital and Medical Research Center in Belgaum between the 1st of January 2021 and the 31st of December 2021. There were a total of 60 patients in this research, and 31 of them were male (51.67%), while only 29 of them were female (48.33%). This indicates that male patients predominated this particular study. According to this research, appendicitis is most frequent among people in their third decade of life, which is between the ages of 20 and 29. When a

person is in their teens or early 20s, the risk of developing appendicitis is at its highest. As a point of comparison, past research have shown that males tend to predominate. According to the findings of a research on the epidemiological characteristics of acute appendicitis that was carried out in 1998 by Al-Omran at the McLeod Institute for Clinical Evaluative Sciences in Toronto, the condition is more prevalent in young boys between the ages of 11 and 20 [137]. Recently, Parsijani PJ. et al. found a sex distribution pattern that was slight male predominant compared to the one seen in the current research (males made up 67.2% of the sample, while females made up 32.8%) [125].

We confirmed the trend shown in the majority of works that appendicitis is more prevalent in younger people. More than half of the people who participated in the current research were between the ages of 18 and 30 years old (54.29 percent), and the next most prevalent age group was between 31 and 40 years old (18.57 percent) [146]. The mean age was 28.32 years with a standard deviation of 13.15 years, while the median age was 25 years. Both of these numbers suggested the existence of a younger age group. A recent research conducted by Lohar HP. et al. at D. Y. Patil Medical College in Pune indicated that 44.65% of the cases were found in the age category of 11 to 20 years, while 36.1% were found in the age group of 21 to 30 years. According to previous research, the incidence of appendicitis steadily increases from birth until the late teenage years, when it reaches its highest point, and then begins to gradually decrease beyond that point [146]. This does come in accordance with the data obtained in our study. Also The mean age observed in the present study is in some agreement with a study from Mangalore by Nanjundaiah N. et al. who reported mean age of 27.82±9.26 years [139].

In contrast to the findings of Goonroos and goonroos [140], we found a nearly equal proportion of males and females among the 20 patients whose Histopathological evaluation for acute appendicitis was negative. 62% of the women and 38% of the men in their research group A (which consisted of 100 patients) had negative appendicectomies. Because there are so many illnesses that are similar to appendicitis, the diagnostic accuracy of acute appendicitis in women of childbearing age was poor.

According to our research, the sensitivity, specificity, predictive value of a positive test, and predictive value of a positive test for raised WBC counts (>12,000 cells/cu mm) are 57.5%, 90%, and 92% correspondingly. The predictive value of a negative test is 51.41%. As can be seen in the table (Table 30) below, our findings are in partial concordance with those of previous research efforts.

Table 30: Comparison of role of WBC count in diagnosis of acute appendicitis with other studies

	Sensitivity	**Specificity**	**Predictive value ± test**	**Predictive value of negative test**
Pettola et al	76			
Doraiswamy et al	42			
Piper et al	66.7			
Present study	57.5	90	92	51.41

However, statistical analysis reveals that leukocytosis (>12,000 cells/mm^3) is most substantially linked with appendicitis diagnosis, which is further supported by Marchand et al who reported that WBC > 10.5 x 109/L was one of the single best tests for acute appendicitis diagnosis with the greatest sensitivities among all the tests

investigated (81–84%) [140]. WBC was the test of choice in detecting simple acute appendicitis, according to a research that was carried out by JM Goonroos et al. [145] However, this test is not a good predictor of extended inflammation. Research conducted by David and Berchley and others lends credence to this assertion. When performed on its own, the WBC count can differentiate between normal appendix and acute appendicitis without complications. However, this does not differentiate between simple and complex forms of appendicitis [146]. According to the findings of Coleman C. and colleagues, WBC is an unreliable indicator of illness severity [147]. After analysing the medical histories of 221 patients, Vermenum et al. came to the conclusion that WBC did not substantially impact the surgical decision making [148]

Our results show that the differential Neutrophill Count has a 57.5% sensitivity, a 75% specificity, a 92% positive predictive value, and a 51.42% negative predictive value. The results are in oppositon to a lesser extent with those of previous studies (Table 31):

Table 31: Comparison of role of neutrophil count in diagnosis of acute appendicitis with other studies

	Sensitivity	**Specificity**	**Predictive value of positive test**	**Predictive value of negative test**
Yang et al	87.2	33	-	-
Marchand et al	81-84	-	-	-
Verma et al	75	-	-	-
Hoffman et al	75	-	-	-
Doraiswamy et al	96	-	-	-
The present study	57.5	75	92	51.42

In the course of our research, we were unable to identify any correlation that was statistically significant between a high neutrophil count and acute appendicitis.

Based on the findings of this study, ultrasonography has a 57.5% sensitivity for the diagnosis of acute appendicitis, a 40% specificity, a 65.71% predictive value for a positive test and a 32% predictive value for a negative test. Examining how well USG compares to other available methods for detecting acute appendicitis, the facts shown in the following table may be drawn. (Table 32).

Table 32: Comparison of role of USG abdomen in diagnosis of acute appendicitiswith other studies

	Sensitivity	**Specificity**	**Predictive value of positive test**	**Predictive value of negative test**	**Accuracy**
Zoller W.Get al	85	96			
Dr xiu	85	92			78-96
A .Shiraziet al	93.7	94.5	94.4	92.5	93
Dr davidet al	85.5	84.4	88.3	80.1	85
Alireza et al	37.1	87.2	96.8	11.7	
Pinto et al	44	47			
Presentstudy	57.5	40	65.71	32	

It can be deduced from the studies that have been described earlier that there is a mixed level of support for the idea that USG of the abdomen and pelvis is a procedure that is accurate, safe, and reliable in the identification of suspected cases of acute appendicitis. According to the findings of a research carried out by Zoller WG et al., the number of unnecessary laparotomies may be reduced by 7%, and every potential differential diagnosis could be either verified or ruled out with the use of

ultrasonography. It is particularly helpful in women since there are numerous acute gynaecological disorders that mirror acute appendicitis. This means that the number of illnesses that might serve as a differential diagnosis for appendicitis is extended [151]. David et al., in their analysis, claimed that an ultrasound of the abdomen and pelvis is a safe and valuable examination. However, in their study, 24% of patients with normal USGs had acute appendicitis; as a result, they indicate that an ultrasound of the abdomen cannot be depended on to the exclusion of a surgeon's thorough and repeated assessment [153].

Even when the data that was mentioned earlier is in direct opposition to the value that was obtained in this study, there have been other reports that have come to similar conclusions, such as the ones done by Alireza et al., who went on to state that it is important to keep in mind that the majority of ultrasonography tests were performed during times of emergency and outside of official hours by radiology assistants. If radiologists were in charge of the examinations, it is likely that different results would be achieved. This is due to a variety of factors, some of which include a lack of operator skills, an increased intestinal gas volume, obesity, anatomical kinds, and restrictions for the detection of patients who have had past laparotomies. Considering the relatively poor negative predictive value in academic facilities, it is recommended that ultrasonography be done for the diagnosis of appendicitis only in severe instances of appendicitis and differential diagnoses (kidney stones and ovarian cysts) [154].

These differences might have been caused by a multitude of variables, and those reasons could all be taken into consideration. To begin, since ultrasound is a technology that is reliant on the operator and has a steep learning curve, an individual's level of ability may be a significant factor in determining the very varied

diagnostic accuracy of appendicitis. In addition, it may be difficult to scan populations of fertile-age females since there is a large and frequent overlap in the symptoms of acute stomach disorders. This may be one reason for the difficulty. According to the graded compression technique, enough compression of the right lower quadrant cannot always be produced in obese people. This is also the case in persons who have had laparotomy in the past. Variability in the appendiceal location is a well-known cause of clinical misdiagnosis, and a false negative US diagnosis may occur, for instance, in the case of a retrocecal location of the appendix that is not appropriately visualised. This is an example of a situation where a clinical misdiagnosis can occur. In point of fact, the majority of incorrect negative diagnoses obtained by ultrasound are due to a lack of visibility of the appendix or inflammation that is limited to the appendiceal tip [155].

Appendicitis Inflammatory Response Scores varied from 2 to 10 in this research. The largest frequency of it is between 4 and 8. The diagnosis of acute appendicitis was made in 51 individuals, with 17 instances of severe acute appendicitis, based on the cut-off values at > 4 and > 8. In 39 of these patients, the diagnosis of acute appendicitis was confirmed on HPR (76.4%; p0.001), whereas there were 16 instances of severe appendicitis. The diagnostic accuracy for acute appendicitis was 80%, with sensitivity, specificity, positive predictive value, and negative predictive value of the AIR being 82.50%, 75%, 86.84%, and 68.18%, respectively based on the Receiver Operator Curve. These results do correlate with the original data provided by Anderson et al. during the process of constructing this scoring system that has a sensitivity of 96%, a specificity of 73%, a positive predictive value of 64%, and a negative predictive value of 97% [135]. Similarly, the research conducted by Manne et al. demonstrated that in the low probability zone,

recognized as below 4, the negative predictive value is at 99% and sensitivity is at 99%. These results are comparable to the findings of our study, which showed a sensitivity of 97.5% and a negative predictive value of 88.89% at this stratum. Furthermore, in the high probability group at more than 8, a specificity of 98% and a positive predictive value of 86% are quite comparable [156].

On looking at the performance of TS we see a sensitivity, specificity, positive predictive value and negative predictive value of 75%, 40%, 71.43%, 44.44% respectively. Also it being shown to have a diagnostic accuracy of 63.33%. while in its conceptual period Tzanaki et al reported this scoring system to have sensitivity, specificity and diagnostic accuracy was 95.4%, 97.4% and 96.5% respectively [157]. This contradictory finding could be attributed to the scoring systems high reliance on ultrasonography for the determination of appendicitis while its being a highly varied and skill/ operator dependent variable. This discrepancy does warrant further evaluation in an independent setting.

Overall, in comparison the AIR score outperformed the TS in this study. With its simple biomarkers and rapid evaluation process the AIR Score can help surgeons in coming to a more quantified diagnosis of acute appendicitis. The use of ultrasonography could be more reserved for diagnostic dilemmas and as a radiographic proof alone. Hence allowing access to higher quality of care even at resource poor regions of our society and helping in the ergonomic distribution of health facilities to the people.

A clinical scoring method calculates the likelihood that a patient has appendicitis by comparing them to a huge pool of other patients who have had comparable symptoms and conditions, from which the score was developed. This information may be utilized to provide support for decision-making for surgeons with

less experience, and it may make it more convenient for surgeons and emergency department professionals to communicate with one another. Patients who may have appendicitis may also have their care based on a clinical grading system, which can serve as the foundation for organized therapy. When used to patients in whom the diagnosis is very improbable, the score makes it possible to safely avoid hospitalization and unnecessary investigations. A grading system like this is necessary for future study in order to more accurately compare outcomes. Additional research on the score is required in the form of a prospective interventional trial with external centers and larger study cohorts.

CONCLUSION

As a very prevalent surgical emergency, acute appendicitis requires immediate attention. Negative appendectomy rates may be lowered by the use of good clinical judgement and an investigative score system. The Appendicitis Inflammatory Response Score has shown superiority over the Tzanakis Score. A raised leucocyte count of >12,000 / cubic mm has found to be statistically significant co-relation with acute appendicitis. Taking a thorough history and doing a thorough physical examination with simple blood investigations are all that is required to get the data / parameters for the Appendicitis Inflammatory Response Score. Even simple radiological assessment tools such as ultrasonography does demonstrate good diagnostic predictions which when coupled with clinical signs and symptoms of high association with appendicitis can improve the overall diagnostic accuracy for all. These rapid, objective, assessment protocols calls for more larger, multi centric scrutiny for its validation, while demonstrating promising outcomes in this study.

A thorough history and physical examination by an experienced surgeon are still crucial steps in making a correct diagnosis of acute appendicitis and should not be discounted. Any or all of the aforementioned tests may be stored in the surgeon's diagnostic armenterium to supplement his clinical diagnosis.

SUMMARY

Acute appendicitis is a major surgical emergency that arises often. In spite of technical improvements in diagnostics, appendicitis still presents a significant diagnostic conundrum . Quite a few different scoring systems have been established as part of an effort to optimize the diagnostic accuracy. The goal in developing Appendicitis Inflammatory Response Score and Tzanakis Screws to make it as simple and dependable as possible while maintaining a high level of diagnostic precision. The above scores were compared with the results of a laparotomy or laparoscopic procedure and a histological report to determine its sensitivity, specificity, positive predictive value, and negative predictive value in the diagnosis of acute appendicitis.

This research spanned a full calendar year (from January 2021 to December 2021) and took place in the General Surgery Department at KLES Dr. Prabhakar Kore Hospital and Medical Research Centre in Belgaum. Sixty people complaining of pain in their right Iliac fossa were included in the study. The patient's Appendicitis Inflammatory Response Scores and Tzanakis Scores were determined after a series of assessments.

With a marginal predominant distribution of cases between male and females at 51.67% and 48.33% respectively. Highest frequency of cases fall under the age category of late second decade and third decade of life. A state of leucocytosis i.e) White Blood Cells >12,000 cells/mm^3 demonstrated significant association with acute appendicitis. However Ultrasonography performed below the expected estimates in diagnosing acute appendicitis. A score of > 4 and ≤ 4 using AIR Score had higher sensitivity of 97.50% while the scores of $> 8\, and\, \leq 8$ presents with a exceptional specificity of 95.00%. The overall Diagnostic accuracy of the Appendicitis inflammatory Response score in this study is found to be at 80.0%. on comparing to

Tzanakis Score having a sensitivity 75% and Specificity of 40% it obviates the event that, Appendicitis Inflammatory Response Score prevails over Tzanakis Score in diagnosing AA.

Scoring systems should aid in correct diagnosis in order to avoid negative appendectomies. The Appendicitis Inflammatory Response Score, scoring system which is based on simple parameters that can be ascertained by complete history, clinical examination and few investigations is a valuable scoring system in the diagnosis of acute appendicitis.

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ANNEXURE I: CONSENT

Mr/Mrs/Miss._____, we are requesting you to enroll yourself in study titled "A COMPARATIVE STUDY OF APPENDICITIS INFLAMATORY RESPONSE SCORE AND TZAKIS SCORE FOR DIAGNOSIS OFPATIENTS WITH ACUTE APPENDICITIS AT KLE DR. PRABHAKAR KORE HOSPITAL AND MEDICAL RESEARCH CENTRE, BELGAUM - A ONE YEAR PROSPECTIVE STUDY", conducted by REG NO: BH0120001, Post Graduate in M.S. General Surgery under the guidance of Dr. _____, Professor, Department of General Surgery, J.N. Medical College, Belagavi under KAHER, Belagavi.

Respected Sir/Madam,

We request you to participate in our study. Your participation in the research is voluntary. Your decision to participate in the study or otherwise will not affect the relationship with KLES Prabhakar Kore Hospital. In an effort to avoid the above mentioned problems, this study has been undertaken. To reduce the incidence of negative appendectomy rate by effective diagnosis of Acute Appendicitis clinically. If you decide not to participate, you are free to withdraw at anytime. During the study, your operative outcome will be assessed by some questions.

Purpose of the study:

The purpose of research is to compare the two scoring systems Appendicitis Inflammatory Response Score and Tzanakis scoring systems in patients with acute appendicitis. The principal investigator of the study is Dr ADIL ANWAR BAGWAN under the guidance of Dr. V. M. PATTANSHETTI

Procedure Involved:

If you agree to be part of the research study, you will be asked the relevant history and will be subjected to relevant clinical examination and investigations. Investigations include chest x-ray, blood investigations, and ultrasound abdomen.

Risks and Benefits:

There is no increased risk involved in being a part of this study and the complications are those which are normally anticipated. This study leads to effective diagnosis of acute appendicitis.

Withdrawing/removal from the study:

The participant has freedom to withdraw from the study whenever he/she wishes and without any prior notice. Even if you decline to participate, there will not be any change in the line of your management or the relationship with your doctor. You will be told about all the information that affects your decision to participate in the study. The investigator may also exclude a participant from the study at any point of time.

Privacy and Confidentiality:

The only people to know that you are a research subject are members of the research team. No information about you or information provided by you during the research will be disclosed to other without your written permission except:

1. In emergency to protect your rights and welfare.
2. If required by law.

Institutional/sponsors policy:

If any unforeseen complications or injury occurs during the period of study, the participant will be given treatment within the limitations of KLES Prabhakar Kore Hospital.

Financial Incentives for participation:

The participant neither gets any financial incentives during the period of study nor will be asked to pay for this study.

Authorization to Publish Results: When the results of the research are published, or discussed in a conference, no information will be displayed that would disclose your identity. Any information that is obtained in this study that can be associated with your identity will remain confidential.

Institutional Policy:

In case you have any questions related to the study, in future or in case of study related injury, you can contact:

Dr. Harsha Hegde, Chairperson, JNMC, IEC & Scientist D,

ICMR, National Institute of Traditional Medicine, Belagavi

Dr. REG NO: BH0120001

Post-Graduate, General Surgery, J. N. Medical College, KAHER, Belagavi

Dr._____

Professor, General Surgery, J. N. Medical College, KAHER, Belagavi

CONSENT TO PARTICIPATE IN THE STUDY

I Mr./Ms,_____have been explained about the research study, the need of the study, the intervention, their risks, benefits and alternatives available in my own vernacular language.

I voluntarily agree to participate in this study by signing up this form below. I understand that I may withdraw at any time from this study. I have been given adequate time to clarify my doubts about the study and my rights as a study participant.

My signature / thumb impression below indicates that I have read or explained information in the consent including the risks and benefits in my own vernacular language and have cleared my doubts.

Name of participant: Signature/LTI:

Name of legally authorized Representative

(if applicable):

Relationship with participant: Signature/LTI

Name of Guide/ Direct supervisor:

Signature

Name of principal investigator: Signature:

ತಿಳುವಳಿಕೆಯ ಸಮ್ಮತಿ

ಶ್ರೀ / ಶ್ರೀಮತಿ / ಮಿಸ್. _____, ಕೆಎಲ್ಇ ಡಾ. ಪ್ರಭಾಕರ್ ಕೋರೆ ಆಸ್ಪತ್ರೆ ಮತ್ತು ವೈದ್ಯಕೀಯ ಸಂಶೋಧನಾ ಕೇಂದ್ರ, ಬೆಳಗಾವಿಲ್ಲಿ ಒಂದು ವರ್ಷದ ನಿರೀಕ್ಷಿತ ಅಧ್ಯಯನ ", ಎಂ.ಎಸ್ ಜನರಲ್ ಸರ್ಜರಿಯಲ್ಲಿ ಸ್ನಾತಕೋತ್ತರ ಪದವೀಧರರಾದ REG NO: BH0120001 ನಡೆಸಿದರು ಜನರಲ್ ಸರ್ಜರಿ ಜನರಲ್ ಸರ್ಜರಿ ವಿಭಾಗದ ಪ್ರಾಧ್ಯಾಪಕ ಡಾ._____ ಅವರ ಮಾರ್ಗದರ್ಶನದಲ್ಲಿ ಜೆ.ಎನ್. ವೈದ್ಯಕೀಯ ಕಾಲೇಜು, ಬೆಳಗಾವಿಯ ಕಾಹೆರ್ ಅಡಿಯಲ್ಲಿ ಬೆಳಗಾವಿ.

ಗೌರವಾನ್ವಿತ ಸರ್ / ಮೇಡಂ,

ನಮ್ಮ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನಾವು ನಿಮ್ಮನ್ನು ವಿನಂತಿಸುತ್ತೇವೆ. ಸಂಶೋಧನೆಯಲ್ಲಿ ನಿಮ್ಮ ಭಾಗವಹಿಸುವಿಕೆ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವ ಅಥವಾ ನಿಮ್ಮ ನಿರ್ಧಾರವು ಕೆ ಎಲ್ ಇ ಎಸ್ ಪ್ರಭಾಕರ್ ಕೋರೆ ಆಸ್ಪತ್ರೆಯೊಂದಿಗಿನ ಸಂಬಂಧದ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ. ಮೇಲೆ ತಿಳಿಸಿದ ಸಮಸ್ಯೆಗಳನ್ನು ತಪ್ಪಿಸುವ ಪ್ರಯತ್ನದಲ್ಲಿ, ಈ ಅಧ್ಯಯನವನ್ನು ಕೈಗೊಳ್ಳಲಾಗಿದೆ. ತೀವ್ರವಾದ ಕರುಳುವಾಳದ ರೋಗನಿರ್ಣಯದ ಮೂಲಕ ಋಣಾತ್ಮಕ ಕರುಳುವಾಳದ ಪ್ರಮಾಣವನ್ನು ಕಡಿಮೆ ಮಾಡಲು. ನೀವು ಭಾಗವಹಿಸದಿರಲು ನಿರ್ಧರಿಸಿದರೆ, ನೀವು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಹಿಂತೆಗೆದುಕೊಳ್ಳಲು ಮುಕ್ತರಾಗಿದ್ದೀರಿ. ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ, ನಿಮ್ಮ ಆಪರೇಟಿವ್ ಫಲಿತಾಂಶವನ್ನು ಕೆಲವು ಪ್ರಶ್ನೆಗಳಿಂದ ನಿರ್ಣಯಿಸಲಾಗುತ್ತದೆ.

ಅಧ್ಯಯನದ ಉದ್ದೇಶ:

ತೀವ್ರವಾದ ಕರುಳುವಾಳ ಹೊಂದಿರುವ ರೋಗಿಗಳಲ್ಲಿ ಎರಡು ಸ್ಕೋರಿಂಗ್ ವ್ಯವಸ್ಥೆಗಳನ್ನು ಅಪೆಂಡಿಸೈಟಿಸ್ ಉರಿಯೂತದ ಪ್ರತಿಕ್ರಿಯೆ ಸ್ಕೋರ್ ಮತ್ತು ಟಿಜಾಕಿಸ್ ಸ್ಕೋರಿಂಗ್ ವ್ಯವಸ್ಥೆಗಳನ್ನು ಹೋಲಿಸುವುದು ಸಂಶೋಧನೆಯ ಉದ್ದೇಶವಾಗಿದೆ. ಡಾ. ವಿ. ಎಂ. ಪಟ್ಟನ್‌ಶೆಟ್ಟಿ ಅವರ ಮಾರ್ಗದರ್ಶನದಲ್ಲಿ ಅಧ್ಯಯನದ ಮುಖ್ಯ ತನಿಖಾಧಿಕಾರಿ ಡಾ. ಆದಿಲ್ ಅನ್ವರ್ ಬಾಗ್ವಾನ್

ಒಳಗೊಂಡಿರುವ ವಿಧಾನಗಳು:

ಸಂಶೋಧನಾ ಅಧ್ಯಯನದ ಭಾಗವಾಗಲು ನೀವು ಒಪ್ಪಿದರೆ, ನಿಮಗೆ ಸಂಬಂಧಿತ ಇತಿಹಾಸವನ್ನು ಕೇಳಲಾಗುತ್ತದೆ ಮತ್ತು ಸಂಬಂಧಿತ ಕ್ಲಿನಿಕಲ್ ಪರೀಕ್ಷೆ ಮತ್ತು ತನಿಖೆಗೆ ಒಳಪಡಿಸಲಾಗುತ್ತದೆ. ತನಿಖೆಯಲ್ಲಿ ಎದೆಯ ಕ್ಷ-ಕಿರಣ, ರಕ್ತ ತನಿಖೆ ಮತ್ತು ಅಲ್ಟ್ರಾಸೌಂಡ್ ಹೊಟ್ಟೆ ಸೇರಿವೆ.

ಅಪಾಯಗಳು ಮತ್ತು ಲಾಭಗಳು:

ಈ ಅಧ್ಯಯನದ ಭಾಗವಾಗಿರುವುದರಲ್ಲಿ ಯಾವುದೇ ಹೆಚ್ಚಿನ ಅಪಾಯವಿಲ್ಲ ಮತ್ತು ತೊಡಕುಗಳು ಸಾಮಾನ್ಯವಾಗಿ ನಿರೀಕ್ಷಿತವಾಗಿವೆ. ಈ ಅಧ್ಯಯನವು ತೀವ್ರವಾದ ಕರುಳುವಾಳದ ಪರಿಣಾಮಕಾರಿ ರೋಗನಿರ್ಣಯಕ್ಕೆ ಕಾರಣವಾಗುತ್ತದೆ.

ಅಧ್ಯಯನದಿಂದ ಹಿಂತೆಗೆದುಕೊಳ್ಳುವುದು / ತೆಗೆದುಹಾಕುವುದು:

ಭಾಗವಹಿಸುವವರಿಗೆ ಅವನು / ಅವಳು ಬಯಸಿದಾಗ ಮತ್ತು ಯಾವುದೇ ಪೂರ್ವ ಸೂಚನೆ ಇಲ್ಲದೆ ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯುವ ಸ್ವಾತಂತ್ರ್ಯವಿದೆ. ನೀವು ಭಾಗವಹಿಸಲು ನಿರಾಕರಿಸಿದರೂ, ನಿಮ್ಮ ನಿರ್ವಹಣೆಯ ಸಾಲಿನಲ್ಲಿ ಅಥವಾ ನಿಮ್ಮ ವೈದ್ಯರೊಂದಿಗಿನ ಸಂಬಂಧದಲ್ಲಿ ಯಾವುದೇ ಬದಲಾವಣೆ ಇರುವುದಿಲ್ಲ. ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವ ನಿಮ್ಮ ನಿರ್ಧಾರದ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವ ಎಲ್ಲಾ ಮಾಹಿತಿಯ ಬಗ್ಗೆ ನಿಮಗೆ ತಿಳಿಸಲಾಗುತ್ತದೆ. ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ತನಿಖಾಧಿಕಾರಿಯು ಭಾಗವಹಿಸುವವನನ್ನು ಅಧ್ಯಯನದಿಂದ ಹೊರಗಿಡಬಹುದು.

ಗೌಪ್ಯತೆ ಮತ್ತು ಗೋಪ್ಯತೆ:

ನೀವು ಸಂಶೋಧನಾ ವಿಷಯವೆಂದು ತಿಳಿದಿರುವ ಏಕೈಕ ಜನರು ಸಂಶೋಧನಾ ತಂಡದ ಸದಸ್ಯರಾಗಿದ್ದಾರೆ. ನಿಮ್ಮ ಲಿಖಿತ ಅನುಮತಿಯಿಲ್ಲದೆ ನಿಮ್ಮ ಬಗ್ಗೆ ಯಾವುದೇ ಮಾಹಿತಿಯನ್ನು ಬಹಿರಂಗಪಡಿಸಲಾಗುವುದಿಲ್ಲ:

- ನಿಮ್ಮ ಹಕ್ಕುಗಳನ್ನು ಮತ್ತು ಕಲ್ಯಾಣವನ್ನು ರಕ್ಷಿಸಲು ತುರ್ತುಸ್ಥಿತಿಯಲ್ಲಿ.

- ಕಾನೂನಿನಿಂದ ಅಗತ್ಯವಿದ್ದರೆ.

ಸಾಂಸ್ಥಿಕ / ಪ್ರಾಯೋಜಕರ ನೀತಿ:

ಅಧ್ಯಯನದ ಅವಧಿಯಲ್ಲಿ ಯಾವುದೇ ಅನಿರೀಕ್ಷಿತ ತೊಂದರೆಗಳು ಅಥವಾ ಗಾಯಗಳು ಸಂಭವಿಸಿದಲ್ಲಿ, ಭಾಗವಹಿಸುವವರಿಗೆ ಕೆಎಲ್ಇಎಸ್ ಡಾ. ಪ್ರಭಾಕರ್ ಕೋರೆ ಆಸ್ಪತ್ರೆಯ ಮಿತಿಯೊಳಗೆ ಚಿಕಿತ್ಸೆ ನೀಡಲಾಗುತ್ತದೆ.

ಭಾಗವಹಿಸುವಿಕೆಗೆ ಆರ್ಥಿಕ ಪ್ರೋತ್ಸಾಹ:

ಭಾಗವಹಿಸುವವರು ಅಧ್ಯಯನದ ಅವಧಿಯಲ್ಲಿ ಯಾವುದೇ ಹಣಕಾಸಿನ ಪ್ರೋತ್ಸಾಹವನ್ನು ಪಡೆಯುವುದಿಲ್ಲ ಅಥವಾ ಈ ಅಧ್ಯಯನಕ್ಕೆ ಪಾವತಿಸಲು ಕೇಳಲಾಗುವುದಿಲ್ಲ.

ಫಲಿತಾಂಶಗಳನ್ನು ಪ್ರಕಟಿಸಲು ಅಧಿಕಾರ:

ಸಂಶೋಧನೆಯ ಫಲಿತಾಂಶಗಳನ್ನು ಪ್ರಕಟಿಸಿದಾಗ, ಅಥವಾ ಸಮ್ಮೇಳನದಲ್ಲಿ ಚರ್ಚಿಸಿದಾಗ, ನಿಮ್ಮ ಗುರುತನ್ನು ಬಹಿರಂಗಪಡಿಸುವ ಯಾವುದೇ ಮಾಹಿತಿಯನ್ನು ಪ್ರದರ್ಶಿಸಲಾಗುವುದಿಲ್ಲ. ನಿಮ್ಮ ಗುರುತಿನೊಂದಿಗೆ ಸಂಯೋಜಿಸಬಹುದಾದ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಡೆದ ಯಾವುದೇ ಮಾಹಿತಿಯು ಗೌಪ್ಯವಾಗಿ ಉಳಿಯುತ್ತದೆ.

ಸಾಂಸ್ಥಿಕ ನೀತಿ:

ಒಂದು ವೇಳೆ ನೀವು ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಯಾವುದೇ ಪ್ರಶ್ನೆಗಳನ್ನು ಹೊಂದಿದ್ದರೆ, ಭವಿಷ್ಯದಲ್ಲಿ ಅಥವಾ ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಗಾಯದ ಸಂದರ್ಭದಲ್ಲಿ, ನೀವು ಸಂಪರ್ಕಿಸಬಹುದು:

ಡಾ. ಹರ್ಷ ಹೆಗ್ಡೆ

ಅಧ್ಯಕ್ಷರು, ಜೆಎನ್ಎಂಸಿ

ಐಇಸಿ ಮತ್ತು ವಿಜ್ಞಾನಿ ಡಿ

ಐಸಿಎಂಆರ್, ನ್ಯಾಷನಲ್ ಇನ್ಸ್ಟಿಟ್ಯೂಟ್ ಆಫ್ ಟ್ರೆಡಿಶನಲ್ ಮೆಡಿಸಿನ್

ಬೆಳಗಾವಿ -590010

REG NO: BH0120001

ಸ್ನಾತಕೋತ್ತರ, ಸಾಮಾನ್ಯ ಶಸ್ತ್ರಚಿಕಿತ್ಸೆ,

ಜೆ.ಎನ್. ವೈದ್ಯಕೀಯ ಕಾಲೇಜು,

ಕಾಹೇರ್,ಬೆಳಗಾವಿ

ಡಾ._____

ಪ್ರೊಫೆಸರ್, ಜನರಲ್ ಸರ್ಜರಿ,

ಜೆ.ಎನ್. ವೈದ್ಯಕೀಯ ಕಾಲೇಜು,

ಕಾಹೇರ್,ಬೆಳಗಾವಿ

ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಒಪ್ಪಿಗೆ

ನಾನು ಶ್ರೀ / ಎಂಎಸ್, _____ ಸಂಶೋಧನಾ ಅಧ್ಯಯನ, ಅಧ್ಯಯನದ ಅವಶ್ಯಕತೆ, ಹಸ್ತಕ್ಷೇಪ, ಅವುಗಳ ಅಪಾಯಗಳು, ಪ್ರಯೋಜನಗಳು ಮತ್ತು ನನ್ನ ಸ್ವಂತ ಭಾಷೆಯಲ್ಲಿ ಲಭ್ಯವಿರುವ ಪರ್ಯಾಯಗಳ ಬಗ್ಗೆ ವಿವರಿಸಲಾಗಿದೆ.

ಈ ಫಾರ್ಮ್ ಅನ್ನು ಕೆಳಗೆ ಸೈನ್ ಅಪ್ ಮಾಡುವ ಮೂಲಕ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನಾನು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಒಪ್ಪುತ್ತೇನೆ. ಈ ಅಧ್ಯಯನದಿಂದ ನಾನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಹಿಂದೆ ಸರಿಯಬಹುದು ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ. ಅಧ್ಯಯನದ ಬಗ್ಗೆ ನನ್ನ ಅನುಮಾನಗಳನ್ನು ಮತ್ತು ಅಧ್ಯಯನ ಭಾಗವಹಿಸುವವನಾಗಿ ನನ್ನ ಹಕ್ಕುಗಳನ್ನು ಸ್ಪಷ್ಟಪಡಿಸಲು ನನಗೆ ಸಾಕಷ್ಟು ಸಮಯ ನೀಡಲಾಗಿದೆ.

ಕೆಳಗಿನ ನನ್ನ ಸಹಿ / ಹೆಬ್ಬೆರಳು ಅನಿಸಿಕೆ ನನ್ನ ಸ್ವಂತ ಸ್ಥಳೀಯ ಭಾಷೆಯಲ್ಲಿನ ಅಪಾಯಗಳು ಮತ್ತು ಪ್ರಯೋಜನಗಳನ್ನು ಒಳಗೊಂಡಂತೆ ನಾನು ಒಪ್ಪಿಗೆಯ ಮಾಹಿತಿಯನ್ನು ಓದಿದ್ದೇನೆ ಅಥವಾ ವಿವರಿಸಿದ್ದೇನೆ ಮತ್ತು ನನ್ನ ಅನುಮಾನಗಳನ್ನು ನಿವಾರಿಸಿದೆ ಎಂದು ಸೂಚಿಸುತ್ತದೆ.

ಭಾಗವಹಿಸುವವರ ಹೆಸರು: ಸಹಿ / ಎಲ್‌ಟಿಐ:

ಕಾನೂನುಬದ್ಧವಾಗಿ ಅಧಿಕೃತ ಹೆಸರು

ಪ್ರತಿನಿಧಿ

(ಅನ್ವಯವಾದಲ್ಲಿ):

ಭಾಗವಹಿಸುವವರೊಂದಿಗಿನ ಸಂಬಂಧ: ಸಹಿ / ಎಲ್‌ಟಿಐ

ಮಾರ್ಗದರ್ಶಿ / ನೇರ ಮೇಲ್ವಿಚಾರಕರ ಹೆಸರು: ಡಾ. ವಿ.ಎಂ. ಪಟ್ಟನ್‌ಶೆಟ್ಟಿ

ಸಹಿ

ಪ್ರಧಾನ ತನಿಖಾಧಿಕಾರಿ ಹೆಸರು: ಡಾ. ಆದಿಲ್ ಅನ್ವರ್ ಬಾಗ್ವಾನ್

ಸಹಿ:

माहितीपूर्ण संमती

श्री / श्रीमती / मिस. _____, आम्ही तुम्हाला विनंती करतो की "कावीळ यकृताचा अपेंडिसाइटिस असलेल्या रुग्णांच्या निदानासाठी ॲपेंडिसाइटिस इन्फ्लमेटरी रिस्पॉन्स स्कोअर आणि टी झकीस स्कोअरचा तुलनात्मक अभ्यास डॉ. प्रभाकर कोरे हॉस्पिटल आणि मेडिकल रिसर्च सेंटर, बेळगाव - एक वर्षाचा संभाव्य अभ्यास एमएस मधील पदव्युत्तर REG NO: BH0120001 बागवान यांनी आयोजित केलेला डॉ. _____, प्रोफेसर, जनरल

सर्जरी विभाग, जे.एन. मेडिकल कॉलेज, बेळगावी, काहीही यांच्या मार्गदर्शनाखाली अंतर्गत,

बेळगावी.

आदरणीय सर / मॅडम,

आमच्या अभ्यासामध्ये आपण सहभागी व्हावे ही विनंती. आपला संशोधनात सहभाग ऐच्छिक आहे. आपल्या अभ्यासामध्ये सहभागी होण्याच्या अन्यथा का. एल ई एस प्रभाकर कोरे हॉस्पिटलशी असलेल्या संबंधांवर कोणताही परिणाम होणार नाही. वरील समस्या टाळण्याच्या प्रयत्नात, हा अभ्यास हाती घेण्यात आला आहे. क्लिनिकली तीव्र ॲपेंडिसाइटिसचे प्रभावी निदान करून नकारात्मक एपेंडेक्टॉमी रुग्णाची घटना कमी करण्यासाठी. जर आपण भाग न घेण्याचे ठरविले तर आपण कधीही माघार घेऊ शकता. अभ्यासादरम्यान, आपल्या ऑपरेटिंग निकालाचे मूल्यांकन काही प्रश्नांद्वारे केले जाईल.

अभ्यासाचा उद्देश:

रुग्णांमध्ये मधुमेह अल्सर सेफ्टीरीटी स्कोअरचा वापर करून मधुमेह असलेल्या पायांच्या अल्सरचा गंभीरपणा मूल्यांकन का. एल एस एस डॉ प्रभाकर कोरे हॉस्पिटल आणि मेडिकल रिसर्च सेंटर, बेळगावी - ए वन इयर्स लॉंगिट्यूडिनल स्टडी येथे केले जाणे.

प्रक्रिया समाविष्ट

आपण संशोधन अभ्यासाचा भाग होण्यासाठी सहमत असल्यास, आपणास संबंधित इतिहास विचारला जाईल आणि संबंधित क्लिनिकल परीक्षा आणि तपासणीस पात्र केले जाईल. तपासणीमध्ये ESR तीचा एक्स-रे रक्ताची तपासणी आणि अल्ट्रासाऊंड ओटीपोटचा समावेश आहे.

धोके आणि फायदे

या अभ्यासाचा एक भाग होण्यात कोणताही धोका नाही आणि सामान्यत: अपेक्षित होणारी गुंतागुंत आहे. या अभ्यासामुळे तीव्र appपेंडिसाइटिसचे प्रभावी निदान होते.

अभ्यासामधून पैसे काढणे / काढणे

सहभागीला जेव्हा पाहिजे असेल तेव्हा व अभ्यासापासून मागे घेण्याचे स्वातंत्र्य आहे. जरी आपण यास भाग घेण्यास नकार दिला तरीही आपल्या व्यवस्थापनात किंवा आपल्या डॉक्टरांशी असलेल्या संबंधात कोणताही बदल होणार नाही. अभ्यासामध्ये भाग घेण्याच्या आपल्या निर्णयावर परिणाम करणारी सर्व माहिती आपल्याला सांगितले जाईल. अन्वेषक एखादेवेळी भाग घेणाऱ्याला अभ्यासामधून वगळू शकतो.

गोपनीयता आणि गोपनीयतेची:

आपण संशोधन विषय आहात हे फक्त काही लोकांनाच माहित आहे की ते संशोधन कार्यसंघाचे सदस्य आहेत. आपल्या लिखित परवानगीशिवाय आपल्याबद्दल कोणतीही माहिती इतरांना उघड केली जाणार नाही:

- आपल्या अधिकारांचे आणि कल्याणासाठीचे संरक्षण करण्यासाठी आणीबाणीमध्ये
- कायद्यानुसार आवश्यक असल्यास.

संस्था / प्रायोजक धोरण:

अभ्यासाच्या कालावधीत जर कोणतीही अनपेक्षित गुंतागुंत किंवा जखम झाली असेल तर सहभागीस केएलईएस डॉ. प्रभाकर कोरे रुग्णालयाच्या मर्यादेत उपचार दिले जातील.

सहभागासाठी आर्थिक प्रोत्साहनः

अभ्यासकास या काळात अभ्यासाच्या काळात कोणतीही आर्थिक प्रोत्साहन मिळत नाही किंवा या अभ्यासासाठी पैसे दिल्यास सांगण्यात येणार नाही.

परिणाम प्रकाशित करण्यासाठी अधिकृतता:

जेव्हा संमेलनामध्ये संशोधनाचे निकाल प्रकाशित केले जातात किंवा त्यावर चर्चा केली जाते तेव्हा आपली ओळख उघडकीस आणणारी कोणतीही माहिती दर्शविली जाणार नाही. या अभ्यासामध्ये प्राप्त केलेली कोणतीही माहिती जी आपल्या ओळखीशी संबंधित असू शकते ती गोपनीय राहील.

संस्थात्मक धोरणः

अभ्यास सहभागी म्हणून आपल्या अधिकारांसंबंधी आपल्याला पुढील माहितीची आवश्यकता असल्यास आपण येथे संपर्क साधू शकता:

डॉ. हर्षा हा□ड□

अध्यक्ष, जा□एनएमसी

आयईसी आणि सायंटिस्ट डी आयसीएमआर,

राष्ट्रीय पारंपारिक औषध संस्था ब□गवी -590010

फोन नंबर : 9480422500

REG NO: BH0120001

पदव्युत्तर, सामान्य शस्त्रक्रिया,

ज□एन. म□डिकल कॉलज□,

काहर□, ब□गवी -590010

डॉ. _____

प्राध्यापक, जनरल सर्जरी,

ज□एन. म□डिकल कॉलज□,

काहर□, ब□गवी -590010

अभ्यासात भाग घ□यासाठी संमती

मी श्री. / एमएस, _____ संशोधन अभ्यासाब□ल, अभ्यासाची आवश्यकता, हस्तक्ष□प□, त्यांच□जोखीम, फायद□आणि माझ्या स्वत: च्या स्थानिक भाष□त उपलब्ध पर्यायांब□ल स्पष्टीकरण दिल□आह□

मी खाली हा फॉर्म साइन अप करून या अभ्यासात भाग घ□यास स्वइ□छेने सहमत आह□मला समजल□आह□की मी या अभ्यासातून कधीही माघार घ□ऊ शकतो. अभ्यासाब□लच्या माझ्या अभ्यासाब□ल आणि अभ्यासात सहभागी असल□ल्या माझ्या हक्कांब□ल स्पष्टीकरण द□यासाठी मला पुरस□ा व□ द□यात आला आह□

खाली माझी स्वाक्षरी / अंगठ्याचा ठसा सूचित करतो की मी स्वत: च्या स्थानिक भाष□त जोखीम आणि फायद□यासहित संमतीन□माहिती वाचली आह□किंवा स्पष्टीकरण दिल□आह□आणि माझ्या शंका दूर क□न्या आह□त.

सहभागीचानाव: स्वाक्षरी / एलटीआय:

कायदेशीररीत्या अधिकृत नाव

प्रतिनिधी

(लागू पडत असल्यास):

सहभागींशी संबंधः स्वाक्षरी / एलटीआय

मार्गदर्शकाचानाव / थेट पर्यवेक्षक: डॉ. व्ही. एम. पट्टनशेट्टी

स्वाक्षरी

मुख्य अन्वेषकांचानाव: डॉ. आदिल अन्वर बागवान

स्वाक्षरीः

PROFORMA / QUESTIONNAIRE TO BE USED FOR DATA COLLECION

The proposed proforma / questionnaire to be used for data collection for the study titled "A COMPARATIVE STUDY OF APPENDICITIS INFLAMATORY RESPONSE SCORE AND TZAKIS SCORE FOR DIAGNOSIS OF PATIENTS WITH ACUTE APPENDICITIS AT KLE DR. PRABHAKAR KORE HOSPITAL AND MEDICAL RESEARCH CENTRE, BELGAUM - A ONE YEAR PROSPECTIVE STUDY" is as:

Name: IP no.:

Sex: Age:

Address:

Education: Date of admission:

Occupation: Date of discharge:

CHIEF COMPLAINTS:

HISTORY OF PRESENTING COMPLAINTS:

PAST HISTORY:

PERSONAL HISTORY:

FAMILY HISTORY:

GENERAL PHYSICAL EXAMINATION:

Built and Nourishment:

Weight:

Pallor / Icterus / Cyanosis / Clubbing / Edema / Lymphadenopathy Vital Signs: PR:

/min; BP: mm Hg; RR: /min; Febrile/Afebrile SYSTEMIC

EXAMINATION:

Abdomen:

Inspection:

Palpation:

Percussion:

Auscultation:

Cardio Vascular System: Respiratory System:

CLINICAL IMPRESSION:

INVESTIGATIONS:

Hb: Total Leucocyte Count: Platelet count: Random blood sugar : C-

Reactive Protein: Blood Group:

Blood urea: Sr. Creatinine:

PT/INR:

Urine routine and microscopy:

HIV: HBsAg:

ECG:

Chest Xray:

USG Abdomen:

Proposed Surgery:

APPENDICITIS INFLAMATORY RESPONSE SCORE:

CLINICAL FEATURE		SCORE
Vomiting		
Pain in Right Iliac Fossa		
Rebound Tenderness		
Temperature {ºC}		
Segmented Neutrophils		

Total Leucocyte Count{x10^9/L}		
C- reactive Protein{g/L}		

TOTAL:

TZANAKI'S SCORE:

Right Illiac Fossa Pain		
Rebound Tenderness		
Total Leucocyte Count >12,000 cells/mm^3		
USG Findings Present		

TOTAL:

Histo-Pathological Finding:

DEMOGRAPHICS					SYMPTOMPMS		SIGNS		LABORATORY INVESTIGATIONS				RADIO. ASSESSMENT	SCORES			HISTOPATHOLOGY	
Sr. Number	**IP. Number**	**Age**	**Gender**	**Duration Of Hospital stay IN DAYS**	**C/o Vomiting**	**C/o Pain in right illiac fossa**	**Rebound tenderness**	**Temperature in (CELCIUS)**	**Total Leucocyte Count (PER ml)**	**Segmented Neutrophill per 100 HPF**	**C- reactive protein**	**TLC >12,000cells/mm**	**Usg Findings**	**AIR score (12)**	**AIR GRADE**	**Tzanakis Score (15)**	**REPORT**	
1	1035308	27	FEMALE	6	ABSENT	PRESENT	PRESENT	37.2	16,000	76	38	PRESENT	ABSENT	6	MODERATE	9	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
2	1038684	25	MALE	4	PRESENT	PRESENT	PRESENT	37.8	9,390	80	48	ABSENT	PRESENT	8	MODERATE	13	CHRONIC APPENDICITIS	NEGATIVE
3	1036239	32	FEMALE	5	ABSENT	PRESENT	PRESENT	38.5	10,400	76	34.2	ABSENT	PRESENT	8	MODERATE	13	ACUTE APPENDICITIS	POSITIVE
4	1036841	22	MALE	4	PRESENT	PRESENT	PRESENT	38.6	12,040	78	40	PRESENT	PRESENT	9	HIGH	13	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
5	1033656	31	MALE	5	PRESENT	PRESENT	PRESENT	38.1	8890	62	0.8	ABSENT	PRESENT	6	MODERATE	13	ACUTE APPENDICITIS	POSITIVE
6	1033914	24	FEMALE	3	ABSENT	PRESENT	ABSENT	37.4	9,900	74	0.4	ABSENT	PRESENT	3	MILD	10	ACUTE APPENDICITIS	POSITIVE
7	1034336	25	FEMALE	4	ABSENT	PRESENT	ABSENT	37.8	7660	66	70	ABSENT	PRESENT	3	MILD	10	CHRONIC OBLITERATED APPENDICITIS	NEGATIVE
8	1064872	18	MALE	4	ABSENT	PRESENT	ABSENT	38.6	18560	78	48	PRESENT	PRESENT	6	MODERATE	12	ACUTE APPENDICITIS	POSITIVE
9	1033417	44	MALE	7	ABSENT	PRESENT	PRESENT	37.6	5670	49	150	ABSENT	PRESENT	5	MODERATE	13	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
10	1035875	52	FEMALE	5	PRESENT	PRESENT	ABSENT	37.8	7500	65	36	ABSENT	ABSENT	3	MILD	4	CHRONIC APPENDICITIS	NEGATIVE
11	1033779	15	MALE	5	PRESENT	PRESENT	ABSENT	38.6	9900	88	3	ABSENT	ABSENT	5	MODERATE	4	CHRONIC APPENDICITIS	NEGATIVE
12	1043498	38	FEMALE	4	PRESENT	PRESENT	PRESENT	37.2	9830	86	27	ABSENT	PRESENT	8	MODERATE	13	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
13	1075765	24	FEMALE	6	PRESENT	PRESENT	PRESENT	38.6	12,000	78	36	PRESENT	PRESENT	8	MODERATE	13	ACUTE APPENDICITIS	POSITIVE
14	1046221	16	MALE	3	PRESENT	PRESENT	PRESENT	38.3	8500	64	8	ABSENT	PRESENT	6	MODERATE	13	ACUTE APPENDICITIS	POSITIVE
15	1037945	28	MALE	5	PRESENT	PRESENT	PRESENT	37.2	7090	68	40	ABSENT	ABSENT	5	MODERATE	7	CHRONIC APPENDICITIS	NEGATIVE
16	1065626	40	FEMALE	3	ABSENT	PRESENT	ABSENT	36.9	11,289	74	50	ABSENT	ABSENT	5	MODERATE	4	CHRONIC APPENDICITIS	NEGATIVE
17	1048260	49	MALE	4	ABSENT	PRESENT	PRESENT	37.2	19,700	94	88.8	PRESENT	PRESENT	9	HIGH	15	IMPENDING PERFORATION OF APPENDIX	POSITIVE
18	1057516	30	FEMALE	3	PRESENT	PRESENT	ABSENT	37.5	11,000	83	15.3	ABSENT	PRESENT	5	MODERATE	10	ACUTE APPENDICITIS	POSITIVE
19	1061676	19	MALE	9	PRESENT	PRESENT	ABSENT	37.8	7,500	75	202.5	ABSENT	ABSENT	6	MODERATE	4	ACUTE APPENDICITIS	POSITIVE
20	1041862	32	FEMALE	5	PRESENT	PRESENT	PRESENT	38.5	15,690	56	15	PRESENT	ABSENT	9	HIGH	9	ACUTE APPENDICITIS	POSITIVE

DEMOGRAPHICS					SYMPTOMPMS		SIGNS		LABORATORY INVESTIGATIONS				RADIO. ASSESSMENT	SCORES			HISTOPATHOLOGY	
Sr. Number	**IP. Number**	**Age**	**Gender**	**Duration Of Hospital stay IN DAYS**	**C/o Vomiting**	**C/o Pain in right illiac fossa**	**Rebound tenderness**	**Temperature in (CELCIUS)**	**Total Leucocyte Count (PER ml)**	**Segmented Neutrophill per 100 HPF**	**C- reactive protein**	**TLC >12,000cells/mm**	**Usg Findings**	**AIR score (12)**	**AIR GRADE**	**Tzanakis Score (15)**	**REPORT**	
21	1040230	18	MALE	3	ABSENT	PRESENT	PRESENT	38.1	6,650	59	90	ABSENT	PRESENT	5	MODERATE	13	CHRONIC APPENDICITIS	NEGATIVE
22	1052976	56	MALE	5	PRESENT	PRESENT	PRESENT	38.4	16,310	89	271.4	PRESENT	ABSENT	10	HIGH	9	IMPENDING PERFORATION OF APPENDIX	POSITIVE
23	1053985	21	MALE	4	PRESENT	PRESENT	ABSENT	37.4	15,700	68	3	PRESENT	ABSENT	4	MILD	6	ACUTE APPENDICITIS	POSITIVE
24	1055398	28	FEMALE	4	PRESENT	PRESENT	PRESENT	38.4	10,400	78	89.3	ABSENT	ABSENT	9	HIGH	7	ACUTE APPENDICITIS	POSITIVE
25	1058946	40	MALE	8	ABSENT	PRESENT	ABSENT	38.6	9,130	60	21	ABSENT	PRESENT	3	MILD	13	CHRONIC APPENDICITIS	NEGATIVE
26	1084264	62	MALE	2	PRESENT	PRESENT	PRESENT	38.4	17,700	53	303.5	PRESENT	ABSENT	9	HIGH	9	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
27	1084212	23	FEMALE	4	PRESENT	PRESENT	ABSENT	38	10,310	81	265	ABSENT	PRESENT	6	MODERATE	10	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
28	1084230	45	MALE	3	ABSENT	PRESENT	ABSENT	37.6	15,660	81	304.5	PRESENT	PRESENT	6	MODERATE	12	ACUTE ON CHRONIC APPENDICITIS	POSITIVE
29	1039545	17	MALE	7	ABSENT	PRESENT	ABSENT	37.6	9,420	75	62	ABSENT	ABSENT	2	MILD	4	CHRONIC APPENDICITIS	NEGATIVE
30	1043667	49	FEMALE	4	PRESENT	ABSENT	PRESENT	37.8	17,300	77	57.4	PRESENT	PRESENT	9	HIGH	15	ACUTE APPENDICITIS	POSITIVE
31	1044269	17	MALE	4	PRESENT	PRESENT	PRESENT	38	8,800	56	0.7	ABSENT	ABSENT	5	MODERATE	7	CHRONIC APPENDICITIS	NEGATIVE
32	1044158	51	FEMALE	7	ABSENT	PRESENT	PRESENT	38.2	9,300	70	14.4	ABSENT	ABSENT	6	MODERATE	7	CHRONIC APPENDICITIS	NEGATIVE
33	1046225	35	MALE	6	PRESENT	PRESENT	PRESENT	38.5	7,400	42	10.3	ABSENT	ABSENT	6	MODERATE	7	ACUTE APPENDICITIS	POSITIVE
34	1080161	23	MALE	6	PRESENT	PRESENT	PRESENT	38.4	16,300	62	22.8	PRESENT	PRESENT	8	MODERATE	15	ACUTE APPENDICITIS	POSITIVE
35	1079707	21	MALE	9	PRESENT	PRESENT	PRESENT	37.4	15,700	68	42.7	PRESENT	ABSENT	7	MODERATE	9	ACUTE APPENDICITIS	POSITIVE
36	1080148	24	FEMALE	6	PRESENT	PRESENT	PRESENT	37.6	16,400	59	28.6	PRESENT	PRESENT	6	MODERATE	15	ACUTE APPENDICITIS	POSITIVE
37	1079337	42	MALE	8	ABSENT	PRESENT	ABSENT	38.1	7,890	54	10.3	ABSENT	PRESENT	2	MILD	13	CHRONIC APPENDICITIS	NEGATIVE
38	1080509	40	FEMALE	4	PRESENT	PRESENT	ABSENT	37.6	8,750	67	86.2	ABSENT	ABSENT	6	MODERATE	7	CHRONIC APPENDICITIS	NEGATIVE
39	1080717	42	FEMALE	6	PRESENT	PRESENT	PRESENT	38.2	6,200	50	1.2	ABSENT	ABSENT	4	MODERATE	7	ACUTE APPENDICITIS	POSITIVE
40	1080958	19	MALE	5	PRESENT	PRESENT	PRESENT	37.8	15,390	58	30	PRESENT	PRESENT	7	MODERATE	15	ACUTE ON CHRONIC APPENDICITIS	POSITIVE

DEMOGRAPHICS					SYMPTOMPMS		SIGNS		LABORATORY INVESTIGATIONS				RADIO. ASSESSMENT	SCORES			HISTOPATHOLOGY	
Sr. Number	**IP. Number**	**Age**	**Gender**	**Duration Of Hospital stay IN DAYS**	**C/o Vomiting**	**C/o Pain in right illiac fossa**	**Rebound tenderness**	**Temperature in (CELCIUS)**	**Total Leucocyte Count (PER ml)**	**Segmented Neutrophill per 100 HPF**	**C- reactive protein**	**TLC >12,000cells/mm**	**Usg Findings**	**AIR score (12)**	**AIR GRADE**	**Tzanakis Score (15)**	**REPORT**	
41	1086407	19	MALE	7	ABSENT	PRESENT	PRESENT	38.2	14,630	62	44.9	PRESENT	ABSENT	7	MODERATE	9	ACUTE APPENDICITIS	POSITIVE
42	1037184	72	MALE	3	PRESENT	PRESENT	ABSENT	38.5	11,190	85	15.2	ABSENT	ABSENT	7	MODERATE	4	ACUTE APPENDICITIS	POSITIVE
43	1040392	24	FEMALE	3	ABSENT	PRESENT	ABSENT	38	7,680	85	10.1	ABSENT	PRESENT	5	MODERATE	13	CHRONIC APPENDICITIS	NEGATIVE
44	1052050	34	MALE	5	PRESENT	PRESENT	ABSENT	38.6	11,200	72	28.1	ABSENT	PRESENT	5	MODERATE	10	ACUTE APPENDICITIS	POSITIVE
45	1056819	71	FEMALE	7	ABSENT	ABSENT	PRESENT	38.6	11,870	76	15.41	ABSENT	PRESENT	7	MODERATE	13	CHRONIC APPENDICITIS	NEGATIVE
46	1054764	54	FEMALE	6	PRESENT	PRESENT	ABSENT	37.8	12,900	90	55.1	PRESENT	PRESENT	7	MODERATE	12	ACUTE APPENDICITIS	POSITIVE
47	1058384	42	FEMALE	4	PRESENT	PRESENT	PRESENT	38.6	13,500	87	76	PRESENT	ABSENT	10	HIGH	9	IMPENDING PERFORATION OF APPENDIX	POSITIVE
48	1062408	18	FEMALE	5	PRESENT	PRESENT	ABSENT	37.4	7,050	52	0.5	ABSENT	PRESENT	2	MILD	10	CHRONIC APPENDICITIS	NEGATIVE
49	1058837	18	MALE	3	PRESENT	PRESENT	ABSENT	38	17,390	68	40	PRESENT	PRESENT	6	MODERATE	15	CHRONIC APPENDICITIS	NEGATIVE
50	1067130	24	MALE	8	ABSENT	PRESENT	PRESENT	38.1	6,560	65	7.5	ABSENT	PRESENT	2	MILD	13	CHRONIC APPENDICITIS	NEGATIVE
51	1076882	20	FEMALE	3	PRESENT	PRESENT	ABSENT	38.8	6,100	85	15.5	ABSENT	ABSENT	6	MODERATE	4	ACUTE APPENDICITIS	POSITIVE
52	1037350	19	MALE	9	PRESENT	PRESENT	ABSENT	37.6	13,930	48	0.31	PRESENT	PRESENT	3	MILD	15	CHRONIC APPENDICITIS	NEGATIVE
53	1039407	28	FEMALE	4	PRESENT	PRESENT	PRESENT	38.3	5,470	52	10.3	ABSENT	ABSENT	6	MODERATE	7	ACUTE APPENDICITIS	POSITIVE
54	1047284	43	MALE	5	PRESENT	PRESENT	PRESENT	38.1	16,600	76	24.51	ABSENT	ABSENT	8	MODERATE	7	ACUTE APPENDICITIS	POSITIVE
55	1051217	22	FEMALE	9	PRESENT	PRESENT	ABSENT	38	15,490	89	49.91	PRESENT	PRESENT	9	HIGH	15	ACUTE APPENDICITIS	POSITIVE
56	1065419	41	FEMALE	3	ABSENT	PRESENT	PRESENT	38.1	17,900	80	12.52	PRESENT	PRESENT	7	MODERATE	15	ACUTE APPENDICITIS	POSITIVE
57	1076652	26	FEMALE	5	PRESENT	PRESENT	ABSENT	38.6	16,810	90	58.4	PRESENT	PRESENT	9	HIGH	12	ACUTE APPENDICITIS	POSITIVE
58	1077953	8	MALE	3	PRESENT	PRESENT	ABSENT	38.3	11,800	58	39.41	ABSENT	ABSENT	5	MODERATE	4	ACUTE APPENDICITIS	POSITIVE
59	1056214	6	FEMALE	6	PRESENT	PRESENT	ABSENT	37.1	10,300	57	10.5	ABSENT	PRESENT	4	MODERATE	10	CHRONIC APPENDICITIS	NEGATIVE
60	1075344	23	FEMALE	3	PRESENT	PRESENT	PRESENT	38.5	16,490	83	45.3	PRESENT	PRESENT	8	MODERATE	15	ACUTE APPENDICITIS	POSITIVE