Evaluation of hyperbilirubinemia as a predictor of complicated acute appendicitis

Thesis

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Contents

List of Abbreviations

Abbrev.	Full-term
AAS	**:** Adult appendicitis score systems
ALT	**:** Alanine transaminase
AST	**:** Aspartate transaminase
AUC	**:** Area under curve
Bil. direct	**:** Direct bilirubin
Bil. Total	**:** Total bilirubin
CBC	**:** Complete blood picture
CT	**:** Computed tomography
ED	**:** Emergency department
Fig.	**:** Figure
MRI	**:** Magnetic resonance imaging
OPD	**:** Outpatient department
PV-	**:** Negative predictive value
PV+	**:** Positive predictive value
RIPASA	**:** Raja Isteri Pengiran Anak Saleha Appendicitis
ROC	**:** Receiver operating characteristic curve
WBC	**:** White blood cells

List of Tables

List of Figures

Introduction

In 1886, Reginald H Fitz, a Harvard pathologist, first delineated the clinical condition of acute appendicitis (i.e., inflammation of the vermiform appendix) ***(Richmond B., 2017).*** He properly identified the importance of its early diagnosis and timely treatment, as indicated by his analysis of 257 cases of perforating inflammation of the appendix and 209 cases of typhlitis or peri typhlitis ***(RH, 1886).*** A couple of years later, Charles McBurney delineated the clinical findings before rupture and advocated early surgical intervention. Despite aggressive intervention, mortality and morbidity remained high through the remainder of the nineteenth century and also the first half of the twentieth century. The mortality related to appendicitis declined with the introduction of antibiotics and with the development of anesthesia and higher perioperative care. Acute appendicitis remains one among the foremost common surgical diseases encountered by physicians.

Appendicitis is one of the most typical causes of abdominal pain and surgical emergencies requiring emergency treatment, and appendicectomy remains among the most frequently performed emergency surgeries worldwide ***(Shogilev et al., 2014).*** Often, it's tough to succeed in a correct diagnosis because there may not be classical symptoms and signs of appendicitis. Different clinical signs and symptoms perpetually mimic the diagnosis of acute appendicitis, as there

are variety of causes resulting in pain in right iliac fossa notably in female patients. diagnosing acute appendicitis clinically still remains a typical surgical problem. correct diagnosis will be assisted by extra testing or expectant management or both. These may delay laparotomy and cause appendiceal perforation with raised morbidity and hospital stay. A safe alternative seems to be appendicectomy as shortly as the condition is suspected, a technique that will increase the number of unneeded appendectomies ***(Fair et al., 2015).***

One of the most common and feared complications of the acute appendicitis is perforation of appendix. the general rate of perforated appendix is 25.8%, children <5 years old, patients >65 years old have the highest rates of perforation (45% and 51, respectively) ***(Omari et al., 2014); (Papandria et al., 2013)***. The perforation of appendix results in higher incidence of postoperative infection and longer hospital stay ***(Temple et al., 1995).*** To decrease the morbidity and mortality of perforated appendix, a preoperative diagnosing of perforation should be sought as soon as possible. To stop the harmful effects of perforated appendix, a surgeon needs diagnostic tools which can signal perforation of appendix at the early stages, as a result of which the delay within the management of perforated appendix will not be witnessed. One newer diagnostic tool added to the spectrum is hyperbilirubinemia, as elevated total blood serum bilirubin has been seen to signal perforation ***(Chaudhary et al., 2013); (Iftikhar et al., 2019).*** Hyperbilirubinemia in patients with

appendicitis could have a predictive potential for preoperative diagnosis of appendiceal perforation. The sensitivity of elevated total serum bilirubin is almost like that of elevated total white blood cell count and CRP however specificity of elevated total serum bilirubin is higher (100%) as compared to elevated TLC and C-reactive protein ***(Zejnullahu et al., 2018)***. This study was undertaken to evaluate the sensitivity, specificity and predictive value of serum hyperbilirubinemia in acute appendicitis and its complications.

Aim of the Work

The aim of the present study is to evaluate the value of serum bilirubin measurement in cases of complicated acute appendicitis.

Embryology

Embryology of the appendix is useful in appreciating traditional anatomy from variants. In utero, development is intimately associated with that of the midgut. At 4 weeks, the midgut, equipped by the superior mesenteric artery, herniates into the umbilical cord. The foregut and hindgut do not herniate because of retention bands. At 5 weeks, the pre-arterial segment of the midgut returns into the abdomen because the gut rotates counterclockwise. The appendix is histologically visible by eight weeks of gestation. By twelve weeks, the post-arterial segment has reduced and therefore the cecum is within the higher abdomen with a 270° gut rotation. The gut continues to stretch as components of primitive mesentery fuse to fix the duodenum, ascending and descending colon to the posterior abdominal wall. Because the cecum forms, the appendix emerges as a bud off of the cecum. Elongation of the colon separates the cecum and therefore the appendix. because the appendix is pushed before the cecum, it adopts numerous positions, apparently randomly. No current literature has explained this process. Appendix might be absent in rare situations also duplication of the appendix explained by three processes: double-barreled, bird type or tenia coli duplication ***(Dubhashi et al., 2015).*** Left-sided appendicitis is also reported in literature, but seldom encountered in practice. It could be found in cases of situs inversus, non-rotation of the large intestine, wandering

cecum and excessively large appendix with its tip crossing the midplane. Though the appendix is subject to diverticulum formation just like the remainder of the bowel, there are few reports of the formation of true congenital appendicular diverticula. Favara found an association between genetic abnormalities and congenital diverticula ***(Favara, 1968)***.

Anatomy

Surgical anatomy

Surgical Anatomy The appendix is vermiform (worm-like) formed tube. it is typically five to nine cm long however can vary from a pair of cm to twenty-five cm. it is a comparatively mobile structure and may exist in a variety of orientations. This could have an effect on the clinical presentation of appendicitis because it irritates adjacent structures. Though, it started as a funnel-shaped in utero life, the appendix during adult life in a narrow-lumen bud from the cecum. This explains why appendicitis could be a rare entity in infanthood. The base of the appendix is typically found at a fixed point. The surface anatomy of the appendicular base is described by McBurney's point, a third of the distance along the line between the anterior superior os spine and the umbilicus. It may occupy one amongst many positions. The most common positions seen in clinical practice are retro-cecal or retro-colic, pelvic, or descending (when the appendix hangs dependently over the pelvic brim, in close relevance to the right uterine tube and ovary in females). Alternative positions, including sub-caecal (below the caecum), and pre- or post-ileal (anterior or posterior to the terminal ileum respectively), are sometimes seen, particularly when there is an extended appendicular mesentery that permits greater mobility. It is reported the likelihood of changes in appendix position ***(Ghorbani et al., 2014).***