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Research Article

**APPENDICITIS AND APPENDECTOMY; RECENT EVIDENCE  
IN PRESENTATION AND MANAGEMENT****Mohammed Abdullah Mohammed AlGhamdi<sup>1</sup>, Rayan Omar Mohammed  
Almuathin<sup>2</sup>, Ahmed Ali Alamamir Alghamdi<sup>3</sup>, Yousef Abdulqader Abdulrahman Fatani<sup>4</sup>**<sup>1</sup>Umm AlQura University , Makkah<sup>2</sup>Umm Al-Qura University<sup>3</sup>Umm Al-Qura University<sup>4</sup>Umm AlQura University, Makkah**Abstract:**

**Context:** Appendicitis is considered to be the commonest cause of surgical emergencies around the world. Incidence of appendicitis has varied among different studies and different populations. Generally, the overall risk of developing appendicitis at any point of life of a male individual can be up to 12%, whereas the overall risk of developing appendicitis at any point of life of a female individual can be up to 23.1%.

**Aim of work:** In this review, we will discuss the most recent evidence regarding appendicitis presentation, management, and surgical treatment.

**Methodology:** We did a systematic search for appendicitis and appendectomy using PubMed and Google Scholar search engines. The terms used in the search were: appendicitis, appendectomy, presentation, diagnosis, management, and treatment.

**Conclusions:** Clinical picture of appendicitis includes vague pain (that will later localize to the right lower abdominal quadrant), fever, anorexia, vomiting, tenderness, and guarding (in severe cases with perforation). Definitive treatment of appendicitis is appendectomy, which can be open or laparoscopic. Open appendectomy had been the procedure of choice before the introduction of laparoscopic techniques, which have proven to be associated with better outcomes, less complications, and lower costs. Antibiotics should be given in some cases along with surgery.

**Keywords:** appendicitis, appendectomy, abdominal surgery, acut abdomen

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**INTRODUCTION:**

The appendix is a visceral organ that has an unclear physiology and function. The appendix is generally present at the cecum base, with anatomical variations among different people. The importance of the appendix comes from appendicitis which is considered to be the commonest cause of surgical emergencies around the world<sup>1</sup>. Moreover, appendicitis is also the most common cause of emergent surgery during childhood and during pregnancy [2].

Incidence of appendicitis has varied among different studies and different populations. Many of these studies cannot be accurate enough due to being retrospective or because of causes related to their methodology. Generally, the overall risk of developing appendicitis at any point of life of a male individual can be up to 12%, whereas the overall risk of developing appendicitis at any point of life of a female individual can be up to 23.1% [1]. When examined according to age, appendicitis has been found to be highest among individuals aged between 10-19 years<sup>3</sup>. Some studies have noted the presence of variation of incidence between different seasons. For example, appendicitis has been more observed during summer than other seasons of the year [4].

Incidences where the appendix perforates due to appendicitis have been recently decreasing. The cause of this decrease has not been well-established, but it could be attributed to improved management and treatment of appendicitis cases before they become severe enough to perforate [5]. This decrease in appendix perforation has been associated with a significant decrease in hospital admissions duration and costs of treatment [5].

In this review, we will discuss the most recent evidence regarding appendicitis presentation, management, and surgical treatment.

**METHODOLOGY:**

We did a systematic search for appendicitis and appendectomy using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). Our search also looked for presentation, and treatment of appendicitis. All relevant studies were retrieved and discussed. We only included full articles.

The terms used in the search were: appendicitis, appendectomy, presentation, diagnosis, management, and treatment.

**Pathophysiology and presentation of Appendicitis:**

The general conception of appendicitis is that it starts with an obstruction of its lumen, mainly with a solid stool mass (fecalith). However, recent evidence has been showing that appendicitis could have other mechanisms<sup>6</sup>. These alternative mechanisms include the development of a viral or bacterial infection that will lead to hyperplasia of the appendix lymphatics. Following the obstruction of the appendix lumen, the appendix continues to secrete mucus leading to an increase in the intraluminal pressure, which will cause distension of the appendix wall. These changes will lead to the feeling of an unspecific visceral pain with poor localization initially. As time passes, accumulation of secretion continues with stasis allowing for overgrowth of different bacteria. All these events will lead to the development of appendicitis [4].

Clinical picture will involve the development of fever, high WBCs counts, anorexia, and abdominal pain in the right lower quadrant of the abdomen. Appendicitis can be complicated with ischemia, gangrene, perforation, and peritonitis, all due to the cessation of blood supply due to arterial occlusion. Complicated appendicitis will present with extremely severe abdominal pain and high fever and is considered a serious disease that can lead to sepsis, shock, and possibly death [4].

**Diagnosis of appendicitis:**

Obtaining a proper history is essential in reaching the diagnosis of appendicitis. Generally, the patient will present with a vague pain (epigastric or periumbilical) that will precede nausea, anorexia, and/or vomiting. Some patients can have a history of recent bowel distress, constipation, and/or diarrhea<sup>7</sup>. Pain will then become more localized in the right lower abdominal quadrant and will become associated with severe tenderness. Fever will develop and become more severe as the inflammation progresses. Late disease could present with signs and symptoms of peritonitis [7].

Despite being common in most patients with appendicitis, fever could be absent in some patients, especially with early disease. Some patients may have persistent tachycardia and hypotension. Physical examination will show abdominal tenderness, which is elicited in the McBurney point. Rebound tenderness can be present in cases of peritonitis along with involuntary guarding. Examination of the rectum can sometimes cause pain when the appendix is located in the pelvis [7].

In cases of suspected acute appendicitis, investigations must include complete blood count,

urinalysis, coagulation parameters, inflammation markers and electrolytes levels. Women must also get a pregnancy test.

The most important laboratory marker when diagnosing a case of appendicitis is the significant increase in counts of WBCs, along with the presence of high C-RP levels<sup>8</sup>. Other markers include bilirubin levels, lactoferrin, fibrinogen and calprotectin [9].

When investigating a case of appendicitis, imaging could be of great benefit in confirming the diagnosis and ruling out other possible causes of acute abdomen. The most important imaging technique when doing the work up of appendicitis is CT scanning. Other techniques include ultrasound and MRI. The decision of which modality to use depends mainly on available techniques, and the characteristics of the patient. For example, ultrasound is cheap, widely available, and associated with no radiation exposures, which make it ideal for use in pregnancy. However, it is associated with relatively low sensitivity and specificity, limiting its routine use in suspected appendicitis. On the other hand, CT images have significantly higher sensitivity and specificity but are associated with significant radiation exposure and high costs<sup>10</sup>. CT images are still, however, not useful in detecting perforation in severe appendicitis [11]. The best imaging modality remains to be MRI, which is, however, associated with significantly higher costs, making it not cost-effective in many cases [12].

#### **Open surgery appendectomy:**

Currently, open appendectomy procedure is rarely attempted due to the emergence of laparoscopic surgical techniques. However, it is still essential for surgeons to be familiar with it, in order to be able to perform it when there is any contraindication to laparoscopic surgery, or when laparoscopic techniques are not available.

Most open appendectomies are done by an oblique incision in the right lower abdominal quadrant, or a transverse incision in the right lower abdominal quadrant in a lateral position to the rectus muscle. The later incision is sometimes preferred as it gives better pelvic access and is associated with better outcomes cosmetic-wise. Then, the external oblique muscle aponeurosis is incised along with the abdominal wall to reach the peritoneum and detect the appendix. The surgeon will then ligate and remove the appendix and ligate the appendiceal artery. Finally, the surgeon irrigates the peritoneum with saline and closes the muscle and the fascia<sup>13</sup>.

#### **Laparoscopic appendectomy:**

The first appendectomy to be performed with laparoscopic techniques was in 1980. This was considered a huge achievement in the field of surgery, as it soon became the procedure of choice for managing and treating appendicitis [14].

Since then, this technique has been continuously improving and several studies have been conducted on it to prove its superiority over open appendectomy. A previous meta-analysis included more than thirty controlled trials (over 3500 total number of patients), has concluded that laparoscopic appendectomy showed significantly better outcomes than open appendectomy regarding rates of infections, duration of hospital admissions, and development of complications. However, this meta-analysis did not include children, and did only study adults [15].

In 1997, the single incision laparoscopic appendectomy was introduced and gave the ability to access the abdomen through only one incision. The main improvement in this technique was to lead to better cosmetic outcomes<sup>16</sup>. Limitations of this technique are the significantly longer operation time associated with it, and its higher costs than standard laparoscopic appendicitis [16].

#### **Natural Orifice Transluminal Surgery:**

In this procedure, the peritoneum is accessed through a body orifice like the mouth, the vagina, or the rectum. Following the access, appendectomy is performed similar to standard laparoscopic procedure. This technique was first introduced in the year 2017, aiming to improve cosmetic outcome, as it will not need a surgical wound [17].

#### **CONCLUSIONS:**

Appendicitis is considered to be one of the most common causes of surgeries in the emergency department, and the most common cause of acute abdomen. Clinical picture of appendicitis includes vague pain (that will later localize to the right lower abdominal quadrant), fever, anorexia, vomiting, tenderness, and guarding (in severe cases with perforation). If not treated early, appendicitis can be complicated with ischemia, gangrene, perforation, peritonitis, sepsis, and possibly death. Diagnosis of appendicitis relies mainly on medical history and physical examination. CT scanning and ultrasound can be used to confirm the diagnosis. MRI is associated with the best sensitivity and specificity. However, it has significantly higher costs making it not cost effective. Definitive treatment of appendicitis is appendectomy, which can be open or

laparoscopic. Open appendectomy had been the procedure of choice before the introduction of laparoscopic techniques, which have proven to be associated with better outcomes, less complications, and lower costs. Antibiotics should be given in some cases along with surgery.

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