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An Overview on Diagnostic and Management Approach of Diverticulosis Disease

Mutaz Naef Alamri[1], Alya Mesfer A Alqahtani[2], Abdullah Abed G Alshareef[3], Abdulellah Talal Alhazmi[3], Hawra Ali G. Aleirani[4], Makki Ayman M. Alamoudi[5], Amani Nasser D Albalawi[6], Yaqoub Yousef A Alkhallafi[7*], Moutaz Abdullah Ali Alghmdi[5], Abdullah Mansour Alomran[8], Ali Hussain Alghanmi[9], Hamzah Saleh Albandar[10]

[1]Faculty of Medicine, King Saud bin Abdulaziz University for Health Sciences, Riyadh, KSA.
[2]Faculty of Medicine, King Khalid University, Abha, KSA.
[3]Faculty of Medicine, King Abdulaziz University, Jeddah, KSA.
[4]Faculty of Medicine, Batterjy Medical College, Jeddah, KSA.
[5]Faculty of Medicine, Vision colleges, Riyadh, KSA.
[6]Faculty of Medicine, Royal College of Surgeons in Ireland., Dublin, Irland.
[7]Faculty of Medicine, Medical University of Lodz, Lodz, Poland.
[8]Department of Urology, Prince Saud Bin Jalawy Hospital, Al-ahsa, KSA.
[9]Faculty of Medicine, Umm Al Qura University, Makkah, KSA.
[10]Clinical Pharmacy, Al Naeriyah Hospital, Al Naeriyah, KSA.

ABSTRACT

Diverticular disease is a common condition that mainly affects elderly patients, however, it can also affect the young population. There are various theories for the etiology and all of them lead to the same endpoint and complication. The patient can be asymptomatic and can present as a case of abdominal peritonitis. Management varies from conservative management to surgical intervention. PubMed database was used for articles selection, and the following keys were used in the mesh ((“diverticular disease "[Mesh]) AND (“diagnosis and treatment”[Mesh]) OR (“diverticular disease diagnosis and treatment Mesh])). In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics: diverticular disease recent diagnosis and treatment. Exclusion criteria were all other articles, which did not have one of these topics as their primary endpoint. Diverticular disease is a very wide topic, many aspects are still unclear and more works are required to improve the outcome of the patient.

Keywords: *Diverticular disease, Diverticular abscess, CT guided drainage, Perforation*

Corresponding author: Yaqoub Yousef A Alkhallafi
e-mail ✉ Yagou.b123@hotmail.com
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INTRODUCTION

Diverticulosis is considered the commonest cause of colon anatomical alteration. Its incidence has been rising in the recent decades, most probably due to the change of lifestyle and eating habits (Piscopo & Ellul, 2020). Nowadays, it is considered an unignorable burden for health systems around the globe, it is more common among males, and in developed societies, it is present in around 10% of people below the age of 40, and it increases with age up to higher than 70% in people above 80 years, it is believed that the direct relationship between the prevalence and the age is due to the prolonged exposer time for the wall of the colon to pathogenic factors, which makes it more susceptible to develop the condition (Munie & Nalamati, 2018).

Diverticula is a saclike protrusion of the wall of the colon. Once it causes symptoms, it is called diverticular disease. Then if inflamed, it becomes diverticulitis. Furthermore, diverticulitis is subdivided into uncomplicated and complicated, with the latter compromising abscesses, fistulas, obstruction, and perforation (Piscopo & Ellul, 2020).

MATERIALS AND METHODS

PubMed database was used for articles selection, and the following keys were used in the mesh ((“diverticular disease "[Mesh]) AND (“diagnosis and treatment”[Mesh]) OR (“diverticular disease diagnosis and treatment Mesh])).
In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics: diverticular disease recent diagnosis and treatment.
Exclusion criteria were all other articles, which did not have one of these topics as their primary endpoint.

Around 90 publications were chosen as the most clinically relevant out of 1,202 articles indexed in the previous two decades, and their full texts were evaluated. A total of 31 of the 90 were included after a thorough examination. Additional research and publications were found using reference lists from the recognized and linked studies. Expert consensus recommendations and commentary were added where relevant to help practicing physicians assess cirrhosis most simply and practically possible.

RESULTS AND DISCUSSION

Pathophysiology

ITo understand the pathophysiology of diverticulitis, we must first clarify the development of the diverticulosis. Again, we must mention that the pathogenesis is multifactorial, as discussed below:

Colon motility and diverticulosis

It was first noticed by Burkitt in 1971 that the native Africans have low incidents compared to the locals, for that he hypothesized that it is their eating habits that contain a high share of fibers which shortens the needed time to evacuate, so less contact time between the food and the colon wall (Burkitt, 1971). On the other hand, people with what is called a low residual diet that contains low fiber along with high processed sugar was supposed to be the main etiology behind the development of diverticulosis due to increasing contact time with the colon wall and the fact that the low residual diet causes constipation as well which is a factor in the development of diverticulosis. It was all based-on observation, but recently a disturbance in the levels of the vasoactive intestinal polypeptide was noticed seemed to support Burkitt's hypothesis (Munie & Nalamati, 2018).

Diverticulitis

After the development of diverticulosis, only a small percentage develop inflammation and symptoms, the exact determinant is not exactly known, and many factors and genetics play a role, but two main theories have been accepted by the scientific community.

Traumatic theory

This theory is considered the most accepted theory for the development of acute diverticulitis; it states that damage to the diverticulum followed by bacterial proliferation inside it is the cause of acute diverticulitis (Zullo, 2018). It all starts with increased pressure inside the lumen of the colon; this pressure pushes fecoliths to the base of the diverticula (Zullo, 2018). This entrapped fecolith will damage the mucosa of the sac, thus causing local inflammation and further bacterial overgrowth. Moreover, either the presence of the fecal matter itself or the edema caused by the inflammation, there will be high pressure in the lumen pressing the wall and the result is vascular congesting and more edema, which obstructs the sac even more (Zullo, 2018). Bacterial proliferation and secretion may breach the wall of the sac and result in perforation and generalized inflammation. This theory describes the events that ended with acute diverticulitis for the older patient in a sequel manner. And as seen above that bacteria play a major role in the pathogenesis; antibiotics are considered the basic treatment option (Zullo, 2018).

Ischemic theory

The former theory was proposed for the older patient, this one approach the pathogenesis of diverticulitis in the younger patient who usually remains asymptomatic (Bassotti *et al*., 2001). The ischemic theory states that prolonged abnormal contraction in the colon predisposes the diverticula to ischemia and micro-perforation. Studies have demonstrated the cause of this abnormal, persistent contraction to be neuromuscular in origin (Golder *et al*., 2003). The enzyme Choline acetyltransferase activity was lower in the affected areas compared to the rest of the colon, which explains the persistent contraction (Golder *et al*., 2003). Moreover, a higher number of M3 receptors were present in the affected area as well. Lastly, patients with diverticular disorders manifested a higher response to exogenous acetylcholine when compared to others (Golder *et al*., 2003). All these previously mentioned factors play has a role in the process of increasing the sensitivity to cholinergic denervation, thus causing prolonged abnormal contraction in response to a normal stimulus. This theory presents the pathogenesis of acute diverticulitis where fecolith and bacteria have no to a limited role. Therefore, here antibiotics use is limited and only used as prophylactic against opportunistic infections (Bassotti *et al*., 2001; Munie & Nalamati, 2018).

Signs and symptoms

Uncomplicated diverticulosis is asymptomatic most of the time. Uncommonly the patients may complain of recurrent mild lower abdominal pain, flatulence, and distention (Wilkins *et al*., 2013). On the other hand, acute diverticulitis, which is a complication of the former condition, is characterized by moderate to severe abdominal pain that shifts to the left iliac fossa with time (Laméris *et al*., 2010). The pain starts increasing in intensity gradually until it becomes constant, but it may show a colicky pattern if obstruction occurs, also associated with tenderness and guarding, with systemic fever and blood per rectum, nausea and anorexia are frequent but vomiting is rare. Change in bowel habits and urinary frequency are possible as well (Laméris *et al*., 2010). On physical examination, the patient will be lying still because of the pain and often showing flushing. Fever and tachycardia are cardinal symptoms. Tenderness and guarding in the left iliac fossa (unlike appendicitis which shows this on the right iliac fossa), if the pain suddenly becomes generalized, then perforation and peritonitis have occurred (Wilkins *et al*., 2013). A palpable sausage mass might be present on the left iliac fossa, palpation of the right iliac fossa cause pain on the right one (reversed Rovsing's sign). Abdominal sounds are normal, absent if peritonitis, and exacerbated in case of obstruction (Wilkins *et al*., 2013).

Diagnosis

Lab tests: full blood count shows high white blood count and possible anemia (due to bleeding), CRP and ESR should be measured, blood should also be collected for a basic metabolic panel to assess renal function and electrolyte imbalance (Käser *et al*., 2010). Urine human chorionic gonadotropin level is tested in premenopausal women to exclude pregnancy, especially if an intervention is to start as some operations and drugs are

contraindicated in pregnancy. Lastly, a fecal sample is obtained during a rectal examination to test occult fecal blood (Käser *et al*., 2010).

Imaging: CT scan of the abdomen and pelvic with contrast is the modality of choice for suspected diverticulitis. Not only does it diagnose the condition but also it helps stage the disease and exclude suspected complications. Supportive findings on CT are colonic outpouching (Positive diverticulosis), the presence of signs of inflammation (thickened bowel wall> 3mm), peri-diverticular mesenteric fat stranding (DeStigter & Keating, 2009). Complications such as peri-diverticular abscess, perforation, and intestinal obstruction are seen on CT scans if present. MRI and ultrasound are indicated as second-line imaging if the patient has a contraindication for CT scans such as allergy to contrast or pregnancy (Heverhagen *et al*., 2008). Colonoscopy is contraindicated in suspected acute diverticulitis as it increases the risk of perforation (Lau *et al*., 2011).

Classification

Classification of diverticulitis is based on the Modified Hinchey stage: -

Class 0 is mild clinical diverticulitis. Class 1a is pericolic inflammation or phlegmon, while 1b is a pericolic abscess. Class 2 is an abscess beyond the pericolic space. Classes 3 and 4 have generalized peritonitis, the former being generalized purulent peritonitis and the latter generalized fecal peritonitis (Tochigi *et al*., 2018).

Management

Treatment differs according to the Modified Hinchey stage

Uncomplicated diverticulitis (stages 0 and 1a)

Most patients with uncomplicated diverticulitis are treated in the outpatient clinic. Treatment is conservative and composed of resting the bowel with a clear liquid diet, then giving broad-spectrum oral antibiotics (against gram-negative rods and anaerobic bacteria) (Andeweg *et al*., 2013). It is mainly Metronidazole plus one of the following: Ciprofloxacin, Levofloxacin, Amoxicillin, or Trimethoprim-sulfamethoxazole. Pain management is considered as well, first-line treatments are antispasmodics (e.g., dicyclomine) and Acetaminophens, NSAIDs, and Opiates are reserved for severe conditions. Antiemetics are given if needed (Chabok *et al*., 2012). The patient is to be followed up in 2-3 days for evaluation of the regression, if no improvement, then the patient is admitted to the inpatient department and the trial of conservation management is repeated. Screening colonoscopy is performed once symptoms resolve. Surgical consideration is considered in repeated attacks of unknown cause and for frequent recurrent symptoms (Chabok *et al*., 2012).

Complicated diverticulitis (beyond 1a)

The first step is to admit the patient then start the resuscitations process. This starts with resting the bowel by putting that patent in the non per oral status and giving IV fluid as needed and blood in case of anemia due to bleeding or chronic disease. IV broad-spectrum antibiotics, as mentioned earlier, analgesics are given as needed following the step ladder method. Lastly, antiemetic if required (Ambrosetti *et al*., 2005). After the resuscitation, the main complication is investigated and treated as described below.

Complications

Complications can be divided into late or early

Early: Perforation, abscess, intestinal obstruction, and bleeding

Late: Fistula, Recurrent diverticulitis, and colon cancer

Perforation: Either local perforation gives rise to abscess or phlegmon, or it might cause generalized purulent peritonitis if the former abscess ruptured. Finally, generalized fecal peritonitis caused raptured infected diverticula (Tochigi *et al*., 2018). Diabetics, immunocompromised, and patients taking NSAIDs are susceptible to developing perforation (Morris *et al*., 2003).

Abscess: Usually localized to the peri-diverticular area and causes symptoms similar to the ones of acute diverticulitis. An abscess is suspected in a patient with persistent fever regardless of the conservative treatment with antibiotics. Management depends on the size of the abscess: if less than 4 cm, then conservative with IV antibiotics is the treatment, if signs of improvement start to appear in the first 72 hours, then start oral feeding gradually and switch to oral antibiotics, if no improvement in 72 hours then considers percutaneous drainage (Dharmarajan *et al*., 2011). If the abscess is larger than 4 cm, then percutaneous drainage is considered, using ultrasound or CT guidance (Dharmarajan *et al*., 2011). If percutaneous drainage isn't feasible, then consider laparotomy. The abscess content (pus) is then sent to culture and sensitivity (Dharmarajan *et al*., 2011).

CONCLUSION

Diverticular disease is a wide topic to be studied, different presentations and variable diagnostic plans can be done for it to determine the best management plan. The treatment can be range from conservative management to surgical intervention. It could be prevented with some lifestyle modifications. However, when it became symptomatic, urgent medical advice should be sought.

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