Original Article

Evaluation of Recent Surgical Updates Regarding Diagnosis and Management of Diverticulitis

Naif Faris Alhadi[1]*, Asma Saeed Mohammed Aldahmashi[2], Mofareh Jubran Safar Alrasasimah[3], Abdulaziz Fahad Alotaibi[4], Abdullah Khalid Alabdulqadir[4], Falah Eid Alotaibi[4], Mohammed Saad Alarbash[4], Moath Omar Mohammed Algabri[5], Fatimah Mohammed Ali Kaabi[6], Faisal Abdulsalam Bakhsh[7]

[1]Ministry of Health, King Abdulaziz Specialists Hospital, Sakaka, KSA, [2] Department of Medical Science, Faculty of Medicine, King Khalid University, Abha, KSA, [3] Department of Medical Science, Faculty of Medicine, Tabuk University, Tabuk, KSA, [4] Department of Medical Science, Faculty of Medicine, King Faisal University, Al- Ahsa, KSA, [5]Ministry of Health, Maternity And Children Hospital, Tabuk, KSA, [6]Department of Medical Science, Faculty of Medicine, Jazan University, Jazan, KSA, [7] Department of Medical Science, Faculty of Medicine, Taibah University, Madina, KSA.

Abstract

Background: Diverticulitis is a prevalent disease in western countries, which is increasing in young people and developing countries due to the adaptation of a low fiber diet. True diverticulitis affects all layers of the intestine, more common on the left side, while false diverticulitis extends only to the mucosa and submucosa. Diverticulitis patients mostly complain of lower left abdominal tenderness. **Objectives:** In this paper, we focused on diverticulitis and surgical intervention, and only relevant studies were discussed. **Methodology**: PubMed database was used for articles selection, and papers on diverticulitis were obtained and reviewed. **Conclusion:** Colonoscopy is best avoided in acute and uncomplicated diverticulitis. Classically, it is a surgical disease but uncomplicated cases can often be managed conservatively. Follow up of treat-ed diverticulitis occurs after four weeks via colonoscopy, in selected cases assessing the risk of developing colonic cancer. Novel therapies are under-studied and are probable replacements for surgical intervention.

Keywords: Diverticulitis, Colonoscopy, Colonic cancer

Introduction

Increasing urbanization in many developing countries by modification of lifestyle has confronted them with the challenge of doubling illnesses [1]. Diverticular diseases and diverticulosis are becoming significantly prevalent in modern society. This issue has a relatively higher incidence in western developed countries. Diverticulosis is a medical condition that is characterized by the presence of diverticula in the colon, most commonly sigmoid colon. They only encompass mucosa and submucosa because they are false diverticula. The disease begins with herniation through weak areas of the lumen, eventually obstructed by fecoliths leading to inflammation and micro-perforation. In the US, admission due to diverticular disease is increasing [2]. Even though this disease is associated more with aging, with prevalence increasing from 5% at 40 years to 65% at 85 years and older. Studies have shown an increased incidence in younger people, therefore diagnosis should be suspected [3]. There are certain common causes of rectal bleeding that the junior surgeon should be wary of including hemorrhoids, colorectal carcinoma, diverticulitis, inflammatory bowel diseases, angiodysplasia, and perianal disease. Diverticulitis is an important differential of left lower quadrant abdominal pain along with sigmoid volvulus, perforated colon, colorectal carcinoma, urinary tract infection, and pyelonephritis. Young people with diverticulosis are more likely to develop diverticulitis than those diagnosed at older ages. This disease, especially if it developed into acute diverticulitis, needs hospitalization as it may be complicated by perforation of the bowels, ensuing peritonitis, and inevitable septic shock. These factors all add to the increasing health care expenditure overall. In this paper, we will review diverticular diseases, their pathophysiology, clinical features, and management (surgical and non-surgical) [4].

Address for correspondence: Naif Faris Alhadi, Ministry of Health, King Abdulaziz Specialists Hospital, Sakaka, KSA.
E-mail: naiffaris8@gmail.com

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Methodology

PubMed database was used for articles selection, and the following keys were used in the mesh ("Diverticulitis"[Mesh] and "Surgery"[Mesh]). In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics; diverticular disease features and surgery, maintenance, and operative management of diverticulitis. Exclusion criteria were all other articles that did not have one of these topics as their primary endpoint.

Discussion

Diverticular disease is a general term that includes arrays of the same pathophysiology process. Generally, this term refers to starts diverticulosis, which simply means the presence of colonic diverticula which is sac-like protrusions that rise to a full-bloomed illness. Diverticula can erupt anywhere along the gastrointestinal tract, but most commonly it occurs in the sigmoid colon. There are two pathological distinguished types of true and false diverticula, both involve the colonic wall. The difference between them is that the muscular layer would be spared in a false diverticulum, and only the mucosa and submucosa are involved, and all layers are involved in the true one. These diverticula is not a disease by itself, however, it can develop diverticulitis which is macroscopic inflammation in it after obstruction by a fecolith. Bleeding diverticulitis occurs when there is micro-perforation on the luminal arteries. The lifetime risk of developing inflammation in people with diverticulosis ranges from 10% to 25% [5]. Defects and weakness in the intestinal lumen develop commonly at the site of vascular penetration (between the antimesenteric and mesenteric teniae). With increasing intraluminal pressures, these sites herniate and develop diverticulae. It can develop acute or chronic complications, and thus clinical features and the course of the disease varies [6]. One of the main events that it is believed to be the main turning point in the development of diverticulitis is the obstruction of the neck of a diverticulum. This will have multiple consequences, such as, local ischemia, bacterial proliferation, and even may cause micro-perforation that may lead to disastrous complications [7].

There are multiple factors believed to cause the diverticula, but the exact pathological mechanism remains unclear. However, it is most likely a multifactorial disease with the aging process, diet, genetics, the microbiota of the colon, colonic motility, and structure all playing major parts in it. Certain factors alter colonic motility and resistance including decreased fiber intake and other dietary issues. Diet has been suggested as a key factor in the pathophysiology, especially that studies proved that increasing dietary fiber portions in daily meals leads to a significant decrease in diverticular disease and resulting in less constipation as well (better colonic motility) [8]. Therefore, low fiber diet, chronic constipation and family history with advancing age are risk factors for disease occurrence.

Patients with diverticulitis were noted to have a specific microbiota which was different compared to an un-inflamed colon, dysbiosis was also noted in the colon of these patients. In these patients, anaerobic bacteria are the most commonly identified organisms, and usually *Bacteroides*, *Peptostreptococcus*, *Clostridium*, and *Fusobacterium* are isolated. Furthermore, some studies reported the isolation and culture of gram-negative aerobes. Even though most of the risk factors are related to lifestyle and inflammation causes, a Swedish twin study demonstrated the importance of genetic susceptibility, as observed in a higher concordance rate of diverticular disease [9]. Decreased colonic motility (constipation) was also suggested as a factor due to its rule causing multiple repeated micro trauma to the tissues and increased time of exposure of the diverticula to feces, and increasing chances of inflammation [6]. Inflammatory status on its own is considered a risk factor since the disease is seen more in immunocompromised status populations such as pregnant women, chronic kidney disease patients, corticosteroid using patients and collagen–vascular disease patients.

Saint's triad is a combination of diverticular disease, cholelithiasis, and hiatal hernia. This is relevant as alert young doctors to the possibility of multiple conditions in patients presenting to the hospital, such as in this case with diverticulitis. Even though the main trigger behind this disease is unknown, the fact that the inflammation process is the hallmark of the disease is undeniable. Diverticulitis patients showed significantly higher levels of inflammatory factors such as TNF- alpha, IL6, and IL1 beta. Fecal calprotectin, microscopic inflammatory infiltrate, inducible nitric oxide synthase were all shown to be significantly higher, and even some studies reported a possible link between inflammatory infiltrates and the severity of the disease [6]. Another spectrum of this disease is complicated diverticulitis and this term used when further complications develop. These include the presence of an abscess, fistula, stricture, bowel obstruction, peritonitis with perforation and even colonic obstruction in some rare cases. These complications have a higher chance of occurrence in patients with repeated acute attacks, especially if not treated or treated poorly. An evident example is noted in obstruction, where the acute episode may lead to it via edema or abscess formation. The repeated attacks may lead to chronic scarring, resulting in stricture formation leading to obstruction.

A great clinical assessment encompassing history and physical examination aids in the diagnosis of diverticulitis for physicians. Patients usually present in the acute setting (acute diverticulitis) with sudden, continuous pain of the left lower quadrant [10, 11]. These patients may also report gastrointestinal disturbances including constipation, nausea, vomiting, diarrhea, and anorexia. There are other symptoms that may be present as well, such as a fever that may even be a high grade one, blood or mucus with defecation, bloating, and flatulence. One of the interesting and unique findings in this disease is that some patients will present with urinary symptoms like urgency, dysuria, and change in frequency due to the adjacent location of diverticulitis to the urinary

structures [10]. When examining such cases, a careful assessment of the abdomen should be made, and tenderness of the left lower quadrant should alert the physician to acute diverticulitis. The clinical examination may reveal more signs such as abdominal distention, tympanic abdomen upon percussion, and hypo/hyper-active bowel sounds upon auscultation [11]. However, these symptoms and clinical signs can present in any part of the colon and thus abdomen and therefore, pain and tenderness that is not in the left lower abdominal quadrant should not rule out the possibility of acute diverticulitis.

Differential diagnoses of diverticulitis mainly depend on its location. Transverse colon diverticulitis may require exclusion of acute pancreatitis or cholecystitis; diverticulitis may occur in the ascending colon and may be missed for acute appendicitis. Thus, a high threshold for clinical suspicion is very helpful to lead the clinician to the right diagnoses, especially in such cases. In complicated diverticulitis, an unstable hemodynamic status may be present and should narrow down the differential when accompanied by the former symptoms. Other clinical features include, absent bowel sounds upon auscultation which may indicate a perforation, especially if accompanied by generalized abdominal pain after being localized, along with rebound tenderness, and generalized guarding [11].

In the presence of a pelvic abscess, a digital rectal examination would palpate mass, increased local tenderness and/or pain with or without peritonitis [12]. Free perforation can occur in 1–2% of patients who present with acute symptoms, and this possibility shall always be thought by the clinician especially with the dramatic worsening state of a patient. These clinical features should alarm and help in directing the physician to the diagnosis and the possible complications.

Patients with abscess are at incremented risk of colorectal carcinoma in the long run, and hence a colonoscopy is required [13]. It is important to note that colonoscopy in diverticulitis is a risk factor for perforation. Moreover, and even after treatment for acute diverticulitis, usually the patients undergo colonoscopy after a month or more of treatment [14]. This is due to the fact that colonoscopy is contraindicated in the acute diverticulitis setting; and even in uncomplicated diverticulitis, colonoscopy is better avoided. Colonoscopy is very important clinically to early diagnose and manage colon cancer, due to the high risk of carcinoma in such patients even though this procedure carries the risk of perforation or even complicate a -not so simple- diverticulitis.

Upon admission, the clinician needs to build up the baseline status of the patient, and this requires a variety of lab investigations, including CBC (which may show leukocytosis related to the inflammatory process), electrolytes, renal and liver function tests, urinalysis, urine and blood cultures, preferably before administering any antibiotics. Patients that are clinically believed to have the disease can be confirmed with radiological studies, and mainly helical CT scan is used due to its high sensitivity and specificity. However, other modalities can be done in specific patients, like contrast enema which can be carried in uncomplicated patients, and plain x-ray which helps in identifications of critical complications such as perforation and obstruction. These radiological modalities have an increasing clinical rule in terms of diagnosis and even management, especially in the acute setting of the disease [15].

In terms of management, the patient presenting with an acute diverticulitis episode with no hemodynamic changes could be monitored conservatively on the clinic. In general, oral medications should be reserved for milder cases; patients in severe distress should be transfused medications intravenously. These patients especially if they are able to tolerate fluid diet, do not have underlying diseases, are not feverish, and not showing any significant leukocytosis are usually not treated surgically [3]. In these patients, it is possible to treat their disease with analgesics, antibiotics, liquid diet for bowel rest, and lifestyle modifications [10].

Surgical intervention is required and preferable when diverticulitis' complications arise including recurrence, obstruction, fistula, and abscess formation [3] The most common fistual in diverticulitis is colovesical where the patient presents with urinary tract infection and air and fecal matter in the urine. Moreover, elective surgery is increasing, as most operations are in young age groups of the US [2]. For other patients, even an elective resection might be life-saving and quality-improving. This group mainly encompasses chronic renal injury, collagen-vascular disease, and patients on immunosuppressants [16]. These patients are very vulnerable to certain complications, especially when it comes to the risk of having a recurrent diverticular disease and even have a higher risk of perforation [16]. Recurrent diverticulitis would inevitably cause scarring and luminal obstruction. Some procedures may decrease the need for operative intervention, for example, percutaneous drainage. Salem et al. reported that percutaneous drainage in complicated diverticulitis decreased the odds of operative intervention [17]. Possibly fortunate news on this disease is pharmaceutical agents for the prevention of recurrent diverticulitis, including mesalamine, rifaximin, and probiotics. Unfortunately, statistical significance does not equate clinical evidence to include them in management protocols as of yet [5]. Diverticulitis is almost exclusively surgically managed, however, the gastroenterologists may still opt for medicinal management in selected cases. However, conservative management carries its own risk with patients commonly suffering from recurrence, especially if not properly treated and followed. On the other hand, surgery can be lifesaving in some patients and early identification of these patients is important. Surgical options include sigmoidal resection and even total colectomy in severe cases. The main indications for surgery include stenotic complaints, fistulas, and recurrent diverticular bleeding [18-20].

Conclusion

Diverticulitis is common in developed worlds, and its incidence is rising in developing countries possibly due to lifestyle changes. Even though it was the disease of the elderly, now it affects the younger population in rising rates. While constipation was believed to be the main cause behind diverticulosis pathogenesis, recent studies are proving that this disease has multifactorial pathophysiology. The rule of a physician is very important for diagnosis and radiological modalities along with a colonoscopy, and all have major weight clinically. Management of patients defers based on the presentation, clinical setting, and available resources, ranging from observation, and antibiotics, lifestyle changes up to major surgeries. Further investigation with larger studies is important to be done to develop a consensus on specific pathophysiological mechanisms, the rule of major surgeries in elective cases, and the rule of new drug modalities that may help in decreasing the recurrence rate of this disease. These topics may change our whole management protocols and understandings of this disease, helping physicians to provide even more optimal care for patients in the future.

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