

Management of Complicated Colonic Diverticulosis

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ABSTRACT

Prevalence of diverticular disease has been increasing worldwide in concert with the development of industrial era and the alteration of diet pattern to low dietary fiber. Mean age of patients is 60 years; peak incidence at age more than 50 years, 20% less than 50 years, 2-8% less than 40 years. About 50 - 90% of diverticular disease are left-sided especially sigmoid, while in Asian people are mostly right sided. The usual complaint of patient is abdominal pain.

Complications that may occur due to diverticulosis are diverticulitis, abscess, fistula, obstruction and bleeding. The presence of complicated diverticulosis can be evaluated by plain X-rays, CT-scan, barium with contrast, ultrasonography and colonoscopy in addition of laboratory examination.

The management of complicated diverticulosis usually consists of combination of medical therapy and surgery. Proper and immediate treatment will influence the prognosis of patients.

Keywords: *diverticular diseases, diverticulitis, abscess, fistula, obstruction, bleeding*

INTRODUCTION

Diverticular disease is commonly encountered in developed countries. In the industrial era followed by lifestyle changes from high dietary fiber to lower dietary fiber had made increasing prevalence of diverticular disease in accordance with increasing age.^{1,2,3}

Painter had stated earlier that diverticular disease would become health problem in 20th century. The pathological description of diverticule was first described in 1700 and the term of diverticule was first introduced by Fleishman in 1815. Graser used the term 'peridiverticule' to describe an inflammation of diverticule in sigmoid.⁴

The incidence of diverticulosis is increasing worldwide recently. However the incidence of complicated diverticulosis has never much changed. The increased incidence of bleeding occurred in younger patients. Mean age was 60 years, peak incidence at age more than 50 years, 20% at age less than 50 years, 2-8% at age less than 40 years. About 50-90% of cases are left-sided especially sigmoid, while in Asian people mostly are right sided, and more frequently to

have massive bleeding compare to diverticulitis. A study conducted in developed country had found 30% at age more than 50 years, 50% at age more than 70 years and 66% at age more than 85 years old. Incidence was not difference between male and female patients.

Clinical manifestation of diverticular disease is varied from asymptomatic, symptomatic to fatal complication.⁵

'Diverticulum' or 'diverticule' is a condition in which intestinal mucosal and submucosal herniation protrude through circular muscle of the abdomen. At the same site, the arteries which are originated from submucosal layer (mainly from sigmoid and descending colon) enter through the abdominal circular muscle. Diverticulosis refers to multiple diverticulums.²

Diverticulitis is a complication when inflammation occurs in one or more diverticule. If inflammation process is localized around diverticule is called peridiverticulitis and if it is spread to other tissue and organ called pericolicitis. Diverticulitis alone may complicate and become abscess, obstruction and bleeding.

EPIDEMIOLOGY

The true incidence of diverticular disease is difficult to know because many patients are asymptomatic. Incidence of diverticular disease is also increasing in society who has low dietary fiber. A prospective study 'Oxford vegetarian' in 1970 had showed significant difference between the high dietary fiber and low dietary fiber group. The number of diverticular disease had reached 33% in non-vegetarians while there was only 12% in vegetarian.⁴

Based on history, diverticular disease is a common disease in developed country, less common in South America and rare in Africa and Asia. However, as western lifestyle is adapted more in Asian and African countries, the prevalence of diverticular disease in those countries is increasing.

Anatomical distribution of diverticula is different between ethnic groups. In the western countries is usually left-sided, while Japanese is usually have right-sided and it accounts 76% of cases. This indicated that many factors influence the occurrence of diverticular disease, such as ethnic group and environment. Most common complication of diverticular disease is diverticulitis with incidence of 10-25%.

PATOPHYSIOLOGY

Colonic diverticulosis is the most commonly found disease that associated to abnormal colonic structure. This disease occurs when there is herniation through colonic wall due to muscle weakness in the colonic wall or there is change in intracolonic pressure or combination of both conditions.^{3,6}

Decreased Strength/Tension of Colonic Wall Muscle

Circular muscle of colonic wall strengthened by connective tissue at some point is penetrated by arteries from serosa layer to deliver oxygen. The points at which diverticula develop, that is, where the vasa recta penetrate the colon wall are considered to be areas of potential weakness within the wall of the colon. In addition to anatomical weaknesses, there is alteration in collagen structure. In elderly, synthesis of collagen type III is decreased. Collagen has role in strengthening colonic wall muscle. If the quantity and quality of collagen is decreased, there will be more areas of potential weaknesses that easily develop to diverticula.^{3,6}

Intracolonic Pressure

Painter et al used manometer and simultaneous sineradiography indicate intermittent segmentation due to systematic contraction of colonic circular muscle which divide lumen into serial space. The result is increased intracolonic pressure which in the end will increase colonic wall pressure. This condition is the early hypothesis of development of diverticula.

Food Factor

Low dietary fiber had been proven to be associated with the development of diverticulosis. Food that contains much fiber will form fecal mass with more volume and weight, so that transit time will be shorter and decrease intraluminal pressure due to colonic distention. On the other hand, lower fiber food causes small fecal mass which has longer transit time and more intraluminal pressure needed to expel it. Thus, it will be easier to develop diverticula.⁶

MANAGEMENT

Uncomplicated diverticulosis may be prevented to become complicated by proper and non-delayed medical treatment. Complicated diverticulosis develops from peridiverticular abscess to peritonitis and perforation or from fistula to visceral. Luminal narrowing due to inflammation can finally make obstruction. Although diverticulosis is commonly found, the type that needs immediate surgery is actually very small in number, only accounts 1% of all cases of diverticulosis. About 30% of patients were asymptomatic and other 30% were hospitalized patients.⁶

Diverticulitis is inflammation and infection related to diverticula. Diverticulitis is the most frequent complication of diverticular disease and accounts for 10-25%. The process of diverticula becoming diverticulitis is like the process developing to appendicitis. It begins with the obstruction in the neck of diverticula by feces and then perforation occurs. Microperforation may be localized and filled by fat from pericolon and mesenterics developing colonic abscess. More big macroperforations may develop larger abscess circulating intestinal wall, become bigger mass, spread to other organ and make a fistula. Although it is rarely happen, free perforation to peritoneum can cause fatal bacterial peritonitis.

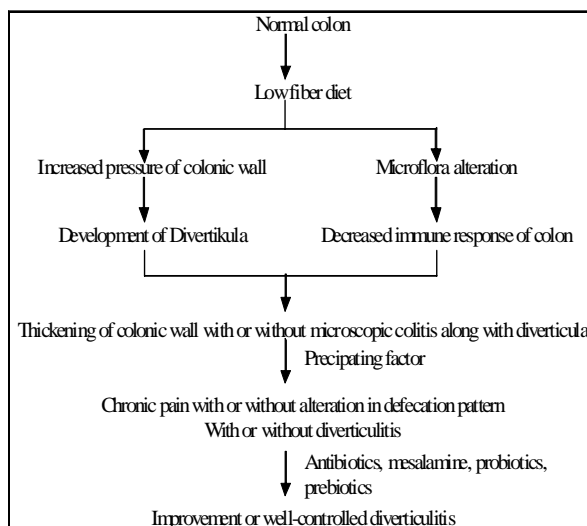


Figure 1. Pathophysiology and therapy of diverticulitis.¹

Hinchey et al, divided 'perforation' into 4 stadium:

- Stadium I, localized pericolic abscess
- Stadium II, larger abscess (retroperitoneal or pelvis)
- Stadium III, general peritonitis caused by rupture of pericolic abscess, not connected to colonic lumen because of obliteration of neck diverticula due to inflammation process
- Stadium IV, fecal peritonitis due to free perforation of diverticula (connection to colonic lumen exists).⁷

CLINICAL SYMPTOMS

In western countries, patients with acute diverticulitis usually come to hospital with complain of abdominal pain of lower left quadrant and this is in accordance with the site of lesion in sigmoid. However in more severe case, sometimes it accompanied by suprapubic pain. In Asian countries, patients come to hospital and complaint more frequently of right quadrant abdominal pain. Pain may persist or diminish and it depends on defecation pattern. Hematoschezia is rarely found. Symptoms may be nausea and vomitus. Dysuria and increased frequency of urination may indicate sympathetic cystitis due to urinary bladder irritation caused by sigmoid inflammation.

Physical examination revealed localized abdominal pain in lower left quadrant or right quadrant. Bowel sound is decreased, but can be normal in mild cases or increased in case with obstruction. Rectal examination may reveal mass or pain especially if abscess is present. Fever is commonly found in patient with acute diverticulitis. There is usually significant leukocytosis, however some studies had reported normal leukocyte count in about 45% of cases.^{8,9,10}

Differential Diagnosis

Table 1. Differential diagnosis of acute diverticulitis¹⁰

Differential diagnosis	Clinical manifestation
Acute appendicitis	Suspected if there is right-lower abdominal pain persists despite adequate medical treatment
Chron's disease	Suspected if there is aphthous ulcers, perianal involvement or chronic diarrhea
Colonic carcinoma	Weight loss, bleeding
Ischemic colitis	High risk patient, bloody diarrhea
Pseudomembranous colitis	Suspected if there is history of antibiotics use or presense of diarrhea
Complicated ulcer diseases	Suspected if there is pneumoperitoneum or peritonitis of diarrhea
Ovary cysts	Female patient with unilateral pan. Can be diagnosed by trans vaginal USG
Ectopic pregnancy	Suspected in female patient and confirmed with pregnancy test

SUPPORTING EXAMINATIONS

Plain X-ray

Examination of chest X-ray in erect position is to evaluate the presence of pneumoperitoneum which can be found in acute diverticulitis and account for 12% of cases. It also aims to evaluate cardiopulmonary status of patients, especially in elderly who are usually has comorbid disease or condition. Plain abdomen X-ray in erect or supine position may show intestine or colon dilatation, obstructive feature, ileus, or tissue description suggesting abscess.¹⁰

CT-scan

CT scan may indicate lesion intra or extraluminal. Abdominal scanning is generally performed with contrast to evaluate small intestine and rectosigmoid. If there is no contraindication, it also possible to use intravenous contrast agent. A study revealed that CT scan had sensitivity of 69-95% and specificity 75-100%. Recent study in Switzerland reported the sensitivity of CT reached 97%.

Barium enema with contrast

Enema with contrast is part of CT scan examination. The choice of contrast agent is still controversial. Barium is much cheaper compare to waters soluble media, but it is contraindicated if perforation is suspected because the possibility of barium peritonitis.

Ultrasonography

Ultrasonography is very effective in diverticular disease because it is non-invasive, safe, and comfortable for patients. From ultrasonography we can obtain description of thickening of colonic wall, the presence of diverticula or abscess and hyperechogenicity around colonic wall indicate inflammatory process. Three prospective studies had compared CT scan and ultrasonography in acute diverticulosis and there was no significant difference between those 2 examinations. However, it is very operator dependent.

Endoscopy

In acute diverticulosis, endoscopy is not recommended due to possibility of perforation. This examination is performed if diagnosis of diverticulosis has not been confirmed yet, mainly to rule out other disease such as inflammatory bowel disease or ischemic colitis.

TREATMENT

Patients with acute diverticulosis should be hospitalized. Generally, patients must fast and let the colon to be inactive by giving cleansing fluid only. Diet is given intravenously and maintenance balance of fluid and electrolyte. Intravenous antibiotics should

be given intravenously in order to eradicate anaerobic and negative gram bacteria, especially *Escherichia coli* and *Bacteroides* spp. Recommended combination therapy based on consensus are metronidazol or clindamycin with aminoglycosides such as gentamycin or tobramycin, monobactam or third generation of cephalosporin. Therapy of single antibiotic of second generation of cephalosporin such as cefositen or cefotetan; or combination of beta lactamase inhibitor such as sulbactam ampicillin or clavulanic acid ticarcillin is another alternative treatment. Evaluation of treatment includes decreased fever and leukocytosis in 2-4 days. However, patients must be given antibiotics until 7-10 days.

Based on reports suggested that diverticulosis is related to chronic inflammation of colon, thus, anti-inflammatory drugs might be indicated. Mesalamine is anti inflammatory drug known to give good response. On the other hand, due to alteration of colonic microflora; treatment of prebiotics and probiotics have been considered beneficial.¹

If medical treatment is failed, it is necessary to identify complications or other diagnosis and perform evaluation by surgical department. Most of patients with acute diverticulosis response well to medical therapy, however 15-30% of cases need surgical intervention.

COMPLICATIONS

Abscess

When perforation of diverticulum occurs, the capability of pericolonic tissue to inhibit widening process of inflammation advanced spreading may form bigger abscess. depend on clinical condition and treatment given. Localized inflammation will form phlegmon and more General peritonitis is rarely happen, but it needs immediate surgical treatment. Clinical symptoms in the presence of abscess are persistent fever, leukocytosis, abdominal tenderness on physical examination. Radiologic examination and Ct are the best method in diagnosis confirmation of abscess. CT scan can be guided tool if drainage is necessary.

Management of diverticular abscess is different depend on the lesion and its complexity. Small pericolonic abscess can be given conservative treatment with antibiotics and relax the colon. In patients with stadium II (widened abscess) or pericolonic abscess which unresponsive to antibiotics, then drainage should be done.

In 1980 CT guided percutaneous drainage is firstly being introduced. Intervention of drainage will improve patient's condition and prevent sepsis. Two retrospective studies reported successful rate of 74% and 80%. Initial surgical procedure was needed in

20-25% cases with multilocular abscess, difficult to drainage anatomically, or unresponsive to drainage. Resection by laparoscopy can be done in diverticular abscess but not frequently performed yet. Piogenic liver abscess may arise as complications of acute diverticulitis. The treatment consists of antibiotics, percutaneous drainage and surgery.¹⁰

Fistula

When a diverticular phlegmone or abscess is rupture, fistula will be developed. In observational study on 84 patients with internal fistula due to diverticular disease, 65% of them were colovesicular. The gender distribution was 2:1 for male predominant. Pneumaturia and fecaluria are common symptoms. Cystoscopy, cystography and barium enema are useful for diagnostic tools. Single stage resection surgery and closure of fistula and primary anastomosis could be performed in 75% of cases.

Colovaginal fistula is the second most common fistula and found in 25% of cases. The treatment consists of resection surgery and fistula closure. Coloenteric, colouterine and coloreteral fistula are rarely found. Colocutaneous fistula is rare and usually due to surgical repair.¹⁰

Obstruction

Obstruction may occur in diverticular disease both acutely and chronically. When acute diverticulitis occur, partial colonic obstruction may present due to luminal narrowing caused by pericolonic inflammation or compression of abscess formation. Total obstruction is rarely happened. Ileus and pseudo-obstruction might also occur. This condition usually response well to adequate medical therapy. If there is no improvement by medical therapy, then it is necessary for surgical intervention. Acute diverticulitis may cause small intestine obstruction due to inflammation or irritation. This condition will improve if inflammation is controlled. However, if inflammation persists, it is necessary to consult to surgery department.

Recurrent diverticulitis may cause fibrosis and stricture of colonic wall and in the end will cause total obstruction and need surgical intervention. It must be differentiated whether the obstruction is really due to fibrosis and stricture or due to mass because the management will be very different.¹⁰

Bleeding

Diverticula and increased vascularization are common causes of gastrointestinal bleeding. A study had revealed that diverticular bleeding might reach 24-42% of total cases of gastrointestinal bleeding. Severe bleeding occurred in 3-5% of patients with diverticulosis. Although most of diverticulum is located in the left sided of colon, but bleeding is more common

in the proximal of colon.

The NSAID treatment has role in diverticular bleeding as in the peptic ulcer bleeding. That is why NSAID should not be given in patient with diverticulosis.^{10,11}

- Clinical manifestation of bleeding

The patient usually complains of lower abdominal pain, urgency of defecation followed by hematoschezia. Melena is rarely occurred. Spontaneous bleeding might occur in 70-80% and recurrent bleeding in 22-38% patients. Third bleeding after second bleeding has 50% possibility to occur. After second bleeding, it is recommended to perform surgical intervention.^{10,12,13}

- Diagnosis and management of bleeding

Fluid resuscitation and blood transfusion must be given immediately. Upper gastrointestinal bleeding must be ruled out by endoscopy or nasogastric tube (NGT) insertion. Flexible sigmoidoscopy should be performed early. If cause of bleeding still cannot be identified, then it is necessary to perform non-invasive and even invasive intervention to identify the source of bleeding and stop it. Therapeutic endoscopy in acute diverticular bleeding had been performed many times and considered beneficial. Bleeding can be stopped by injection of epinephrine on site of bleeding. However, this kind of intervention still requires further study to be recommended for standard procedure in management of diverticular bleeding.

Surgical intervention is performed if medical treatment, endoscopic or angiographic intervention are failed. Segmental resection is the most common procedure in known source of bleeding. Recurrent bleeding in patients who had performed segmental resection was approximately 6%. In patients whom the source of bleeding could not be identified endoscopically or angiographically, subtotal colectomy should be performed.

In most of patients, diverticular bleeding may stop spontaneously. Colonoscopy is performed to identify the source of bleeding and rule out the presence of malignant lesion. Of 2,000 patients who had performed colonoscopy, we found cases of neoplasm or polip were 32% and carcinoma 19%.^{14,15}

CONCLUSION

Diverticular diseases have been developing in concert with lifestyle changes especially low fiber diet and increasing age. Non complicating diverticular diseases may become complicated if proper management is delayed or not available. Surgery might be treatment of choice in some cases of complicated diverticular diseases.

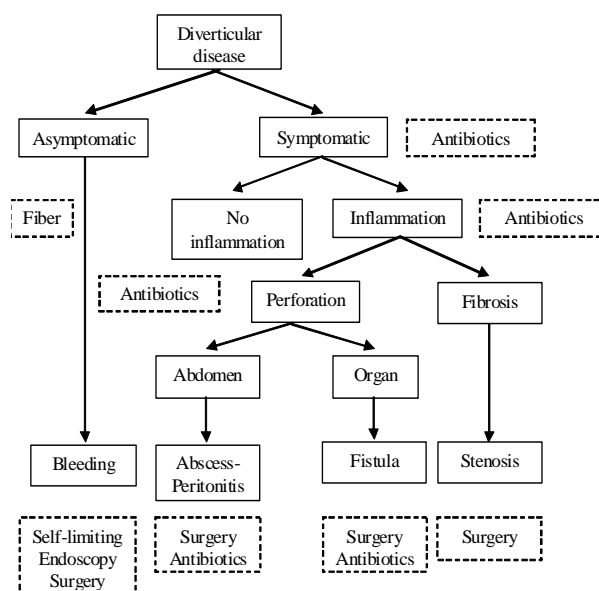


Figure 2. Algorithm of management of diverticular disease¹⁶

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