Abstract

The aim of this retrospective study was to evaluate the emergency surgical treatment of life-threatening complications of colonic diverticula. Material and method. In the last 11 years, 22 of 101 patients with colonic diverticula (22.1%) underwent urgent surgery for acute complications: perforated gangrenous diverticulitis with generalized peritonitis (n=8) or pericolic abscesses (n=8), acute bowel obstruction (n=4) and severe diverticular bleeding (n=2). In all patients with diffuse peritonitis or acute obstruction the indication for surgery was decided on clinical basis and the complicated diverticula were recognized only intra-operatively. Results. Emergency surgical strategy differed according to the type of complication and the biologic condition of the patient: segmental colectomy and primary anastomosis for diverticular perforation (n=4), colonic stenosis (n=3) or diverticular bleeding (n=2); Hartmann resection with late reconnecting anastomosis in patients with diverticular perforation (n=5) or colonic obstruction (n=1); diverticulectomy with peritoneal drainage (n=2) and colostomy and drainage followed by secondary colectomy (n=5) for diverticular perforations in patients with poor general condition. Only one patient (4.5%) died post-operatively of multiple organ failure from generalized peritonitis. There was no anastomotic leakage in patients with primary anastomosis. Six patients (27.2%) developed wound infection. Hospital stay ranged between 11 and 60 days, significantly longer in cases with two-stage operations. Conclusion. Primary colectomy with immediate or delayed anastomosis is the best surgical procedure for acute diverticular complications in patients with good biologic status. Two-stage operations such as colostomy and drainage coupled with late colectomy remain the viable alternative in patients with advanced disease and critical biologic condition.

Key words
Urgent surgery - colonic diverticula – diverticular perforation – colonic stenosis – diverticular bleeding

Conclusion. Primary colectomy with immediate or delayed anastomosis is the best surgical procedure for acute diverticular complications in patients with good biologic status. Two-stage operations such as colostomy and drainage coupled with late colectomy remain the viable alternative in patients with advanced disease and critical biologic condition.

J Gastrointest Liver Dis
March 2006 Vol.15 No.1, 37-40
Address for correspondence: Gheorghe Funariu
1st Surgical Clinic
Clinicilor Str. no 2-5
Cluj Napoca, România
E-mail: g.funariu@email.ro

Colectomia primară cu anastomoză primară sau într-un timp secundar este opțiunea terapeutică preferabilă la pacienții cu complicații acute ale bolii diverticulare și status biologic nealterat. Operațiile în doi timpi, reprezentate de colostomie și drenaj, urmate într-un timp secundar de rezeția colică, rămân alternative viabile la pacienții cu boală avansată și condiție biologică critică.

**Introduction**

Encountered in 15% to 20% of cases, acute complications of colonic diverticula requiring urgent operation pose serious diagnostic and surgical problems (1). The aim of this retrospective study was to discuss the emergency surgical treatment of life-threatening complications caused by colonic diverticulitis.

**Material and methods**

Twenty two consecutive patients presenting vital complications of colonic diverticula were reviewed retrospectively. There were 14 men and 8 women with a mean age of 55±15 years. Seven patients were aged under 50 years and two under 40. They represented 22.1% of the total 101 patients with colonic diverticula admitted in our department in the last 11 years. All patients underwent urgent surgery for one of the following life-threatening complications (Table I): macroperforation with generalized peritonitis (8 patients) or large pericolic abscess (8 patients), acute bowel obstruction due to segmental colonic stenosis (4 patients) and severe diverticular bleeding (2 patients).

**Table 1 Complications of colonic diverticular disease requiring urgent surgery**

<table>
<thead>
<tr>
<th>Clinical presentation</th>
<th>No. Complication pts.</th>
<th>Diagnostic</th>
<th>Location of complicated diverticulum</th>
</tr>
</thead>
<tbody>
<tr>
<td>diffuse peritonitis</td>
<td>8</td>
<td>perforation</td>
<td>transverse colon</td>
</tr>
<tr>
<td>localised peritonitis</td>
<td>8</td>
<td>abscess</td>
<td>sigmoid colon</td>
</tr>
<tr>
<td>septic syndrome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>acute intestinal</td>
<td>4</td>
<td>stenosis</td>
<td>ascending colon</td>
</tr>
<tr>
<td>obstruction</td>
<td></td>
<td></td>
<td>sigmoid colon</td>
</tr>
<tr>
<td>severe lower intestine</td>
<td>2</td>
<td>bleeding</td>
<td>sigmoid colon</td>
</tr>
</tbody>
</table>

Indication for surgery in patients with diffuse peritonitis or acute colonic obstruction was decided on clinical basis correlated with x-ray and ultrasound (US) assessment of the abdomen. In the majority of these cases the presence of complicated diverticula was recognized only intraoperatively. In patients with pericolic abscess or diverticular bleeding the diagnosis was established preoperatively by US and CT scan of the abdomen or endoscopy, respectively.

The surgical interventions were carried on by 12 surgeons, permanent members of our department and chiefs of the operative teams on call at the time of patients’ presentation.

**Results**

Complicated diverticula were located most frequently on the sigmoid colon (16 patients presenting 72% of the 22 cases with emergency operations), other locations being at the cecum (2 patients), ascending (2 patients) and transverse colon (2 patients).

Surgical strategy was different according to the type of complication and the biologic condition of the patient (Table II). Nine patients underwent segmental colectomy and primary anastomosis for diverticular perforation with early diffuse peritonitis (1 patient) or large abscess (3 patients), colonic stenosis and acute obstruction (3 patients) or diverticular bleeding (2 patients). The Hartmann’s procedure and late reconnecting anastomosis were performed in 6 patients presenting generalized peritonitis (3 patients), pericolic abscess (2 patients) or colonic stenosis (1 patient). Diverticulectomy and peritoneal drainage were performed in 2 patients with gangrenous diverticulitis and pericolic abscesses. Colostomy and peritoneal lavage followed by secondary colectomy was the only therapeutic alternative in 5 patients with diverticular perforation and advanced diffuse peritonitis (4 patients) or extensive pericolic abscess and poor general condition (1 patient). In these cases intestinal continuity was restored 6-8 weeks after the emergency operation.

Resective surgical procedures were carried out in patients with good general and local conditions and consisted of different types of colectomy according to the site of complicated diverticula: sigmoid colectomy followed by primary anastomosis for sigmoid diverticula (5 patients), right hemicolectomy in patients with diverticula of the right colon (3 patients), total colectomy for multiple bleeding diverticula (1 patient), Hartmann’s resection for sigmoid diverticula complicated with advanced local or diffuse peritonitis (6 patients) and diverticulectomy for cecal diverticulitis (2 patients). In total, colonic resection was performed during the emergency operation in 77.2% of the cases (17 patients).

The in-hospital mortality rate was 4.5%; one patient died postoperatively of multiple organ failure due to advanced generalized peritonitis. There was no anastomotic leakage among patients with colonic resection and primary anastomosis. Wound infection developed in 27.2% of the cases (6 patients). Hospital stay ranged between 11 and 60 days, significantly longer for patients with two-stage...
operations (30±14 vs. 15±5.8 days) who, after 6-8 weeks, needed a second admission in the hospital for the reconstructive procedure.

Table II Urgent surgical treatment of complicated colonic diverticula

<table>
<thead>
<tr>
<th>No. pts. surgical strategy</th>
<th>Complication</th>
<th>No. Secondary pts. surgical procedure</th>
<th>Total pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>segmental colectomy and primary anastomosis</td>
<td>perforation + diffuse peritonitis</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>perforation + abscess</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>colonic stenosis + acute obstruction bleeding</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hartmann’s resection</td>
<td>perforation + peritonitis</td>
<td>3</td>
<td>reconnecting 6 anastomosis</td>
</tr>
<tr>
<td>5</td>
<td>perforation + abscess</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>colonic stenosis</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>diverticulectomy + peritoneal drainage</td>
<td>perforated diverticulum + abscess</td>
<td>2</td>
<td>suture of colostomy</td>
</tr>
<tr>
<td>3</td>
<td>perforation + diffuse diverticulum</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>perforation + abscess</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The increasing prevalence of diverticular disease of the colon in Eastern countries in the last decades reflects changes in life-style and eating habits. Therefore, complicated colonic diverticulitis that requires urgent surgical interventions are encountered nowadays more frequently than in the past.

Diverticula arise at the points where the vessels enter the colonic wall between two equidistant longitudinal bands, a weak site where the mucosal layer herniates through the muscularis towards the serosa. Consequently, the diverticular wall does not contain a muscular layer. Diverticula formation is related to a long-standing low-fiber diet associated with abnormalities in colonic motility and raised intraluminal pressure (1-3).

Most frequently colonic diverticula are located distally on the sigmoid colon alone (26%) or involving both the sigmoid and descending colon (30%). However, sometimes they are scattered throughout the colon (16%) or are limited to the cecum and ascending colon (less than 5% of the cases) (3).

Perforation is the most frequent complication of diverticular disease requiring surgical treatment. Because it is preceded by local inflammation, in most of the cases the perforated contents are walled of by adherent pericolic structures leading to a pericolic abscess. Free perforation occurs rarely and results in diffuse peritonitis, sepsis and shock. Furthermore, severe pericolitis and fibrous stricture formation around the bowel may lead to acute colonic obstruction while erosion of nutrient vessels of the colon causes diverticular bleeding, in both cases surgical treatment being often necessary.

Urgent surgery for complications of colonic diverticula is indicated in patients with large or/and multiloculated diverticular abscesses inaccessible to percutaneous drainage or in whom clinical symptoms persist after CT-guided percutaneous drainage, diverticulitis associated with free perforation and purulent or fecal diffuse peritonitis, large bowel obstruction presumably caused by diverticular stricture or severe and persistent diverticular bleeding (1,2).

The present-day surgical strategy for emergency cases recommends that a resective procedure should be carried out whenever it is possible.

Nowadays it is considered that a primary anastomosis can be performed in the majority of cases with pericolic abscesses (1). Although the surgical approach must always be assessed individually based on the local and general conditions of the patient, a single-stage procedure consisting of primary resection and anastomosis without protective stoma has become the treatment of choice in most of the cases (2-5). Resection must remove entirely the inflamed and thickened colon so that the primary, tension-free anastomosis is realised in normal, well vascularized tissue (1). In patients with complicated sigmoid diverticula the entire sigmoid colon must be removed and the anastomosis constructed between the descending colon and the rectum (1,2).

Alternatively, a two-stage procedure like Hartmann’s resection or primary resection with anastomosis and proximal colostomy may be performed in selected cases, especially in patients with substantial fecal contamination and inflammation (1-3, 6). For instance, in cases with free diverticular perforation and generalized peritonitis Hartmann’s resection is considered to be the procedure of choice (1,2,8).

Patients with complicated diverticula of the right colon and no preoperative bowel preparation can be treated by a right hemicolecotomy or, in special cases, by diverticulectomy and drainage of the pericolic abscess (7).

Drainage alone, with or without suture of the perforation or with its conversion to colostomy remains the single alternative in cases with advanced fecal peritonitis and poor general condition, allowing a temporary solution to a patient in whom a more extensive surgical procedure is precluded due to the high operative risk.

The most appropriate surgical approach in patients with persistent large bowel obstruction caused by diverticular stricture is Hartmann’s resection when stenosis involves the sigmoid colon and right hemicolecotomy for obstructions of the right colon (1,4,6). If the condition of the patient is critical, proximal colostomy and delayed resection may also be acceptable (1). Total or subtotal colectomy is imperative.
when acute obstruction of the sigmoid colon caused advanced diffuse ischemic lesions proximal to the stenotic area.

Severe diverticular hemorrhage has been reported to occur in 3 – 5% of patients with diverticulosis, located more frequently in the proximal colon (1). In such cases, following aggressive resuscitation, the diagnostic options to localize the bleeding diverticulum include nuclear bleeding scans, angiography and colonoscopy (9). Surgery for diverticular bleeding is usually reserved for patients with ongoing hemorrhage in whom conservative and interventional therapies fail (1,10). It is mainly represented by segmental colonic resection although, in cases with persistent bleeding without a clear identification of the bleeding site, a subtotal or total colectomy may be necessary (1).

Conclusions

Primary colectomy with immediate or delayed anastomosis is the best surgical procedure for acute diverticular complications in patients with good biologic status.

Two-stage operations such as colostomy and peritoneal drainage coupled with late colectomy remain viable alternatives in patients with advanced disease and critical biologic condition.

In cases with multiple bleeding sites or severe ongoing hemorrhage from a source that can not be localised despite endoscopic and angiographic assessment, subtotal or total colectomy may be imperative. The same approach may also be necessary in cases with long-standing large bowel obstruction and consequent advanced diffuse ischemic lesions of the colonic wall.

Diverticulectomy with peritoneal drainage may be performed in special situations, such as perforated cecal diverticulum with limited gangrenous lesions, instead of the more demanding right hemicolectomy.

References