Laparoscopic Management of Colonic Diverticular Disease and its Complications: an Analysis

Prakash Kurumboor¹ · N. P. Kamalesh¹ · K. Pramila¹ · Deepak George¹ · Rohan Shetty¹ · Shaji Ponnambathayil¹ · Sylesh Aikot¹

Received: 26 March 2015 / Accepted: 26 April 2016 / Published online: 1 May 2016
© Association of Surgeons of India 2016

Abstract Dense inflammatory reactions, loss of tissue planes and sepsis make surgical treatment of diverticulitis complex and difficult. Experience with laparoscopic management of this disease is scanty in our country. This study aims to assess the pattern of presentation, the site of involvement and complications of diverticulitis coli. This study also aims to audit the results of laparoscopic approach for complicated colonic diverticulitis. A retrospective analysis of all patients who had laparoscopic management of complicated diverticulitis patients from August 2007 to October 2014 was done from the database. The site of involvement, extent and presence or absence of complications of diverticular disease was noted. The surgical approach, intraoperative parameters and short-term outcome measures were analysed. There were 38 (8.8 %) patients with diverticular disease out of 427 patients who had laparoscopic colorectal surgery in the study period with a median age of 59 years. Out of 38 patients, 50 % had comorbid conditions. Internal fistulae were seen in 9 (23.6 %) patients, 6 with colovesical and 3 with colovaginal fistulae. Elective laparoscopic colectomy with primary anastomosis was done in 34 (89 %) cases of which, and 10 (26 %) patients had abscess on presentation requiring drainage. Four patients required emergency laparoscopic surgery of which primary resection and anastomosis was done in 3 (7.8 %), and Hartmann's operation was done in 1 (2.6 %) patient. Two patients required stoma. The morbidity was seen in 15 % cases, and the mean hospital stay was 9.54 days. Laparoscopic approach for diverticular disease and its

complication is feasible and safe. Careful selection of patients, judicious use of diverting stoma and appropriate selection of the procedure help to achieve good results even in those with septic complications and fistulising disease.

Keywords Laparoscopy · Diverticulitis · Colonic diverticulitis · Complications

Introduction

Colonic diverticulosis refers to a small out pouching of the large intestinal wall. Diverticular disease of the colon is common in the Western world, with a prevalence of approximately 33 % in patients over 60 years of age [1]. Although autopsy series has reported incidence of diverticulosis in up to 50 % of population, about 10–25 % of these only become symptomatic [2]. Of these, about 25–30 % of patients will go on to develop some complication like perforation, abscess, fistula formation or obstruction [3, 4].

Diverticular disease is considered less prevalent in India and Asian countries. In a recent series from India, in patients who underwent colonoscopies for various indications, prevalence rate of diverticulosis has been reported as 9.9 % [5]. Of patients with diverticulosis becoming symptomatic, most of them respond to conservative treatment and about 30 % would require surgical intervention [6, 7]. Due to dense inflammation and sepsis, surgical treatment of diverticulitis is considered complex. However, in the recent literature, there are many reports and reviews about successful management of diverticulosis and its complications using laparoscopic method [8–10]. There are only few reports about the management of diverticulitis from India, predominantly in the emergency setting [11, 12]. Data about clinical experience with laparoscopic management of this disease is scanty in our country.

✉ Prakash Kurumboor
kdrprakash@gmail.com

¹ Department of GI Surgery, PVS Memorial Hospital, Kaloor, Kochi, Kerala 682017, India

Methods

A retrospective analysis of data of patients who underwent laparoscopic surgery for colorectal diseases during August 2007 to October 2014 was done at PVS Memorial Hospital, Kochi, Kerala. A prospective database of all laparoscopic colorectal surgeries including the details of clinical presentation, investigations, preoperative procedures, type of the surgery and short-term outcome was maintained. Amongst these, 38 patients who had undergone laparoscopic treatment for diverticulitis and its complications form the study group in this paper. During this period, no patients underwent open surgery for diverticular disease. The demographic features, clinical presentation, modified Hinchey stage of the disease and line of management were analysed. Indications for surgery in diverticular disease were 2 or more episodes of documented diverticulitis, pericolic abscess, features of perforation and/or peritonitis. In brief, patients with recurrent sigmoid diverticulitis or those with small abscess (<4 cm) were managed initially conservatively with third generation cephalosporins and metronidazole initially and later taken up for surgery after 6 weeks. Those with large abscess (>4 cm) were initially drained under USG/CT guidance and managed with antibiotics as above and taken up for surgery after control of sepsis. These patients were labelled as elective surgery. Patients with Hinchey stage 3 or 4 were taken up for emergency surgery and resection followed by either Hartmann's operation or primary anastomosis with stoma were undertaken based on clinical situation. These patients were grouped as emergency surgery.

As a policy, before an elective surgery, preoperative prophylactic ureteric stenting was done if the ureter appeared to be close to the inflammatory mass on preoperative CT scan. Briefly, laparoscopic mobilisation of the affected segment, vascular control and division of distal bowel, usually at the upper rectum level was done under laparoscopic vision using endoscopic staplers. Proximal colon was mobilised adequately so that a healthy normal appearing colon could be brought down for anastomosis. Subsequently, a 5–6-cm infra umbilical vertical incision was performed for specimen extraction and resection. The anvil of circular stapler was subsequently secured in the proximal colon, and anastomosis was performed under laparoscopic control. In those patients with sepsis, primary anastomosis was performed if the local condition of the tissue was favourable for a primary anastomosis and these patients were given a diversion stoma. In case of faecal peritonitis, if the local conditions are not favourable for anastomosis; a Hartmann's procedure was performed. Immediate postoperative outcome measures like operation time, blood loss, time for nasogastric tube removal, passage of flatus, stools, days of oral liquid and semisolid food and hospital stay were documented. The postoperative outcome was analysed.

Results

During the study period, August 2007 to October 2014, there were 427 patients who underwent laparoscopic surgery for colorectal diseases. Of which, there were 38 (8.8 %) patients who had undergone laparoscopic treatment for diverticulitis. The demographic features, clinical presentation and the type of the disease according to modified Hinchey classification are detailed in Table 1. The group was male predominant, and median age group was 60 years. Nineteen patients (50 %) had significant comorbid illness. The predominant site of involvement was sigmoid colon in 73 % of cases, and 21 % had diffuse involvement.

The clinical presentation was recurrent diverticulitis in 19 (50 %) patients, with pericolic abscess seen in 10 (26.4 %) cases that required percutaneous ultrasound/CT-guided abscess drainage and subsequent surgery. Colovesical and colovaginal fistula were noted at presentation in 6 (15.7 %) and 3 (7.8 %) patients. The surgical intervention was performed as an elective procedure in 34 (89 %) cases. Those who had abscess >4cm or those with features of sepsis underwent CT/USG-guided drainage and were given antibiotics. Once they recover, there were taken up for surgery. In these patients, laparoscopic resection was done after a mean period of 1.6 months. Colovesical fistulae and colovaginal fistulae were seen in 6 (15.7 %) and 3 (7.8 %) patients, respectively. These patients underwent resection of the affected colon with repair of the viscus to which fistula had formed. Preoperative ureteric stenting was done in 4 patients. In the emergency interventions, 4 patients had features of sepsis, 3 with Hinchey stage III disease and 1 patient with stage IV,

Table 1 Demographic features and clinical presentation

Parameter	Number (%)
Age (median)	60 years
Male: female	26:12
Comorbid illness	19 (50 %)
Mean episodes of diverticulitis	2.4
Preoperative abscess drainage	10 (26 %)
Duration of surgery after drainage	1.6 months
Site of involvement	
Sigmoid	28 (73 %)
Diffuse	6 (21 %)
Caecal	2 (6 %)
Modified Hinchey stage	
Stage Ia	15 (39.4 %)
Stage Ib	13 (34.2 %)
Stage II	6 (15.7 %)
Stage III	3 (7.8 %)
Stage IV	1 (2.6 %)

underwent emergency laparoscopic colectomy. Amongst those, 2 patients underwent primary colorectal anastomosis with diverting stoma and 1 patient had primary anastomosis (7.8 %). Patient with Hinchey stage IV with large perforation, faecal peritonitis and sepsis underwent Hartmann's procedure (2.6 %). There was no conversion in the entire cohort. The details of intraoperative parameters and short-term recovery are detailed in Table 2. Postoperative morbidity was noticed in 6 patients (15 %) in the form of surgical site infection in 4 patients, deep vein thrombosis in 2 patients and self-limiting urinary fistula in 1 patient. The mean hospital stay was 9.7 days, and there was no mortality in this cohort.

Discussion

Diverticular disease is considered to have low prevalence in India compared to Western data (9.9 versus 30 %) [1, 3, 5]. There is a paucity of data from India about surgical management of colonic diverticulitis, and these reports predominantly discuss the management of these patients in the emergency setting [11, 12]. Kakodkaret al [12] had reported that a third of patients were identified during emergency laparotomy, and diagnosis was often delayed. Laparoscopic approach for diverticulitis and its complications is challenging due to the inflammatory process involving colon and adjacent structures making the surgery difficult due to ill-defined tissue planes [9, 10]. Lack of tactile sensation has been cited as the most

common difficulty in this clinical setting, and hand-assisted approach [13] has been described to overcome this limitation of laparoscopy. Similarly, lateral first approach and retrograde approach have also been described for a safe approach for colectomy in patients with diverticulitis [14, 15]. In current series, no such technical modifications were adopted and all procedures could be completed laparoscopically. The policy to delay the surgery in those patients with inflammation or small abscess after a course of antibiotics perform preoperative ureteric stenting whenever indicated based on preoperative imaging, and this could be the reason for a satisfactory outcome of these patients in this series. In the current series, there was no incidence of inadvertent injuries and we could complete these surgeries without any conversion.

Approach towards management of patients with diverticulitis with perforation and peritonitis had been Hartmann's procedure. However, with laparoscopic approach, there is a trend towards primary resection and anastomosis with or without protecting stoma with good short- and long-term results [16–18]. There are many reports and studies of laparoscopic lavage to stabilise the general condition of the patient followed by successful elective surgery in recent literature [19]. This has been large because of the fact that it has been observed that in nearly 27 % of patients who had Hartmann's procedure, it is not possible to close the stoma due to various reasons [18]. Hence, it is generally considered that Hartmann's resections are done when the risk involved in primary resection anastomosis is considered high due to adverse local conditions or when patient's condition is unstable for a procedure like resection and anastomosis. In the current series as well, though the numbers are small, a similar strategy has been adopted with successful outcome. We performed one Hartmann's procedure in a patient with large colonic perforation, faecal peritonitis and sepsis. In other patients, primary resection and anastomosis could be done with judicious use of diversion stoma.

Fistula to another hollow viscus like urinary bladder or vagina in diverticulitis also presents a technical challenge for management of this condition. In the current series, 9 (23.6 %) cases had fistulae and they could be managed successfully. Preoperative ureteric stenting in selected cases where inflammatory mass is adjacent to the ureter helps in preventing inadvertent injury to the ureter, and this approach was required in 4 cases. Similar approach has been described by other series as well. In the current series, there were no conversion to open surgery compared to about one-third conversion in similar series, probably attributed to the selection of treatment alternative depending upon the local inflammatory condition and patient's general condition [20, 21]. The short-term outcome of the current series was with a morbidity of 15 % and a hospital stay of 9.57 days which has been similarly reported in most other series as well [10, 16, 18].

In conclusion, laparoscopic approach for diverticular disease and its complication is feasible and safe. Careful selection

Table 2 Treatment details and short-term outcome

Parameter	Number (%)
Elective surgery	34 (89 %)
Type of presentation	
Recurrent diverticulitis	19 (50 %)
Abscess	10 (26.4 %)
Colovesical fistula	6 (15.7 %)
Colovaginal fistula	3 (7.8)
Emergency	4 (11 %)
Primary resection anastomosis	3 (7.8 %)
Hartmann's procedure	1 (2.6 %)
Operation time (min)	275
Blood loss (ml)	162
Conversion	None
Stoma	2 (6 %)
ICU stay	1.6 days
Nasogastric tube removal	1.9 days
Oral liquids	4.06 days
Semisolid diet	5.1 days
Morbidity	6 (15 %)
Hospital stay	9.57 days

of procedures judicious use of diverting stoma is required when these surgeries are required in an emergency setting. Laparoscopic approach is technically feasible in diverticular disease with internal fistulae as well.

Acknowledgments None.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

References

- Wong WD, Wexner SD, Lowry A et al (2000) Practice parameters for the treatment of sigmoid diverticulitis-supporting documentation: the Standards Task Force. The American Society of Colon and Rectal Surgeons. *Dis Colon Rectum* 43:290–297
- Hughes LE (1969) Post-mortem survey of diverticular disease of the colon. I Diverticulosis Diverticulitis *Gut* 10:336–344
- Rege RV, Nahrwold DL (1989) Diverticular disease. *Curr Probl Surg* 26:133–189
- Rodkey GV, Welch CE (1984) Changing patterns in the surgical treatment of diverticular disease. *Ann Surg* 200:466–478
- Kamlaesh NP, Prakash K, Pramili K, Sylesh A, Prakash Z, Ramesh GN, Mathew P (2012) Prevalence and patterns of diverticulosis in patients undergoing colonoscopy in a southern Indian hospital. *Indian J of Gastroenterol* 31:337–339
- Roberts PL, Veidenheimer MC (1994) Current management of diverticulitis. *Adv Surg* 27:189–208
- Roberts P, Abel M, Rosen L et al (1995) Practice parameters for sigmoid diverticulitis. The Standards Task Force American Society of Colon and Rectal Surgeons. *Dis Colon Rectum* 38:125–132
- Menenakos E, Hahnloser D, Nassiopoulou K, Chanson C, Sinclair V, Petropoulos P (2003) Laparoscopic surgery for fistulas that complicate diverticular disease. *Langenbecks Arch Surg* 388:189–193
- Zapletal C, Woeste G, Bechstein WO, Wullstein C (2007) Laparoscopic sigmoid resections for diverticulitis complicated by abscesses or fistulas. *Int J Colorectal Dis* 22:1515–1521
- Siddiqui MRS, Sajid MS, Qureshi S, Cheek E, Baig MK (2010) Elective laparoscopic sigmoid resection for diverticular disease has fewer complications than conventional surgery: a meta-analysis. *Am J Surg* 200:144–161
- Balsara KP, Dubash C (1998) Complicated sigmoid diverticulosis. *Indian J Gastroenterol* 17(2):46–47
- Kakodkar R, Gupta S, Nundy S (2005) Complicated colonic diverticulosis: surgical perspective from an Indian Centre. *Trop Gastroenterol* 26(3):152–155
- Anderson J, Luchtefeld M, Dujovny N, Hoedema R, Kim D, Butcher J (2007) A comparison of laparoscopic, hand-assist and open sigmoid resection in the treatment of diverticular disease. *Am J Surg* 193:400–403
- Ferzli GS, Sayad P, Cacchione RN (2001) The lateral approach to laparoscopic sigmoid colon resection. *J Am Coll Surg* 193(1):105–108
- Khoe JL, Nelson TJ, Gouda B, Bhojru S (2008) Retrograde approach to elective laparoscopic sigmoid colon resection for diverticulitis. *J Am Coll Surg* 206:595–598
- Bretagnol F, Pautrat K, Mor C, Benchellal Z, Hutten N, Calan LD (2008) Perforated sigmoid diverticulitis: a promising alternative to more radical procedures. *J Am Coll Surg* 206:654–657
- Blair NB, Germann E (2002) Surgical management of acute sigmoid diverticulitis. *Am J of Surg* 183:525–528
- Constantinides VA, Heriot A, Remzi F, Darzi A, Senapati A, Fazio VW, Tekkis PP (2007) Operative strategies for diverticular peritonitis: a decision analysis between primary resection and anastomosis versus Hartmann's procedure. *Ann Surg* 245:94–103
- Swank HA, Vermeulen J, Lange JF et al (2010) The Ladies trial: laparoscopic peritoneal lavage or resection for purulent peritonitis and Hartmann's procedure or resection with primary anastomosis for purulent or faecal peritonitis in perforated diverticulitis (NTR2037). *BMC Surg* 10:29
- Bartus CM, Lipof T, Shahbaz SCM et al (2005) Colovesical fistula: not a contraindication to elective laparoscopic colectomy. *Dis Colon Rectum* 48:233–236
- Nguyen SQ, Divino CM, Vine A, Reiner M, Katz BL, Barry SB (2006) Laparoscopic surgery for diverticular disease complicated by fistulae. *JSLs* 10:166–168