

INCISIONAL HERNIA AFTER SURGERY FOR DIVERTICULAR DISEASE

Incizijska hernija nakon operacije zbog divertikularne bolesti

Zuzana Adamova

Abstract

Background

Incisional hernia after open surgery is a well-known complication. A retrospective study was conducted to determine the incidence and predisposing factors of incisional hernia after colonic surgery for diverticular disease.

Methods

A retrospective cohort of 105 consecutive patients undergoing either laparoscopic or open surgery for complicated diverticulosis between January 2000 and December 2010 was identified. The influence of demographic data, surgical approach and timing for incisional hernia development were analysed. Statistical evaluation was performed using the chi-square test according to Pearson and Mann-Whitney test.

Results

In a group of 31 men and 74 women, with an average age of 67 years, incisional hernia developed in 27 patients (26%) at a mean follow-up of 5.5 years. Incisional hernia was found in two of 23 patients (9%) in the laparoscopic surgery group compared with 25 of 82 patients (30%) in the open surgery group ($P = 0.03$). We did not prove a higher risk for incisional hernia after acute surgery ($P = 0.6$). Significant demographic factor influencing incisional hernia incidence was female gender ($P = 0.003$), but not age ($P = 0.43$). Mean time to hernia occurrence was 1.5 years.

Conclusion

Laparoscopic surgery leads to a significantly lower incidence of incisional hernia compared to open surgical technique. Female gender represents a higher

risk for incisional hernia than acute surgery or age. Because laparoscopy is more feasible as elective surgery, when speaking of incisional hernia, we should recommend sigmoid resections early, especially to women.

Keywords

diverticular disease, laparoscopy, open surgery, sigma resection, incisional hernia

Sažetak

Pozadina

Incizijska hernija nakon otvorene operacije dobro je poznata komplikacija. Napravljena je retrospektivna studija s ciljem utvrđivanja učestalosti i predodređujućih faktora incizijske hernije nakon operacije kolona zbog divertikularne bolesti.

Metode

Praćena je retrospektivna kohorta od 105 uzastopnih pacijenata podvrgnutih laparoskopskoj ili otvorenoj operaciji zbog komplikacija divertikuloze između siječnja 2000. i prosinca 2010. godine. Praćen je utjecaj demografskih čimbenika, kirurški pristup i vrijeme za razvitak incizijske hernije. Statistička evaluacija izvedena je pomoću Pearsonovog hi-kvadratnog testa i Mann-Whitneyevog testa.

Rezultati

U grupi od 31 muškarca i 74 žene, prosječne dobi 67 godina, incizijska hernija razvila se kod njih 27 (26%) u prosječnom vremenu praćenja od 5,5 godina. Incizijska hernija nađena je kod 23 pacijenta (9%) u grupi operiranoj laparoskopski u usporedbi s 25 od 82 pacijenta (30%) u grupi podvrgnutoj otvorenom zahvatu ($P = 0,03$). Nije dokazan veći rizik za incizijsku

herniju nakon akutne operacije ($P = 0,6$). Važan demografski čimbenik koji utječe na učestalost pojavljivanja incizijske hernije bio je ženski spol ($P = 0,003$), ali ne i dob ($P = 0,43$). Srednje vrijeme pojave hernije bilo je 1,5 godina.

Zaključak

Laparoskopska kirurgija ima znatno nižu učestalost incizijske hernije u usporedbi s otvorenom kirurškom tehnikom. Ženski spol ima veći rizik za incizijsku herniju od akutne operacije ili dobi. Budući da je laparoskopija izvedivija kao elektivna operacija, kada govorimo o incizijskoj herniji, trebalo bi rano preporučiti sigmoidne resekcije, posebice ženama.

Ključne riječi

divertikularna bolest, laparoskopija, otvorena operacija, resekcija sigme, incizijska hernija

Introduction

Diverticular disease of the colon is an acquired condition that results from herniation of the mucosa through sites of low resistance in areas of vascular passage defects of the colonic wall. Epidemiological studies have revealed that diverticular formation of the colon is primarily a disease that occurs in industrialized countries [1]. Approximately 60% of humans over the age of 60 living in westernized countries will develop colonic diverticula. It became prevalent after the 1920s and is possibly associated with decrease in fibre intake. Most patients with diverticulosis remain asymptomatic throughout their lifetime and only 25–30% develop symptoms at some stage [2].

Diverticular disease produces a wide range of clinical presentations varying from minimal clinical discomfort to life-threatening complications. Uncomplicated diverticulitis is a domain of conservative therapy consisting of bowel rest and antibiotics [3, 4]. 60% of patients treated for the first episode of acute diverticulitis will recover and have no further clinical problems. Complicated diverticulitis Hinchey I could be handled exclusively in a conservative manner. Hinchey II may be drained under computed tomography (CT) control and so acute operation could be postponed to an elective one [5, 6]. Complicated diverticulosis, mainly Hinchey III and IV, is in the domain of surgical treatment [7]. Bleeding usually ceases spontaneously, while colonoscopy or angiography could be helpful.

Laparoscopy is surely suitable for elective surgery [8]. In acute cases laparoscopy belongs to the hands of an experienced surgeon.

The introduction of minimally invasive surgery for colorectal resection has resulted in reduced postoperative pain, decreased morbidity, earlier hospital discharge, faster return to normal activity and

better cosmetic results [9, 10], but usually longer operative time, higher cost or specific morbidity such as trocar-site complications [9]. There are conflicting results regarding possible benefits of laparoscopic surgery compared with open surgery with respect to the development of incisional hernia [11, 12].

The main objective of this study was to compare the rates of incisional hernia after laparoscopic and open colorectal surgery.

Patients and methods

This was a retrospective study including a cohort of 105 consecutive patients who underwent either laparoscopic or open surgery for complicated diverticular disease between January 2000 and December 2010 in our hospital. We looked up the occurrence of symptomatic incisional hernia in the patient records. Incisional hernia was defined as a bulge visible and palpable at the site of abdominal incision when the patient was standing with spontaneous or pressure-induced protrusion of abdominal contents. Diagnosis was made on the basis of clinical or ultrasound examination. We considered the hernia as symptomatic when it was limiting the patient in everyday activities because of its size or painfulness. Other data recorded for each patient included age, gender, indications for surgery (acute or elective), year and type of performed procedure.

Surgical technique

All interventions were performed by the same surgical team. We used open technique on 82 patients. In the years 2000 and 2001 we performed six myotomies from median laparotomy, but later this method was abandoned. We included these patients into the open surgery group too, because the approach through the abdominal wall was the same as in the primary resection or Hartmann's procedure, which were used on other 76 patients. We used midline, transverse or oblique laparotomy. We started using laparoscopy more often only since 2005 and that is why the laparoscopically operated group is smaller (23 patients). We preferred laparoscopic sigmoid resection for elective surgery and we used it in acute ones in only four cases. We utilized four ports. Mobilization of the bowel and ligation of the vascular pedicle were performed intracorporeally. The specimen was removed through a midline incision approximately 5–8 cm long. Intraabdominal stapled anastomosis was performed in case of sigmoidectomy. For right hemicolectomy, bowel anastomosis was performed extracorporeally. Right hemicolectomy was indicated twice.

The decision on suitability for laparoscopic resection was made on a case-by-case basis by the operating surgeon.

Statistical evaluation

The patients' data were entered into a Microsoft Excel database. The data were analyzed using standard methods of descriptive statistics. To test for significance, the Pearson's chi-square test was used for nominal data and Mann-Whitney U test was used for continuous data. A P-value ≤ 0.05 was considered statistically significant.

Results

This study included 105 patients, 31 men and 74 women, with an average age of 67 years (tab. 1). Mean follow-up was 5.5 years. The laparoscopic group consisted of 23 patients with a mean age of 63 years (range 38–86 years), and the open group consisted of 82 patients with a mean age of 68 years (range 36–94 years). Out of the 23 patients in the laparoscopic group, two (9%) patients developed a hernia compared with 25 (30%) of 82 patients in the open group ($P = 0.03$). Average time to incisional hernia was 1.5 years (1.5 years after open surgery and one year after laparoscopy). In total, 66 surgeries were elective, 39 operations were acute. Indication for acute surgery was complicated diverticulitis Hinchey I–IV and indication for elective surgery were recurrent attacks of inflammation, stenosis, chronic pain or bleeding. In nine (23%) cases hernia developed after the acute operation, 18 incisional hernias came up in the elective operated group (27%). We did not prove a statistically significant difference ($P = 0.6$).

It is interesting that we did not find an increasing incidence of incisional hernia in older patients ($P = 0.43$).

We compared the incisional hernia dependence according to gender. It appeared in 25 (30%) of 74 women and just in two (6%) of 31 men. The difference is statistically significant ($P = 0.003$).

Table 1. Characteristics of groups operated on by using open and laparoscopic technique.

	Acute operation	Elective operation	Women	Men	Average age	Incisional hernia
Open	35	47	55 (67%)	27 (33%)	63	25
Laparoscopy	4	19	19 (83%)	4 (17%)	68	2

Discussion

Incisional hernia is a frequent late complication of major abdominal surgery with incidence rates of up to 20% after a 10-year follow-up period [13]. A study performed by Hoer et al. revealed that 31.5% of all incisional hernias developed in the first six months after the operation, 54.4% after 12 months, 74.8% after two years and 88.9% after five years [14]. Factors considered to increase the risk of incisional hernia are

acute surgery [15, 16], using vertical incision, suture technique and materials [17], age over 60 years, obesity, post-operative wound infection [16], male gender [14] and comorbidity such as chronic obstructive pulmonary disease [17]. Smoking is also a risk factor for incisional hernia [18, 19].

In our group, women have a higher risk of incisional hernia ($P = 0.003$). We did not show age dependency.

Lumley et al. [20] performed a study focused on intermediate and long-term outcomes following laparoscopic colorectal surgery. In this study on 181 patients, during a median follow-up period of six years, incisional hernia developed only in one case (0.5%). Regadas et al. [21] looked up complications of laparoscopic colorectal resection and found four cases (4%) of incisional hernia out of 92 patients. According to Laurent et al., laparoscopic approach significantly decreases the risk of long-term incisional hernia 13% vs. 30%, 335 patients were included in this study [22]. Lumley's study concentrated mainly on patients with colorectal cancer, while Regadas and Laurent included only patients with colorectal cancer.

A study performed by Garret et al. was aimed to evaluate the outcomes for 200 patients with diverticular disease who underwent elective laparoscopic sigmoid colectomy. They found incisional hernia in just three (1.5%) patients [10]. Ihedioha et al. dealt with a group of 95 patients with the same diagnosis. They did not find a statistically significant reduction of incisional hernia rates after laparoscopic colorectal resections (9%) when compared with open colorectal resection (16%) [12]. A French study was more concerned with short-term benefit of elective laparoscopic treatment of sigmoid diverticulitis, but the 2.5-year follow-up found no incisional hernia [9].

According to the conclusion of a Danish study performed on 201 patients, laparoscopic sigmoid resection leads to a significantly lower incidence of incisional hernia compared to open surgical technique, 3.4% vs. 14.7% [13]. A large American study on 716 patients established 2.4% of incisional hernias after laparoscopic compared with 12.9% after open bowel resection ($P = 0.00002$) [11]. The study included both patients who had small bowel resections and colorectal surgery.

So our results are consistent with most studies which prove the benefits of laparoscopy for colorectal resection in a long term perspective. Lower occurrence of incisional hernia in other studies compared to ours can be attributed to elective performances and that the specimen is not primarily infected in oncological

indication. Another reason is our preferred use of midline incision for specimen extraction. Midline incision is associated with a higher incisional hernia rate as compared to transverse [15, 23], paramedian [24] or oblique incision [25].

Conclusion

Laparoscopic surgery leads to a significantly lower incidence of incisional hernia compared with open

surgical technique. Female gender represents a higher risk for incisional hernia than acute surgery or age. Because laparoscopy is more feasible as elective surgery, when speaking of incisional hernia, we should recommend sigma resections early, especially to women.

References

- Hobson KG, Roberts PL. Etiology and pathophysiology of diverticular disease. *Clin Colon Rectal Surg* 2004 Aug;17(3): 147–153.
- Tursi A, Papagrorgoriadis S. Review article: the current and evolving treatment of colonic diverticular disease. *Aliment Pharmacol Ther* 2009 Sep;15;30(6): 532–546.
- Beckham H, Whitlow CB. The medical and nonoperative treatment of diverticulitis. *Clin Colon Rectal Surg* 2009 Aug;22(3): 156–160.
- Lopez DE, Brown CV. Diverticulitis: the most common colon emergency for the acute care surgeon. *Scand J Surg* 2010;99(2): 86–89.
- Soumian S, Thomas S, Mohan PP, Khan N, Khan Z, Raju T. Management of Hinchey II diverticulitis. *World J Gastroenterol* 2008 Dec;21; 14(47): 7163–7169.
- Constantinides VA, Heriot A, Remzi F, et al. Operative strategies for diverticular peritonitis: a decision analysis between primary resection and anastomosis versus Hartmann's procedures. *Ann Surg* 2007 Jan;245(1): 94–103.
- Boudart C, Simoens Ch, Thill V, Debergh N, Smets D, Mendes da Costa P. Management of sigmoid diverticulitis: a retrospective study of 268 patients. *Hepatogastroenterology* 2008 Nov–Dec;55(88): 2065–2071.
- Andersen JC, Bundgaard L, Elbrønd H, et al. Danish national guidelines for treatment of diverticular disease. *Dan Med J* 2012 May;59(5): C4453.
- Berthou JC, Charbonneau P. Elective laparoscopic management of sigmoid diverticulitis. Results in a series of 110 patients. *Surg Endosc* 1999 May;13(5): 457–460.
- Garrett KA, Champagne BJ, Valerian BT, Peterson D, Lee EC. A single training center's experience with 200 consecutive cases of diverticulitis: can all patients be approached laparoscopically? *Surg Endosc* 2008 Nov;22(11): 2503–2508. Epub 2008 Mar 18.
- Duepre HJ, Senagore AJ, Delaney CP, Fazio VW. Does means of access affect the incidence of small bowel obstruction and ventral hernia after bowel resection? *Laparoscopy versus laparotomy. J Am Coll Surg* 2003 Aug;197(2): 177–181.
- Ihedioha U, Mackay G, Leung E, Molloy RG, O'Dwyer PJ. Laparoscopic colorectal resection does not reduce incisional hernia rates when compared with open colorectal resection. *Surg Endosc* 2008 Mar;22(3): 689–692.
- Andersen LP, Klein M, Gögenur I, Rosenberg J. Incisional hernia after open versus laparoscopic sigmoid resection. *Surg Endosc* 2008 Sep;22(9): 2026–2029. Epub 2008 Apr 25.
- Höer J, Lawong G, Klinge U, Schumpelick V. Factors influencing the development of incisional hernia. A retrospective study of 2,983 laparotomy patients over a period of 10 years. *Chirurg* 2002 May;73(5): 474–480.
- Grantcharov TP, Rosenberg J. Vertical compared with transverse incisions in abdominal surgery. *Eur J Surg* 2001 Apr;167(4): 260–267.
- Mingoli A, Puggioni A, Sgarzini G, et al. Incidence of incisional hernia following emergency abdominal surgery. *Ital J Gastroenterol Hepatol* 1999 Aug–Sep;31(6): 449–453.
- Adell-Carceller R, Segarra-Soria MA, Pellicer-Castell V, et al. Incisional hernia in colorectal cancer surgery. Associated risk factors. *Cir Esp* 2006 Jan;79(1): 42–45.
- Sørensen LT, Hemmingsen UB, Kirkeby LT, Kallehave F, Jørgensen LN. Smoking is a risk factor for incisional hernia. *Arch Surg* 2005 Feb;140(2): 119–123.
- Turunen P, Wikström H, Carpelan-Holmström M, Kairaluoma P, Kruuna O, Scheinin T. Smoking increases the incidence of complicated diverticular disease of the sigmoid colon. *Scand J Surg* 2010;99(1): 14–17.
- Lumley J, Stitz R, Stevenson A, Fielding G, Luck A. Laparoscopic colorectal surgery for cancer: intermediate to long-term outcomes. *Dis Colon Rectum* 2002 Jul;45(7): 867–872.
- Regadas FS, Rodrigues LV, Nicodemo AM, Siebra JA, Furtado DC, Regadas SM. Complications in laparoscopic colorectal resection: main types and prevention. *Surg Laparosc Endosc* 1998 Jun;8(3): 189–192.
- Laurent C, Leblanc F, Bretagnol F, Capdepon M, Rullier E. Long-term wound advantages of the laparoscopic approach in rectal cancer. *Br J Surg* 2008 Jul;95(7): 903–908.
- DeSouza A, Domajnko B, Park J, Marecik S, Prasad L, Abcarian H. Incisional hernia, midline versus low transverse incision: what is the ideal incision for specimen extraction and hand-assisted laparoscopy? *Surg Endosc* 2011 Apr;25(4): 1031–1036. Epub 2010 Aug 25.
- Singh R, Omiccioli A, Hegge S, McKinley C. Does the extraction-site location in laparoscopic colorectal surgery have an impact on incisional hernia rates? *Surg Endosc* 2008 Dec;22(12): 2596–2600. Epub 2008 Mar 18.
- Burger JW, van't Riet M, Jeekel J. Abdominal incisions: techniques and postoperative complications. *Scand J Surg* 2002;91(4): 315–321.