Original article

French multicentre prospective observational study of laparoscopic *versus* open colectomy for sigmoid diverticular disease

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Background: **The aim of this study was to compare in-hospital morbidity and mortality rates after elective laparoscopic and open colorectal surgery for sigmoid diverticular disease (SDD).**

Methods: **This prospective national multicentre observational study included all consecutive patients undergoing open or laparoscopic elective colectomy for SDD in a 4-month period between June and September 2002. Postoperative in-hospital mortality and morbidity in the two groups were compared.**

Results: **Three hundred and thirty-two consecutive patients undergoing either laparoscopic (163 patients) or open (169 patients) colectomy for SDD were analysed. Overall postoperative mortality and morbidity rates were 0·3 and 23·8 per cent respectively. The morbidity rate was significantly higher in the open than in the laparoscopic group ($P < 0·001$), leading to a significantly longer hospital stay ($P < 0·001$). The morbidity rate remained significantly higher in the open group when the patients were matched for age ($P = 0·015$) or American Society of Anesthesiologists score ($P = 0·028$). An open procedure (relative risk (RR) 2·13 (95 per cent confidence interval (c.i.) 1·29 to 3·45)), age over 70 years (RR 1·62 (95 per cent c.i. 1·14 to 2·30)) and intraperitoneal contamination (RR 2·54 (95 per cent c.i. 1·18 to 5·50)) were identified as independent risk factors for morbidity.**

Conclusion: **A laparoscopic approach to elective treatment of SDD may be associated with reduced postoperative morbidity and hospital stay. A randomized study is required to confirm these results.**

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Introduction

Elective surgical treatment of sigmoid diverticular disease (SDD) may be indicated after one acute complicated episode (abscess or fistula) in patients younger than 50 years and also in immunosuppressed patients. For older and immunocompetent patients most surgeons recommend resection after two acute episodes[1]. Open elective resection for SDD is highly effective, with early postoperative morbidity rates ranging from 5 to 14 per cent in most series, and mortality rates of 0–1·2 per cent[2–4].

The major goal of the laparoscopic approach is to achieve morbidity and mortality rates that are at least comparable to those obtained with open surgery. A minimally invasive operation may also improve the early postoperative course, allow faster recovery, and reduce the risk of complications such as abscess and hernia. For successful laparoscopic treatment of SDD, the principles applied in the open approach must be observed, such as resection of all inflamed colon, a tension-free anastomosis using well vascularized colonic ends, and an anastomosis below the rectosigmoid junction.

Although several studies have demonstrated the feasibility of laparoscopic sigmoid colectomy for SDD[5–13], evidence for its advantages in terms of clinically relevant outcome variables is scant. Five studies have found

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that laparoscopic colectomy compares favourably with open colectomy for the treatment of SDD with regard to reduced intraoperative trauma, decreased postoperative pain, decreased length of ileus, better cosmesis, early discharge from hospital and early return to work[14–18]. However, the analyses were retrospective and there were fewer than 50 patients per group in three studies[15,16,18]. No randomized trials have been conducted to date.

The aim of this prospective national observational study was to compare in-hospital morbidity and mortality rates after laparoscopic and open colorectal surgery for SDD.

Patients and methods

All members of the Association Française de Chirurgie (AFC) were encouraged to participate in a prospective multicentre study that examined mortality and morbidity rates after colorectal surgery during the 4 months from June to September 2002. The study was approved by the institutional review board of the AFC. Of a total 1426 patients, only 332 consecutive patients undergoing open or laparoscopic elective surgery for SDD were included. The remaining patients underwent either urgent surgery for SDD (92) or surgery for colorectal cancer (1002). Results for these patients have been published elsewhere[19]. In this observational study, patients were selected for laparoscopic or open resection according to patient characteristics and the surgeon's preference. An intention-to-treat analysis was performed; patients whose laparoscopic operation was converted to open surgery were included in the laparoscopic group.

Data were collected prospectively on standard forms. The patients were assessed before operation for surgical risk using the American Society of Anesthesiologists (ASA) score. All premorbid conditions were documented including obesity (body mass index over 30), underweight (weight loss of more than 10 per cent within the past 6 months), diabetes mellitus, recent steroid treatment, cardiopulmonary co-morbidity (myocardial infarction, atrial fibrillation, chronic obstructive pulmonary disease, history of smoking), neurological co-morbidity (stroke, functional status, Glasgow Coma Scale) and gastrointestinal co-morbidity (history of alcohol abuse, chronic liver disease, Child–Pugh classification). Other variables documented were hospital type (university, general or private), age, sex, previous laparoscopy or laparotomy, previous episodes of sigmoid diverticulitis (number of attacks, treatment of each attack), complicated sigmoid diverticulitis (abscess, fistula, obstruction, haemorrhage, perforation), indication for surgery (elective surgery, fistula, perisigmoid abscess, haemorrhage), type of bowel preparation, type of prophylactic antibiotics, procedure (laparoscopy or laparotomy), reasons for conversion, intraoperative septic complications (including iatrogenic intraperitoneal contamination, defined as intestinal intraperitoneal contamination resulting from incomplete colonic preparation or an intestinal tear), associated procedures (including resection of other organs), type of intestinal anastomosis (manual *versus* stapled), duration of operation, amount of homologous blood transfused, blood loss, and use of abdominal drainage. Conversion to open surgery was defined as any unplanned incision or a planned incision longer than 5 cm that was necessary for simple exteriorization of the resected specimen and construction of the anastomosis.

Postoperative mortality and morbidity were defined as deaths and specific complications that occurred in hospital. Postoperative morbidity included superficial and deep wound infections, wound dehiscence, pneumonia, clinical anastomotic dehiscence, intra-abdominal abscess, prolonged ileus, haemorrhage from the anastomosis, bleeding that required blood transfusion, cardiac arrest, myocardial infarction, pulmonary embolism, pneumonia, pulmonary oedema, failure to wean from the ventilator by 48 h after operation, progressive renal insufficiency, renal failure that required dialysis, urinary tract infection, stroke, deep vein thrombophlebitis and systemic sepsis.

Statistical analysis

Values are expressed as mean(s.d). Groups were compared using the χ^2 test, Mann–Whitney U test, Student's t test, ANOVA, Kruskal–Wallis H test, Pearson correlation or Spearman's rank correlation as appropriate. Multiple logistic regression analysis was performed to determine the main independent factors for postoperative morbidity and the relative risk (RR) was calculated for each significant variable. $P < 0{\cdot}050$ was considered statistically significant. Although it seemed unlikely in this observational study that adjustment by propensity score would eliminate bias from the comparison, multiple correction methodology was used to compare the two groups, using a saturated propensity score. To compute the propensity score, factors that significantly influenced the choice of operation (laparotomy *versus* laparoscopy) were identified. Logistic regression was used to calculate the probability of the laparotomy approach among each sub-class. Nevertheless, logistic regression was performed, testing the association between postoperative morbidity and surgical approach including the propensity score. Data collection and statistical analyses were done using SEM software[20].

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Results

Among the 1426 patients operated on in 81 participating centres, 332 consecutive patients had elective colectomy for SDD, 163 via a laparoscopic approach and 169 through a laparotomy. Laparoscopic procedures were done in 46 centres (57 per cent), with a mean of 2·4(3·0) (range 1–12) patients operated on in each centre; open procedures were carried out in 67 centres (83 per cent) with a mean of 2·5(2·6) (range 1–11) patients per hospital.

Patient characteristics are shown in *Table 1*. Patients in the open group were significantly older and had higher ASA scores than those in the laparoscopic group. Cardiorespiratory co-morbidity was significantly more common in the open group and patients in this group were more likely to have undergone laparotomy previously.

Operative findings are summarized in *Table 1*. Intraperitoneal contamination was significantly more common in the open group than the laparoscopic group. Blood loss was significantly greater in the open group, which resulted in a greater need for homologous blood transfusion. Abdominal drainage was required significantly more frequently in the open group, whereas the mean operating time was significantly longer in the laparoscopic group. Thirteen patients required a protective stoma, with no significant difference between groups.

Table 1 Demographic, clinical and operative data for patients who underwent open or laparoscopic colectomy for sigmoid diverticular disease

	Open ($n = 169$)	Laparoscopic ($n = 163$)	P
Hospital type			
University	81 (47·9)	78 (47·9)	
General	54 (32·0)	41 (25·2)	
Private	34 (20·1)	44 (27·0)	
Mean age (years)	63	58	< 0·001
Mean body mass index	27	26	0·490
Mean ASA score	1·96	1·68	< 0·001
Previous laparotomy	99 (58·6)	72 (44·2)	0·009
Cardiopulmonary co-morbidity	87 (51·5)	62 (38·0)	0·010
Prophylactic antibiotics	164 (97·0)	159 (97·5)	0·660
Bowel preparation	166 (98·2)	158 (97·0)	0·960
Intraperitoneal contamination	9 (5·3)	1 (0·6)	0·030
Converted to laparotomy	—	25 (15·3)	
Visceral injury	6 (3·6)	7 (4·3)	0·720
Perioperative transfusion	10 (5·9)	3 (1·8)	0·050
Mean operating time (min)	166	204	< 0·001
Mean blood loss (ml)	248	170	< 0·001
Protective stoma	9 (5·3)	4 (2·5)	0·180
Abdominal drainage	134 (79·3)	106 (65·0)	0·003

Values in parentheses are percentages. ASA, American Society of Anesthesiologists.

One patient in the open group died in hospital, giving a postoperative mortality rate of 0·3 per cent. Postoperative complications were observed in 79 patients (23·8 per cent) (*Table 2*). The overall morbidity rate was significantly higher in the open group, as were rates of surgical complications such as wound complications, intra-abdominal abscess and anastomotic leakage (*Table 2*). The rate of postoperative medical complications was similar in the two groups.

The laparoscopic procedure was converted into a laparotomy in 25 patients (15·3 per cent). Conversion was indicated because of extensive inflammation or dense adhesions in most patients. The postoperative morbidity rate was higher in the 25 patients whose operation was converted than in those whose operation was completed laparoscopically (24 *versus* 15 per cent), but the difference was not significant ($P = 0·430$).

In the present study, conversion was associated with a significantly longer operating time than in non-converted patients (288 ± 88 *versus* 185 ± 67 min, $P = 0·038$).

The mean hospital stay was significantly shorter in the laparoscopic group (including conversions) than the open group (10(5) *versus* 18(15) days; $P < 0·001$), and after a completely laparoscopic operation compared with a converted laparoscopic procedure (9 *versus* 14 days; $P < 0·001$).

The morbidity rate was significantly higher after laparotomy than laparoscopy for patients younger than 70 years (odds ratio (OR) 1·86 (95 per cent confidence interval (c.i.) 1·15 to 3·00); $P = 0·002$) (*Table 3*). The difference between patients in the open and laparoscopy groups remained significant when patients were matched

Table 2 Postoperative morbidity after open or laparoscopic colectomy for sigmoid diverticular disease

	Open ($n = 169$)	Laparoscopy ($n = 163$)	P
Overall morbidity	53 (31·4)	26 (16·0)	< 0·001
Wound complications	16 (9·5)	6 (3·7)	0·030
Intra-abdominal abscess	15 (8·9)	3 (1·8)	0·010
Anastomotic fistula	9 (5·3)	2 (1·2)	0·030
Haemorrhage	4 (2·4)	4 (2·5)	0·730
Cardiopulmonary complications	9 (5·3)	3 (1·8)	0·070
Pulmonary embolism	3 (1·8)	0 (0)	0·290
Prolonged ileus	10 (5·9)	3 (1·8)	0·150
Urinary tract infection	15 (8·9)	6 (3·7)	0·160
Septic shock	3 (1·8)	0 (0)	0·390
Reoperation	5 (3·0)	3 (21·8)	0·760
Readmission to hospital	20 (11·8)	13 (8·0)	0·230
Mean hospital stay (days)*	18(15)	10(5)	< 0·001

Values in parentheses are percentages unless indicated otherwise; *values are mean(s.d.).

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Table 3 Postoperative morbidity according to age and American Society of Anesthesiologists score

	Morbidity rate		
	Open	Laparoscopic	*P*
Age (years)			
< 70	32 of 110 (29·0)	21 of 134 (15·7)	0·002
≥ 70	21 of 57 (37)	5 of 28 (18)	0·074
ASA score			
< 3	36 of 130 (27·7)	23 of 149 (15·4)	0·012
≥ 3	14 of 31 (45)	3 of 9 (33)	0·800

Values in parentheses are percentages. ASA, American Society of Anesthesiologists.

for age (OR 1·68 (95 per cent c.i. 1·1 to 2·6); $P = 0·015$) and ASA score (OR 1·8 (95 per cent c.i. 1·05 to 2·52; $P = 0·028$). Multiple regression analysis revealed three variables that were independently associated with postoperative complications: a traditional open procedure (RR 2·1 (95 per cent c.i. 1·3 to 3·4) $P = 0·003$), age over 70 years (RR 1·62 (95 per cent c.i. 1·1 to 2·3) $P = 0·042$) and intraperitoneal contamination (RR 2·54 (95 per cent c.i. 1·2 to 5·5) $P = 0·017$).

After a propensity score correction, the area under the receiver–operator characteristic curve (0·64) did not reach the saturation level usually needed to make the correction (i.e. 0·80) (*Fig. 1*). However, logistic regression including the propensity score showed that the propensity score and the surgical approach remained significant (*Table 4*). The propensity score was most significant ($P = 0·010$), followed by the surgical approach ($P = 0·015$), whereas

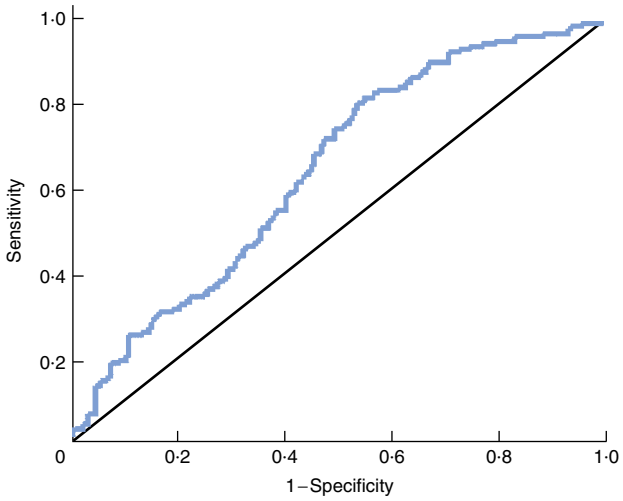

Fig. 1 Area under the receiver–operator characteristic curve (AUC) calculated by the propensity score correction. AUC 0·64 (95 per cent c.i. 0·58 to 0·70)

Table 4 Logistic regression analysis testing the association between postoperative morbidity and surgical approach including the propensity score

	Coefficient	Standard error	*P*	Odds ratio
Propensity score	– 3.015	1·166	0·010	0·05 (0·01, 0·82)
Laparotomy	0·683	0·281	0·015	1·98 (1·07, 3·29)
Intraperitoneal contamination	0·689	0·662	0·300	1·99 (0·54, 7·30)

Values in parentheses are 95 per cent c.i.

intraperitoneal contamination lost its initial significance. The OR associated with laparotomy remained stable at 1·98 (95 per cent c.i. 1·14 to 3·43).

Discussion

In this large prospective study, laparoscopic colectomy for SDD was associated with a significantly lower postoperative morbidity rate and shorter hospital stay than the open procedure.

Although laparoscopic sigmoid resection for SDD has gained widespread popularity and should be considered as a surgical option, its acceptance has been slow for several reasons. First, recurrent sigmoid diverticulitis and its complications often cause dense pericolic and mesenteric inflammation with distortion of the normal anatomical planes, making surgical dissection difficult and potentially hazardous. Second, the lack of tactile sensation and inability to use digital blunt dissection, especially for diverticulitis, appear to represent major shortcomings of laparoscopy. For this reason some surgeons prefer a laparoscopically assisted technique, in which part of the procedure (usually specimen extraction or anastomosis) is carried out extraperitoneally via a small incision. The feasibility of laparoscopically assisted left colectomy for SDD has been demonstrated in several retrospective studies[5–13]. However, in the absence of a prospective randomized trial, some authors continue to perform traditional open colectomy for SDD because it is associated with low morbidity and mortality rates.

The two principal disadvantages of laparoscopy are the potential requirement for conversion to laparotomy and increased operating time. In the present study, 15·3 per cent of laparoscopic operations were converted into open operations, compared with published rates of 5–26 per cent. The fact that this was a multicentre study might explain the high rate of conversion. However, because of the large number of surgeons involved, no definitive conclusion concerning conversion rate during laparoscopic sigmoidectomy for SDD can be made.

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Although it has been reported that conversion to laparotomy leads to an increase in postoperative morbidity and mortality rates[21,22], two recent studies that included more than 100 patients[23,24] reported no difference in morbidity between laparoscopic colectomy and converted procedures. In the present study conversion was associated with a longer operating time and delayed hospital discharge, but both hospital stay and postoperative morbidity remained lower than those for the traditional open procedure. The operating time for laparoscopic colectomy was significantly longer than that for open traditional colectomy, consistent with two previous reports[14,18].

The main advantages of the laparoscopic approach should be an earlier recovery of intestinal transit and resumption of normal diet[14,15], less postoperative pain, and a reduction in postoperative morbidity leading to a decrease in hospital stay. The present study did not examine intestinal function or analgesic use. The relatively long duration of hospital stay in both groups in the present study might be explained partly by the inclusion of unselected patients (elderly and high-risk patients) and partly by the fact that this was a multicentre study. Nevertheless, a significant reduction of 1 week was noted in the laparoscopic group.

In this study both overall postoperative morbidity rates and hospital stay were significantly lower after laparoscopic colectomy than open colectomy. Previous retrospective comparative studies showed a significant reduction in hospital stay after laparoscopic colectomy for SDD[14–18], although only two reported a significant reduction in postoperative morbidity[17,18]. Although the morbidity rate was lower in the laparoscopic group in the present study, it should be noted than the two groups of patients were not strictly comparable as patients in the open group were older, with a higher ASA score and a higher frequency of cardiorespiratory co-morbidity. However, the morbidity rate remained significantly higher in the open group, even when the patients were matched for age and ASA score. Multiple regression analysis revealed the operative approach of laparotomy to be the worst independent risk factor for postoperative morbidity after colectomy for SDD. The remaining factors were intraperitoneal contamination and age over 70 years. Although a propensity score correction was performed, the influence of operative approach (laparoscopy *versus* laparotomy) on morbidity rate remained significant, independently of the factors that might have influenced the choice of surgical approach.

On the basis of the present results, laparoscopic colectomy may be considered an acceptable approach for the elective treatment of SDD, similar to recommendations for colonic cancer surgery made by the Clinical Outcomes of Surgical Therapy study[25]. However, a randomized trial is still required to confirm these results.

References

1 Wong WD, Wexner SD, Lowry A, Vernava A III, Burnstein M, Denstman F *et al*. (The Standard Task Force, American Society of Colon and Rectal Surgery). Practice parameters for the treatment of sigmoid diverticulitis – supporting documentation. *Dis Colon Rectum* 2000; **43**: 290–297.

2 Moreaux J, Vons C. Elective resection for diverticular disease of the sigmoid colon. *Br J Surg* 1990; **77**: 1036–1038.

3 Poilleux J, Delhomme P, Gignoux M, Joubert M, Lalaude J, Laurent B *et al*. Choix thérapeutique dans les complications de la maladie diverticulaire colique: a propos de 247 observations. *Chirurgie* 1987; **113**: 356–359.

4 Zinzindohoué F, Vaillant J-C, Faucheron J-L, Parc R. Morbidité opératoire de la colectomie segmentaire idéale fait par la laparotomie pour diverticulose colique compliquée. *Gastroenterol Clin Biol* 1998; **22**: 286–289.

5 Kockerling F, Schneider C, Reymond MA, Scheidbach H, Scheuerlein H, Konradt J *et al*. Laparoscopic resection of sigmoid diverticulitis. Result of a multicenter study. Laparoscopic Colorectal Surgery Study Group. *Surg Endosc* 1999; **13**: 567–571.

6 Berthou JC, Charbonneau P. Elective laparoscopic management of sigmoid diverticulitis. Results in a series of 110 patients. *Surg Endosc* 1999; **13**: 457–460.

7 Perniceni T, Burdy G, Gayet B, Dubois F, Boudet MJ, Levard H. Résultats de la colectomie segmentaire élective faite par coelioscopie pour diverticulose compliquée. *Gastroenterol Clin Biol* 2000; **24**: 189–192.

8 Smadja C, Sbai Idrissi M, Tahrat M, Vons C, Bobocescu E, Baillet P *et al*. Elective laparoscopic sigmoid colectomy for diverticulitis. Results of a prospective study. *Surg Endosc* 1999; **13**: 645–648.

9 Boulez J, Blanchet MC, Espalieu P. Diverticulose colique et laparoscopie. Analyse d'une série de 60 cas. *Ann Chir* 1999; **53**: 1033–1038.

10 Siriser F. Laparoscopic-assisted colectomy for diverticular sigmoiditis. A single-surgeon prospective study of 65 patients. *Surg Endosc* 1999; **13**: 811–813.

11 De Chaisemartin C, Panis Y, Mognol P, Valleur P. Sigmoïdectomie laparoscopique pour diverticulite: la phase d'apprentissage est-elle associée à une sur morbidité? *Ann Chir* 2003; **128**: 81–87.

12 Schlachta CM, Mamazza J, Poulin EC. Laparoscopic sigmoid resection for acute and chronic diverticulitis. An outcomes comparison with laparoscopic resection for nondiverticular disease. *Surg Endosc* 1999; **13**: 649–653.

13 Slim K, Pezet D, Stencl J Jr, Lagha K, Le Roux S, Lechner C *et al*. Prospective analysis of 40 initial laparoscopic colorectal resections: a plea for a randomized trial. *J Laparoendosc Surg* 1994; **4**: 241–245.

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14 Dwivedi A, Chahin F, Agrawal S, Chau WY, Tootla A, Tootla F *et al*. Laparoscopic colectomy *vs* open colectomy for sigmoid diverticular disease. *Dis Colon Rectum* 2002; **45**: 1309–1315.
15 Faynsod M, Stamos MJ, Arnell T, Borden C, Udani S, Vargas H. A case–control study of laparoscopic *versus* open sigmoid colectomy for diverticulitis. *Am Surg* 2000; **66**: 841–843.
16 Liberman MA, Phillips EH, Carroll BJ, Fallas M, Rosenthal R. Laparoscopic colectomy *vs* traditional colectomy for diverticulitis. Outcome and costs. *Surg Endosc* 1996; **10**: 15–18.
17 Senagore AJ, Duepree HJ, Delaney CP, Dissanaike S, Brady KM, Fazio VW. Cost structure of laparoscopic and open sigmoid colectomy for diverticular disease: similarities and differences. *Dis Colon Rectum* 2002; **45**: 485–490.
18 Tuech JJ, Pessaux P, Regenet N, Rouge C, Hennekinne S, Bergamaschi R *et al*. Laparoscopic colectomy for sigmoid diverticulitis: a prospective study in the elderly. *Hepatogastroenterology* 2001; **48**: 1045–1047.
19 Alves A, Panis Y, Mathieu P, Mantion G, Kwiatkowski F, Slim K and the French Association of Surgery. Postoperative mortality and morbidity in French patients undergoing colorectal surgery: results of a prospective multicenter study. *Arch Surg* 2005; **140**: 278–283.
20 Kwiatkowski F, Girard M, Hacene K, Berlie J. SEM: a suitable statistical software adapted for research in oncology. *Bull Cancer* 2000; **87**: 715–721.
21 Slim K, Pezet D, Riff Y, Clark E, Chipponi J. High morbidity rate after converted laparoscopic colorectal surgery. *Br J Surg* 1995; **82**: 1406–1408.
22 Benchimol D, Domergue J. *Chirurgie de la maladie diverticulaire sigmoidienne: rapport présenté au 102e Congrès Français de Chirurgie. October 5–7 2000, Paris, France*. Rueil-Malmaison: Arnette.
23 Le Moine MC, Fabre JM, Vacher C, Navarro F, Picot MC, Domergue J. Factors and consequences of conversion in laparoscopic sigmoidectomy for diverticular disease. *Br J Surg* 2002; **90**: 232–236.
24 Schlachta CM, Mamazza J, Seshadri PA, Cadeddu MO, Poulin EC. Predicting conversion to open surgery in laparoscopic colorectal resections. A simple clinical model. *Surg Endosc* 2000; **14**: 1114–1117.
25 The Clinical Outcomes of Surgical Therapy Study Group. A comparison of laparoscopically assisted and open colectomy for colon cancer. *N Engl J Med* 2004; **350**: 2050–2059.

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