

Treatment of left-sided colonic emergencies: a comparison of US, UK and Australian surgeons

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Abstract Background This study sought to identify and compare the current practice of surgeons in Australia, the UK and the US when presented with a left-sided colonic emergency. **Methods** Questionnaires were posted to 500 US, 500 UK and 500 Australian surgeons. Demographic data were collected regarding the surgeon's age and surgical interest, as well as their preferred method of managing left-sided colonic emergencies (namely obstruction and perforation in stable and unstable patients). The results were analysed using the chi-squared test. **Results** Completed questionnaires were received from 224 UK surgeons (45%), 180 US surgeons (36%) and 259 Australian surgeons (52%). All the US surgeons had an interest in gastrointestinal surgery, while 31% of the UK surgeons and 22% of Australian surgeons had an interest in colorectal surgery. In a haemodynamically stable patient with a good anaesthetic risk presenting with a complete sigmoid obstruction, significantly more UK (84%) and Australian surgeons (70%) would perform a resection and anastomosis than US surgeons (54%, $p < 0.0001$). Of those with a colorectal interest, 97% of UK

surgeons and 80% of Australian surgeons would opt for resection and anastomosis. In a haemodynamically stable patient with a good anaesthetic risk with a perforation of the sigmoid colon and purulent peritonitis, 46% of UK surgeons, 32% of Australian surgeons and 33% of US surgeons would opt for resection and anastomosis, and among colorectal surgeons, 68% of UK surgeons and 50% of Australian surgeons would opt for resection and anastomosis. **Conclusions** The management of left-sided colonic emergencies varies depending on geographic location and degree of colorectal subspecialization. While the literature suggests that single-stage procedures are accepted and safe, the reasons for this variation are explored.

Key words Colonic · Emergencies · Treatment

Introduction

Left-sided colonic obstruction or perforation remains a common surgical emergency facing surgeons worldwide. The aetiology is varied, but the majority of cases are due to either colorectal cancer or diverticular disease. Of the 12,600 patients newly diagnosed with colorectal cancer in Australia each year, about 30% with colon cancer and 10% with rectal cancer will present as an emergency [1], and of these 80% will be obstructed and 15% will have a perforation [2, 3]. Perforation of the distal colon secondary to diverticular disease occurs in approximately 4 per 100,000 patients [4].

This study was designed to identify the current practice of surgeons in Australia when presented with left-sided colonic emergencies, and directly compare it with the practice of US and UK surgeons [5, 6].

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Methods

A questionnaire was sent to 500 US-based surgeons randomly selected from the membership list of the Society for Surgery of the Alimentary Tract; these questionnaires were analysed by Goyal et al. [6]. The same questionnaire (Fig. 1) was sent to 500 randomly selected members of the Royal College of Surgeons of England and 500 randomly selected members of the Royal Australasian College of Surgeons. Statistical analysis was performed using the chi-squared test.

Personal Details

a. Your Age _____

b. Area of Interest _____

c. Number of colonic emergencies treated by you per year _____

d. Academic Appointment – Professor, Associate Professor, Assistant Professor, None or Other _____

Please select one of the choices of surgical procedure in answering the following questions.

1. Sigmoid resection and primary anastomosis.
2. Sigmoid resection and primary anastomosis with on table colonic lavage.
3. Hartmann's procedure.
4. Subtotal colectomy and primary anastomosis.
5. Defunctioning transverse colostomy.
6. Other (please explain) _____

1. Your procedure of choice in a haemodynamically stable 72-year old patient presenting with complete sigmoid obstruction.

a) In a patient with a good anaesthetic risk _____

b) In a patient with a poor anaesthetic risk _____

2. Your procedure of choice in a haemodynamically stable 72-year old patient suffering from diverticular perforation of the sigmoid colon with localised purulent peritonitis.

a) In a patient with a good anaesthetic risk _____

b) In a patient with a poor anaesthetic risk _____

Fig. 1 Questionnaire sent to 500 UK, US and Australian surgeons. Note that in the UK question 'd' in the personal details section was omitted

Results

Fully completed questionnaires were received from 259 Australian surgeons (52%), 224 UK surgeons (45%), and 180 US surgeons (36%). Their mean ages were 51 years (33–77 years) in Australia, 50 years (32–78 years) in the UK, and 51 years (32–75 years) in the US study. The mean number of colonic resections per surgeon per year was 9.5 (range 0–50) in Australia, 18.7 (range 0–150) in the UK, and 13 (7–30) in the US.

Among Australian general surgeons, 56 (22%) identified colorectal surgery as an area of interest, of the remainder there were 103 'general' or 'GI' surgeons, 39 upper GI surgeons, 7 vascular surgeons, 7 rural surgeons, and 33

breast/endocrine surgeons. Of the Australian surgeons, 102 (39%) indicated that they held academic positions.

All US surgeons had an interest in gastrointestinal surgery, with 82% practising in an academic setting (professor 42%, associate professor 24%, assistant professor 17%). The UK respondents had a more diverse range of specialist interests and included 70 colorectal surgeons (31%), 52 'general' or 'GI' surgeons, 28 upper GI surgeons, 29 vascular surgeons, and 29 breast surgeons.

Responses to question 1: 'Your procedure of choice in a haemodynamically stable 72-year old patient presenting with complete sigmoid obstruction'

(a) In a patient with a good anaesthetic risk

Of the UK surgeons, 189 (84%) would opt for a single-stage procedure, with 128 (57%) favouring sigmoid resection, primary anastomosis and on-table colonic lavage (Table 1, Fig. 2). A significantly smaller proportion of US surgeons (97 out of 180, 54%, $p < 0.0001$) would opt for a single-stage procedure, with only 46 (26%, $p < 0.0001$) opting for resection, anastomosis and lavage. Of the Australian surgeons, 180 (70%) would opt for a single-stage procedure, with 109 (42%) choosing resection, anastomosis and lavage ($p < 0.001$).

Of note, 97% of the UK surgeons with a colorectal interest stated that they would perform some kind of single-stage procedure, in contrast to 77% of noncolorectal surgeons ($p < 0.0001$); equivalent figures for the Australian surgeons were 80% and 67%, respectively. Segmental resection with colonic lavage was preferred by 69% of UK colorectal surgeons and 51% of UK noncolorectal surgeons ($p < 0.01$), and by 63% of Australian colorectal surgeons and 37% of Australian noncolorectal surgeons.

(b) In a patient with a poor anaesthetic risk

A Hartmann's procedure was favoured by the majority of surgeons in the UK (58%), US (67%), and Australia (68%), with 15%, 26% and 17%, respectively, opting for a defunctioning loop colostomy (Fig. 3). Even in this higher risk group, 22% of UK surgeons would opt for some form of one-stage procedure compared with 6% of the US surgeons ($p < 0.01$) and 10% of the Australian surgeons. Among colorectal surgeons, 30% of UK surgeons and 21% of Australian surgeons would opt for a one-stage procedure.

Responses to question 2: 'Your procedure of choice in a haemodynamically stable 72-year-old patient suffering from diverticular perforation of the sigmoid colon with localised purulent peritonitis'

Table 1 Responses of UK surgeons (*n*=224), US surgeons (*n*=180) and Australian surgeons (*n*=259) to questions 1 and 2 of the questionnaire. Values are percentages of each group of surgeons

| Procedure | Sigmoid obstruction Good risk (1a) | | | Poor risk (1b) | | | Sigmoid perforation Good risk (2a) | | | Poor risk (2b) | | |
|---|---------------------------------------|-------|-----|----------------|-----|-----|---------------------------------------|-------|-----|----------------|----|-----|
| | UK | US | Aus | UK | US | Aus | UK | US | Aus | UK | US | Aus |
| Sigmoid resection and anastomosis | 17 | 18 | 16 | 5 | 3* | 2 | 11 | 22* | 20 | 4 | 2 | 1 |
| Sigmoid resection, anastomosis and lavage | 57 | 26*** | 42 | 13 | 3** | 5 | 34 | 11*** | 12 | 5 | 2 | 2 |
| Hartmann's procedure | 13 | 40*** | 26 | 58 | 67 | 68 | 50 | 65 | 66 | 83 | 88 | 89 |
| Subtotal colectomy | 10 | 10 | 11 | 4 | 0* | 3 | 1 | 1 | 0 | – | – | – |
| Transverse colostomy | 1 | 5 | 3 | 15 | 26 | 17 | 1 | 1 | – | 6 | 7 | 5 |
| Other | 2 | 1 | 2 | 5 | 1 | 5 | 3 | – | 2 | 2 | 1 | 3 |

p*<0.05; *p*<0.01; ****p*<0.0001

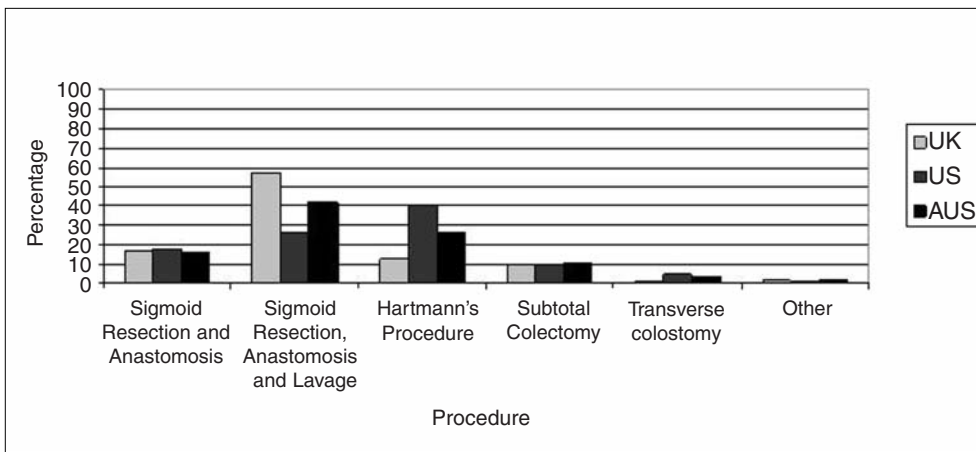


Fig. 2 Questionnaire responses by UK, US and Australian surgeons concerning their surgical procedure of choice in a haemodynamically stable 72-year-old patient presenting with complete sigmoid obstruction with a good anaesthetic risk (question 1a)

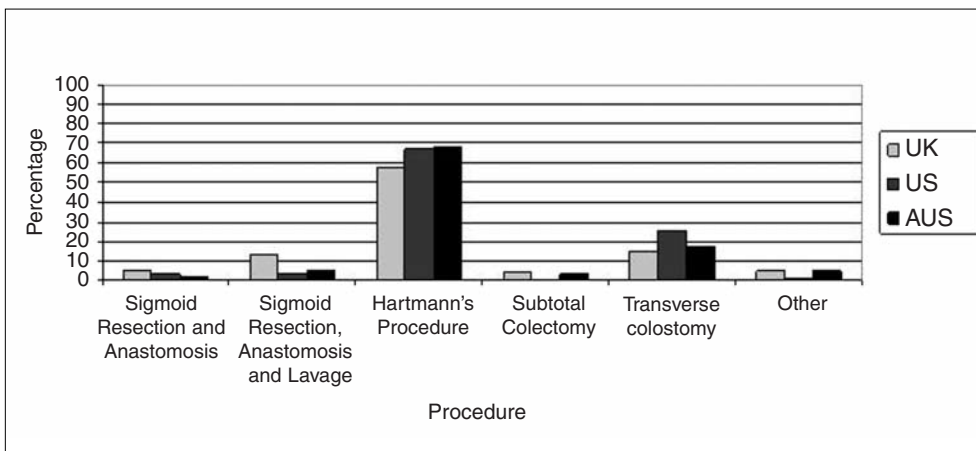


Fig. 3 Questionnaire responses by UK, US and Australian surgeons concerning their surgical procedure of choice in a haemodynamically stable 72-year-old patient presenting with complete sigmoid obstruction with a poor anaesthetic risk (question 1b)

(a) In a patient with a good anaesthetic risk
Of UK surgeons, 46% would opt for a single-stage operation with 34% preferring segmental resection with lavage compared with 33% and 11%, respectively, among the US surgeons, and 32% and 12% among the Australian surgeons (Fig. 4). Among colorectal surgeons, 68% of UK surgeons and 50% of Australian surgeons would opt for a single-stage procedure, with 54% and 27% of them preferring additional on-table lavage.

(b) In a patient with a poor anaesthetic risk
Hartmann's procedure was considered the safest proce-

dure by 83% of the UK surgeons, 88% of the US surgeons, and 89% of the Australian surgeons (Fig. 5).

Discussion

Traditional teaching mandates the avoidance of an anastomosis in the presence of obstruction or perforation [7].

The resistance of surgeons to performing single-stage restorative procedures in the emergency setting originated from early uncontrolled studies in the 1970s that demonstrated an anastomotic leak rate of up to 50% [8].

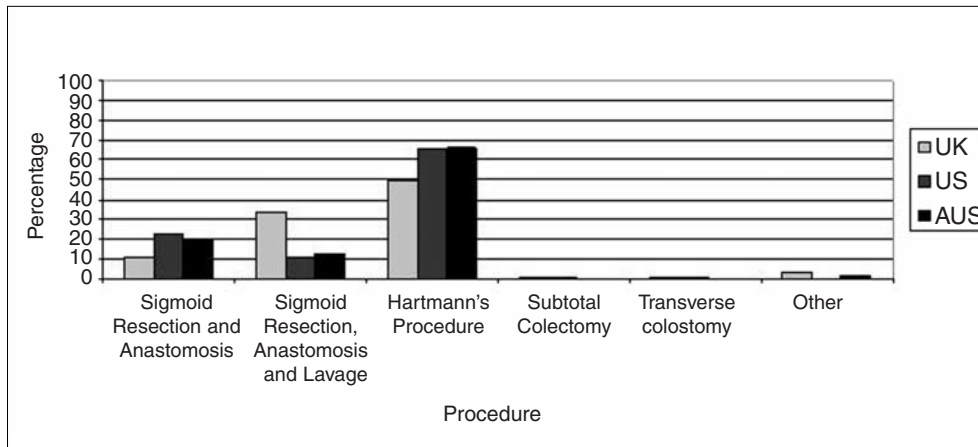


Fig. 4 Questionnaire responses by UK, US and Australian surgeons concerning their surgical procedure of choice in a haemodynamically stable 72-year-old patient suffering from diverticular perforation of the sigmoid colon with localized purulent peritonitis with a good anaesthetic risk (question 2a)

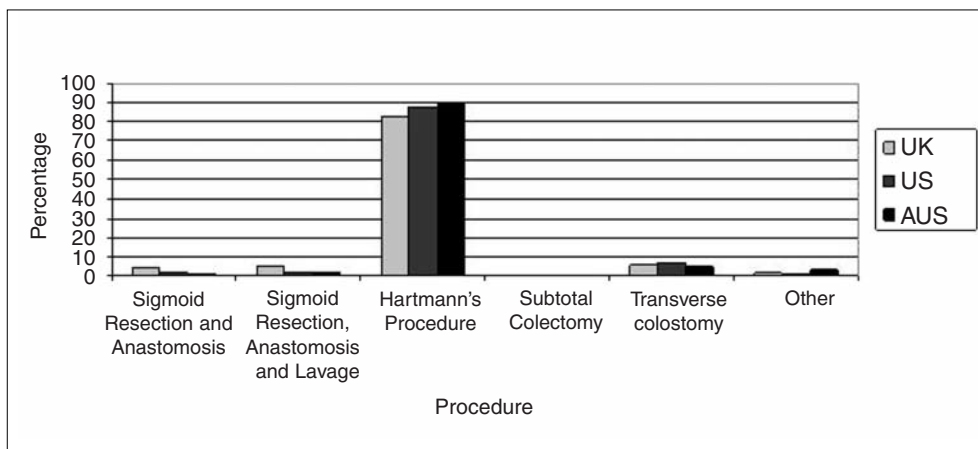


Fig. 5 Questionnaire responses by UK, US and Australian surgeons concerning their surgical procedure of choice in a haemodynamically stable 72-year-old patient suffering from diverticular perforation of the sigmoid colon with localized purulent peritonitis with a poor anaesthetic risk (question 2b)

The majority of surgeons at this time would have performed either resection with delayed anastomosis or, in cases of bowel obstruction, decompression and staged resection. However, these procedures are not without significant complications. In ten series comprising 235 patients who underwent Hartmann's procedure for obstruction the overall mortality was 19% [9–19].

In addition to the high mortality rate, complications affecting the stoma occur in 10–20% of patients [17, 19]. Patients having a Hartmann's procedure have a one in three chance of never having their stoma reversed [7]. Among those who do have reversal, mortality approaches 4% [7, 9, 16, 17, 19] and their chance of anastomotic leak is 16% [20]. Among those in whom immediate resection is deemed unsafe and obstruction is relieved by a defunctioning loop colostomy, the mortality rate is 16% with a further 5% mortality in those undergoing later resection [21].

There is evidence that primary resection with immediate anastomosis in selected patients can be performed with good results [22, 23]. Extended right hemicolectomy or segmental colonic resection and anastomosis, with or without on-table lavage, is associated with shorter hospital stay, lower leak rate and mortality compared to staged procedures [24].

Segmental resection, on-table colonic lavage and immediate anastomosis, initially described by Dudley et al. in 1980, has gained widespread acceptance [11, 25–30]. No randomized trials evaluating this technique have been performed, but in a combined series the anastomotic leak rate was 6% and mortality 9% [23]. However, patient selection bias may have influenced the favourable outcomes reported.

Many surgeons eschew colonic lavage when performing primary anastomosis, some disregarding the faecal load [31] and others preferring decompression with limited faecal extrusion [32, 33]. Immediate anastomosis of the unprepared bowel is accepted practice in trauma surgery for colonic perforation [34]. Indeed, the importance of an empty proximal colon in preventing anastomotic leak before segmental resection and primary anastomosis has yet to be established [35]. One trial has shown no effect on anastomotic leak rate or overall outcome in elective left-sided colonic resection [36].

The authors acknowledge some shortfalls of this study. Many factors are involved in a surgeon's decision-making process apart from haemodynamic stability (e.g. aminosalicylic acid use and comorbidities). There was a discrepancy in response rates: 52% and 45% of Australian and UK

surgeons responded, compared with only 35% of US surgeons. This may represent a bias. All the US surgeons were registered with the Society for Surgery of the Alimentary Tract. This does not mean that these surgeons have a colorectal interest but rather all surgeons do perform some gastrointestinal surgery. Of Australian and UK surgeons, 22% and 31%, respectively, had a colorectal interest. While the remainder performed some gastrointestinal surgery, as all surgeons surveyed in the UK and Australia were primarily trained as general surgeons. This discrepancy may represent bias when comparing the data. Further studies comparing colorectal and noncolorectal surgeons between the three countries may be helpful.

Obstruction

UK surgeons expressed a greater readiness for one-stage surgery with colonic cleansing than the US surgeons. In a 1992 survey of 47 UK surgeons, 76% favoured a single-stage procedure in well-resuscitated patients with sigmoid obstruction, and over two-thirds chose segmental resection and primary anastomosis with on-table lavage [21]. In a larger, more recent survey of 180 US surgeons, only 53% would have performed a one-stage procedure in similar circumstances [6]. Of these, less than half would have performed on-table lavage. In a stable patient with a localized sigmoid perforation, approximately one-third of surgeons in the US study would have performed a one-stage procedure.

A more recent survey in the UK found that a dedicated colorectal surgeon was more likely to perform a primary anastomosis than a noncolorectal surgeon when faced with a left-sided colonic emergency [37].

Our data support these findings where, in good risk patients with sigmoid obstruction, UK and Australian surgeons were significantly more likely to prefer segmental excision with on-table colonic lavage when compared with US surgeons who favoured a Hartmann's procedure ($p < 0.0001$). Even in poor-risk patients, UK surgeons were significantly more likely to perform segmental excision and immediate anastomosis with or without lavage than US or Australian surgeons ($p < 0.05$, $p < 0.01$). In patients with localized sigmoid perforation, UK surgeons again were found to be more likely to perform segmental excision with lavage ($p < 0.0001$).

The preference of UK surgeons, compared to those in the US and Australia, for performing segmental resection and immediate anastomosis with on-table colonic lavage was even more apparent among colorectal specialists ($p < 0.0001$). This may be because the technique of on-table lavage in the emergency setting was originally popularized in the UK, with further European series confirm-

ing the safety of the procedure [11, 25–29]. In contrast, to date, only one centre in the US has described its experience [30]. Australian surgeons were also less likely to perform a single-stage procedure, even among those with a colorectal interest. This may reflect the number of surgeons influenced by postgraduate training in the US; however, this information was not included in this survey.

Extended right hemicolectomy is another option for the primary anastomosis of unprepared bowel. Advantages of this procedure include a lower leak rate for ileocolic compared to colocolic anastomosis, and the resection of unsuspected metachronous tumours in the more proximal bowel [3]. Postoperative diarrhoea, albeit temporary, remains the major disadvantage, particularly in more distal tumours. Reported mortality following this procedure is 13% to 24% depending on the seniority of the operating surgeon [38].

More recently, colonic stenting for malignant obstruction has been utilized both as a bridge to elective surgery in potentially curable patients and with palliative intent. Studies have shown a lower mortality than surgery as a palliative means of treating left-sided malignant obstruction. Nevertheless, colonic stenting as palliation cannot be considered a procedure without morbidity, as colonic perforation occurs in up to 16% of procedures, migration in up to 10% of patients, and reocclusion also in up to 10% of patients [39–44]. Moreover, it is important to note that the Stent-in-1 trial on palliative treatment of left-sided malignant obstruction versus surgery was closed prematurely because of the high rate of adverse events in the stent arm [45]. There are concerns about the risk of tumour dissemination related to stent placement, which has not been adequately evaluated. While long-term data are not yet available, there are currently two large randomized multicentre trials evaluating the safety of stenting as a bridge to surgery, i.e. the Stent-in-2 study [46] and the ESCO (Enteral Stent for Colonic Obstruction) study.

There are clinical scenarios where each of the surgical procedures described is appropriate. There is evidence for the advantages of single-stage procedures in selected, stable patients who present with left-sided colonic emergencies, with no evidence to favour staged resection over primary anastomosis [38, 39]. A recent Cochrane review has addressed this point and suggests that large-scale randomized controlled trials are necessary to clarify the issue [39].

Perforation

The management of perforated benign colonic disease is facilitated by CT assessment, as management is largely

dependent on the degree of intraabdominal contamination. This can be staged using the classification of Hinchey et al. [47]. Surgical resection or lavage is required for Hinchey III disease. Resection and primary anastomosis has been shown to be safe and to be associated with lower morbidity and mortality than a Hartmann's procedure in the treatment of perforated diverticular disease. However, there are no randomized trials to compare resection of affected bowel with and without primary anastomosis [48, 49]. From our data, colorectal surgeons were more likely than noncolorectal surgeons to perform a primary anastomosis, and UK surgeons were more likely than US or Australian surgeons to perform a primary anastomosis in the presence of contained purulent peritonitis in a stable patient. Resection without primary anastomosis was unanimously preferred in the unstable patient.

Lavage of the abdominal cavity and drainage have also been utilized in the past, and there are some data supporting laparoscopic lavage in the management of Hinchey I–III disease with low mortality, morbidity and recurrent abscess rates (3%, 4% and 3%, respectively) [50].

In conclusion, this study showed that there is growing acceptance in the UK, Australia and the US to consider a single-stage procedure in the management of a left-sided colorectal emergency, indicating a pragmatic shift in practice away from more traditional teaching. A greater proportion of colorectal surgeons in all three countries preferred primary anastomosis over a Hartmann's procedure than of noncolorectal surgeons. However, the choice of procedure will undoubtedly remain a complex judgement based on a surgeon's individual experience when confronted with this common but difficult clinical dilemma.

Conflict of interest statement The authors declare that they have no conflict of interest related to the publication of this article.

References

1. Australian Institute of Health and Welfare (2004) Cancer in Australia 2001. Australian Institute of Health and Welfare, Australasian Association of Cancer Registries, Canberra
2. Ohman U (1982) Prognosis in patients with obstructing colorectal carcinoma. *Am J Surg* 143:742–747
3. Mandava N, Kumar S, Pizzi WF et al (1996) Perforated colorectal carcinomas. *Am J Surg* 172:236–238
4. Hart AR, Kennedy HJ, Stebbings WS et al (2000) How frequently do large bowel diverticulae perforate? An incidence and cross-sectional study. *Eur J Gastroenterol Hepatol* 12:661–665
5. Engledow AH, Bond-Smith G, Motson RW et al (2008) Treatment of left sided colonic emergencies: a comparison of US and UK surgical practices. *Colorectal Dis* (in press)
6. Goyal A, Schein M (2001) Current practices in left sided colonic emergencies: a survey of US gastrointestinal surgeons. *Dig Surg* 18:399–402
7. Irvin TT, Greaney MG (1977) The treatment of colonic cancer presenting with intestinal obstruction. *Br J Surg* 64:741–744
8. Irvin TT, Goligher JC (1973) Aetiology of disruption of intestinal anastomosis. *Br J Surg* 60:461–464
9. Carty NT, Ravichandran D (1996) The management of malignant large bowel obstruction. In: Johnson CD, Taylor I (eds) *Recent advances in surgery* 19. Churchill Livingstone, London, pp 1–18
10. Fielding LP, Stewart-Brown S, Blesovsky I (1979) Large bowel obstruction caused by cancer: a prospective study. *Br Med J* 2:515–517
11. Koruth NM, Krukowski ZH, Youngson GG et al (1985) Intraoperative colonic irrigation in the management of left-sided large bowel emergencies. *Br J Surg* 72:708–711
12. Vigler L, Tzur N, Huber M et al (1985) Management of obstructive cancer of the left colon: comparative study of staged and primary resection. *Arch Surg* 120:825–828
13. Kronborg O (1986) The missing randomised trial of two surgical treatments for obstruction due to carcinoma of the left colon and rectum: an interim report. *Int J Colorect Dis* 1:162–166
14. Waldron RP, Donovan IA (1986) Mortality in patients with obstructing colorectal cancer. *Ann R Coll Surg Engl* 68:219–221
15. Huddy SPJ, Shorthouse AJ, Marks CG (1988) The surgical treatment of intestinal obstruction due to left sided carcinoma of the colon. *Ann R Coll Surg Engl* 70:40–43
16. Dixon AR, Holmes JT (1990) Hartmann's procedure for carcinoma of rectum and distal sigmoid colon: 5-year audit. *J R Coll Surg Edinb* 35:166–168
17. Stephenson BM, Shandall AA, Farouk R et al (1990) Malignant left sided large bowel obstruction managed by subtotal colectomy. *Br J Surg* 77:1098–1102
18. Gandrup P, Lund L, Balslev I (1992) Surgical treatment of acute malignant large bowel obstruction. *Eur J Surg* 158:427–430
19. Allen-Mersh TG (1993) Should primary anastomosis and on-table colonic lavage be standard treatment for left colonic emergencies. *Ann R Coll Surg Engl* 75:195–198
20. Pearce NW, Scott SD, Karran SJ (1992) Timing and method of reversal of Hartmann's procedure. *Br J Surg* 79:839–841
21. Carty NJ, Corda AP (1992) Which surgeons avoid a stoma in treating left sided colonic obstruction? Results of a postal questionnaire. *Ann R Coll Surg Engl* 74:391–394
22. Lee EC, Murray JJ, Collier JA et al (1997) Intraoperative colonic lavage in nonelective surgery for diverticular disease. *Dis Colon Rectum* 40:669–674
23. Hsu TC (1998) One-stage resection and anastomosis for acute obstruction of the left colon. *Dis Colon Rectum* 41:28–32
24. Koruth NM, Hunter DC, Krukowski ZH et al (1985) Immediate resection in emergency large bowel surgery: a 7 year audit. *Br J Surg* 72:703–707
25. Dudley HA, Racliff AG, McGeeham D (1980) Intraoperative irrigation of the colon to permit primary anastomosis. *Br J Surg* 67:80–81
26. Kourtesis GJ, Motson RW (1988) Primary anastomosis in emergency distal colonic surgery after on-table colonic lavage. *Aust N Z J Surg* 58:961–964
27. Arnaud JP, Casa C, Georgeac C et al (1994) Intraoperative colonic irrigation in the emergency treatment of occlusive lesions of the left colon. *J Chir* 131:538–540
28. Biondo S, Perea MT, Rague JM et al (2001) One-stage procedure in non-elective surgery for diverticular disease complications. *Colorectal Dis* 3:42–45
29. Maher M, Caldwell MP, Waldron R (1996) Staged resection or primary anastomosis for obstructing lesions of the left colon. *Ir Med J* 89:138–139
30. Murray JJ, Schoetz DJ Jr, Collier JA et al (1991) Intraoperative colonic lavage and primary anastomosis in nonelective colon resection. *Dis Colon Rectum* 34:527–531
31. Irving AD, Scrimgeour D (1987) Mechanical bowel preparation for colonic resection and anastomosis. *Br J Surg* 74:580–581

32. Amsterdam E, Krispin M (1985) Primary resection with colocolostomy for obstructive carcinoma of the left side of the colon. *Am J Surg* 150:558–560
33. Dorudi S, Wilson NM, Heddle RM (1990) Primary restorative colectomy in malignant left-sided large bowel obstruction. *Ann R Coll Surg Engl* 72:393–395
34. George SM, Fabien TC, Voeller GR et al (1989) Primary repair of colon wounds: a prospective trial in nonselected patients. *Ann Surg* 209:728–734
35. Burke P, Mealy K, Gillen P et al (1994) Requirement for bowel preparation in colorectal surgery. *Br J Surg* 81:907–910
36. Platell C, Hall J (1998) What is the role of mechanical bowel preparation in patients undergoing colorectal surgery. *Dis Colon Rectum* 41:875–883
37. Singhal R, Hull P, Budhoo M (2007) Management of left sided colorectal emergencies. Results of a postal questionnaire. *Minerva Chir* 62:437–441
38. The SCOTIA Study Group (1995) Single-stage treatment for malignant left sided colonic obstruction: A prospective randomised control trial comparing subtotal colectomy with segmental resection following intraoperative irrigation. Subtotal colectomy versus irrigation and anastomosis. *Br J Surg* 82:1622–1627
39. Regenet N, Pessaux P, Hennekinne S et al (2003) Primary anastomosis after intraoperative colonic lavage vs. Hartmann's procedure in generalised peritonitis complicating diverticular disease of the colon. *Int J Colorectal Dis* 18:503–507
40. De Salvo GL, Gava C, Lise M et al (2004) Curative surgery for obstruction for primary left sided colorectal carcinoma: primary or staged resection? *Cochrane Database of Systematic Reviews*, Issue 2. Art. no. CD002101
41. Khot UP, Lang AW, Murali K et al (2002) Systemic review of the efficiency and safety of colorectal stents. *Br J Surg* 89:1096–1102
42. Carne PW, Frye JN, Robertson GM et al (2004) Stents or open operation for palliation of colorectal cancer: a retrospective, cohort study of perioperative outcome and long-term survival. *Dis Colon Rectum* 47:1455–1461
43. Dastur JK, Forshaw MJ, Modarai B et al (2008) Comparison of short- and long-term outcomes following either insertion of self-expanding metallic stents or emergency surgery in malignant large bowel obstruction. *Tech Coloproctol* 12:51–55
44. Alcantara M, Serra X, Bombardó J et al (2007) Colorectal stenting as an effective therapy for preoperative and palliative treatment of large bowel obstruction: 9 years' experience. *Tech Coloproctol* 11:316–222
45. van Hooft JE, Fockens P, Marinelli AW et al (2006) Premature closure of the Dutch Stent-in I study. *Lancet* 368:1573–1574
46. van Hooft JE, Bemelman WA, Breumelhof R et al (2007) Colonic stenting as bridge to surgery versus emergency surgery for management of acute left-sided malignant colonic obstruction: a multicenter randomized trial (Stent-in 2 study). *BMC Surg* 7:12
47. Hinchey EJ, Schaal PG, Richards GK (1978) Treatment of perforated diverticular disease of the colon. *Adv Surg* 12:85–109
48. Alanis A, Papanicolaou GK, Tadros RR et al (1989) Primary resection and anastomosis for treatment of acute diverticulitis. *Dis Colon Rectum* 32:933–939
49. Leong QM, Koh DC, Ho CK (2008) Emergency Hartmann's procedure: morbidity, mortality and reversal rates among Asians. *Tech Coloproctol* 12:21–25
50. Myers E, Hurley M, O'Sullivan GC et al (2008) Laparoscopic peritoneal lavage for generalized peritonitis due to perforated diverticulitis. *Br J Surg* 95:97–101