

Use of preoperative bowel preparation in elective colorectal surgery in Denmark remains high

Julie Andersen, Jens Thorup & Peer Wille-Jørgensen

ABSTRACT

INTRODUCTION: Previous studies have shown that preoperative bowel preparation does not influence the frequency of postoperative complications after elective open colonic resections. The Danish Colorectal Cancer Group (DCCG) recommends that mechanical bowel preparation (MBP) should be omitted prior to elective colonic resections. Several surveys show that most surgeons use MBP before colorectal surgery. The aim of this survey was to investigate the use of preoperative bowel preparation in elective colonic and rectal resections in Denmark.

MATERIAL AND METHODS: The survey was conducted in 2009. A questionnaire on the use of preoperative bowel preparation in elective colonic and rectal resections performed in 2008 was sent to all the departments of surgery that perform colorectal surgery in Denmark.

RESULTS: 34% of the patients received bowel preparation before open colonic resection compared with 81% before open rectal resection. Overall, the frequency of bowel preparation was significantly higher in laparoscopic (63%) than in open surgery (50%).

CONCLUSION: MBP before elective open colonic resections remains widely used despite the national DCCG guideline. MBP before laparoscopic colorectal resections was more frequently used than before open colorectal resections as MBP before rectal resections was more frequently used than before colonic resections. The need for preoperative bowel preparation in these procedures has yet to be determined.

FUNDING: not relevant.

TRIAL REGISTRATION: not relevant.

Preoperative bowel preparation has been a surgical dogma since the beginning of the 20th century and has been used routinely since the 1960s [1, 2]. It has been considered an important factor in preventing postoperative infectious complications and anastomotic leakage [1, 3]. The assumed positive effect is, however, based on clinical experience and observational studies [1, 4, 5].

During the past two decades, several randomized controlled trials have been performed comparing mechanical bowel preparation (MBP) with no MBP [1, 2, 4, 6]. They all suggest that MBP should be omitted prior to all colonic and rectal surgery because it does not affect complication rates and may even be harmful.

Five recently published meta-analyses [1-3, 4, 7] and a recently updated Cochrane-review [5] support these results. Three studies [3, 4, 7] even found that anastomotic leakage occurred significantly more often in patients who underwent MBP. In one study [8], the overall infectious complications rate was significantly higher in the MBP group than in the non-MBP group.

The majority of studies [1, 3-8] confirmed that there is no evidence that preoperative bowel preparation in elective colonic and rectal surgery reduces the number of postoperative complications and therefore they concluded that MBP should be abandoned. Despite this, several surveys show that most surgeons use bowel preparation before colonic and rectal surgery [9-13].

The aim of this survey was to investigate the use of preoperative bowel preparation in elective colonic and rectal resections in Denmark. Furthermore, the survey examined whether practice reflects previously published evidence.

MATERIAL AND METHODS

A questionnaire on the use of preoperative bowel preparation in elective colonic and rectal resections performed in 2008 was sent to the 22 departments of surgery in Denmark, which report to the Danish Colorectal Cancer Group (DCCG) database. The questions related to the practice in different types of operations at the specific department. Patients undergoing Hartmann's procedure were excluded from the data analysis.

The questionnaire was distributed in April 2009 with a reminder one month later.

Statistical analysis was performed using SPSS 16.0 (SPSS Inc., Chicago, Illinois, USA). χ^2 tests were used to compare the use of MBP in different elective colonic and rectal resections in Denmark. Two-tailed p values < 0.05 were considered significant.

Trial registration: not relevant.

RESULTS

During 2008, a total of 2,786 elective colonic and rectal resections were performed in Denmark. Of these, 2,437 were performed by the departments that answered the questionnaire (88%).

ORIGINAL ARTICLE

Department of
Surgery K,
Bispebjerg Hospital

Dan Med Bul
2011;58(9):A4313

Variation in the use of MBP among departments and regions in Denmark was considerable (**Table 1**). Among the departments, only two routinely used MBP and one never used MBP. The remaining departments showed great variation in their use of MBP and there was no correlation between the number of performed operations and the use of MBP.

MBP was used in 54% of all operations. Among these, enema was used in 57%, cathartics in 34% and a combination of both in 9% of patients who underwent MBP (**Table 2**).

MBP prior to laparoscopic resections (63%) was used more frequently compared with open resections (50%) ($p < 0.001$). The use of enema was more frequent

in laparoscopic resections (69%) than in open resections (49%) ($p < 0.001$) (**Table 2**).

MBP was used more often in rectal resections (80%) than in colonic resections (42%) ($p < 0.001$). Within colonic resections, the use of MBP was more frequent in left (68%) than in right colonic resections (15%) ($p < 0.001$).

In rectal resections, more than half of the patients received oral cathartics (54%) compared with the patients undergoing colonic resections (16%) ($p < 0.001$). In contrast, enemas were more often used in right (86%) and left (84%) colonic resections. The combination of both was only used in rectal resections (19%) (**Table 2**).

In open surgery, MBP was used more often before open colonic resections (34%) than before open rectal resections (81%) ($p < 0.001$) (**Table 3**).

MBP was used more often before laparoscopic than before open surgery in left hemicolectomy ($p < 0.001$), sigmoid resections ($p < 0.001$) and rectum extirpation ($p = 0.0275$). The opposite was seen in low anterior resections, where the use of MBP was more outspoken in open than in laparoscopic resections ($p < 0.001$). There was no difference in the use of MBP between laparoscopic and open resections in right hemicolectomy (**Table 3**). The use of cathartics was significantly more frequent in open rectal than in laparoscopic resections ($p < 0.001$) (**Table 3**).

DISCUSSION

This questionnaire study investigated the use of MBP in Denmark in 2008. The response rate was 88%, which is high in comparison to similar surveys performed in other countries, where the response rate varied from 30% to 76% [9-13]. The results of this survey are considered representative for clinical practice in Denmark in 2008.

Throughout Denmark's five regions, the use of MBP varied considerably, both among and within the regions (**Table 1**). The Capital Region of Denmark had the lowest use of MBP with 33% of 730 performed operations and was the region that performed most operations in 2008. There was little correlation between the departments or regions regarding the use of MBP before elective colonic and rectal resections.

A recently updated Cochrane-review [5], which included 13 randomized controlled trials with a total of 4,777 patients, gave no evidence that patients benefit from MBP prior to elective colonic and rectal surgery. However, the authors concluded that more trials with a representative number of patients were needed in order to address the clinical effectiveness of MBP versus no MBP, especially before rectal and laparoscopic surgery. The frequent use of MBP in elective colonic and rectal resections in Denmark (**Table 2**) suggests that a more

TABLE 1

Preoperative use of bowel preparation among the departments and regions in Denmark in 2008. The total numbers of resections and the numbers that received preoperative bowel preparation are listed. Some departments were excluded from the data analysis as the hospitals did not answer the questionnaire.

Department no. (excluded)	Resections, n	Preoperative bowel preparation, n (%)
<i>Region of the Danish capital</i>		
1	66	44 (67)
2	251	151 (60)
3	129	36 (28)
4	257	0 (0)
(5)	110	–
Total	703	231 (33)
<i>Region of Zealand</i>		
6	249	186 (75)
7	136	50 (37)
8	150	150 (100)
Total	535	386 (72)
<i>Region of southern Denmark</i>		
9	64	41 (64)
10	153	97 (63)
11	139	82 (59)
12	33	16 (49)
13	151	114 (76)
(14)	81	–
Total	540	350 (65)
<i>Region of central Denmark</i>		
15	113	27 (24)
16	174	72 (41)
17	116	80 (69)
(18)	44	–
(19)	95	–
Total	403	179 (44)
<i>Region of northern Denmark</i>		
20	206	130 (63)
21	50	50 (100)
(22)	19	–
Total	256	180 (70)

– = no response.

than 100-year-old tradition still influences current surgical practice.

DCCG guidelines are the closest we get to a national guideline. We found a significant difference in the use of MBP in right and left colonic resections. This is not consistent with the current evidence and the DCCG guidelines [14, 15], which recommend that MBP should be omitted prior to all elective colonic surgery. The DCCG guidelines were last updated in 2009, which is the year after this survey was conducted. It would be interesting to see if there has been a change in the use of MBP in elective colonic resections in Denmark after 2009.

This survey found that the use of MBP prior to left colonic resections (Table 2) is comparable with the use reported in a survey conducted in Great Britain and Ireland [12], where 62.2% of surgeons used some form of MBP compared with 68% in Denmark.

This is in contrast to other surveys from Europe and the USA [9, 11, 13, 16], where the use of MBP varied from 81-99% before colonic surgery.

An anastomotic leakage is a severe complication often leading to septic complications resulting in high morbidity and mortality. This may explain why surgeons are reluctant to omit MBP, especially in patients undergoing rectal resections [17].

A limited number of trials have investigated the effect of MBP in rectal resections; among these are a Cochrane-review [5], Wille-Jorgensen et al's [3] meta-analysis, a case-control study [18] and a randomized prospective trial [8]. These studies included between 62 and 275 patients. None of the four studies showed a positive effect in the use of MBP in rectal resections. This may have been due to small sample sizes, which gave the trials inadequate power to detect an effect of MBP. A newly published subgroup analysis by Van't Sant et al [17] including a total of 449 patients who underwent a low anterior resection with a primary anastomosis showed that MBP had no significant influence on anastomotic leakage, septic complications or mortality rate, even in combination with a diverting ileostomy. Diverting ileostomy is believed to reduce and prevent anastomotic leakage and septic complications by keeping the anastomosis free from faecal contamination. It seems controversial to apply a diverting ileostomy without MBP, and an investigation of the importance of MBP in combination with a diverting ileostomy in lower colorectal surgery is needed.

Bretagnol et al [19] demonstrated that rectal resection without MBP was associated with an increase in both infectious complications rate and overall morbidity. The study included only 178 patients and is the only study supporting the continuous use of preoperative MBP prior to elective rectal cancer resection. If the data from the Bretagnol study are included in the Cochrane

meta-analysis, the overall conclusion remains that there is no reason to use MBP before rectal surgery.

The lack of evidence and the general reluctance to omit MBP in rectal resections may be reflected in the significantly more frequent use of MBP in rectal than in colonic resections in Denmark in 2008 (Table 2).

The use of MBP prior to rectal resections in this survey (80%) is below the results reported in a Spanish survey [11], where 99% of the respondents used MBP. Among surgeons in Germany and Austria [10], 98% of German and 93% of Austria surgeons used MBP prior to rectal resections.

As there is currently no convincing evidence for omitting enema in rectal surgery, there is a need for



TABLE 2

The frequency and method of preoperative bowel preparation in all resections in open and laparoscopic operations and in colon and rectal resections.

	Total, n	Total bowel preparations, n (%)	Type of bowel preparation, n (%)		
			oral cathartic	enema	combination of oral cathartic and enema
All	2,437	1,326 (54)	453 (34)	751 (57)	122 (9)
Open	1,630	819 (50)	335 (41)	400 (49)	84 (10)
Laparoscopic	807	507 (63)	118 (23)	351 (69)	38 (8)
Rectal resections	787	632 (80)	343 (54)	167 (26)	122 (19)
Colon resections	1,650	694 (42)	110 (16)	584 (84)	0
Right colon	806	118 (15)	17 (14)	101 (86)	0
Left colon	844	576 (68)	93 (16)	483 (84)	0



TABLE 3

General use of bowel preparation, including the different types of bowel preparation in open and laparoscopic types of resections.

Types of resection	Total, n	Total bowel preparations, n (%)	Type of bowel preparation, n (%)		
			oral cathartic	enema	combination of oral cathartic and enema
<i>Open resections</i>					
Right-sided hemicolectomy	587	86 (15)	17 (20)	69 (80)	0
Left-sided hemicolectomy	149	56 (38)	11 (20)	45 (80)	0
Sigmoid resections	325	214 (66)	16 (8)	198 (93)	0
Total colon resections	1,061	356 (34)	44 (12)	312 (88)	0
Low anterior resections	389	351 (90)	219 (62)	63 (18)	69 (20)
Abdominoperineal resections	180	112 (62)	72 (64)	25 (22)	15 (13)
Total rectal resections	569	463 (81)	291 (63)	88 (19)	84 (18)
<i>Laparoscopic resections</i>					
Right-sided hemicolectomy	219	32 (15)	0	32 (100)	0
Left-sided hemicolectomy	105	77 (73)	4 (5)	73 (95)	0
Sigmoid resections	265	229 (86)	62 (27)	167 (73)	0
Total colon resections	589	338 (57)	66 (20)	272 (81)	0
Low anterior resections	175	134 (77)	42 (31)	62 (46)	30 (22)
Abdominoperineal excision of the rectum	43	35 (81)	10 (29)	17 (49)	8 (23)
Total rectal resections	218	169 (78)	52 (31)	79 (47)	38 (23)

No need for preoperative bowel preparation in elective colon surgery.



further research on enema versus no MBP. The need for further research on MBP in rectal surgery is also apparent in the present guidelines from DCCG [15], which only recommend that MBP be omitted in elective colonic surgery.

Few studies have investigated MBP in laparoscopic colonic and rectal surgery. Zmora et al [20] conducted a retrospective medical record review of 200 patients to assess the utility of MBP in laparoscopic colectomy. They concluded that laparoscopic colectomy could be safely performed without MBP and that it is easier to perform laparoscopic colectomy when the bowel is not empty due to the use of gravity. On the other hand, MBP facilitates tumour localization and allows intraoperative colonoscopy in case of uncertain localization. Preoperative endoscopic ink marking of the lesion probably limits the frequency of conversion to laparotomy.

The present survey showed that MBP in general and the use of enema in particular was practiced significantly more frequently in laparoscopic than in open resections (Table 2), except for right hemicolectomy (Table 3).

In a Spanish survey [11], 87% of surgeons used MBP in open surgery and 86% used it in laparoscopic surgery, which is more frequent than in our survey (Table 2). The present survey is based on relatively few patients and there is a risk of type II error. However, it suggests that the lack of evidence concerning the effectiveness of MBP in laparoscopic surgery still influences daily clinical practice. Therefore, there is a need for further trials to determine whether MBP is beneficial in laparoscopic surgery.

Lassen et al [13] conducted their survey in 2003. A comparison of their results with the results from Denmark in 2008 shows that there has been a significant drop in the use of MBP (from 81% to 38%) before open left hemicolectomy among the Danish surgeons (Table 3).

CONCLUSION

MBP before laparoscopic was more frequently used than before open colorectal resections as MBP before rectal

resections was more frequently used than before colonic resections. However, the need for preoperative bowel preparation and determination of which type of preparation should be used remains to be established.

Past experience has shown a delay of 10-15 years from the time evidence is published until it becomes implemented in clinical practice. This is reflected in this survey. It would be interesting to see if the latest update of the national guideline from DCCG has influenced the use of MBP before elective colonic resections in Denmark.

CORRESPONDENCE: Julie Andersen, Prinsessegade 75A, 3., 1422 Copenhagen K, Denmark. E-mail: julieandersen@me.com

ACCEPTED: 22 June 2011

CONFLICTS OF INTEREST: none

LITERATURE

- Pineda CE, Shelton AA, Hernandez-Boussard T et al. Mechanical bowel preparation in intestinal surgery: a meta-analysis and review of the literature. *J Gastrointest Surg* 2008;12:2037-44.
- Slim K, Vicaut E, Launay-Savary MV et al. Updated systematic review and meta-analysis of randomized clinical trials on the role of mechanical bowel preparation before colorectal surgery. *Ann Surg* 2009;249:203-9.
- Wille-Jørgensen P, Guenaga KF, Matos D et al. Pre-operative mechanical bowel cleansing or not? An updated meta-analysis. *Colorectal Dis* 2005;7:304-10.
- Bucher P, Mermillod B, Gervaz P et al. Mechanical bowel preparation for elective colorectal surgery. A meta-analysis. *Arch Surg* 2004;139:1359-64.
- Guenaga KKFG, Matos D, Wille-Jørgensen P. Mechanical bowel preparation for elective colorectal surgery (Review). *Cochrane Database Syst Rev* 2009(1):CD001544.
- Pekka R, Miettinen J, Laitinen ST et al. Bowel preparation with oral polyethylene glycol electrolyte solution vs. no preparation in elective open colorectal surgery. Prospective, Randomized Study. *Dis Colon Rectum* 2000;43:669-77.
- Slim K, Vicaut E, Panis Y et al. Meta-analysis of randomized clinical trials of colorectal surgery with or without mechanical bowel preparation. *Br J Surg* 2004;91:1125-30.
- Scabini S, Rimini E, Romairone E et al. Colon and rectal surgery for cancer without mechanical bowel preparation: One-center randomized prospective trial. *World J Surg Onc* 2010;8:35.
- Hasenberg T, Keese M, Länle F et al. "Fast-track" colonic surgery in Austria and Germany – results from the survey on patterns in current perioperative practice. *Colorectal Dis* 2009;11:162-7.
- Hasenberg T, Längle F, Reibenwein B et al. Current perioperative practice in rectal surgery in Austria and Germany. *Int J Colorectal Dis* 2010;25:855-63.
- Roig JV, García-Fadrique A, García-Armengol J et al. Mechanical bowel preparation and antibiotic prophylaxis in colorectal surgery: use by and opinions of Spanish surgeons. *Colorectal Dis* 2008;11:44-8.
- Arsalani-Zadeh R, Ullah S, Khan S et al. Current pattern of perioperative practice in elective colorectal surgery: a questionnaire survey of ACPGBI members. *Int J Surg* 2010;8:294-8.
- Lassen K, Hannemann P, Ljungqvist O et al. Patterns in current perioperative practice: survey of colorectal surgeons in five northern European countries. *BMJ* 2005;330:1420-1.
- Danish Colorectal Cancer Group. Retningslinjer for diagnostik og behandling af kolorektal cancer. 3. Udgave. www.dccg.dk: Danish Colorectal Cancer Group 2005:40.
- Danish Colorectal Cancer Group. Retningslinjer for diagnostik og behandling af kolorektal cancer. 4. udgave. www.dccg.dk: Danish Colorectal Cancer Group 2009:52.
- Kehlet H, Büchler MW, Beart RW et al. Care after colonic operation – is it evidence-based? Results from a multinational survey in Europe and the United States. *J Am Coll Surg* 2006;202:45-54.
- Van't Sant HP, Weidema F, Hop WCJ et al. The influence of mechanical bowel preparation in elective lower colorectal surgery. *Ann Surg* 2010;251:59-63.
- Bretagnol F, Alves A, Ricci A et al. Rectal cancer surgery without mechanical bowel preparation. *Br J Surg* 2007;94:1266-71.
- Bretagnol F, Panis Y, Rullier E et al. rectal cancer surgery with or without bowel preparation: The French Greccar III Multicenter Single-Blinded Randomized Trial. *Ann Surg* 2010;252:863-8.
- Zmora O, Lebedyev A, Hoffman A et al. Laparoscopic colectomy without mechanical bowel preparation. *Int J Colorectal Dis* 2006;21:683-7.