Rectal enema is an alternative to full mechanical bowel preparation for primary rectal cancer surgery

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Abstract

Aim According to the French GRECCAR III randomized trial, full mechanical bowel preparation (MBP) for rectal surgery decreases the rate of postoperative morbidity, in particular postoperative infectious complications, but MBP is not well tolerated by the patient. The aim of the present study was to determine whether a preoperative rectal enema (RE) might be an alternative to MBP.

Methods An analysis was performed of 96 matched cohort patients undergoing rectal resection with primary anastomosis and protective ileostomy at two different university teaching hospitals, whose rectal cancer management was comparable except for the choice of preoperative bowel preparation (MBP or RE). Prospective databases were retrospectively analysed.

Results Patients were well matched for age, gender, body mass index and Charlson index. The surgical approach and cancer characteristics (level above anal verge, stage and use of neoadjuvant therapy) were comparable between the two groups. Anastomotic leakage

occurred in 10% of patients having MBP and in 8% having RE ($P = 1.00$). Pelvic abscess formation (6% *vs* 2%, $P = 0.63$) and wound infection (8% *vs* 15%, $P = 0.55$) were also comparable. Extra-abdominal infection (13% *vs* 13%, $P = 1.00$) and non-infectious abdominal complications such as ileus and bleeding (27% and 31%, $P = 0.83$) were not significantly different. Overall morbidity was comparable in the two groups (50% *vs* 54%, $P = 0.83$).

Conclusion A simple RE before rectal surgery seems not to be associated with more postoperative infectious complications nor a higher overall morbidity than MBP.

Keywords Mechanical bowel preparation, bowel preparation, rectal cancer, surgery, enema

What does this paper add to the literature?

Rectal cancer surgery requires some form of bowel preparation. Full mechanical bowel preparation is not well tolerated and may have unwanted effects. This study demonstrates that a rectal enema only is associated with a comparable outcome.

Introduction

Full mechanical bowel preparation (MBP) is no longer recommended for elective colonic resection [1]. Several Cochrane analyses [2,3] have demonstrated no benefit for MBP in reducing anastomotic leakage or wound infection. However, these results cannot be directly extended to all rectal surgery as the published data are very heterogeneous. In a subgroup analysis of a randomized study of 449 patients [4], MBP had no influence on anastomotic leakage for low rectal resection.

The same result was reported in a case-control study of 112 patients [5]. Moreover, MBP is often not well tolerated by patients [6] and it may cause adverse gastrointestinal symptoms [7].

The French GRECCAR III trial [8], a prospective randomized study aimed at determining the influence of MBP in patients undergoing rectal cancer surgery, demonstrated decreased morbidity including infective complications after full MBP compared with no bowel preparation. Clearly, the results suggested that some form of bowel preparation is necessary. The preoperative administration of a rectal enema has been studied as an alternative to MBP for left sided colon resections [9], but the few studies published were heterogeneous with differences in the site of the tumours and whether

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or not a protective ileostomy was used [3]. The aim of this study was therefore to determine whether a rectal enema given preoperatively is associated with a similar morbidity compared with a full MBP.

Method

Patients

All consecutive patients undergoing low anterior resection with a protective ileostomy for rectal cancer between January 2007 and December 2011 at two different teaching university hospitals were included. The peri-operative management of patients was similar at the two institutions, with the exception of the preoperative bowel preparation. Hospital A performed full oral MBP using 2–3 l of polyethylene glycol (PEG) solution and hospital B prepared the bowel with a rectal 1 l enema consisting of 800 ml of water and 200 ml of glycerol the evening before surgery and one 250 ml enema on the day of surgery. All patients underwent total mesorectal excision with high ligation of the mesenteric artery, a stapled colorectal or hand-sewn coloanal anastomosis and a protective ileostomy. Exclusion criteria were inflammatory bowel disease, immunosuppressed patients (> 10 mg prednisone/day), no anastomosis, previous colonic resection and hyperthermic intraperitoneal chemotherapy.

All consecutive patients having a rectal enema (RE group) were compared with the same number of patients undergoing full MBP (MBP group) matched for age (± 5 years), gender, body mass index (± 2 kg/m²) and Charlson index (3 or over) [10]. The postoperative outcome of the two cohorts was compared.

Outcome

Prospective databases in each hospital were analysed retrospectively to identify parameters of preoperative, peri-operative and postoperative outcome. The primary end-point was 30-day overall morbidity. Secondary postoperative end-points included infective abdominal complications, including anastomotic leakage and pelvic or wound infection as described in the study by Bretagnol *et al.* [8], and non-infectious abdominal complications such as obstruction or bleeding. Extra-abdominal postoperative morbidity such as pulmonary embolism or myocardial infarction was also analysed.

Statistical analysis

The study was a matched cohort study. Every categorical variable was tested using McNemar's test and

confidence interval for the difference. For quantitative variables, such as operation time and duration of hospital stay, mean values with standard deviation were given. Comparison of these variables was carried out using the Wilcoxon matched pairs test. The *P* value was adjusted due to the multiple significance tests performed according to Bonferroni; it was then defined as significant at 0.003.

Results

Ninety-six patients were included. Both groups were well matched (Table 1). The 30-day morbidity was not statistically different (50% MBP group *vs* 54% RE group, *P* = 0.83). The major morbidity rate defined as Clavien–Dindo III or more [11] was also not significantly different between the two groups (17% *vs* 21%, *P* = 0.80). The 30-day mortality was zero but one patient in the RE group died of systemic disease 1 year after surgery.

Infective abdominal complications (Table 2) were similar in the two groups (29% group A and 27% group B, *P* = 1.00). Anastomotic leakage, pelvic infections and wound infections were not increased in the RE group. Non-infective abdominal complications were also similar (27% *vs* 31%, *P* = 0.83). There was a non-statistically significant trend towards more non-infectious extra-abdominal complications in the RE group.

Table 1 Patient demographics.

	MBP group (<i>n</i> = 48)	RE group (<i>n</i> = 48)	<i>P</i>
Age (years)	63 (± 11)	63 (± 12)	0.93
Male	62.5%	58.3%	0.73
BMI (kg/m ²)	24.7 (± 0.6)	24.8 (± 0.7)	0.93
Charlson index (three or over)	50.0%	56.3%	0.54
Tumour location (mid or low rectum)	67.4%	60.8%	0.84
Neoadjuvant radiotherapy	64.6%	64.2%	1.00
Laparoscopic intervention	81.3%	83.0%	1.00
Conversion rate	23.1%	30.0%	0.80
Operative time (min)	272 (± 62)	338 (± 72)	< 0.01
Intraoperative complications	4.2%	14.6%	0.18
Stapled anastomosis	83.3%	79.2%	0.79
Colonic pouch	4.2%	12.5%	0.29
Pelvic drainage	81.3%	37.5%	< 0.01

BMI, body mass index; MBP, mechanical bowel preparation; RE, rectal enema.

Table 2 General outcome and specific morbidity after rectal cancer surgery following mechanical bowel preparation or a preoperative rectal enema.

	MBP group (<i>n</i> = 48)	RE group (<i>n</i> = 48)	Difference	95% CI of the difference	<i>P</i> value
Overall 30-day morbidity	24 (50%)	26 (54.2%)	4.2%	−14.9%; 23.3%	0.83
Major morbidity (Clavien–Dindo III or more)	8 (16.7%)	10 (20.8%)	4.1%	−12.1%; 20.1%	0.80
Reoperation	5 (10.4%)	9 (18.8%)	8.4%	−6.8%; 23.4%	0.42
Hospital stay (days)	14.6 (± 9.9)	16.6 (± 12.7)	2.0	−2.7; 6.7	0.54
Abdominal infectious morbidity	14 (29.2%)	13 (27.1%)	2.1%	−15.7%; 19.9%	1.00
Anastomotic leakage	5 (10.4%)	4 (8.3%)	2.1%	−8.7%; 12.9%	1.00
Pelvic infection	3 (6.3%)	1 (2.1%)	4.2%	−3.9%; 12.2%	0.63
Wound infection	4 (8.3%)	7 (14.6%)	6.3%	−7.2%; 19.7%	0.55
Peristomal abscess	0	1 (2.1%)	2.1%	−2.0%; 6.1%	1.00
Urinary infection	3 (6.3%)	5 (10.4%)	4.1%	−7.3%; 15.7%	0.73
Non-infectious abdominal morbidity	13 (27.1%)	15 (31.3%)	4.2%	−14.9%; 23.3%	0.83
Extra-abdominal infectious morbidity	6 (12.5%)	6 (12.5%)	0%	−11.5%; 11.5%	1.00
Non-infectious extra- abdominal morbidity	3 (6.3%)	10 (20.8%)	14.6%	0.5%; 28.7%	0.09

MBP, mechanical bowel preparation; RE, rectal enema.

Discussion

This matched cohort study of patients undergoing total mesorectal excision and protective ileostomy for rectal cancer suggests that bowel preparation using rectal enema is not associated with more postoperative complications than MBP. Bowel preparation by rectal enema is less invasive and well accepted by patients. For these reasons serious consideration should be given to the use of a rectal enema as the standard bowel preparation for elective rectal cancer surgery.

Routine MBP in colorectal surgery has been widely debated. Randomized controlled trials and meta-analyses have demonstrated that MBP is unnecessary for colonic resection and might be used selectively for rectal surgery [1,3,12,13]. MBP is not harmless, however, and oral sodium phosphate (NaP) agents can cause hypovolaemia and metabolic disturbances such as hyperphosphataemia, hypocalcaemia or hyponatraemia sometimes causing acute renal failure, tetany or seizure [14,15]. Haemodynamic changes such as hypotension have also been described after ingestion of NaP or PEG solution [6]. In addition, PEG can cause structural alterations and inflammation of the colonic mucosa [12] and is associated with a higher rate of bowel content spillage during surgery [16]. Another important drawback of MBP is its poor tolerance by patients. In the GRECCAR III trial 17% of patients complained of

vomiting and 18% experienced abdominal pain [8]. In comparison to these drawbacks a rectal enema is an excellent alternative.

The overall morbidity rate of 50% and 54% in the two groups in the present study was higher than that reported in the GRECCAR III trial (27–44%) [8], but this difference was mainly due to a higher incidence of minor morbidity (Clavien–Dindo I and II) in the present study. In both institutions, the postoperative complications were recorded prospectively using the Clavien–Dindo classification and morbidity and mortality were reviewed weekly; thus every small event was recorded and classified. This could explain the high overall morbidity rate found in this study.

One of the limitations of the study was the small number of patients, which was because the use of a rectal enema was confined to one of the two hospitals. In order to diminish the selection bias in the univariate analysis and to make the groups comparable, all consecutive patients were matched with controls undergoing full MBP. Patients were only matched for four known major infective risk factors including obesity, comorbidity (Charlson index), age and gender [17,18]. We also included only patients with an anastomosis below the peritoneal reflection and protected by an ileostomy.

Another possible bias is the two-centre nature of the study. Except for the type of bowel preparation used and the use of pelvic drainage for the first 48 h in one

institution, the peri-operative management was similar in both hospitals. Both were university hospitals, with a similar volume of colorectal operations mostly performed by an EBSQ certified surgeon. No patient underwent a formal, standardized enhanced recovery pathway. The impact of drainage on morbidity is reported to be insignificant in the literature [19]. In both institutions, the postoperative complications were recorded prospectively using the Clavien–Dindo classification and morbidity and mortality were discussed weekly. This made the results of the two institutions comparable.

In conclusion, rectal enema the day before surgery did not seem to increase the postoperative morbidity of rectal cancer surgery. Rectal enema is less invasive and better tolerated by the patient.

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