



Original article

Clinical results of loop ileostomy closures in rectal cancer surgical patients. Effect of chemotherapy in the waiting period

Ricardo Courtier,* David Parés, Claudio Andrés Silva, Maria José Gil, Marta Pascual, Sandra Alonso, Miguel Pera, and Luis Grande

Servicio de Cirugía General y del Aparato Digestivo, Hospital Universitario del Mar, Universitat Autònoma de Barcelona, Barcelona, Spain

ARTICLE INFORMATION

Article history:

Received May 13, 2010

Accepted August 20, 2010

Keywords:

Loop ileostomies

Morbidity

Mortality

Ileostomy closure

A B S T R A C T

Introduction: The introduction of sphincter preservation surgery in rectal cancer has led to an increase in the number of low resections protected with a loop ileostomy. This requires subsequent closure of the stoma, a surgical procedure which is not devoid of morbidity or mortality. The aims of the study were to analyse the clinical results of the passage reconstruction surgery and to find out the interval between both surgeries, as well as the role chemotherapy plays in this.

Patients and method: The prospective data of patients previously operated on for rectal cancer were used retrospectively with those whose ileostomy was closed between May 2004 and September 2008. Data associated to chemotherapy indication, interval between surgeries and complications were collected and analysed.

Results: A total of 54 consecutive patients with a mean age of 66 years were analysed. The mean interval between surgeries was 178 days, being significantly less in the patient group that did not receive chemotherapy ($P=.008$). The post-operative stay was 6.3 days ($SD=4.1$). Mortality due to respiratory failure was 1.8% and the morbidity was 22.2%, with 7.4% requiring further surgery.

Conclusions: The mortality and morbidity of ileostomy closures are not inconsiderable, although its advantages in the protection of the stoma justify its use. The ileostomy construction interval appears to be significantly affected by post-operative chemotherapy.

© 2010 AEC. Published by Elsevier España, S.L. All rights reserved.

Resultados clínicos del cierre de ileostomías en asa en pacientes intervenidos de cáncer de recto. Efecto de la quimioterapia en el tiempo de espera

R E S U M E N

Introducción: La implantación de la cirugía de preservación esfinteriana en el cáncer de recto ha hecho incrementar el número de resecciones bajas protegidas con una ileostomía en

Palabras clave:

Ileostomías en asa

*Corresponding author.

E-mail address: rcourtier@hospitaldelmar.cat, 16604@imas.imim.es (R. Courtier).

Morbilidad
Mortalidad
Cierre ileostomía

asa. Esto obliga a un posterior cierre del estoma mediante un acto quirúrgico no desprovisto de morbilidad ni mortalidad. Los objetivos del estudio fueron analizar los resultados clínicos de la cirugía de reconstrucción del tránsito y conocer el intervalo entre ambas cirugías, así como el papel que la quimioterapia determina en el mismo.

Pacientes y método: Se utilizó retrospectivamente la base de datos prospectiva de los pacientes intervenidos previamente de cáncer de recto a los que se les cerró la ileostomía entre mayo de 2004 y septiembre de 2008. Se recogieron y analizaron los datos relativos a indicación de quimioterapia, intervalo entre cirugías, y complicaciones.

Resultados: Se analizaron 54 pacientes consecutivos con edad media de 66 años. El intervalo medio entre cirugías fue de 178 días siendo significativamente menor en el grupo de pacientes que no recibió quimioterapia ($p = 0,008$). La estancia postoperatoria fue de 6,3 días ($DE = 4,1$). La mortalidad fue del 1,8% por causa respiratoria y la morbilidad fue del 22,2% con un porcentaje de reintervenciones del 7,4%.

Conclusiones: La mortalidad y morbilidad del cierre de la ileostomía no son despreciables, si bien sus ventajas en la protección del estoma justifican su uso. El intervalo de reconstrucción de la ileostomía se ve afectado significativamente por la quimioterapia postoperatoria.

© 2010 AEC. Publicado por Elsevier España, S.L. Todos los derechos reservados.

Introduction

Total mesorectum excision as the treatment of choice for surgery of rectal cancer, as well as the increased preservation of the sphincter, has meant that the number of resections with low, ultra-low, and coloanal anastomoses has risen.¹ The percentage of anastomotic dehiscence in rectal resections varies greatly according to study, ranging between 3% and 30%.² This is the most severe complication following a rectal resection, associated with an elevated morbidity and mortality, and the incidence increases in anastomoses performed close to the anal margin.² The protective effect of derivative stoma is well-documented, not so much in the prevention of dehiscence, but rather in reducing its severity, avoiding reinterventions, and facilitating the viability of protected rectal anastomoses.³⁻⁶ Disagreement exists in the literature regarding the preference between a colostomy or lateral ileostomy, as there are several opinions in spite of the recent meta-analysis that appears to confirm a greater benefit from ileostomy.^{7,8}

When evaluating the benefits of protective ostomy, one must keep in mind that posterior closing of the stoma increases morbidity, and sometimes mortality, which must be added to the rates of the initial procedure, and be considered in order to understand the role played by derivative stoma in this type of operation.

In the absence of complications, the ileostomy is normally closed between two and three months after the initial surgery.⁹ However, in those patients in which postoperative chemotherapy is required, closing of the ileostomy tends to be delayed until finishing the treatment.⁹ This reconstruction interval is another point of discussion, and opinions appear with growing frequency calling for an early closure during the same hospitalisation period, which can be a feasible option in select cases.¹⁰⁻¹²

This study aims to analyse the clinical results for closing loop ileostomies at a Colorectal Surgical Unit over the last

four years, and to gain an understanding of the repercussions of chemotherapy between the construction and ileostomy closure.

Patients and methods

We performed a retrospective analysis on a prospective database maintained by the Coloproctology Unit at the Hospital Universitari del Mar. We analysed data regarding patients previously operated on for rectal cancer, who then underwent a loop ileostomy between May 2004 and September 2008.

For the purpose of this study, we have defined rectal cancer as any malignant tumour that was found between zero and thirteen centimetres from the anal margin, measured using a rigid rectoscope.

After performing endorectal ultrasound and/or nuclear magnetic resonance, neoadjuvant therapy was administered to patients with stage II-III rectal neoplasia, in compliance with the treatment protocol for rectal cancer at our hospital. The patients also received 5-fluorouracil at 225 mg/m²/day through a central venous catheter administered by 24-hour continuous infusion, during the 5-week radiotherapy treatment period. All patients that underwent neoadjuvant therapy received postoperative chemotherapy, except those with stage II that had grade 3-4 tumour regression (isolated tumour cells or no tumour).

Partial mesorectum excision with a 4 cm distal margin was performed for upper rectal cancers, and a total mesorectum excision for middle and lower rectal cancers. The anastomosis was protected when situated at least 6cm from the anal margin. Mechanical preparation of the colon was performed for cases that needed a protective ileostomy.

We excluded ileostomies that had been constructed for other reasons such as dehiscences, emergency surgery, or any other circumstance. We decided whether patients

who were to undergo postoperative chemotherapy were to require ileostomy reconstruction as soon as rectal surgery was complete so that chemotherapy was not delayed. Patients that did not need postoperative chemotherapy had their ileostomy closed after 12 weeks. A gastrografin enema through the ileostomy was performed on all patients before reconstruction surgery to ensure that there were no complications in the anastomosis.

Surgical technique

The ileostomy was closed in all cases through a periileostomy incision. The anastomosis was created through a stoma resection with a manual end-to-end anastomosis or mechanical functional end-to-end anastomosis using GIA 75 and TA 90 staplers, to the surgeon's discretion. No intra-abdominal drains were performed. All incisions were closed after having cleaned the subcutaneous cellular tissue with 500 ml of saline solution. All patients received intravenous antibiotic prophylaxis with 240 mg of gentamicin and 1 g of metronidazole.

Complications

The patients followed a multimodal rehabilitation programme at our hospital.¹³ They started to ingest water between 6 and 8 hours after the procedure, and progressed intake depending on tolerance.

Postoperative ileus was considered when the patient was intolerant to food, causing hospital discharge to be delayed until after the seventh day, due to diet being delayed or interrupted for over 48 h, or when a nasogastric tube was required.

Infection in the surgical site was defined according to the criteria accepted by the NNIS (National Nosocomial Infections Surveillance System),¹⁴ and complications were classified according to the Clavien grading system.¹

Statistical analysis

Results are presented as a mean (standard deviation) and percentages. We used the student's t test to compare normal quantitative variables, we used the Student's t test. Variables that did not follow a normal distribution were analysed using the Mann-Whitney U test. We used the chi-square test to compare qualitative variables. *P* values less than .05 were considered as statistically significant.

Results

We analysed the results obtained from 54 consecutive patients included in the study, whose demographical and clinical characteristics are summarised in Table 1.

The ileostomy protected a direct anastomosis in 39 cases, and a colonic-J reservoir in 15 cases.

Neoadjuvant therapy was indicated for 39 patients. Of these, 33 received the complete neoadjuvant treatment, while for six cases the tumour regression grade allowed them to be

Table 1 – Demographical and clinical characteristics of the patients

Patients	No. 54
Men	43
Women	11
Age, years	66 (39-81)
Neoadjuvant therapy	39
Pre and postoperative	33
Only preoperative	6
No neoadjuvant therapy	15
Mean time between initial surgery and ileostomy closure,* days	178 (SD=95)
Group of patients that did not receive chemotherapy after initial surgery, days	145 (SD=99)
Group of patients that received chemotherapy after initial surgery, days	198 (SD=84)
	<i>P</i> =.008**
SD indicates standard deviation.	
*Includes all patients.	
**Statistically significant difference between the total group of patients and the group that did not receive postoperative chemotherapy.	

left out of the postoperative cycles. Neoadjuvant therapy was not indicated for 15 patients. A total of 21 patients did not receive postoperative chemotherapy (Table 1).

The gastrografin enema performed before closing the ileostomy did not find any problems that would delay the procedure.

The mean interval between the initial surgery and the ileostomy closure was 178 (95) days. However, this interval was significantly lower for patients that did not receive chemotherapy after the initial surgery, for which the mean time was 145 (99) days, compared with those that did receive postoperative chemotherapy, with a mean time of 198 (84) days (*P*=.008) (Table 1).

Four patients required additional procedures. Two needed surgery for liver metastases, and two ventral hernia repair with mesh.

All patients were operated on under general anaesthesia. The periileostomy incision did not have to be modified in any of the cases. Cases requiring liver surgery also entailed a subcostal incision. In the case of hernia, the normal technique of placing a reinforcing polypropylene mesh was used. A parastomal hernia was clinically evident in one patient, which was treated using a reinforcing mesh over the ileostomy closure. No median laparotomies were performed.

Manual end-to-end anastomosis was performed outside the mucosa with loose 3/0 silk sutures in 27 cases. The other 27 patients underwent a functional end-to-end anastomosis. The cutaneous closing of the incision was always primary, and subcutaneous aspiration drains were placed in only two cases. The mean postoperative hospitalisation period was 6.3 (4.1) days.

Complications

The complications that arose during the study are summarised in Table 2, representing a morbidity rate of 22.2%. Of the 12

Table 2 – Complications. Clavien grading system.¹⁵

Complication category	Type of complication	Number (%)	Clavien grade
Technique	Anastomosis dehiscence	1 (1.8)	III b
	Unnoticed iatrogenic injury	1 (1.8)	III b
	Anastomosis haemorrhage	1 (1.8)	III b
	Enterocutaneous fistula	1 (1.8)	II
Cardiovascular	Inflammatory bowel disease thrombophlebitis	1 (1.8)	II
Respiratory	Pneumonia	1 (1.8)	V
Infection	Skin wound infection	3 (5.5)	I
	Topical cure by primary care doctor	2 (3.6)	II
	Antibiotics	1 (1.8)	III b
	Infection of the organ/space	1 (1.8)	
G.I. transit	Paralytic ileus	1 (1.8)	II
	Mechanical ileus	1 (1.8)	II
Total		12 (22.2)	

complications, 4 (7.4%) required reinterventions (Clavien grade IIIb): one anastomotic dehiscence, one intestinal lesion that went unnoticed, one linear suture haemorrhage from a mechanical anastomosis, and one patient required drainage of an abdominal collection which could not be operated percutaneously. In another case, an intestinal-cutaneous fistula was clinically suspected, requiring readmission ten days after the surgery, as the patient's dressing was stained. No quantifiable leakage was detected and the patient was discharged after seven days.

We found no correlation between age and complications, nor did we encounter significant differences based on the type of anastomosis (manual or mechanical). We also found no significant differences in complications produced between patients that had received chemotherapy and those that had not (Table 1).

One patient died (1.8%) due to sepsis of a respiratory origin, secondary to pneumonia, which caused readmission to the hospital five days after being discharged following the ileostomy closure. The patient died 24 h after admission.

Discussion

In spite of the reduced mortality and morbidity presented by rectal surgery since the progressive development of colorectal surgery units,¹⁶ complications continue to be severe, with anastomosis dehiscence being associated with the highest rate of mortality. Among the preventative measures that have been adopted, only protective ostomies have been shown to be effective, implying that the absence of a derivative ileostomy is a risk factor for the appearance of symptomatic dehiscence following a total mesorectal excision in rectal cancer patients.¹⁷

Although studies have been performed on cost-effectiveness, in which an economic benefit can be seen only after dehiscence incidences of 16.5%,¹⁸ it appears evident

that the reduced number of reinterventions and increased percentage of preserved anastomoses justifies the use of this technique. Even so, the inconveniences inherent to ileostomy must be taken into account, since it does not only entail the need for a new intervention to close the ostomy, but also reduces quality of life for the patient in the meantime.^{19,20}

For most rectal cancer cases, the interval until ileostomy closure depends on the need for chemotherapy cycles to be finished or radio-chemotherapy started if not administered before surgery. In most cases, this determines whether or not closing must be delayed until after the treatment has finished.

In our study, we observed that patients who did not require postoperative chemotherapy had their ileostomies closed much earlier than patients that did receive this treatment. Since finishing chemotherapy treatment tends to be the priority in these cases, the only possibility for shortening the waiting period is an early closure, even during the same hospitalisation period. In a study by Alves et al,²¹ this treatment was made possible for 75% of cases, with slightly better results than in delayed closure except for surgical wound infection values. This appears to be a very feasible option, although it could aggravate symptoms of low anterior resection syndrome.

However, in spite of the delay caused by postoperative chemotherapy, we also believe that those patients that did not receive this treatment have an excessively long mean waiting period at 145 (99) days, attributable to the delay in performing tests and the difficulties in programming the surgery. Finding a solution to these issues should take the highest priority.

In our patients, before the stoma was closed, a systematic gastrografin enema was performed from the distal end of the ileostomy, which did not indicate any abnormalities that would postpone the operation. In the literature, the majority opinion is that enemas applied before closing an ileostomy are of little value, and thus their use would not be entirely

necessary, since in those cases in which previous problems in rectal surgery have not arisen, the possibility of later encountering unknown abnormalities is very scarce.²²

Another point of conflict in these procedures occurs when hepatic metastases are present, which must be excised after the primary tumour surgery. On two occasions, we have combined hepatic metastases surgery with the ileostomy closing without causing an increase in complications. However, these were minor resections, since we believed as other authors have mentioned²³ that the association of major hepatic resections along with ileostomy closing could lead to increased morbidity and a prolonged hospital stay.

Even though some studies have indicated that this procedure is possible under local anaesthesia,²⁴ we have always opted for general anaesthesia, as we subscribe to its use in outpatients as has been suggested by other groups.^{24,25}

No differences between manual and mechanical anastomoses were observed in our patients in terms of postoperative ileus, as has been indicated in other studies,²⁶ nor were there differences in terms of complications and duration of hospital stay. The similarity in our results coincides with most information available on suture types,^{26,27} although shorter operation times seem standard when using mechanical sutures.^{26,27}

The mortality in our study was a single case (1.8%). In the literature, a wide range of indices can be found, varying between 0.06% and 6.4%.^{28,29}

Complications arose in 22.2% of cases, falling within the standard for this type of surgery,²⁶⁻²⁸ with a percentage of reinterventions needed (7.4%) also similar to other studies.^{19,21,29}

In general, dehiscence in this type of surgery can be treated by resection and a new anastomosis, as was performed in the single case that arose in our study. As such, patients that receive this procedure can be discharged from hospital with adequate intestinal transit reconstruction.

Haemorrhage of the anastomosis is a complication that appears to be more frequent in mechanical anastomoses.^{26,27,29} We believe that it is due to the everted suture line that is produced, and that the practice of a invaginated seroseros suture could reduce this problem.

In our study, the remaining complications inherent to this procedure, such as medical complications and abnormalities in gastrointestinal transit, did not vary from the results found in the literature, and were to be expected for this type of surgery.

Considering the published data, we believe that the complications produced by this procedure are significant, and must be taken into account by patients and surgeons alike in order to give this surgery its due consideration with regard to the importance of the previous rectal resection.

Occasionally, the waiting period can be long and the need for postoperative chemotherapy determines whether or not there will be a delay in transit reconstruction. We believe that ileostomy closing should be performed as early as possible in order to improve patient quality of life.

Conflict of interest

The authors affirm that they have no conflicts of interest.

REFERENCES

1. Allal AS, Bieri S, Pelloni A, Spataro V, Anchisi S, Ambrosetti P, et al. Sphincter-sparing surgery after preoperative radiotherapy for low rectal cancers: feasibility, oncologic results and quality of life outcomes. *British Journal of Cancer*. 2000;82:1131-7.
2. Ajani JA. In rectal cancer: colostomy or no colostomy: is this the question? *J Clin Oncol*. 1993;11:193-4.
3. Gastinger I, Marusch F, Steinert R, Wolff S, Koeckerling F, Lippert H. Protective defunctioning stoma in low anterior resection for rectal carcinoma. *Br J Surg*. 2005;92:1137-42.
4. Chude GG, Rayate NV, Patris V, Koshariya M, Jagad R, Kawamoto J, et al. Defunctioning loop ileostomy with low anterior resection for distal cancer: should we make an ileostomy as a routine procedure? A prospective randomized study. *Hepatogastroenterology*. 2008;55:1562-7.
5. Matthiessen P, Hallböök O, Rutegård J, Simert G, Sjö Dahl R. Defunctioning stoma reduces symptomatic anastomotic leakage after low anterior resection of the rectum for cancer: a randomized multicenter trial. *Ann Surg*. 2007;246:207-14.
6. Hüser N, Michalski CW, Erkan M, Schuster T, Rosenberg R, Kleeff J, et al. Systematic review and meta-analysis of the role of defunctioning stoma in low rectal cancer surgery. *Ann Surg*. 2008;248:52-60.
7. Rondelli F, Reboldi P, Rulli A, Barberini F, Guerrisi A, Izzo L, et al. Loop ileostomy versus loop colostomy for fecal diversion after colorectal or coloanal anastomosis: a meta-analysis. *Int J Colorectal Dis*. 2009;24:479-88.
8. Silva MA, Ratnayake G, Deen KI. Quality of life of stoma patients: temporary ileostomy versus colostomy. *World J Surg*. 2003;27:421-4.
9. Chand M, Nash GF, Talbot RW. Timely closure of loop ileostomy following anterior resection for rectal cancer. *Eur J Cancer Care (Engl)*. 2008;17:611-5. Epub 2008 Sep 3.
10. Lordan JT, Heywood R, Shirol S, Edwards DP. Following anterior resection for rectal cancer, defunctioning ileostomy closure may be significantly delayed by adjuvant chemotherapy: a retrospective study. *DP. Colorectal Dis*. 2007;9:420-2.
11. Krand O, Yalti T, Berber I, Tellioglu G. Early vs. delayed closure of temporary covering ileostomy: a prospective study. *Hepatogastroenterology*. 2008;55:142-5.
12. Menegaux F, Jordi-Galais P, Turrin N, Chigot JP. Closure of small bowel stomas on postoperative day 10. *Eur J Surg*. 2002;168:713-5.
13. Gil-Egea MJ, Martínez MA, Sánchez M, Bonilla M, Lasso C, Trillo L, et al. Rehabilitación multimodal en cirugía colorrectal electiva. Elaboración de una vía clínica y resultados iniciales. *Cir Esp*. 2008;84:251-5.
14. Culver DH, Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG. Surgical wound infection rates by wound class operative procedure and patient risk index. National Nosocomial Infection Surveillance System. *Am J Med*. 1991;91(Suppl 3B):153S-7S.
15. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg*. 2004;240:205-13.
16. Smedh K, Olsson L, Johansson H, Aberg C, Andersson M. Reduction of postoperative morbidity and mortality in patients with rectal cancer following the introduction of a colorectal unit. *Br J Surg*. 2001;88:273-7.

17. Peeters KC, Tollenaar RA, Marijnen CA, Klein Kranenbarg E, Steup WH, Wiggers T, et al; Dutch Colorectal Cancer Group. Risk factors for anastomotic failure after total mesorectal excision of rectal cancer. *Br J Surg*. 2005;92:211-6.
18. Koperna TH. Cost-effectiveness of defunctioning stomas in low anterior resections for rectal cancer. A call for Benchmarking. *Arch Surg*. 2003;138:1334-8.
19. García-Botello SA, García-Armengol J, García-Granero E, Espí A, López-Mozos JF, Lledó S. A prospective audit of the complications of loop ileostomy construction and takedown. *Dig Surg*. 2004;21:440-6.
20. Thalheimer A, Bueter M, Kortuem M, Thiede A, Meyer D. Morbidity of temporary loop ileostomy in patients with colorectal cancer. *Dis Colon Rectum*. 2006;49:1011-7.
21. Alves A, Panis Y, Lelong B, Dousset B, Benoist S, Vicaud E. Randomized clinical trial of early versus delayed temporary stoma closure after proctectomy. *Br J Surg*. 2008;95:693-8.
22. Khair G, Alhamameh O, Avery J, Cast J, Gunn J, Monson JR, et al. Routine use of gastrograffin enema prior to the reversal of a loop ileostomy. *Dig Surg*. 2007;24:338-41.
23. Lordan JT, Riga AT, Karanjia ND. Liver resections combined with closure of loop ileostomies: a retrospective analysis. *HPB Surgery*. 2008;2008:5. Article ID 501397.
24. Haagmans MJ, Brinkert W, Bleichrodt RP, Goor HB, André J. Short-term outcome of loop ileostomy closure under local anesthesia: results of a feasibility study. *Dis Col Rectum*. 2004;47:1930-3.
25. Kalady MF, Fields RC, Klein S, Nielsen KC, Mantyh CR, Ludwig KA. Loop ileostomy closure at an ambulatory surgery facility: a safe and cost-effective alternative to routine hospitalization. *Dis Colon Rectum*. 2003;46:486-90.
26. Hasegawa H, Radley S, Morton DG, Keighley MRB. Stapled versus sutured closure of loop ileostomy. A randomized controlled trial. *Ann Surg*. 2000;231:202-4.
27. Kraemer M, Seow-Choen F, Eu KW. A comparison of sutured and stapled closure of diverting loop ileostomies. *Tech Coloproctol*. 2000;4:89-92.
28. Wong KT, Remzi FH, Gorgun E, Arrigain S, Church JM, Preen M, et al. Loop ileostomy closure after restorative proctocolectomy: outcome in 1,504 patients. *Dis Col Rectum*. 2005;48:243-50.
29. Filkier-Zelkowitz B, Codina-Cazador A, Farrés-Coll R, Olivet-Pujol F, Martín-Grillo A, Pujadas-de Palol M. Morbilidad y mortalidad en relación con el cierre de ileostomías derivativas en la cirugía del cáncer de recto. *Cir Esp*. 2008;84:16-9.