

- radioimmunoscintigraphy of lung adenocarcinoma. *Chest* 1991, 99, 14-19.
10. Torres M, Jimenez-Hefferman A, Valverde A, *et al.* Immunoscintigraphy of lung cancer using  $^{111}\text{In}$ -labeled anti-CEA F023C5-F(ab')<sub>2</sub> fragments. *Nucl Med Commun* 1991, 12, 937-950.
  11. Buccheri G, Biggi A, Ferigno D, *et al.* Imaging lung cancer by scintigraphy with indium 111-labeled F(ab')<sub>2</sub> fragments of the anticarcinoembryonic antigen monoclonal antibody F023C5. *Cancer* 1992, 70, 749-759.
  12. Peltier P, Le Doussal LM, Curtet C, *et al.* Two-step immunoscintigraphy (IS) of medullary carcinoma of the thyroid (MTC) using anti-CEA/anti-DTPA bispecific monoclonal antibody (BS-MAB) and 111-indium labeled DTPA dimers [abstract]. *J Nucl Med* 1992, 33, 912.



Pergamon

*European Journal of Cancer* Vol. 30A, No. 8, pp. 1092-1095, 1994  
 Copyright © 1994 Elsevier Science Ltd  
 Printed in Great Britain. All rights reserved  
 0959-8049/94 \$7.00 + 0.00

0959-8049(94)E0121-J

# Total Rectal Resection and Colo-anal Anastomosis for Low Rectal Tumours: Comparative Results in a Group of Young and Old Patients

E. Leo, R.A. Audisio, F. Belli, M. Vitellaro, M.T. Baldini, L. Mascheroni, R. Patuzzo, G. Rigillo, G. Rebuffoni, A. Filiberti, P. Navarria and S. Andreola

Rectal cancer incidence is increasing among the elderly who are more often considered for palliation rather than for surgical cure. Moreover, sphincter-sparing surgery is often avoided when treating the elderly. We report our experience on a consecutive series of 38 subjects, suffering from a lower third rectal tumour with a median distance of 5.6 cm from the anal verge (7 Dukes' A, 6 Dukes' B, 17 Dukes' C, 3 Dukes' D, 3 anastomotic recurrences and 2 large villous adenomas). All subjects were prospectively collected in a 2-year period and treated with total resection and colo-anal hand-sewn anastomosis on a J colic reservoir. 20 patients younger than 65 years and 18 over 65 years were matched for surgical complications, late morbidity, oncological and functional results but no statistical difference was found. Our hope is that a conservative approach in treating the low rectal tumours will progressively be accepted for elderly patients.

**Key words:** rectal neoplasm, colo-anal, conservative surgery, J pouch, surgery in elderly, quality of life  
*Eur J Cancer*, Vol. 30A, No. 8, pp. 1092-1095, 1994

## INTRODUCTION

RECTAL CANCER is becoming a major public health problem in western countries where the incidence of the disease is increasing, especially among the elderly [1].

Notwithstanding the improvement of the quality and number of intensive care units, elderly patients are still more likely to be submitted to local palliation rather than radical surgical cure. Moreover, Miles's abdominoperineal amputation is still more easily conducted in the elderly than sphincter-sparing operations, adding the disability of a definitive colostomy to the already uneasy social condition of the aged. We have reviewed

our consecutive series of patients affected by lower third rectal cancer to understand the feasibility, operative risk and oncological adequacy of a hand-sewn colo-anal anastomosis, and to compare the results in a group of young versus old patients.

## PATIENTS AND METHODS

38 consecutive patients, 23 males and 15 females, were seen and treated for distal rectal cancer at the Division of Surgical Oncology B, National Cancer Institute of Milan, Italy from March 1990 to August 1992. All patients had a lower tumour margin between 8 and 4 cm (median 5.6) from anal verge, and were eligible to enter the study (Table 1). 20 patients were younger than 65 years and 18 were older.

The median pre-operative Karnofsky performance status (PS) [2] was 90 (range 80-100) and, concerning elderly patients, quality of life was also investigated with the QL-Index (QL-I) proposed by Spitzer [3] (median 9, range 8-10).

7 patients had Dukes' A adenocarcinomas, 6 Dukes' B, 17 Dukes' C and 3 Dukes' D affected by synchronous liver metastases (2 patients) or lung metastases (1 patient); 3 had anastomotic recurrences after anterior resection previously per-

Correspondence to E. Leo.

E. Leo, F. Belli, M. Vitellaro, M.T. Baldini, L. Mascheroni and R. Patuzzo are at the Division of Surgical Oncology B; G. Rigillo, G. Rebuffoni and S. Andreola are at the Division of Anaesthesia and Intensive Care; A. Filiberti is at the Division of Research Psychology; S. Andreola is at the Division of Pathological Anatomy and Cytology; and P. Navarria is at the Division of Radiotherapy A, and R.A. Audisio is at the Division of Diagnostic Oncology and Outpatient Clinic, Istituto Nazionale Tumori, via Venezian 1, 20133 Milan, Italy.

Revised 28 Feb. 1994; accepted 3 Mar. 1994.

Table 1. *Series presentation*

	Young (20 patients)	Elderly (18 patients)
Median age (years)	54	71
Range	(30–64)	(65–79)
Males/females*	12/8	11/7
Median Karnofsky PS	90	80
Range	(80–100)	(80–100)
Median Spitzer QL-I	9	8
Range	(9–10)	(7–10)
Median distance from anal verge (cm)	5.5	6
Range	(2–8)	(4–8)
Dukes' A*	5	2
Dukes' B*	2	4
Dukes' C*	9	8
Dukes' C*	2	1
Anastomotic recurrence*	1	2
Villous adenoma*	1	1
Pre-operative radiotherapy*	1	—
Postoperative radiotherapy*	8	12
Adjuvant chemotherapy*	6	4

\*No. of patients. PS, performance status; QL-I, quality of life index.

formed elsewhere while 2 had large villous adenomas. Pre-operative radiotherapy was administered to only 1 patient with an anastomotic recurrence (2500 cGy) but 20 had postoperative pelvic-perineal radiation treatment: a three-field isocentric technique (two lateral and one posterior) to 5040 cGy (180 cGy/d; 5 days a week) was administered by a 15-MeV linear accelerator.

Adjuvant chemotherapy with 5-fluorouracil (5-FU) and folinic acid (5-FU 370 mg/m<sup>2</sup>; folinic acid 100 mg/m<sup>2</sup> for 5 consecutive days, every 21 days) [4] was administered to 10 patients with metastatic or extensive nodal/local disease.

All patients underwent colo-anal anastomosis (CAA) with a J-shaped colic reservoir and a temporary colostomy on the transversum [5]; the same technique as described by Parks in 1982 [6], adding a colic reservoir as reported more recently by Parc [7].

The patient was placed in supine position to allow a combined abdominal and perineal approach. The abdomen was explored through a midline laparotomy; the sigmoid and left colon were mobilised up to the splenic flexure after a proximal ligation of the inferior mesenteric vessels.

Whenever possible, the inferior mesenteric artery was sectioned below the origin of the left colic branch to maintain better arterial inflow to the residual sigmoid and descending colon.

A careful dissection of the lymph nodes along the mesenteric and ilia C (common and internal) vessels, and the lower third of aorta was performed. All the connective tissues surrounding the rectum, the mesorectum and the recto-prostatic (recto-vaginalis) fascia were removed.

The rectum was completely dissected down to the ano-rectal junction, exposing the levator muscles.

The sigmoid colon was divided proximally using a gastrointestinal anastomosis stapler (GIA); the rectum was sectioned distally by a coagulator as low as possible and just above the pelvic floor. The remaining sigmoid was then utilised to prepare a mechanically-made (GIA) J-shaped reservoir 7 cm long.

Soft dilatation of the anal margin was obtained by placing two self-retaining Gelpi's retractors under the pectinate line. Afterwards, a complete mucosectomy of the upper anal canal

was gently performed with scissors to avoid traumatising or damaging the surrounding muscles. The reservoir was then drawn, without adding tension, to the anus and opened; using 12–14 interrupted 3/0 resorbable sutures, a side-to-end, pouch-endo-anal anastomosis with the external sphincter and anus mucosa was performed at the level of the dentate line.

To compare the feasibility and the efficacy of this sphincter-saving procedure in the two groups of young (Y) and elderly patients (E), here taken as 65 years old or more, we statistically tested the difference in the operative mortality and morbidity, length of the surgical procedure, hospital stay and number of blood transfusions: comparisons were performed according to the Mantel-Haenszel test with Yates correction.

We also studied the functional results 2 and 6 months after colostomy removal according to the Park's classification of continence [8], the numbers of evacuations per day, night soiling and necessity of wearing a pad were also recorded. At the same time the quality of life was re-evaluated (Karnofsky PS and Spitzer QL-I).

The median follow-up, local recurrence rate and median recurrence-free interval were calculated, as well as absolute survival, disease-free survival and local recurrence-free survival.

## RESULTS

A hand-sewn anal pouch anastomosis was performed in all patients, at the dentate line. All resection margins proved unaffected at pathological examination and the median distance from the tumour to the disease-free tissue was 2.0 cm (range 0.3–6.0); the minimum distance from the resection line was 0.9 cm in the case of malignancy, but a large villous adenoma, with intraoperative frozen section confirmation of benign disease, was resected at only 3 mm. The median duration of the surgical procedure was 5.5 h (range 210–600 min); less than one unit of red blood cells was due per patient but one subject required 6 units (range 0–6 units) (Table 2).

No operative mortality within 30 days from surgery was recorded in both groups Y and E. The overall 30 days morbidity consisted specifically in five asymptomatic small fistulas of the reservoir radiologically detected, transient urinary retention after transurethral catheter removal in 2 patients, pleural effusion in 4 patients, arrhythmia in only 1 elderly patient and pneumothorax in 1 patient of group Y, who underwent subclavian vein puncture for postoperative parenteral support. 2 elderly patients were moved to the intensive care unit for better monitoring (Table 2).

All patients had nasogastric tubes maintained until canalisation of gas occurred through the stoma, which occurred on average on the fourth postoperative day (range 1–8), while the first bowel movement was recorded on average on the fifth day after CAA (range 2–9). Median postoperative hospital stay was 17 days (range 9–42).

Late complications (after 30 days from surgery) affected 2 subjects: 1 patient had a traumatic rupture of the reservoir during a radiological control which caused fibrosis of the paracolic tissues and stenosis of the pouch's upper portion: the patient underwent a second operation with removal of the old reservoir and a new end-to-end colo-anal anastomosis at the dentate line, after removal of the former suture. A second patient who had a postradiotherapeutic fibrosis of the reservoir was treated with dilatations. No late urinary dysfunction was recorded.

Median colostomy maintenance time was 2 months (range 45–91 days).

When functional results were taken into account, 31 patients

Table 2. Clinical results

	Young (20 patients)	Elderly (18 patients)
Median safe tissue margins (cm)	2.4	3.3
Range	(0.3–6)	(1–6)
Median postoperative hospital stay (days)	17	17
Range	(9–42)	(9–33)
Median colostomy maintenance (days)	62	65
Range	(45–74)	(50–91)
Length of operation (min)	344	337
Range	(240–600)	(210–540)
No. blood transfusions (units)	0.8	1
Range	(0–2)	(0–6)
Operative mortality	—	—
Operative morbidity*	9 (45%)	7 (39%)
Subclinical phistula	3	2
Urinary retention	1	1
Pleural effusion	1	3
Arrhythmia	—	1
Pneumothorax	1	—
Late complications*		
Anastomotic stenosis	1	—
Pouch perforation	1	—
Median Karnofsky PS	80	80
Range	(80–90)	(70–90)
Median Spitzer QL-I	8	8
Range	(7–10)	(7–9)

\*No. of patients. PS, performance status; QL-I, quality of life index.

(82%) scored 1, 7 patients (18%) scored 2 and there were no scores of 3 or 4; this allowed a good quality of life in all subjects. No significant score modification was evident when pre- and postoperative Karnofsky PS and Spitzer QL-I were matched, all patients being able to differentiate between gas and faeces; only 3 patients complained of occasional minor night leakage; the average frequency of evacuations was 2/24 h (range 1–4/24 h); (Table 3).

An overall median follow-up of 19 months showed 7 Dukes' C patients recurring (18%) a median of 11 months after CAA (range 7–17; Table 4); of these, 2 patients underwent Miles abdominoperineal amputation, 2 were judged unresectable and were given chemotherapy plus perineal radiotherapy, and a third had a second colo-anal anastomosis although a new pouch was not feasible in one of them.

The statistical comparison of all the variables reported in Tables 1–3 indicated no difference between groups Y and E.

Table 3. Functional results

	Young (20 patients)	Elderly (18 patients)
Median no. bowel movements/day	2	3
Range	(2–4)	(1–4)
No. patients using pads	1	2
Parks' continence classification*		
Normal	17 (85%)	14 (78%)
Difficult diarrhoea control	3 (15%)	4 (22%)
No diarrhoea control	—	—
No solid stool control	—	—

\*No. of patients.

Table 4. Oncological results

	Young (20 patients)	Elderly (18 patients)
Median follow-up (months)	21	16
Range	(10–38)	(6–25)
Local recurrence	5 patients	2 patients
Median recurrence-free time (months)	11	11
Range	(7–17)	—

## DISCUSSION

Recent pathological investigations have put in a new light the pathways of spread of rectal cancer, their findings substantially changing the surgical approach to this disease, thus revolutionising the idea, introduced by Cole in 1913, that in order to limit the intramural spread, a 5-cm distal margin is needed [9]. In fact, following a question-answer by Weese [10] 70 years later, it has recently been proved that recurrence is no more common, and stage survival is as good, both after resection and abdominoperineal excision, provided that safe tissue resection margins are 2 cm or more [11–13]; distal intramural spread may exceed 1 cm in 10–18% of the patients, but only 1–5% show distal intramural spread 1.5 cm below the tumour [11, 14–19]. In addition, the demonstration that the stretch receptors, responsible for a normal anal sphincter reflex, are not located within the bowel but in the pelvic floor muscles and particularly at the levator ani [20, 21], forces surgical opinion towards sphincter-sparing procedures, both for malignant and inflammatory disease [22, 23]; the advantage of creating a reservoir resulting in a better continence has also been emphasised by Lazorthes' [24] and Nicholls' [25] studies. Hence, the interesting perspective offered by CAA, widely accepted in the treatment of low rectal cancer and supported by large clinical series [26], proved feasible in our group of elderly who had no operative mortality; this may be due to the improvements of anaesthesia and the skill of our intensive care operators, as well as to the absence of most negative prognostic factors recently pointed out by Reiss [27], in particular, that no procedure was performed either as an emergency or in the presence of peritonitis or extensive malignancy. The control of the anaesthesia level has been remarkably improved in recent years; this allowed, particularly in the elderly patients, a better control of the physiological variables during surgery, as well as a quicker awakening after surgery. Every elderly patient systematically received the cannulation of a central vein both to obtain an early mobilisation in the peri-operative period, and to assess when parenteral nutrition with hypertonic solution by infusion was required. The placement of a central venous catheter, with its tip in the lower superior vena cava, provided valuable information concerning the circulatory condition (CVP) in the very high risk patients. Pre-operative physiotherapy treatment also reduced the incidence of pulmonary pathology due to prolonged immobilisation.

No major peri-operative complication was recorded: the routine institution of a defunctionalising stoma might have helped in preventing dreadful pelvic septic complications and its indication should be stressed.

Concerning late surgical morbidity, we report a pouch rupture during an X-ray control and 1 case of postastatic fibrosis of the pouch, both in young subjects and not strictly related to the surgical procedure. This was the only complication related to postoperative pelvic-perineal radiation treatment which we

administered to 20 subjects, thus proving the high feasibility of radiotherapy on pouch-bearing patients.

Our present experience with CAA is very satisfying when considering morbidity, functional and oncological results, although the short median follow-up does not allow final conclusions, and the poorly selected series (53% Dukes' C and D), due to the lack of screening programs, is likely to result in an increased recurrence rate.

This study also highlights the procedures of CAA in our division, and the excellent functional results achieved in the elderly patients, in keeping with the early report from Huguet [28]. As Phillips and McArdle demonstrated with their retrospective studies [29, 30], a significantly lower hospital mortality and morbidity could be achieved when major colorectal surgery was performed by experienced surgeons and teams. We had no operative mortality and most morbidity reported was minor; the surgical procedure's length and number of blood units required did not depend on the age; the same was true when pre-operative mortality and morbidity were analysed. Although group E showed a 1-day delay in recovering bowel functions (canalisation to gas and faeces), postoperative hospital stay was not consequently lengthened in this group. Long-term complications were exceptional, and the two which occurred were both in group Y. Concerning quality of life and continence, the patients' subjective evaluation was very positive, possibly as a consequence of the favourable expectations, with these subjects having been referred by several surgeons who had denied any possible sphincter-sparing operation. Eighty-two per cent achieved normal continence (a slightly better result, but not significant, is reported from group Y, 85 versus 78%); 18% scored 2, only complaining of difficult control of diarrhoea (Y 15% versus E 22%). The number of bowel movements in 24 h was also similarly distributed.

We are consequently convinced that, after the pioneering experience with CAA reported by Parc [7], this technique can be safely and successfully employed in the elderly.

The present new assessment does not deny a role for abdomino-perineal amputation in the treatment of low rectal adenocarcinoma, but suggests that it has to be considered as the last step beyond a conservative philosophy of surgical treatment.

- Decarli A, La Vecchia C. Cancer mortality in Italy, 1988. *Tumori* 1992, 78, 69-74.
- Karnofsky DA, Burchenal JH. The clinical evaluation of chemotherapeutic agents in cancer. In Macleod CM, ed. *Evaluation of Chemotherapeutic Agents*. New York, Columbia University Press, 1949, 199-205.
- Spitzer WO, Dobson AJ, Hall J, et al. Measuring the quality of life of cancer patients: a concise QL-index for use by physicians. *J Chron Dis* 1981, 34, 585-597.
- Machover D, Schwarzenberg L, Goldschmidt E, et al. Treatment of advanced colorectal and gastric adenocarcinoma with 5-FU combined with high-doses folinic acid: a pilot study. *Cancer Treat Rep* 1982, 66, 1803-1807.
- Leo E, Belli F, Baldini MT, et al. Total rectal resection, colo-

- doanal anastomosis and colic reservoir for cancer of the lower third of the rectum. *Eur J Surg Oncol* 1993, 19, 283-293.
- Parks AG, Percy JP. Resection and sutured colo-anal anastomosis for rectal carcinoma. *Br J Surg* 1982, 69, 301-304.
- Parc R, Turet E, Frileux P, Moszkowski E, Loygue J. Resection and colo-anal anastomosis with colonic reservoir for rectal carcinoma. *Br J Surg* 1986, 73, 139-141.
- Parks AG. Anorectal incontinence. *J R Soc Med* 1975, 68, 21-30.
- Cole PP. The intramural spread of rectal carcinoma. *Br Med J* 1913, 1, 431-433.
- Wecse JL, O'Grady MG, Ohevy FD. How long is the 5 cm margin? *Surg Gynecol Obstet* 1986, 163, 101-103.
- Kirwan WO, Drumm J, Hogan JM, Keohane C. Determining safe margin of resection in low anterior resection for rectal cancer. *Br J Surg* 1988, 75, 720.
- Wolmark NW, Fisher B. An analysis of survival and treatment failure following abdominoperineal and sphincter-saving resection in Dukes' B and C rectal carcinoma: a report of the NSABP clinical trials. *Ann Surg* 1986, 204, 480-489.
- Pollett WG, Nicholls RJ. The relationship between the extent of distal clearance and survival and local recurrence rates after curative resection for carcinoma of the rectum. *Ann Surg* 1983, 198, 159-163.
- Williams NS. The rationale for preservation of the anal sphincter in patients with low rectal cancer. *Br J Surg* 1984, 71, 575-581.
- Sindoni A, Bufalari A, Alberti PF. Distal intramural spread in colorectal cancer: a reappraisal of the extent of distal clearance in fifty cases. *Tumori* 1991, 77, 514-517.
- Grinnell RS. Distal intramural spread of carcinoma of the rectum and rectosigmoid. *Surg Gynecol Obstet* 1954, 99, 421.
- Madsen PM, Christiansen J. Distal intramural spread of rectal carcinomas. *Dis Colon Rectum* 1986, 29, 279-282.
- Quer EA, Dahlin DC, Mayo CW. Retrograde intramural spread of carcinoma of the rectum of rectosigmoid: a microscopic study. *Surg Gynecol Obstet* 1953, 94, 24.
- Penfold JC. A comparison of restorative resection of carcinoma of the middle third of the rectum with abdominoperineal excision. *Aust N Z J Surg* 1974, 44, 354.
- Lane RHS, Parks AG. Function of the anal sphincters following colo-anal anastomosis. *Br J Surg* 1977, 64, 596-599.
- Williams NS. Anorectal reconstruction. *Br J Surg* 1992, 79, 733-734.
- DeCosse JJ. Sphincter-sparing surgery. *Surgery* 1991, 110, 457-458.
- Phillips RKS. Pelvic pouches. *Br J Surg* 1991, 78, 1025-1026.
- Lazorthes F, Fages P, Chiotasso P, Lemozy J, Bloom E. Resection of the rectum with construction of a colonic reservoir and colo-anal anastomosis for carcinoma of the rectum. *Br J Surg* 1986, 73, 136-138.
- Nicholls RJ, Lubowski DZ, Donaldson DR. Comparison of colonic reservoir and straight colo-anal reconstruction after rectal excision. *Br J Surg* 1988, 75, 318-320.
- Berger A, Turet E, Parc R, et al. Excision of the rectum with colonic J pouch-anal anastomosis for adenocarcinoma of the low and mid rectum. *World J Surg* 1992, 16, 470-477.
- Reiss R, Deutsch A, Nudelman I. Surgical problems in octogenarians: Epidemiological analysis of 1,083 consecutive admissions. *World J Surg* 1992, 16, 1017-1021.
- Huguet C, Harb J, Bona S. Coloanal anastomosis after resection of low rectal cancer in the elderly. *World J Surg* 1990, 14, 619-623.
- Phillips RKS, Hittinger R, Blesovsky L, Fry JS, Fielding LP. Local recurrence following "curative" surgery for large bowel cancer: the overall picture. *Br J Surg* 1984, 71, 12-16.
- McArdle CS, Hole D. Impact of variability among surgeons on postoperative morbidity and mortality and ultimate survival. *Br Med J* 1991, 302, 1501-1505.

**Acknowledgement**—This paper has been partially supported by PRESTCO, Milan, Italy.