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TOTAL MESORECTAL EXCISION IN TREATMENT OF MIDDLE AND LOWER THIRD RECTAL CARCINOMA: MEASURES TO REDUCE ANASTOMOTIC LEAKAGE RATE.

By
Mohamed Yasser Abdel-Atty, Walid Wahdan**, Mohey Eddin R., El-Banna**, Ahmed EI-Kased*, Said Askar*, Saleh Abdel-Kader** and Osama Fouad***
Departments of General Surgery, Menoufia* and Ain Shams**University.

Background: *The local recurrence rate after potentially curative resection for rectal carcinoma has remained relatively high with little change in the prognosis of this common disease. Many attempts had been made to decrease the local recurrence rates after anterior resection of the rectum, the most important of which has been total mesorectal excision. The only drawback of this technique has been its association with a high anastomotic leakage rate.*

Patients and methods: *Thirty six patients with lower and middle third rectal carcinoma have been operated upon by low anterior resection with total mesorectal excision between January 1996 and December 1999. We used the descending colon near the splenic flexure for the anastomosis with the anal canal, making sure to fill the pelvic cavity -that resulted from mesorectal excision- with the redundant colon behind the anastomosis, to prevent any pelvic collection and hematoma formation. A defuncioning transverse loop colostomy was performed in 29 patients. The patients were followed up as regards anastomotic leakage rate, local recurrence and functional outcome. Follow up ranged between 7 - 48 months with median of 38 months.*

Results: *Anastomotic leakage occurred in 3 patients (8.3%), two of whom did not have a defunctioning colostomy Local recurrence rate was 6.6%. Functional outcome was grade I continence in 65.5% and grade II in 25% ofpatients.*

Conclusion: *Total mesorectal excision accomplishes a very low local recurrence rate, the claimed high leakage rate could be ameliorated by mobilizing the colon up to the hepatic fiexure, using the descending colon near the splenic flexure for the anastomosis which is done without tension, permitting the redundant colon and the omentum to lie in the sacral hollow behind the anastomosis to prevent hematoma formation and performing a defunctioning colostomy.*

INTRODUCTION

The local recurrence rate after potentially curative resection for rectal carcinoma has remained relatively high, with little change in the prognosis of this common disease[1] Published data clearly clarify that the most important limiting factor in the surgical cure of patients with distal rectal carcinoma is probably not the distal or proximal tumor free margin, but rather radial margins of resection [2]. Total mesorectal excision (TME) has been recently introduced as the gold standard technique for anterior resection of the rectum, as it has been associated with the lowest local recurrence rates [2]. This could be justified by regarding the rectum and mesorectum as a single lymphovascular "organ" with no internal natural boundaries to the spread of tumor [1]. The leakage rate after low anterior resection is higher than that after high anterior resection, several factors affect this problem namely the anastomotic technique, bowel preparation and defunctioning colostomy [3]. Total mesorectal excision has reduced the incidence of local recurrence after anterior resection at the expense of higher anastomotic leakage rate [4]. The aim of this study is to evaluate the results of TME in the management of middle and lower third rectal carcinoma with special reference to anastomotic leakage,

local recurrence rates and functional outcome.

PATIENTS AND METHODS

The study was performed between January 1996 and December 1999, in which 36 patients (28 males and 8 females) with median age 56 years (range 27-72 years), suffering from middle and lower third rectal carcinoma, underwent low anterior resection with TME at General Surgery departments, Menoufia and Ain Shams University hospitals.

Preoperative evaluation included routine laboratory and radiographic investigations, ECG, colonoscopy and tissue biopsy for histopatho logical diagnosis of malignancy, preoperative carcinoembryonic antigen (CEA) levels, with abdomino-pelvic ultrasonography, CAT scan for detection of lymphatic or distant abdominal metastases and plain chest radiography for pulmonary metastases (Fig 1).

All patients underwent thorough bowel preparation and received prophylactic antibiotics in the form of metronidazole and third generation cephalosporine. A Foley's catheter was routinely introduced in all patients after induction of anaesthesia.

Operative technique entailed exploration of the abdomen for distant metastasis or synchronous lesions, mobilization of the left colon up to the hepatic flexure to eliminate the risk of suture line tension. Ligation of the inferior mesenteric artery as proximal as possible close to its origin from the aorta, and the inferior mesenteric vein as it passes up at the inferior border of the pancreas. Dissection was then carried out sharply at the plane between the mesorectum and the autonomic nerve plexuses in the pelvis, dissection of the mesorectum is carried out as lateral as possible -reaching the lateral pelvic walls- to be removed en bloc with the rectum.

Ligation of the middle rectal vessels was done cautiously. Then continuing the dissection downwards till the entire rectum and mesorectum can be lifted free from the levator muscles. This straightened the curved rectum enabling resection to be done, flush with the anal canal or leaving a maximum of 1-2 cm of the rectum. This technique provided up to 4 centimeters of additional rectal length increasing the distance of the tumor from the anal verge. Proximally, resection was done proximal to the sigmoid colon (Fig 2). The distal stump was washed with povidone-iodine and saline. The anastomosis was performed using the descending colon near the splenic flexure and not the sigmoid colon, to ensure good blood supply and to allow a redundant part of the colon to lie behind the anastomosis filling the dead space that resulted from excision of the whole mesorectum. The anastomosis was done manually -without tension- in a single layer in 26 patients and with circular stapler in 10 patients. A defunctioning transverse loop colostomy was performed in 29 patients. The colostomy was done in the transverse colon near the hepatic flexure, if no contraindication -such as anastomotic leakage- the colostomy as closed intra-peritoneally after 4-6 weeks. Wide bore tube drains were routinely used in all patients.

Resection was defined at laparotomy as "potentially curative" or "palliative" (with residual local or distant disease). All histological sections were reviewed by a histopathologist and tumors staged according to:

1) Duke's classification: stage A: tumor limited to the wall of the rectum, stage B: tumor extends through rectal wall into extrarectal tissue and stage C: lymph node involvement and 2) degree of differentiation: grade I: well differentiated, grade II: moderately differentiated and grade III: undifferentiated.

Oral feeding was started on the sixth postoperative day in absence of any evidence of anastomotic leakage.

Patients were followed up postoperatively as regards anastomotic leakage, abdominal or pelvic collection and postoperative continence scores: I) perfect control, II) frequency and/or urgency, III) occasional day or night incontinence, IV) total incontinence, and V) failure to close the stoma [5]. Follow up for detection of local recurrence was done every 3 months for one year, then every 6 months afterwards, patients were reviewed regularly with clinical examination, lower G.I.T. endoscopy, CEA assay and CT scan if serial rise of serum CEA level was noted. Follow up ranged between 6 - 48 months, median follow up was 38 months.

All patients with Dukes' B and C received postoperative radiotherapy and chemotherapy in the form of 5-fluorouracil and Levamisole.

RESULTS

During the period of the study (48 months), thirty six patients with middle and lower third rectal carcinoma underwent low anterior resection with TME. The presenting symptoms were rectal bleeding (29 patients), alternating constipation and diarrhea (18 patients), and tenesmus (14 patients). The site of the tumor was lower third (up to 5 cm from anal verge) in 10 patients (28%) and middle third (5-10 cm from anal verge) in 26 patients (72%).

All patients were subjected to low anterior resection with TME, thirty two patients were considered to have potentially curative resection, while 4 (11 %) had a palliative resection due to residual malignant tissue in 2

para-aortic lymph nodes in I patient and distant metastasis in another (this patient had 2 hepatic secondaries that could not be detected by pre-operative radiography).

Dukes' staging for the whole group was stage A: 11 patients (30.5%), stage B: 18 patients (50%), stage C: 6 patients (16.7%), while 1 patient had extranodal metastasis (2.8 per cent) (Table 1):

About seventy two per cent of the whole group of patients (26 patients) proved to have moderately differentiated adenocarcinoma (grade II), while 4 patients (11%) had grade I tumors and 6 patients (17%) had undifferentiated (grade III) malignancy (Table 2).

Histopathological study also revealed no lateral margin invasion in any of the patients who underwent potentially curative resection.

Two patients died in the early postoperative period, one due to major anastomotic leakage, the other was a 70 years old male that was diagnosed as having massive pulmonary embolism.

Anastomotic leakage was clinically detected in 3 patients (Fig 3). Out of these 3 patients (8.3 per cent) one had a major leakage, who subsequently died from septic shock, the second needed a proximal permanent colostomy, while the third was managed conservatively. Two out of these 3 patients did not have a covering colostomy in the initial operation (Table 3).

Two patients had anastomotic strictures (one after documented leakage), both responded well to transanal dilatation.

Twenty five patients (24 were classified as Dukes' B and C and 1 patient with extranodal metastasis) received postoperative radio- and chemotherapy in the form of 5-fluorouracil and levamisole.

Two out of the 32 patients who were considered to have a potentially curative resection did not continue the follow up, two out of the 30 patients left developed local recurrence (6.6%). One was Dukes' B and the other Dukes' C stage, with lesions at 6 and 8 cm from the anal verge respectively, the histopathological study of their tumors revealed undifferentiated adenocarcinoma grade III, the 2 patients were re-explored (21 and 15 months respectively after the initial operation), the first was a female in whom there was invasion of upper vagina and cervix, wide excision with panhystrectomy was performed with permanent colostomy and the patient is still alive after 32 months. The other patient was a 52 years old male in whom exploration revealed extensive pelvic and vascular invasion, the patient died after 6 months (Table 4).

A defunctioning transverse loop colostomy was performed in 29 patients, while a permanent colostomy was done in 2 patients: one after a major anastornotic leakage and the other after local recurrence. One patient needed revision of the colostomy due to ischaemic changes of the edges. Intraperitoneal closure of the defunctioning colostomy was done 6-8 weeks postoperatively if there was no contraindication. One patient developed anastomotic leakage after closure that necessitated re-exploration and re-anastomosis.

Functional outcome could not be assessed in 4 patients, two patients died, and 2 patients did not continue the follow up on regular basis. Twenty one (65.6%) out of the 32 patients left had perfect control (grade I), 8 patients (25%) complained of frequency and/or urgency (grade II), 1 patient (3.1%) developed occasional incontinence (grade III), while 2 patients (6.3%) did not have his stoma closed after exteriorization after anastomotic leakage (grade V).

The urinary catheter was generally removed on day 3-4, four patients (11.1%) developed urinary retention after catheter removal, two patients responded well to parasympathomimetics in the form of Tofranil, while 2 needed recatheterization for 5 and 8 days with doubling of the dose of Tofranil until normal function could be achieved.

Table (1): ***Dukes' Staging of the whole group of patients n = 36.***

Dukes' stage	*Number*	*Percentage*
A	11	30.5
B	18	50
C	6	16.7
Extranodal metastasis	1	2.8

Table (2): *Classification according to degree of differentaion.*

Grade	*Number*	*Percentage*
I	26	72
II	4	11
III	6	17

Table (3): *Data of patients with anastomotic leakage , n = 3.*

Age	*Sex*	*Dukes' stage*	*Time of detection of leakage*	*Management*	*Outcome*
56	Male	B	Day6	Permanent colostomy	Stoma not closed
43	Female	B	Day7	Conservative	Leakage stopped on day 17
63	Male	C	Day 5	Major leak, resuscitation of septic shock, drainage	Died on day 9

Table (4): *Data of patients with local recurrence, n=2.*

Age	*Sex*	*Level of tumor from anal verge*	*Grade*	*Dukes' stage*	*Time of detection of recurrence*	*Outcome*
69	Female	6 cm	III	B	21 months	Alive at 32 months
52	Male	8 cm	III	C	15 months	Died at 21 months

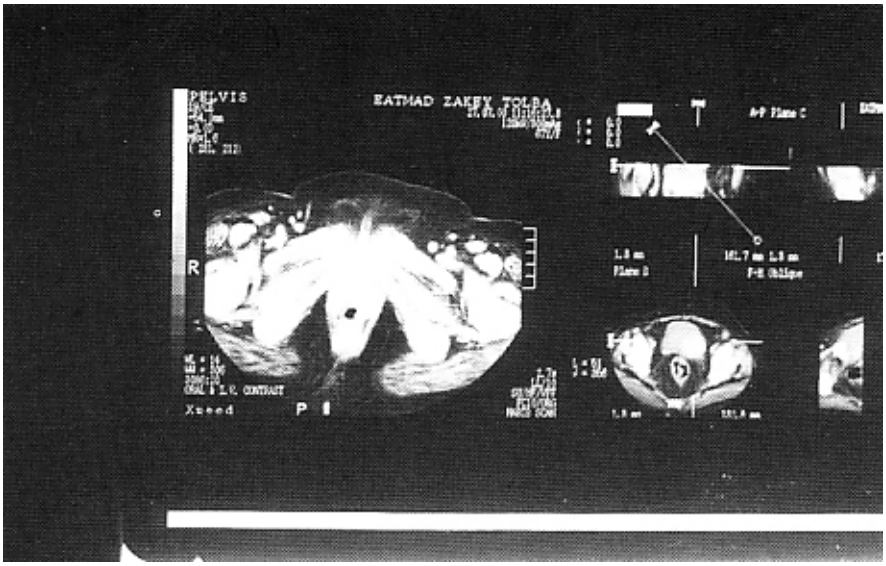

Fig. (1): *CAT scan of a patient with middle third rectal carcinoma.*

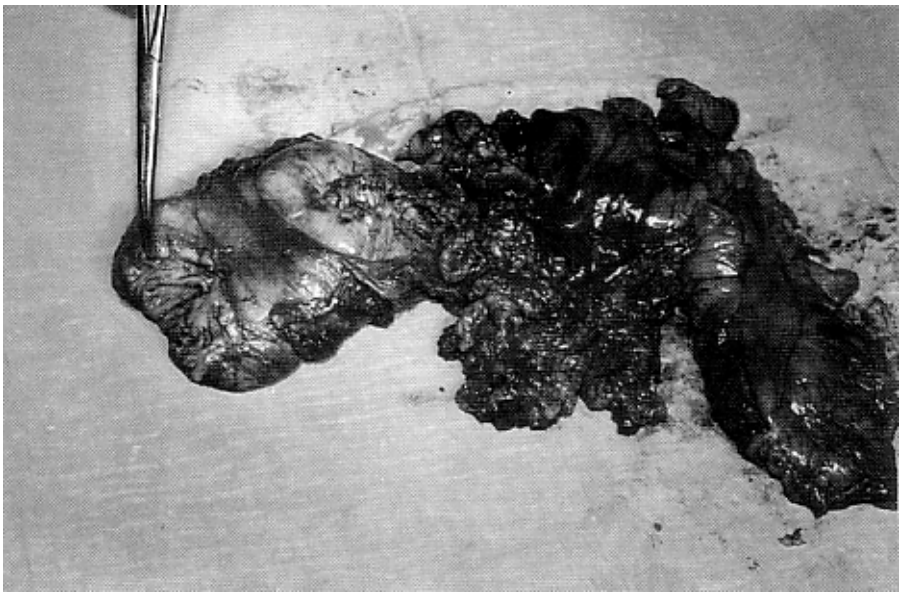

Fig. (2): ***Resected specimen showing the lesion and the distal cut edge, with the whole mesorectum..***

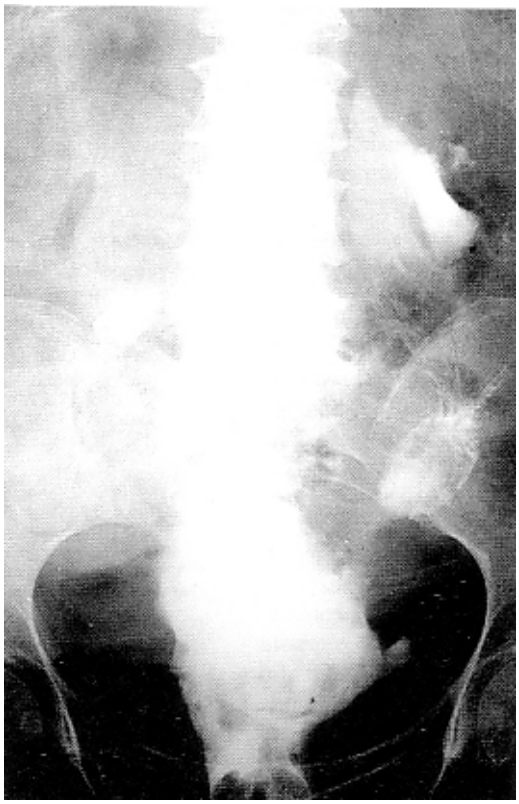

Fig. (3): ***Postoperative gastrografin enema showing anastomotic leakage.***

DISCUSSION

Despite "potentially curative" surgery for rectal cancer, the number of deaths from colorectal cancer has changed little over the past 50 years [5]. The 5-year survival rate after curative resection of rectal cancer varies from 40 to 80% depending on the local recurrence rate [6]. The local recurrence rates after potentially curative resection for rectal cancer has remained relatively high ranging from less than 5% to greater than 20 per cent [7].

Steele (1994) in revising the principles of surgical therapy for rectal cancers emphasizes that: I) the entire cancer or precancer should be removed, which means complete pathologic review of the specimen and histologic proof that deep and radial margins are clear of tumor, II) removal and histologic review of the pericolic or perirectal soft tissues to define whether or not the cancer has invaded into the surrounding tissues and III) analysis of the perirectal lymphatic tissue (mesorectum), which are the first route of spread of most invasive adenocarcinomas. This analysis carries reasonable chance for cure if all tumor is removed [8].

There is a growing support for the concept of wide local surgical resection in the management of colorectal carcinoma. Published data clearly show that the presence of tumor at the circumferential margin after potentially curative resection is associated with high local relapse rates, with figures of 60% for positive margins versus 10% for negative margins [9]. Lateral margin involvement may merely be a marker of poor prognosis [10].

This can justify why TME is associated with the lowest recurrence rate ever reported [2]. But this technique may contribute to a higher incidence of anastomotic leakage. Several mechanisms may be involved in such leakage: compromising the blood supply of the anorectal remnant due to excessive dissection, tension on the suture line and the large cavity within the pelvis after TME which may lead to the formation of hematoma that may become infected, point and discharge through or near to the anastomosis [11].

In an attempt to decrease the leakage rate, we 1) performed extensive mobilization of the left colon reaching as far as the hepatic flexure, 2) used the descending colon in the vicinity of the splenic flexure -and not the sigmoid colon- for the anastomosis, 3) avoided upward traction and tension on the anastomotic line, 4) permitting an ample length of the colon and greater omentum to lie in the sacral hollow with no potential space behind the anastomosis to prevent hematoma formation and 5) performed a covering colostomy in most of the patients.

In the present study a leakage rate of 8.3% (3 patients) was achieved which is relatively low and compares well with that concluded by Tagart [3] and Corder et al [10] (15 and 12% respectively).

We performed a covering transverse loop colostomy in 29 out of the 36 patients included in the study, two out of the 3 patients in whom an anastomotic leakage occurred did not have a defunctioning colostomy, including the only patient who died -in the early postoperative period- due to septicemia after a major leak.

So, an initial defunctioning stoma reduced the incidence of major anastomotic leakage after TME, and protects against the development of peritonitis. We believe that defunctioning stoma is not a step backwards and that a proportion of minor leaks occurring in patients with an initially defunctioned anastomosis may have presented as major leaks if they had not undergone defunctioning. These observations are similar to those of Schrock et al and Karanjia et al [11,12] who found major leaks to be more common and more serious in the absence of proximal stoma, on the other hand Mealy et al [13] had some doubt on the effeciveness of a denctioning colostomy.

The functional outcome after TME in this study was satisfactory, reaching 90% of patients having grade I-lI continence score postoperatively. Similar figures were reported by Mc Anena et al [14].

Thirty two patients (89%) were operated upon in the first 2.5 years of the study, the median follow up was 38 months, which gives a fairly objective results on the local recurrence rate, since 80% of local recurrences occur in the first 2 years [1]. Our local recurrence rate of 6.6% falls within the published range of 3.7-43% [13].

Wiig et al (1999) emphasized that the mesorecturn is the key to local recurrence after anterior resection of the rectum, and that recurrences were mostly due to inadequate radial, and in few cases longitudinal, dissection of the mesorectum [15].

In their international analysis of 1411 patients having rectal carcinoma, Havenga et al (1999) compared TME with the conventional surgical technique as regards local recurrence and survival. They noticed a significantly lower local recurrence rates in the group of patients who underwent TME for treating rectal carcinoma, reaching the conclusion that TME gives superior survival and local control when compared to conventional surgery [16].

Our results concerning the low local recurrence rate (6.6%) agree with the previous remarks and with other authors [2,5,1 7] who suggest that TME has become the gold standard technique for the surgical treatment of rectal

carcinoma. The excellent results of this technique in terms of lower recurrence rates are well documented, but this was claimed to come at the expense of higher anastomotic leakage rates, which can be ameliorated if the previously - mentioned measures were undertaken.

Moreover, the seriousness of these leaks can be reduced by the performance of a defunctioning colostomy.

REFERENCES

1. Di Matteo G, Mascagni D, Lentini A, Tarroni D, Filippini A. Advances in rectal cancer surgery. Dis Colon Rectum 1 994; 37 (2 suppl): S50-3.

2. Abulfi AM, Williams NS. Local recurrence of colorectal cancer: the problem, mechanisms, management and adjuvant therapy. Br J Surg 1994;81: 7-19.

3. Tagart REB. Restorative rectal resection: an audit of 220 cases. Br J Surg 1986; 73: 70-1.

4. Heald RG, Husband EM, Ryall RDH. The mesorecturn in rectal cancer surgery: clue to pelvic recurrence? Br J surg 1982; 69: 613-16.

5. Jatzko C, Lisborg P, Wette V.Improving survival rates for patients with colorectal cancer. BrJ Surg 1992; 79:588-91.

6. Williams NS. Surgical treatment of rectal cancer. In: Keighley MRB, Williams NS, eds. Surgery of the Anus, Rectum and Colon. Vol. 1. London: WB Saunders, 1993; 939-1053.

7. Phillips RKS, Hittinger R, Blesovsky L, Fry JS, Fielding LP. Local recurrence following curative surgery for large bowel cancer: 1. The overall picture. Br J Surg 1984; 71:12-16.

8. Steele Jr. Colorectal cancer, in Cancer Surgery: Mc Kenna RJ and Murphy GP. JB Lippincott company, Philadelphia, 1994; 125-184.

9. Ng IO, Luk ISC, Yuen ST et al. Surgical lateral clearance in resected rectal carcinomas. A multivariate analysis of clinicopathologic features. Cancer 1993; 71:1972-1806.

10. De Azevado JP, Dozois RR, Gunderson LL. Locally recurrent rectal cancer: surgical strategy. World J Surg 1992; 16: 490-4.

11. Corder AP, Karanjia ND, Williams JD, Heald RJ. Flush aortic tie versus selective preservation of the ascending left colic artery in low anterior resection for rectal carcinoma. Br J Surg 1992; 79: 680-2.

12. Karanjia ND, Corder AP, Holdsworth PJ, Heald RJ. The risk of peritonitis and fatal septicemia and the need to defunction the low anastomosis. BrJ Surg 1991; 78:196-8.

13. Mealy K, Burke P, Hyland J.Anterior resection without a defunctioning colostomy: questions of safety. Br J Surg 1992; 79: 305-7.

14. McAnena OJ, Heald RJ, Lockhart-Mummery HE. Operative and function results of total mesorectal excision with ultralow anterior in the management of carcinoma of the lower one-third of the rectum. Surg Gynecol Obst 1990; 170: 517-21.

15. Wiig JN, Wolff PA, Tveit KM, Giercksky KE. Location of pelvic recurrence after curative low anterior resection for rectal cancer. Eur J Surg Oncol 1999 Dec; 25(6):590-4.

16. Havenga K, Enker WE, Norstein J, Moriya Y, Heald RJ, van Houwelingen HC, van de Velde CJ. Improved survival and local control after total mesorectal excision or D3 lymphadenectomy in the treatment of primary rectal cancer: an international analysis of 1411 patients. Eur J Surg Oncol 1999 Aug; 25(4):368-74.

17. Karanjia ND, Corder AP, Beam P, Heald RJ. Leakage from stapled low anastomosis after total mesorectal for carcinoma of the rectum. Br J Surg 1994; 81:1224-6.