

TOTAL MESORECTAL EXCISION FOR RECTAL CANCER

Stimuli for TME:

1. High incidence of local recurrence after resection of rectal cancer.
2. Although a 2 cm distal mucosal margin is adequate, local control of rectal cancers requires removal of the mesorectum and lateral pararectal tissue.
3. No benefit in survival or local disease control with a more extended lymphadenectomy (iliac/periaortic nodes/pelvic sidewall) and the complication rates are higher with these more extensive procedures.

Goals of TME:

1. Provide an adequate lymphadenectomy for resection of rectal cancer.
2. Optimize the oncologic operation by not only removing draining lymph nodes, but also maximizing lateral resection margins around the tumor.

Morbidity of TME:

Increases incidence of anastomotic leaks because of devascularization of the rectal stump.

- Leak rates of 11-16% after TME compared to 6-9% after non-TME resection.

Carlsen E, Schlichting E, Guldvog I, Johnson E, Heald RJ. Effect of the introduction of total mesorectal excision for the treatment of rectal cancer. Br J Surg 1998;85(4):526-9.

- Compared 2 groups of patients undergoing resection of rectal cancer:
- 76 patients from 1992-1993 before TME was introduced
- 76 patients from 1994 to 1995.
- TME associated with 16% leak rate as compared to 8% leak rate for non-TME.
- No difference in in-hospital mortality.

Technique:

1. Sharp excision and removal of the mesorectum by dissecting outside of the investing fascia of the mesorectum.
2. Can be facilitated by high ligation of the IMA and IMV.
 - Data on whether high ligation also results in decreased recurrence remains equivocal.
3. Lateral margins can be maximized by sharp dissection outside the mesorectum on the endopelvic fascia.
4. It is controversial whether the entire mesorectum must be excised for all rectal cancers or whether the mesorectum can be sharply divided at the distal resection margin.

MD Anderson - The mesorectum is excised to the distal resection margin, which includes nearly the entire mesorectum for lower and lower half of middle rectal cancers, while preserving a portion of the mesorectum for the upper and upper half of middle rectal cancers. No data that this compromises the oncologic operation and may decrease the incidence of devascularization of the rectal stump and anastomotic leak.

Evaluation of TME Using EBM:

1. No prospective, randomized studies comparing TME vs. conventional mesorectal excision.

2. However, some institutions have demonstrated a decreased incidence of the local recurrence rates with TME compared with historical controls using conventional surgery.

Review of Literature:

Kapiteijn E, Putter H, van de Velde CJ; Cooperative investigators of the Dutch ColoRectal Cancer Group. Impact of the introduction and training of total mesorectal excision on recurrence and survival in rectal cancer in The Netherlands. Br J Surg 2002;89(9):1142-9.

- Compared short and long-term outcome in the TME Trial (1996-1999; n=269) to an older trial before TME - CRAB = Cancer Recurrence and Blood Transfusion (1987-1990; n=661) for patients operated on for curative intent who did not undergo preoperative chemoradiotherapy.
- Higher incidence of anastomotic leak with TME in univariate analysis but not multivariate analysis.
- TME decreased local recurrence from 16% to 9% (p=0.002).
- Type of operation was an independent predictor of survival - TME associated with improved survival (p=0.019).

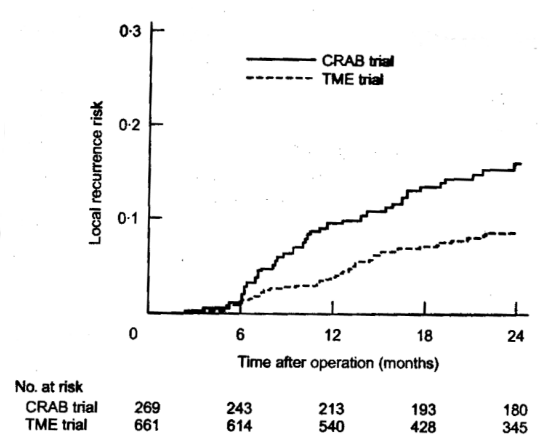


Fig. 1 Kaplan–Meier plot showing influence of type of operation on local recurrence risk. CRAB, cancer recurrence and blood transfusion; TME, total mesorectal excision. Cox model: hazard ratio TME 0.02 (95 per cent confidence interval 0.00 to 0.22), *P* = 0.002

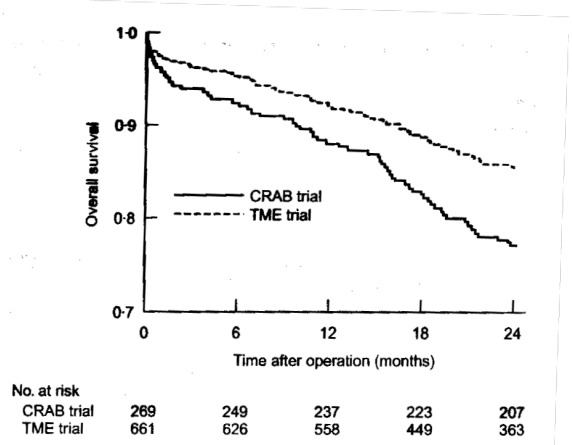


Fig. 3 Kaplan–Meier plot showing influence of type of operation on overall survival. CRAB, cancer recurrence and blood transfusion; TME, total mesorectal excision. Cox model: hazard ratio TME 0.21 (95 per cent confidence interval 0.06 to 0.78), *P* = 0.019

2. Kapiteijn E, Marijnen CA, Nagtegaal ID, Putter H, Steup WH, Wiggers T, et al; Dutch Colorectal Cancer Group. Preoperative radiotherapy combined with total mesorectal excision for resectable rectal cancer. N Engl J Med 2001;345(9):638-46.

- Multicenter randomized trial of to determine whether the addition of preoperative RT improves survival after TME.
- Randomly assigned 1861 patients with resectable rectal CA either to preoperative RT (5 Gy x 5) followed by TME (n=924 patients) or TME alone (n=937).

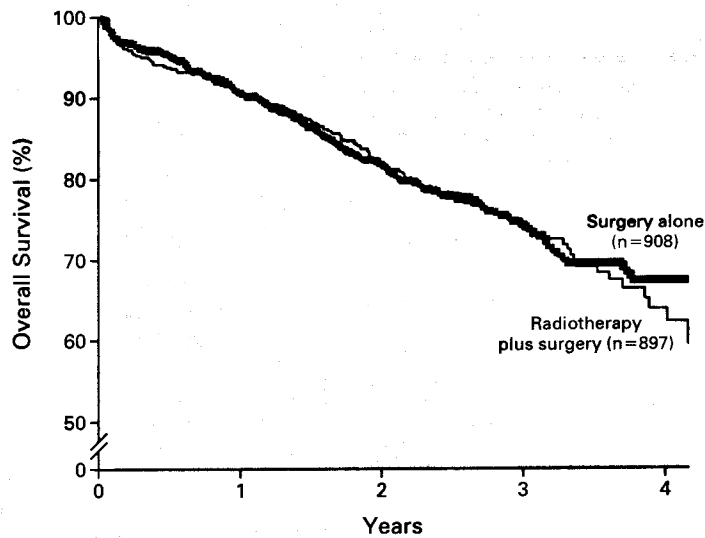
TABLE 2. CHARACTERISTICS OF THE 1805 ELIGIBLE PATIENTS.*

CHARACTERISTIC	RADIOTHERAPY PLUS SURGERY (N=897)	SURGERY ALONE (N=908)	P VALUE
Age — yr			0.79
Median	65	66	
Range	26–88	23–92	
Sex — no. (%)			0.92
Male	573 (64)	578 (64)	
Female	324 (36)	330 (36)	
Distance of tumor from anal verge — no. (%)			0.48
10.1–15 cm	267 (30)	280 (31)	
5.1–10 cm	384 (43)	364 (40)	
≤5 cm	244 (27)	263 (29)	
Unknown	2 (<1)	1 (<1)	
Type of resection — no. (%)			0.12
None	16 (2)	29 (3)	
Low anterior	579 (65)	604 (67)	
Abdominoperineal	251 (28)	234 (26)	
Hartmann†	50 (6)	40 (4)	
Unknown	1 (<1)	1 (<1)	
TNM stage — no. (%)			0.53
0	11 (1)	17 (2)	
I	265 (30)	244 (27)	
II	252 (28)	245 (27)	
III	300 (33)	324 (36)	
IV	61 (7)	61 (7)	
Unknown or no resection	8 (<1)	17 (2)	

*Characteristics were unknown in some cases because not all case-report forms were received. Because of rounding, not all percentages total 100. TNM denotes tumor–node–metastasis.

†A Hartmann resection is a low anterior resection without the construction of an anastomosis.

• Survival:

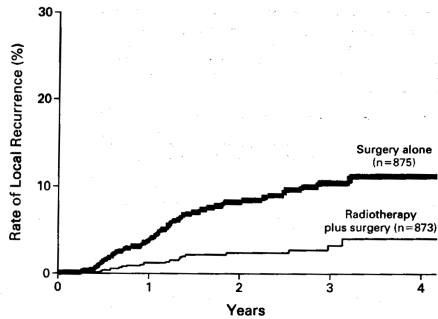


No. AT Risk					
Radiotherapy plus surgery	897	741	435	192	41
Surgery alone	908	744	454	207	42

Figure 1. Rates of Overall Survival in the Population of 1805 Eligible Patients, According to Treatment Group.

At two years, the rate of overall survival was 82.0 percent in the group assigned to radiotherapy and surgery and 81.8 percent in the group assigned to surgery alone (P=0.84).

- Local Recurrence:



No. at Risk

Radiotherapy plus surgery	873	691	407	170	30
Surgery alone	875	688	406	173	37

Figure 2. Rates of Local Recurrence in the Population of 1748 Eligible Patients Who Underwent Macroscopically Complete Local Resection, According to Treatment Group.

At two years, the rate of local recurrence was 2.4 percent in the group assigned to radiotherapy and surgery and 8.2 percent in the group assigned to surgery alone ($P < 0.001$).

TABLE 3. RESULTS OF MULTIVARIATE COX REGRESSION ANALYSIS OF LOCAL RECURRENCE AMONG THE 1748 ELIGIBLE PATIENTS WITH A MACROSCOPICALLY COMPLETE LOCAL RESECTION.*

VARIABLE	HAZARD RATIO (95% CI)	P VALUE
Treatment group		< 0.001
Radiotherapy and surgery	1.00	
Surgery alone	3.41 (2.05–5.70)	
Distance of tumor from anal verge		0.03
10.1–15 cm	1.00	
5.1–10 cm	2.13 (1.13–4.01)	0.02
≤ 5 cm	2.78 (1.22–6.31)	0.02
Type of resection		0.90
Low anterior	1.00	
Abdominoperineal	1.15 (0.59–2.24)	0.68
Hartmann†	1.16 (0.42–3.25)	0.78
TNM stage		< 0.001
I	1.00	
II	3.44 (1.26–9.39)	0.02
III	9.69 (3.89–24.2)	< 0.001
IV (distant metastases but complete local resection)	16.2 (5.40–48.6)	< 0.001

*A variable was included in the multivariate analysis if its P value in the univariate analysis was less than 0.10. Patients with missing data were excluded from the analysis of local recurrence. Twenty-eight patients without a tumor (TNM stage 0) were excluded from the multivariate analysis because they were not at risk for local recurrence. CI denotes confidence interval and TNM tumor–node–metastasis.

†A Hartmann resection is a low anterior resection without the construction of an anastomosis.

3. Morino M, Parini U, Giraudo G, Salvai M, Brachet Contul R, et al. Laparoscopic total mesorectal excision: a consecutive series of 100 patients. Ann Surg 2003;237(3):335-42.

- Prospective study of 100 consecutive laparoscopic LAR with TME's for low and mid-rectal cancers.
- Distal distance from anal verge was 6.1 cm (range of 3-12 cm).
- Conversion rate of 12%.
- Mean postoperative stay of 12 days.
- Overall morbidity: 36%, including 17 anastomotic leaks.
- 30-day mortality: 2%.
- Median f/u of 45.7 months:
 - 18.5% died of cancer.
 - 8.5% are alive with metastatic disease.
 - Port site metastatic rate was 1.4%.

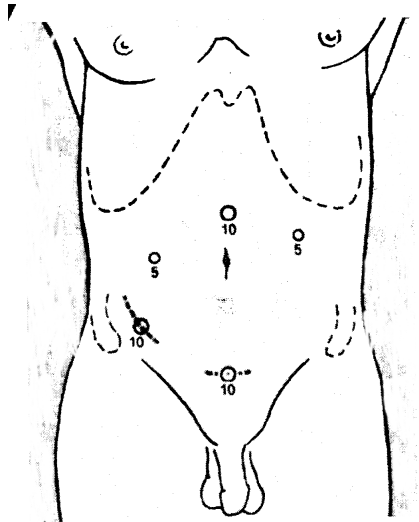


Figure 1. Trocar positions for laparoscopic total mesorectal excision; dotted lines represent possible sites of miniaparotomy. The numbers represent the size of trocars (5 or 10 mm).

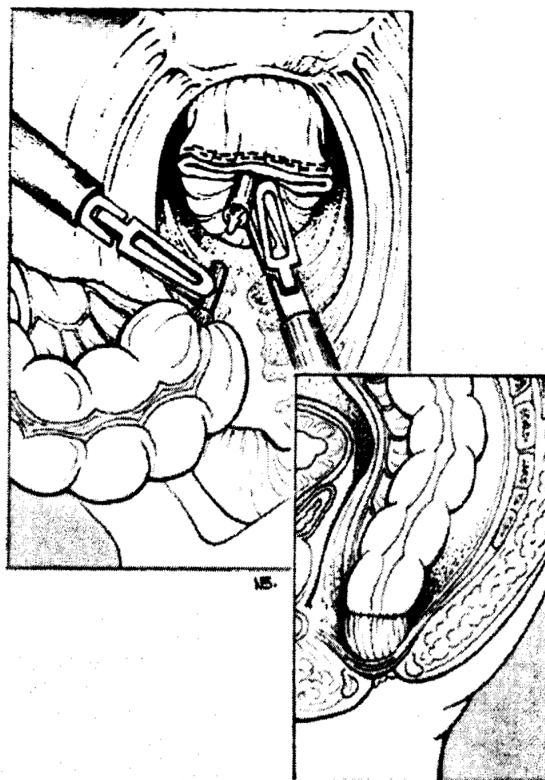


Figure 3. Laparoscopic-assisted end-to-end colorectal anastomosis with a double-stapled technique.

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