Variation in circumferential resection margin: Reporting and involvement in the South-Netherlands

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Abstract

Background: Since the introduction of total mesorectal surgery the outcome of rectal cancer patients has improved significantly. Involvement of the circumferential resection margin (CRM) is an important predictor of increased local recurrence, distant metastases and decreased overall survival. Abdomino perineal excision (APE) is associated with increased risk of CRM involvement. Aim of this study was to analyze reporting of CRM and to identify predictive factors for CRM involvement.
Methods: A population-based dataset was used selecting 2153 patients diagnosed between 2008 and 2013 with primary rectal cancer undergoing surgery. Variation in CRM reporting was assessed and predictive factors for CRM involvement were calculated and used in multivariate analyses.
Results: Large variation in CRM reporting was found between pathology departments, with missing cases varying from 6% to 30%. CRM reporting increased from 77% in 2008 to 90% in 2012 ($p < 0.001$). CRM involvement significantly decreased from 12% to 6% over the years ($p < 0.001$).

In multivariate analysis type of operation, low anterior resection or APE, did not influence the risk of CRM involvement. Clinical T4-stage [odds ratio (OR) = 3.51; 95% confidence interval (CI) = 1.85–6.65) was associated with increased risk of CRM involvement, whereas neoadjuvant treatment (5×5 gray radiotherapy [OR 0.39; CI 0.25–0.62] or chemoradiation therapy [OR 0.30; CI 0.17–0.53]) were associated with significant decreased risk of CRM involvement.
Conclusion: Although significant improvements are made during the last years there still is variation in reporting of CRM involvement in the Southern Netherlands. In multivariate analysis APE was no longer associated with increased risk of CRM involvement.
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Keywords: Rectal cancer; Circumferential resection margin (CRM); Involvement; Abdomino perineal excision (APE); Low anterior resection (LAR)

Introduction

The circumferential resection margin (CRM) is an important prognostic factor in rectal cancer care and a predictor of local recurrence, distant metastases and overall survival.[1,2] The CRM was first described in 1986 by Quirke[3] and is part of a standardized histopathological protocol. Transverse sectioning of the excision specimen is one of the key procedures in this protocol, which is now recommended in almost every national rectal cancer guideline in Europe.

Since the introduction of the CRM, the prognosis of patients with rectal cancer has dramatically improved. The introduction of total mesorectal excision (TME) and extralevator techniques for lower rectal tumors have led to a decrease in CRM involvement, and consequently to less local recurrence and improved metastasis free and overall survival.[4] Besides improved surgical techniques, the introduction of standard magnetic resonance imaging (MRI) has enabled clinicians to properly select patients with locally advanced disease and treat them with preoperatively with (chemo)radiation therapy.[5,6] Also, short course radiotherapy has proved to decrease local recurrence rates,[7,8] similar to long course chemoradiation therapy for locally advanced tumors.[9] Besides prognostic information, the CRM provides the surgeon of essential feedback on the quality of surgery.[3]

Determination of predictive factors for CRM involvement is essential to provide the best patient care. According to the literature more extensive tumors (i.e. T4 and N2 stage tumors) are related to higher CRM involvement rates.[10–12] The results of the Dutch TME trial illustrated a significant difference in CRM involvement between low anterior resection (LAR) and abdomino perineal excision (APE), respectively 14% and 29% ($p < 0.001$).[2] On the other hand, the introduction of new surgical techniques, such as extralevator APE (ELAPE), resulted in less CRM involvement and better oncological outcome in patients with distal rectal cancer.[13,14]

Population-based data on CRM reporting and involvement are rare in the available literature.[15] The aim of the current study was to evaluate variation in CRM reporting within different pathology departments and CRM involvement in different hospitals. Moreover, prognostic factors for CRM involvement were identified using the population-based database of the Eindhoven Cancer Registry (ECR).

Patients and methods

All patients diagnosed with primary rectal cancer (stage I–III) between January 2008 and January 2013 were selected using population-based data from the Eindhoven Cancer Registry (ECR) which is part of the Netherlands Cancer Registry and maintained by the Netherlands Comprehensive Cancer Organization (IKNL). The ECR collects data on all newly diagnosed patients with rectal cancer in the Southern Netherlands. The ECR covers an area with ten community hospitals and six pathology departments. Due to intensive training of the registrars and computerized consistency checks, the quality of the retrospective data is high.[16] Consent was obtained from all patients in accordance with the local and international legislation (declaration of Helsinki).

Patients who were diagnosed in another region, but operated in one of the ECR hospitals were not included, as well as patients who did not undergo an operation. Other exclusion criteria were stage IV rectal cancer and patients who underwent a local excision of their rectal tumor.

The outcome of interest was CRM reporting and CRM involvement. Rectal cancer was defined as a carcinoma of the rectum within 15 cm of the anal verge. In the present study a negative or free CRM was defined as more than 1 mm, or when "free" was reported in the pathology report. A positive resection margin was defined as a margin of 1 mm or less, or when "positive" was reported in the pathology report.

The CRM reporting was assessed by the year of diagnosis as well as for pathological laboratories of the ECR area. Other variables that were collected for analyses were: comorbidity according to the Charlsons comorbidity index, tumor characteristics, neoadjuvant therapy, type of surgery, and localization of the tumor (topography). Neoadjuvant therapy was divided in four groups; no neoadjuvant therapy, short term 5×5 gray (Gy) radiotherapy (RT), chemoradiation therapy (CRT), and only chemotherapy. The type of surgery was divided into four groups: the LAR, APE, Hartmann operations and other surgery (which included exenterations and proctocolectomies). The localization of the tumor was categorized into three groups (based on MRI if available): the lower-rectum (distance from anus 0–49 mm), the mid-rectum (distance from anus 50–99 mm) and the upper-rectum (distance from anus ≥100 mm). For describing clinical tumor characteristics the following abbreviations are used; clinical tumor stage (cT), clinical node stage (cN).

In the analysis to determine predictive factors for CRM involvement all patients with missing pathology reports were excluded. In the multivariate logistic regression analyses for CRM involvement adjustments were made for sex, age category (18–49, 50–64, or age more than 65 years old), cT, cN, the use of neoadjuvant thereapy (no therapy, 5×5 Gy RT, or CRT), distance of the tumor to the anal verge (lower, mid, and upper rectum), type of surgery (LAR, APE, Hartmann, or any other type of surgery), and surgical approach (open, laparoscopy, or conversion to open surgery). The derived odds ratios (ORs) and the 95% confidence intervals (CIs) are presented.

Furthermore, it was evaluated whether the number of operations on rectal cancer per hospital per year influenced CRM involvement. To do so, hospitals were divided into three groups: hospitals in which ≤20 operations, 21 to 40 operations or >40 operations per year were performed. Because of centralization of cT4-stage tumors to specialized centers they were excluded from this analysis to avoid negative selection bias.

All statistical analyses were performed using SPSS version 21.0 for Windows (Inc., Chicago, Illinois, USA). P-values were two-sided and values < 0.05 were considered significant.

Results

Patients and characteristics

A total of 3348 patients were diagnosed with rectal cancer during the study period. In total 71% of the patients