

ORIGINAL REPORT

Standardization of Histopathological Auditing of the Mesorectal Specimen in the Brazilian National Cancer Institute / INCA

Leonaldson Santos Castro,¹ MSc, PhD, TCBC, FACS; Jorge Mali Júnior,¹ MD; Gustavo Stoduto,¹ MD; Audrey Tieko Tsunoda,¹ MD; José Humberto Simões Corrêa,¹ MSc, TCBC; Rubens Kesley,¹ MSc, MD; Jurandir de Almeida Dias,¹ MD; Ivanir Martins de Oliveira,² MD

1 Abdominal-Pelvic Surgery Service Brazilian National Cancer Institute/Rio de Janeiro-Brazil

2 Pathology Service; Brazilian National Cancer Institute/Rio de Janeiro-Brazil

ABSTRACT

Aiming the decrease of local recurrence, the Heald's standardization was based on the clinical and pathological studies of Quirke and Reynolds that demonstrated the importance of the systematic exam of the radial margins which predicted the occurrence of recurrence, evidencing that most of the pelvic recurrences happened when the circumferential limit was involved. The Abdominal-Pelvic Surgery and Pathology Services of Brazilian National Cancer Institute (INCA) standardized the evaluation of radial margin of extraperitoneal rectum tumors submitted to a curative surgery since July 2004. Besides that the Quirke's technique of histopathological analysis of the mesorectum modified by the INCA will be described.

Key words: Rectal neoplasms/anatomy/histology. Classification/standards.

INTRODUCTION

Since 1908, when Ernest Miles established the abdominoperineal resection as conventional treatment for the rectum tumors,¹ there have been several clinical and surgical advancements including the advent of mechanical stapling devices, the improvement of anesthetic techniques and post operative cares. In spite of these aforementioned developments, the local recurrence rate for the rectum adenocarcinoma kept concerning with indices from 12% to 38%.² There was also the high incidence of sexual and bladder dysfunctions that occurred on the post operative of curative resections using the

technique of blunt dissection. Possible explanations for this high and variable local recurrence rate include the surgeon experience, inadequate resection and suture implantation of lumen tumor cells. However, the answer to this question was about to be answered, when Heald standardized the concept of the total mesorectal excision (TME) in 1979.³ Aiming the decrease of local recurrence, the Heald's standardization was based on the clinical and pathological studies of Quirke and Reynolds that demonstrated the importance of the systematic exam of the radial margins which predicted the occurrence of recurrence, evidencing that most of the pelvic recurrences happened when the circumferential limit was involved.^{4,5} On later studies, Heald and Enker published their personal series using the TME technique demonstrating a cumulative risk of local recurrence, in five years, of 2,7% and 7,3%, respectively.^{6,7} These results were reproduced by other authors and the TME technique became recognized worldwide resulting in significative decrease of local recurrence and increase of survival when compared to the conventional technique.

Correspondence

Leonaldson dos Santos Castro
Chefia do Abdome – INCA – HCI
Praça da Cruz Vermelha, 23 5º andar
20230-130 Rio de Janeiro – Brazil
E-mail: leonaldson@uol.com.br

Among the benefits of TME are a better local control as consequence of uninvolved margins of resection of the intramesorectal tumors, nerve-sparing dissection less likely to lead to bladder and sexual dysfunctions and a higher possibility of sparing anal sphincter. The major morbidity associated with this procedure includes a longer operative time, an increase of rate of anastomotic leak due to devascularization of the rectal stump and a higher intraoperative blood loss. The TME is formally indicated in extraperitoneal rectum tumors given irrefutable evidence, demonstrated by Quirke, of intramesorectal tumor deposits up to 3.0cm beyond the inferior tumor border.

The Abdominal-Pelvic Surgery and Pathology Services of Brazilian National Cancer Institute (INCA) standardized the evaluation of radial margin of extraperitoneal rectum tumors submitted to a curative surgery since July 2004. Besides that the Quirke's technique of histopathological analysis of the mesorectum modified by the INCA will be described.

QUIRKE'S METHOD FOR DISSECTING RECTAL ADENOCARCINOMA

In summary, the fresh mesorectal fat is inked and then rectal is opened above and below the tumour, along the antimesenteric border, avoiding the tumour, and fixed in 10% formalin for a minimum of 48 – 72 hours. Dissection consisted of serial 5 - 10mm slicing of the whole tumour and the surrounding mesorectum in the transverse plane. The slice containing the most lateral spread was identified as the "primary slice" and was selected for division into multiple blocks which were all embedded and then routinely processed for haematoxylin and eosin in 5µm sections. Specimens were then ordered to identify the shortest distance (in millimetres) from the outermost part of the tumour to the lateral resection margin. If macroscopic tumour deposits were noted in the mesorectum outside the main tumour, the measurement was made to the outer border of the deposit. In this method, a circumferential margin greater than 1mm was defined as an uninvolved margin.^{4,8}

HISTOPATHOLOGICAL TECHNIQUE MODIFIED BY THE BRAZILIAN NATIONAL CANCER INSTITUTE

The histopathological technique used to analyse surgical specimen consists in three major procedures. At first, with fresh specimen and intact mesorectum, it is realized a global macroscopic evaluation of the specimen enhancing its exterior surface which must be bright, cylindrical and intact (Figure 1). Afterwards the rectum segment is longitudinally sectioned up to 1cm above and below the tumour provided that the distal limit is 2cm or more. Next, the distance from the tumour to the distal surgical margin is measured using a ruler which is guided by the pathologist. At the end of this first stage, the kind of TME is classified as 1, 2 or 3. Grade 1, with deep clefts into the mesorectal fat that expose the bared muscularis of the rectal wall; grade 2, with superficial clefts into the mesorectal fat that do not expose the muscularis and grade 3, completeness mesorectal excision with fascial

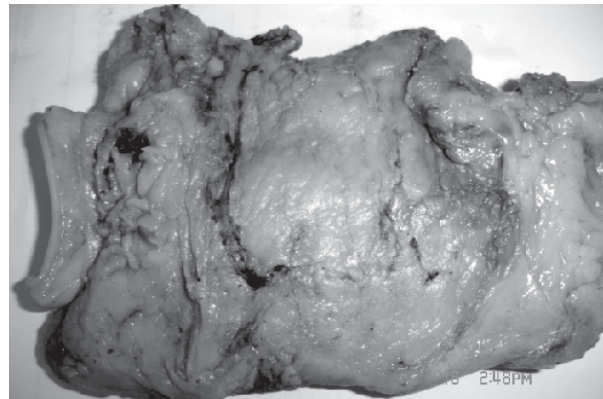


Figure 1 - Analysis of surgical fresh specimen. Mesorectal excision degree III



Figure 2 - Mesorectal surface inked in blue



Figure 3 - Serial transverse slices ordered for analysis



Figure 4 - Transverse cut demonstrating radial margin involved by tumour

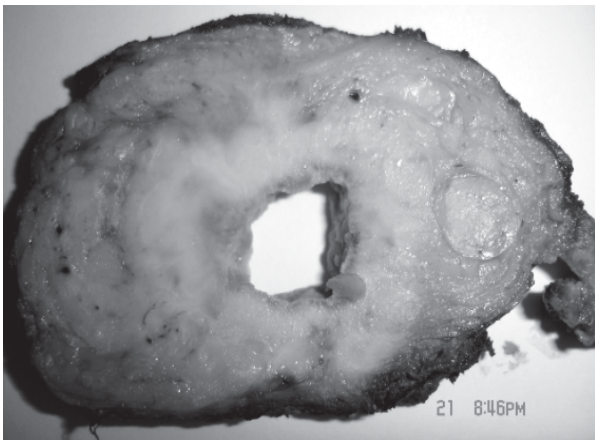


Figure 5 - Transverse cut showing radial margin involved by direct extension of the tumour and lymph node implants in the mesorectum

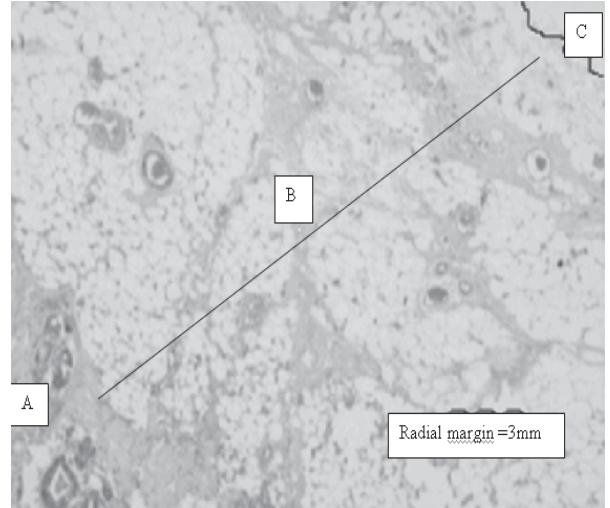


Figure 6 - A: Tumour. B: Distance from the tumour to the radial margin (1mm). C: Radial margin

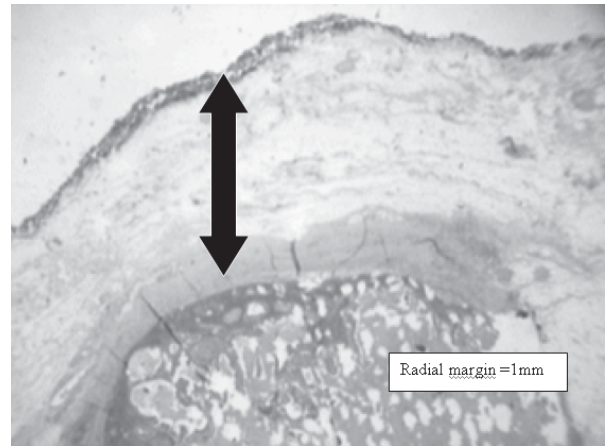


Figure 7 - Distance from the lymph node to the radial margin (Radial margin involved)

envelope that is intact circumferentially. After the surgical specimen is fixed in tamponated formol for 48 hours. On the second procedure the intact mesorectum is superficially colored in blue or black ink followed by transverse slice with serial cuts of 5mm of thickness of the colored portion (Figure 2 and 3). Right after, the slices are ordered the shortest distance from outermost part of the tumour or tumour deposit to the resection margin (Figures 4 and 5). The circumferential margin greater than 1 mm was defined as an uninvolved margin (Figure 6 and 7).

DISCUSSION

TME is defined as the complete excision of the intact unit, rectum and mesorectum. Anatomically, this unit corresponds to the posterior visceral compartment of the pelvis, in which the rectum and the mesorectum are enveloped within the visceral pelvic fascia.

TME has been advocated as the appropriate operation for rectal cancer, improving survival and reducing the rates of local recurrence in comparison with conventional surgery, since that the tumour is not burst the visceral fascia. Macfarlane⁷ and Enker,⁹ reported a local failure rate of 5 – 8%, while conventional operation is associated with a worldwide incidence of pelvic failure averaging 30%. Adam¹⁰ examined the circumferential margins for tumor involvement and reported that when circumferential margins were positive, 78% of these patients developed pelvic failure, while local recurrence occurred only in 10% of those with no circumferential involvement.

Quirke¹¹ has emphasized the importance of the dissected mesorectum and also made a review on the standard method of examining the pathologic specimen following resection of the rectum for cancer. They suggest that serial slices through the tumour, the rectum and mesorectum, are a more sensitive means of evaluating the pathology in relation to the prognosis, in contrast to routine sampling methods in which a variable number of blocks are taken only from the luminal surface.

Comparing the original technique described by Quirke to the INCA method, the difference is that we first fix the resected specimen in formol and only after 48 hours we color its surface, then the microscopic analysis is proceeded. The INCA believes that this sequence allows a more dynamic process and a lower degree of autolysis of the surgical specimen since when the specimen is first colored, as Quirke described, it is necessary a considerable time to dry the specimen and afterwards fix it. This period is that increases the degree of autolysis of the mesorectal specimen.

We believe that the establishment of a routine for the histopathological mesorectum evaluation is essential to analyse the circumferential margin, the main prognostic indicator of pelvic recurrence of rectal cancer.

Besides that, we think that in the future the information about circumferential margin will be the principal marker to select the patients for postoperative adjuvant therapy.

REFERENCES

1. Miles WE. A method of performing abdomino-perineal resection for carcinoma of the rectum and of the terminal portion of the pelvic colon. *Lancet* 1908; 2:1812-3.
2. Kapiteijn E, Van de Velde CJH. The role of total mesorectal excision in the management of rectal cancer. *Surg Clin N Am* 1998; 82:995-1007.
3. Heald RJ. A new approach to rectal cancer. *Br J Hosp Med* 1979; 22:277-81.
4. Quirke P, Durdy P, Dixon MF, Williams NS. Local recurrence of rectal adenocarcinoma due to inadequate surgical resection. Histopathological study of lateral tumour spread and surgical excision. *Lancet* 1986; 1:996-9.
5. Reynolds JV, Joyce WP, Dolan J, Sheahan K, Hyland JM. Pathological evidence in support of mesorectal excision in the management of rectal cancer. *Br J Surg* 1996; 83:1112-5.
6. Heald RJ, Ryall RD. Recurrence and survival after total mesorectal excision for rectal cancer. *Lancet* 1986; 1:1479-82.
7. Enker WE, Thaler HT, Cranor ML, Polyak T. Total mesorectal excision in the operative treatment of carcinoma of the rectum. *J Am Coll Surg* 1995; 181:335-46.
8. Total Mesorectal Excision (TME). Available at: URL:<http://www.ualberta.ca/~rmclean/tme.htm>. Accessed May 5, 2005.
9. MacFarlane JK, Ryall RDH, Heald RJ. Mesorectal excision for rectal cancer. *Lancet* 1993; 341:457-60.
10. Adam IJ, Mohamdee MO, Martin IG, Scott N, Finan PJ, Johnston D, et al. Role of circumferential margin involvement in the local recurrence of rectal cancer. *Lancet*; 344:707-11.
11. Quirke P. Circumferential margins and pelvic recurrence in rectal: pathologic evaluation. In: Swap course an total mesorectal excision in rectal cancer The royal College of surgeons of England, London, 1996; 27-28 April.