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Pathology audit of 1996 and 2000 reporting for rectal cancer in BC

Our pathology reports do not consistently contain assessment of the radial resection margin or minimum number of lymph nodes required to determine adequacy of surgical resection and need for adjuvant therapy. Clearly we need to do better.

ABSTRACT: We reviewed pathology of 933 rectal cancer specimens in BC for the years 1996 and 2000. Pathology reports were assessed for inclusion of data elements now used as standard reporting for rectal cancer in view of the surgical technique known as *total mesorectal excision.* We found little change between 1996 and 2000. We also found that pathology reports routinely assessed tumor size, distal margin, layer of bowel wall invasion, differentiation, and lymphatic and vascular invasion. However, radial margin was assessed in only 48% of reports and average number of lymph nodes assessed was seven (the recommended minimum number is 12). Therefore, BC pathologists need to improve their reporting of rectal cancer specimens in order for us to better understand the quality of our surgical technique of mesorectal excision and to improve staging for recommendation of adjuvant treatment and prognosis.

Total mesorectal excision (TME) is the surgical technique of choice for resection of rectal cancer. TME is associated with the lowest published recurrence rates—5% to 10%—for rectal cancer management.[1-4] Surgeon awareness of TME has increased principally due to championship by Dr Bill Heald of Basingstoke, UK. Dr Heald has promoted TME as a "specimen-oriented surgery" in order to emphasize that the surgeon must take great care to excise the rectal cancer within an intact mesorectal fascial envelope in order to minimize the likelihood of recurrent cancer. Within the mesorectal fascial envelope is the rectum, the rectal cancer, and all rectal blood vessels and accompanying lymphatics and lymph nodes. The excised mesorectal specimen is a package based on the oncologic principle of resecting a cancer and all regional lymph nodes within a fascial compartment.

Pathology of the TME specimen has been developed and advocated by Dr Phil Quirke, a pathologist from Leeds, UK. Dr Quirke has promoted the circumferential margin of the TME envelope as a significant predictor of recurrent cancer.[5,6] Recent large rectal cancer trials in the Netherlands and Norway have adopted Dr Quirke's methodology of TME pathology. These large trials have convincingly shown an association between intactness of the TME envelope and local recurrence.[3,7]

From our review of rectal cancer outcomes in BC in 1996,[8] we became aware that the radial margin was inconsistently assessed in pathology reports (the term *radial* is equivalent to lateral and circumferential margin). Additionally, it seemed that the number of lymph nodes assessed was inconsistent despite recommendations that assessment of 12 or more nodes was required to assure accuracy of a metastatic node-negative stage.[9]

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The main aim of this study is to determine which data elements of TME pathology are being reported in pathology reports in BC so that pathologists and surgeons in this province can be aware of the potential need to improve pathology reporting of TME specimens. A secondary aim is to determine whether there was change in the pathology reports between 1996 and 2000 (in parallel to increasing surgical awareness of TME as a surgical technique). A third aim is to assess whether pathology reporting of rectal cancer was different between University of British Columbia teaching hospitals vs community hospitals or between high-volume vs low-volume rectal cancer hospitals.

A TME pathology reporting template was devised to include data elements of gross descriptions, histology, and metastatic spread.

Methods

All rectal cancer cases registered in the BC Cancer Agency for 1996 and 2000 were reviewed. The study was approved by the BC Cancer Agency research review committee.

In 1996 and 2000, 1532 rectal cancer cases were identified in the BC Cancer Agency registry. A number of cases (516) were excluded on the basis of inappropriateness of assessing circumferential resection margins including polypectomy, transanal excision, biopsy only, and diagnosis on autopsy. In addition, cases of sigmoid colon cancer and nonrectal primary cancers were excluded. We were unable to retrieve pathology reports in 9% (83) of cases. After exclusions and incomplete information, there were 933 cases we could evaluate.

We devised a TME pathology reporting template based on the recently reported Dutch TME and preoperative radiation trial and on the currently enrolling MRC (UK) TME and preoperative radiation trial. Data categories of the TME pathology reporting template are categorized as elements for gross specimen description, histology, and metastatic spread.

TME pathology reporting template data elements for gross specimen description were as follows:

- Distance of tumor from dentate line.
- Relationship of tumor to peritoneal reflection.
- Maximum tumor diameter.
- Distance of tumor from proximal margin.
- Distance of tumor from distal margin.
- Percent tumor occupies of rectal circumference.
- Tumor perforation.
- Mesorectal fascia intact.
- Gross radial margin clear.

TME pathology reporting template data elements for histology were as follows:

- Differentiation.
- Local invasion (submucosa, muscularis propria, beyond muscularis propria, subserosa, through serosa, adjacent organ).
- Minimum distance from tumor to radial margin.
- Minimum distance from lymph node to circumferential margin.
- Lymphatic or vascular margin.

TME pathology reporting template data elements for metastatic spread were as follows:

- Number of lymph nodes examined.
- Apical node positive (along a named blood vessel).
- Extranodal tumor extension.
- Extravascular tumor extension.

We assessed 1996 and 2000 rectal cancer pathology reports in BC for the above data elements of the TME pathology reporting template. Data were recorded as data element assessed or not mentioned. Summary data are expressed as a percentage of reports containing an assessment of the data element or as average ± standard deviation.

For this study, Vancouver Hospital and St. Paul's Hospital were classified as pathology teaching hospitals. All other hospitals were classified as community hospitals. There were 18 high-volume rectal cancer hospitals (defined as having 11 or more cases per year) and 34 low-volume rectal cancer hospitals (performing up to 10 cases per year). Frequencies were compared using chi-square and means were compared using Student *t*-test. Data were analyzed using SPSS (version

11.0, Chicago, IL). Where indicated, the results were expressed as mean ± 1 standard deviation.

Results

Tables 1, 2, and 3 give the summary data for gross specimen description, histology, and metastatic spread, respectively.

Assessment of the gross radial margin was present in 48% of pathology reports and the distal resection margin in about 79% of pathology reports. Assessment of relationship to peritoneal reflection was present in about 24% of pathology reports and tumor perforation in about 29% of pathology reports. Assessment of mesorectal fascia envelope intactness was present in about 10% of pathology reports.

Assessment of local invasion and lymphatic or vascular invasion were present in the vast majority of reports. However, minimum distance from the tumor to the radial margin was assessed in only about 25% of reports.

Average number of lymph nodes assessed was 7.0. Assessment of the apical lymph node was reported in 8% of cases.

No great overall improvement was seen in reporting of TME pathology data elements between 1996 and 2000 (Tables 1, 2, and 3). However, radial margin reporting increased from 42% to 53%, $P = 0.001$, and average number of lymph nodes assessed increased from 6.3 to 7.4, $P = 0.004$, from 1996 to 2000, respectively. Teaching hospitals assessed radial margin slightly more frequently than community hospitals, 61% vs 45%, $P = 0.001$. Teaching hospitals also assessed slightly more lymph nodes than community hospitals, 7.8 ± 6 vs 6.8 ± 5, $P = 0.04$. High-volume rectal cancer hospitals assessed radial margin more frequently than low-volume hospitals, 49% vs 26%, $P = 0.002$. High-volume rectal cancer hospitals assessed slightly more lymph nodes than low-volume hospitals, 7.0 ± 5 vs 5.1 ± 4, $P = 0.02$.

Table 1. Gross description data elements.

	1996	2000
Distance of tumor from dentate line	18%	23%
Relationship of tumor to peritoneal reflection	22%	26%
Maximum tumor diameter	95%	93%
Distance of tumor from proximal margin	48%	27%
Distance of tumor from distal margin	80%	79%
Percent tumor occupies of rectal circumference	27%	33%
Tumor perforation	36%	23%
Mesorectal fascia envelope intact	9%	12%
Gross radial margin clear	42%	53%

Table 2. Histology data elements.

	1996	2000
Differentiation	97%	94%
Local invasion	99%	97%
Maximum distance of spread from muscularis propria	81%	65%
Minimum distance from tumor to radial margin	23%	26%
Minimum distance from lymph node to circumferential margin	2.1%	1.5%
Lymphatic or vascular invasion	90%	89%

Table 3. Metastatic spread.

	1996	2000
Number of lymph nodes examined		
—Mean	6.3	7.4
—SD	5.1	5.3
Apical node positive (along a named blood vessel)	7.4%	7.2%
Extranodal tumor extension	43%	37%
Extravascular tumor extension	36%	29%

Discussion

The main finding is that 1996 and 2000 pathology reports in BC did not consistently assess radial margins and did not meet the minimum number of lymph nodes of 12 required to confidently assign a negative nodal metastatic stage. Although there was no overall change in reporting apparent between 1996 and 2000, reporting of radial margin involvement and number of lymph nodes examined did

increase slightly. Teaching and high-volume hospitals did report slightly higher rates of radial margin assessment and lymph nodes compared to community and low-volume hospitals.

Significant clinical improvements in rectal cancer outcomes have occurred in Sweden, the Netherlands, and Norway[2-4] from teaching by Dr Heald on the surgical resection of rectal cancer using the TME technique and by Dr Quirke on pathology processing of the rectal cancer specimen. From our review of rectal cancer outcomes in BC in 1996, we have identified the problem that our local recurrence rates are much higher than those published in these recent reports.[8] Our local recurrence rates for rectal cancer in 1996 were stage 1–7%, stage 2–16%, and stage 3–27%. By comparison, using techniques of TME and preoperative radiation, the Dutch reported local recurrence rates of stage 1–0.5%, stage 2–1.0%, and stage 3–4.3%. Previous local recurrence rates for rectal cancer in the Netherlands was about 40%. We must replicate this improvement achieved by the Dutch, Swedes, and Norwegians using improved surgical and pathologic techniques in BC.

An integral part of TME surgery is pathology assessment using TME pathology techniques developed by Dr Quirke.[5] Attention to assessment of the intactness of the TME fascial envelope will provide immediate feedback to the surgeon about the quality of the resected rectal cancer specimen.

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In Dr Quirke's protocol, pathologists will assess minimum distance of tumor to radial margin. This measurement will provide prognosis about recurrence, since local recurrence has been shown to increase significantly if it is less than 1 mm.[5,6] Most recently, the Dutch have reported that a tumor-to-radial-margin distance of 2 mm is highly related to local recurrence.[7] Dr P. Hermanek has advocated assignment of a radial margin/residual disease status to complement TNM staging.[10] *R0* refers to a negative radial margin with no residual disease. *R1* refers to microscopically positive radial margin with assumed residual microscopic disease. *R2* refers to macroscopically positive radial margin with macroscopic residual disease. From our 1996 review, we concur that residual margin disease is an important prognostic factor for survival. Survival at 4 years of follow-up was about 47% for margin-positive cancer resection compared to 76% for margin-negative cancer resection, $P = 0.0001$.[8]

Lymph node assessment is a key prognostic factor. In our 1996 review, local recurrence was significantly affected by lymph node status; stage 2–16% vs stage 3–27%. However, understaging metastatic lymph node status could have a significant detrimental effect on survival. The average number of lymph nodes assessed in 1996 was six. This low number of assessed lymph nodes indicates the possibility of understaging our 1996 cases, particularly since 4-year survival in our 1996 review survival was stage 2–78% vs stage 3–72%. Since stage 2 cancer should have survival better than 80%, it is possible that stage 3 designation was underreported. The alternative explanation is that resected specimens in fact did not contain sufficient mesentery and sufficient lymph nodes for assessment, which could reflect poor surgical technique and incomplete mesorectal excision. Nevertheless, it is generally understood that searching for lymph nodes is a potentially difficult task that requires great diligence to achieve the desired minimum number to provide accurate nodal status staging.

This audit was performed to further assess our clinical outcomes review of BC in 1996. The second year of the audit (2000) was chosen as the most recent complete year as possible in the BC Cancer Agency registry. Number of nodes examined increased statistically, but the increase is not clinically significant. Clearly, no clinically significant change was apparent in content of pathology reporting between 1996 and 2000. However, revised guidelines for BC pathologists were not published by the BC Association of Laboratory Physicians until

December 2001 (*Surgical Pathology Minimal Reporting Guidelines—Version 3, December 2002*, available at http://bcalp.ca/pub_documents.html). These revised minimum reporting guidelines contain the data elements radial margin, perforation, and pTNM stage. Dr Quirke's TME pathology method was demonstrated at the Vancouver conference on rectal cancer, 30 November 2002. We anticipate that this educational update for pathologists will improve pathology reporting for rectal cancer in BC.

Our high local recurrence rates in BC could be due to residual tumor left behind at radial resection margins or in lymph nodes, or suboptimal use of adjuvant therapy. Our pathology reports do not consistently contain assessment of the radial resection margin or minimum number of lymph nodes required to determine adequacy of surgical resection and need for adjuvant therapy. Clearly we need to improve pathology reporting practices in BC so we can improve our provincial clinical outcomes.

Residual margin disease is an important prognostic factor; the pathology report should add assessment of R0, R1, or R2 to the TNM staging of the resected specimen.

Competing interests

None declared.

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