Surgeons' Evaluation of Colorectal Cancer Resections Against Standard HPE Protocol—Auditing the Surgeons

Ismail Sagap · Abdel Latif K. Elnaim · Imtiaz Hamid · Isa M. Rose

Received: 4 October 2009 / Accepted: 7 October 2009 / Published online: 15 February 2011
© Association of Surgeons of India 2011

Abstract The survival of Colorectal Cancer patients is very much dependent on complete tumor resection and multimodality adjuvant treatment. However, the main determinants for management plan of these patients rely heavily on accurate staging through histopathological examination (HPE). A reliable standard HPE protocol will be a significant impact in determining best surgical outcome. We evaluate surgeons' intra-operative judgment and the quality of resected specimens in the treatment of colorectal cancers. To quantify the quality of surgery by applying standard HPE protocol in colorectal cancer specimens and to assess the use of new format for pathological reporting in Colorectal Cancer using a formulated standard proforma. We perform a prospective observation of all colorectal cancer patients who underwent surgical resection over 8 month duration. Surgeons are required to make self-assessment about completion of tumor excision and possible lymph nodes or adjacent organ involvement while all pathologists followed standard reporting protocol for examination of the specimens. We evaluate the accuracy of surgeons judgment against HPE. The study involved 44 colorectal cancers comprising of 23 male and 21 female patients. The majority of these patients were Malay (50%) followed by Chinese (43%) and Indian (7%). The main presenting symptoms were bleeding (32%), intestinal obstruction (29%) and perforation (7%). Sixteen (36%) patients underwent emergency surgery. Rectal tumor was the commonest (53%) followed by sigmoid colon (22.7%). Neoadjuvant Chemoradiation were given to 8 patients and

complete pathological response was observed in 1 (12.5%) of these. The final TNM classification for staging were; stage I (22.7%), stage IIa (18.2%), stage IIb (11.4%), stage IIIa (2.3%), stage IIIb (25%), stage IIIc (13.6%) and stage IV (6.8%). The commonest surgery performed was anterior resection with mesorectal excision (43.2%). Ten patients (22.7%) had laparoscopic surgery with 3 (30%) patients converted to open surgery. The surgeons claimed to have performed a curative resection with complete excision and clear margin in 40 (90%) patients. Of these, only 1 (2.5%) patient had a positive resection margin. Meanwhile, the surgeons reported involvement of resection margins in 4 cases but this was disputed by the HPE in all 4 cases. Lymph nodes involvement was detected intra-operatively in 13 (29.5%) of the cases and all were proven positive for metastases through HPE. On the other hand, of the remaining 31 patients who were reported as no obvious lymphadenopathy by the surgeons, lymph nodes positivity was found in 7 (22.5%) cases. Using standard HPE reporting protocol brings suitable evaluation of surgery in colorectal cancer treatment. Although surgeons' judgment is fairly accurate in predicting margin clearance and complete specimen excision, complete mesocolic and mesorectal excision is of utmost importance since lymph nodes metastatic involvement may not be obvious at surgery.

Keywords Standard HPE protocol · Auditing surgeons

Introduction

Colorectal cancer is a major health burden worldwide. The incidence and mortality from colon cancer has been on a slow decline over the past 20 years in the United States;

I. Sagap (✉) · A. L. K. Elnaim · I. Hamid · I. M. Rose
Universiti Kebangsaan Medical Centre,
Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras,
Kuala Lumpur, Malaysia
e-mail: drisagap@ppukm.ukm.my

however, colon cancer remained the third most common cause of cancer-related mortality in 2008. A multitude of risk factors have been linked to colorectal cancer, including heredity, environmental exposures, and inflammatory syndromes affecting gastrointestinal tract. In 2003, the World Health Organization estimated that approximately 940,000 individuals were be diagnosed with colorectal cancer worldwide and 492,000 died from it that year. The American Cancer Society estimated that 148,810 individuals would be diagnosed with colorectal cancer and 49,960 would die from this disease in the United States in 2008 [1].

Predisposing conditions to colorectal cancer are either inflammatory like Ulcerative colitis, crohn's disease, Shistosomiasis and amoebiasis and Juvenile polyposis syndrome, or they may be neoplastic which include aberrant crypt foci with dysplasia, adenomas, familial adenomatous polyposis coli(FAPC) and related Gardner's syndrome, previous or synchronous carcinoma, HNPCC and Hyper plastic polyposis [1]. Colon cancer often causes no symptoms until it reaches a relatively advanced stage. Symptoms include changes in bowel habits, bloody stools or rectal bleeding, stools with mucous, feeling of incomplete defecation, or bowel obstruction which is relatively rare presentation. The incidence of colorectal cancer is about equal for males and females. Age is a well-known risk factor for colorectal cancer, as it is for many other solid tumors. The timeline for progression from early premalignant lesion to malignant cancer ranges from 10–20 years. The incidence of colorectal cancer peaks at about age 65 years [1].

TNM classification of colorectal cancer will assess the tumor, nodal status and presence of distant metastasis and will categorize it into Stage I which includes (T1, N0,M0) and (T2, N0,M0), Stage II A (T3,N0,M0), stage II B(T4,N0,M0), Stage III A(T1-2,N1,M0), stage III B(T3-4,N1,M0), stage III C(anyT,N2,M0) and Stage VI (anyT,anyN,M1) [1].

Histopathological evaluation is a critical component in the management of patients with colorectal carcinoma (CRC). It is the most powerful tool for assessing prognosis in CRC resection specimens and determines the need for adjuvant therapy (chemotherapy/radiotherapy). The other important prognostic factor is the quality of surgery offered to the patient in the sense that how clear was the margin and adopting non-touch technique in handling the tumor as well as harvesting enough number of lymph nodes (10–20).

Several studies have highlighted deficiencies in the content of colorectal cancer resection reports including elements that are considered crucial for patient management. A proforma for reporting of colorectal cancer resection specimens has been created from a set of minimum data items to facilitate accurate and complete reporting of colorectal carcinoma. Moreover a colorectal cancer surgical request form has also been prepared to aid

in the collection of all the essential data items. Many studies have shown that adherence to a minimum dataset proforma for colorectal cancer reporting significantly improves the rate of inclusion of all crucial features needed for proper decision making regarding further management [2].

Investigation of colorectal cancer is by endoscopy and biopsy with staging of biopsy-proven cancers by CT scan of chest, abdomen and pelvis for local and distant spread. MRI of rectal tumors compliment clinical examination by imparting information about nodal disease and the status of tumor edge in relation to the mesorectal envelope and its facial plane that influences neoadjuvant and operative management decisions.

Our main aim behind the use of the proforma was to assess our quality of surgery, as good surgery is the only factor that is superior to proper HPE reporting as far as prognosis is concerned.

Methodology

This is a prospective observational study in which universal sampling was used. All patients received the standard management of colo-rectal cancer. The request form for histopathological examination and pathological reporting form were in form of check list following standard proforma recommended in the international protocol in order to include all the important criteria needed for decision making in further management of diagnosed CRC patients.

The staging was TNM classification which gives more prognostic information and allows easy communication between surgeons and clinical team. Resected tumour was assessed for circumferential resection margin (CRM) and quality of surgery. Assessment of quality of surgery is done by the pathologist. Transverse slicing done at site of tumour which is preferred to longitudinal slicing to allow assessing the resection margin. Standard methods of tissue handling was used using H& E stains for staining. Local lymph nodes should be identified and embedded as well as those above and below tumour site, between 10 to 20 blocks need to be harvested and examined to assess lymph nodes involvement properly. The circumferential margin is considered to be involved if the tumour extends to within 1 mm of the circumferential excision margin.

Data collected includes demographic information, if the patient given neo-adjuvant therapy or not, operative information which include site of tumor, type of surgery done, local extent of tumor, adjacent organs involvement, lymph nodes status, any distant metastasis as well as surgeon opinion about type or resection done is it complete excision or not and his comment on the margins. In

addition, data also include the histological parameters which include macroscopic picture of the tumor, histological type, tumor grade and differentiation, TNM staging of the tumor, number of lymph nodes harvested, number of lymph nodes examined and number of the positive ones, circumferential resection margin involvement and response to neoadjuvant therapy if given.

Statistical Analysis

Statistical analysis was performed by SPSS for Windows version 16.0. The quantitative and qualitative variables will analyse using Student and Paired t test and Chi square (χ^2) respectively.

P value of less than 0.05 was considered significant.

Results

The study involved 44 colorectal cancers comprising of 23 male and 21 female patients. The mean age of the patients was 61 years. The majority of these patients were Malay (50%) followed by Chinese (43%) and Indian (7%) as shown in Table 1. The main presenting symptoms were bleeding (32%), intestinal obstruction (29%) and perforation (7%). Sixteen (36%) patients underwent emergency surgery as 13 of them presented with intestinal obstruction and 3 of them presented with peritonitis secondary to tumor perforation.

Rectal tumor was the commonest (53%) followed by sigmoid colon (22.7%). Neoadjuvant Chemoradiation were given to 8 patients and complete pathological response was observed in 1 (12.5%) of these. The final TNM classification for staging were; stage I (22.7%), stage IIa (18.2%), stage IIb (11.4%), stage IIIa (2.3%), stage IIIb (25%), stage IIIc (13.6%) and stage IV (6.8%) as shown in Table 1.

Table 1 Showing demographic data of patients and their tumor staging

Race	N	%
Malay	22	50
Chinese	19	43.2
Indian	03	6.8
Gender		
Male	23	52.3
Female	21	47.7
Tumor stage		
I	10	22.7
II	13	29.6
III	18	40.9
IV	03	06.8

The commonest surgery performed was anterior resection with mesorectal excision (43.2%). Ten patients (22.7%) had laparoscopic surgery with 3 (30%) patients converted to open surgery.

The surgeons claimed to have performed a curative resection with complete excision and clear margin in 40 (90%) patients. Of these, only 1 (2.5%) patient had a positive resection margin. Meanwhile, the surgeons reported involvement of resection margins in 4 cases but this was disputed by the HPE in all 4 cases (Table 2). Lymph nodes involvement was detected intra-operatively in 13 (29.5%) of the cases and all were proven positive for metastases through HPE.

On the other hand, of the remaining 31 patients who were reported as no obvious lymphadenopathy by the surgeons, lymph nodes positivity was found in 7 (22.5%) cases as showed in Table 3. The mean of the maximal tumour diameter was 44 mm while the mean of tumour distance to the nearer cutting edge was 55 mm. For lymph nodes assessment, the mean for the number of examined nodes was 11 which is fairly near the recommended 13 as a minimum number of lymph nodes, while mean of the lymph nodes involved by the cancer were two.

Discussion

Pathological staging of colorectal cancer patients is the main determinant for management plan and relies heavily on accurate histopathological examination. Many studies have shown that adherence to a minimum dataset proforma for colorectal cancer reporting significantly improves the rate of inclusion of all crucial features. The adoption of proforma reporting has shown improvement of completeness of dataset from 0% to 98% when compared to non-proforma reporting [3, 4].

In our study we adopted new formulated proforma for histopathological examination that provided proper staging using only TNM classification, providing all information crucial for the subsequent management plan for colorectal cancer patients. Our main objective was to assess the quality of our surgical resection, as good surgery is the only factor that is superior to a proper histopathological examination reporting as far as prognosis is concerned.

A national audit was done in New Zealand to assess quality of pathological reporting in colorectal cancer and

Table 2 Shows comparison between surgeon assessment and histopathological examination with regards to the resection margin

Comment	Surgeon assessment	HPE	P value
Surgical margin involved	4	0	0.749
Surgical margin clear	40	39	0.894

Table 3 Shows comparison between surgeon and histopathological examination with regards to lymph nodes status

Comment	Surgeon assessment	HPE	P value
Lymph nodes present	13	13	0.347
Lymph nodes absent	31	31	

rate of inclusion of crucial information. They analyzed 388 reports and found that 40% of the reports used multiple staging system, 56% used Duke's classification, 21% used Jases classification, 20% used TNM classification, 14% used Astler Collier and 10% used Australian Clinic Pathological Staging system. That led to improper staging and missing of very important information needed for management plan in more than 50% of reports [5]. When we compared these results to our study we found the rate of inclusion in our study is more complete as site of tumor, maximal tumor diameter, distance of tumor to nearer cut end, type of tumor and its degree of differentiation, margin status, lymph nodes, final TNM staging was commented on in 100% of our proforma reports which is good in guiding our further management plans. Lymphovascular invasion was commented on in 91% of the cases while perineural invasion was commented on in 89% of the reports.

Our new study formulated a new proforma for histopathological examination that provided proper staging using only TNM classification and including all the information crucial for decision making for subsequent management for colorectal cancer patients.

This had also been proven by Beattie et al. [3] they noticed that the introduction of the standardized proforma in reporting colorectal cancer improves the quality of histopathological reporting, which aids decision-making regarding adjuvant chemotherapy or radiotherapy and further surveillance. Our study results showed that histological differentiation was commented on in 86% of reports before and 100% after the proforma, apical lymph nodes were commented on in 40% before and 99% after the proforma, while complete resection was mentioned in 86% of reports before and 100% of reports after the introduction of the proforma.

Many studies have shown that adherence to a minimum dataset proforma for colorectal cancer reporting significantly improves the rate of inclusion of all crucial features. The adoption of proforma reporting has shown improvement of completeness of datasets from 0% to 96%, and a 28.4% increase in completed data items when compared with non-proforma reporting [5, 6, 19, 20].

Currently there is overwhelming evidence of the importance of circumferential resection margin (CRM) as an independent prognostic factor in management of colorectal cancer CRC. Therefore its evaluation should be part of

histological assessment of quality of surgery. In our study surgeons were sensitive in assessing resection margin but were not specific. The surgeons claimed to have performed a curative resection with complete excision and clear margin in 40 (90%) patients. Of these, only 1 (2.5%) patient had a positive resection margin. Meanwhile, the surgeons reported involvement of resection margins in 4 cases but this was disputed by the HPE in all 4 cases. The frequency of involvement of the circumferential resection margin CRM depends on the quality of surgery, advancing TNM stage and whether the patient has undergone preoperative neoadjuvant therapy. The closer the tumor is to the CRM the worse the prognosis [7].

The residual tumor status in the TNM staging system requires that tumor be identified at the resection margin for the margin to be considered involved. Thus in TNM staging if the tumor is not actually seen at this margin it is coded as R0. Therefore, recording the distance between the tumor and the CRM will alert the clinician to those patients who may benefit from being treated as though they were margin positive [8]. The mean for tumor distance in our study was 55 mm from the resection margin.

The number of total sampling lymph nodes was proved to be an independent prognostic factor in their study for T1 colorectal tumors. The poor prognosis of a low number of total sampling lymph nodes was most likely related to the underestimation of lymph node metastasis as a result of inadequate nodal sampling [13, 14]. Inadequate examination of lymph nodes could down stage the tumor with detrimental effects on outcome of the patients [9]. Our study shown that surgeon assessment of lymph nodes status was very poor as lymph nodes involvement was detected intra-operatively in 13 (29.5%) of the cases and all were proven positive for metastases through HPE. On the other hand, of the remaining 31 patients who were reported as no obvious lymphadenopathy by the surgeons, lymph nodes positivity was found in 7 (22.5%) cases. Total mesocolic and total mesorectal excision (TME) as shown in (Fig. 1)

Fig. 1 Showing laparoscopic TME for sigmoid colon tumor

should be adopted in all CRC surgeries, as accurate examination of resected bowel is mandatory to detect as high number of lymph nodes as possible [17, 18]. It was found that when at least 10–20 lymph nodes were examined histologically, more than 90% of the specimens containing nodal metastasis could be identified; the suggested number of lymph nodes is 13 for good evaluation [2, 10]. The probability of finding a positive node increases with the number of nodes found although this probability curve flattens out after finding 12–15 nodes. However, for practical purposes all lymph nodes present should be harvested from the specimen [11]. In our study the mean for number of examined lymph nodes was 11 which is fairly equal to the recommended number for sound evaluation.

In CRC management surgical skill is crucial to outcome, and there is evidence of wide variation between the survival rates of patients operated on by individual surgeons, while more recent studies suggest that variation between both surgeons and institution persist [12].

Conclusion

The use of standard HPE proforma seems suitable and may bring accurate evaluation of surgery in colorectal cancer treatment. Moreover the use of proforma is highly recommended as it has improved the quality of reporting by highlighting all information that is vital for further planning in patient management. Although surgeons' judgment is fairly accurate in predicting margin clearance and complete specimen excision, complete mesocolic and mesorectal excision is of utmost importance since lymph nodes metastatic involvement may not be obvious at surgery.

References

- Tomislav D, Vassiliki LT Colon Cancer, Adenocarcinoma. Available via Medscape CME. <http://www.medscape.com/viewarticle/277496>. update June 2009
- Bull AD, Biffin AH, Mella J et al (1997) Colorectal cancer pathology reporting: regional audit. *J Clin Pathol* 50:138–142
- Beattie GC, McAdam TK, Elliott S et al (2003) Improvement in quality of colorectal cancer pathology reporting with a standardized proforma – A comparative study. Blackwell Publishing Ltd, *Colorectal Disease* 5:558–562
- Quirke P, Morris E (2007) Reporting colorectal cancer. *Histopathology* 50:112–130
- Keating J, Lolohea S, Kenwright D (2003) Pathological reporting of rectal cancer: national audit. *NZ Med J* 116:1178
- Jill F, Sian M, Nicholas H (2007) Minimum Dataset for Colorectal Cancer, 1st edn
- Nagtegaal ID, Marijnen C, Kranenberg EK et al (2002) CRM involvement is still an important predictor of local recurrence in CRC. *AJSP* 26:350–357
- Green FL, Page DL, Fleming ID et al (2002) *AJCC cancer staging manual*. Springer, New York
- Huann SW, WenYL, Tzu CL (2005) Curative resection of T1colorectal Carcinoma ,Risk of Lymph nodes Metastasis and long – term prognosis. Available at Pubmed. <http://www.ncbi.nlm.nih.gov/pubmed/15793641>
- Ratto C, Sofo L, Ippoliti M et al (1999) Accurate lymph-nodes detection in colorectal specimens resected for cancer is of prognostic significance. *Dis Colon Rectum* 42:2
- Goldstein NS (2002) Recommendations for minimum number of recovered lymph nodes based on predictive probabilities. *Am J Surg Pathol* 26:179–189
- Improving Outcome in Colorectal Cancer, Manual Update; Guidance on Cancer Service; National Institute for Clinical Excellence: London may 2004
- Tang R, Wang JY, Chen JS et al (1995) Survival impact of lymph node metastasis in TNM Stage III carcinoma of colon and rectum. *J Am Colorectal Surg* 180:705–712
- Scott KW, Grace RH (1989) Detection of lymph nodes metastasis in colorectal cancer before and after fat clearance. *Br J Surg* 76:1165–1167
- Adam IJ, Mohamdee MO, Quirke P et al (1994) Role of CRM involvement in the local recurrence of rectal cancer. *Lancet* 344:707–711
- Wibe A, Rendedal PR, Svensson E et al (2002) Prognostic significance of CRM following total mesorectal excision for rectal cancer. *Br J Surg* 89:327–334
- Birbeckkt MCP, Tiffin NJ et al (2002) Rates of CRM involvement vary between surgeons and predict outcomes in CRC surgery. *Ann Surg* 235:449–457
- Bateman AC, Carr NJ, Warren BF (2005) The retroperitoneal surface in distal caecal and proximal ascending colon carcinoma. *J Clin Pathol* 58:246–248
- The royal college of pathologist working group on cancer service (1998) UK Guidelines. Minimum Dataset for Colorectal Cancer Histopathology Reports. In London, R C of Pathology
- Jass J, Brien M, Riddell R et al (2007) Recommendations for the reporting of surgically resected specimens of colorectal carcinoma. *Virchow's Arch* 450:1–13