Original article

Reliability of pre-operative biopsies in the histological grading of colorectal adenocarcinomas

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Background: Management of colorectal cancer depends on many patient and tumour variables. Decisions are sometimes based on the histological grade of tumour as assessed by initial biopsy. This retrospective study looked at the reliability of grading colorectal cancer from pre-operative biopsies.

Methods: 118 patients with a diagnosis of colorectal cancer, who had adequate pre-operative biopsies, were included in the study. A single consultant histopathologist re-examined all the pre-operative biopsy slides, but was blinded to the final grading of the resection specimen.

Results: Of the 118 resection specimens, 41 were graded well-differentiated, 52 moderately differentiated and 25 poorly differentiated. When compared with postoperative grading, 37 (31%) initial biopsies were undergraded, 49 (43%) were correctly graded and 32 (26%) were overgraded.

Conclusions: These results suggest that the histological grading of pre-operative specimens is inaccurate and should be used with caution to determine treatment. The difficulty with grading pre-operative biopsies in colorectal cancer may be owing to a lack of specific criteria such as is used in, for example, breast cancer.

Key words: Biopsy – Histology – Colorectal cancer

It is standard practice to take pre-operative biopsies of colorectal tumours at colonoscopy before proceeding to definitive surgery. Despite the increasing availability of transrectal ultrasound scan (TRUS), computed tomography (CT) and magnetic resonance imaging (MRI) in the pre-operative assessment of colorectal carcinomas in certain situations, the histological grading of a tumour may determine management. For example, some tumours amenable to transrectal or colonoscopic resection may be treated more radically in the presence of poorly differentiated histology. Therefore, it is important to establish the reliability of such biopsies.

Patients and Methods

This study looked at data collected from Crawley Hospital from January 1996 to December 1999. All patients who had had adequate pre-operative biopsies of colorectal cancer and subsequent surgical resection were included in the study. Between 2–6 biopsies were taken per patient. A total of 118 patients were included. A single consultant histopathologist re-examined all the pre-operative biopsy slides, but was blinded to the final grading of the resection specimen.

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Table 1 Grading of biopsies and resection specimens (n = 118)

	Pre-operative biopsy	Resection specimen
Well-differentiated	22	41
Moderately differentiated	54	52
Poorly differentiated	24	25
Adenoma	18	0

Results

Grading of the initial biopsies revealed 22 well-differentiated, 54 moderately differentiated and 24 poorly differentiated carcinomas and 18 adenomas. This was compared to the grading of the resection specimens which showed 41 well-differentiated, 52 moderately differentiated and 25 poorly differentiated tumours (Table 1).

When the grading of the pre-operative biopsy was compared with the resection specimens, overall results showed 32 (26%) of the biopsies had overgraded the tumours, 37 (31%) were undergraded and 49 (43%) were correctly graded. The results were further analysed according degree of differentiation of the final resection specimen (Fig. 1). The percentages of tumours correctly graded according to differentiation were 35% for well-differentiated tumours, 52% for moderately differentiated and 52% for poorly differentiated.

Discussion

The standard investigation of a patient presenting with symptoms suspicious of colorectal cancer includes colonoscopy and biopsy. If carcinoma is found, then further investigations include blood tests (FBC, LFTs and tumour markers), ultrasound and/or CT scan of the abdomen and MRI or TRUS depending on the site of the tumour. The results of all the relevant investigations contribute to the multidisciplinary review and decision on the next stage of management. Biopsy results confirming adenocarcinoma are an essential part of that decision-making process. However, some studies demonstrate that the accuracy of such pre-operative biopsies compared to the final resection specimen is poor with Taylor *et al.* producing a 34% false-negative rate and false-positive rate of 10%.¹ Such rates are similar to those reported by Detry *et al.*, with an overall accuracy of 50%, although they were looking more specifically at low- and high-grade dysplasia and diagnosis of adenocarcinoma in colorectal villous tumours rather than degree of differentiation of the adenocarcinoma.² Other studies have tried introducing brush cytology as

Figure 1 Accuracy of histological grading of pre-operative biopsies.

well as biopsy to improve the accuracy of the pre-operative diagnosis.^{3,4} Our results suggest that the overall grading of pre-operative biopsies in colorectal cancer is accurate in less than 50% of cases.

A similar Japanese study demonstrated a 57.9%, 77.45% and 85.5% correspondence rate between biopsy specimen and resection specimen in well, moderately and poorly differentiated adenocarcinomas, respectively.⁵ Although these results show a better correlation than our respective results of 35%, 52% and 52%, they still show a high degree of variance. There are several possibilities as to why the correlation of the grade of initial biopsies and resection specimens is so poor. Inadequate sampling of the colorectal cancer leads to difficulties with histological interpretation. There are sometimes varying degrees of differentiation within the tumour, but increasing the number of biopsies taken should increase the chances of detecting this.⁶ Finally, histological criteria for grading CRC are less specific than, for example, in breast cancer biopsies where stringent guidelines are in place. This makes individual interpretation of the biopsies less uniform and makes the likelihood of intra- and interobserver bias more likely.

The accuracy of the initial biopsy has implications if the grading of the pre-operative biopsy is ever used to determine subsequent management. Certainly, our unit would be reluctant to offer colonoscopic or local transanal resection of a poorly differentiated colorectal carcinoma because of the increased risk of nodal spread and local recurrence. However, the 50% accuracy of our pre-operative biopsies causes concern when used in deciding management plans.

Conclusions

These results suggest that histological grading of pre-operative biopsies should be used with caution when determining treatment of patients with colorectal cancer. This unit plans a re-audit of our results in the future after the introduction of at least 6 biopsies per tumour and implementing stricter histological criteria.

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