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Original Research Article

Colonoscopic miss rate for colorectal cancer: a district general hospital experience

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ABSTRACT

Background: The aim of the study was to review our post-colonoscopy colorectal cancer (PCCRC) diagnoses rate and compare it to national standards, to identify any common factors in our missed cancer cases and create a policy for capturing missed cancers data.
Methods: We analyzed retrospectively collected data on patients with colorectal cancer from January 2015 to July 2017. Patients who had a previous colonoscopy within 3 years of diagnosis were then identified. We excluded colonoscopies done within 6 weeks of diagnosis or repeat colonoscopies due to poor bowel preparation.
Results: 503 colorectal cancer patients were identified. 135 (26.8%) were initially diagnosed without a lower GI endoscopy. 30 had a negative colonoscopy 6 weeks to 3 years prior to diagnosis. Only 10 patients (2.7%) were true missed lesions (false negative colonoscopy). Male/female: 5/5. Mean age was 68.4 (49-80). 9 patients had good or satisfactory bowel preparation. 50% of lesions were found during follow-up or treatment of a different lesion. Average time from false negative scope to diagnosis was 20.3 months (4-31). Sites of missed lesions are left colon- 4, low rectum- 3, caecum- 2 and transverse colon- 1.
Conclusions: Our PCCRC rate is below the GUT recommended target of <5% and well below the national average 8.5%. We identified no common features across all missed cases. Contrary to other published data, right sided lesions were less common with no female predominance. We recognize the limitations of access to only local trust data. We propose to monitor PCCRC rate annually, present this at clinical governance meetings and review each case individually as an adverse event.

Keywords: Colonoscopy, Colon cancer, Miss rate, Missed cancer

INTRODUCTION

Colorectal cancer remains the 4th most common cancer in the UK, with 40,000 new cases diagnosed every year.[1] It accounts for approximately 10% of all cancer deaths each year. It is well recognised that early diagnosis carries the best prognosis with 5 year survival of around 90% of those diagnosed in the earliest stage.[2]

Colonoscopy is the gold standard tool for assessment of the large bowel and is crucial in the detection, and prevention, of colorectal cancers.[3] Given the significantly improved prognosis from early detection; endoscopy units should be delivering high quality procedures to identify lesions early to enable curative procedures and improved patient outcomes.[2] Delivering a high standard of colonoscopy should be evidenced in a low number of colorectal cancers diagnosed following a "normal" colonoscopy; the post-colonoscopy colorectal cancer rate

(PCCRC). While a small number of colorectal cancers may be fast-growing, it is recognised that more often, the cause of PCCRC is a missed or inadequately excised pre-cancerous lesion.[4-8]

PCCRC rate has been highlighted as a key performance indicator in 2016. GUT-published quality assurance guidelines for colonoscopy.[9] The combined national working group of BSG, ASGBI and JAG have advised that endoscopy units should be aiming for a PCCRC rate of <5% and all PCCRC diagnosed within 3 years of a colonoscopy should be reported as an adverse event with each unit having a policy for capturing PCCRC data.

There is little standardized data published on average PCCRC rates either in the UK or internationally.[10-12] This is likely due to a lack of PCCRC definition, differing methods of rate calculations as well as variable inclusion/exclusion criteria.[13,14] A study of the NHS England National Cancer Data Repository from 2001-2008 estimated a UK average PCCRC rate of 8.5%, with international averages ranging from 2.5-10.6%.[11,12,15-17]

Following the publication of "UK key performance indicators and quality assurance standards for colonoscopy-GUT 2016", we proposed a study to review our department's PCCRC rate, comparing it to national standards.9 We also planned to identify any common factors in our missed cancer cases and create a standardised process for capturing and reviewing missed cancers data.

METHODS

Data was retrospectively collected from the electronic records in a large district general hospital which serves a population of over a million. Appropriate ethical approval was obtained from the local Research and Development department at the hospital.

All patients diagnosed with colorectal cancer between January 2015 and July 2017 was included in the study. Cancer patients who had a colonoscopy within three years of diagnosis were then highlighted. Cancer patients who were diagnosed without a colonoscopy were excluded. Colonoscopies performed within 6 weeks of diagnosis were excluded from the study as these were presumed to be index diagnostic scope. Collected data were then analysed prospectively to identify missed cancers, thus false negative colonoscopies.

Highlighted missed cancer cases were reviewed individually and further exclusions were made for the following: repeat colonoscopies for endoscopic mucosal resection (EMR) with no new lesion identified on the follow up scope, index scope of diagnosis (outside the 6-week exclusion), previous flexible sigmoidoscopy with more proximal lesion identified and coding errors.

For patients undergoing multiple procedures, the false negative endoscopy closest to diagnosis was the only one used in this analysis. Further data were collected from colonoscopy reports and follow up clinic letters, which included patient demographics; indication for colonoscopy, bowel preparation, caecal intubation; documented retroflexion; procedural difficulties; outcome from initial scope; length of time between scope and eventual diagnosis; locations of lesion; pathology and management plan.

Data was illustrated as descriptive statistics and validated by sampling 20% of all cases of colorectal cancer. Case notes were reviewed by the team to identify any non-coded previous colonoscopies to limit coding error in analysis.

To calculate our colonoscopic miss-rate, the number of true positive and false negative colonoscopies was used as the denominator rather than the total number of colorectal cancers diagnosed.

RESULTS

There were 10255 colonoscopies performed and a total of 503 cases of colorectal cancers diagnosed during the 30-month period of the study. 135 colorectal cancer patients (26.8%) were diagnosed using imaging having never undergone colonoscopy. 338 patients had their colonoscopies more than three years, or less than 6 weeks prior to diagnosis. These were not considered false negatives (Figure 1).

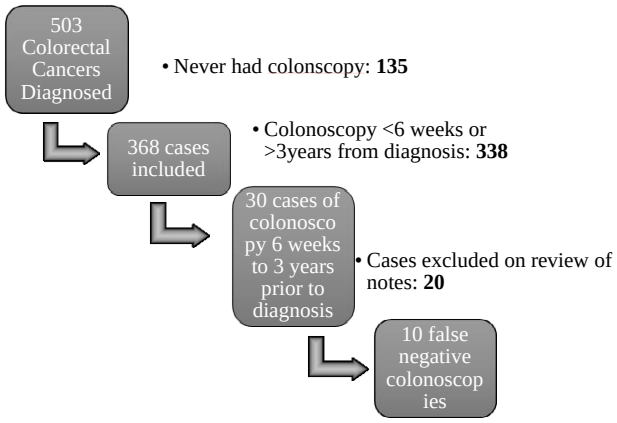

Figure 1: False negative colonoscopies.

The remaining 30 cases were found to have a previous colonoscopy between six weeks and 3 years of diagnosis. Following individual case note review, a further 20 cases were excluded for the reasons highlighted in Table 1. This resulted in 10 cases being the false negative colonoscopies and therefore a PCCRC rate of 2.7% for the period reviewed.

Table 1: Case review exclusions.

Reviews	No. of cases excluded
Index scope of diagnosis	8
Previous flexi sig	5
Polyp surveillance	5
2nd scope for EMR	1
Wrong coding	1

Features of missed lesions

Patient's demographics are described in Table 2. Indications for initial scope were altered bowel habit, PR bleeding, anaemia and surveillance scope for underlying IBD. Bowel preparation was noted to be good in 9/10 of initial procedures. Diagnosis was found on planned follow up of a different, more proximal, lesion in 50% of cases.

Table 2: Patients demographics.

No. of missed cancers	Male:female	Average age	Average time from 1st scope to diagnosis
10	5:5	68.4 (49-80) years	20.3 months (4-31)

Table 3: Characteristics of missed cancers.

Indication for initial procedure	Level reached	Retroflex	Bowel prep	Outcome of procedure	Factors leading to diagnosis	Outcome
Altered bowel habit and PR bleeding	Hepatic flexure	Yes	Good	Incomplete-for CTC.	Significant time delay. Distal lesion seen on CT colonoscopy	Right hemicolectomy. Well.
PR bleeding	Splenic flexure	Yes	Good	Normal-discharge.	Ongoing abdo pain. CT scan identified cancer.	Best supportive care. Died 2 months later.
Altered bowel habit	Caecum	Yes	Good	Caecal polyps x5 resected – surveillance.	F/U surveillance scope (missed twice).	Polypectomy surveillance- patient request. Well.
PR bleeding	Not stated	Not stated	Good	Haemorrhoids banded-discharge.	CT for ongoing symptoms. Metastatic Ca.	Down staging chemo rad- ongoing palliative chemo.
Altered bowel habit	Caecum	Yes	Good	Normal-discharge.	Bowel screening positive result.	Chemo Rad then APR. Well.
PR bleeding	Hepatic flexure	Yes	Good	Normal-discharge.	Ureteric obstruction- CT Metastatic Ca.	Palliative chemo Died 9 months later.
IBD monitoring	TI	Yes	Good	Pancolitis. Biopsy taken.	Repeat surveillance.	Panprocto-colectomy. Well.
PR bleeding	Sigmoid	Not Stated	Poor	Incomplete for barium enema study	Completion colonoscopy from Barium identified lesion	Endoscopic resection Under surveillance Well
Altered bowel habit	Caecum	Yes	Good	Transverse colon polyp-for EMR.	Scope for EMR and follow up (missed twice).	Right hemicolectomy. Well.
Iron deficiency anaemia	Caecum	Yes	Good	Caecal polyp 5mm excised.	Ongoing IDA.	Right hemicolectomy. Well.

Lesions found on a colonoscopy arranged following a re-referral have a longer average time from initial scope to diagnosis than those found on a planned follow up (23.2 vs 17.6 months). No lesions found on follow up colonoscopy resulted from inadequate polypectomy. Detailed characteristics of missed lesions are demonstrated in Table 3.

Site of missed lesions (Figure 2) had a left sided predominance, with 3 rectal, 3 sigmoid and 1 descending colon lesions seen. Caecal lesions accounted for 2/10 with the final missed lesion found in the transverse colon.

In our cohort of ten cases, two lesions were missed twice by two separate endoscopists prior to identification. Both

of which were early stage cancers found on follow up colonoscopy.

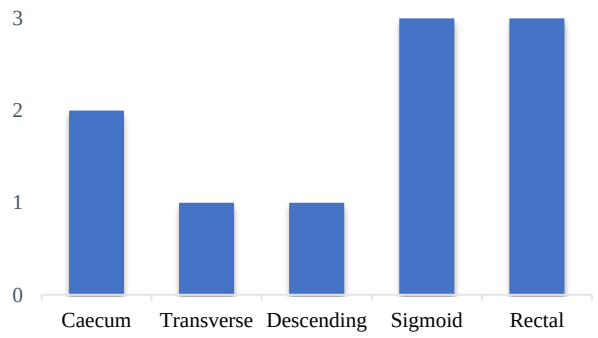

Figure 2: Location of missed lesions.

Patient outcomes

Most missed lesions were early stage (Figure 3). 6 out of 10 cancers were staged Dukes A; all of which underwent resections (4 colonic resections: 2 endoscopic resections due to co-morbidities or patient choice). All six patients are fit and well at the time of this study. Five of these patients had their lesions identified on a follow up colonoscopy.

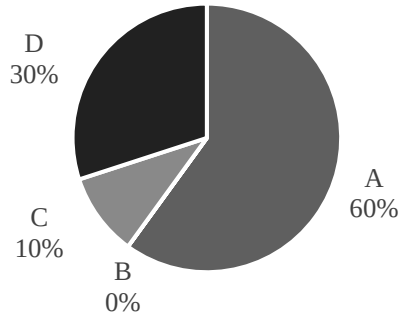

Figure 3: Duke's staging.

Three out of 10 patients were found to have advanced colorectal malignancy. Two patients died (2 and 9 months after diagnosis) having undergone best supportive care. One is still undergoing palliative chemotherapy. These lesions were found 24, 31 and 4 months respectively after initial negative colonoscopy.

One patient was found to have a rectal Dukes C adenocarcinoma and is alive and well following down staging chemo-radiotherapy and an abdomino-perineal resection.

DISCUSSION

The aim of this descriptive analysis was to recognise any patterns or common practices that lead to missed diagnosis of colorectal cancers following colonoscopy. Furthermore, by sharing this information we aim to re-iterate the importance of meticulous inspection throughout the colon, even after identifying or treating a lesion.

In this study, we identified no common features across all missed cases to account for the 10 cases which we identified as false negative. 50% of the missed cancers were found during a follow up procedure for surveillance or treatment of a different, more proximal lesion. Most of these were small and at an early stage.

Two of the three missed advanced colorectal cancers were 2 years following the initial negative colonoscopy. In those initial colonoscopies the areas of subsequent lesion development had had good quality normal images taken, raising the possibility of an aggressive cancer. The third case however was very shortly (4 months) after an initial scope, with poor documentation and no photographic evidence of area of cancer growth; and was almost certainly a "true missed lesion".

At 2.7%, our PCCRC rate fell within the GUT recommended target of <5% and well below the national average of 8.5%.[9,12,18]

Contrary to much published data regarding PCCRC, none were due to incomplete polypectomy, right sided lesions were less common, and there was no female predominance.[5,6,8] There has been suggestion in previous studies that polyps <10 mm, multiple, flat or located in the left colon are associated with a higher miss rate.[18] This was not evident in our study.

Various methods have been used in the calculation of PCCRC rates which likely accounts for the variability in rates. We used the methodology of the GUT guideline-referenced Morris et al paper reviewing PCCRC rates across NHS England from 2001-2008.[12] This compared various methods and concluded a standardised methodology is required, suggesting use of colonoscopy as denominator in rate calculations rather than total number of cancers diagnosed. Therefore, PCCRC in our department using all colorectal cancers diagnosed over this time period would have reduced our rate to 1.9%.

We also identified two lesions missed by more than one endoscopist, but in order to keep to proposed standardised methodology as above, these were only counted as single misses. Considering these as multiple misses would have increased our rate to 3.2%, which is still within the target of <5%.

We recognise the limitations of this retrospective study including access to only local trust data and further diagnoses may be made outside our region.

Other variables that may affect colorectal cancer development (smoking, alcohol and family history) were

not analysed in this study. In addition, analysis of individual endoscopist's data may have added extra value to the results. Further prospective large studies are needed to demonstrate which factors affect the miss rate of colorectal cancers.

CONCLUSION

Missed colorectal cancer can have significant health and economic effects. Careful inspection during colonoscopy is recommended to minimise the missed cancer rate. We also propose to monitor PCCRC rate annually, present this at clinical governance meetings and review each case individually as an adverse event.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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