Ulster Med J 2013;**82(3):**160-163

Paper

Colorectal Cancer Screening: The Northern Trust Experience

David Neely[1], William Campbell[1], Philip Davey[1], Colin Rodgers[2], David McCrory[1]

Accepted 3 April 2013

ABSTRACT

Objective: Colorectal cancer (CRC) is the third most common type of cancer with resulting major mortality. In a bid to reduce the mortality, bowel cancer screening has been established in the United Kingdom. The screening programme was commenced in Northern Ireland in 2010 within the Northern Health and Social Care Trust, following its implementation in England and Scotland. This study aimed to look at early outcome data for bowel cancer screening in Northern Ireland and compare data with other regions in the UK.

Design: A retrospective analysis was conducted of patients who tested faecal occult blood (FOB) positive and attended for pre-assessment between May 2010 and May 2011. Data was also collected from the computerised endoscopy database (Endoscribe®). Patient demographics, colonoscopic depth of insertion, findings and complications were documented. Subsequent surgical management, pathological staging and final outcome were also noted.

Results: 182 patients attended for pre-assessment in the time frame and 178 patients proceeded to colonoscopy. The commonest pathology encountered was polyps, identified in 95 (52.7%) patients. Macroscopically 13 cancers were seen on endoscopy and a further two were found on post-operative histology of polyps that were not amenable to endoscopic resection. In addition, 5 malignant polyps were found on histological analysis of the excised polyps. The staging of cancers was favourable with 35% being Dukes' A stage.

Conclusion: Outcomes from the first year of colorectal cancer screening in the Northern Trust are in keeping with early results from previous studies in terms of cancer detection rates per colonoscopy and proportion of early stage cancers. However, the adenoma detection rate was higher than anticipated.

Keywords: colorectal cancer, screening, FOB, colonoscopy, sigmoidoscopy

INTRODUCTION

Colorectal cancer (CRC) is the third most common type of cancer in the UK with resulting major mortality. In a bid to reduce the mortality, bowel cancer screening has been established in the United Kingdom since its original pilot in England.[1] This programme was rolled out to include Scotland (2007) and Wales (2007) with Northern Ireland in 2010. As in the rest of the UK, this programme involves asymptomatic patients aged from 60 to 69 years, who are invited to enrol in the programme and complete the FOB test on a biennial basis. There are several available bowel cancer screening methods which either by detection of early cancers or benign adenomas may reduce CRC morbidity and mortality and potentially the incidence of CRC in the population.[2]

There is ongoing debate regarding screening with FOB and subsequent colonoscopy versus once only flexible sigmoidoscopy. A recent Cochrane review has demonstrated a relative risk reduction in CRC mortality of up to 16% associated with bowel cancer screening using the faecal occult blood test.[2] On the other hand, a large randomised controlled trial that examined outcomes following a once only flexible sigmoidoscopy claimed a reduction of CRC incidence by 33% in the trial group with mortality reduction of 43%.[3] There is some data to suggest that colonoscopy results in significant reductions in left sided cancers but very little benefit for right sided malignancy.[4] The reasons for this are unclear but a new Scandanavian study into benefits of colonoscopy may clarify this point.[5]

This study aimed to look at early outcome data for bowel cancer screening in Northern Ireland and compare data with other regions in the UK.

PATIENTS AND METHODS

Individuals registered with a General Practitioner within the Northern Trust catchment area and aged between 60 and 69 years are eligible for inclusion into bowel cancer screening. Those aged 70 years and above can request screening through their general practitioner, however, individuals under the

Departments of [1]Surgery and [2]Gastroenterology, Northern Trust, Antrim Area Hospital, Bush Road, BT41 2RL, N. Ireland.

Correspondence to David Neely

dneely01@qub.ac.uk

age of 60 cannot be included in the screening programme under any circumstances. Exclusion criteria for screening include those that have undergone total removal of the colon and individuals that are already involved in a surveillance programme (e.g. ulcerative colitis or polyp surveillance).

Screening invitations and testing kits are posted to eligible patients and a reminder is sent 6 weeks following kit postage if no kit has been returned and the patient has not formally declined screening. Individuals that return negative FOB kits are informed of the result and are re-invited for screening every 2 years. Individuals that return an inconclusive FOB kit (1-4 out of 6 windows positive) are sent a faecal immunochemical test (FIT). Patients that return a faecal occult blood kit with 5 or 6 windows positive are invited for pre-assessment. Pre-assessment is undertaken by bowel cancer screening practitioners and involves history taking and assessment of fitness for colonoscopy. It is at this visit that bowel preparation is dispensed depending on the patients' cardiovascular status and renal function. Any patient deemed unfit for colonoscopy is discussed with a cancer screening endoscopist and renal function is checked prior to arranging a CT colonogram. Pre-assessment data is recorded on the Bowel Screening Information Management System (BSIM).

All pre-assessments and colonoscopies are carried out in Whiteabbey Hospital; a JAG accredited endoscopy screening unit. Colonoscopies are performed by four nominated consultant endoscopists who have been trained and validated to provide the service. Patients that have an incomplete colonoscopy are offered a CT colonogram.

During the study period (May 2010 to May 2011), data was collected from the computerised database (Endoscribe) along with individual patient charts. The BSIM database was checked to ensure that all patients that underwent colonoscopy were included. Patient demographics, adequacy of preparation, depth of insertion, findings, complications and follow-up were documented. Number, location and histology of polyps were noted along with location and histology of cancers. Subsequent surgical management, pathological staging and final disposal were also noted.

RESULTS

Demographics

One hundred and eighty two patients presented for investigation of positive FOB as a result of screening, of which 180 were included in this study. 115 (63%) were male. One patient chose to have investigations carried out privately and another had recently undergone complete gastrointestinal investigations hence repeat endoscopy was not required. 178 patients eventually proceeded to colonoscopy. Two patients were deemed unfit for colonoscopy and underwent CT colonography and flexible sigmoidoscopy.

Bowel preparation and adequacy of preparation

Both Moviprep® and Klean prep® were used as bowel preparation as per local department guidelines. The patients that had planned flexible sigmoidoscopy in addition to CT colonography received a phosphate enema. Two patients had to return for repeat colonoscopy due to poor adequacy of preparation.

Depth of insertion

The unadjusted caecal intubation rate was 91.6% (n=163) of patients. All four of the identifying landmarks were identified in 54.5% namely, the ileocaecal valve, terminal ileum, tri-radiate fold and appendix orifice. Incomplete assessment was defined as inability to reach the caecum. The reasons for incomplete assessment (15) included; stenotic or obstructing distal tumour (2), benign sigmoid stricture (4), excess colonoscope looping (2), patient discomfort (3), acute bend within sigmoid colon (3) and tetany due to hyperventilation (1). Three patients were rebooked for repeated colonoscopy with sedation and the remainder underwent CT colonography. No tumours or polyps were found on CT colonography however, one patient was found to have colitis.

Findings

In the 2 patients deemed unfit for colonoscopy, CT colonography showed diverticulosis. One patient had sigmoid polyps removed on flexible sigmoidoscopy with no proximal polyps seen on CT. No pathology was found in 29 patients (16.1%). The commonest pathology encountered was polyps, identified in 95 (52.8%) patients; 86.8% of polyps were excised and retrieved. The distribution of the observed polyps is illustrated in figure 1. As would be expected, the majority of the polyps that were excised were tubular adenomas with low grade dysplasia. There were 78 patients with adenomas giving rise to an adenoma detection rate of 43.8 per 100 colonoscopies. The histology of the excised polyps is summarised in table 1.

Table 1:

Pathology resulting from excised polyps

Polyp histology	Number of polyps (%)
Tubular adenoma- low grade dysplasia	116 (61.1)
Tubular adenoma- high grade dysplasia	3 (1.6)
Tubulovillous adenoma- low grade dysplasia	24 (12.6)
Tubulovillous adenoma- high grade dysplasia	7 (3.7)
Serrated adenoma	3 (1.6)
Inflammatory	5 (2.6)
Hyperplastic	21 (11.1)
Pseudopolyp (colitis)	1 (0.5)
Polyp cancers	7 (3.7)
No histological diagnosis	3 (1.6)

Macroscopically 13 cancers were seen on endoscopy. A further two cancers were found on post-operative histology, where surgery was performed for large (presumed) polyps that were not amenable to endoscopic resection and had been biopsied. The commonest cancer location was the rectum followed by the caecum. In addition, 5 malignant polyps were found on histological analysis of the excised polyps; all were located in the sigmoid colon. Four of these were Haggit 3 and one Haggit 1. The distribution of cancers found is shown in table 2. Each of these patients underwent appropriate staging investigations and were discussed at the colorectal multidisciplinary meeting (MDM). The final staging of all the cancers is shown in figure 2. 'A' stage include true Dukes' A cancers and polyp cancers. No patient had more than one cancer.

TABLE 2

Cancers found according to location

Cancer location	Number of cancers	Number of polyp cancers
Rectum	7	0
Caecum	4	0
Sigmoid colon	2	5
Descending colon	1	0
Ascending colon	1	0

The remaining benign pathologies encountered were: diverticulosis (78), haemorrhoids (17), colitis (7), radiation proctitis (2), angiodysplasia (2), terminal ileal ulcer (1) and rectal mucosal prolapse (1).

COMPLICATIONS

In total seven patients suffered complications. Six patients experienced polypectomy site bleeding which was controlled with Resolution® clips with or without adrenaline injection. One of these patients was admitted to hospital for observation overnight and was discharged the following day having had no further bleeding. In one case the colonoscope broke during the procedure and a second colonoscope had to be used. Due to the length of the procedure and patient choice, the patient returned for completion colonoscopy and polypectomy. There have been no colonic perforations or major bleeding thus far during colorectal cancer screening in this Trust.

DISCUSSION

Screening for colorectal cancer is now well established in the UK and is now being established in each of the Healthcare Trusts within Northern Ireland. This report provides the first available colorectal screening data for Northern Ireland as the Northern Trust was the first Healthcare Trust to provide colorectal cancer screening in this region. The eligible population for inclusion in colorectal cancer screening in the Northern Trust is 46000 and it was estimated that approximately 250 screening colonoscopies would be performed in the first year of screening. However, as can be expected with the implementation of any new programme, screening did not run at full capacity throughout the whole of the first year and 178 colonoscopies were performed. Unfortunately population information cannot yet be obtained regarding the uptake of screening, FOB positivity rates and positive predictive value of a positive FOB for colorectal cancer or all neoplasia. These figures will be available in due course.

There are several notable observations when our figures are compared to the screening colonoscopy quality assurance standards.[6] Firstly, the caecal intubation rate of 91.6% compares favourably both with these standards and previous screening pilots.[8] This reflects the performance of screening colonoscopies in a dedicated JAG accredited unit by a small number of highly trained endoscopists. Secondly, an adenoma detection rate of 43.8 per 100 colonoscopies is significantly higher than the standard 35 per 100 colonoscopies and that observed in both Scottish and English first round of screening pilots.[6-8]

A cancer detection rate (including polyp cancers) of 11 per 100 colonoscopies is in line with the standard expected.[6] The proportion of cancers detected at Dukes' A stage (55%) is also comparable with the Scottish and English pilot studies where figures of 49.2% and 48% were described. This figure would be expected to fall in subsequent rounds of screening.[7,8] The proportion of Dukes' A cancers compares very favourably with the Northern Ireland cancer registry data in 2006 where only 10% of all cancers were diagnosed at Dukes' A stage.[9] This confers a significant five year survival benefit.

Colonoscopy appears to be the definitive investigation of choice. Whereas there are cost implications and indeed increased levels of risk assumed by the patient in undergoing colonoscopy, studies show that there are a significant number of proximally located colonic neoplasms found in patients with distally located adenomatous polyps on sigmoidoscopy.[10] From our initial findings it can be seen that 33.3% (n=5) of the cancers and 19% of polyps were right sided i.e. out of the range of a flexible sigmoidoscope. A further 21% of polyps were located in the transverse colon. This may have implications on the model of screening with flexible sigmoidoscopy. However, three of the patients with right sided cancers had synchronous distal polyps and would have proceeded to full colonoscopy if screened using flexible sigmoidoscopy. A previous study confirmed a significant left to right shift in colorectal cancer distribution in Northern Ireland. This combined with the predicted low compliance rate of flexible sigmoidoscopy screening in Ireland may support the use of FOB and colonoscopy screening in this region.[11]

Any potential inferiority of screening with flexible sigmoidoscopy would appear to be refuted by the recent publication of a large randomised controlled trial that examined outcomes following a once only flexible sigmoidoscopy. This study reported a reduction in CRC incidence and mortality of 33% and 43% respectively in the trial group.[3] The authors do report a subgroup of patients with adverse features that were referred on for full

colonoscopy and concede that their study does not adequately examine for right sided cancers. Two other trials (PLCO and NORCCAP)[12,13] have colonoscopy levels up to four times that of Atkin and therefore it should shed some light as to the advantage that colonoscopy confers. There is some data to suggest that colonoscopy results in significant reductions in left sided cancers but very little benefit for right sided malignancy.[4] The reasons for this are unclear but a new Scandanavian study into benefits of colonoscopy may clarify this point.[5] Research and trialling of screening with flexible sigmoidoscopy is ongoing in the UK.

There is also much ongoing debate regarding the use of FOB as the initial screening tool. This is mainly due to the limited sensitivity and fairly low positive predictive value for colorectal cancer. A recent review demonstrated a relative risk reduction in CRC mortality of up to 16% associated with bowel cancer screening using the faecal occult blood test.[2] The same review suggested that over 80% of all positive FOBs were false-positives however, this figure does not include adenoma pick-up.[2] This has several implications. Undue anxiety and stress may be caused by a false-positive result and patients are encouraged to undergo further investigation which although very low, is not devoid of risk. Our results show that in only 16.1% of patients was no pathology encountered. As stated earlier, the incidence of colorectal adenomas was higher than initially expected.

Screening with FIT may be used to overcome the problem of low sensitivity of FOB and also test duplication, where an initial inconclusive FOB is obtained. FIT is specific for the globin moiety of haemoglobin and does not require any dietary restrictions as they are unaffected by plant peroxidases.[8,14] FITs are currently more expensive than FOB and have a higher sensitivity thus leading to a higher endoscopy demand; both key considerations for the screening programme.[15] A recent analysis conducted in Ireland suggested that a screening programme based on biennial FIT would be preferable to biennial FOB and once only flexible sigmoidoscopy and was associated with much larger health gains.[14] Hence our regional policy follows the Scottish bowel screening programme with a reflex analytically sensitive FIT test (following a weak positive FOB) as a negative FIT in this setting indicates a very low risk of significant neoplasia.[15]

CONCLUSION

Our data from the first year of colorectal cancer screening in the Northern Trust are in keeping with early results from previous studies in terms of cancer detection rates per colonoscopy and proportion of early stage cancers. The adenoma detection rate was higher than anticipated, however, polyp surveillance has now been included in the bowel cancer screening programme and so no extra burden has been placed on hospital endoscopy services. It will be interesting to observe long-term colorectal cancer incidence in the region as one would expect that removal of colorectal adenomas should provide long-term protection. Population and Trust specific information regarding uptake of screening, FOB positivity rates and positive predictive value of FOB will follow in due course.

The authors have no conflict of interest.

REFERENCES

1. Weller, D, Alexander, F, The UK CRC Screening Pilot Evaluation Team. English Pilot of Bowel Cancer Screening: Evaluation of the UK Colorectal Cancer Screening Pilot. Final Report 2003.
2. Hewitson P, Glasziou PP, Irwig L, Towler B, Watson E. Screening for colorectal cancer using the faecal occult blood test, Hemoccult. Cochrane Database of Systematic Reviews 2007, Issue 1.Art.No.:CD001216. DOI:10.1002/14651858.CD001216.pub2.
3. Atkin WS, Edwards R, Kralj-Hans I, Wooldrage K, Hart AR, Northover JMA et al. Once only flexible sigmoidsocopy screening in the prevention of colorectal cancer: a multicentre randominsed controlled trial. *Lancet* 2010;**375(9726)**:1624-33
4. Brenner H, Hoffmeister M, Arndt V, Stegmaier C, Altenhofen L, Haug U. Protection from right and left sided colorectal neoplasm after colonoscopy: a population based study. *J Natl Cancer Inst* 2010;**102**: 89-95
5. Norwegian Department of Health and Social Affairs. The Northern European Initiative on Colorectal Cancer trial (NordICC). www.clinicaltrials.gov/ct2/show/NCT00883792 (Accessed 7 Mar 2012).
6. Weller D, Moss S, Butler P, Campbell C, Coleman D, Melia J et al. English Pilot of Bowel Cancer Screening: an evaluation of the second round. Final Report to the Department of Health. February 2006. http://www.cancerscreening.nhs.uk/bowel/pilot-2nd-round-evaluation.pdf (Accessed 7 Mar 2012).
7. UK Colorectal Cancer Screening Pilot Group. Results of the first round of a demonstration pilot of screening for colorectal cancer in the United Kingdom. *BMJ* 2004;**329**:133-138.
8. Steele RJC, McClements PL, Libby G, Black R, Morton C, Birrell J et al. Results from the first three rounds of the Scottish demonstration pilot of FOBT screening for colorectal cancer. *Gut* 2009;**58**:530-535.
9. Fitzpatrick D and Gavin A, 2009. Monitoring care of colorectal cancer patients in Northern Ireland diagnosed 2006 (with comparisons 1996 & 2001). N. Ireland Cancer Registry. Available at http://www.qub.ac.uk/research-centres/nicr/Research/CancerServicesAudit/ (Accessed 7 Mar 2012)
10. Ikeda, Y, Mori M, Miyazaki M, Yoshizumi T, Maehara Y, Sugimachi K. Significance of small distal adenoma for detection of proximal neoplasms in the colorectum. *Gastrointest Endosc* 2000;**52**: 358-361
11. McCallion, K, Mitchell RMS, Wilson RH, Kee F, Watson RGP, Collins JSA, Gardiner KR. Flexible sigmoidoscopy and the changing distribution of colorectal cancer: implications for screening. *Gut* 2001;**48(4)**: 522–525
12. Weissfeld J, Schoen R, Pinsky P, Bresalier RS, Church T, Yurgalavitch S et al. Flexible sigmoioscopy in the PLCO cancer screening trial: results from the baseline screening examination of a randomised trial. *J Natl Cancer Inst* 2005;**97**:989-997
13. Hoff G, Grotmol T, Skovlund E, Bretthauer M. Risk of colorectal cancer seven years after flexible sigmoidoscopy screening: randomised controlled trial. *BMJ* 2009;**338**: b1846
14. Sharp L, Tilson L, Whyte S, O'Ceilleachair A, Walsh C, Usher C et al. Cost-effectiveness of population-based screening for colorectal cancer: a comparison of guaiac-based faecal occult blood testing, faecal immunochemical testing and flexible sigmoidoscopy. *Br J Cancer* 2012;**106**:805-816.
15. Fraser CG, Matthew CM, Mowat NAG, Wilson JA, Carey FA, Steele RJ. Evaluation of a card collection based faecal immunochemical test in screening for colorectal cancer using a two-tier reflex approach. *Gut* 2007;**56**:1415-1418.