Irish Medical Journal
Established 1867

Issue: Ir Med J; Vol 114; No. 10; P486

Comparison of Colonoscopy and Flexible Sigmoidoscopy for Investigation of Young Patients with Low-Risk Rectal Bleeding

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Abstract

Aims

To determine the yield of significant pathology in under 50s with low-risk rectal bleeding and ascertain the optimal endoscopic investigation for this age group.

Methods

Data were retrieved on patients who had lower gastrointestinal endoscopy for rectal bleeding between September 2017 and September 2019 at South Infirmary Victoria University Hospital, Cork, Ireland. Patients with other bowel symptoms, weight loss, anaemia, colitis or colorectal cancer were excluded, leaving 709 with 'low-risk' rectal bleeding.

Results

Two patients (1%) 30-39yrs had colorectal cancers and 12 (7%) had adenomatous polyps, 42% (5/12) being high risk polyps. There were no cancers in patients 40-49yrs but 23 (13%) had adenomatous polyps, 39% (9/23) being high risk. No patients <30yrs had adenomatous polyps or colorectal cancer. This compared to 10 patients (3%) $\geq$ 50yrs with colorectal cancers and 58 (21%) with adenomatous polyps, 43% (25/58) being high risk. Colonoscopy had an adenoma detection rate of 20%, which was significantly higher than flexible sigmoidoscopy at 7% ($p < 0.001$). Also, 15% (49/333) of patients who had colonoscopies had adenomatous polyps proximal to the splenic flexure, likely to go undetected on flexible sigmoidoscopy.

Conclusion

Colonoscopy is the preferred investigation modality for 30-49 year olds with low-risk rectal bleeding, given their high rate of significant pathology.

Introduction

Colorectal cancer is the third most frequent invasive cancer worldwide,[1] as is the case in Ireland where it makes up 11% of all cancers in females and 14% of all cancers in males[2]. The overall incidence is decreasing worldwide, however there is a growing incidence in younger populations[1,3], with colon cancer increasing by 0.8% per year in Ireland in those less than 50 years of age (under 50s) in the decade leading up to 2014[2]. Rectal bleeding can be an early symptom of colorectal cancer; however, it is most commonly due to benign anal pathology,[3] particularly in younger age groups where overall incidence in Ireland of colorectal cancer in under 50s is only 0.32-0.38%[2]. This leads to controversy regarding the most appropriate investigation for low-risk rectal bleeding in under 50s, with national guidelines varying from rigid sigmoidoscopy in a rapid access outpatient department clinic to flexible sigmoidoscopy or colonoscopy in an endoscopy suite[3]. The current Irish guidelines[3] (set in 2014) for investigation of isolated rectal bleeding, advise flexible sigmoidoscopy (limited examination of the large bowel) for under 40s and sigmoidoscopy, colonoscopy (complete examination of the entire large bowel) or CT colonography, as appropriate, for those over 40 years of age. Whilst colonoscopy is the most comprehensive investigation, the relatively low yield of sinister pathology found in under 50s must be compared with the invasiveness, potential procedural risks and morbidity due to bowel preparation[4-6]. Multiple Irish centres are currently breaching their waiting list targets[2] due to constrained endoscopy resources compared to demand, making it of further importance to target the scarce resource for the most appropriate patient population. The data used to establish the Irish guidelines[3] did not include studies comparing the effectiveness of colonoscopy versus flexible sigmoidoscopy and the latest Irish GI (Gastrointestinal) Endoscopy Quality Improvement Report (2018) has suggested hospitals consider increasing flexible sigmoidoscopy numbers where appropriate to reduce colonoscopy waiting lists.[7] Thus, the aim of this study was to determine the yield of sinister pathology in young patients with low-risk rectal bleeding and compare effectiveness of flexible sigmoidoscopy with colonoscopy.

Methods

This study included patients who had flexible sigmoidoscopy or colonoscopy at South Infirmary Victoria University Hospital, Cork, Ireland between September 2017 and September 2019. The data were collated from the in-house endoscopic reporting system (Unisoft) and extracted using 'The Auditors Tool Kit'. Ethics approval was granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals, which is nationally recognised by the Department of Health.

Of the 3604 lower GI endoscopies completed in the study period, 1159 patients had rectal bleeding as a procedural indication (Figure 1). Patients with other bowel symptoms (excluding perianal pain or constipation), weight loss, anaemia, lower GI endoscopy within the last 5 years or a personal history of inflammatory bowel disease or colorectal cancer were excluded. Also excluded were patients who had a first-degree relative with colorectal cancer that would indicate a need for lower GI endoscopy before the age of 50yrs[8]. The remaining 709 patients made up the study population which were deemed patients with 'low-risk' rectal bleeding.

Flexible sigmoidoscopy involved patients receiving a phosphate enema 30 minutes prior to the procedure, and the endoscope was advanced until the image was obscured by faeces. The intent of flexible sigmoidoscopy was to examine the distal colon, with the splenic flexure being the common maximum depth reached. The intent of colonoscopy was to reach the caecum, and prior to the procedure patients received full bowel preparation and diet restrictions to allow examination of the entire colon.

Information was recorded on patient demographics, symptoms, procedural indications and findings of the procedure. Identified pathology was managed according to local policy, with small polyps removed, advanced complex polyps not suitable for simple polypectomy referred to specialists and tumours biopsied. The location and size of all pathology was documented. This data was anonymised, stratified by age and histopathology was retrieved in all cases. For this study 'significant pathology' was defined as adenomatous polyps and colorectal cancer. Adenomatous polyps were further divided into high risk and low risk polyps as per the 2013 Post-polypectomy Colonoscopy Surveillance European Society of GI Endoscopy guidelines[9], upon which the Irish National GI endoscopy guidelines are based[10]. Hospital policy was if adenomatous polyps, colorectal cancer or colitis were found on flexible sigmoidoscopy, patients would proceed to colonoscopy at a later date, but the results of those subsequent colonoscopies are not included in this report.

The statistical analysis was performed using Pearson's chi-squared test.

Results

Of the total patients referred for lower GI endoscopy in this study period, 32% (1159/3604) had rectal bleeding as a symptom, with 61% (709/1159) categorised as 'low-risk' rectal bleeding (Figure 1).

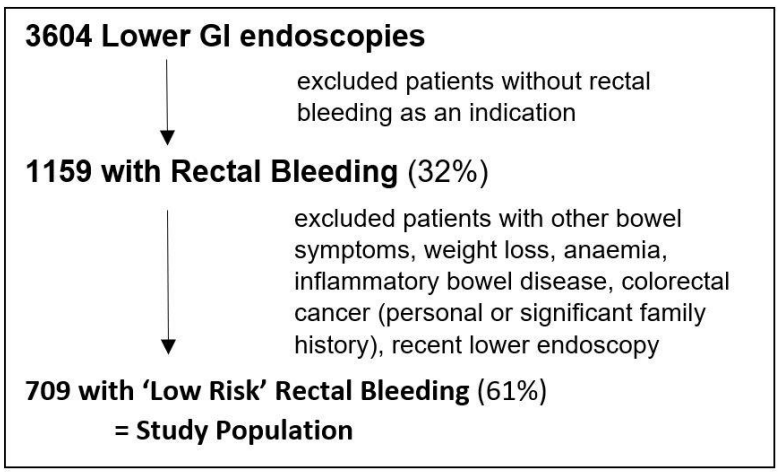

Figure 1: Study profile and exclusion criteria.

Across all age groups, no pathology was found in only 14% of the study population, while significant pathology was identified in 15% (Table 1). Benign anal pathology (69%), which included haemorrhoids, fissures, fibroepithelial polyps, skin tags and mucosal prolapse, was the predominant pathology, followed by diverticulosis (21%), hyperplastic polyps (9%) and colitis/proctitis (4%).

Note that some patients had dual pathologies, thereby resulting in the sum of all pathologies exceeding the total number of patients.

The incidence of pathology increased as age increased with 18% having no pathology in the 20-39yrs cohort, 15% in 40-49yrs and 10% in the ≥50yrs group (Table 1). This difference is significant ($p < 0.01$) between under 50s and ≥ 50yrs. All patients < 30yrs had no 'significant pathology'.

Table 1: Pathology found on Lower GI Endoscopy.

	Age group (yrs)					
	0-19 *(n=3)*	20-29 *(n=65)*	30-39 *(n=182)*	40-49 *(n=177)*	≥50 *(n=282)*	Total *(n=709)*
No Pathology	0	12 (18)	32 (18)	26 (15)	27 (10)	97 (14)
Benign Anal Pathology	1 (33)	51 (78)	135 (74)	125 (71)	179 (63)	491 (69)
Diverticulosis	0	2 (3)	7 (4)	26 (15)	111 (39)	146 (21)
Colitis/Proctitis	2 (67)	1 (2)	8 (4)	6 (3)	8 (3)	25 (4)
Hyperplastic Polyps	0	3 (5)	11 (6)	22 (12)	28 (10)	64 (9)
Adenomatous Polyps	**0**	**0**	**12 (7)**	**23 (13)**	**58 (21)**	**93 (13)**
Colorectal Cancer	**0**	**0**	**2 (1)**	**0**	**10 (4)**	**12 (2)**

The data shown are the number of patients followed by (%).

Fifty-three patients (50%) with significant pathology also had coincident benign anal pathology (Table 2). The proportions with dual pathology were similar across age categories.

Table 2: Patients with Significant Pathology and coincident Benign Anal Pathology.

	Age group (yrs)					
	0-19	20-29	30-39	40-49	≥50	Total
Adenomatous Polyps + Colorectal Cancer	0	0	14	23	68	106
Number with coincident Benign Anal Pathology	0	0	7 (50)	14 (61)	32 (47)	53 (50)

The data shown are the number of patients followed by (%).

Of patients 30-39yrs, two (1%) had colorectal cancers and 12 (7%) had adenomatous polyps, 42% (5/12) of these being high risk polyps (Table 3). There were no cancers in patients 40-49yrs but 23 (13%) had adenomatous polyps, 39% (9/23) of these being high risk. In the patients ≥ 50yrs, 10 had colorectal cancers (3%) and 58 (21%) had adenomatous polyps, 43% (25/58) being high risk.

In under 50s, 97% (130/134) of colonoscopies achieved caecal intubation with 80% (107/134) also attaining ileal intubation and 4 (3%) were incomplete. Of the flexible sigmoidoscopies in under 50s, 20% (58/293) reached the splenic flexure, 15% (45/293) the descending colon, 23% (66/293) the sigmoid descending colon junction and 4% (13/293) just the sigmoid colon. Whilst 38% (111/293) of the flexible sigmoidoscopies reached beyond the splenic flexure.

Pathology proximal to the splenic flexure could potentially be missed by flexible sigmoidoscopy alone. Of patients with adenomatous polyps detected on colonoscopy, 53% (10/19) of < 50yrs and 80% (39/49) of $\geq$ 50yrs had polyps proximal to the splenic flexure (Table 3). One of seven colorectal cancers detected with colonoscopy was proximal to the splenic flexure. Sigmoidoscopy detected 5 colorectal cancers. The adenoma detection rate (proportion of patients who had at least one adenomatous polyp detected) was significantly higher with colonoscopy, which had a rate of 20% compared to 7% with sigmoidoscopy ($p < 0.001$). The higher adenoma detection rate with colonoscopy is consistent in both under 50s (14% colonoscopy vs 5% sigmoidoscopy; $p < 0.01$) and $\geq$ 50yrs (25% colonoscopy vs 11% sigmoidoscopy; $p < 0.01$)

Table 3: Significant Pathology in Flexible Sigmoidoscopy versus Colonoscopy.

Age group (yrs)	Lower GI Endoscopy	Colorectal Cancer	Adenomatous Polyps			
			Total Polyps	ADR*	High Risk Polyps	Proximal to SF**
17-29	Flexible Sigmoidoscopy *n=63*	0	0	0	0	
	Colonoscopy *n=5*	0	0	0	0	0
30-39	Flexible Sigmoidoscopy *n=150*	2 (1)	6	4%	2 (1)	
	Colonoscopy *n=32*	0	6	19%	3 (9)	3 (9)
40-49	Flexible Sigmoidoscopy *n=80*	0	10	13%	6 (8)	
	Colonoscopy *n=97*	0	13	13%	3 (3)	7 (7)
≥50	Flexible Sigmoidoscopy *n=83*	3 (4)	9	11%	3 (4)	
	Colonoscopy *n=199*	7 (4)	49	25%	22 (11)	39 (20)
Total	Flexible Sigmoidoscopy *n=376*	5 (1)	25	7%	11 (3)	
	Colonoscopy *n=333*	7 (2)	68	20%	28 (8)	49 (15)

**Adenoma Detection Rate **Proximal to Splenic Flexure*
The data shown are the number of patients followed by (%).

Discussion

Worldwide the number of lower GI endoscopies performed has increased significantly over the years[1]. The latest Irish National GI Endoscopy Quality Improvement Report from 2018 showed a 46% increase since 2005 in the number of elective lower GI endoscopies performed with an estimated annual cost of €50million for these procedures[3,7]. Despite this, access to lower GI endoscopy remains constrained as demand is increasing at an even higher rate, resulting in difficulty meeting waiting list targets[2].

The 2018 report suggested that hospitals could reduce waiting times by performing more flexible sigmoidoscopies and it highlighted that Ireland currently has no guidelines regarding when flexible sigmoidoscopy could be used as an alternative to colonoscopy[7]. Along with requiring more hospital resources, colonoscopies also have higher procedure morbidity (including bowel preparation), and procedural risks in comparison to flexible sigmoidoscopies[4-6], making it important to weigh up the risk of disease in the population you are assessing.

Current Irish guidelines[3] are not specific which modality to use to investigate those over 40 years of age with isolated rectal bleeding, advising flexible sigmoidoscopy, colonoscopy or CT colonography, as appropriate, which leads to variations between institutions and endoscopists.

In Ireland, the number of colorectal cancers in the 30-50 age group has increased from 182 in 2010 to 202 in 2015, but the incidence in patients under 30yrs remains low[2]. These numbers are reflected in this study, where no significant pathology was found in patients < 30yrs, but two rectal cancers and 35 adenomatous polyps were discovered in patients aged 30-50yrs who presented with low-risk rectal bleeding. This indicates that all rectal bleeding should be considered potentially serious in this age cohort.

The overall adenoma detection rate in our Irish study was 8% in under 50s compared with 21% in patients $\geq$ 50yrs ($p < 0.001$). The rate in the younger age group is lower than a comparative 2004 US study[11] (n=223) investigating rectal bleeding in patients under 50yrs which had an adenoma detection rate of 12%, but they only used colonoscopy. An interesting aspect of our study is the comparison between colonoscopy and flexible sigmoidoscopy where the adenoma detection rate in under 50s with colonoscopy was 14% compared to 5% with flexible sigmoidoscopy ($p < 0.01$). A similar result was reported by researchers from Iran[12] in 2018, where colonoscopy detected 14% and flexible sigmoidoscopy 10%, however they examined fewer patient numbers (n = 120).

In under 50s, 53% of those with adenomatous polyps on colonoscopy had polyps proximal to the splenic flexure, which may have been missed if they only had flexible sigmoidoscopies. A similar Brazilian prospective study[13] in 2019 of 187 young patients with rectal bleeding found 19% of patients had adenomatous polyps on colonoscopy, with 31% having polyps exclusively proximal to the splenic flexure. In addition, a 2018 Singaporean retrospective study[14] of 361 patients found adenomatous polyps in 13% of patients with almost half (49%) proximal to the splenic flexure. This emphasises the importance of colonoscopy given the rates of proximal disease in young people presenting with rectal bleeding.

The majority of adenomatous polyps were incidental findings and would not explain the patients rectal bleeding which prompted the investigation. Their removal theoretically decreases the risk of colorectal cancer in the future[1,15]. Adenomatous polyps are potentially precancerous and patients with these polyps are at higher risk of future polyps and colorectal cancer[1,5], therefore there is benefit in early identification, resection and future monitoring. The European Society of Gastrointestinal Endoscopy recommends population-based screening programs for ages 50-75 using faecal immunochemical testing (FIT), followed by colonoscopy for positive results.

It bases this recommendation on evidence provided by four Randomised Control Trials that showed an overall reduction of colorectal cancer mortality by 24% with screening using faecal occult blood testing (FOBT), and FIT is 2 to 3 times more sensitive than FOBT[15]. Because of the increasing incidence of colorectal cancer amongst younger people, the United States Preventive Services Task Force have updated their recommendations in 2020 to advise screening begins at age 45[15,16].

In this study exactly half of the patients with significant pathology also had benign anal pathology. This aligns with a large 2010 Netherlands cross-sectional study[17] of 1910 patients with haemorrhoids where >70% were found to have additional disease, 35% having concurrent polyps. This suggests that an outpatient department evaluation alone is insufficient, as anal pathology explaining rectal bleeding could mask more serious proximal pathology.

In conclusion our single-centre study suggests colonoscopy should be the preferred modality for evaluation of low-risk rectal bleeding in patients in the 30-49yrs cohort given the high rate of significant pathology encountered. The higher cost and potentially increased patient morbidity associated with colonoscopy are outweighed by the benefits of increased identification and management of a potentially fatal pathology.

Declaration of Conflicts of Interest:
The authors have no conflicts of interest to declare.

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