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R0 Resection Margin, A New Quality Measure in the Era of National Bowel Screening?

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Abstract

Aims
To determine the completeness of polyp resection (i.e. achieving an R0 margin) and its relation with Endoscopists, histopathologist, size, location and technique of polypectomy in an NSS cohort. The definition of R0 margin is complete macroscopic resection with a negative microscopic margin at polypectomy.

Method
NCCS (National Colon Cancer Screening) colonoscopies are offered to bowel cancer screening patients after a positive faecal immunochemical test (FIT) test in a Joint Advisory Group (JAG) accredited Gastrointestinal Endoscopy centre. We histologically evaluated the polyp margins for complete resection, which was defined as the absence of adenomatous or hyperplastic tissue in the resected polyp margins in a cohort of faecal immunochemical test positive patients.

Results
A total of 186 consecutive NCCS colonoscopies out of a total of 542 performed between 2013 and 2017 were included in this study. Of the polyps excised 152(27%) had a R0 margin histologically, and 30(5%) had involvement of the margin. Surprisingly in 373(67%) of polyps pathologists were unable to assess the margin.

Conclusion
Achieving an R0 margin should be a key performance indicator for endoscopists performing polypectomy. At the same time more studies on polyp margins are recommended.

Keywords: Colorectal screening, FIT+ve, Polypectomy, Polyp Margin

Introduction

Cancer of the colon and rectum (CRC) is the second most commonly diagnosed cancer in Ireland accounting for around 11% of all cancers in women and 14% in men [1].Due to its considerable impact, there is a need to develop and then correctly implement strategies to reduce the risk of developing CRC. The Irish Bowel Cancer Screening Program is a two-step process which uses simple, safe and validated tests to detect CRC at a curable stage. The initial step targets individuals between 60 and 69 years of age to participate in bowel screening through a home test kit called Faecal Immunochemical Testing (FIT). The programme will be expanded in a stepwise manner until the full 55-74 age group is covered[2]. The FIT is considered positive at a threshold of 200 µg Hb/g faeces (FOB gold; Sentinel, Milan, Italy. National Screening Service (NSS).

Colonoscopies are offered for further evaluation of bowel cancer screening patients after a positive FIT test in a JAG accredited centre. Complete polypectomy is the absence of adenomatous or hyperplastic tissue in the resection site marginal specimens from pathologically confirmed polyps. Complete polypectomy is designated as R0, and in spite, its relevance is still not a standard quality metric among Endoscopists[3]. Different approaches have been designed to measure the completeness of the resection such as quadrantic biopsies from the post-polypectomy site, endoscopic mucosal resection (EMR) of 1-3mm margin around the resection site and inspection of the post-polypectomy area with magnification endoscopy. Larger size, right-sided polyps, non-polypoid morphology, piecemeal polypectomy and trainee endoscopists have been associated with incomplete resection margins[4]. EMR may have an advantage in achieving complete resection rates than hot snare polypectomy (HSP) for larger polyps, particularly for those more than 20 mm [5]. FIT positive colonoscopies detect twice as many advanced adenomas and CRC as gFOB[6]. Whatever the method used the goal of polypectomy is to achieve an R0 margin meaning that the margin is free from abnormal tissue. Studies have shown that 10-30% **of** interval cancers occur due to incomplete resection[7]. The incomplete resection rate has not been addressed previously in an NCCS cohort.

Methods

It was a Retrospective observational study on an NSS colonoscopy cohort between October 2013 and June 2017. All these procedures were conducted in a single centre at Louth county hospital (LCH), Ireland. Only first time FIT-based screening attendees undergoing colonoscopies as part of NCCS were included in the study. Since it was part of a hospital improvement project institutional ethical board review was not deemed necessary.

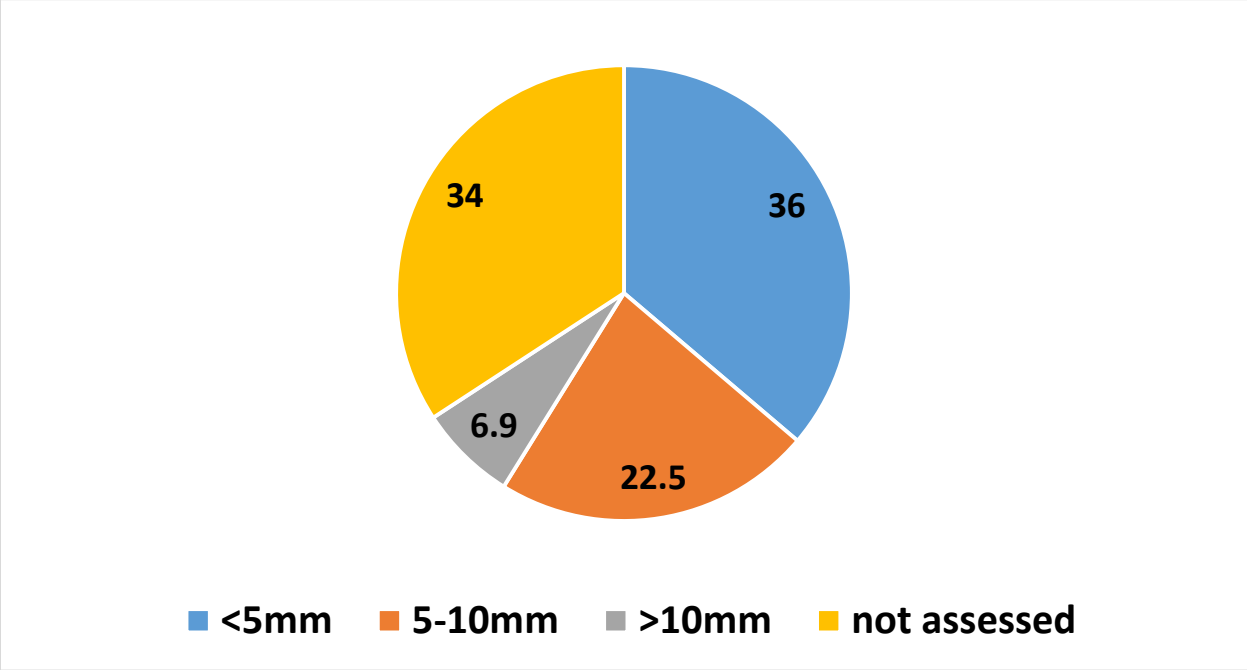
All the Colonoscopies were performed by two experienced medical endoscopists (Gastroenterologists) each with more than ten years of endoscopy experience using white light with Narrow band imaging used if deemed necessary. As far as possible patients were scoped in two different positions. The procedures were performed under conscious sedation using a parenteral combination of a short-acting benzodiazepine (midazolam) and a potent opioid (fentanyl). All procedures were performed with (Olympus (Tokyo, Japan) with 180- and 190-series colonoscope containing NBI (Narrowband Imaging). Bowel preparation was achieved using 2 litres of Moviprep A&B with split preparation used for afternoon procedures. Patients were excluded if they had inadequate bowel preparation (Boston Bowel Preparation score≤ 6with any segment score of 0). As a result of pre-screening, more than 95% of the colonoscopies achieved the desired bowel preparation score. Individual endoscopist Caecal intubation and polyp detection rates were captured. The polyp description was based on the Paris classification[8.] Method of polyp removal was based on the endoscopists judgement.

The primary outcome was the rate of R0 (absence of adenomatous or hyperplastic tissue in the resection site marginal specimens from pathologically confirmed polyps) and assessment of the margin. We also performed subgroup analyses according to location (proximal/distal to the splenic flexure), morphology (protruded, sessile/superficial, elevated), polyp size (1 –5mm/6– 9 mm), and operator experience. It consisted of capturing relevant data along with the demographics using Endoscopy & histology reports. A standardised endoscopy -reporting software using predefined text-blocks is used, ensuring collection of all relevant data points, including exact data on all aspects of each polyp (size, location, morphology). Polyps histology reporting was centralised on a standardised Performa. A total of 10 GI pathologists in a centralised facility analysed the specimens concerning complete removal and evaluation of the margins. SPSS software was used for statistical analysis. Statistical significance was defined at $p < 0.05$.

Results

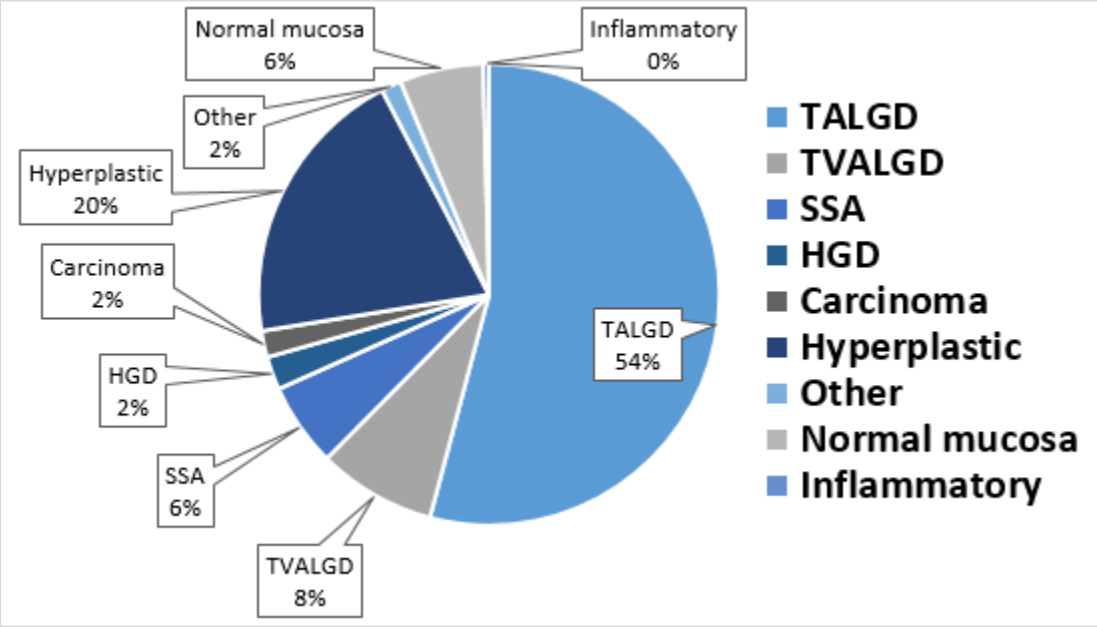
In this retrospective study, a total of 542 colonoscopies were performed with no polyps detected in 103(19%) resulting in a polyp detection rate which was used as a surrogate marker of adenoma detection rate of 81%. Here we present a sub analysis of 186 consecutive colonoscopies during which 707 polyps were identified. The average age was 66 years (SD 2.8) with 190(27%) females. The polyp distribution was 255(36%), 85(12%) and 365(52%) in right, transverse and left colon respectively. Most of the polyps were less than 5 mm (320,59%) with (62,11.5%)greater than one cm in size (figure1).

Figure 1:Polyp size



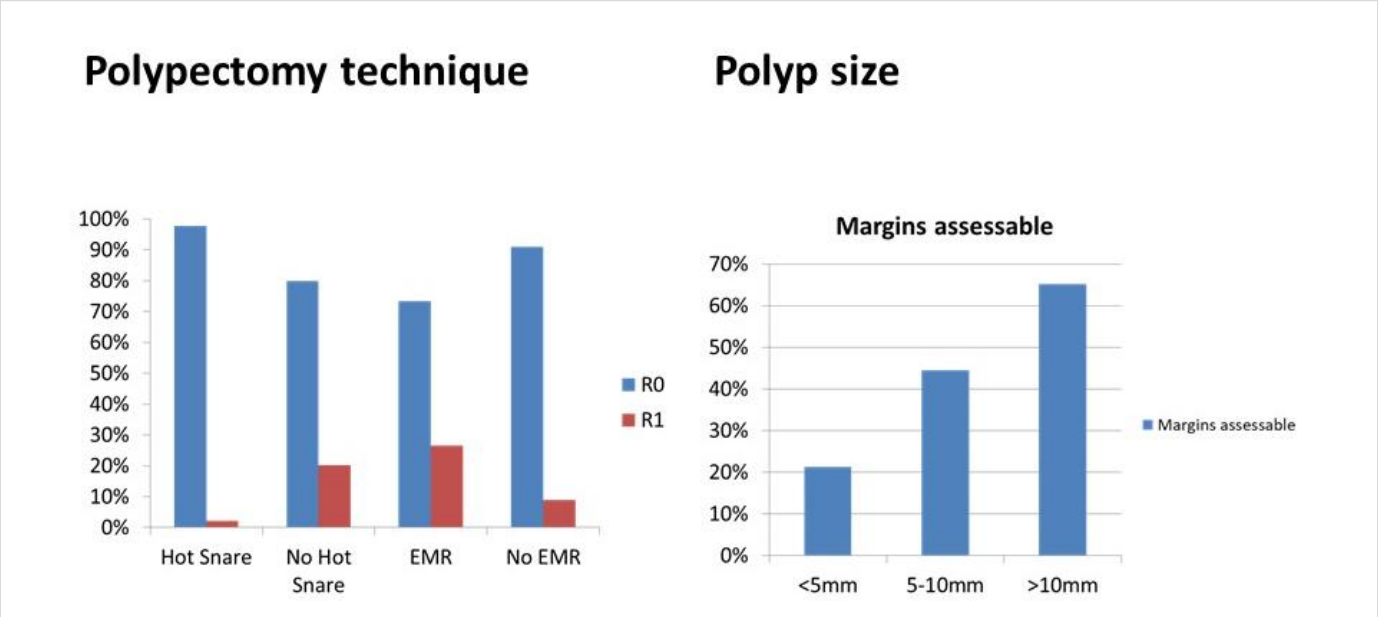
152(27%) had an R0 margin histologically, and 30(5%) had involvement of the margin. In 373(67%) polyps pathologist were unable to assess the margin and 3% of polyps were not retrieved. The polyp histology was varied with two major groups being tubular adenomas (>50%) and hyperplastic (20%) (figure2).

Figure 2: Polyp histology



Polypectomy technique in the form of hot snare had a direct relation with R0 margin ($p<0.003$) with an inverse relation of Endoscopic mucosal resection (EMR, $p<0.004$). Accessibility of margins also had a linear relation with the size of the polyp, resection technique (figure3).

Figure 3: Polyp, resection technique



There was a statistically significant difference in favour of hot snare and biopsy to cold biopsy and snare ($p<0.02$) and the reporting pathologist about achieving an accessible margin. Achieving an R0 margin was not statistically significant between endoscopists, size and location of the polyp. The endoscopists intubated the caecum in 98% of the colonoscopies analyzed in this study with an average withdrawal time of just above six minutes across all procedures (6.4 minutes). There was just one case of post-polypectomy bleeding which needed admission and blood transfusion.

Discussion

The complete endoscopic removal of colorectal polyps reduces the incidence and mortality of colorectal cancer[9, 10]. We used evaluation of the resection margin to define completeness of excision. This retrospective study revealed a small rate of incomplete resection with a high percentage of inadequate assessment of the resection margin. Two step screening for colorectal cancer has been introduced in Ireland and a few other western countries[11]. The first step consists of a biennial stool based FIT test followed by an offer of colonoscopy in those patients who return with a positive FIT test. A recent Taiwanese study found that patients with positive FIT have an advanced stage CRC if they don't get a timely follow-up colonoscopy[12]. Quality indicators for colonoscopy include, among others, Caecal intubation rate, a detection rate of polyps, withdrawal time, retrieval rate of polyps, and recording of adverse outcomes[13, 14]. These procedures aim to identify polyps at an early stage of adenoma-carcinoma sequence for them to be resected entirely achieving an R0 margin. It has been shown that incomplete polyp removal does reduce the efficiency of colonoscopy in colorectal cancer prevention[15]. The incomplete polyp resection in our real world cohort using mixed resection techniques was comparable to Cold Snare Polypectomy (CSP) alone for polyp's 6-9 mm polyps at 6%[16] and hot snare resection[4]. However, a surprising finding was that polyp margins were or could not be adequately assessed in 67% of the polyps which is nearly similar to another study[16]. Technique for obvious reasons (piecemeal versus enblock) along with reporting pathologist (possibly the pathologist method of polyp preparation may vary) appeared to be important in determining the accessibility.

Each of our experienced endoscopists on average do more than 300 colonoscopies per year. Colonoscopy is an operator-dependent test, so crucial quality measures are recorded to ensure that the screening colonoscopies meet best practice. We recorded the rates of Caecal intubation along with polyp detection rate (PDR) as an indicator of the quality of Colonoscopies carried out. It has been found that competent colonoscopists should succeed in intubating the caecum in ≥90% of all cases and 95% in screening[17]. Also, we had a PDR of 81% which is very favourable as compared to a large mixed Irish colonoscopy cohort from a tertiary institute[18]. Our study has several limitations. We failed to take into account the relationship of the fragmentation of the specimen to the study outcomes. Due to the retrospective nature of this study,

there was no routine protocol to assess the margins post-polypectomy. Despite using magnification techniques post-polypectomy it was not explicitly registered on the report, therefore is not possible to assess if additional biopsies were taken from the polyp base. There is no mention of the endoscopists identifying the section margin with India ink or with a pin if the lesion was removed in one piece. The specimen is usually cut along the marker. In the case of EMR, ideally, the specimen should have been oriented, pinned and stretched on card board in the endoscopy unit. If the specimen was not removed in one piece, reconstruction of the specimens should have been attempted. Painting of the base and margins is useful, as tumour extension to the deep margin implies surgery and remnants of the neoplastic epithelium at the lateral margins indicate re-excision or postoperative destruction. If these procedures are not followed strictly, it cannot be expected that the section margin can be evaluated properly. This might have accounted for the lateral polyp margins not be assessed adequately for 206 polyps (67.1%). On checking with the pathologist it was suggested that because the single tissue fragment was "rounded up" in such a manner that a clear cut margin is not visible and as such was very common in biopsy / excision of very small polyps. As we don't use "Resection and Discard" strategy 20% of polyps included were hyperplastic. Also because two endoscopists performed all the colonoscopies in a bowel screening population, the generalizability and implications of findings for clinical practice are uncertain and need to be determined by future studies. In Conclusion Only 27% of the Polyps retrieved achieved an R0 margin while in 67% of cases the pathologists were unable to assess the margin suggesting that this might not be the right approach to assess the completeness of resection. A multidisciplinary approach has to be developed between the endoscopists and pathologist for achieving R0 margin. Endoscopists might need to spend more time examining the mucosal margins after polyp resection. Polypectomy requires significant focused training and experience to maximise success. In future, this could be included as a key performance indicator for polypectomy. We also recommend more studies on margin analysis.

Declaration of Conflicts of Interest:
None of the authors have any financial or conflict of interest disclosures to make.

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References:

1. Colorectal Cancer Incidence, Mortality, Treatment and Survival in Ireland: 1994-2010.National Cancer Registry, Ireland.
2. Optimizing adequacy of bowel cleansing for colonoscopy: recommendations from the U.S. Multi-Society Task Force on Colorectal Cancer Johnson DA, Barkun AN, Cohen LB, Dominitz JA, Kaltenbach T, Martel M, Robertson DJ, Boland CR, Giardello FM, Liberman DA, Levin TR, Rex DK .Gastrointestinal Endoscopy , Volume 80 , Issue 4 , 543 - 562
3. Robertson, D. J., Lieberman, D. A., Winawer, S. J., Ahnen, D. J., Baron, J. A., Schatzkin, A., Cross, A. J., Zauber, A. G., Church, T. R., Lance, P., Greenberg, E. R., Martínez, M. E. Colorectal cancers soon after colonoscopy: a pooled multicohort analysis. Gut. 2014;63(6):949-956. doi:10.1136/gutjnl-2012-303796.
4. Pohl H, Srivastava A, Bensen SP, Anderson P, Rothstein RI, Gordon SR, Levy LC, Toor A, Mackenzie TA, Rosch T, Robertson DJ. Incomplete polyp resection during colonoscopy – results of the complete adenoma resection (CARE) study. Gastroenterology 2013; 144: 74 – 80 e1
5. Horiuchi A, Makina T, Kajiyama M, Tanaka N, Sano K, Graham DY .Comparison between endoscopic mucosal resection and hot snare resection of large nonpedunculated colorectal polyps: a randomized trial Endoscopy 2016; 48(07): 646-651.DOI: 10.1055/s-0042-10555

6. Brenner H, Tao S. Superior diagnostic performance of faecal immunochemical tests for haemoglobin in a head-to-head comparison with guaiac based faecal occult blood test among 2235 participants of screening colonoscopy. Eur J Cancer 2013;49:3049–54.
7. Adler J, Robertson DJ. Interval colorectal cancer after colonoscopy:exploring explanations and solutions. Am J Gastroenterol 2015; 110:1657 – 1664.
8. The Paris endoscopic classification of superficial neoplastic lesions: esophagus, stomach, and colon Participants in the Paris Workshop, Gastrointestinal Endoscopy , Volume 58 , Issue 6 , S3 - S43
9. Zauber AG,Winawer SJ, O'Brien MJ , Vogelaar IL, Ballegooijen MV, Hankey BF, Shi W, Bond JH, Schapiro M, Panish JF, Stewart ET, Waye JD. Colonoscopic polypectomy and long-term prevention of colorectal-cancer deaths. N Engl J Med 2012; 366: 687 – 696
10. Bretthauer M, Kaminski MF, Løberg M, Zauber AG, Regula J, Kuipers EJ, Hernán MA, McFadden E, Sunde A, Kalager M, Dekker E, Lansdorp-Vogelaar I, Garborg K, Rupinski M, Spaander MC, Bugajski M, Høie O, Stefansson T, Hoff G, Adami HO; Nordic-European Initiative on Colorectal Cancer (NordICC) Study Group. Population-based colonoscopy screening for colorectal cancer: a randomized clinical trial.JAMA Intern Med 2016; 176: 894 – 902
11. Benson VS, Patnick J, Davies AK,Nadel MR, Smith RA, Atkin WS; International Colorectal Cancer Screening Networket al. International colorectal cancer screening network. Colorectal cancer screening: a comparison of 35 initiatives in 17 countries. Int J Cancer 2008; 122: 1357–1367
12. Lee Y C; Fann J CY; Chung S . Time to colonoscopy and risk of colorectal cancer in patients with positive results from fecal immunochemical tests Clin Gastroenterol Hepatol. 2018 Oct 31. pii: S1542-3565(18)31207-2. doi: 10.1016/j.cgh.2018.10.041
13. Rembacken B, Hassan C, Riemann JF,Chilton A, Rutter M,Dumonceau JM, Omar M, Ponchon T. Quality screening colonoscopy:position statement of the European Society of GastrointestinalEndoscopy (ESGE). Endoscopy 2012; 44: 957–968
14. Parihar, V., O'Leary, C; O'Reagan, P. Timed colonoscopy withdrawal, a mandatory quality measure in the era of national screening? Ir J Med Sci (2018). https://doi.org/10.1007/s11845-018-1750-0
15. Farrar WD, Sawhney MS, Nelson DB, Lederle FA, Bond JH. Colorectal cancers found after a complete colonoscopy. Clin gastroenterol hepatol 2006; 4: 1259–
1264
16. Matsuura N, Takeuchi Y, Yamashina T, Ito T, Aoi K, Nagai K, Kanesaka T, Matsui F, Fujii M, Akasaka T, Hanaoka N, Higashino K, Tomita Y, Ito Y, Ishihara R, Iishi H, Uedo N.Incomplete resection rate of cold snare polypectomy: a prospective single-arm observational study.Endoscopy. 2017 Mar;49(3):251-257. doi: 10.1055/s-0043-100215. Epub 2017 Feb 13
17. Marshall J,Barthel, J. (1993) "The frequency of total colonoscopy and terminal ileal intubation in the 1990s", Gastrointestinal Endoscopy, 39(4), pp. 518-520. doi: 10.1016/s0016-5107(93)70162-5.
18. Parihar V, Sopheno-Falco J, Maheshwari P, O'Moran N, Graziadei V, O'Grady Walshe A, O'Dwyer O, Kumar L, Fennessy S, Breslin N, Ryan B, M, McNamara D: Adherence to European Polypectomy Guidelines: Retrospective Experience from a Tertiary Irish Hospital. Gastrointest Tumors 2018. doi: 10.1159/000494351