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Optical diagnosis of small colorectal polyps during colonoscopy: When to resect and discard?

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A B S T R A C T

Colonoscopy with polypectomy has been shown to be effective in reducing incidence and mortality from colorectal cancer (CRC). The increase in use of colonoscopy in national bowel cancer screening programmes combined with improved technology has resulted in a large increase in detection of polyps. Most polyps detected at screening colonoscopy are small (<10 mm) or diminutive (<6 mm) and, in particular the latter, have a very small chance of containing advanced features or cancer. The main reason for resecting small adenomas and sending them to histopathology serves to inform on the future surveillance intervals. Being able to diagnose adenomas in vivo would allow for them to be resected and discarded, saving the costs associated with histopathology. Diagnosing distal hyperplastic polyps in vivo would allow for these to be left in situ reducing the risks associated with polypectomy. There are now a number of new technologies that could potentially make optical diagnosis a reality. Resect and discard policy is an attractive concept for patients, gastroenterologists and health service providers and would present an enticing change to current clinical practice.

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Introduction

Colorectal cancer (CRC) is one the leading causes of morbidity and mortality in the Western world [1]. It is the second most common cancer in Europe, with 447,000 new cancer cases diagnosed in 2012 (Cancer Research UK). Colorectal cancer screening reduces the incidence and mortality from CRC and is widely recommended and implemented in the Europe and USA [2,3]. The benefit of colonoscopy is two fold – first as adenomas are thought to be precursors of CRC, their removal at colonoscopy prevents development of CRC [4].

Cohort studies of colonoscopy and polypectomy have suggested that against SEER (Surveillance Epidemiology and End Results) data, the rate of CRC detected was 76–90% lower after polypectomy than expected for the population [5,6]. An Ontario population-based cohort study of 2,412,077 individuals 50–90 years of age followed over 14 years, found that for every 1% increase in complete colonoscopy rate, the hazard of death from CRC decreased by 3% [7]. Further evidence for a protective effect of colonoscopy with polypectomy can be extrapolated from flexible sigmoidoscopy trials, with the recent randomised controlled trial [8] that enrolled 170,432 participants demonstrating that the incidence of CRC in people attending for screening was reduced by 33% (0.67; 95% CI 0.60–0.76) and mortality by 43% (0.57; 95% CI 0.45–0.72). Nishihara et al. [9] followed 88,902 participants over 22 years and found that negative index colonoscopy was associated with reduced risk of all CRC (hazard ration 0.44, 95% CI, 0.38 to 0.52) and reduced incidence of proximal CRC (hazard ratio, 0.73; 95% CI, 0.57 to 0.92).

Secondly, colonoscopy allows stratification of patients into risk categories, with those with higher risk having more frequent surveillance than those at lower risk. The efficacy of endoscopic surveillance has only been addressed in epidemiological series, however those studies have suggested that patients who are not entered into a surveillance programme have a 3-4 fold greater risk of CRC [10,11].

Most polyps detected at colonoscopy are either adenomas or hyperplastic polyps. The latter ones are not thought to be pre-malignant in general. However, as white light endoscopy cannot reliably differentiate between these two types of polyp, the current standard of care dictates that all polyps seen at colonoscopy are removed and sent for histopathology. This practice has several disadvantages. First, it incurs an unnecessary time and cost associated with polypectomy and subsequent histopathology of distal hyperplastic polyps. Secondly, although complications of colonoscopy are rare, bleeding and perforation are associated with polypectomy and given the large number of colonoscopies performed for screening and subsequent surveillance this could become clinically significant [12–15]. Therefore sending small polyps for histopathology purely serves to differentiate whether they are adenomas or hyperplastic and therefore decide on surveillance intervals.

Being able to differentiate adenomas from hyperplastic polyps in vivo (optical diagnosis) would allow for adenomas to be resected and discarded and small distal hyperplastic polyps to be left in situ thereby reducing the time and cost associated with polypectomy and histopathology and giving a patient a surveillance interval immediately after the procedure.

Prevalence and significance of small colorectal polyps

More than 90% of polyps detected at colonoscopy are small (6–9 mm) or diminutive (≤5 mm), with the latter making up the majority [16–18]. In a study of 13,992 asymptomatic patients who had a screening colonoscopy, 6360 (45%) patients had polyps and 83% of those had a largest polyp that was ≤9 mm in size [16]. Furthermore, only 2549 out of 4942 (52%) were neoplastic with the rest composed of hyperplastic and inflammatory polyps and lymphoid aggregates. Similar findings were reported in a retrospective study of 10,034 patients who underwent colonoscopy over a five-year period [18]. Polyps ≤5 mm represented 81.6% of all polyps removed and of those 47.9% were tubular adenomas. In a cumulative analysis [19] of 18,549 patients who had a screening colonoscopy, half of diminutive polyps were adenomas (range 49–61%). Screening series have reported adenoma prevalence of up to 50% with the use of high-definition colonoscopy [20,21]. However, this proportion might be lower in the rectum and sigmoid colon where there is high prevalence of small hyperplastic polyps, reducing the reported prevalence of adenomas to below 20% [22].

Clinical significance of small polyps is not clear. Risk of advanced features (high-grade dysplasia or villous component >25%) in small and diminutive polyps is low, ranging from 0.1% to 26% with most