Comparison of the yield and miss rate of narrow band imaging and white light endoscopy in patients undergoing screening or surveillance colonoscopy: a meta-analysis

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CRD summary
The review concluded there were no significant differences between high-definition narrow-band imaging and high-definition white light endoscopy in the detection or miss rates of colon polyps and adenomas in patients who underwent screening/surveillance colonoscopy. Potential trial quality limitations and confounding factors in the review mean that the reliability of the authors' conclusions is uncertain.

Authors' objectives
To compare the efficacy of high-definition narrow-band imaging (HD-NBI) and high-definition white light endoscopy (HD-WLE) for patients undergoing screening/surveillance colonoscopy.

Searching
MEDLINE, EMBASE and the Cochrane Central Register of Controlled Trials (CENTRAL) were searched for studies published in English and non-English languages; search terms were reported. The authors did not report the time scale of the search but the included studies were published from 2005 to 2010. Bibliographies of included studies and abstracts of Digestive Diseases Week and the National Meetings of the American College of Gastroenterology from 2000 to 2010 were handsearched. One study was identified by personal communication with the author.

Study selection
Randomised controlled trials (RCTs) that compared HD-NBI with HD-WLE in patients undergoing screening or surveillance colonoscopy for the detection of colon polyps were eligible for inclusion. Trials with and without tandem colonoscopy that compared polyp and adenoma detection were also eligible for inclusion. Trials that assessed the sensitivity and accuracy of narrow-band imaging for the detection or characterisation of polyps that had already been found with white light endoscopy were excluded. RCTs that compared HD-NBI and standard definition white light endoscopy were also excluded. Adenoma detection rate was the primary outcome. Secondary outcomes included the yield of polyps, adenomas over 10mm, flat adenomas, and miss rates of polyps and adenomas.

In all the included trials, both HD-WLE and HD-NBI were used for the entire withdrawal phase; withdrawal time ranged from 7.3 to 18.9 minutes for HD-WLE and 7.7 to 17.6 minutes for HD-NBI. Fifty-six percent of the trials were of screening, 22% were of screening/diagnostic, and 22% were of high-risk patients with positive faecal occult blood tests. Where reported (67% of included trials), multiple endoscopists were involved in 33% of trials, two endoscopists in 22% of trials, and a single endoscopist in one trial. Mean patient age ranged from 56 to 65.5 years. One of the included trials was a multi-centre study.

Two independent reviewers performed the study selection.

Assessment of study quality
A formal assessment of methodological quality was not performed.

Data extraction
The numbers of events were used to calculate odds ratios (ORs) with 95% confidence intervals (CIs). Authors were contacted for missing data or data clarification.

The authors did not report how many reviewers performed the data extraction.

Methods of synthesis
Results were pooled using a fixed-effect model if there was no significant heterogeneity, and a random-effects model (Mantel-Haenszel) if there was significant heterogeneity giving odds ratios with 95% confidence intervals. Heterogeneity was assessed using the I² statistic. Significant heterogeneity was thought to be present when p<0.1. All
the trials were combined for the yield analysis. For the miss-rate analysis, the results of the tandem RCTs were used, where the numbers of polyps and adenomas missed with one technique and detected on subsequent examination using the other technique were compared.

Sensitivity analyses were performed using only the trials of higher quality (published in full rather than abstract). Results using both random-effects and fixed-effect models were also compared.

Publication bias was assessed visually using funnel plots when five or more trials were combined.

Results of the review
Nine RCTs were identified (2,968 patients, range 48 to 1,256 from Table 1, 3,059 patients reported in text) including three tandem-RCTs. Three trials were published as abstracts only.

Yield analysis: There was no significant difference between high-definition narrow-band imaging (HD-NBI) and high-definition white light endoscopy (HD-WLE) for the detection of adenomas (OR 1.01, 95% CI 0.74 to 1.37; $I^2=60%$; six RCTs) or for the detection of patients with polyps, patients with adenomas, the detection of adenomas over 10mm, flat adenomas and flat adenomas per patient. Values of $I^2$ ranged from 0 to 83%.

Miss rate analysis (tandem-RCTs): There was no significant difference for HD-NBI versus HD-WLE in polyp miss rate (OR 1.17, 95% CI 0.80 to 1.71; $I^2=50%$; three RCTs) or adenoma miss rate (OR 0.65, 95% CI 0.40 to 1.06; $I^2=10%$; three RCTs).

The results of the sensitivity analyses using the four trials with full manuscripts (presumed to be of better quality) found no difference in outcomes; there were no differences using random-effects or fixed-effect models for the analyses.

Funnel plots suggested publication bias in favour of HD-NBI for the detection of adenomas, flat adenomas, patients with polyps, and flat adenomas per patient, but there was no evidence of publication bias for the detection of adenomas over 10mm or patients with adenomas.

Authors’ conclusions
Compared with HD-WLE, HD-NBI did not increase the detection of colon polyps, adenomas or flat adenomas, nor did it decrease the miss rate of colon polyps or adenomas in patients undergoing screening/surveillance colonoscopy.

CRD commentary
The review addressed a well-defined question for study design, participants and interventions. Clear definitions of the relevant outcomes were not given. Relevant databases were searched; the search included unpublished trials and studies published in any language. There was evidence for publication bias with most outcomes.

The quality of included trials was not formally assessed. The authors assumed that trials published as abstracts were of lower quality, which may not have been the case. Very little relevant data was provided which would allow assessment of trial quality. Some relevant study details were reported. Efforts were reported to reduce error and bias in study selection but they were not reported for data extraction. The number of participants reported in the text differed from those given in Table 1. The synthesis performed seemed appropriate. There was a high level of heterogeneity for many of the meta-analyses. The authors were concerned about various confounding factors including: learning by experience increased detection rates; variations in the definition of flat adenomas; trial heterogeneity for indications, patient and endoscopic factors; variations in the experience and numbers of endoscopists used in the trials; differences in withdrawal time; and initial intubation in all the trials was performed using WLE, which may have biased results towards WLE. The authors also noted the small number of trials used in the meta-analyses of miss rates.

The authors’ conclusions reflect the evidence presented, but in view of potential limitations in trial quality and the confounding factors described by the authors, the reliability of their conclusions is uncertain.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors suggested that the general improvement in detection rates with both HD-WLE and HD-NBI...
compared with those reported for standard definition WLE identified should be evaluated in a separate meta-analysis.

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