Meta-analysis for evaluating the accuracy of endoscopy with narrow band imaging in detecting colorectal adenomas

Jin XF, Chai TH, Shi JW, Yang XC, Sun QY

CRD summary
This review concluded that narrow-band imaging endoscopy seemed to improve the detection of flat adenomas, particularly with high definition, but it increased the withdrawal time. There were limitations to the review and the included studies, so the results and conclusions should be interpreted with caution.

Authors' objectives
To determine whether narrow-band imaging could enhance the accuracy of adenoma detection during endoscopic examination of the colon and rectum.

Searching
PubMed, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), and CBM were searched for English-language studies from their inception to June 2011; the search strategy was reported. Bibliographies of included studies and reviews, and conference proceedings were searched.

Study selection
Studies were eligible for inclusion if they compared narrow-band imaging and white-light microscopy during colonoscopy for patients with known colorectal adenomas or cancer; after a positive faecal occult blood test; or with rectal bleeding, abdominal pain, and changes in bowel habits, diarrhoea, or iron-deficiency anaemia. Studies had to report the number of patients with at least one adenoma in both groups, one flat adenoma in both groups, the number of adenomas per patient, the number of flat adenomas per patient, or the mean withdrawal time, established using white-light endoscopy. They had to have highly homogeneous populations with no known familial adenomatous polyps, and no comorbidities. Abstracts of studies were eligible.

The included studies used either the LUCERA or EXERA II endoscopic video systems. Half the studies used high definition, narrow-band imaging; these also used high definition, white-light colonoscopy. Of those that used standard narrow-band imaging, most used standard white-light colonoscopy.

Three reviewers independently applied the inclusion criteria to full papers; disagreements were resolved by consensus. It was unclear how many reviewers screened titles and abstracts.

Assessment of study quality
Study quality was assessed for randomisation, allocation concealment, blinding of outcome assessment, and withdrawals and dropouts. The reviewers did not report how many reviewers assessed quality.

Data extraction
Data were extracted to produce relative risks for dichotomous variables, and mean differences for continuous variables, along with 95% confidence intervals. The reviewers did not report how many reviewers extracted the data.

Methods of synthesis
Pooled relative risks or weighted mean differences and 95% confidence intervals were produced using a Mantel–Haenszel fixed-effect model, unless heterogeneity was observed, in which case a DerSimonian and Laird random-effects model was used. Heterogeneity was investigated using Cochran $Q$ and $I^2$. Where heterogeneity was observed, sensitivity analyses were used to investigate it; individual studies were excluded in turn, and analyses were grouped according to factors that could potentially influence the results, but these factors were not pre-specified. Publication bias was assessed using funnel plots and the Egger test.

Results of the review
Eight studies met the inclusion criteria, with 3,049 patients (range 91 to 1,256). All studies used adequate methods of
randomisation; three clearly described methods to conceal allocation; three reported blinding; and six had no withdrawals or losses to follow-up.

The overall rate of adenoma detection, in patients with at least one adenoma (eight studies), regardless of the tumour size, was not statistically significantly higher with narrow-band imaging than with white-light colonoscopy (RR 1.09, 95% CI 1.00 to 1.19; I²=15.4%). For the flat adenomas (five studies), detection by narrow-band imaging was significantly better than with white-light microscopy (RR 1.96, 95% CI 1.09 to 3.52; I²=84.4%). The colonoscopy withdrawal time (eight studies) was significantly longer with narrow-band imaging than with white-light microscopy (WMD 0.90, 95% CI 0.38 to 1.42; I²=89.4%).

Results from subgroup analyses, sensitivity analyses, and outcomes that were poorly reported within studies, were presented. Publication bias was indicated for the overall rate of adenoma detection.

**Authors’ conclusions**

Narrow-band imaging seemed to improve the detection of flat adenomas, particularly with high definition, but it increased the withdrawal time. Routine use of narrow-band imaging for the surveillance of adenomas could be recommended once it has been modified.

**CRD commentary**

The review addressed a clear research question, with reproducible inclusion criteria. Several relevant sources were searched, with attempts to identify unpublished studies. Only studies published in English were eligible, and one in another language was excluded. Study selection at the full paper stage was conducted in duplicate; it was unclear whether similar methods to reduce error and bias were used at the title and abstract stage, and during data extraction and quality assessment. Relevant criteria were used to assess study quality, and the results were published in full. Most of the included studies were open to a high risk of bias. The overall results were pooled from clinically different studies and, where statistical heterogeneity was observed, this was investigated.

There were limitations to the review and the included studies, so the results and conclusions should be interpreted with caution.

**Implications of the review for practice and research**

**Practice:** The authors stated that the learning curve for narrow-band imaging had important implications for its use in real-time endoscopic pathological diagnosis and clinical decision-making. They stated that high-definition colonoscopy might be superior to standard colonoscopy, and if it became widely used, quality standards should be revised. It was better at detecting flat adenomas than conventional endoscopy, which could have a significant impact on routine screening colonoscopy by decreasing pathology costs and polypectomy complications, but the studies varied.

**Research:** The authors stated that randomised controlled trials with good quality methods were needed, including multicentre trials with large samples, to determine the value of endoscopy with narrow-band imaging in detecting adenomas. They stated that a standard measure of bowel preparation should be used.

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