Meta-analysis: capsule enteroscopy vs. conventional modalities in diagnosis of small bowel diseases

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CRD summary
This well-conducted review compared the yield of capsule enteroscopy (CE) with conventional modalities in patients with small bowel disease. The authors concluded that CE is superior to conventional modalities in the diagnosis of ileal diseases. The results support the finding of a greater yield of CE, but it is not possible to comment on the diagnostic accuracy since it was not evaluated.

Authors' objectives
To evaluate the diagnostic yield and safety of capsule enteroscopy compared with alternative diagnostic modalities in patients with small bowel diseases.

Searching
MEDLINE, EMBASE, Current Contents and the Cochrane Library were searched from 1966 to March 2005; the search terms were reported. No language restrictions were applied. Abstracts submitted to 'Digestive Disease Week' and 'United European Gastroenterology Week' over the same period were handsearched, as were relevant journals. In addition, companies and researchers in the field were contacted for ongoing or unpublished studies, bibliographies of included studies were screened, and the authors' personal databases were reviewed.

Study selection
Study designs of evaluations included in the review
Prospective comparative trials were eligible for inclusion. Studies that used historical controls were excluded. Patients appear to have served as their own controls: i.e. patients underwent both techniques and the results obtained by each technique were compared.

Specific interventions included in the review
Studies that compared capsule enteroscopy (CE) with any other diagnostic modality were eligible for inclusion. The procedures compared with CE were push enteroscopy, small bowel follow through, enteroclysis and computed tomography enteroclysis.

Reference standard test against which the new test was compared
The review did not include any diagnostic accuracy studies that compared the performance of the index test with a reference standard of diagnosis.

Participants included in the review
Studies of adults suffering from suspected small bowel disease were eligible for inclusion. The studies had to include patients with obscure gastrointestinal bleeding (GIB) or Crohn's disease (CD). The patients in the included studies were being investigated for obscure bleeding, known Crohn's disease, suspected Crohn's disease, and small bowel diseases.

Outcomes assessed in the review
The studies had to include specific reference to the safety of the tested procedures, either in the text or tables. They also had to provide data on efficacy. A negative outcome was defined as any undesired event directly related to the application of a diagnostic procedure. In particular, capsule retention was defined as no evidence of capsule excretion within 3 days. The outcomes reported in the review were rate differences in the absolute rate of positive findings between CE and control technique, and the probability of a positive finding with CE compared with control techniques.

How were decisions on the relevance of primary studies made?
Two reviewers independently reviewed the results of the searches. Any disagreements were resolved through consensus.
Assessment of study quality
The studies were evaluated according to 17 of the 22 items of the Consolidated Standards of Reporting Trials (CONSORT) statement; items relating to randomisation were not considered as all of the included studies were non-randomised. The studies were assigned a quality score ranging from 0 to 17. The authors did not state how many reviewers performed the validity assessment.

Data extraction
Two reviewers independently extracted the data using a standardised form. Any disagreements were resolved through consensus. The number of patients in which CE was contraindicated was recorded. Raw study data were used to calculate the odds ratios (ORs), number-needed-to-diagnose (NND) and rate differences (RDs), along with 95% confidence intervals (CIs). The studies were analysed on an intention-to-treat basis.

Methods of synthesis
How were the studies combined?
Pooled crude and weighted RDs, ORs and NNDs with 95% CIs were calculated. For studies in which cells in the 2x2 table contained 0 events, 0.5 was added to each cell. The Peto fixed-effect model was used in the absence of heterogeneity (p>0.05), whereas random-effects models were used in the presence of heterogeneity. Publication bias was assessed for significant findings, and was defined as the number of additional non significant studies required to negate the significant result.

How were differences between studies investigated?
Heterogeneity was assessed using the Q statistic. Three separate analyses were conducted: all included studies, studies having the identification of the source of occult GIB as the main outcome, and studies having the diagnosis of ileal involvement in CD as the main outcome.

Results of the review
Seventeen studies (n=526) were included.

The quality scores ranged from 8 to 15.

All studies (17 studies).
The pooled RD was 40.8% (95% CI: 35.6, 45.9, p<0.0001). CE significantly increased the odds of a positive finding compared with the control techniques (OR 4.9, 95% CI: 3.9, 6.4, p<0.001). The NND was 2 (95% CI: 2, 3): for every two patients investigated CE provided one more diagnosis compared with control techniques.

Studies of obscure GIB (9 studies).
The pooled RD was 36.9% (95% CI: 29.6, 44.1, p<0.0001). The odds of a positive finding was significantly increased in studies of CE compared with those of push enteroscopy (OR 4.3, 95% CI: 3.1, 6.0, p<0.001). The NND was 3 (95% CI: 3, 5).

Studies of patients with suspected or known CD (8 studies).
The pooled RD was 44.5% (95% CI: 30.9, 58.0, p<0.001). The odds of a positive finding were significantly higher among those who received CE compared with those who received enteroclysis (OR 5.4, 95% CI: 3.0, 9.9) and small bowel follow through (OR 13.0, 95% CI: 2.3, 71.4). The NND was 2 (95% CI: 2, 3).

In terms of safety, a failure to visualise the caecum occurred in 68 of the 526 patients submitted to CE.

Adverse events occurred in 29 patients. Among patients with obscure GIB, 15 adverse events were related to CE: these included technical defect, obscured vision due to active bleeding, blocked capsule, long oesophageal transit, capsule
retention, temporary electrical disconnection, battery dysfunction and error to transfer data. One adverse event was related to push enteroscopy; this was due to no advance beyond the duodenal bulb. There were seven adverse events in patients with CD; these were all the result of capsule retention.

**Authors’ conclusions**
CE is superior to push enteroscopy and small bowel radiology in the diagnosis of ileal diseases. CE is safe, though prior radiology is still necessary to rule out small bowel strictures in patients with known or suspected CD.

**CRD commentary**
This review addressed a clearly defined question that was supported by explicit inclusion criteria. A detailed literature search was conducted and attempts were made to locate unpublished studies. The methods of the review process were reported and these included appropriate steps to avoid bias. A quality assessment was undertaken but details of this were only reported as summary quality scores, rather than as individual quality items, and the results were not incorporated into the analysis.

Appropriate methods appear to have been used to pool the results, although additional details would have been helpful. The data presented support the authors’ conclusion that CE is superior to the other techniques investigated in terms of the number of positive findings. However, the types of study included in this review only gave information on the yield of the techniques investigated, not on the accuracy of these techniques; it was therefore not possible to draw conclusions about the accuracy of CE. The conclusions regarding the detection of small bowel strictures are not supported, as no results relating to this were presented.

**Implications of the review for practice and research**
Practice: The authors stated that ‘the diagnostic advantage of CE over all other current diagnostic modalities is such that CE should be considered as the procedure of choice in the evaluation of patients with obscure bleeding and suspected small bowel CD’.

Research: The authors did not state any implications for further research.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.