Diagnostic characteristics of given video capsule endoscopy in diagnosis of celiac disease: a meta-analysis

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CRD summary
This review assessed diagnostic performance of video capsule endoscopy for uncomplicated coeliac disease and found that it was not adequate to justify routine use as an alternative to small bowel biopsies. The authors suggested that video capsule endoscopy may be helpful where biopsy cannot be done and more studies are needed. These conclusions are appropriate to the limited data available.

Authors' objectives
To determine the diagnostic characteristics of video capsule endoscopy in detecting uncomplicated coeliac disease.

Searching
MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from 1999 to March 2008. PubMed, Web of Science, Scopus, DARE, (ClinicalTrials.gov and FDA (US Food and Drug Administration) website were also searched. Search terms were reported; no language restrictions were applied. The manufacturer of video capsule endoscopy was contacted for ongoing trials or unpublished data. The previous three years of abstracts from Digestive Disease weekly and the International Conference of Capsule Endoscopy, along with bibliographies of included studies, were screened for additional articles.

Study selection
Prospective studies that assessed the diagnostic performance of video capsule endoscopy, in patients with symptoms of coeliac disease or biopsy proven coeliac disease, were eligible for inclusion. Included studies were required to use oesophagastroduodenoscopy with duodenal pathology as the reference standard; the video capsule endoscopy reader had to be blinded to the results of duodenal pathology.

The primary outcome measure was successful diagnosis of coeliac disease using video capsule endoscopy. The secondary outcome measures were test-associated complications and costs of each diagnostic tool.

Two reviewers independently assessed studies for inclusion and disagreements were resolved by consensus.

Assessment of study quality
The methodological quality of included studies was assessed using the QUADAS (Quality Assessment of Diagnostic Accuracy Studies) tool, a 14 item checklist, which assessed aspects of internal validity (including verification biases, blinding, incorporation bias, review biases, disease progression bias, and handling of withdrawals and indeterminate test results) and generalisability.

Methodological quality was independently assessed by two reviewers; disagreements were resolved by consensus.

Data extraction
Data were extracted on diagnostic performance outcomes (sensitivity, specificity and positive and negative predictive values), complications (if any) and costs. Data were also extracted on endoscopic and video capsule endoscopy appearance, histological findings, and inter-observer/intra-observer variability.

Data were extracted by two reviewers, using a pre-formatted data extraction sheet.

Methods of synthesis
Overall sensitivity and specificity estimates, with 95% confidence intervals (CIs) were calculated using simple pooling
(modified Wald approach) rather than meta-analysis. Likelihood ratios were estimated using the exact method for pooling common odds ratios; confidence intervals were calculated using the mid-P method.

Between study heterogeneity was assessed using the $I^2$ statistic.

Inter-observer and intra-observer agreement was assessed using the kappa statistic.

**Results of the review**

Three studies, with a total of 107 adult participants, were included in the review. All were prospective studies. No details of participant characteristics were reported. Two studies reported the time interval between oesophagogastroduodenoscopy and video capsule endoscopy; this ranged from one to 15 days, in most patients. The number of investigators performing video capsule endoscopy readings varied; one study used only one experienced gastroenterologist and the other two studies each used four investigators. For the two studies using multiple investigators, the kappa values were 0.26 to 1.0 and 0.56 to 0.87. The results of methodological quality assessment were not reported or discussed.

The pooled estimates for video capsule endoscopy in the diagnosing of coeliac disease were 83% (95% CI 71 to 90) for sensitivity and 98% (95% CI 88% to 99.6%) for specificity; there was no evidence of between study heterogeneity. The pooled estimate of positive likelihood ratio was 34.5 (95% CI 16.7 to 43.5) and negative likelihood ratio was 0.22 (95% CI 0.01 to 0.64), with no evidence of between study heterogeneity.

Only one study reported on complications; one patient with minor discomfort due to video capsule endoscopy, and eight patients with minor discomfort plus one patient with major discomfort due to oesophagogastroduodenoscopy.

**Cost information**

One study reported costs of £693 (UK pounds sterling) per patient for video capsule endoscopy and £410 per patient for oesophagogastroduodenoscopy.

**Authors’ conclusions**

The overall diagnostic characteristics of video capsule endoscopy, when used to diagnose coeliac disease, although good with an experienced eye, could not justify the routine use of video capsule endoscopy as an alternative to the pathology of small bowel biopsies. Video capsule endoscopy may be helpful in situations where oesophagogastroduodenoscopy and duodenal biopsy cannot be done. More studies are needed with proper cost-benefit analysis.

**CRD commentary**

The review addressed a clearly stated research question, defined by appropriate inclusion criteria. A wide range of sources were searched for relevant studies; no language restrictions were applied and efforts were made to identify unpublished studies. Measures were taken, throughout the review process, to minimise the potential for error and/or bias.

The authors reported that the methodological quality of included studies was assessed, but no results of this assessment were reported or discussed in the article. The details of included studies and participants were minimal, which made interpretation difficult. The methods used to generate pooled estimates of diagnostic performance were reasonable.

The authors’ conclusions are appropriately cautious, given the very small amount of data available.

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

**Practice**: The authors stated that the diagnostic performance of video capsule endoscopy is not sufficient to justify its routine use as an alternative to the pathology of small bowel biopsies. Video capsule endoscopy may be helpful in situations where oesophagogastroduodenoscopy and duodenal biopsy cannot be done.

**Research**: The authors stated that more studies are needed to explore the value of video capsule endoscopy in...
situations where coeliac disease is likely and duodenal biopsies are negative. Cost analysis of video capsule endoscopy compared to oesophagogastroduodenoscopy is also required.

**Funding**
Not stated.

**Bibliographic details**

**PubMedID**
19405806

**DOI**
10.1089/lap.2008.0380

**Original Paper URL**

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Capsule Endoscopy; Celiac Disease /diagnosis; Humans; Predictive Value of Tests; Reproducibility of Results

**AccessionNumber**
12010000054

**Date bibliographic record published**
14/04/2010

**Date abstract record published**
06/10/2010

**Record Status**
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.