EGD in children with abdominal pain: a systematic review
Thakkar K, Gilger M A, Shulman R J, El Serag H B

CRD summary
This review examined the diagnostic yield (number of additional diagnoses made) as a result of esophagogastroduodenoscopy. The available data were limited and the review included only English language studies. The authors appropriately concluded that the available data indicate a low diagnostic yield, but further research is needed.

Authors' objectives
To determine the diagnostic yield of endoscopy and histology in esophagogastroduodenoscopy (EGD), to assess abdominal pain of unknown cause in children.

Searching
MEDLINE (1966 to January 2006), EMBASE (1995 to January 2006) and the Cochrane Library (January 2006) were searched; the search terms were reported. The searches were restricted to English language articles. Additional studies were sought through examination of the bibliographies of relevant articles.

Study selection
Study designs of evaluations included in the review
The included studies were required to have a minimum of 50 participants. Both prospective and retrospective studies, with and without consecutive enrolment, were included. The results of 14 studies with sample sizes of less than 50 were reported in addition to the included studies.

Specific interventions included in the review
Studies of EGD for the assessment of abdominal pain were eligible for inclusion.

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 patients under the age of 18 years, with abdominal pain of unknown cause, were eligible for inclusion. Where reported, the mean age of the participants ranged from 7.5 to 11.8 years and the proportion of male participants ranged from 35 to 57%.

Outcomes assessed in the review
Studies were eligible for inclusion when either the endoscopic or biopsy reports arising from EGDs were reported and enumerated. The secondary outcomes assessed were: association of alarm symptoms or signs with diagnostic yield; correlation of duration, location, or severity of pain with pathology; interpretation of prognostic results as diagnostic; and predictive value of blood tests taken prior to EGD.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
For each study the authors assessed whether: the participants were recruited consecutively; the outcomes were measured accurately; confounders were identified and adjusted for; and whether or not consecutive recruitment was reported. The authors did not state how the validity assessment was performed.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. The prevalence rates of endoscopic and histological findings, as well as any prognostic or therapeutic implications, were extracted and reported for each study.

Methods of synthesis
How were the studies combined?
Prevalence rates for endoscopic and histological findings were enumerated and summed; weighted means were not used. The calculated prevalence for each study was multiplied by its sample size, and the sum of these values (for all studies) was divided by the total sample size to produce an overall estimate of diagnostic yield.

How were differences between studies investigated?
The results of the included studies were grouped by three geographic regions: USA, Asia, and Europe and the Middle East. No formal investigation of between-study heterogeneity was presented. The discussion of differences between the studies was limited.

Results of the review
Eighteen studies, with a total of 1,871 participants or procedures, were included in the review. Fifteen studies included histology reports. All identified articles reported observational cross-sectional or cohort studies.

The majority of the included studies (83%) were conducted in European, Middle Eastern or Asian populations. The studies had relatively small sample sizes (ranging from 9 to 396 procedures) and 10 studies included less than 100 procedures.

The histology reports did not contain any organic disease. The prevalence of non-specific gastrointestinal inflammatory lesions as a histological finding ranged from 23 to 93%. Endoscopic findings were one case of inflammatory bowel disease and 66 duodenal or gastric ulcers. The overall diagnostic yield of EGD was, therefore, 3.6% (95% confidence interval: 2.8, 4.5). Fourteen studies reported on Helicobacter pylori (H. pylori), with prevalence ranging from 2 to 63%. If H. pylori infection were considered a diagnostic finding, the overall diagnostic yield increased to 28.2%.

Few studies reported secondary outcomes; the results of these studies were described in the text.

Authors' conclusions
The diagnostic yield of EGD in children with abdominal pain of unknown cause was very low; however, the existing evidence base is poor. The effect of EGD on management decisions, quality of life and abdominal pain is unknown, as is its cost-effectiveness.

CRD commentary
The review addressed a clearly stated research question, defined by appropriate inclusion criteria. The literature search was limited to English language publications and no attempt to identify unpublished studies was reported; this might have resulted in the omission of relevant data from the review. Limited details of the study participants were reported, making the generalisability of the findings difficult to assess. The review methodology and quality assessment were poorly reported. In addition, the potential impact on the review's findings of reviewer error and bias introduced during the review process, and the effect of methodological limitations of the included studies, cannot be assessed. The results of the included studies and summary findings were generally clearly presented. However, a number of studies that did not meet the inclusion criteria were also presented, and there was some inconsistency in the results between the abstract and text. Overall, the authors' conclusions are appropriately cautious and relate largely to the need for further research.
Implications of the review for practice and research

Practice: The authors made no specific recommendations for practice.

Research: The authors recommended a large, multicentre study of the association between clinical factors and EGD findings. Such a study should be adequately powered and examine the predictive value of 'alarm signs', laboratory tests and the nature of pain.

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