EUS vs MRCP for detection of choledocholithiasis
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CRD summary
This review assessed the comparative accuracy of endoscopic ultrasound and magnetic resonance cholangiopancreatography for diagnosing biliary stones. The authors concluded that both imaging techniques had high diagnostic performance and that they were equivalent. Limitations in the methods used to identify studies for the review and to analyse the data mean that the results presented should be viewed with caution.

Authors' objectives
To compare the diagnostic accuracy of endoscopic ultrasound (EUS) with that of magnetic resonance cholangiopancreatography (MRCP) for the detection of choledocholithiasis in patients with suspected biliary disease.

Searching
MEDLINE and the Cochrane Controlled Trials Register were searched using the terms 'EUS' and 'MRCP'. Additional studies were sought by screening the bibliographies of review articles and relevant studies. Studies not published in the English language were excluded.

Study selection
Study designs of evaluations included in the review
Prospective, blinded (the endosonographer and the radiologist evaluating patients were blind to the findings of the other study), controlled comparisons of EUS and MRCP were eligible for inclusion.

Specific interventions included in the review
Studies in which both EUS and MRCP were performed in the same patients for the diagnosis of extra-hepatic biliary obstruction were eligible for inclusion. The procedures (including the reference standard) had to be performed within 24 to 72 hours of each other in most cases.

Reference standard test against which the new test was compared
The included studies were required to follow the index test with either endoscopic retrograde cholangiopancreatography (ERCP), or intra-operative cholangiography (with or without choledochoscopy) as the reference standard of diagnosis. Three of the included studies used ERCP as the reference standard investigation in all patients, while the remaining two used either ERCP or intra-operative cholangiography.

Participants included in the review
Studies of patients with suspected biliary disease were eligible for inclusion. The included studies were required to have similar patient populations with respect to age, gender distribution and clinical indication for the test. In the included studies, the mean age of the patients ranged from 46.5 to 64 years and the proportion of males ranged from 36 to 57%.

Outcomes assessed in the review
No inclusion criteria for the outcome measures were specified. The sensitivity, specificity, positive and negative likelihood ratios, and positive and negative predictive values were reported for each included study. In calculating these values, patients with a final diagnosis of choledocholithiasis were considered positive, while those with no pathology or a diagnosis other than biliary stone were classified as negative.

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
The authors did not state that they assessed validity. However, the inclusion criteria were formulated to minimise interpretation biases and disease progression bias.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. The total numbers of patients with stones, with other diagnoses, and with no pathology were reported for each included study.

Methods of synthesis
How were the studies combined?
Pooled estimates of the sensitivity, specificity, positive and negative likelihood ratios, and positive and negative predictive values, along with 95% confidence intervals (CIs), were calculated using a random-effects model.

How were differences between studies investigated?
Between-study homogeneity was assessed using the chi-squared test. However, the minimum expected frequency requirements were not met because of the small sample sizes of the included studies.

Results of the review
Five randomised controlled trials with a total of 320 participants were included in the review. Nineteen patients (11 from one study, four from another and two each from a further two) were excluded from the analysis because they did not undergo all three evaluations.

The pooled estimates of sensitivity for EUS and MRCP were 0.93 (95% CI: 0.87, 0.98) and 0.85 (95% CI: 0.77, 0.93), respectively. The corresponding specificities were 0.96 (95% CI: 0.91, 1.00) and 0.93 (95% CI: 0.88, 0.98), respectively.

The pooled estimates of the positive likelihood ratio for EUS and MRCP were 23.04 (95% CI: 11.6, 46.5) and 12.14 (95% CI: 7.22, 20.43), respectively. The corresponding negative likelihood ratios were 0.07 (95% CI: 0.04, 0.15) and 0.16 (95% CI: 0.10, 0.25), respectively.

The pooled estimates of positive predictive value for EUS and MRCP were 0.93 (95% CI: 0.87, 0.99) and 0.87 (95% CI: 0.79, 0.94), respectively. The corresponding negative predictive values were 0.96 (95% CI: 0.94, 0.98) and 0.92 (95% CI: 0.87, 0.96), respectively.

There were no statistically significant differences between EUS and MRCP with respect to their sensitivity, specificity, or positive and negative predictive values.

Authors' conclusions
Both EUS and MRCP had high overall diagnostic performance, with no significant differences between them.

CRD commentary
The review addressed a clearly stated research question using well-defined inclusion criteria. The search strategy was limited and the additional limitation to English language studies might have resulted in the omission of some relevant data. No details of the review process were reported, thus it was not possible to judge the potential for bias and error during the study selection and/or data extraction processes. No formal assessment of the methodological quality of included studies was reported, but the inclusion criteria used minimised the potential for review bias and disease progression bias.

Patient characteristics, inclusion criteria and testing protocols were reported in detail for the five included studies, as
well as diagnostic performance measures. The description of the methods used to generate pooled estimates was minimal and the possibility of between-study heterogeneity could not be ruled out. It was therefore difficult to judge the extent to which the generation of pooled estimates for sensitivity, specificity and likelihood ratios may be considered appropriate. The pooling of positive and negative predictive values from individual studies was unlikely to be appropriate since these are highly dependent upon disease prevalence; the prevalence of biliary stones in the included studies ranged from 17 to 80%.

The authors’ conclusions regarding the accuracy and equivalence of EUS and MRCP are a reasonable interpretation of the data presented, but should be viewed with caution given the limitations outlined.

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

Practice: Given the equivalence of EUS and MRCP in terms of diagnostic performance, the authors recommended that other factors should be considered, such as resource availability, experience and cost when deciding which test to use.

Research: The authors made no recommendations for future research.

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