A systematic review of the accuracy of ultrasound in the diagnosis of endometriosis

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Authors' objectives
To assess the diagnostic performance of transvaginal and transabdominal ultrasound, with or without Doppler, to diagnose pelvic endometriosis.

Searching
MEDLINE (from 1966 to 2001) and EMBASE (from 1980 to 2001) were searched for potential studies for inclusion; the search terms were given. The references of the retrieved articles were also checked for additional studies.

Study selection
Study designs of evaluations included in the review
Prospective studies were eligible for inclusion. Case reports and descriptive series were excluded.

Specific interventions included in the review
Studies of transvaginal and transabdominal ultrasound, with or without Doppler, were eligible for inclusion. Studies of rectal ultrasound or endoscopic ultrasonography were excluded.

Reference standard test against which the new test was compared
The studies had to compare ultrasound examination with a visual assessment of the pelvis using laparoscopy or laparotomy to be eligible for inclusion.

Participants included in the review
Studies of women with pelvic pain, infertility, a pelvic mass, or other complaint where endometriosis is one of the differential diagnoses were eligible for inclusion. Studies were eligible if they included symptomatic or asymptomatic women. Studies of women who were pregnant or had extrapelvic endometriosis or adenomyosis were excluded. Where stated, the mean age of the included patients ranged from 33 to 46 years (age range: 14 to 78).

Outcomes assessed in the review
No a priori inclusion criteria relating to the outcome measure were specified. Studies that reported the number of true positives, false positives, false negatives, and true negatives to allow the construction of a 2x2 contingency table were included in the review.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed the studies for inclusion. Any disagreements were resolved by consulting a third reviewer.

Assessment of study quality
The studies were assessed according to whether they fulfilled the following criteria: consecutively enrolled patients; blinding of the ultrasound operator; blinding of the surgeon to ultrasound findings; clear description of technical details of the equipment used and criteria used to confirm diagnosis; and use of the revised American Fertility Society (rAFS) classification system, or histological confirmation of endometriosis, as the reference standard.

If all criteria were met the study was considered to be 'good' quality, if one criterion was missing the study was considered to be 'moderate', and if more than one criterion was missing the study was considered to be 'poor'. Two reviewers independently assessed the quality of the included studies. Any disagreements were resolved by consulting a third reviewer.
**Data extraction**

Two reviewers independently extracted the data. Any disagreements were resolved by consulting a third reviewer. Data were extracted to construct 2x2 tables, then used to calculate a positive and negative likelihood ratio (LR) with confidence intervals (CIs), and the sensitivity and specificity for each included study.

**Methods of synthesis**

**How were the studies combined?**

The results of each of the included studies were tabulated according to the type of ultrasound and presented in a narrative summary.

**How were differences between studies investigated?**

Differences between the studies were discussed in a narrative discussion, according to the type of ultrasound.

**Results of the review**

Six studies (1,257 cysts; range: 37 to 656) were included in the review.

Two studies were considered to be of good quality, three were moderate, and one was poor.

Transvaginal grey-scale ultrasound without Doppler (6 studies, 1,257 cysts).

The positive LR ranged from 7.6 (95% CI: 3.7, 15.6) to 29.8 (95% CI: 18.2, 49). The negative LR ranged from 0.1 (95% CI: 0.04, 0.4) to 0.4 (95% CI: 0.2, 0.8). The sensitivity ranged from 64% (specificity 100%) to 89% (specificity 91%), while the specificity ranged from 91% (sensitivity 89%) to 100% (sensitivity 64%).

Conventional colour Doppler with grey-scale ultrasound (1 study, 57 cysts).

The positive LR was 1.2 (95% CI: 0.8, 1.4) and the negative LR was 0.4 (95% CI: 0.09, 1.7). The sensitivity was 90% and the specificity was 22%.

Colour Doppler energy imaging with grey-scale ultrasound (1 study, 170 cysts). The positive LR was 33.5 (95% CI: 10.9, 103) and the negative LR was 0.1 (95% CI: 0.05, 0.2). The sensitivity was 90% and the specificity was 97%.

**Authors’ conclusions**

Transvaginal ultrasound appeared to be of moderate accuracy for the differentiation of endometrioma from other adnexal masses. However, the CIs were wide. Further research to determine the role of ultrasound in the diagnosis of other forms of endometriosis and the use of colour Doppler energy imaging is required.

**CRD commentary**

The review addressed a clear question and used clearly defined inclusion criteria. The search was restricted to two electronic databases, thus it is possible that some studies might have been missed from the review. The authors used procedures to minimise bias in the study selection and data extraction processes. The quality of the included studies was assessed systematically and was considered in the discussion of the results. Details of each of the included studies were adequately reported and the narrative synthesis presented was appropriate. The authors' conclusions are suitably cautious given the evidence presented in the review. However, the authors acknowledged that the CIs were wide, suggesting that the estimates of LR may be imprecise. It is also possible that the search strategy used in this review might not have identified all relevant studies.

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

Practice: The authors stated that transvaginal ultrasound appears to be a useful diagnostic tool to confirm and rule out a diagnosis of ovarian endometrioma.
Research: The authors stated that further prospective studies are required to assess the diagnostic performance of colour Doppler energy imaging in women with endometriosis. Further research to determine the use of ultrasound in the diagnosis of other forms of endometriosis is also needed.

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