Diagnostic accuracy of transvaginal sonography for the diagnosis of adenomyosis: systematic review and metaanalysis

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CRD summary
The review assessed the accuracy of transvaginal sonography for diagnosing adenomyosis and found it to be moderately accurate. Included studies assessed transvaginal sonography alone and in combination with a number of other tests and used different criteria for diagnosis. This factor, along with limitations in the review process, means that overall estimates of diagnostic accuracy are unlikely to be reliable.

Authors' objectives
To assess the accuracy of transvaginal sonography (TVS) for diagnosing adenomyosis.

Searching
MEDLINE, EMBASE, Current Contents and The Cochrane Library were searched from 1966 to December 2007. Search terms were reported. Ovid (Silver Platter) search engine was used. Studies not in English but with an abstract in English were included. Abstracts of relevant scientific meetings (since 1966) were handsearched to identify unpublished studies. Published systematic reviews and chapters from textbooks were searched for additional studies.

Study selection
Studies of women who underwent transvaginal sonography for assessment of uterine pathology were eligible for inclusion. Histology following hysterectomy was the reference standard used to confirm diagnosis.

Included studies were of transvaginal sonography alone or in combination with magnetic resonance imaging (MRI), uterine needle biopsy or transabdominal ultrasound; one study was of transabdominal ultrasound alone. Studies used ultrasound transducers of between 5MHz and 9MHz. Criteria for ultrasound diagnosis varied across studies and were described in detail in the paper.

Two reviewers assessed studies for inclusion. Disagreements were discussed with a third reviewer and resolved by consensus.

Assessment of study quality
Methodological quality of included studies was assessed using the QUADAS tool, a 14-item checklist of participant spectrum, adequacy of reference standard, verification biases, review biases, incorporation bias, reporting of test execution and handling of withdrawals and indeterminate test results. Study quality was defined as high when at least nine items were met, moderate when at least six items were met and low when fewer than six items were met.

The authors did not state how many reviewers performed the quality assessment.

Data extraction
Data were extracted to construct 2x2 contingency tables of diagnostic performance (numbers of true positive, false negative, false positive and true negative test results). For each study, sensitivity and specificity, positive and negative likelihood ratios, positive and negative predictive values and diagnostic odds ratios were calculated, with 95% confidence intervals (CIs).

The authors stated neither how data were extracted for the review nor how many reviewers performed data extraction.

Methods of synthesis
Summary estimates of sensitivity and specificity, and positive and negative likelihood ratios (with 95% CIs) were
calculated using the Der Simonian and Laird random-effects model. Post-test probabilities were calculated based on pooled likelihood ratios and overall pretest probability of a diagnosis of adenomyosis. Area under the summary receiver operating characteristic (SROC) curve was estimated, but the associated SROC plot was not presented.

Possible sources of heterogeneity were investigated using meta-regression analysis. Explanatory variables were study design, number of participants, test description, QUADAS score, country of publication, language of publication, type of ultrasound transducer and whether the study included participants with symptoms consistent with adenomyosis. Subgroup analyses were performed for patients who had a hysterectomy for symptoms consistent with adenomyosis and for patients who had a hysterectomy for any reason.

Publication bias was assessed by visual inspection of funnel plots and using the Egger test.

**Results of the review**

Fourteen studies (1,898 participants) were included in the review. All studies were defined as high quality; QUADAS scores ranged from 11 to 13. All studies were prospective. All published in English.

Pooled estimate of sensitivity was 82.5% (95% CI 77.5% to 87.9%) and pooled estimate of specificity was 84.6% (95% CI 79.8% to 89.8%). Pooled estimate of positive likelihood ratio was 4.7 (95% CI 3.1 to 7.0) and pooled estimate of negative likelihood ratio was 0.26 (95% CI 0.18 to 0.39).

Prevalence of adenomyosis was 27.9% (95% CI 25.5% to 30.3%). Therefore, probability of adenomyosis with an abnormal transvaginal sonography was 66.2% (95% CI 61.6% to 70.6%) and probability of adenomyosis with a normal transvaginal sonography result was 9.1% (95% CI 7.3% to 11.1%).

Results of subgroup analyses did not differ significantly from analyses for the whole population. None of the explanatory variables in the meta-regression significantly affected diagnostic accuracy. There was no evidence of publication bias.

**Authors’ conclusions**

Published evidence suggested that transvaginal sonography was a moderately accurate test for diagnosis of adenomyosis.

**CRD commentary**

The review stated a clear research question that was defined by limited, but appropriate, inclusion criteria. A number of sources were searched for relevant studies. There were no restrictions by publication status. However, the effective language restriction (studies were included only if they had an English-language abstract) left open the possibility of language bias (all the included studies were in English). Measures were taken to reduce error and/or bias during the study selection process; it was unclear whether similar measures were applied throughout the review process. Methodological quality of included studies was assessed, but the results of this assessment were not reported and were used to generate overall quality scores (generation of overall quality scores using QUADAS has been shown to be an unreliable method of assessing study quality). Although no formal assessment of between-study heterogeneity was presented, pooled estimates of accuracy measures were of doubtful validity given that the included studies assessed a number of different tests and combinations of tests and used different diagnostic criteria. Results of individual studies were not presented, which made the findings of the review difficult to interpret. Given the limitations described, the authors conclusions may be unreliable and should be viewed with caution.

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

**Practice:** Transvaginal sonography represented the most practical preoperative test for adenomyosis and may be useful in planning surgical or alternative interventions.

**Research:** The authors suggested that future meta-analyses could compare transvaginal sonography with MRI.

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