Accuracy of ultrasound to identify chronic liver disease

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CRD summary
This review concluded that ultrasound of the liver surface was a useful diagnostic tool in patients at risk of chronic liver disease for assessing whether they should undergo a liver biopsy. Weaknesses in the review methods, differences between included studies and poor sensitivity values for liver surface ultrasound, mean that these conclusions should be treated cautiously.

Authors' objectives
To assess the diagnostic performance of ultrasound imaging for identifying chronic liver disease in a high-risk population.

Searching
MEDLINE, EMBASE, CINAHL and Science Citation Index were searched in November 2009. Search terms were reported; no search filters were used. Bibliographies of included studies were screened for additional articles. Only studies reported in English were included.

Study selection
Prospective studies of ultrasound that assessed adults at risk of chronic liver disease, where liver biopsy was used as the reference standard, were eligible for inclusion. Included studies were required to report sufficient data to extract 2x2 contingency tables or sensitivity, specificity and prevalence values.

The aetiology of liver disease was described as "mixed" or "viral" for the most of the included studies. The mean age of participants ranged from 36 to 54 years (where reported); most were male. Study inclusion criteria were abnormal liver function tests and/or hepatitis virus in most studies. The prevalence of chronic liver disease ranged from 9 to 62%.

Included studies reported accuracy for 30 different ultrasound techniques, most of which were assessed by a single study; techniques were classified as low-frequency grey-scale imaging, high-frequency grey-scale imaging, Doppler techniques, and scoring systems using a combination of techniques. The most common method for histological staging of biopsy samples was METAVIR.

One author determined the eligibility of studies for inclusion in the review.

Assessment of study quality
Two reviewers independently assessed methodological quality using the 14-item QUADAS (Quality Assessment of Diagnostic Accuracy Studies) tool. Disagreements were resolved by consensus or a third reviewer.

Data extraction
Data were extracted or calculated for sensitivity and specificity of ultrasound tests.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
Studies were summarised in a narrative synthesis and the results of included studies were plotted in receiver operating characteristic (ROC) space. Three plots were constructed showing studies classified by: category of ultrasound technique; ultrasound techniques reported by multiple studies; and reporting of blinding of reference test interpretation.

Results of the review
Twenty-one studies were included in the review (n=3,486 patients). Across all studies, the mean number of responses within the QUADAS assessment tool was 10 (range 7 to 13) for “Yes”, 1 (range 0 to 3) for “No” and 3 (range 0 to 6) for “unclear”.
For low-frequency grey-scale techniques, diagnostic sensitivity ranged from 29 to 86.3% and specificity ranged from 35.3 to 99% (eight studies, 14 data sets).

For high-frequency grey-scale techniques (liver surface), diagnostic sensitivity ranged from 12.5 to 87.5% and specificity ranged from 78 to 95% (eight studies).

For Doppler techniques, sensitivity ranged from 31.4 to 94% and specificity ranged from 39 to 100% (six studies, 19 data sets).

For scoring systems, sensitivity and specificity both ranged from 68 to 100% (four studies, five data sets).

Studies that reported blinded interpretation of reference standard appeared to show greater diagnostic accuracy (ROC plot) than those where blinding was uncertain.

**Authors' conclusions**
Ultrasound of the liver surface was a useful diagnostic tool in patients at risk of chronic liver disease for assessing whether they should undergo a liver biopsy.

**CRD commentary**
The review addressed a clearly stated research question, defined by appropriate inclusion criteria. A range of sources were searched for relevant studies, but exclusion of non-English language studies raised the possibility of language bias and omission of relevant data. Only one reviewer assessed studies for inclusion, increasing the possibility of error and/or bias in the study selection process; it was unclear how data extraction was performed.

An assessment of the methodological quality of included studies was performed, but only summary data were reported, so that the reliability of the included study results could not be adequately assessed. Included studies were heterogeneous, so the choice of a narrative synthesis was appropriate.

The authors’ conclusions, supporting the usefulness of ultrasound of the liver surface, appear too strong for the data reported and should be treated with caution; specificity values were high, but sensitivity was poor, which indicated that the use of this test may lead to relatively high numbers of patients with chronic liver disease being missed. Some scoring systems reported by single studies appeared more promising (high sensitivity and specificity) and these results may have warranted greater emphasis.

**Implications of the review for practice and research**
The authors did not state any recommendations for practice or research.

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