Ultrasonography for the initial evaluation of blunt abdominal trauma: a review of prospective trials
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Authors' objectives
To assess the efficacy of diagnostic ultrasound in blunt abdominal trauma, to investigate the impact of training and experience of ultrasound operator on outcome measures, and to identify questions for future research.

Searching
MEDLINE was searched from January 1980 to November 1994 using the search terms ‘abdominal injuries' and 'ultrasound'. Additional references were obtained from the retrieved studies. The studies were restricted to peer-reviewed articles published in English.

Study selection
Study designs of evaluations included in the review
Only prospective studies were included. Studies were excluded if the ultrasound studies were undertaken one hour after the patient had arrived in the emergency department.

Specific interventions included in the review
No inclusion criteria relating to the index test were specified, and no details of the ultrasound techniques used in the included studies were reported. Studies that also evaluated diagnostic peritoneal lavage and/or computed tomography were included.

Reference standard test against which the new test was compared
No inclusion criteria relating to the reference standard were specified, and no details of the reference standards used in the included studies were reported.

Participants included in the review
No inclusion criteria relating to participant characteristics were specified. The included studies were of patients with blunt abdominal trauma. Three included studies were selective in their inclusion so that a limited spectrum of disease would be included; they specifically excluded severely injured patients. One paediatric study was excluded.

Outcomes assessed in the review
No inclusion criteria relating to the outcome measures were specified. The diagnostic outcome measures used in the review were the sensitivity and specificity for the detection of intraperitoneal fluid, detection of intraperitoneal organ injury, determination of the need for emergency laparotomy, and the localisation of injured organs. The authors also looked for evidence of a therapeutic effect on patient outcome in terms of morbidity, mortality, or quality of life.

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 studies were graded according to the following: sample size; representative nature of the sample; use of an appropriate reference standard for assessing the presence of disease; application of the reference standard to all patients; blinding; and temporal proximity of study and reference standards for diagnostic effect outcomes. The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
A narrative review was undertaken.

How were differences between studies investigated?
Differences between the studies were discussed in the text.

Results of the review
Eleven studies (2,000 participants) were included.

The validity assessment, using the grading scheme, indicated that none of the studies were of a high quality. Three studies were of good quality and 8 studies presented weak evidence.

Four studies reported results for the ultrasound detection of free intraperitoneal fluid. The sensitivity ranged from 87% (specificity 100%) to 98% (specificity 99 and 100%) and the specificity from 99% (sensitivity 98%) to 100% (specificity 87 and 98%), based on 3 studies.

Ultrasonography as a screening test for intraperitoneal organ injury was reported in 5 studies. The sensitivities ranged from 69% (specificity 99%) to 96% (specificity 95%) and the specificities from 95% (sensitivity 92 and 96%) to 100% (specificity 83%). Variations were thought to reflect the different patient co-morbidities and diagnostic protocols used.

Four studies assessed the effectiveness of ultrasound in determining the need for emergency laparotomy. These reported sensitivities ranging from 84% (specificity 88%) to 93% (specificity 100%) and specificities from 88% (sensitivity 84%) to 100% (sensitivity 93%).

The effectiveness of ultrasound localisation of injured organs was examined in 3 studies. The sensitivities ranged from 20 to 80%, depending upon the organ injured.

The review found no studies reporting therapeutic effect or patient outcome determinations.

The relationship between operator training and the diagnostic performance of ultrasound could not be adequately investigated, given the differences in study population characteristics and design.

Authors’ conclusions
All 11 studies included in this review concluded that ultrasound was valuable for the assessment of blunt intraperitoneal trauma. However, frequent methodological flaws were detected in these studies. The criteria for clinical efficacy were not fulfilled and there was a lack of assessment of therapeutic effect and patient outcome. Additional trials are required before ultrasound is accepted as a standard diagnostic test for blunt abdominal trauma.

CRD commentary
This review lacked many of the characteristics necessary for a systematic review of the literature. The objective was clearly reported. However, the inclusion criteria were very poorly defined, particularly in respect of the reference standard. The search strategy was very limited and was restricted to English language publications. It therefore seems likely that relevant data were omitted. No assessment of publication bias was reported. Study quality was assessed, but the reporting of the assessment was somewhat confused. In addition, since the reporting of the review methodology was poor, there is the possibility that methodological flaws in the review process might have introduced bias. The reporting of the characteristics of the included studies was also limited, making it difficult to assess the generalisability of the review’s findings. The limitations of the review and of the primary literature were discussed in the text.
The authors' conclusions follow broadly from the results presented but, given the limitations described, the review should be interpreted with caution.

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

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that assessments of therapeutic effect and patient outcome were lacking, and that further trials should be conducted before ultrasound is accepted as a standard test for the evaluation of blunt trauma.

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