CRD summary
This review concluded that, while certain findings accurately increased or decreased the probability that intracranial haemorrhage had occurred in acute stroke patients, no individual finding or combination of findings could be considered diagnostic in all patients; diagnostic certainty required neuroimaging. Some caution should be exercised in the interpretation of these conclusions.

Authors' objectives
To determine the accuracy of clinical examination in distinguishing haemorrhagic stroke from ischaemic stroke.

Searching
PubMed (from 1970) and EMBASE (from 1988) were searched up to April 2010. Search terms were reported. References of selected studies were also checked. Only studies reported in English were eligible for inclusion in the review.

Study selection
Prospective studies of patients that presented to clinicians in a hospital or emergency department with a diagnosis of stroke which used computed tomography (CT), magnetic resonance imaging (MRI) or autopsy to distinguish haemorrhage from ischaemia were eligible for inclusion in the review. Studies were required to report sufficient information to permit the construction of 2x2 tables.

Included studies had maximum permitted intervals between the onset of neurological conditions and CT scanning which varied from less than three days (most of the studies) to over 15 days. Some studies assessed the following stroke scoring systems: Siriraj stroke score and Besson score.

Two reviewers independently assessed the studies for inclusion in the study.

Assessment of study quality
Two reviewers independently assessed the studies for quality by assigning a grade similar to other studies in a published series, based on adequacy of sample size, consecutive enrolment of cases, and independent comparison with the gold standard. Blinding of the CT assessor was also assessed. Studies with at least 100 patients and at least 30 patients with hemorrhagic stroke were considered to be large for the purposes of the assessment.

Data extraction
Two reviewers independently extracted data to calculate sensitivity, specificity and positive and negative likelihood ratios with 95% confidence intervals (CIs). Discrepancies were resolved through consensus.

Methods of synthesis
Pooled estimates for sensitivity, specificity and likelihood ratios were calculated using a DerSimonian and Laird random-effects model, with a 0.5 correction for empty cells.

In the analysis of the Siriraj score, subgroup analyses were conducted of patients who received CT within 72 hours and of studies given a methodological quality grade of 1 versus 2 or 3.

Results of the review
Nineteen studies were included in the review (n=6,438 patients, of whom 1,528 had haemorrhagic stroke).
The Siriraj score (assessed in 13 studies) showed higher diagnostic accuracy than the Besson score (two studies). The likelihood ratio of haemorrhagic stroke, when indicated by a Siriraj score greater than 1, was 5.7 (95% CI 4.4 to 7.4), but the likelihood ratio when ischaemic stroke was indicated (score below -1) was 0.29 (95% CI 0.23 to 0.37). However, 20% of all patients were classified as uncertain on the basis of their Siriraj score (between -1 and 1), with a likelihood ratio for hemorrhagic stroke of 0.94 (95% CI 0.77 to 1.1). Comparable likelihood ratios for Besson scores were 1.4 (95% CI 0.92 to 2.2) and 0.23 (95% CI 0.01 to 5). One study found that overall clinical impression provided comparable results to the Siriraj score, with a positive likelihood ratio of 6.2 (95% CI 4.2 to 9.3) and a negative likelihood ratio of 0.28 (95% CI 0.20 to 0.39).

The following individual findings increased the probability of hemorrhagic stroke: coma, neck stiffness, seizures accompanying the neurologic deficit, diastolic blood pressure greater than 110mmHg, vomiting and headache. Conversely, cervical bruit and prior transient ischaemic attack significantly decreased the probability of haemorrhage.

Authors' conclusions
In acute stroke patients, certain findings accurately increased or decreased the probability that intracranial haemorrhage had occurred, but no individual finding or combination of findings could be considered diagnostic in all patients; diagnostic certainty required neuroimaging.

CRD commentary
The review question and the inclusion criteria were clear. The authors searched two relevant databases, but did not report attempts to identify unpublished studies. This, together with the decision to limit the review to studies reported in English, may have increased the chances of selection bias. The authors reported using methods designed to reduce reviewer bias and error at all stages of the review process.

Whilst the studies were assessed for quality using several relevant criteria, only summary results of this assessment were reported. Little information on the characteristics of included studies was reported. Although some limited exploration of clinical heterogeneity was undertaken, there was no reporting of statistical heterogeneity, so it was unclear whether the statistical pooling of results was appropriate.

While the authors' conclusions are reasonable, some caution should be exercised in their interpretation.

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

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