Reviewer's report

Title: Systematic review and meta-analysis of the diagnostic accuracy of ultrasonography for deep vein thrombosis

Version: 1 Date: 5 July 2005

Reviewer: Miriam Brazzelli

Reviewer's report:

General
The review is cogent and addresses a relevant medical topic. There are, however, a couple of points that might benefit from further consideration.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

Methods
1. The methodological quality of included studies was not formally assessed (with the exception of blinding procedures) and it is unclear, for example, whether verification bias might have occurred in some of the included studies and it was also unclear how uncertain/unreliable test results were interpreted. If retrieval of this information proves difficult at this stage I would recommend mentioning it in the discussion section amongst the possible limitations of the review.

2. The authors did not record the range of US frequencies used in the original studies and how much these varied between studies. Variation in the frequencies of US used might affect accuracy and explain some of the heterogeneity observed between studies.

3. It would have been useful to extract data from original studies on the time period between US and venography to be sure that the clinical presentation of DVT did not change between the two tests. It would be also important to know whether the patients were scanned roughly at the same time after admission/enrolment across studies and if not, whether the time period between admission and US might have affected accuracy. Again, if retrieval of this information proves unfeasible at this stage appropriate comments should be added to the text of the review.

Results
4. Number of participants is not provided. Total number of participants and range of study sample sizes should be added.

5. Considering the high variation between studies in terms of study design, population, and ultrasound techniques it is debatable whether statistical pooling of results was really appropriate. I agree it is reasonable to present the data graphically by means of forest plots for sensitivity and specificity but, because of the observed heterogeneity (common in systematic reviews of diagnostic tests accuracy) it is advisable not to include the summary estimates; these should be omitted from the graphs.

6. Meta-regression analysis - The authors should consider adding the proportions of patients with previous DVT in their analysis. This variable will very likely influence pre-test probability, but may also materially influence diagnostic test accuracy.

Discussion
7. I would further stress that the results should be considered with caution due to the remaining high heterogeneity (despite meta-regression analysis). I would also put further emphasis on the fact that the results related to repeated US scanning (best estimates and predictive values) are based on a limited number of studies and are therefore far from being definitive.

8. The inclusion of non-English language studies was both important and praiseworthy. However, the authors could mention that restriction to English, French, Spanish, Italian, or German could have potentially contributed to publication bias.

Conclusions
9. The conclusions and abstract do not fully reflect the opinions stated in the discussion, i.e. that findings were subject to significant unexplained heterogeneity. This should be expressed in both the abstract and conclusions. The conclusions on the value of repeated scanning are worded very positively, and in my opinion the data are not robust enough to support such a conclusion. I would therefore suggest deleting the last paragraph (the conclusions on repeated scanning should be more tentative).

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Abstract
1. Conclusions, last sentence - It would be more appropriate to replace the word support with assess

Results section
2. Repeated US - For clarity it would be better to add totals and subtotals in Table 3 to match numbers in the text.

Discretionary Revisions (which the author can choose to ignore)

1. Results - It would have been useful if the authors had discussed potential causes of heterogeneity (i.e. heterogeneity due to a possible threshold effect, methodological heterogeneity, and clinical heterogeneity). A summary ROC (SROC) model - after computation of diagnostic ORs - could have been considered in order to examine whether heterogeneity in study results could have been explained by potential differences in the criteria used to define a positive test result (see for example Moses and colleagues model on Stat Med 1993). The SROC model could have also been extended to include covariates (by means of a regression method) to explain methodological or clinical differences between studies (see for example Mol and colleagues model on Hum Reprod 1998).

2. Assuming that the level of experience of the examiners could not be compared between studies, analysis of studies by year of publication as a proxy for changes in technology and increasing level of expertise with ultrasound imaging would have been useful, especially in view of the unexpectedly lower sensitivity observed in studies where ultrasound scans were interpreted by radiologist.

Which journal?: Not appropriate for BMC Medicine: an article whose findings are important to those with closely related interests and more suited to BMC Medical Imaging

What next?: Offer publication in BMC Medical Imaging after discretionary revisions

Quality of written English: Acceptable
Statistical review: No

Declaration of competing interests:
I declare that I have no competing interests.