Does this patient with a pericardial effusion have cardiac tamponade?

Roy C L, Minor M A, Brookhart M A, Choudhry N K

CRD summary
The authors concluded that most patients with cardiac tamponade will have dyspnoea, tachycardia, elevated jugular venous pressure or cardiomegaly on chest radiograph and that pulsus paradoxus greater than 10 mmHg helps identify patients with the condition where there is pericardial effusion, but additional testing is required. Limitations of the review methods and available data mean that these conclusions should be regarded with caution.

Authors’ objectives
To evaluate the accuracy of history, physical examination, and basic diagnostic tests for the diagnosis of cardiac tamponade.

Searching
MEDLINE was searched up to December 2006; the search terms were reported. In addition, references of retrieved articles and textbooks were screened. The review was restricted to publications in the English language.

Study selection
Study designs of evaluations included in the review
The studies had to include at least 15 patients to be eligible.

Specific interventions included in the review
Studies evaluating history, physical examination, and routine diagnostic tests such as electrocardiography or plain chest radiography were eligible for inclusion. The included studies evaluated the following: clinical history; indicators in the physical examination, such as pulsus paradoxus above 10 mmHg, tachycardia or elevated jugular venous pressure; abnormalities in electrocardiography; and cardiomegaly on chest radiography.

Reference standard test against which the new test was compared
Studies that compared test results to pericardiocentesis with right heart catheterisation and echocardiography were eligible. The majority of the included studies used right heart catheterisation and pericardiocentesis as the reference standard.

Participants included in the review
Studies of patients with suspected cardiac tamponade were eligible; studies of patients with cardiac tamponade after cardiac surgery and studies dealing with other pericardial diseases were excluded. The majority of studies were of patients referred for pericardiocentesis.

Outcomes assessed in the review
The studies had to report data on the diagnosis of cardiac tamponade to be eligible. The review reported the sensitivity of the investigated indicators; for some outcomes the specificity and likelihood ratios (LRs) were also reported. The measurement methods used in the included studies varied, e.g. pulsus paradoxus was measured with an intra-arterial transducer or sphygmomanometer.

How were decisions on the relevance of primary studies made?
Two reviewers independently screened the studies.

Assessment of study quality
The studies were graded for quality. Level 1 studies independently comparing indicators with an acceptable reference standard in a large number of consecutive patients. Level 2 studies were as for level 1, but with fewer patients. Level 3
studies were as for levels 1 and 2, but examined nonconsecutive patients suspected of having the target disorder. Level 4 studies were non-independent comparisons of signs and symptoms among patients with, and perhaps without, the target condition. The authors did not state how the validity assessment was performed.

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?
When 3 or more studies were available and presented data, pooled sensitivities together with the confidence intervals (CIs) were calculated using a random-effects model. Other data were presented as point estimates or ranges.

How were differences between studies investigated?
No formal investigation of between-study heterogeneity was reported. Some differences were referred to in the text.

Results of the review
Eight studies (n=300) were included: 4 prospective cohort studies (n=149) and 4 retrospective chart reviews (n=151).

All studies were classified as level 4 studies. The number of participants ranged from 16 to 65.

Reported sensitivities for the five features shown to occur in the majority of patients with tamponade were as follows: dyspnoea (range: 0.87 to 0.89; 2 studies), tachycardia (0.77, 95% CI: 0.69, 0.85; 4 studies), pulsus paradoxus (0.82, 95% CI: 0.72, 0.92; 7 studies), elevated jugular venous pressure (0.76, 95% CI: 0.62, 0.90; 4 studies) and cardiomegaly on chest radiograph (0.89, 95% CI: 0.73, 1.00; 4 studies). According to 1 study, the presence of pulsus paradoxus greater than 10 mmHg in patients with pericardial effusion increases the likelihood of tamponade (LR 3.3, 95% CI: 1.8, 6.3), whereas 10 mmHg or less lowers the likelihood (LR 0.03, 95% CI: 0.01, 0.24).

Authors’ conclusions
A minority of patients with cardiac tamponade will not have dyspnoea, tachycardia, elevated jugular venous pressure or cardiomegaly on chest radiograph. A pulsus paradoxus greater than 10 mmHg helps distinguish patients with or without cardiac tamponade in patients with a pericardial effusion. Additional testing is required to achieve diagnostic certainty.

CRD commentary
This review addressed a complex topic with well-defined inclusion criteria. The search was limited, being restricted to English language publications and a single bibliographic database, with no explicit attempt to locate unpublished material. It is therefore possible that pertinent studies have been missed and that language and publication biases have been introduced into the review. The reviewers reported only limited steps to reduce reviewer errors and bias.

The data seemed to stem directly from the individual studies as reported, rather than having been computed from diagnostic 2x2 tables; this makes the review vulnerable to mistakes in the included studies and misses crucial data, i.e. in several cases the specificity was not reported together with the sensitivity, so that the number of false positives that might be generated by a diagnostic criterion remains unknown. The included studies were of poor quality and rather unsuited to provide valid diagnostic accuracy data. Very little information was given about the pooling of the data and the results were not reported together with the statistical heterogeneity, making it very difficult to evaluate the validity of the pooled results. Owing to limitations in the review methodology and paucity of data, and the poor quality of the included studies, the conclusions of the review should be regarded with caution.

Implications of the review for practice and research
Practice: The authors stated that when faced with a patient with a known pericardial effusion, clinical examination may guide decisions on management or invasive interventions.

Research: The authors did not state any implications for further research.

**Bibliographic details**
Roy C L, Minor M A, Brookhart M A, Choudhry N K. Does this patient with a pericardial effusion have cardiac tamponade? JAMA 2007; 297(16): 1810-1818

**PubMedID**
17456823

**DOI**
10.1001/jama.297.16.1810

**Original Paper URL**
http://jama.ama-assn.org/

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Cardiac Tamponade /diagnosis /etiology /physiopathology /therapy; Echocardiography; Humans; Pericardial Effusion /complications /diagnosis /therapy; Pericardiocentesis; Physical Examination; Pulse; Radiography

**AccessionNumber**
12007008118

**Date bibliographic record published**
30/11/2007

**Date abstract record published**
30/11/2007

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.