Detection of lymph node metastases in head and neck cancer: a meta-analysis comparing US, USgFNAC, CT and MR imaging

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CRD summary
This review found that ultrasound-guided fine-needle aspiration cytology has the greatest accuracy for the detection of cervical lymph node metastases. Ultrasound also performs well, whereas computed tomography and magnetic resonance imaging are less accurate. Failure to assess study quality and to account for variation between the studies means that the authors' conclusions are unlikely to be reliable.

Authors' objectives
To compare the accuracy of ultrasonography (US), US-guided fine-needle aspiration cytology (USgFNAC), computed tomography (CT) and magnetic resonance imaging (MRI) for the detection of lymph node metastases in head and neck cancer.

Searching
MEDLINE, EMBASE and the Cochrane Library were searched from 1990 to 2006; the search terms were reported. Reference lists were screened for additional relevant studies.

Study selection
Study designs of evaluations included in the review
Inclusion criteria were not defined in terms of the study design.

Specific interventions included in the review
Studies that provided data on US, USgFNAC, CT and/or MRI for the detection of lymph node metastases in head and neck tumours were eligible for inclusion. The primary tumour and lymph node metastases had to be squamous cell carcinomas for the study to be included. Size and morphologic criteria for the determination of cervical lymph node metastases were reported; these varied considerably between studies and techniques.

Reference standard test against which the new test was compared
Studies in which the reference standard consisted of histopathology findings from specimens obtained at surgery or at lymph node biopsy were eligible for inclusion.

Participants included in the review
Inclusion criteria were not defined in terms of the participants.

Outcomes assessed in the review
Studies had to report sufficient data to construct a 2x2 table of test performance.

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

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Two reviewers independently extracted the data as 2x2 tables of test performance using a standardised form. Any disagreements were resolved by a third reviewer.

Methods of synthesis
How were the studies combined?
A bivariate model was used to pool the data on sensitivity and specificity. Summary diagnostic odds ratios and 95%
confidence intervals (CIs) were also calculated and used to fit summary receiver operating characteristic (ROC) curves based on Moses-Littenberg methods.

How were differences between studies investigated?
Differences between the studies were not formally investigated.

Results of the review
Seventeen studies (number of participants unclear), reporting 25 sets of 2x2 data (some studies reported data for multiple tests), were included.

CT (8 studies): the sensitivity ranged from 55 to 95% and the specificity from 39 to 100%. The pooled sensitivity and specificity were 81% (95% CI: 68, 90) and 76% (95% CI: 62, 87), respectively.

US (7 studies): the sensitivity ranged from 63 to 97% and the specificity from 69 to 100%. The pooled sensitivity and specificity were 87% (95% CI: 76, 93) and 86% (95% CI: 74, 93), respectively.

MRI (5 studies): the sensitivity ranged from 64 to 92% and the specificity from 40 to 81%. The pooled sensitivity and specificity were 81% (95% CI: 65, 91) and specificity were 63% (95% CI: 43, 80), respectively.

USgFNAC (3 studies): the sensitivity ranged from 48 to 90% and the specificity from 98 to 100%. The pooled sensitivity and specificity were 80% (95% CI: 57, 92) and 98% (95% CI: 93, 100), respectively.

Ultra-small particle iron oxide-MRI (2 studies): the sensitivity ranged from 67 to 80% and the specificity from 81 to 94%. The pooled sensitivity and specificity were 74% (95% CI: 44, 91) and 88% (95% CI: 66, 96), respectively.

Summary ROC curves were difficult to interpret as it was not possible to distinguish which lines were assigned to which modality from the small grey-scale illustration.

Authors’ conclusions
USgFNAC has the greatest accuracy for the detection of cervical lymph node metastases. US also performs well, whereas CT and MRI are less accurate.

CRD commentary
The review addressed a focused question that was supported by inclusion criteria defined in terms of the index test, reference standard and outcome. Details of the population and study design were not provided. The literature search was adequate but did not include attempts to locate unpublished studies, and it is unclear whether any language restrictions were applied. The review may therefore be subject to language and publication bias. Appropriate steps were taken to minimise bias and errors in the selection of studies and extraction of data. The quality of the included studies was not assessed, so it is not possible to determine the validity of their findings. Very few details were provided about the included studies, especially in relation to the population, which makes it impossible to determine the generalisability of the findings. Although the most statistically robust method was used to combine sensitivity and specificity, the analysis suffered from a number of limitations. Based on individual study estimates of sensitivity and specificity it appears that there was considerable heterogeneity between the studies, but this was not assessed or investigated. Limitations in the literature search, failure to assess study quality or report adequate details of the included studies, and failure to assess or investigate heterogeneity between the studies mean that the authors’ conclusions are unlikely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that USgFNAC is the most reliable imaging technique with which to determine the presence of metastases in cervical lymph nodes in patients with head and neck cancer.

Research: The authors stated that further studies are needed to investigate the diagnostic accuracy of radiological imaging, focusing on patients with clinically N0 necks.
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