Radiological staging in patients with hilar cholangiocarcinoma: a systematic review and meta-analysis

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CRD summary
This review concluded that computed tomography had acceptable accuracy for assessment of ductal extent, portal vein and hepatic artery involvement in patients with hilar cholangiocarcinoma but low sensitivity for nodal status. The authors noted that lack of data and poor study quality precluded conclusions for other imaging modalities. These conclusions were appropriately cautious and are likely to be reliable.

Authors' objectives
To assess the diagnostic performance of computed tomography (CT), magnetic resonance imaging (MRI), ultrasound and 18F-fluorodeoxyglucose positron emission tomography (FDG-PET)/CT for the staging of hilar cholangiocarcinoma.

Searching
MEDLINE, EMBASE and Cochrane Database of Systematic Reviews were searched from inception to March 2011. The search strategy was reported and it appeared that no language restrictions were applied. Bibliographies of retrieved articles were screened for additional studies.

Study selection
Studies were eligible for inclusion if they assessed CT, MRI, ultrasound or FDG-PET/CT for the primary staging of hilar cholangiocarcinoma and included at least 10 participants. Studies were required to use surgical or pathological confirmation as the reference standard. Included studies were required to report sufficient data to construct 2x2 contingency tables (numbers of true positive, false positive, false negative and true negative imaging test results) for portal vein involvement, hepatic artery involvement, lymph node involvement or presence of distant metastasis. Studies that reported accuracy for the ductal extent of the tumour were included where no 2x2 data were available.

Study participants were 29 to 89 years old and 46% to 91% were men. Most of the included studies assessed CT performance and most of these used 16-slice multi-detector CT. Where reported, the maximum time from imaging to surgery ranged from 10 to 42 days.

Two reviewers independently assessed studies for inclusion. Any disagreements were resolved by consensus.

Assessment of study quality
Methodological quality of included studies was assessed using nine items from the QUADAS tool. Items on differential verification bias, incorporation bias and reporting of withdrawals and indeterminate test results were omitted. An additional item on study design (prospective or retrospective) was added.

Two reviewers independently assessed study quality.

Data extraction
Data were extracted to populate 2x2 contingency tables for each imaging modality and disease stage; associated estimates of sensitivity and specificity with 95% confidence intervals (CIs) were calculated.

Data were independently extracted by two reviewers using a standardised form. Any disagreements were resolved by consensus.

Methods of synthesis
Summary estimates of sensitivity and specificity, with 95% CIs, were calculated for each imaging modality and disease stage using a random-effects bivariate model.

Results of the review
Sixteen studies (470 participants) were included in the review. Eleven studies assessed CT, three assessed ultrasound, three assessed MRI and one assessed FDG-PET/CT; two studies directly compared CT and MRI. Six studies recruited a consecutive series of patients and gave a clear description of selection criteria. Seven studies reported a delay between index test and reference standard of 31 days or less. None of the studies reported blinded interpretation of the reference standard. One study reported using a prospective design.

**Portal vein involvement:** Summary estimates of sensitivity and specificity for CT were 89% (95% CI 80 to 94) and 92% (95% CI 85 to 96) based on data from seven studies. One study reported sensitivity and specificity estimates for MRI of 79% and 0%; this study included only one participant without portal vein involvement. Two studies reported sensitivity estimates for ultrasound of 75% and 83% with corresponding specificity estimates of 93% and 100%.

**Hepatic artery involvement:** Summary estimates of sensitivity and specificity for CT were 84% (95% CI 63 to 94) and 93% (95% CI 69 to 99) based on data from six studies. Two studies reported sensitivity estimates for ultrasound of 0% (only one participant with hepatic involvement included) and 43% with specificity estimates of 100% for both.

**Lymph node involvement:** Summary estimates of sensitivity and specificity for CT were 61% (95% CI 28 to 86) and 88% (95% CI 74 to 95), based on data from five studies. One study reported sensitivity and specificity estimates for FDG-PET/CT of 42% and 80%.

**Distant metastases:** One study reported sensitivity and specificity estimates for CT of 50% and 75% and a second study reported sensitivity and specificity estimates for FDG-PET/CT of 56% and 88%.

**Ductal involvement:** The overall accuracy of CT for detection of ductal involvement was 86% (95% CI 77 to 92%) based on data from eight studies. Three studies reported accuracy estimates for MRI that ranged from 71% to 80%. Two studies reported accuracy estimates for ultrasound of 59% and 82%. Two studies compared the accuracy of CT and MRI directly and reported conflicting results.

**Authors’ conclusions**

Diagnostic accuracy studies of CT, MRI, ultrasound or FDG-PET/CT for staging were sparse, small and of moderate methodological quality. CT had acceptable accuracy for assessment of ductal extent, portal vein and hepatic artery involvement but low sensitivity for nodal status.

**CRD commentary**

The review reported a clear objective and defined appropriate inclusion criteria. Several sources were searched for relevant studies. No restrictions were apparent. No searches for unpublished studies were reported; attempts to identify unpublished studies may have been useful given the paucity of published data. Measures to minimise error and bias were applied throughout the review process and the methodological quality of included studies was assessed and reported in full. Appropriate meta-analytic methods were applied.

The authors’ conclusions were appropriately cautious given the limited data available and are likely to be reliable.

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

**Practice:** The authors did not specify any recommendations for clinical practice.

**Research:** The authors stated a need for new methodologically rigorous studies to allow adequate comparison of the various investigations.

**Funding**

Not stated.

**Bibliographic details**


**PubMedID**

22919007
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.