Radiofrequency ablation versus resection for colorectal cancer liver metastases: a meta-analysis

Weng M, Zhang Y, Zhou D, Yang Y, Tang Z, Zhao M, Quan Z, Gong W

CRD summary
The review concluded that although multiple confounders exist in the clinical trials (especially the bias in patient selection) liver resection was significantly superior to radiofrequency ablation in the treatment of cancer liver metastases even when subgroups were analysed. Despite some review limitations the authors' conclusions appropriately reflect the limited observational data available and appear likely to be reliable.

Authors' objectives
To compare liver resection with radiofrequency ablation in the treatment of cancer liver metastases.

Searching
PubMed, EMBASE and The Cochrane library were searched without language or date restrictions; search terms were reported. Reference lists of retrieved articles were examined.

Study selection
Studies that compared radiofrequency ablation with liver resection for the treatment of colorectal cancer liver metastases were eligible for inclusion. Studies had to report results for at least three- or five-year overall survival. Studies of combined treatments and review articles and case reports were excluded.

Mean ages ranged from 57 to 67 years (where reported). Mean tumour size ranged from 1cm to 5.3cm. Most patients were male. Studies used only percutaneous radiofrequency ablation, only carried out ablation during open surgery or used either method.

The authors did not state how many reviewers selected studies.

Assessment of study quality
Study quality was not assessed formally but the authors compared baseline characteristics of the treatment groups.

Data extraction
Data were extracted in order to calculate risk ratios (RR), hazard ratios (HR) or mean differences, each with 95% confidence intervals (CI). Authors were contacted for missing data where necessary.

Two reviewers independently extracted data. Disagreements were resolved by a third reviewer.

Methods of synthesis
Meta-analyses were performed to calculate pooled risk ratios, hazard ratios or standardised mean differences (SMD), each with 95% confidence intervals, using a random-effects model. Heterogeneity was assessed using the I² statistic and X² test. Publication bias was assessed using a funnel plot and Begg's test.

Subgroup analyses explored the impact of whether the maximal tumour diameter was less than 3cm, presence of only a solitary tumour and type of radiofrequency ablation (laparoscopic or open surgery).

Results of the review
Thirteen studies were included (1,266 patients received liver resection and 620 received radiofrequency ablation). Twelve studies were retrospective and one was prospective.

Liver resection was significantly superior to radiofrequency ablation in three-year overall survival (RR 1.38, 95% CI 1.25 to 1.52; I²=57%; 12 studies), five-year overall survival (RR 1.47, 95% CI 1.28 to 1.69; I²=22%; 12 studies), three-year disease-free survival (RR 1.74, 95% CI 1.48 to 2.03; I²=65%; 10 studies) and five-year disease-free survival (RR 2.23, 95% CI 1.82 to 2.72; I²=72%; 10 studies). Results for all subgroups indicated similar effects.
Postoperative morbidity was significantly higher in patients who received liver resection (RR 2.5, 95% CI 1.88 to 3.31; I²=61%; nine studies). No significant difference was found in postoperative mortality. Patients who received liver resection had a significantly longer hospital stay (SMD 3.28, 95% CI 3.05 to 3.52).

There was no evidence of publication bias.

Authors' conclusions
Although multiple confounders exist in the clinical trials (especially the bias in patient selection) liver resection was significantly superior to radiofrequency ablation in the treatment of cancer liver metastases even when subgroups were analysed. Caution should be taken when treating with radiofrequency ablation before more supportive evidence is obtained from randomised trials.

CRD commentary
The review addressed a clear question and was supported by reproducible eligibility criteria. Attempts to identify all relevant studies in any language were undertaken by searching electronic databases and checking references. It appeared that there were no searches for unpublished studies; the authors could not detect the presence of publication bias affecting the pooled results. Duplicate processes were employed to reduce the risks of reviewer error and bias during data extraction; the authors did not report on whether such methods were used to select studies.

Study quality was not assessed formally but the authors acknowledged biases present in the observational data. Appropriate methods were used to pool data and to assess heterogeneity. Results using hazard ratios were not clearly presented and the methods of calculation were not clearly described which made interpretation difficult. Heterogeneity largely remained present and unexplained in the subgroup analyses.

Despite some review limitations the authors' conclusions appropriately reflect the limited observational data available and appear likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that although it was suggested that tumour size being smaller than 3cm, solitary tumours and open surgery or laparoscopic approach were the prognostic factors favourable to radiofrequency ablation, performing radiofrequency ablation in such scenarios still did not achieve a comparable overall survival and disease-free survival to those of liver resection. They added that caution should be taken when treating with radiofrequency ablation before more supportive evidence was obtained from randomised trials.

Research: The authors stated a need for a randomised trial to compare radiofrequency ablation with liver resection.

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