Ablative therapies for colorectal liver metastases: a systematic review
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CRD summary
The review concluded that, despite limitations of the evidence base, ablation offers improved survival compared to chemotherapy alone. Radiofrequency ablation and microwave ablation offer acceptable complication rates. Due to gaps in the reporting of the studies, limited methods of synthesis and poor study quality, the conclusions of this review may not be reliable.

Authors' objectives
To evaluate the effectiveness of ablative therapies for patients with colorectal liver metastases and provide an overview of survival, recurrence and complications.

Searching
MEDLINE, The Cochrane Library and ClinicalTrials.gov were consulted. Handsearching of selected reviews, expert consensus and reference lists from excluded papers complemented the searches. Studies were searched from 1994 to January 2010. Only studies in English were included. Search terms were reported.

Study selection
Studies in which ablative treatments were used as an adjunct or definitive treatment of colorectal liver metastases were eligible for inclusion. Studies with at least one year follow-up and 10 or more patients were included. Randomised controlled trials (RCTs), prospective and retrospective cohort studies were included in the initial analysis (it appeared that other designs such as case series were subsequently included).

Where reported, mean number of metastases at baseline ranged from one to 6.2, with a mean diameter ranging from 1.3 to 15mm. Rates of extrahepatic disease ranged from zero to 38%. Nearly half the studies reported using radiofrequency ablation. Other treatments included cryotherapy and microwave ablation.

Several studies defined major complications as either life-threatening if left untreated, or that would lead to substantial morbidity and disability, hospital admission or substantially longer hospital stay. Other complications were considered minor.

The authors did not report how many reviewers selected the studies for inclusion.

Assessment of study quality
RCTs were assessed according to the following criteria: randomisation methods, allocation concealment, blinding and losses to follow-up. Case series were assessed according to size, number of centres, clarity of inclusion/exclusion criteria, time period and consecutive patient series.

Two reviewers independently assessed study quality. Discrepancies were resolved via discussion with additional reviewers.

Data extraction
Data was extracted from each study to calculate or report rates of survival at one, three and five years, median survival, recurrence rates and rates of minor and major complications.

Two reviewers independently extracted study data.

Methods of synthesis
A narrative synthesis was presented with studies grouped by intervention.

Results of the review
Seventy-five studies were included. The authors stated that the quality of the evidence base was limited, as most of the
data came from single-arm studies conducted in a single centre.

**Cryotherapy (26 studies)**

Survival rates ranged from 46% to 92% at one year follow-up, eight to 60% at three years and zero to 44% at five years. Median survival ranged from 22.9 to 94.2 months. Mean survival rates were 84% at one year, 37% at three years and 17% at five years. Major complication rates were between seven and 66%. Local recurrence ranged from 12% to 39%.

**Radiofrequency ablation (36 studies)**

Survival for patients receiving radiofrequency ablation alone ranged from 75% to 93% at one year, seven to 60% at three years, and 18.4 to 60.8% at five years follow-up. Median survival was between four and 40 months. Mean survival rates were 85% at one year, 36% at three years and 24% at five years. Major complication rates ranged from zero and 33.3%. Local recurrence ranged from 8.8 to 34%.

**Microwave ablation (13 studies)**

Survival rates ranged from 40 to 91.4% at one year follow-up, from zero to 57% at three years follow-up and 14 to 32% at five years follow-up. Median survival was between 20.5 and 43 months. Mean survival rates were 73% at one year, 30% at three years and 16% at five years. The rate of major complications was between zero and 19%. Local recurrence ranged from two to 12.5%.

**Authors' conclusions**

Despite limitations in the evidence base, ablation offers improved survival compared to chemotherapy alone. Radiofrequency ablation and microwave ablation offer acceptable complication rates.

**CRD commentary**

The review question was broad. Inclusion criteria were reported, although it is unclear whether the study design inclusion criteria was amended. Studies in English were searched for using several bibliographic sources. The data extraction and quality assessment processes included measures to minimise error and bias; it was not clear whether similar measures were applied to the selection of the studies.

Results of the quality assessment were not reported. However, the authors noted that most studies were single-arm and from a single centre, which suggested that the quality of the evidence was poor overall. Some study details (such as use and type of comparator, adjuvant treatment and comorbidities) were not reported. Notably, it was unclear which studies, if any, included patients receiving chemotherapy. This made the comparability between the interventions (notably between ablation and chemotherapy) difficult to assess. Methods of synthesis appeared limited by not taking into account study size or quality, and the authors did not provide a rationale for the methods of analysis used. The review did not provide sufficient evidence to allow assessment of ablative therapy compared with palliative chemotherapy.

Due to gaps in the reporting of the studies, limited methods of synthesis and poor study quality, the conclusions of this review may not be reliable.

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

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that future studies should provide precise definitions of radiologically complete treatment and recurrence to allow better comparison between studies. A universally accepted definition of major and minor complications would also facilitate comparison of complication rates between modalities.

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