A systematic review of radiofrequency ablation for the treatment of liver tumours

CRD summary
This well-conducted review compared the safety and efficacy of radiofrequency ablation with other techniques for the treatment of liver tumours. The authors were unable to draw firm conclusions about the relative merits of the procedures and advised that further research should be undertaken. Such advice is appropriate given the methodological limitations of the studies included in the review.

Authors’ objectives
The objective was to compare the safety and efficacy of radiofrequency ablation (RFA) with other surgical and nonsurgical techniques for the treatment of primary hepatocellular carcinoma or metastatic colorectal liver carcinoma.

Searching
Studies were identified using the following electronic sources: MEDLINE, EMBASE, Current Contents, the Cochrane Library and the Science Citation Index from inception to 2002. A range of other databases was searched on 18 April 2002. Handsearches of conference proceedings and Internet sites were also carried out and additional articles were identified by checking the references of the studies retrieved. The searches were conducted without any restrictions on language or date of publication. No attempt to identify unpublished studies was made. The search terms are documented in the report.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), quasi-RCTs and non-randomised comparative studies were eligible for the review.

Specific interventions included in the review
To be eligible for the review, studies needed to include patients treated with RFA and at least one other comparative intervention. Surgical comparative techniques included resection or hepatic artery infusion chemotherapy. Nonsurgical comparative interventions included percutaneous ethanol injection (PEI), cryoablation, microwave coagulation therapy (MCT) and laser-induced thermotherapy.

Participants included in the review
The participants needed to have either a primary hepatocellular carcinoma or metastatic colorectal liver carcinoma. They must not have had an additional disease treated at the same time, nor have had recurrent liver disease.

Outcomes assessed in the review
The eligible outcomes were:
peri- and post-operative mortality;
peri- and post-operative morbidity including infection, bleeding, bile leaks, injury to other structures, discomfort and/or pain;
peri- and post-operative factors for patients including operative time, reoperation or re-intervention, operative or intervention failure rate, rate of recurrent or persistent disease, rate of 'new disease' not confined to the liver, completion of ablation and/or resection;
convalescence of the patients including length of hospital stay, time until resumption of activities, quality of life measures, and post-operative care requirements; and
the evaluation of intra-operative guidance during treatment and follow-up therapeutic response imaging, including ultrasound and computed tomography.

How were decisions on the relevance of primary studies made?
Two researchers assessed whether the references met the inclusion criteria.

Assessment of study quality
Validity was assessed on the basis of the methods used to select the patients, comparability of the patient groups, completeness of follow-up, and any other feature of the study design or execution that might have introduced bias. The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.

Data extraction
One researcher extracted the data and a second researcher checked it. Standardised data extraction tables were used. If a particular complication was not mentioned in an included study, it was assumed to be unreported rather than not having occurred.

Methods of synthesis
How were the studies combined?
The studies were combined descriptively in a detailed summary.

How were differences between studies investigated?
Differences between the studies and the difficulties encountered in making meaningful comparisons were highlighted within the report.

Results of the review
Twelve studies with a total of 872 patients (in four studies the numbers were unclear or unstated) were included in the review. Four studies were RCTs, one was a quasi-RCT and seven were retrospective non-randomised studies.

The included studies had problems relating to methodological quality and poor reporting. The participants were not blinded to the procedure they were undergoing in any of the included studies, and assessor blinding was either not stated or did not occur. The method of patient selection was stated in only four of the 12 studies. Randomisation methods in the RCTS were not explicit or were problematic. The sample size and follow-up times were limited. There was variability in the units of measurement. Most of the studies concentrated on reporting efficacy outcomes rather than safety outcomes. Although there were limitations within the data, it was possible to make some comparisons between techniques.

Based on one RCT, a more complete ablative effect was noted for RFA when compared with MCT (relative risk, RR=1.08, 95% confidence interval, CI: 0.96, 1.21). Based on one RCT, RFA had a survival advantage over PEI (RR 0.16, 95% CI: 0.02, 1.28). Based on one retrospective study, surgical resection was associated with a lower rate of recurrence than RFA, 19% versus 39%. It was also associated with an increased time interval to recurrence compared with RFA, 292 days (standard deviation, SD=269.1) versus 160.1 days (SD=104.8). In terms of safety, fever, pain and the need for post-treatment analgesia were more common in patients treated with RFA than PEI. One RCT showed that significantly more RFA than PEI sessions reported high fever for more than 3 days (RR 2.80, 95% CI: 1.59, 4.92). Based on one RCT, RFA appeared to be associated with fewer minor complications than MCT, but there were no statistically significant differences between procedures for major complications. Based on one non-randomised comparative study, complications appeared to be less common after RFA than laser-induced thermotherapy. One non-randomised comparative study suggested that RFA was associated with fewer complications and lower mortality than hepatic artery infusion chemotherapy.
Authors’ conclusions
RFA might offer an alternative treatment in the palliation of very ill patients unable to undergo surgical resection. Further conclusions were limited by the fact that none of the trials in the review thoroughly assessed the procedure.

CRD commentary
This review had a clear question with defined inclusion criteria for the participants, interventions, outcomes and study designs. A range of sources was searched and no language restrictions were applied. However, unpublished material was not obtained. Study methodology was carefully examined and details of the studies were provided to allow the reader to assess the authors’ conclusions. Two reviewers were involved in the review process, thus helping to minimise bias in the selection and evaluation of studies. Overall, the review was well conducted, although there is a minor concern that the inclusion of completed unpublished research might have contributed to the evidence base. The authors’ cautious conclusions about the relative efficacy and safety of RFA appropriately reflect the limitations within the evidence base.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors suggested that further research (ideally RCTs) should be conducted of RFA together with other ablative therapies. The outcomes should focus on long-term local and overall recurrence. New studies should recruit adequate numbers of patients and standardise outcome measures. Other areas for consideration are comparison of the percutaneous approach with other access methods, the role of RFA as an adjunct to resection, and the possibility of resectable lesions undergoing RFA.

Bibliographic details

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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.