NICE guidance

Radiofrequency-assisted liver resection

Interventional procedures guidance
Published: 28 February 2007

www.nice.org.uk/guidance/ipg211

1 Guidance

1.1 Limited evidence on the safety and efficacy of radiofrequency (RF)-assisted liver resection appears adequate to support the use of this procedure as one of the options for liver resection, provided that the normal arrangements are in place for consent, audit and clinical governance.

2 The procedure

2.1 Indications

2.1.1 RF-assisted liver resection is one method that may be used in surgery for primary or secondary liver cancer. Liver metastasis (secondary cancer) occurs as part of the disease process of many primary cancers and is particularly common with colorectal cancer.

2.1.2 Treatment strategies for liver cancer depend on the site, number and size of tumours and, for metastatic disease, the origin of the tumour. Liver tumours can be removed surgically in some patients. Bleeding during surgery is a particular problem associated with liver resection and various methods can be used to control it, including the Pringle manoeuvre (continuous or intermittent), vascular clamping, inflow occlusion and total hepatic vascular exclusion.

2.2 Outline of the procedure

2.2.1 The aim of RF-assisted liver resection is to transect the liver with minimal blood loss. The procedure is usually performed under general anaesthesia using ultrasound guidance. The capsule of the liver is scored and a line of dissection marked at an appropriate distance from the tumour. Ablation of liver parenchyma is then achieved using an RF probe, applied repeatedly until a sufficient depth of coagulation is achieved. The liver is then resected along the line of necrosed tissue, using a scalpel, scissors, electrocautery or forceps. A number of devices can be used to perform RF-assisted resection.

2.3 Efficacy

2.3.1 A randomised controlled trial comparing RF-assisted liver resection (n = 40) with a clamp crushing method (n = 40) found no significant difference in total blood loss during the procedure: mean blood losses were 665 ml and 733 ml, respectively (p = 0.450). The mean transection time was 79 minutes with RF-assisted resection and 80 minutes with clamp crushing (p = 0.740). The mean length of hospital stay was 16 days and 18 days, respectively (p = 0.941).

2.3.2 In a non-randomised controlled trial and four case series, mean operative blood loss during RF-assisted liver resection was 30 ml (in two studies), 46 ml, 100 ml and 120 ml. Across these same studies, the mean operative time was between 90 and 220 minutes, although operative techniques differed between studies.

2.3.3 A case series of 15 patients undergoing RF-assisted liver resection for

secondary lesions, followed up for a mean of 7 months (range 2–20 months), reported that there was no local recurrence of liver tumours on either imaging or clinical examination. For more details, refer to the 'Sources of evidence' section.

2.3.4 The Specialist Advisers stated that reducing blood loss is a key outcome measure. They expressed uncertainty as to whether RF-assisted resection offers any significant advantage over conventional techniques.

2.4 Safety

2.4.1 In a randomised controlled trial, there were three incidents of major biliary leakage and two other incidents of major morbidity in 40 patients undergoing RF-assisted liver resection; there were two incidents of major biliary leakage but no other major morbidity in the 40 patients having clamp crushing resection. There were no operative deaths in either group.

2.4.2 In one case series, biliary leakage occurred in 2% (4/170) of patients undergoing RF-assisted liver resection. One patient had a pulmonary embolus 2 weeks after surgery, but there were no postoperative bleeds, and no reoperations were required. In another case series, one of 42 patients (2%) developed biliary leakage from a hepaticojejunostomy soon after surgery, requiring intensive care and a blood transfusion. Another patient in the same case series developed a subphrenic abscess, and another developed a chest infection. In a third case series, significant intraoperative bleeding occurred in 1 of 8 patients being treated by RF-assisted liver resection, which required pressure and repeat RF coagulation. One patient developed an abscess at the resection site, and one experienced worsening of heart failure symptoms. For more details, refer to the 'Sources of evidence' section.

2.4.3 The Specialist Advisers stated that potential adverse effects associated with RF-assisted liver resection include inadvertent tumour cell spillage, and an increased risk of postoperative infection and bile leakage. They also noted a risk of injury to major vascular and biliary structures if the procedure is used for centrally located tumours.

2.5 Other comments

2.5.1 It was noted that this procedure is one of several options for surgical resection of the liver; however, it is not clear whether RF-assisted resection offers any advantage compared with other methods.

Andrew Dillon
Chief Executive
February 2007

3 Further information

Sources of evidence

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document:

'Interventional procedure overview of radiofrequency-assisted liver resection', August 2006.

Information for patients

NICE has produced information describing its guidance on this procedure for patients and their carers ('Understanding NICE guidance'). It explains the nature of the procedure and the decision made, and has been written with patient consent in mind.

4 About this guidance

NICE interventional procedure guidance makes recommendations on the safety and efficacy of the procedure. It does not cover whether or not the NHS should fund a procedure. Funding decisions are taken by local NHS bodies after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS. It is for healthcare professionals and people using the NHS in England, Wales, Scotland and Northern Ireland, and is endorsed by Healthcare Improvement Scotland for implementation by NHSScotland.

This guidance was developed using the NICE interventional procedure guidance process.

It has been incorporated into the NICE pathway on colorectal cancer, along with other related guidance and products.

We have produced a summary of this guidance for patients and carers. Information about the evidence it is based on is also available.

Changes since publication

16 January 2012: minor maintenance.

Your responsibility

This guidance represents the views of NICE and was arrived at after careful consideration of the available evidence. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of healthcare professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way which would be inconsistent with compliance with those duties.

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Endorsing organisation

This guidance has been endorsed by Healthcare Improvement Scotland.