

Arthroscopic radiofrequency chondroplasty for discrete chondral defects of the knee

Interventional procedures guidance

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www.nice.org.uk/guidance/ipg493

1 Recommendations

- 1.1 Evidence on the efficacy of arthroscopic radiofrequency chondroplasty for discrete chondral defects of the knee is limited but shows benefit in the short term, and there are no major safety concerns. Therefore this procedure may be used with normal arrangements for clinical governance, consent and audit.
- 1.2 The procedure should only be carried out by clinicians with specific training in the use of arthroscopic radiofrequency ablation and with particular attention to the avoidance of thermal injury.
- 1.3 Further research into arthroscopic radiofrequency chondroplasty of the knee should clearly document patient selection and the types of chondral defects being treated. More evidence on long-term outcomes would be useful.

2 Indications and current treatments

- 2.1 Discrete chondral defects in articular cartilage usually occur as a result of trauma. The rough, irregular edges of a defect may cause inflammation, swelling, pain and difficulty walking. Progressive degeneration of a chondral defect can expose the underlying bone and lead to arthritis. If pieces of cartilage break off from the edges of a chondral defect this may cause cartilage damage elsewhere in the knee and lead to further arthritic changes.
- 2.2 Treatment options depend on the size and site of the chondral defect. The condition is usually chronic and different treatment strategies may be needed at different stages. Conservative treatment includes analgesics to relieve pain and inflammation. Physiotherapy and/or prescribed exercise may be used to improve knee function and mobility.

3 The procedure

- 3.1 Radiofrequency chondroplasty aims to slow the progression of discrete chondral defects by removing the unstable edges of the defect, producing a smooth, stable articular cartilage surface.
- 3.2 The procedure is usually done with the patient under general anaesthesia. An arthroscope is inserted into the knee and large chondral defects are trimmed from the weight-bearing surfaces of the femoral condyles, using instruments such as a blunt hook or an electric shaver. Under arthroscopic guidance, a radiofrequency probe is then used to smooth the edge of the chondral defect using irrigation to stabilise temperature and flush any debris. The aim is to improve mechanical stability and prevent further cartilage damage.

4 Efficacy

This section describes efficacy outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the [interventional procedure overview](#).

- 4.1 A randomised controlled trial of 60 patients treated by bipolar radiofrequency energy (n=30) or by mechanical shaver debridement (n=30) reported that patients in the bipolar radiofrequency energy group returned to work sooner than patients in the mechanical shaver debridement group (16.4 ± 6.5 days compared with 21.7 ± 6.1 days, $p=0.002$).
- 4.2 In the randomised controlled trial of 60 patients treated by bipolar radiofrequency energy or mechanical shaver debridement, non-steroidal anti-inflammatory drugs were taken by 2% of patients in the bipolar radiofrequency energy group and 23% of patients in the mechanical shaver debridement group at 1-year follow-up ($p=0.026$).
- 4.3 In the randomised controlled trial of 60 patients treated by bipolar radiofrequency energy or mechanical shaver debridement, mean Knee injury and Osteoarthritis Outcome Score (KOOS) for pain, symptoms, activities of daily living, sports and quality of life (higher scores indicating better outcomes) were 81.2, 80.8, 81.5, 81.7 and 80.2 respectively in the bipolar radiofrequency energy group and 57.9, 58.3, 58.8, 57.3 and 56.2 respectively in the mechanical shaver debridement group at 1-year follow-up ($p<0.001$ for all inter-group comparisons). At 4-year follow-up, patients in the radiofrequency group continued to report significantly higher scores than patients in the mechanical shaver debridement group. Mean KOOS scores for pain, symptoms, activities of daily living, sports and quality of life were 75.1, 72.7, 69.9, 75.0 and 67.0 respectively in the radiofrequency group (n=25) and 55.7, 53.1, 50.9, 56.7 and 52.9 respectively in the mechanical shaver debridement group (n=15) ($p<0.001$ for all inter-group comparisons).
- 4.4 In a prospective case series of 15 patients (25 knees) treated by bipolar radiofrequency energy, the mean size of chondral defects decreased from 170.2 mm^2 (range 9–625 mm^2) at initial arthroscopy to 107.7 mm^2 (range 0–300 mm^2) at follow-up arthroscopy after a mean of 10.4 months: 32% (8/25) of defects showed no progression of degeneration; 32% (8/25) showed partial healing; and 24% (6/25) had healed completely. Twelve per cent (3/25) of defects showed unstable borders with progressive damage to the surrounding cartilage.

- 4.5 A randomised controlled trial of 60 patients treated by monopolar radiofrequency energy plus mechanical shaver debridement (n=30) or by mechanical shaver debridement only (n=30) reported that mean International Knee Documentation Committee (IKDC) scores improved from 36 to 69 ($p<0.05$) and from 35 to 68 ($p<0.05$) respectively at a mean follow-up of 19 months (higher scores indicating better outcomes). No statistically significant differences in postoperative scores were observed between groups.
- 4.6 The specialist advisers stated that key efficacy outcomes include MRI findings and functional scores such as the Tegner, IKDC and Lysholm scores.

5 Safety

This section describes safety outcomes from the published literature that the Committee considered as part of the evidence about this procedure. For more detailed information on the evidence, see the [interventional procedure overview](#).

- 5.1 A second-degree burn after radiofrequency chondroplasty was reported in the US Food and Drug Administration's (FDA) manufacturer and user facility device experience (MAUDE) database. This was attributed to improper use of the radiofrequency equipment: a suction line, which should have been attached to the probe during the procedure, had not been attached.
- 5.2 Osteonecrosis of the medial femoral condyle was observed in 4% (2/50) of patients at a follow-up assessment that occurred at least 6 months after treatment, in a prospective case series of 50 patients. No clinical consequences were reported as a result of this.
- 5.3 The confirmed or presumed detachment of a mechanical component of the radiofrequency probe within a patient's knee was reported on 7 occasions between 2002 and 2012 in the MAUDE database.
- 5.4 The specialist advisers stated that theoretical adverse events include excessive debridement of articular cartilage, avascular necrosis of the underlying bone, chondrocyte death and damage to surrounding

cartilage and other structures.

6 Committee comments

- 6.1 The Committee originally intended to evaluate the use of arthroscopic radiofrequency chondroplasty of the knee for a variety of indications. However, most of the published evidence was for discrete chondral defects (mainly caused by trauma) in younger patients. There was insufficient evidence about the use of arthroscopic radiofrequency chondroplasty in older patients with osteoarthritis for the Committee to comment on its use for that indication.

7 Further information

- 7.1 For related NICE guidance see the [NICE website](#).

Information for patients

NICE has produced information on this procedure for patients and carers ([Information for the public](#)). It explains the nature of the procedure and the guidance issued by NICE, and has been written with patient consent in mind.

About this guidance

NICE interventional procedures 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.

This guidance was developed using the NICE [interventional procedures guidance process](#).

We have produced a [summary of this guidance for patients and carers](#). Information about the evidence the guidance is based on is also [available](#).

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