

# Balloon kyphoplasty for vertebral compression fractures

Interventional procedures guidance

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[www.nice.org.uk/guidance/ipg166](http://www.nice.org.uk/guidance/ipg166)

## Your responsibility

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

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

This guidance replaces IPG20.

# 1 Guidance

This guidance replaces previous guidance on balloon kyphoplasty for vertebral compression fractures (Interventional Procedures Guidance no. 20, November 2003).

- 1.1 Current evidence on the safety and efficacy of balloon kyphoplasty for vertebral compression fractures appears adequate to support the use of this procedure provided that normal arrangements are in place for consent, audit and clinical governance.
- 1.2 The following are recommended.
- This procedure should only be undertaken with prior discussion by a specialist multidisciplinary team that includes a radiologist and a spinal surgeon, and when there are facilities for good imaging, and arrangements for good access to a spinal surgery service.
  - Clinicians should receive training to reach an appropriate level of expertise before carrying out this procedure. In particular, they must follow the manufacturer's instructions for making the cement, to reduce the risk of embolisation.

## 2 The procedure

### 2.1 Indications

- 2.1.1 Vertebral compression fractures are one of the most common types of osteoporotic fracture. Osteoporotic fractures are common in the elderly and particularly in postmenopausal women, but they can also be associated with other factors such as chronic steroid usage. Other causes of vertebral compression fracture include malignancy in the vertebrae or, more rarely, haemangioma.
- 2.1.2 Pain is the most common symptom in patients with vertebral compression fractures. Fractures can also cause progressive spinal deformity with abnormal curvature (kyphosis). This can lead to increased risk of further fracture at adjacent levels and progressive malalignment, deformity and pain. There is also an increased risk of falls.

- 2.1.3 Conventional treatment for vertebral compression fractures is focused on the alleviation of symptoms with analgesic medication and spinal support. The majority of patients become symptom free through these measures and surgery is rarely indicated.
- 2.1.4 Surgery may be considered in patients whose condition is refractory to medical therapy and in whom there is continued vertebral collapse and severe pain. Recently there has been increased interest in minimally invasive procedures, including balloon kyphoplasty and vertebroplasty.

## 2.2 Outline of the procedure

- 2.2.1 Balloon kyphoplasty is performed under local or general anaesthesia assisted by fluoroscopy. One or more levels of the spine can be treated in one session.
- 2.2.2 The fractured vertebra is accessed through a small incision in the patient's back. A hand drill is used to create a channel through which one or two balloon-like devices (inflatable bone tamps) can be inserted into the medullary space. The inflatable tamp is positioned in the vertebral body and filled with a radiopaque contrast medium for visualisation. The balloon is slowly inflated until the normal height of the vertebral body is restored or the balloon reaches its maximum volume. The balloon is then deflated and the cavity created filled with cement (typically polymethylmethacrylate, PMMA) at a low pressure.

## 2.3 Efficacy

- 2.3.1 Three non-randomised studies were reviewed: two compared balloon kyphoplasty with conventional medical care (physical and analgesic therapy) and one compared the procedure with vertebroplasty. All three studies found that patients who had undergone balloon kyphoplasty had improved pain scores compared with the control group at a maximum follow-up of 24 months.
- 2.3.2 In two non-randomised controlled studies, physical function following balloon kyphoplasty, as measured by the European Vertebral Osteoporosis Study Group questionnaire or Oswestry Disability Index (ODI), was shown to be significantly improved from baseline at 12 months. However, in one of these trials physical function (ODI) at 2 years was not found to be significantly different from preoperative values in either the balloon kyphoplasty group (61% vs 56%) or the

vertebroplasty group (61% vs 52%).

- 2.3.3 In a study of 222 patients (360 procedures), a greater than 20% restoration of lost vertebral height was achieved in 63% and 69% of fractures at the anterior and midline, respectively, and the kyphosis angle decreased from 22° to 15°. In a study comparing balloon kyphoplasty with conventional medical care, midline vertebral body height was significantly increased in the balloon kyphoplasty group compared with that at baseline and at 12 months was significantly greater than in the controls (67% vs 56%). For more details, refer to the Sources of evidence.
- 2.3.4 The Specialist Advisors expressed uncertainties about whether the improvements following balloon kyphoplasty (reduced pain and height restoration) are maintained in the long term.

## 2.4 Safety

- 2.4.1 The most commonly reported complications following balloon kyphoplasty were cement leaks and new fractures. One study of 360 procedures in 222 patients reported 38 cement leaks (11% of procedures), with one resulting in an episode of radiculopathy (the patient recovered with selective nerve block and rehabilitation). In another study of 192 procedures in 102 patients, cement leaks were reported from eight vertebral bodies (7%), all of which were asymptomatic.
- 2.4.2 In one study of 115 osteoporotic patients (225 procedures), 26 patients (23%) developed a post-procedure fracture. In the non-randomised controlled study comparing balloon kyphoplasty to standard medical care, seven new fractures were observed in 7/40 (18%) patients in the balloon kyphoplasty group, compared with 11 fractures in 10/20 (50%) patients in the control group. In another non-randomised controlled study (28 patients undergoing balloon kyphoplasty, 35 fractures), six fractures to adjacent vertebrae were observed within 4 months from the procedure.
- 2.4.3 Other reported adverse events during or after balloon kyphoplasty included balloon rupture (two cases), motor deficits caused by faulty puncture (one case) and epidural bleeding (one case).

- 2.4.4 In a review of complications reported to the US Food and Drug Administration (Center for Devices and Radiological Health), there were 33 major complications in patients (denominator estimated at between 40,000 and 60,000 procedures) following balloon kyphoplasty. These included one death; five cases of permanent paralysis, radiculopathy, paraesthesia or loss of motor function; and 13 cases of canal intrusion or cord compression. For more details, refer to the Sources of evidence.
- 2.4.5 The Specialist Advisors listed cement leakage as the most common complication following balloon kyphoplasty. They also listed infection, allergy and spinal cord or nerve root injury caused by incorrect needle placement as potential complications.

## 2.5 Other comments

- 2.5.1 The [Medicines and Healthcare products Regulatory Agency](#) has issued a safety notice relevant to the use of cement in balloon kyphoplasty (MDA/2007/088 – 'Injectable polymeric cements used in percutaneous vertebroplasty, balloon kyphoplasty and pedicle screw augmentation').

## 3 Further information

- 3.1 The Institute has issued guidance on [percutaneous vertebroplasty](#).

Andrew Dillon  
Chief Executive  
April 2006

## Sources of evidence

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

['Interventional procedure overview of balloon kyphoplasty for vertebral compression fractures'](#), June 2005.

## Information for patients

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

## 4 Other NICE recommendations on balloon kyphoplasty

Further recommendations have been made as part of the clinical guideline on metastatic spinal cord compression published in November 2008, as follows:

*Vertebroplasty or kyphoplasty should be considered for patients who have vertebral metastases and no evidence of MSCC or spinal instability if they have either:*

- *mechanical pain resistant to analgesia, or*
- *vertebral body collapse.*

*Vertebroplasty or kyphoplasty for spinal metastases should only be performed after agreement between appropriate specialists including an oncologist, interventional radiologist, and spinal surgeon, and in facilities where there is good access to spinal surgery.*

Clinical and cost-effectiveness evidence was reviewed in the development of this guideline which has led to this more specific recommendation. More information is [available](#). The IP guidance on Balloon kyphoplasty for vertebral compression fractures remains current, and should be read in conjunction with the clinical guideline.

## 5 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 updates and replaces NICE interventional procedure guidance 20.

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

20 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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### Contact NICE

National Institute for Health and Clinical Excellence  
Level 1A, City Tower, Piccadilly Plaza, Manchester M1 4BT

[www.nice.org.uk](http://www.nice.org.uk)

[nice@nice.org.uk](mailto:nice@nice.org.uk)

0845 033 7780

## Endorsing organisation

This guidance has been endorsed by [Healthcare Improvement Scotland](#).