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NHS
National Institute for Clinical Excellence

Lung volume reduction surgery for advanced emphysema

1 Guidance

1.1 Current evidence on the safety and efficacy of lung volume reduction surgery for advanced emphysema appears adequate to support the use of this procedure provided that the normal arrangements are in place for consent, audit and clinical governance.

1.2 Clinicians wishing to use lung volume reduction surgery for advanced emphysema should ensure that patients are fully informed about the risks of the procedure and the likelihood of deterioration in the longer term. Use of the Institute's *Information for the public* is recommended.

1.3 Patient selection is important because mortality is increased in patients with the most seriously compromised lung function. The Institute has issued a clinical guideline on chronic obstructive pulmonary disease, which is available from www.nice.org.uk/CG012.

1.4 The procedure should be undertaken by a multidisciplinary team that includes a respiratory physician, specialists in pulmonary rehabilitation and a thoracic surgeon.

2 The procedure

2.1 Indications

2.1.1 Emphysema is a chronic lung disease. The walls of the air sacs (alveoli) in the lung weaken and disintegrate, leaving behind abnormally large air spaces that remain filled with air even when the patient breathes out. These air spaces may coalesce to form larger air-filled sacs called bullae. The surface area of the alveoli is decreased, so there is less space for the exchange of oxygen and carbon dioxide. This leads to reduced levels of oxygen in the blood. The most common symptoms of emphysema are shortness of breath (dyspnoea), coughing, fatigue and weight loss.

2.1.2 Emphysema often co-exists with chronic bronchitis. Both of these conditions may be described by the more general term of chronic obstructive pulmonary disease (COPD).

2.1.3 Treatment for COPD involves a multidisciplinary approach, which may include education, exercise, breathing retraining, smoking cessation, oral and inhaled medication, oxygen therapy, and lung transplantation. Lung volume reduction surgery may be an option for patients with severe symptoms for whom conservative treatments have proved inadequate.

2.2 Outline of the procedure

2.2.1 Lung volume reduction surgery is a palliative treatment that aims to remove the least functional part of the lungs. Computed tomography (CT) and perfusion scanning are used to identify the diseased lung tissue. The diseased part of the lung can be accessed by various techniques including median sternotomy, video-assisted thoracoscopy and thoracotomy. The first two are the most common techniques. Median sternotomy involves cutting through the sternum to open the chest. The video-assisted procedure involves making a number of small incisions in both sides of the chest to allow the insertion of instruments into the chest between the ribs.

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This guidance is written in the following context:
This guidance represents the view of the Institute which was arrived at after careful consideration of the available evidence. Health professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of health professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Interventional procedures guidance is for health professionals and people using the NHS in England, Wales and Scotland.

A thoracotomy involves making an incision between the ribs on one side of the chest and separating the ribs to access the lung.

2.2.2 The aim of the surgery is to reduce the volume of the lung. This is done by using a surgical stapling device to cut and seal the tissue, laser ablation to shrink lung volume, or a combination of both. Once the tissue has been removed, the lung is re-inflated and the chest closed.

2.3 Efficacy

2.3.1 Evidence on efficacy indicates that in certain patients lung function, exercise performance and quality of life are improved in the short term after lung volume reduction surgery. These results have been relatively consistent across study designs and were confirmed in the National Emphysema Treatment Trial, a recent large-scale randomised controlled trial comparing surgery with medical therapy.

2.3.2 The National Emphysema Treatment Trial randomised 1218 patients, of whom 580 underwent surgery. At 24 months, exercise capacity had improved in 15% (54/371) of patients in the surgery group compared with 3% (10/378) of patients in the medical group ($p < 0.001$). Quality of life had also improved in the surgical group (121/371) as compared with the medical group (34/378) at 24 months (33% versus 9%, $p < 0.001$). However, the trial found no difference in overall mortality between the two groups (0.11 deaths per person-year, risk ratio 1.01, $p = 0.90$). For more details, refer to the Sources of evidence.

2.3.3 The Specialist Advisors considered that the procedure is beneficial for a select proportion of patients, but the benefit tends to decline with time.

2.4 Safety

2.4.1 The most common complication was persistent air leak from the lung. In one study of 250 patients, 45% (113/250) of patients experienced prolonged air leaks lasting more than 7 days, with 8 of these patients (3%) requiring a subsequent operation. Other complications in this series included pneumonia 10% (24/250), in-hospital mortality 5% (12/250), myocardial infarction 2% (5/250), deep vein thrombosis 2% (4/250), small bowel obstruction 2% (6/250) and phrenic nerve injury < 1% (2/250). For more details, refer to the Sources of evidence.

2.4.2 Complications include those that may arise from pre-existing co-morbidities as well as those that are directly due to the surgery.

2.4.3 The Specialist Advisors considered that the risks of surgery were well known. They listed the main complications as being air leaks, chest infections and respiratory failure.

2.5 Other comments

2.5.1 It was noted that endobronchial techniques are being used increasingly as an alternative to this procedure

Andrew Dillon
Chief Executive
February 2005

Information for the public

NICE has produced information describing its guidance on this procedure for patients, carers and those with a wider interest in healthcare. It explains the nature of the procedure and the decision made, and has been written with patient consent in mind. This information is available, in English and Welsh, from www.nice.org.uk/IPG114publicinfo

Sources of evidence

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

Interventional procedures overview of lung volume reduction surgery for advanced emphysema, June 2004.

Available from: www.nice.org.uk/IP236overview

Ordering information
Copies of this guidance can be obtained from the Department of Health Publications Order Line by telephoning 0870 1555 455 and quoting reference number N0819. *Information for the public* can be obtained by quoting reference number N0820 for the English version and N0821 for a version in English and Welsh.

The distribution list for this guidance is available at www.nice.org.uk/IPG114distributionlist

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