

**NATIONAL INSTITUTE FOR HEALTH AND CARE  
EXCELLENCE**

**Interventional procedure consultation document**

**Implantation of a sphenopalatine ganglion  
stimulation device for chronic cluster  
headache**

Cluster headaches are attacks of severe pain around the eye accompanied with reddening, eye-watering and a runny nose. Attacks can occur several times a day and last from minutes to hours. In this procedure a small device is implanted just above the gum. This device electrically stimulates a group of nerves at the base of the skull called the sphenopalatine ganglion. The aim is to relieve pain and reduce the number of headache attacks.

The National Institute for Health and Care Excellence (NICE) is examining sphenopalatine ganglion stimulation for chronic cluster headache and will publish guidance on its safety and efficacy to the NHS. NICE's Interventional Procedures Advisory Committee has considered the available evidence and the views of specialist advisers, who are consultants with knowledge of the procedure. The Advisory Committee has made provisional recommendations about sphenopalatine ganglion stimulation for chronic cluster headache.

This document summarises the procedure and sets out the provisional recommendations made by the Advisory Committee. It has been prepared for public consultation. The Advisory Committee particularly welcomes:

- comments on the provisional recommendations
- the identification of factual inaccuracies
- additional relevant evidence, with bibliographic references where possible.

**Note that this document is not NICE's formal guidance on this procedure. The recommendations are provisional and may change after consultation.**

The process that NICE will follow after the consultation period ends is as follows.

- The Advisory Committee will meet again to consider the original evidence and its provisional recommendations in the light of the comments received during consultation.
- The Advisory Committee will then prepare draft guidance which will be the basis for NICE's guidance on the use of the procedure in the NHS.

For further details, see the [Interventional Procedures Programme process guide](#), which is available from the NICE website.

Through its guidance NICE is committed to promoting race and disability equality, equality between men and women, and to eliminating all forms of discrimination. One of the ways we do this is by trying to involve as wide a range of people and interest groups as possible in the development of our interventional procedures guidance. In particular, we aim to encourage people and organisations from groups who might not normally comment on our guidance to do so.

In order to help us promote equality through our guidance, we should be grateful if you would consider the following question:

Are there any issues that require special attention in light of NICE's duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations between people with a characteristic protected by the equalities legislation and others?

Please note that NICE reserves the right to summarise and edit comments received during consultations or not to publish them at all where in the reasonable opinion of NICE, the comments are voluminous, publication would be unlawful or publication would otherwise be inappropriate.

Closing date for comments: 25 February 2015

Target date for publication of guidance: May 2015

## 1 Provisional recommendations

- 1.1 Current evidence on the short-term efficacy of implantation of a sphenopalatine ganglion stimulation device for chronic cluster headache is adequate. With regard to safety, a variety of complications have been documented, most of which occur early and resolve; surgical revision of the implanted system is sometimes needed. Therefore, this procedure should only be used with special

arrangements for clinical governance, consent and audit or research.

1.2 Clinicians wishing to implant a sphenopalatine ganglion stimulation device for chronic cluster headache should take the following actions:

- Inform the clinical governance leads in their NHS trusts.
- Ensure that patients understand the uncertainty about the procedure's safety and long-term efficacy and provide them with clear written information. Patients should be informed about other treatment options. In addition, the use of NICE's [information for the public](#) *[[URL to be added at publication]]* is recommended.
- [Audit](#) *[URL to audit tool to be added at publication]* and review clinical outcomes of all patients having sphenopalatine ganglion stimulation (see section 7.2).

1.3 The selection of patients for implantation of a sphenopalatine ganglion stimulation device and their management should be done by multidisciplinary teams specialising in refractory headache.

1.4 Clinicians should enter details about all patients being implanted with a sphenopalatine ganglion stimulation device onto the national [Neuromodulation register](#) hosted by the National Institute for Cardiovascular Outcomes Research (NICOR). Clinical outcomes should also be reviewed locally.

1.5 NICE encourages further research on sphenopalatine ganglion stimulation for chronic cluster headache. Reported outcomes should include long-term efficacy and device durability.

## **2 Indications and current treatments**

- 2.1 Cluster headaches are characterised by episodes of unilateral periorbital pain, conjunctival injection, lacrimation and rhinorrhoea. This form of neurovascular headache most commonly affects middle-aged men. Headache attacks can last from a few minutes to several hours and can occur many times a day, over several days. Chronic cluster headaches can be separated by headache-free periods of less than 1 month, or not separated at all.
- 2.2 The usual treatments for acute cluster headache attacks are oxygen inhalation and/or medications such as triptans. Medications such as corticosteroids, verapamil and occipital nerve blocks are used to prevent or reduce the number of attacks. Surgical treatments are reserved for patients with distressing symptoms that are refractory to medical treatments. They include deep brain stimulation to modulate central processing of pain signals and radiofrequency ablation to interrupt trigeminal sensory or autonomic pathways.

## **3 The procedure**

- 3.1 It is believed that cluster headaches are caused by a trigeminal-autonomic reflex mediated through the sphenopalatine ganglion. This procedure aims to relieve pain and reduce the frequency of cluster headache attacks by implanting a device in the pterygopalatine fossa to stimulate the sphenopalatine ganglion with small electrical currents.
- 3.2 Implantation of the neurostimulator device is performed with the patient under general anaesthesia. A small incision is made in the mucogingival margin adjacent to the maxillary first or second molar

on the affected side. Under X-ray control, the lead of the neurostimulator device is advanced subperiosteally along the posterior maxilla in order to place stimulating electrodes in the pterygopalatine fossa. Through the same incision in the mucogingival margin, the main body of the device is fixed medial to the zygoma by means of a small plate. After implantation, the device is tested to assess electrode functionality and the patient's physiological responses to stimulation.

- 3.3 When cluster headaches occur, the patient activates the neurostimulator (up to a pre-determined maximum dose) by placing a handheld control unit on their cheek, over the area where the main body of the device is implanted.

## 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 In a randomised sham-controlled crossover study of 32 patients who randomly had full stimulation, sub-perception stimulation or sham stimulation during each cluster headache attack, a reduction in pain at 15 minutes after neurostimulation was reported in 67% (65/190) of attacks treated by full stimulation and 7% (15/192) of attacks treated by sham stimulation ( $p < 0.001$ ). A reduction in pain at 15 minutes after neurostimulation was reported in 7% (14/184) of attacks treated by sub-perception stimulation (p value compared against sham stimulation = 0.96). Complete resolution of pain at 15 minutes after neurostimulation was reported in 34% (65/190) of attacks treated by full stimulation and 2% (3/192) of attacks treated

by sham stimulation ( $p < 0.001$ ). Complete resolution of pain at 15 minutes after neurostimulation was reported in 2% (3/184) of attacks treated by sub-perception stimulation (p value compared against sham stimulation = 0.97).

- 4.2 In the randomised sham-controlled crossover study of 32 patients, a reduction in pain at 90 minutes after neurostimulation was reported in 60% of cluster headache attacks treated by full stimulation and 13% of attacks treated by sham stimulation ( $p < 0.001$ ).
- 4.3 In the randomised sham-controlled crossover study of 32 patients, the mean attack frequency reduced from 17.4 attacks per week to 12.5 attacks per week at 2-month follow-up, for the 28 patients who completed the experimental period ( $p = 0.005$ ). The frequency of headaches reduced by a minimum of 50% in 43% (12/28) of patients.
- 4.4 In the randomised sham-controlled crossover study of 32 patients, mean Headache Impact Test scores (scores range from 36 to 78 with lower scores indicating better quality of life) decreased by  $6.8 \pm 10.2$  points (from 66 to 59) at 2-month follow-up, for the 28 patients who completed the experimental period ( $p = 0.002$ ). Mean SF-36 physical function scores (scores range from 0 to 100 with higher scores indicating better outcomes) increased from 38 to 43.5 at 2-month follow-up ( $p = 0.005$ ). Mean SF-36 mental function scores increased from 34.5 to 39.0 ( $p = 0.02$ ).
- 4.5 Specialist advisers listed key efficacy outcomes as acute treatment of headaches, reduction in attack frequency, reduction in acute medication use and improved quality of life as measured by the Headache Impact Test.

## 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 Lead revision or explantation of the device was needed for 16% (5/32) of patients, between 30 days and 1 year after the procedure, in a randomised sham-controlled crossover trial of 32 patients who randomly had full stimulation, sub-perception stimulation or sham stimulation during each cluster headache attack.
- 5.2 Sensory disturbances (including localised loss of sensation, hypoaesthesia, paraesthesia, dysaesthesia and allodynia) were reported in 81% (26/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in 58% (15/26) of these patients. Sensory disturbances were reported in 16% (5/32) of patients between 30 days and 1 year after the procedure; symptoms resolved in 60% (3/5) of these patients.
- 5.3 Pain (facial, cheek, gum, temporomandibular joint, nose, incision site or periorbital) was reported in 38% (12/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients. Severity of pain was not described and symptoms resolved in all of these patients. Pain was reported in 19% (6/32) of patients between 30 days and 1 year after the procedure: symptoms resolved in 50% (3/6) of these patients.
- 5.4 Unspecified swelling was reported in 22% (7/32) of patients within 30 days of device implantation in the randomised sham-controlled

crossover trial of 32 patients; symptoms resolved in 86% (6/7) of these patients.

- 5.5 Trismus was reported in 16% (5/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in 80% (4/5) of these patients.
- 5.6 Headaches, that were not cluster headaches, were reported in 9% (3/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in all of these patients. Headaches, that were not cluster headaches, were reported in 9% (3/32) of patients between 30 days and 1 year after the procedure; symptoms resolved in 1 of these patients.
- 5.7 Dry eye was reported in 9% (3/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in 1 of these patients. Dry eye was reported in 1 patient between 30 days and 1 year after the procedure; no further details were provided.
- 5.8 Haematoma was reported in 9% (3/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in all of these patients.
- 5.9 Mild paresis of the muscles around the nasolabial fold was reported in 6% (2/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in 1 of these patients.



- 5.10 Infection was reported in 6% (2/32) of patients within 30 days of device implantation in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in all patients following treatment with antibiotics. Infection was reported in 1 patient between 30 days and 1 year after the procedure; symptoms resolved following treatment with antibiotics.
- 5.11 Epistaxis, facial asymmetry, lacrimation, vomiting, lead migration and a maxillary sinus puncture (no details were provided) were each reported as occurring on single occasions in different patients within 30 days of device implantation, in the randomised sham-controlled crossover trial of 32 patients; symptoms resolved in all patients.
- 5.12 Itching, dry nose, dry skin, taste alterations, a depressed gag reflex and sensation in the infratemporal fossa (no details were provided) were each reported as occurring on single occasions in different patients, between 30 days and 1 year after the procedure in the randomised sham-controlled crossover trial of 32 patients.
- 5.13 In addition to safety outcomes reported in the literature, specialist advisers are asked about anecdotal adverse events (events which they have heard about) and about theoretical adverse events (events which they think might possibly occur, even if they have never done so). For this procedure, specialist advisers did not highlight any anecdotal adverse events. They considered that damage to adjacent structures (such as the sinuses) was a theoretical adverse event.

## **6 Committee comments**

- 6.1 The Committee was advised that, in most patients, cluster headache responds to medical treatments. However, a small number of patients have headaches that do not respond and they may have very distressing symptoms. Treatment choices for these patients are limited and sphenopalatine ganglion stimulation may be 1 option for offering them some relief.

## **7 Further information**

- 7.1 For related NICE guidance, see the [NICE website](#).
- 7.2 This guidance requires that clinicians undertaking the procedure make special arrangements for audit. NICE has identified relevant audit criteria and is developing an audit tool (which is for use at local discretion), which will be available when the guidance is published.

Bruce Campbell

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