

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Interventional procedures consultation document

Nerve graft for corneal denervation

Blinking helps prevent infection and keeps the eye healthy by spreading a film of tears across the clear layer at the front of the eye (cornea). When nerves to the cornea are damaged (denervation), feeling is lost, and blinking happens less often. This makes the cornea vulnerable to infection and ulcers, which can result in poor vision. In this procedure, under general anaesthesia, one end of a piece of another nerve (the nerve graft) is attached to a healthy nerve, usually above the eye. The other end is passed under the skin and inserted around the damaged cornea. Over several months, feeling returns to the cornea. The aim is to protect the cornea by improving healing, to reduce infections and the need for eye drops.

NICE is looking at nerve graft for corneal denervation.

NICE's interventional procedures advisory committee met to consider the evidence and the opinions of professional experts, who are consultants with knowledge of the procedure.

This document contains the [draft guidance for consultation](#). Your views are welcome, particularly:

- comments on the draft recommendations
- information about factual inaccuracies
- additional relevant evidence, with references if possible.

NICE is committed to promoting equality of opportunity, eliminating unlawful discrimination and fostering good relations between people with particular protected characteristics and others.

This is not NICE's final guidance on this procedure. The draft guidance may change after this consultation.

After consultation ends, the committee will:

- meet again to consider the consultation comments, review the evidence and make appropriate changes to the draft guidance
- prepare a second draft, which will go through a [resolution process](#) before the final guidance is agreed.

Please note that we reserve the right to summarise and edit comments received during consultation or not to publish them at all if, in the reasonable opinion of NICE, there are a lot of comments or if publishing the comments would be unlawful or otherwise inappropriate.

Closing date for comments: 1 March 2022

Target date for publication of guidance: June 2022

1 Draft recommendations

- 1.1 Evidence on the safety of nerve graft for corneal denervation is limited but raises no major safety concerns. Evidence on efficacy is limited in quantity and quality. Therefore, this procedure should only be used with special arrangements for clinical governance, consent, and audit or research. Find out [what special arrangements mean on the NICE interventional procedures guidance page](#).
- 1.2 Clinicians wanting to do nerve graft for corneal denervation should:
- Inform the clinical governance leads in their healthcare organisation.
 - Give patients (and their families and carers as appropriate) clear information to support [shared decision making](#), including [NICE's information for the public](#).
 - Ensure that patients (and their families and carers as appropriate) understand the procedure's safety and efficacy, and any uncertainties about these.
 - Audit and review clinical outcomes of all patients having the procedure. The main efficacy and safety outcomes identified in this guidance can be entered into [NICE's interventional procedure outcomes audit tool](#) (for use at local discretion).
 - Discuss the outcomes of the procedure during their annual appraisal to reflect, learn and improve.
- 1.3 Healthcare organisations should:
- Ensure systems are in place that support clinicians to collect and report data on outcomes and safety for every patient having this procedure.
 - Regularly review data on outcomes and safety for this procedure.

- 1.4 Further research should be in the form of randomised controlled trials, analysis of registry data, or case series.
- 1.5 Patient selection should be done by clinicians experienced in managing the condition.
- 1.6 The procedure should only be done in specialist centres by surgeons with skills and experience in this procedure.

2 The condition, current treatments and procedure

The condition

- 2.1 The cornea is innervated by the ophthalmic branch of the trigeminal nerve. This innervation maintains the health of the cornea. It does this by providing trophic factors to the corneal cells, activating protective blink reflexes, and stimulating tear production.
- 2.2 Damage to the trigeminal nerve can result in a decrease or loss of corneal sensation. The trigeminal nerve can be damaged by various diseases, chemical burns, physical injuries, or by surgery. Loss of innervation to the cornea can result in neurotrophic keratitis (also known as neurotrophic keratopathy). People with neurotrophic keratitis typically have corneal epithelium defects, poor corneal healing, and can develop sight loss. They are also prone to corneal infections.

Current treatments

- 2.3 Current treatment for neurotrophic keratitis aims to stop progression to later stages of the disease and promote regeneration of the epithelium. This can include topical lubricants and artificial tears. Antibiotic tear drops may be needed to prevent infections. Options for severe disease include lateral tarsorrhaphy (using sutures to partially or fully close the eyelids), topical nerve

growth factor, topical collagenase inhibitors, and amniotic membrane grafting.

The procedure

- 2.4 Nerve graft to restore corneal sensation is done under general anaesthesia. The nerve graft can either be an autograft, when the graft is taken from the person having the procedure, or an allograft, when the graft is a processed nerve from a deceased donor. Several types of grafts have been described in the literature, including the sural nerve, lateral antebrachial cutaneous nerve, great auricular nerve, and a nerve from a deceased donor.
- 2.5 The nerve graft is harvested or prepared. At the same time, an incision is made on the contralateral side. This is to access an orbital nerve (the supratrochlear, supraorbital, or infraorbital nerve) of the eye that still has normal sensation (the 'donor' nerve). In some people, the ipsilateral supratrochlear, supraorbital, or infraorbital nerve, or the ipsilateral great auricular nerve is used as a donor nerve. The nerve graft is attached to the donor nerve and then subcutaneously tunnelled to the perilimbal area of the affected eye. The nerve fascicles can either be placed around the entire limbal circumference and secured to the sclera or are inserted into corneoscleral tunnels. The nerve fascicles are secured with sutures or fibrin glue, or both. The conjunctiva is closed and a temporary lateral tarsorrhaphy may be placed. A patch and topical lubricants may be prescribed after surgery. Over time, new nerve endings grow into the cornea. A corneal transplant may be needed to fully restore sight in people with loss of corneal clarity.

3 Committee considerations

The evidence

- 3.1 NICE did a rapid review of the published literature on the efficacy and safety of this procedure. This comprised a comprehensive

literature search and detailed review of the evidence from 9 sources, which was discussed by the committee. The evidence included 1 non-randomised controlled trial, 2 before-and-after studies, 4 case series, and 2 case reports. It is presented in [the summary of key evidence section in the interventional procedures overview](#). Other relevant literature is in the appendix of the overview.

- 3.2 The professional experts and the committee considered the key efficacy outcomes to be: corneal healing and stabilisation, reduction in use of lubricating eye drops, patient-reported outcomes including quality of life, and reduction in corneal complications.
- 3.3 The professional experts and the committee considered the key safety outcomes to be: pain, infection, persistent facial neuropathy, graft nerve disconnect or damage, and donor-site morbidity.
- 3.4 Patient commentary was sought but none was received.

Committee comments

- 3.5 There were a variety of techniques described in the literature. This guidance only considers indirect corneal neurotisation using an interpositional nerve graft and does not consider direct neurotisation by nerve transfer.
- 3.6 The committee was informed that this procedure can be done with an allograft.
- 3.7 The committee was informed that the primary purpose of this procedure is to improve healing of the cornea (trophic effect) rather than improving corneal sensation.
- 3.8 The committee was informed that neurotrophic keratitis can be a very disabling condition. Neurotisation is likely to be used only in patients whose disease has not responded to other less invasive treatments.

- 3.9 The committee was informed this procedure may enable patients to have a corneal graft if one is indicated.

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Chair, interventional procedures advisory committee

February 2022

ISBN: