NICE National Institute for Health and Care Excellence

NICE guidance

Phototherapeutic laser keratectomy for corneal surface irregularities

HealthTech guidance

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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, and specifically any special arrangements relating to the introduction of new interventional procedures. 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.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

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. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

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.

Contents

1 Recommendations 4

2 The procedure 5

2.1 Indications and current treatments 5

2.2 Outline of the procedure 5

2.3 Efficacy 6

2.4 Safety 7

2.5 Other comments 7

Update information 9

This guidance replaces IPG358.

1 Recommendations

1.1 Current evidence on the safety and efficacy of phototherapeutic laser keratectomy for corneal surface irregularities is adequate to support the use of this procedure provided that normal arrangements are in place for clinical governance, consent and audit.

1.2 Patient selection and treatment should be carried out only by ophthalmologists who specialise in corneal surgery.

2 The procedure

2.1 Indications and current treatments

2.1.1 Symptomatic corneal surface irregularities may result from a range of pathologies including band keratopathy, corneal scarring, nodular degeneration, epithelial basement membrane dystrophy or other dystrophies. Symptoms may include loss of visual acuity, pain, sensitivity to light and foreign body sensation.

2.1.2 Treatment aims to restore a normal regular corneal surface and adherence between the epithelium and Bowman's membrane (a basement membrane that lies between the outer layer of stratified epithelium and the substance of the cornea) with associated improvement in visual acuity and comfort.

2.1.3 Standard treatment includes lubrication of the ocular surface, bandage contact lens placement or topical medication. Surgical procedures may include anterior stromal puncture, mechanical debridement, lamellar keratoplasty or resurfacing keratectomy using a diamond burr. Corneal transplantation may be considered in eyes refractory to treatment.

2.2 Outline of the procedure

2.2.1 The aim of phototherapeutic laser keratectomy for corneal surface irregularities is to create a smooth stromal surface to improve postoperative corneal clarity, decrease existing scarring and facilitate subsequent epithelial adhesion.

2.2.2 Local anaesthetic eye drops are applied and the corneal epithelium is mechanically removed. A laser is used to sequentially ablate uniformly thin layers of corneal tissue, creating a smooth surface which then becomes re-epithelialised. Postoperative management consists of an eye pad, topical antibiotics, sedatives and non-steroidal anti-inflammatory drugs.

2.3 Efficacy

Sections 2.3 and 2.4 describe efficacy and 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 overview.

2.3.1 A non-randomised controlled study of 39 patients (42 eyes) reported no significant difference in overall change in best corrected visual acuity (BCVA) between patients treated by phototherapeutic laser keratectomy and those treated by diamond burr polishing at 7-month follow-up (p=0.6): BCVA improved in 36% (5 out of 14) and 14% (3 out of 21) of eyes, remained unchanged in 64% (9 out of 14) and 81% (17 out of 21) of eyes and worsened in 0% (0 out of 14) and 5% (1 out of 21) of eyes respectively.

2.3.2 In a case series of 211 patients (232 eyes) mean BCVA improved by 1.4 lines from baseline at 2-year follow-up (p<0.002). No significant difference was reported in BCVA improvement between subgroups of patients with corneal dystrophy, nodular degeneration, corneal scar, or band keratopathy (absolute figures not stated; p=0.15).

2.3.3 In a case series of 216 patients (252 eyes), among eyes with recurrent erosion at baseline, further recurrent erosion was reported in 9% (9 out of 103) of eyes at 12-month follow-up.

2.3.4 The case series of 216 patients reported that 100% (29 out of 29) of eyes with band-like keratopathy were pain free by 6-day follow-up.

2.3.5 A case series of 191 patients (203 eyes) reported that significantly fewer patients with bullous keratopathy had severe symptoms of pain, photosensitivity and/or watering at 6-month follow-up (n=15) compared with baseline (n=56; p<0.017). Similarly, significantly fewer patients with corneal scarring had severe symptoms at 6-month follow-up (n=4) compared with baseline (n=13; p<0.0001).

2.3.6 The Specialist Advisers listed key efficacy outcomes as visual acuity, ocular surface health, ocular comfort and pain relief.

2.4 Safety

2.4.1 Recurrent keratitis requiring penetrating keratoplasty was reported in 1% (3 out of 232) of eyes at up to 2-year follow-up in the case series of 211 patients.

2.4.2 One occurrence each of progressing keratolysis at 8-day follow-up, circular subepithelial corneal scarring at 5-month follow-up (both requiring penetrating keratoplasty), progressive kerectasia at 6 months (sequelae not reported), and a sterile corneal immune ring at 4-day follow-up, were described in 4 separate case reports.

2.4.3 A loss of BCVA of 2 lines or more was reported in 13% (3 out of 24) of patients at 2-year follow-up in the case series of 211 patients.

2.4.4 Idiopathic iritis and a marginal corneal ulcer developed in 1 eye each at up to 2-year follow-up in the case series of 211 patients.

2.4.5 Mild postoperative haze was reported in 11% (22 out of 203) of eyes in the case series of 191 patients; this resolved in 12 eyes by 6-month follow-up. There was no significant difference in the occurrence of mild haze between patients treated by laser phototherapeutic keratectomy (33% [5 out of 15] of eyes) or by diamond burr polishing (26% [7 out of 27] of eyes) in the non-randomised controlled study of 39 patients at 7-month follow-up (p=0.38).

2.4.6 The Specialist Advisers identified corneal infection as an adverse event reported in the literature. They considered theoretical adverse events to include epithelial defect, corneal ectasia, scarring and induction of astigmatism or refractive error.

2.5 Other comments

2.5.1 The Committee noted that the published evidence comprised a mixture of different indications and outcomes, but nevertheless they considered that the case for safety and efficacy was adequately supported by this evidence and by specialist advice.

2.5.2 NICE received 3 completed questionnaires from patients treated by the

procedure. They reported improvements in quality of life including reduced photosensitivity (which had required sunglasses) and the ability to walk with more confidence.

Update information

Minor changes since publication

January 2026: Interventional procedures guidance 358 has been migrated to HealthTech guidance 231. The recommendations and accompanying content remain unchanged.

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Endorsing organisation

This guidance has been endorsed by Healthcare Improvement Scotland.