# Compressive C-Shaped Lamellar Keratoplasty

## *A Surgical Alternative for the Management of Severe Astigmatism from Peripheral Corneal Degeneration*

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***Objective:*** To describe a compressive lamellar surgical technique for treating severe astigmatism in peripheral corneal ectasia.

***Design:*** Retrospective, noncomparative, interventional case series.

***Participants:*** Four eyes of 3 patients with either pellucid or Terrien's marginal corneal degeneration were included in this series.

***Methods:*** C-shaped lamellar keratoplasty using multiple trephines of different sizes, with deliberate undersizing of the donor graft for a controlled compressive effect, was performed on these patients.

***Main Outcome Measures:*** Visual acuity outcome and refraction were measured at different intervals at up to 40 months of follow-up.

***Results:*** All eyes achieved Snellen visual acuity of 20/40 or better and stable astigmatism ranging from 0 to −2.75 diopter cylinder within 6 months, with no recurrence of corneal thinning or peripheral corneal vascularization.

***Conclusions:*** Compressive C-shaped lamellar keratoplasty is able to reduce severe corneal astigmatism in peripheral corneal ectasia and can result in good visual and refractive outcomes with early visual rehabilitation.
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Extreme and irregular astigmatism with poor visual acuity may occur with advanced marginal corneal disorders such as pellucid marginal degeneration[1–4] and Terrien's marginal degeneration. Terrien's marginal degeneration is a rare form of idiopathic progressive peripheral thinning leading to peripheral gutter formation.[5] Pellucid marginal degeneration, which is a bilateral, clear, noninflammatory, inferior corneal thinning disorder,[1] also may result in acute hydrops formation and spontaneous perforation.[6,7] Rigid contact lenses may be used to correct the asymmetrical corneal astigmatism in mild to moderate cases, but this is not effective for more severe cases.[1] Multiple surgical procedures ranging from thermokeratoplasty,[8] to epikeratophakia, to penetrating keratoplasty,[8] to crescentic lamellar keratoplasty,[9,10] and to crescentic wedge resection[11] have been described with variable degrees of success. We describe herein a modified technique of compressive C-shaped lamellar keratoplasty in which we establish the principle of lamellar corneal compression by donor tissue undersizing, which, in turn, corrects the severe ectasia and peripheral astigmatism occurring in these patients.

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## Patients and Methods

### Surgical Technique

All procedures were performed under general anesthesia. The conjunctiva adjacent to the superior or inferior ectasia first was incised and retracted away from the limbus for adequate exposure. The exact extent of peripheral corneal thinning and ectasia then was outlined carefully with a fine surgical marker. To regularize the size and shape of the ectasia, circular keratoplasty trephines (Solan; Xomed Surgical Products, Inc., Jacksonville, FL) of standard diameters were inked and used to mark the inner and outer circumferential limits of the arcuate-shaped ectasia. The usual sizes of trephines used were 9 mm in diameter for the inner circumference and 14 mm for the outer circumference (Fig 1).

The width between these 2 marked arcs then was measured using calipers, and disposable dermatological trephines (Kai Dermal Biopsy Punch; Kai Europe GmbH, Solingen, Germany) of corresponding sizes (usually 2 or 3 mm) then were used to outline the ends of the arcs, thus completing the C-shaped area of dissection. The circumferential chord length of the C-shaped outline was noted and recorded.



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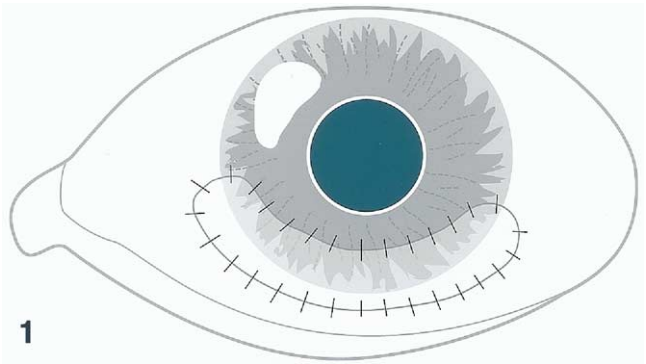

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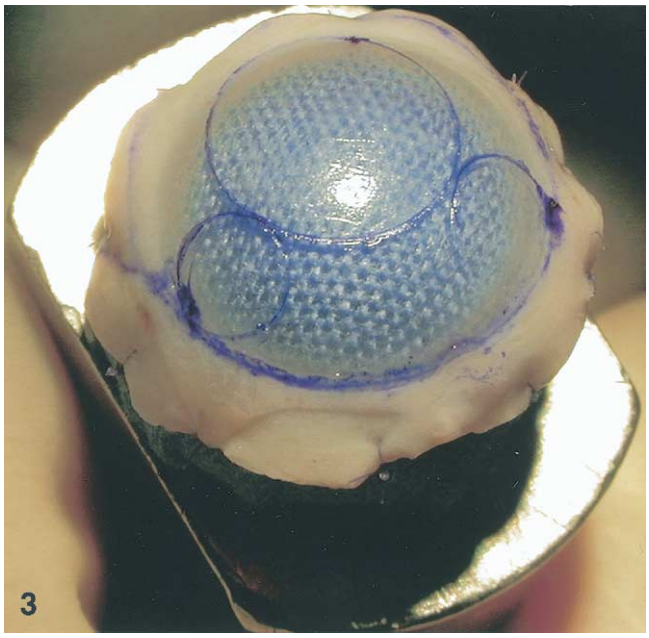

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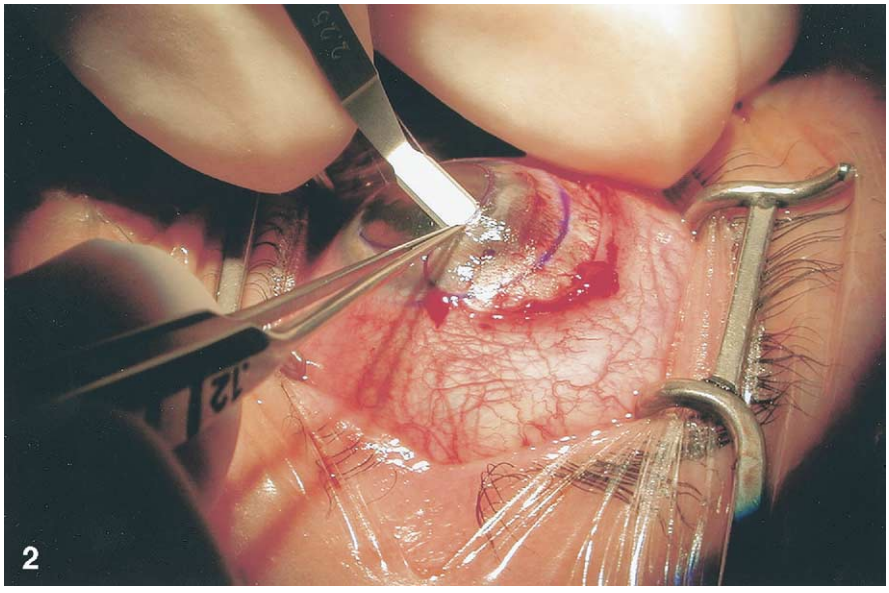

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