

LAMELLAR KERATOPLASTY

ARNOLD I. TURTZ, M. D.

(New York - U. S. A.)

Lamellar keratoplasty is the replacement of 50% or more of the corneal thickness without penetrating into the anterior chamber.

Improved surgical techniques and the availability of more dependable donor material for penetrating keratoplasty have sharply reduced the number of lamellar keratoplasties performed, particularly since the visual results after penetrating keratoplasty are usually more dramatic and the technique of lamellar keratoplasty more difficult. In certain situations, however, lamellar keratoplasty offers definite advantages. It is a much neglected effective procedure in ophthalmology.

What are the advantages of lamellar over penetrating keratoplasty? Donor material standards are far less demanding. The age of the donor is unimportant and the acceptable time after death or enucleation is extended. Corneas preserved by freezing, glycerin dehydration or tissue culture fluid storage are equally acceptable. The timing and scheduling of surgery is therefore easier. Since the anterior chamber is not opened the risk to intraocular structures is minimized and complications due to aqueous leakage, flat chamber or lens damage are eliminated. There are fewer homograft reactions and fewer cloudy grafts. The convalescent period is safer particularly in children or unruly patients. Vision may be more dramatically improved by a successful penetrating keratoplasty but it is rarely made worse by a lamellar procedure.

Due to the presence of a smooth front surface there is better and faster visual improvement than after superficial keratectomy. There is less chance of bulging and ectasia and less disproportion in thickness should a later penetrating keratoplasty be required. However total superficial

ARNOLD I. TURTZ

keratectomy may be an effective procedure as it was for this eye where vision was poor due to superficial scarring and calcification.

There are disadvantages. Vision is often imperfect due to a faint haze at the interface which may become more prominent with time. 20/40 vision is the exception rather than the rule. In vascularized corneas there may be a proliferation of vascularized connective tissue in the cleavage plane. It is valueless when the pathology involves the deepest layers of the cornea except in those cases where penetrating keratoplasty cannot be performed and we are willing to accept limited visual improvement. Technical difficulty is only a relative disadvantage.

Lamellar keratoplasty may involve the total extent of superficial cornea or only a portion, centrally, peripherally or in annular fashion. Some unusual conditions call for odd combinations of lamellar dissection with penetrating donor buttons or the use of the recipient's own tissue in grafting. Here a total lamellar is contrasted with partial, central, peripheral and annular grafts.

Lamellar grafts are indicated for optical, tectonic or therapeutic reasons.

Optical lamellar keratoplasty is largely limited to cases where inactive disease processes have resulted in opacification confined to the anterior half of the cornea, secondary to trauma, infection, marked thinning, degeneration or dystrophy. Scarring from inactive keratitis offers a good prognosis. It is helpful in superficial degenerations such as this ulcerated lattice dystrophy. It may be a particularly good choice in keratoplasty candidates who are aphakic, unioocular or unruly.

Tectonic lamellar keratoplasty is used to repair or rebuild a markedly thinned or badly damaged cornea when its condition is unsuitable for penetrating keratoplasty. Excessively thin bulging conical corneas are candidates as well as corneas melting away as a result of old herpes, radiation and chemical injuries. They are also used for the repair of marginal degeneration and to fill defects after recurrent pterygium or tumor excision. Some accompany keratoprosthesis. This cornea melted away years after radiation therapy for an orbital tumor. Lamellar keratoplasty was effective. Here a peripheral graft was used to repair an extensive area of marginal necrosis associated with rheumatoid arthritis. This patient had several recurrences of Bowen's disease. The excisional defect was covered with a peripheral lamellar graft. Several years later she

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developed multiple areas of recurrent corneal tumor and a total lamellar keratoplasty was performed which remains clear ten years post-operatively. Although tectonic grafts are performed in preparation for subsequent penetrating keratoplasty the visual result is occasionally quite satisfactory and the secondary procedure becomes unnecessary. This patient was incapacitated by photophobia and poor vision secondary to bilateral nodular dystrophy. The corneas were irregularly thinned, thickened and opacified. One eye achieved excellent vision after lamellar keratoplasty alone. The second eye required subsequent penetrating keratoplasty because of interfacial scarring. There is considerable overlap with optical keratoplasty on the one hand and therapeutic keratoplasty on the other.

Therapeutic lamellar keratoplasty is useful in the treatment of active chronic progressive or recurrent corneal disease that does not respond to more standard forms of therapy. Corneal infections which are unresponsive to indicated antibiotic and chemotherapeutic agents may do well after lamellar keratoplasty. Necrotic and infected tissues are removed and there may be some ill-defined direct therapeutic effect in replacement by donor material for it is often effective even when the offending organisms are incompletely removed. This herpetic keratitis was a persistent problem for two years and eventually became secondarily infected with *E. Coli* organisms. Intensive medical therapy failed to control the infection but lamellar keratoplasty resulted in a quiet eye seen here at six months just prior to suture removal. Here another anesthetic herpetic cornea with secondary infection proceeded over the course of many months to the stage of descemetocele. Lamellar keratoplasty was curative. Therapeutic grafting immediately following chemical burns has not been very successful and late keratoplasty for the resulting vascularized leukoma often results in deep proliferation of vascular connective tissue, however, in severely damaged opaque devitalized corneas with resistant infection such as this one-eyed patient with an infected deteriorating cornea years after a chemical injury lamellar keratoplasty can salvage the globe, restore some vision or at least provide a base for keratoprosthesis at a later date. Small diameter lamellar grafts may effectively cover a descemetocele. Full thickness grafts in a lamellar bed will result in symptomatic improvement of aphakic bullous keratoplasty or can be used to repair an area of limbal necrosis following cataract extraction.

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Summary:

Lamellar keratoplasty may be useful for visual improvement, treatment of progressive corneal disease or salvage of severely damaged eyes. Visual improvement can be significant though less dramatic than that achieved through penetrating keratoplasty. There is, however, less surgical risk and less chance of devastating visual loss. It is a much neglected often effective procedure in ophthalmology.

F. S.