

MAJOR REVIEW

Infectious Keratitis Following Keratoplasty

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Abstract. Infectious keratitis following corneal transplantation is one of the leading causes of failure of a corneal graft. The incidence of graft infection is variable, with developing countries having a higher incidence. The majority of the graft infections occur within 1 year of the corneal transplantation. Suture-related problems and persistent epithelial defect are the most common risk factors predisposing to graft infection. Pneumococcus species and *Staphylococcus aureus* have been found to be the commonest microorganisms in the developed world, whereas *Staphylococcus epidermidis* is the most often detected microorganism in corneal graft infection in the developing world. The early identification of predisposing risk factors in patients and their appropriate management at the earliest may prevent the occurrence of graft infection and might improve graft survival. Visual prognosis in eyes with post-keratoplasty graft infection is poor even after optimal therapy and there is a high rate of graft decompensation. (*Surv Ophthalmol* 52:1–12, 2007. © 2007 Elsevier Inc. All rights reserved.)

Key words. cornea • graft • infection • keratitis • keratoplasty

I. Introduction

Corneal infection is one of the leading causes of ocular morbidity and blindness.^{1,2,5,11} The functional success of a corneal graft is dependent on many variables, including good surgical technique with appropriate coaptation of donor and host, immunologic acceptance of the foreign tissue, a functional degree of astigmatism, and a smooth corneal surface that is supported by the ocular adnexa. Infectious keratitis whether active or healed following keratoplasty is a major complication that may jeopardize the outcome of a graft, leading to graft failure and poor visual outcome.^{3,4,6,21,23,25,29,63,66,67,69}

II. Incidence

The incidence rates of microbial keratitis following keratoplasty have been found to be variable in

different studies. In the developed countries, the incidence of post penetrating keratoplasty infectious keratitis is lower than the developing world and most studies have reported incidence rates of 1.76% to 7.4%.^{3,6,12,16,34,35,63,67} A similar study performed in the developing world reported incidence of post-keratoplasty infection of up to 11.9%.⁴ However, an incidence rate as high as 25% has been reported in one study from the developed world.⁶⁴

It is known that recurrence of herpetic keratitis in a corneal graft is high. Remeijer et al, in their study, reported an incidence of 1.2 per 1000 person-years of herpetic keratitis in the graft after penetrating keratoplasty.⁴⁹ This is 14.2 times the incidence rate of herpetic keratitis in the normal population (95% confidence interval [CI], 8.2–21.07) as found in a study.⁴⁰ In another similar study performed in India,⁴⁶ the incidence of herpetic keratitis in corneal grafts done for viral keratitis was found to be 18%.

III. Indications for Keratoplasty

Penetrating keratoplasties are at times performed on eyes with compromised ocular defense mechanisms, rendering them more susceptible to infection. Saini et al, in their study of post-keratoplasty corneal ulcers, reported that the commonest indication of keratoplasty in their study in which graft infection occurred was aphakic bullous keratopathy.⁵¹ Bullous keratopathy was the most common indication for penetrating keratoplasty in another study.⁶⁴ Further, Fuchs dystrophy was the most common indication for keratoplasty in a study by Tavakkoli and Sugar.⁶³

In another study performed by Vajpayee et al,⁶⁸ the most common indication for keratoplasty was corneoidic scar. Corneal scarring due to healed keratitis was also the most common indication for surgery in another study (Table 1).³ Al-Hazzaa and Tabbara reported that the major indication for keratoplasty was postinfectious corneal scarring,⁴ because the patient selection was based on visual needs as a first priority rather than predictive favorable prognosis. They reported a high incidence of microbial keratitis following corneal grafting and concluded that corneal scarring due to microbial keratitis or incompletely treated microbial keratitis carries a higher risk for the development of microbial keratitis after keratoplasty. They suggested that proper selection of patients for corneal grafting may decrease the incidence of postoperative keratitis.

Mannis et al have reported three cases of post-keratoplasty herpetic keratitis wherein the indica-

tions for keratoplasty were bullous keratopathy and healed viral keratitis.⁴¹

IV. Interval Between Keratoplasty and Onset of Microbial Keratitis

Microbial keratitis in the graft can occur at variable times after keratoplasty. Studies have reported that most graft infections usually occur within 1 year of corneal transplantation.^{3,49,63,68} The high incidence of corneal ulcers during this period warrants intensive follow-up of the patients for the first year postoperatively, particularly those with high risk factors, such as keratoconjunctivitis sicca, acne rosacea, blepharitis, chemical burns, chronic epithelial defect, and herpes simplex keratitis. Whereas early postoperative infection may occur due to recurrence of host disease, infected donor corneas,^{15,24,27} or intraoperative contamination, late infections are usually caused by pathogens that are acquired from the environment.^{29,66}

In a study performed by Akova et al, the median interval between penetrating keratoplasty and microbial keratitis was 7.6 months (range: 1–48 months).³

Fifteen infections occurred within the first 6 months after penetrating keratoplasty. They suggested that because most patients were given aggressive topical steroid therapy in the first 6 months, 71% of the patients presented with microbial keratitis during this period. Similar range of interval of post-keratoplasty infectious keratitis was reported in

TABLE 1

Indications for Keratoplasty in Patients with Post-keratoplasty Infectious Keratitis

Indications	Saini et al ⁵¹ n (%)	Vajpayee et al ⁶⁸ n (%)	Tavakkoli & Sugar ⁶³ n (%)	Tixier et al ⁶⁴ n (%)	Mannis et al ⁴² n (%)	Akova et al ³ n (%)
Bullous keratopathy	9 (34.6)	8 (16)	7 (23.7)	8 (50)	2 (66)	2 (9.5)
Fuchs	3 (11.5)		10 (33)			
Keratoconus	2 (7.6)		3 (10)			3 (14.3)
Alkali burns	2 (7.6)					
Herpes simplex keratitis	1 (3.8)	8 (16) (healed)			1 (33) (healed)	
Healed keratitis	4 (15.3)	9 (18)		4 (25)		12 (57.2)
Failed grafts	5 (19.2)	9 (18)				
Corneoidic Scars		16 (32)				
Corneal ulcer			3 (10)			2 (9.5) (Perforated)
Dystrophy			2 (6.75)			2 (9.5)
CHED			1 (3.3)			
Interstitial keratitis			1 (3.3)			
Trauma			1 (3.3)			
Scar			1 (3.3)			
Others				4 (25)		

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