

Herpes simplex keratitis in children

Bijan Beigi, Kais Algawi, Aisling Foley-Nolan, Michael O'Keefe

Department of Paediatric Ophthalmology, The Children's Hospital and Department of Ophthalmology, Mater Misericordiae Hospital, Dublin, Ireland
B Beigi
K Algawi
A Foley-Nolan
M O'Keefe

Correspondence to: Mr Michael O'Keefe, Department of Paediatric Ophthalmology, University College Dublin, The Children's Hospital, Temple Street, Dublin 1, Ireland.

Accepted for publication 10 January 1994

Abstract

Ophthalmic findings are reported in 31 eyes of 28 children with herpes simplex keratitis. Twenty two had dendritic ulcers, and nine had geographic ulcers or disciform stromal keratitis. After resolution of keratitis, 80% (19/22) of children with dendritic ulcers achieved corrected visual acuity of 6/9 or better, 50% (11/22) had induced astigmatism, 45% (9/22) had one to five recurrences. In the group with geographic or disciform lesions, 89% (8/9) had reduced corrected vision, 78% (7/9) had induced astigmatism which was predominantly against the rule, and 87% (7/9) had one to six recurrences. (*Br J Ophthalmol* 1994; 78: 458-460)

Herpes simplex virus (HSV) infections are ubiquitous in humans, are spread by direct contact, and have a high recurrence rate. Although both types I and II HSV can produce keratitis,^{1,2} type I is usually responsible. Primary keratitis normally heals up completely and it is the recurrence of the infection that leaves a corneal scar.³ Reactive disease presents as a dendritic, geographic ulcer or a disciform stromal keratitis.⁴ The effect of these on the visual outcome of children has been studied.

Materials and methods

Thirty one eyes of 28 children, 16 males and 12 females, with herpetic keratitis were included in this study (Table 1). They presented during the years 1982 to 1992. They have been followed up for a mean of 4 years. Their ages ranged from 2 to 18 years. Diagnosis was made on clinical presentation, and viral isolation was not performed.

Patients were divided into two groups according to the type of keratitis. Twenty (group I) presented with a typical dendritic keratitis, and eight (group II) presented with geographic ulcers or a disciform lesion. Assessment of visual acuity and retinoscopy was carried out in both eyes before and after the resolution of the keratitis, using Catford drum, Allen picture cards, Sheridan Gardiner cards, and Snellen chart according to age. The type and severity of the corneal involvement and number of recurrences in the affected eyes were recorded. Scar density was assessed using the method of Flanders,⁵ with +1 being visible only with a slit-lamp, +2 faintly visible with light, and +3 evidently visible with light.

The majority of children were treated with acyclovir. Topical corticosteroid was used sparingly in the cases with disciform lesions. Debridement was performed in some cases. One

Table 1 Details of patients with herpetic keratitis

Patient No	Sex and age (years)	Age at 1st onset	No of recurrences	Treatment
1	F 10	7	5	Acyclovir*/cyclopentolate 1%†
2	M 15	10	>4	Acyclovir
3	M 7	4	1	Acyclovir
4	M 10	9	—	Acyclovir
5	M 6	3	3	Acyclovir
6	M 6	3	—	Acyclovir
7	F 13	9	—	Acyclovir
8	M 9	2	—	Acyclovir
9	M 15	10	—	Acyclovir/cyclopentolate 1%
10	F 15	12	—	Acyclovir/prednisolone acetate 0-12%
11	M 7	3	—	Acyclovir
12	F 18	5	2	Acyclovir
13	M 17	13	—	Acyclovir/cyclopentolate 1%
14	M 10	7	—	Acyclovir/cyclopentolate 1%
15	M 9	4	—	Acyclovir
16	M 6	5	—	Acyclovir
17	F 2	1	4	Acyclovir
18	M 12	7	5	Acyclovir/betamethasone‡
19	F 6	4	3	Acyclovir/erythromycin
20	F 2	1	2	Acyclovir
21	F 4	1	1	Acyclovir/atropine eye drops
22	F 13	2	3	Acyclovir
23	F 15	6	6	Acyclovir
24	F 6	4	2	Acyclovir
25	F 11	7	1	Acyclovir/betamethasone/neomycin**/keratoplasty
26	M 13	6	5	Acyclovir/betamethasone/neomycin
27	M 15	11	2	Acyclovir/betamethasone/neomycin/keratoplasty
28	M 10	5	—	Acyclovir/betamethasone /neomycin

* Zovirax; † Mydrilate; ‡ Betnesol; ** Betnesol N.

Table 2 Ophthalmic findings in group I with dendritic keratitis

Case	Eye	K	Scar	Rec	Visual acuity		Refraction	
					R	L	R	L
1	R	D	++	5	6/12*	6/9	+0.75/+3.25×130*	+0.5
2	L	D	++	>4	6/6	6/9*	plano	plano/+2.5%×160*
3	L	D	—	1	6/6	6/6*	+0.25/+0.25×170	+0.5/+0.25×45*
4	L	D	—	—	6/6	6/9*	plano	-0.25*
5	R/L	D	-/+	3	6/6*	6/12*	+2.25/+1.25×150*	+5.00/+0.75×45*
6	R/L	D	-/-	—	6/6*	6/6*	plano*	plano*
7	L	D	+	—	6/6	6/6*	plano	plano*
8	R	D	—	—	6/6*	6/12	+2.00/+0.25×175*	+4.75/+0.25×5
9	L	D	+	—	6/6	6/9+2*	-1.50	-1.00/+0.75×80*
10	L	D	++	—	6/9	6/12*	plano	-1.25/+1.00×90*
11	L	D	—	—	6/6-2	6/6-1*	+0.25	+0.25/+0.25×180*
12	L	D	+	2	6/6-1	3/60 (a)*	plano	plano/+4.50×90*
13	R	D	—	—	6/6*	6/6	-2.00/+2.00×50*	plano
14	L	D	+	—	6/9	6/9*	+0.75	+0.25/+0.75×70*
15	R	D	—	—	6/6*	6/12 (a)	+2.00*	+2.00
16	R	D	+	—	6/12 (a)*	6/6	plano/+1.00×180*	plano
17	L	D	+	4	CSM	CSM*	plano	+0.5/+1.00×180*
18	R	D	+++ (p)	5	6/9*	6/6	plano*	plano
19	L	D	+	3	6/6	6/9*	+2.00	+2.00*
20	L	D	—	2	CSM	CSM*	+3.50	+4.00*

*=affected eye; (a)=amblyopia; CSM=central steady maintained; D=dendritic; K=keratitis; L=left eye; (p)=peripheral; Rec=recurrences; R=right eye.

Table 3 Ophthalmic findings in group II with geographic (G) or disciform (DF) keratitis

Case	Eye	K	Scar	Rec	Visual acuity		Refraction	
					R	L	R	L
21	R	G	+++	1	CSM*	CSM	+7.75/+2.25×15*	+6.25/+0.25×10
22	L	G	+++	3	6/12	6/24*	plano/+2.50×40	-2.25/+1.00×180*
23	L	G	+	6	6/6	6/18 (a)*	plano	-3.00/+3.00×60*
24	R	G	+	2	6/12*	6/9	+4.00/+2.00×100*	+5.00
25	R	G	++	1	6/36 (a)*	6/9	-3.50/+2.5×40*	+0.25/+2.00×90
26	R/L	DF	++/+	5	6/18*	6/6*	+0.25*	plano*
27	L	DF	+	2	6/6	6/9*	plano	+0.75/+1.00×40*
28	L	G	++	-	6/6	6/36 (a)*	-0.5/+0.5×75	+6.75/+5.75×35*

* Affected eye.

of the children required a full thickness keratoplasty (case 25).

Results

Thirty one eyes of 28 children which had active herpetic keratitis were reviewed; 12 right and 19 left eyes were affected. In three children both eyes were involved.

In group I, there were 22 eyes with dendritic keratitis in 20 children (Table 2). Recurrence was recorded in nine children (45%), ranging from one to five recurrences with a mean of 0.38 recurrences per year per case. In this group at the time of the resolution, 16 achieved a visual acuity of 6/9 or better; five were 6/12; case 12 was 3/60 (Table 1). The non-affected eye of case 15 was amblyopic due to strabismus. Five eyes in this group were emmetropes, six were low hypermetropes; 11 (50%) had +0.75 to +4.50 astigmatism induced by the keratitis, six of them with the rule (cases 1, 9, 10, 12, 13, 14) and five of them against the rule (cases 2, 5R, 5L, 16, 17).

In group II, there were nine affected eyes in eight children (Table 3). Three eyes had disciform keratitis (cases 26R, 26L, 27); the other six had geographic ulcers. Seven children (87.5%) had recurrences, ranging from one to six, with a mean of 0.65 recurrences per year per case. Eight out of nine eyes (89%) had a reduction of vision. Seven (78%) were 6/18 or worse. Seven had +1.00 to +5.75 astigmatism. No significant astigmatism was noted in their fellow non-affected eyes. Five (71.5%) were against the rule astigmatism (cases 21, 22, 25, 27, 28); and two were with the rule astigmatism (cases 23, 24). The two affected eyes of case 26 with disciform keratitis had no astigmatism.

Discussion

There have been few studies on a small number of children with herpes simplex keratitis.^{5,6} This study on a larger group of children highlights their astigmatism, reduction of vision, and recurrence. It also shows a clear difference between children with typical dendritic keratitis and those with geographic ulcers or disciform keratitis. Group I, with dendritic ulcers had better visual acuity, less scarring, and lower recurrence rate. Induced astigmatism was noted in 11 eyes (50%) of this group. However, with proper spectacle correction of the astigmatism all improved to 6/9 or better, with the exception of three cases (cases 12, 15, 16) with amblyopia. In group II, children with geographic ulcers had noticeably worse vision, more recurrences, denser scars and

higher degree of astigmatism. This is due to a predominantly stromal involvement in this group. This might suggest that a different strain of HSV is involved.^{7,8,9} Reduced corrected vision was noticed in eight eyes, seven of them (78%) were 6/18 or worse. This is in contrast with 6% to 10% reduction of vision at the time of the resolution reported in other studies.^{4,10} Recurrence rate of 87% in the period of observation in group II was almost twice of that in group I. Amblyopia has been noted by others, studying small number of children with herpes simplex keratitis.^{5,6} At least 14 eyes (45%) in our study had reduced corrected vision. This was considered as amblyopia induced by astigmatism in group I, and a combination of astigmatic amblyopia and corneal scarring in group II.¹¹ Hence, spectacle correction of the astigmatism during and after the resolution of HSV keratitis would probably help preservation of the vision.

We have treated these children routinely with acyclovir because of its selectivity and fewer side effects.¹⁷ In spite of the resistance of some strains of HSV, we seldom used a different antiviral agent. Debridement was performed in three cases.¹² Our experience with systemic antiviral agents is limited, but they have been recommended in cases with deep stromal or intraocular involvement.⁹ Topical corticosteroid was used in cases with disciform keratitis.¹³ Systemic steroid was not administered. Penetrating keratoplasty is indicated in central opacifications obstructing the visual axis. However, because of the risks of reinfection, rejection, and induced astigmatism, particularly in younger children, the visual prognosis is poor.¹⁴ Penetrating keratoplasty was performed in one case without improvement of vision, probably because of amblyopia. In some cases, progression of the astigmatism up to 1 year after the resolution of the keratitis required several modifications in the spectacle correction.

Education of parents is important and they should be advised about the recurrences, importance of early attendance, and spectacle correction to prevent amblyopia. Parents should be encouraged to have an antiviral agent in their possession and, in the event of a recurrence, start the antiviral treatment immediately and before seeing an ophthalmologist urgently.

As shown in our study, children with geographic ulcers have worse prognosis and need a more vigorous treatment. Seventeen (61%) of our children had induced astigmatism, 10 of them against the rule. Astigmatism in childhood is usually with the rule.¹⁵ Herpes simplex keratitis in children is a potentially serious sight threatening condition, in that it causes corneal scarring

and astigmatism. We conclude that regular check ups and repeated refractions are important, with proper spectacle correction and occlusion therapy when indicated.

- 1 Nahmias AJ, Hagler WS. Ocular manifestations of herpes simplex in the new born. *Int Ophthalmol Clin* 1972; 12: 191-213.
- 2 Laibson RP, Waring GO. Herpes simplex and viral infections. In: Harley RD, ed. *Pediatric ophthalmology*. Philadelphia: Saunders, 1983; 1: 435-7, 492-508.
- 3 Poirier RH. Herpetic ocular infections in childhood. *Arch Ophthalmol* 1980; 98: 704-6.
- 4 Wilhelmus KR, Coster DJ, Donovan HC, Falcon MG, Jones BR. Prognostic indicators of herpetic keratitis. *Arch Ophthalmol* 1981; 99: 1578-82.
- 5 Flanders HE. Herpes simplex keratitis and amblyopia. *Paediatr Ophthalmol Strabismus* 1987; 24: 94-6.
- 6 Beneish RG, Williams FR, Polomeno RC, Flanders ME. Herpes simplex keratitis and amblyopia. *J Pediatr Ophthalmol Strabismus* 1987; 24: 94-7.
- 7 Easty DL, Shimeld C, Claoue CMP, Mange M. Herpes simplex virus isolation in chronic stromal keratitis. *Curr Eye Res* 1987; 6: 69-74.
- 8 Hill TJ. Ocular pathogenicity of herpes simplex virus. *Curr Eye Res* 1987; 6: 1-7.
- 9 Liesegang TJ. Ocular herpes simplex infection. Pathogenesis and current therapy. *Mayo Clin Proc* 1988; 63: 1092-105.
- 10 Cobo M. Ocular herpes simplex infection. *Mayo Clin Proc* 1988; 63: 1154-6.
- 11 Von Noorden GK. Classification of amblyopia. *Am J Ophthalmol* 1967; 63: 238-44.
- 12 Coster DJ, Jones BR, Falcon MG. Role of debridement in the treatment of herpetic keratitis. *Trans Ophthalmol Soc UK* 1977; 97: 313-7.
- 13 Power B, Hillery M, Benedict-Smith A, Collum L. Double-blind controlled trial of acyclovir combined with steroid or placebo in the treatment of first episode disciform keratitis in patients who never had previous steroid treatment. *Br J Ophthalmol* 1992; 76: 711-3.
- 14 Cobo LM, Coster DJ, Rice NSC, Jones BR. Prognosis and management of corneal transplantation for herpetic keratitis. *Arch Ophthalmol* 1980; 98: 1755-9.
- 15 Dobson V, Fulton AB, Lawson Sebris S. Cycloplegic refractions of infants and young children: the axis of astigmatism. *Invest Ophthalmol Vis Sci* 1984; 25: 83-7.