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Blindness and ocular posterior segment involvement in the acute phase of Kawasaki disease: a mini-review

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Abstract : Ocular involvement in the acute phase of Kawasaki disease typically involves the anterior segment of the eye, and its associated treatment outcomes are generally excellent. However, there are rare reports of posterior segment involvement, and these are associated with poorer outcomes. This study reviewed six patients with recently reported blindness and/or ocular posterior segment involvement in the acute phase of Kawasaki disease. The median age of these patients was 8.5 years old (range: 6–12 years old). The ocular symptoms were photophobia, reduction of vision, blindness, and ocular pain. Five patients exhibited optic disc involvement and three patients showed retinal vessel involvement. All patients received intravenous immunoglobulin therapy and two patients received systemic corticosteroid administration. The visual acuity outcomes of treatment were excellent in five of the patients. However, in one patient there was still no light perception in the affected eye at two months after the initial onset of the disease. This was associated with the possible obstruction of the ophthalmic artery due to vasculitis. Older children may have a higher associated risk of blindness and ocular posterior segment involvement in the acute phase of Kawasaki disease.

Keywords - *Kawasaki disease, Blindness, Ocular complications, Intravenous immunoglobulin therapy, Older children*

I. INTRODUCTION

Kawasaki disease is an acute systemic vasculitis of unknown cause that affects mainly infants and children [1]. Coronary artery lesions (CAL) are one of the most important complications of this disease. Ocular involvement in this disease is characterized by non-exudative conjunctivitis and anterior uveitis [2]. Posterior segment involvement is rare; however, recent studies have shown the involvement of the ocular posterior segment in the acute phase of Kawasaki disease [3, 5–8]. This study has reviewed six recent reports of patients associated with blindness and/or ocular posterior segment involvement in the acute phase of Kawasaki disease [3–8].

II. BLINDNESS

Recently, two separate case studies have reported two patients (one patient each) with blindness in the acute phase of Kawasaki disease (Table 1) [4, 5]. The patients in these two cases were similar in regards to their sex (both female), age (both were older children), no presence of associated CAL, and their eyes were affected unilaterally. Patient 1 had no apparent ocular posterior segment involvement, including the optic disc and retinal vessels. Conversely, patient 2's ocular involvement was associated with pale swollen optic disc and narrowing retinal arterioles. Thus, outcomes of visual acuity were different between these patients, with recovery of sight in the former and no recovery in the latter. The causes of blindness in the former case were considered to be the compression of the optic disc via increased intraocular pressure due to uveitis and possible subclinical optic perineuritis. In the latter case, the possible cause of temporary blindness was the acute obstruction of the ophthalmic artery due to vasculitis.

Cerebral infarction after high-dose intravenous immunoglobulin (IVIG) therapy is the rare complication in the acute phase of Kawasaki disease, and concomitant use of aspirin does not prevent this complication [9]. This was true in the possible acute obstruction of the ophthalmic artery due to vasculitis in patient 2 [5].

Patient 2 was a case report from Iran. Incidentally, another recent study from Iran showed three cases of peripheral gangrene in the acute phase of Kawasaki disease [10]. It seems that the reports regarding gangrene are fewer in Japan, despite more cases of Kawasaki disease being reported [10, 11]. Ethnic features of arteries in Kawasaki disease may be one of the contributing factors in peripheral artery obstruction.

Table 1. Patients with blindness in the acute phase of Kawasaki disease [4, 5]

	Patient 1	Patient 2
Sex	Female	Female
Age	12 y.o.	9 y.o.
Major signs	4	6
CAL	None	None
Onset of blindness	12 di	7 di
Eye with blindness	Right	Right
Ocular complications	Hyperremia of conj bulbi	Hyperremia of conj bulbi
	Uveitis	Uveitis
	Increased intraocular pressure	Diffuse intense retinal whitening
	Possible optic perineuritis	Narrowing retinal arterioles
		Pale swollen optic disc
		Possible acute obstruction of the ophthalmic artery due to vasculitis
Therapy	IVIG (5+9 di)	IVIG (6 di)
	ASA (6 di–7 di)	ASA (6 di–)
	Flurbiprofen (7 di–)	Steroid (7 di–)
	Topical ß-blocker	
	Topical steroid	
Outcome of visual acuity	Recovery	No recovery
	(3 months later)	(2 months later)

y.o.: years old, Major signs: major signs of Kawasaki disease, CAL: coronary artery lesions, IVIG: intravenous immunoglobulin therapy, ASA: aspirin, di: day of illness.
The author has already received the permission to quote this table from reference [4].

III. OCULAR POSTERIOR SEGMENT INVOLVEMENT

The studies reviewed here described five patients with ocular posterior segment involvement in the acute phase of Kawasaki disease (Table 2) [3, 5–8]. All of these patients were older children in terms of age of disease onset. Difficulties in detecting ocular symptoms in younger children compared to older children may lead to more case reporting in older age groups; however, a study regarding the findings of eye fundus in the acute phase of Kawasaki disease showed that eye fundus of older children was more severe than those of the younger children [12]. Older children with ocular symptoms should be evaluated by ophthalmologist in the acute phase of Kawasaki disease due to possible posterior segment involvement.

The most frequent ocular symptom was photophobia. Ocular symptoms had developed, on median, by day 7 (range, 3–22 days) among the five patients included in this review. Optic disc involvement was seen in all patients; four of these patients (patient 2, 3, 4, and 6) also exhibited optic disc swelling, and patient five suffered a peri-optic disc edema. Three of five patients had retinal vessel involvement, with narrowing of the retinal arterioles and distortion of the retinal vessels [3, 5, 8].

All patients received IVIG therapy and two patients received systemic steroid administration. Patient 3, who presented with severe global inflammatory involvement of ocular segments and optic disc swelling, received rescue therapy using 1 mg/kg/day of oral prednisone [6]. Ocular complications resolved after IVIG therapy and aspirin administration in two patients (patients 4 and 6).

Visual acuity outcomes were excellent in four out of five patients (patients 3 to 6). However, in one patient (patient 2) there was no recovery of visual acuity at 2 months after disease onset [5].

Table 2. Patients with posterior segmental ocular complications in the acute phase of Kawasaki disease [3, 5–8]

Patient No	2	3	4	5	6
Sex	Female	Female	Female	Female	Male
Age	9 y.o.	12 y.o.	8 y.o.	6 y.o.	7 y.o.
Major signs	6	5	5	5	6
CAL	None	TD of RCA	None	NM	None
Ocular symptoms	Blindness	Photophobia	Photophobia	RV	Photophobia
(di)	(7 di)	Ocular pain	RV	(after 22 di)	(7 di)
		RV	(3 di)		
		(5 di)			
Post seg					
Retinal vessels	Involved	Not involved	Involved	NM	Involved
Optic disc	Involved	Involved	Involved	Involved	Involved
Therapy	IVIG	IVIG	IVIG	IVIG	IVIG
	ASA	ASA	ASA	Vitamin B_{12}	ASA
	Steroid	Steroid		Topical steroid	
		Topical steroid			
Outcome of visual acuity	No recovery	Recovery	Recovery	Recovery	Recovery
	(2 m later)	(2 m later)	(3 m later)		(6 w later)

y.o.: years old, Major signs: major signs of Kawasaki disease, CAL: coronary artery lesions, TD of RCA: transient dilatation of right coronary artery, NM: not mentioned, RV: reduction of vision, di: day of illness, Post seg: ocular posterior segment, IVIG: intravenous immunoglobulin therapy, ASA: aspirin, m: months, w: weeks.

IV. IVIG THERAPY

The prevalence of CAL caused by Kawasaki disease is higher in older children compared to younger children [13]. A recent study showed that full dose IVIG infusion of 2 g/kg body weight/dose in older children may be safe and effective for suppressing CAL [14]. This review article showed that older children may have a higher incidence of blindness and/or ocular posterior segment involvement in the acute phase of Kawasaki disease, and that IVIG therapy might be beneficial for ocular involvements. The current standard of therapy during the acute phase of Kawasaki disease is 2 g/kg/dose IVIG therapy. A recent study regarding the patients who received this therapy showed that the prevalence of ophthalmologic complications including uveitis, papilledema, and conjunctival hemorrhage was 13.2 %, and that these complications were not present in the second ophthalmologic assessment 30 days later [15]. This study also suggested that full dose IVIG infusion of 2 g/kg body weight/dose was effective in older children for the treatment of ophthalmologic complications in the acute phase of Kawasaki disease.

On the other hand, a recent study presented the case of a 7-year-old girl on a course of crystalline-like keratopathy following IVIG therapy in the acute phase of Kawasaki disease [16]. Decreased vision and photophobia developed after six days after IVIG therapy. Slit-lamp examination revealed bilateral diffuse corneal punctate epitheliopathy and anterior stromal haze. Corneal epitheliopathy seemed like crystal deposits; this is unusual ocular finding in the acute phase of Kawasaki disease. Her unusual presentation with keratopathy may be associated with her previous course of IVIG therapy.

V. CONCLUSIONS

Older children may have a higher incidence of blindness and ocular posterior segment involvement in the acute phase of Kawasaki disease. Evaluation by an ophthalmologist is necessary for the patients with ocular symptoms during the acute phase of Kawasaki disease. Full dose IVIG infusion of 2 g/kg body weight/dose in older children may be effective for the treatment of ophthalmologic complications caused by Kawasaki disease.

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