·Clinical Research·

Vitrectomy for the treatment of posttraumatic endophthalmitis

Xiao Ma[1], Zao-Xia Liu[2], Yi-Fei Huang[1], Zhao-Hui Li[1]

[1] Department of Ophthalmology, General Hospital of Chinese PLA, Beijing 100853, China

[2] Eye Hospital of Jilin University, Changchun 130021, Jilin Province, China

Correspondence to: Xiao Ma. Department of Ophthalmology, General Hospital of Chinese PLA, Beijing 100853, China. mxia-010@163.com

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Abstract

• AIM: To evaluate the efficacy of vitrectomy in combination with intravitreal dexamethasone and vancomycin perfusion in the management of severe posttraumatic endophthalmitis.

• METHODS: Thirty eyes of 30 cases diagnosed as posttraumatic infectious endophthalmitis were analyzed retrospectively from April 2004 to April 2006. All the patients underwent vitrectomy in combination with intravitreal drugs perfusion and were followed up for 12 to 24 weeks. The visual acuity, traumatic causes and microorganisms culture were analyzed.

• RESULTS: There are significant reduction in inflammation at 3 months after surgery. Infectious symptoms were completely controlled in 97% of the cases (29/30). Final visual acuity were improved in 93% of cases (28/30). Among traumatic causes, foreign body is the most common cause (57%). Staphylococcus aureus is the commonest microorganism.

• CONCLUSION: Vitrectomy in combination with intravitreal dexamethasone and vancomycin perfusion is the most effective method in the treatment of severe posttraumatic endophthalmitis.

• KEYWORDS: posttraumatic endophthalmitis; vitrectomy; intravitreal drugs perfusion

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INTRODUCTION

Posttraumatic infectious endophthalmitis is a devastating complication of penetrating ocular trauma. The overall incidence estimated by large statistic data is approximately from 3.3% to 17%.In rural settings, the figure can approach 30%. Endophthalmitis following penetrating eye injures has a relatively poor prognosis because of the delayed diagnosis, infection by more virulent and resistant organism, and polymicrobial infections. Therefore, rapid diagnosis and treatment is essential.

To evaluate the efficacy of intravitreal dexamethasone co-administered with antibiotics along with complete vitrectomy in the management of severe posttraumatic endophthalmitis, We retrospectively analyzed 30 eyes diagnosed as posttraumatic infectious endophthalmitis between April 2004 to April 2006.

PATIENTS AND METHODS

Thirty patients with clinical diagnosis of severe posttraumatic endophthalmitis were included in this retrospective study. The clinical diagnosis criteria was made based on: 1. Definite history of penetrating ocular injury and 2. Development of bulbar conjunctiva congestion, hydropsia and hypopyon 3. Presence of vitritis or vitreous exudation and retinal red reflex can not be seen. A detailed history was recorded regarding the traumatic causes, circumstance and time of the injury; all patients underwent detailed clinical evaluation by slit-lamp biomicroscopy, ophthalmoscopy, X-ray and ultrasonography. (Baseline clinical characteristic of 30 patients in Table 1) .

All the patients were operated as quick as possible. A standard three port vitrectomy was done. Vitreous samples were collected in all cases before opening the infusion cannula so as to obtain an undiluted vitreous sample. Cataract extraction (lensectomy/lens fragmentation) or implantation of the intraocular lens (IOL) was done if considered an absolute necessity with prior informed consent. During vitrectomy, 24 cases were given intravitreal drugs perfusion in 500mL BSS, 4 cases with 5mg vancomycin (10mg/L) and 10mg dexamethasone (200mg/L), 8 cases with 4mg gentamycin (8mg/L), 12 cases with 5mg vancomycin.

Table 1 Baseline clinical characteristic of 30 eyes of 30 patients

Variable	Median(range) (%)
Age	30.1±12.3(7-54)a
Follow-up	4.4±1.1(3-6)mo
Sex	
Male	27(90)
Female	3 (10)
Causes of trauma	
Intraocular foreign body	17(57)
Needles	3(10)
Wooden sticks	2(7)
Iron wire	8(26)
Location of trauma	
Cornea	23(77)
Sclera	5(17)
Corneoscleral limbus	1(3)
Unclear traumatic location	1(3)
Lens status	
Clear lens	8(27)
Pseudophakic	1(3)
Focal lens capsule disruption	6(20)
Diffuse cataract	10(33)
Frank lens rupture	5(17)

Table 2 Visual acuity change after vitrectomy

Surgery	Visual acuity			
	No light	-0.02	-0.19	0.2-
Before	5	21	1	3
After	1	12	8	9

Undiluted vitreous specimen and the cassette fluid used in the surgery were transported to the microbiology laboratory for bacterial , fungal culture and sensitivity test. Gram staining was performed in all cases.

Postoperatively, all the patients except 1 diabetes mellitus were continued on intravenous antibiotics and intravenous steroids for 7 days. Each patient received topical antibiotics and topical steroids 4 times per days.

The patients were followed up from 12 to 24 weeks after surgery.

Three cases with retained intraocular foreign body, the fibrous adhesions around the foreign body were released and the foreign body were removed. 11 cases developed retinal detachment, 4 cases with silicon oil and 5 cases with 200mL/L C_3F_8 gas endotamponade. 2 cases with retinal necrosis were given silicon oil endotamponded. Silicone oil was removed 12 weeks after surgery. Data were analyzed using χ^2 test and the Fisher's exact test.

RESULTS

Patients were assessed 48 hours later. All patients showed evidence of improvement in media clarity and visual acuity. Infectious symptoms were completely controlled in 97% of cases (29/30). Final visual acuity were improved in 93% of cases (28/30). The postoperative visual acuity was better than the preoperative visual acuity. (χ^2=73.57, P <0.005, Table 2).

In our study, intraocular foreign body is the most common cause and accounted for 57% of all cases (17/30). 70% of the cases (21/30) were found to have associated lens injuries such as focal lens capsule disruption, diffuse cataract and frank lens rupture.

Microorganisms culture was positive in 23% of the cases (7/30). The commonest microorganism isolated was Staphylococcus aureus and is found in 57% of the cases (4/7). Other microorganisms cultured including Acinetobacter baumannii (1 case), Listeria seeligeri (1 case), Nocardia(1 case). All gram-positive isolates demonstrated susceptibility to vancomycin.

DISCUSSION

Endophthalmitis is an important cause of visual loss following open globe injuries. It is well known that vitrectomy with introvitreal drugs is the most effective management[1]. In our study, all patients underwent compelet vitrectomy and 43% of patients (13/30) got a useful visual outcome(≥20/400 0.05). It is possible that complete vitrectomy helps in preventing the inflammatory chorioretinal damage by more extensive clearance of the microbiological load from the vitreous cavity. Complete vitrectomy with vitreous base excison helps in preventing fibrous proliferation and tractional retinal detachment. Complete vitrectomy helps the drugs diffusion in the vitreous cavity. In our study, all the patients underwent lens extraction wherever the lens was injured or clear. We consider that lens extraction is necessary in severe posttraumatic endophthalmitis because extracting lens will help to increase the operation field. In addition, lensectomy can accelerate the associated toxins and inflammatory substances removing from eye through trabecular meshwork [2]. Our results suggest that silicone oil is preferable to intraocular gas tamponade since silicone oil is impenetrable to bacteria and could prevent reinfection. Silicone oil as an optically clear medium will permits early visual rehabilitation of the patient and necessitates laser photocoagulation of any missed breaks in the postoperative period. In our study, 6 cases were chosen to use tampond silicone oil because of severe endophthalmitis and the inflammation was well controlled after operation. Since our sample is relatively small , a randomized controlled study is needed to evaluate the role of silicone oil endotamponade on the visual outcomes in eyes undergoing complete vitrectomy for posttraumatic endophthalmitis.

It is believed that concurrent administration of

corticosteroids and antibiotics is necessary for bacterial endophthalmitis. Because even if the intraocular spaces are sterilised with appropriate antibiotic(s), a significant amount of bacterial debris and potentially toxic products remain to contribute to virulence of intraocular infection [3]. It is also being speculated that treatment of Gram negative endophthalmitis with antibiotics alone can result in release of inflammatory endotoxin. Hence, the treatment of bacterial endophthalmitis should be simultaneously directed to control of both infection and inflammation. Intravitreal perfusion of dexamethasone is a safe and effective route without the complications of systemic corticosteroid therapy. Since the maximum inflammatory damage to the eye in bacterial endophthalmitis occurs in the first few days [4], intravitreal dexamethasone is useful and could be the sole route of administration in patients when oral corticosteroids are contraindicated for medical reasons. Many experiments found that the use of intravitreal dexamethasone (400mg) had no potential retinal toxicity. In our study, we added 10mg dexamethasone in 500mL BSS and no side effect was found.

Posttraumatic endophthalmitis often has a mixed infection. Now, Vancomycin combined with ceftazidime are the most common antibiotics used in endophthalmitis. Vancomycin provides the broadest spectrum of coverage against the common gram-positive pathogens. Ceftazidime and Amikacin is sensitive to nearly all of the gram-negative bacteria. However, Amikacin have potential retinal toxicity [5]. Vancomycin, ceftazidime, and dexamethasone are physically incompatible and, if mixed in the same syringe, may produce precipitate [6]. So we object to using ceftazidime or Amikacin combination with vancomycin for the treatment of endophthalmitis at the same time.

Microorganisms were isolated in 23% of all the cases (7/30). This is lower than the results of earlier studies. Broad spectrum antibiotics used in most of the patients before operation may contribute to this result. In our study, Staphylococcus aureus, which is sensitive to vancomycin, is the commonest microorganism.

Effective treatment of infectious endophthalmitis depends on early recognition. Once the possibility of infectious endophthalmitis is considered, we should obtain intraocular biopsy specimen promptly. Risk factors associated with posttraumatic endophthalmitis are lens disruption, the presence of an intraocular foreign body, a plant- or soil-related injury, injury in a rural environment, delayed primary repair, and penetration with an obviously contaminated missile or device. We should give intravenous antibiotics and corticosteroids to such high risk patients. Because of the lack of a randomized clinical evaluation, the use of intravitreal injection in prevention of endophthalmitis remains controversial.

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