

Clinical Evaluation of Endophthalmitis in Patients referred to Khatam al-Anbia Hospital

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ABSTRACT

Background: The clinical symptoms, causative causes, microbiological results and vision of patients with endophthalmitis referred to Khatam al-Anbia hospital in Mashhad were investigated in this study.

Methods: In a cross-sectional descriptive study, all data of patients with definitive diagnosis of infectious endophthalmitis in the Infection Control Committee of Khatam al-Anbia hospital were recorded from January 2016 to June 2016. The findings were analyzed using SPSS version 22.

Results: At present study, 182 patients with endophthalmitis were studied, of which 60 (33%) were male and 122 (67%) were female. There was significant difference between the two groups (men and women) in terms of the type of endophthalmitis ($p < 0.05$). Eighty eight patients (78.6%) had no endophthalmitis related risk factors and 16 patients (14.3%) had the MGD symptoms.

The most common type of infection in endogenous endophthalmitis was urinary tract infection with frequency of 4 cases (11.8%) followed by pneumonia and sepsis with frequency of 3 cases (8.8%). The vitreous smear results revealed that 58 patients (35.6%) had gram-positive cocci. The highest number of gram-positive cocci was in the postoperative group, and the lowest number was in the bleb group, although no significant difference was seen between the two groups in terms of gram-positive cocci ($P > 0.05$). Fourteen patients (8.6%) had *Staphylococcus epidermis* and vitreous culture of *Staphylococcus aureus* was seen in eight patients (4.9%).

Conclusion: The most common cause of endophthalmitis in the current study was surgery.

Keywords: Endophthalmitis; Microbial culture; Causative agents

INTRODUCTION

Endophthalmitis is a serious intraocular inflammatory disorder in eye [1-8]. It is a main complication of open globe injury [9-12]. Visual outcomes after endophthalmitis depend on early diagnosis, acute or chronic, and appropriate treatment methods [13]. If endophthalmitis occurs in the first 6 weeks, it is considered as acute endophthalmitis. Clinical findings in acute endophthalmitis include redness of the eyes, eyelid inflammation, decreased vision, impaired pupillary reflex, corneal infiltration, fibrin reaction in the anterior chamber, and vitreous inflammation.

The predominance cause of post cataract surgery endophthalmitis in Western countries is bacteria, whereas fungal

etiology may be more prevalent at least in the developing countries [14]. Endophthalmitis may be divided into various categories, including acute post-cataract, chronic post-cataract, post-injection, bleb-related endophthalmitis, post-traumatic endophthalmitis, endogenous bacterial, candida endophthalmitis, and mould endophthalmitis [15]. Most of these cases are exogenous and happen after penetrating ocular trauma, eye surgery, or an extension of corneal infection. In addition, the most common endophthalmitis is due to cataract surgery (0.1%-0.4%). This incidence after cataract surgery by extra capsular method and phacoemulsification methods is between 0.7%-0.12% which usually occurs within 6 weeks after cataract surgery. The factors of endogenous endophthalmitis are blood infections, sepsis, emboli, immunodeficiency, orbital

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abscesses, and sinusitis. Immediate treatment with intravitreal antibiotics with or without vitrectomy can eliminate the risk of blindness and systemic antibacterial treatment is initiated after blood cultures.

The complications and challenges of endophthalmitis and the high cost of treatment due to hospitalization of patients receiving systemic antibiotics and the possibility of the need for deep vitrectomy surgery indicate the importance of finding solutions to improve diagnosis and screening methods; therefore, due to importance of endophthalmitis as an ophthalmic emergency with life-threatening complications, and no comprehensive study in this regard in our country, the aim of this study was the clinical evaluation of endophthalmitis in patients referred to Khatam al-Anbia hospital, Mashhad, Iran

MATERIALS AND METHODS

This descriptive cross sectional study was conducted on patients with clinical diagnosis of infectious endophthalmitis who admitted in Khatam al-Anbia hospital from January to June 2016. Eye pain, decreased vision, presence of inflammatory cells, fibrin with or without hypopyon in the anterior chamber, presence of vitreous inflammation on B scan, gender, age, date of hospitalization, and discharge, history of previous illness, immunodeficiency problems, and cause of infection (trauma, endogenous) were extracted from medical records. The eye pain was assessed based on Verbal Rating Scale (VRS) scoring system. This scale was designed based on five-point scale, including 0=mild, 1=moderate, 3=severe. Eye conjunctival redness was divided into 3 groups, including no conjunctival redness, mild or moderate conjunctival redness, and severe moderate conjunctival. Cells in the anterior chamber, cells in the anterior vitreous, fibrin in the anterior chamber, hypopyon in the anterior chamber, corneal involvement as edema and infiltration, Marcus Gunn syndrome (swinging flashlight test) at the time of admission, B scan findings, smear result and vitreous culture, prescribed antibiotics, therapy and surgery types were recorded in the form.

Ethical consideration

The current study was approved by Ethical Committee of Mashhad University of Medical Sciences with number.

Statistical analysis

Data were entered to SPSS, version 22. *Chi square* test was used for analysis of data. P -value<0.05 was assumed significant.

RESULTS

The current study was conducted on 182 patients with mean age 54.56 ± 21 years old. Among them, 122 (67%) were men, and 60 (33 %) were women. Among these patients, 124 patients (68.13%) were inhabitants of town and 54 patients (29.67%)

were inhabitants of village. In addition, 4 patients (2.2%) were from foreign nationals; however, no significant relation was observed between these groups and the type of endophthalmitis ($p=0.21$). Frequency distribution of patients with endophthalmitis in terms of history of disease showed that the most frequency of disease was related to diabetes; and hypertension with frequency of 19 (10.4%), and 12 (6.6%), respectively. In addition, 95 patients (52.2%) did not have history of diseases.

The frequency distribution of eye disease in patients with endophthalmitis showed that the most frequency was related to diabetic retinopathy and glaucoma 24 (13.3%), and 14 (7.7%), respectively.

Among these patients, the most vision threatening condition (most traumas) was vitreous loss with frequency of 6 (5.3%). In addition, 101 patients (88.6%) did not have vision threatening condition.

In addition, mild, moderate, and severe eye pain was seen in 61 (3.1%), 96 (49.7 %), and 22 cases (11.4 %). The rest of patients did not have any pain. The highest and lowest pain (both) in patients with endophthalmitis was seen in postoperative group ($p>0.05$). The most frequency of eye redness was seen in postoperative group 60 (33 %).

The frequency distribution of patients in terms of the type of endophthalmitis demonstrated that traumatic, post-operative, endogenous, and bleb endophthalmitis were seen in 31 (17%), 109 (59.9%), 35 (19.2%), and 7 (3.8%) patients, respectively. The frequency distribution of patients in terms of the type of trauma showed that sharp trauma and blunt trauma were observed in 29 (93.5%), and 2 (6.5%) patients, respectively. The type of foreign object type demonstrated that metal, stone and wood were found in 14 (87.5%), 1 (6.3%), and 1 (6.3%) cases, respectively. In addition, foreign body and absence of a foreign body were seen in 16 (50%), and 16 (50%) patients, respectively.

In addition, among 192 patients, hypopyon was observed in 137 patients (71.4 %). The highest and lowest number of hypopyons in the anterior chamber were in post-operative and bleb groups with frequency of 109 (59.9%), and 7 cases (3.8%), respectively. The highest number of anterior vitreous cells was in the postoperative and bleb groups with frequency of 109 cases (59.9%), and 7 cases (3.8%), respectively.

Distribution of risk factors in patients with endophthalmitis after surgery showed that 88 patients (78.6%) did not have risk factors, whereas the most common risk factors in these patients was MGD with frequency of 16 cases (14.3%).

Distribution of surgery type in patients with endophthalmitis is shown in (Table 1).

Table 1: Distribution of surgery type in patients with endophthalmitis.

Surgery type	Frequency (%)
Phacoemulsification	63 (54.3)
Intravitreal injection of bevacizumab	20 (17.2)
Vitrectomy	5 (4.3)
Extracapsular cataract surgery	2 (1.7)
Trabeculectomy, and phacoemulsification	4 (3.4)
Corneal transplantation	2 (1.7)
Lensectomy	2 (1.7)
Intraocular Lens (IOL)	1 (0.9)
Artisan phakic intraocular lense	4 (3.4)
Secondary intraocular lense	1 (0.9)
Vitrectomy, intravitreal injection of bevacizumab, phacoemulsification	1 (0.9)
Phacoemulsification, deep sclerectomy, and Intravitreal injection of bevacizumab	1 (0.9)
Phacoemulsification, and vitrectomy	3 (2.6)
Vitrectomy, and intravitreal	2 (1.7)
Ahmed glaucoma valve implant	2 (1.7)
Trabeculectomy	3 (2.6)
Total	116 (100)

As shown in Table 1, Phacoemulsification was the most common type of surgery.

tract infection with frequency of 4 cases (11.8%), and then pneumonia and sepsis with frequency of 3 cases (8.8%).

As shown in Table 2, the most common type of infection in patients with endogenous enophthalmitis was related to urinary

Table 2: Distribution of infection in patients with endogenous endophthalmitis.

Distribution of infection	Frequency (%)
Absence of infection	15 (44.1)
Pneumonia	3 (8.8)
Diabetic foot ulcers	2 (5.9)
Urinary tract infection	4 (11.8)
Dialysis catheter	1 (2.9)
Sepsis	3 (8.8)
Septic Arthritis	1 (2.9)
Pacemaker infection	1 (2.9)

Sinusitis	2 (5.9)
Total	34 (100)

Table 3 shows the frequency distribution of ocular manifestations in B- scan of patients with endophthalmitis. According to Table 3, the most frequency of ocular manifestations were dot lesion, and mixed lesion with frequency of 135 (70.7%), and 29 (15.2%), respectively.

Table 3: The frequency distribution of ocular manifestations in B-scan of patients with endophthalmitis.

Ocular manifestations	Frequency (%)
Normal	6 (3.1)
Dot lesion	135 (70.7)
Membrane lesion	8 (4.2)
Mixed lesion	29 (15.2)
undone	13 (6.8)
Total	191 (100)

The frequency distribution of therapeutic intervention in patients with endophthalmitis is shown in Table 4.

Table 4: The frequency distribution of therapeutic intervention in patients with endophthalmitis.

Therapeutic intervention	Frequency (percent)
Oral medicine	12 (6.1)
Injectable antibiotics	46 (23.2)
Vitrectomy with silicone injection	58 (29.3)
Vitrectomy without silicone injection	51 (25.8)
Evisceration	11 (5.6)
Artificial cornea, and vitrectomy with silicone injection	1 (0.5)
Vitrectomy with silicone injection, and removal bag	2 (1)
Vitrectomy with bleb reconstruction and silicone injection	2 (1)
Vitrectomy with removal of intraocular objects and without silicone oil	4 (2)
Vitrectomy with removal of intraocular objects and silicone oil	11 (5.6)
Total	198 (100)

The frequency distribution of therapeutic intervention in patients with endophthalmitis showed that the most common therapeutic intervention was vitrectomy with silicone injection (25.8%).

The frequency distribution of vitreous smear results in patients with endophthalmitis is shown in Table 5.

Table 5: The frequency distribution of vitreous microbial culture results in patients with endophthalmitis.

Negative	38 (23.3)
Unknown	94 (57.7)
<i>Klebsiella</i>	1 (6 %)
<i>Staphylococcus aureus</i>	8 (4.9)
<i>Staphylococcus epidermidis</i>	14 (8.6)
<i>Streptococcus</i>	5 (3.1)
<i>Escherichia coli</i>	1 (6 %)
<i>Citobacter</i>	1 (6 %)
Other	1 (6 %)
Total	163 (100)

As demonstrated in Table 5, the most frequency of vitreous smear results was related to gram-positive cocci (35.6%). In addition, the highest number of gram-positive cocci was seen after surgery and the lowest number was observed in the bleb group, although no significant difference was seen between the two groups (p=0.23).

The frequency distribution of the findings of vitreous microbial culture in patients with endophthalmitis is shown in Table 6.

Table 6: The frequency distribution of patient’s vision with endophthalmitis at the time of visit and discharge.

Vision	Frequency (percent)	Frequency (percent)
	At the time of the visit	At the time of discharge
NLP	12 (6.9)	18 (10.1)
LP	7 (4)	3 (1.7)
Perceive light without understanding direction	4 (2.3)	1 (0.6)
Perceive light with understanding direction	31 (17.7)	27(15.1)
The motion of hand without realizing the direction	12 (6.9)	13 (7.3)
The motion of hand with realizing the direction	73 (41.7)	63 (35.2)
The counting of the fingers at a distance of half a meter and less	13 (7.4)	20 (11.2)
The counting of the fingers at a distance of 1 m	7 (4)	11 (6.1)
The counting of the fingers at a distance of 1.5 m	5 (2.9)	5 (2.8)
The counting of the fingers at a distance of 2 m	3 (1.7)	5 (2.8)
No evaluation	7 (4)	8 (4.5)
The counting of the fingers at a distance of 3 m	1 (0.6)	5 (2.8)
Total	175 (100)	179 (100)

LP: Light Perception

As demonstrated in Table 6, among bacteria, the most frequency of vitreous microbial culture results was due to *Staphylococcus epidermis's* (8.6%). In addition, the findings showed that the highest and lowest frequency of vitreous microbial culture was seen in postoperative and bleb groups with frequency of 99 (63.9%), and 7 cases (4.5%), respectively ($p=0.475$). Moreover, the frequency distribution of culture results in patients with endogenous endophthalmitis

demonstrated that *staphylococcus aurous* was observed in 3 patients (9.7%).

The frequency distribution of vision of patients with endophthalmitis at the time of visit and discharge is shown in Table 7.

Table 7: The frequency distribution of vitreous smear results in patients with endophthalmitis.

Vitreous smear result	Frequency (percent)
Gram-positive cocci	58 (35.6)
Gram-positive bacilli	1 (0.6)
Gram-negative bacilli	6 (3.7)
Fungus causes	1 (0.6)
Negative	32 (19.6)
No evaluation	59 (36.2)
Gram positive cocci and gram negative bacilli	6 (3.7)
Total	163 (100)

As shown in Table 7, the most frequency of vision in patients with endophthalmitis was related to the motion of hand with realizing the direction.

The mean vision at the time of discharge in traumatic and bleb groups was 3.4333 ± 1.5 , and 2.9750 ± 0.9 , respectively ($p=0.573$).

DISCUSSION

Endophthalmitis is a severe inflammation of the eye caused by infectious factors such as bacteria, fungi, parasites, or other rare conditions. This condition can lead to vision loss. The most common causes of endophthalmitis are penetrating eye injury, intraocular surgery such as cataract surgery, filtering surgery, and a source of endogenous infection (the pathogens of other parts of body spread to eye). The patient's clinical symptoms, severity of the disease, type of microorganisms, type of treatment and therapeutic outcomes vary in each of the causes of endophthalmitis.

In the present study, 182 patients with endophthalmitis were studied, of which 60 (33%) were male and 122 (67%) were female. The frequency of gender in terms of the type of endophthalmitis was significant. The highest frequency of women in the endophthalmitis group after surgery was 41 cases (68.3%) and the lowest frequency in the bleb group was 0 cases (0%).

The highest frequency of men in the endophthalmitis group after surgery was 68 cases (55.7%) and the lowest frequency in the bleb group was 5 cases (5.7%). The mean age of the subjects was 54.56 ± 21 years old (the minimum, and maximum age was 1, and 88 years). Assessed 1593 patients with endophthalmitis over a 12 year's period and observed that trauma, endogenous endophthalmitis, ophthalmic surgery, and corneal ulcer with perforation were seen in 82.6%, 7.8%, 6.9%, and 2.7 % of patients, whereas in our study, the highest type of endophthalmitis was related to post-operative surgery and endogenous endophthalmitis with frequency of 109 cases (59.9%), and 35 cases (19.2%), respectively. The most common microorganisms were gram-positive organisms. In this regard, 66.7% of cases were related to trauma, 92% of cases to eye surgery, 44.8% of cases to endogenous endophthalmitis, and 60% of cases to corneal ulcer. In addition, the most number of gram-positive cocci was seen after surgery and the lowest number was observed in the bleb group. However, there was no significant difference between the two groups in terms of gram-positive cocci. *Staphylococcus epidermis* and vitreous culture of *staphylococcus aureus* were seen in 14 (8.6%), and 8 patients (4.9%), respectively.

A retrospective study was conducted regarding the incidence of endophthalmitis over a 13 year's period in Germany and observed that endogenous endophthalmitis was seen in 41% of cases, while cases of endophthalmitis following penetrating ocular trauma was seen in 12% of cases. But in our study, endogenous endophthalmitis and endophthalmitis following penetrating

ocular trauma were seen in 35 (19.2%), and 31 cases (17%), respectively [16,17].

A retrospective study in India showed that endogenous endophthalmitis, and penetrating eye injury were seen in 16.8 %, and 40.2 % of patients, respectively [18], while in our study, the most common endophthalmitis was observed after surgery with frequency of 109 cases (59.9%), and the most common cause was related to endogenous endophthalmitis with frequency of 35 cases (19.2%).

A retrospective study in Malaysia on endogenous endophthalmitis showed that 75% of patients had primary external ocular infection and the most common source of urinary tract infection was bacteremia with frequency of 17.5% [19].

The results of this study was consistent with our study, because in this study the most common source of endogenous endophthalmitis infection was related to urinary tract infection, pneumonia and sepsis with frequency of 4 cases (11.8%), 3 cases (8.8%), and 3 cases (8.8%), respectively.

A study was conducted on post-cataract surgery endophthalmitis in Iran and revealed that the incidence post-operative endophthalmitis was 0.02%-0.1%. The most common pathogens were coagulase-negative staphylococci, *Staphylococcus aureus*, and streptococcus. The most common risk factors were old age, male gender, diabetes mellitus, living in rural areas, extra capsular cataract surgery, and vitreous loss during surgery, and not taking antibiotics in the anterior chamber.

CONCLUSION

The most frequency of patients with endophthalmitis was due to diabetic retinopathy and then glaucoma. Moreover, the most common type of surgery was phacoemulsification, and bevacizumab (IVB). Eighty eight patients (78.6%) had no risk factors for endophthalmitis and 16 patients (14.3%) had MGD symptoms. The most common type of infection in endogenous enophthalmitis is related to urinary tract infection, pneumonia and sepsis with frequency of 4 cases (11.8%), 3 cases (8.8%), and 3 cases (8.8%), respectively. The vitreous smear results revealed that gram-positive cocci were seen in 58 patients (35.6%).

The highest gram-positive cocci were seen in postoperative group, and the lowest number was seen in the bleb group, although no significant difference was seen between these groups. Furthermore, *Staphylococcus epidermis*, and vitreous culture of *Staphylococcus aureus* were seen in 14 (8.6%), and 8 patients (4.9%), respectively.

The highest frequency of vitreous culture was seen in postoperative group (63.9%) and the lowest number was seen in the bleb group (4.5%), although no significant difference was seen between them. *Staphylococcus aureus* was observed in blood culture of 3 patients (9.7%). On the other hand, *Staphylococcus aureus* was observed in microbial cultures of 3 patients (18.8%) with endogenous endophthalmitis. Intraocular infection can have irreversible consequences and always affect the patient's quality of life. Therefore, the finding of causes, controlling and treating of the disease are very important.

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