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ANALYSIS OF TREATMENT RESULTS OF ENDOPHTHALMITIS PATIENTS ACCORDING TO THE DATA FROM THE CITY OPHTHALMOLOGY CENTER AT THE FOR 2014-2015

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✧ ***Aim.*** To estimate development terms, visual functions upon hospital admission and discharge, and medical and surgical treatment results of different types of endophthalmitis. ***Materials and methods.*** Data of 40 patients who received treatment for postoperative, endogenous, and posttraumatic endophthalmitis were studied. The mean age of patients was 61 years. ***Results and discussion.*** Patients with postoperative endophthalmitis have higher baseline visual acuity, and emergency vitrectomy is a method of choice. Patients with endogenous severe endophthalmitis need enucleation more often. Intravitreal antibiotic injection does not always cause an improvement in endophthalmitis, but could be used as an adjunct to systemic therapy or as a measure in anticipation of vitrectomy.

✧ ***Keywords:*** Endophthalmitis; post-surgery; endogenous; posttraumatic; conservative; medical and surgical treatment.

АНАЛИЗ РЕЗУЛЬТАТОВ ЛЕЧЕНИЯ ПАЦИЕНТОВ С ЭНДОФТАЛЬМИТОМ ПО ДАННЫМ ГОРОДСКОГО ОФТАЛЬМОЛОГИЧЕСКОГО ЦЕНТРА ПРИ ГМПБ № 2 ЗА 2014–2015 ГОДЫ

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✧ ***Цель работы:*** оценить сроки развития, зрительные функции при поступлении и при выписке, результаты консервативного и хирургического лечения эндофтальмита различного генеза. ***Материалы и методы.*** Исследованы 40 пациентов, получавших лечение по поводу послеоперационного, эндогенного, посттравматического эндофтальмита. Средний возраст пациентов — 61 год. ***Результаты и обсуждение.*** Пациенты с послеоперационным эндофтальмитом имеют более высокую исходную остроту зрения, и выполнение неотложной витрэктомии является методом выбора. Пациентам с тяжёлым эндогенным эндофтальмитом чаще требуется выполнение энуклеации. Интравитреальное введение антибиотика при эндофтальмите далеко не всегда приводит к улучшению, но может применяться как дополнение к общей терапии или как мера в ожидании пациентом витрэктомии.

✧ ***Ключевые слова:*** эндофтальмит; послеоперационный; эндогенный; посттравматический; консервативно и хирургическое лечение; витрэктомия.

BACKGROUND

Endophthalmitis remains one of the most dangerous postoperative and post-traumatic complications. Eyeball injuries cause bacterial endophthalmitis in approximately 20% of cases. According to Brinton et al., endophthalmitis develops in 7.4% of patients with penetrating eye injuries, and the presence of an intraocular foreign body doubles the risk of purulent infection [1, 2]. During wartime, gunshot wounds of the eye are complicated by endophthalmitis in 4.2% of cases [3]. In accordance with the report of The European Society of Cataract and Refractive Surgeons (2013), the frequency of endophthalmitis after cataract surgery is between 0.039% and 0.59%. The risk of postoperative endophthalmitis is 6-fold in corneal tunnel incisions than that in scleral tunnel incisions; surgical complications show a 5-fold increase in this risk. Patients with silicone intraocular lenses (IOL) are 3 times more likely to develop endophthalmitis compared to those with acrylic IOLs [4]. Rapid technological advances in surgery and surgical quality do not eliminate the possibility of endophthalmitis development.

Endogenous endophthalmitis is a relatively rare event; its predisposing factors include immunodeficiency, diabetes mellitus (DM), chronic renal failure, and recreational drug use [7]. The mechanism is associated with the hematogenous spread of bacterial pathogens from remote inflammation sites (in patients with furuncles, abscesses, phlegmon, sinusitis, tonsillitis, pneumonia, osteomyelitis, sepsis, meningitis, bacterial endocarditis, and other conditions) to the capillaries of the iris and ciliary body.

The Endophthalmitis Vitrectomy Study (EVS) (1995) recommends vitrectomy only in patients with visual acuity at the level of light perception. However, an analysis of more recent studies using the latest techniques for vitreoretinal surgery demonstrated improved functional results of vitrectomy in patients with postoperative endophthalmitis, including those with visual acuity higher than light perception (the latest result is 91% with final visual acuity of ≥20/40 compared to 53% in the EVS study) [5, 6].

AIM

In the present study, we aimed to assess the timing of endophthalmitis development, visual function upon hospital admission and discharge, and the results of conservative and surgical treatment of endophthalmitis in patients admitted to the City Centre of Ophthalmology at the Saint Petersburg City Multifunctional Hospital No. 2, during 2014–2015. This hospital is a leading health care institution that receives patients emergency.

MATERIALS AND METHODS

The study was conducted at the Department of Eye Microsurgery of the Saint Petersburg City Multifunctional Hospital No. 2. This department provides specialized medical care to patients with vitreoretinal diseases and eye injuries. Forty patients (19 males and 21 females) diagnosed with endophthalmitis and admitted as an emergency were treated in the department during 2014–2015. Patient ages varied between 21 and 86 years; mean age was 61 years. Surgery was performed using the Alcon CONSTELLATION® Vision System (Alcon, USA) and Lumera I surgical microscope (Carl Zeiss).

RESULTS AND DISCUSSION

Patients were divided into three groups depending on the type of endophthalmitis: postoperative, post-traumatic, and endogenous (Table 1).

Thus, postoperative endophthalmitis, endogenous endophthalmitis, and post-traumatic endophthalmitis were observed in 60% ($n = 24$), 27.5% ($n = 11$), and 12.5% ($n = 5$) participants, respectively. The majority of patients with postoperative endophthalmitis were aged >60 years; endogenous endophthalmitis was more frequent among patients aged 40–60 years; post-traumatic endophthalmitis was observed equally in participants aged 20–40 years and 40–60 years (2 cases in each group), whereas only 1 patient >60 years had post-traumatic endophthalmitis.

Postoperative endophthalmitis. This group included patients who had at least 1 open eye surgery

Table 1

Distribution of patients according to endophthalmitis etiology and age

Таблица 1

Распределение пациентов по этиологии эндофтальмита и по возрасту

Endophthalmitis/age	20–40 years	41–60 years	> 60 years	Total
Postoperative	0	5	19	24
Endogenous	2	7	2	11
Post-traumatic	2	2	1	5
Total	4	14	22	40

and developed endophthalmitis in the early or remote postoperative period. As a rule, patients in this group had no comorbidities or controlled ones. Nine of 24 patients with postoperative endophthalmitis were operated in the Saint Petersburg City Multifunctional Hospital No. 2, and the remaining 15 were operated in other hospitals.

Table 2 shows the distribution of patients depending on the type of surgery and timing of endophthalmitis development. If a patient had >1 eye surgery, the last one was considered for the study. The majority of patients in this group were evaluated after cataract surgery (14/24). Most of them developed endophthalmitis in the early postoperative period (1 or 2 weeks post-surgery). Three of 14 participants had intraoperative posterior capsule rupture; in 2 anterior chamber IOL was implanted. Development of endophthalmitis was observed in 6 patients after IOP-lowering surgery; 4 in the late postoperative period in the eyes with end-stage glaucoma and 2 after placement of the Ahmed glaucoma valve. Notably, patients after vitreous surgery [vitrectomy, intravitreal injection of Lucentis (IVIL)] represented the minority in this group; however, they developed endophthalmitis earlier (2 days post-surgery).

Endogenous endophthalmitis. This group included patients who developed endophthalmitis as a result of uncompensated disease or condition associated with immunodeficiency. Most patients who had any eye surgeries in their history underwent them well in the past; therefore, these interventions were unlikely to induce intraocular infection. The majority of participants in this group (7/11) were patients with DM, and uveitis (which turned into endophthalmitis) occurred due to decompensated systemic disease or its complications (plantar phlegmon, osteomyelitis, and others). One patient had chronic hepatitis B and C, 1 had chronic pyelonephritis, and 1 had prostate cancer (after epicystostomy). A patient (aged 77 years) with chronic pyelonephritis and chronic renal failure was diagnosed with bilateral endophthalmitis. A significant proportion of patients were admitted to the hospital in poor systemic state. In addition to ophthalmologists, patients were treated by other health care specialists including endocrinologists, surgeons, and urologists. These patients required a variety of diagnostic procedures to clarify the diagnosis and administer appropriate treatment, which is possible in a multipurpose hospital. A patient (aged 44 years) had unilateral posterior uveitis that turned into endophthalmitis at completely normal health state, and we failed to identify the possible cause for its development.

Post-traumatic endophthalmitis was diagnosed in 5 patients; in 4 cases after penetrating eye injuries with an intraocular metallic foreign body, and 1 patient received a blunt trauma of the eyeball with a corneoscleral rupture and prolapse of the internal ocular tunics and IOL.

Endophthalmitis treatment. A patient with endophthalmitis requires rapid diagnostic and therapeutic measures immediately after hospital admission. Treatment of such patients is a challenge because the physician has to consider various factors: baseline functions, condition of the optical system, possibility to perform ophthalmoscopy, B-scan data, rate of infection development, and general state of the patient. Assessment of these parameters is extremely important for the surgeon to decide between urgent surgery (vitrectomy, enucleation) and conservative

Table 2

Distribution of patients depending on the type of surgery and timing of endophthalmitis development

Таблица 2

Распределение пациентов по виду вмешательства и срокам развития эндофтальмита

Surgery/timing of endophthalmitis development	< 7 days	7–14 days	2 weeks–1 month	1–3 months	> 3 months	Total
PEC + IOL (ECCE + IOL)	5	4	0	2	3	14
IOP-lowering surgery (STE + PTS, Ahmed glaucoma valve implantation)	0	1	0	1	4	6
Vitrectomy for ERM	1	0	0	0	0	1
Extrascleral filling (with a puncture)	0	1	0	0	0	1
Keratoplasty	0	0	0	1	0	1
IVIL	1	0	0	0	0	1
Total	7	6	0	4	7	24

Note: PEC, phacoemulsification; IOL, intraocular lens; ECCE, extracapsular cataract extraction: STE, sinus trabeculectomy; PTS, posterior trephination of the sclera; ERM, epiretinal membrane; IVIL, intravitreal injection of Lucentis

antibacterial and anti-inflammatory therapy. If an urgent high-tech surgery (vitrectomy) is required, the surgeon has to have the necessary equipment and perform the intervention with the support of an experienced anesthesiologist.

The main methods of treatment for postoperative, endogenous, and post-traumatic endophthalmitis are shown in Table 3. The majority of patients with postoperative endophthalmitis underwent vitrectomy, which ensured subsequent positive dynamics. The surgery was performed within 24 hours after admission to the hospital. All patients received local and systemic antibacterial and anti-inflammatory treatment pre- and post-surgery. Twelve of 20 patients who underwent vitrectomy received an intravitreal antibiotic injection (usually 1 mg vancomycin).

Four patients with endogenous endophthalmitis were on conservative treatment; 2 of them received intravitreal antibiotic injection at early stages. We had to perform enucleation in 5 of 11 patients due to the absence of any perspectives for organ preserving treatment. Most of these patients were admitted to the hospital with clouding or purulent melting of the cornea and absence of light perception.

Patients with post-traumatic endophthalmitis underwent vitrectomy and enucleation (depending on the eye condition and prognosis) equally often; 1 patient received conservative treatment.

Tables 4 and 5 show visual acuity of patients with different types of endophthalmitis upon admission to the hospital and after treatment (upon discharge), respectively.

The majority of patients with postoperative endophthalmitis had higher visual acuity upon hospital admission compared to those with endogenous endophthalmitis. The absence of light perception is typical of endogenous endophthalmitis; patients in this group more frequently required enucleation. Patients with post-traumatic endophthalmitis were admitted to the hospital with both no light perception visual acuity (1 patient) and light perception with or without correct light projection (4 patients).

Table 5 demonstrates visual acuity of study participants depending on treatment strategy (vitrectomy or conservative treatment) regardless of the type of endophthalmitis. Our results suggest that patients post vitrectomy had higher visual acuity at discharge (from hand movements to 0.2) compared to patients who received antibacterial and anti-inflammatory therapy alone.

CONCLUSION

Patients with postoperative endophthalmitis have higher visual acuity upon admission compared to those with other types of endophthalmitis; urgent vitrectomy is the most effective treatment method.

Patients with endogenous endophthalmitis more frequently require enucleation due to poor health and initial condition of the eye.

Table 3

Main methods of endophthalmitis treatment

Таблица 3

Основные методы лечения эндофтальмита

Endophthalmitis	Postoperative	Endogenous	Post-traumatic	Total
Vitrectomy	20	2	2	24
Enucleation	1	5	2	8
Conservative treatment	3	4	1	8
Total	24	11	5	40

Table 4

Visual functions of patients with endophthalmitis upon admission to the hospital

Таблица 4

Зрительные функции пациентов с эндофтальмитом при поступлении в стационар

Endophthalmitis /visual function upon admission	0 (zero)	1/∞, pr. l. incerta	1/∞, pr. l. certa	Hand movements – 0.01	Total
Postoperative	1	6	8	9	24
Endogenous	6	2	2	1	11
Post-traumatic	1	2	2	0	5
Total	8	10	12	10	40

Table 5

Visual functions of patients with endophthalmitis upon discharge (8 patients out of 40, who underwent enucleation were excluded)

Таблица 5

Зрительные функции пациентов при выписке из стационара (не учтены 8 пациентов из 40, которым выполнена энуклеация)

Treatment/visual function upon discharge	0 (zero)	1/∞, pr. l. incerta	1/∞, pr. l. certa	Hand movements – 0.01	0.01–0.1	0.1–0.2	Total
Vitrectomy	1	3	4	7	5	1	21
Conservative treatment	2	2	1	4	2	0	11
Total	3	5	5	11	7	1	32

According to our data, an intravitreal antibiotic injection (vancomycin or amikacin) in patients with endophthalmitis does not always lead to improvement, but it could be used in addition to conservative therapy or while awaiting vitrectomy.

The treatment results of patients with post-traumatic endophthalmitis require further investigation owing to the small number of cases ($n = 5$).

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