Review Article

ENDOGENOUS ENDOPHTHALMITIS IN COVID-19 PATIENTS

Abstract:

Intrinsic endophthalmitis is indeed a behavior that causes eye disease that spreads into the bloodstream from a distant primary site. The intraocular disease caused by hematogenous microbial proliferation is known as indigenous endophthalmitis. Extrinsic and intrinsic endophthalmitis are the two types of endophthalmitis that exist. The presence of an external point of entry is linked to extrinsic endophthalmitis. Intrinsic endophthalmitis is a kind of septicaemia caused by a blood - borne infection. Endophthalmitis is a disease of all the inner coating of the eyeball except sclera and cornea, that is accompanied by substantial, increasing vitreous swelling. Endophthalmitis is a serious ocular crisis which can have serious visual and general consequences. An exterior injury of entrance, such as injury, operation, or an inflamed cornea, is the most prevalent route of entry for potential pathogens. Endophthalmitis has a complex aetiology, with a long list of pathogenic species and substantial regional heterogeneity. The treatment of endophthalmitis has evolved dramatically during the last century. Endophthalmitis induced by direct inoculation dissemination of pathogenic microbes is a rare occurrence that occurs most commonly in people who are sick or disadvantaged. Intravenous medication usage, diabetes mellitus, immunological impairment, cancer, prolonged hospitalization, or systemic antibiotic therapy have all been linked to a 0.04 percent incidence rate. Haden described metastatic endophthalmitis in a seriously sick patient with pneumococcal cerebro-spinal encephalopathy who was treated with intravenously anti-meningococcal serum in the 1918 volume of the Journal Ophthalmology. Endogenous endophthalmitis, unlike extrinsic endophthalmitis, need comprehensive systemic antibiotic treatment. In indigenous endophthalmitis, the illness originates not in the eye, but elsewhere in the body. As a result, it is necessary to obtain comprehensive cultures. Patients are sometimes unable to carry out their functions in society or household. As a result of which the person is unable to cope up financially and socially in his environment. Many social and influential factors are disturbed in their lives and the patients are often depressed. Cosmetically the surgeries are not satisfying. Artificial prosthetics can be used but they're seldom of minimum functional importance. Such interventions can be helpful for the patient. Focus should be made to deliberately save the patients and not just the cosmetic value of the surgery. Persons with chronic endophthalmitis had greater eye sight than people with symptomatic or subacute endophthalmitis. Improvements in eyesight was observed in individuals with persistent or subacute keratitis several months after the surgery more frequently than that in people with symptomatic endophthalmitis. Nevertheless, in 40 percent of the overall all instances with an abrupt start, there has been no improvements or even decrease of visual acuity

Keywords: Endogenous endophthalmitis, Covid 19, Ocular, Infections, Viral, Comorbidities

Introduction:

Endophthalmitis is a disease of all the inner coating of the eyeball except sclera and cornea, that is accompanied by substantial, increasing vitreous swelling.[2] Intrinsic endophthalmitis is indeed a behavior that causes eye disease that spreads into the bloodstream from a distant primary site. The intraocular disease caused by hematogenous microbial proliferation is known as indigenous endophthalmitis.[1] Extrinsic and intrinsic endophthalmitis are the two types of endophthalmitis that exist. The presence of an external point of entry is linked to extrinsic endophthalmitis. Intrinsic endophthalmitis is a kind of septicaemia caused by a blood - borne infection.[1] Endophthalmitis is a serious ocular crisis which can have serious visual and general consequences. An exterior injury of entrance, such as injury, operation, or an inflamed cornea, is the most prevalent route of entry for potential pathogens. Endophthalmitis has a complex aetiology, with a long list of pathogenic species and substantial regional heterogeneity.[2] The treatment of endophthalmitis has evolved dramatically during the last century. To much more successfully treat endophthalmitis and enhance visual outcomes, a better knowledge of the relationships between problematic organisms and the intraocular host immune response is required. While antibacterials and anti-inflammatory medications efficiently kill intraocular organisms and suppress the intraocular inflammatory process, clinical data demonstrates that these treatments have no impact on the pollutants or inflammatory mediators and enzymes that directly alter retinal function or architecture. As more knowledge on the natural course of various kinds of endophthalmitis becomes known, numerous phases in the treatment process will be taken.

History

The era which was before antibiotics, the largely therapeutic uses of systemic era, and the present intravitreal antibacterial era are the three endophthalmitis temporal periods that have existed historically. Endophthalmitis care from several etiologies is reviewed, including endogenous, bleb-associated, post-injection, post-cataract surgery, and other anterior segment related such as the post-penetrating keratoplasty, glaucoma drainage device-associated, and open globe injury-associated. Specific etiologies can help forecast one of the most prevalent microbiological causes and suggest treatment options. The treatment of endophthalmitis has evolved dramatically during the last century. Throughout most instances, contemporary care entails taking vitreous specimens, doing TAP or PPV, and injecting intravitreal antibiotics. Antimicrobials, intravitreal corticosteroids, and silicone and synthetic oil are all effective supplementary therapy. Even in today's medical environment, there is still a need for newer, better and efficient ways of combating endogenous endophthalmitis. Endophthalmitis induced by direct inoculation dissemination of pathogenic microbes is a rare occurrence that occurs most commonly in people who are sick or disadvantaged. Intravenous medication usage, diabetes mellitus, immunological impairment, cancer, prolonged hospitalization, or systemic antibiotic therapy have all been linked to a 0.04 percent incidence rate. Haden described metastatic endophthalmitis in a seriously sick patient with pneumococcal cerebro-spinal encephalopathy who was treated with intravenously anti-meningococcal serum in the 1918 volume of the Journal Ophthalmology.[3]

Epidemiology

Endophthalmitis induced by direct inoculation dissemination of pathogenic microbes is a rare occurrence that occurs most commonly in people who are sick or disadvantaged. Intravenous medication usage, diabetes mellitus, immunological impairment, cancer, prolonged hospitalization, or systemic antibiotic therapy have all been linked to a 0.04 percent incidence rate. Haden described metastatic endophthalmitis in a seriously sick patient with pneumococcal cerebro-spinal encephalopathy who was treated with intravenously anti-meningococcal serum in the 1918 volume of the Journal Ophthalmology. [3] The admission of microorganisms into the distal part of the eye as a consequence of hematogenous dissemination from a distant initial site of infection causes indigenous endophthalmitis. Endogenous endophthalmitis is uncommon, contributing somewhat just 2 to 8% of all instances of endophthalmitis.[4]

Morbidity

Intrinsic endophthalmitis is a disease of both the eyeballs caused by sepsis that occurs in 0.04–0.5percent of the overall septicaemia or fungemia. Injectable drug abuse (IVDA), hyperglycemia, sanctifying grace catheters, and immunological dysfunction are all major risk factors. Most individuals have bacteremia or fungemia that is widely suspected; nevertheless, culture yield has been observed to be minimal (approximately 50 percent). The goal of this research is to determine the output of clinical evaluations, including microbe, during a 6.5-year span at a US academic centre.Intrinsic endophthalmitis occurs when microorganisms pass across the blood-ocular natural barrier, defy the immune response, and multiply within in the eyeball. Ocular discomfort & vision problems are common symptoms; hypopyon, a cluster of leukocytes in the anterior chamber, may be seen on examination.In 8 individuals, perhaps the most prevalent recognised cause of infection included injectable drug taking (IVDA) (22.9 percent). The study showed that the majority of instances with just this related risk factor increased with time, with 0 cases in 2011, 2012, and 2013, 1 in 2014 and 2015, 2 in 2016, and 4 in 2017. Hyperglycemia was perhaps the most prevalent complication detected in this sample, affecting 16 individuals (45.7 percent).

Etiology

Endophthalmitis has a complex aetiology, with a long list of pathogenic species and substantial regional heterogeneity. In the industrial nations, both fungal and microbial pathogens have been identified as probable endophthalmitis agents in the journals. Gram-positive organisms also including Streptococci and Staphylococci predominate infection in the industrialised world, but gram-negative organisms are more frequent among South Asians. Aspergillus have indeed been identified as the causal microorganisms in Asian research. Recent hospitalisation, uncontrollable hypertension and diabetes mellitus, bacterial infection of genitourinary system, immunodeficiency (particularly linked with inherent neoplasia, thrombocytopenia, and HIV AIDS human immunodeficiency virus), injectable drug abuse (IVDA), and implantable catheter devices are among the most prevalent risk variables. Abscesses of the hepatic system have been linked to endogenous endophthalmitis, primarily driven by gram-negative bacteria including Klebsiella pneumonia. Despite mature endophthalmitis, newborn endophthalmitis is almost always triggered by an indigenous infection. Endogenous or intrinsic endophthalmitis is a substantial risk for newborns with bacteremia candidemia, septicaemia, retinopathy of prematurity, and foetal growth restriction (IUGR).

Classification

Greenwald devised a categorization scheme that reflects the damaged parts of the globe as well as the aesthetic prognosis. Intravenous antibiotics work effectively for localized endophthalmitis, and there are usually few side effects. Posterior spreading endophthalmitis and panophthalmitis have a substantially worse prognosis as some of these disorders frequently result in visual impairment, globe degeneration, or surgical excision. Extrinsic and intrinsic endophthalmitis are the two types of endophthalmitis that exist. The presence of an external point of entry is linked to extrinsic endophthalmitis. Intrinsic endophthalmitis is a kind of septicaemia caused by a blood - borne infection.[2] Exogenous or extrinsic endophthalmitis is further classified into post operative and post traumatic. For convenience, post-operative type can be further divided into acute, chronic and conjunctival filtering bleb. Similarly, intrinsic or endogenous endophthalmitis can be classified into focal type, diffuse type and panophthalmitis. Depending upon location and site of infection, focal and diffuse types are further divided into anterior and posterior endophthalmitis.

Pathophysiology

Endophthalmitis is a disease of all the inner coating of the eyeball except sclera and cornea, that is accompanied by substantial, increasing vitreous swelling. Endophthalmitis is a serious ocular crisis which can have serious visual and general consequences. An exterior injury of entrance, such as injury, operation, or an inflamed cornea, is the most prevalent route of entry for potential pathogens. Endophthalmitis induced by direct inoculation dissemination of pathogenic microbes is a rare occurrence that occurs most commonly in people who are sick or disadvantaged. Intravenous medication usage, diabetes mellitus, immunological impairment, cancer, prolonged hospitalization, or systemic antibiotic therapy have all been linked to a 0.04 percent incidence rate. Haden described metastatic endophthalmitis in a seriously sick patient with pneumococcal cerebro-spinal encephalopathy who was treated with intravenously anti-meningococcal serum in the 1918 volume of the Journal Ophthalmology.[3] Endogenous endophthalmitis, unlike extrinsic endophthalmitis, need comprehensive systemic antibiotic treatment. In indigenous endophthalmitis, the illness originates not in the eye, but elsewhere in the body. As a result, it is necessary to obtain comprehensive cultures.[4]

Clinical features

Endogenous endophthalmitis produced by K. pneumoniae should be seen by an ophthalmologist as part of an invasive illness induced by the pathogen.

An interdisciplinary strategy that includes close collaboration with doctors and immunologists is required. Aside from ocular care, general management of sepsis with appropriate medicines and evacuation of the main abscesses are critical. Nonetheless, due to the virulence of Klebsiella pneumoniae, the prognosis of just this condition remains dismal, both visually and physiologically.The individual generally has a fast decline in visual acuity, which is habitually caused by discomfort. Increasing vitritis characterises all kinds of endophthalmitis. Milder variants are characterised by a minor acute inflammation, such as the appearance of neutrophils in the anterior chamber with fluid. Inflammation of the lids, severe eye injections with chemosis, corneal edoema, hypopyon, highlighted vitritis with lack of red reflex, and the occurrence of RAPD all seem to be symptoms of the serious forms.Endophthalmitis' clinical presentation could suggest the likely root cause(s) of infections, making it easier to determine how and where to

address and pick the appropriate antimicrobial therapy. The much more aggressive the pathogenic germs, the much more quickly endophthalmitis develops. Infections with Streptococcus pneumoniae, Aureus, Bacillus cereus, and Gram-negative bacteria, in particular, induce severe inflammatory reactions. Infections generated by coagulase-negative staphylococci result in a far less intense inflammatory response and a better prognosis.[5-7]

Diagnosis and investigation

Patients present to the Outdoor Patient Department (OPD) with a range of symptoms right from asymptomatic presentation to redness, edema, chemosis, corneal edema, hypopyon in anterior chamber. Maximum cases of endophthalmitis can be made by clinical examination of the eyes. But in cases of endogenous endophthalmitis, in which the etiology initiates from inside the patient's body, it becomes necessary to conduct more thorough investigations. Samples such as humoral specimen, vitreous fluid should be obtained to perform bacterial cultures to determine the origin of the infection. Vitreous fluid should be diluted and non diluted in nature. More accurate modes are serological diagnostic tests, real time polymerase chain reaction (RT-PCR) and enzyme linked immunosorbent assay (ELISA) can be done for quicker results.

Complications

As the name suggests, the disease is the end stage disease of all the other diseases. Widely, there are preoperative, intraoperative, and postoperative complications of endor endophthalmitis. Operative complications include suprachoroidal and expulsion hemorrhage, vitreous fluid loss and loss of fragments of lens (posterior lenticular fibre loss). Intraoperative complications of endophthalmitis include striated keratopathy, acute sudden bacterial or fungal endophthalmitis and prolapse of iris. Finally,boost Operative complications of endophthalmitis include chronic or delayed onset bacterial or fungal endophthalmitis, detachment of retinal epithelium, displacement of implant, detachment of corneal tissue and opacification of posterior lenticular capsule. Endogenous endophthalmitis is a rapidly progressive lethal disease which often results in loss of vision or complete loss of eye post operatively.

Differential diagnosis

The differential diagnoses of non infectious endophthalmitis are Idiopathic, Sarcoidosis, Behçet syndrome, Sterile endophthalmitis from recent intravitreal injection such as anti-VEGF or steroid, Sympathetic ophthalmia, Juvenile idiopathic arthritis, Vogt-Harada disease. Whereas the differential diagnoses for infectious retinitis are Herpes simplex virus,Varicella-zoster virus, Epstein-Barr virus, Cytomegalovirus. Other diagnoses can be Malignancy that is Intraocular lymphoma, Leukemic infiltrate, Retinoblastoma
and Intraocular foreign body, White dot syndromes. Autonomic dysfunction disorder endophthalmitis from subsequent intravitreal injection like anti-VEGF or steroid, Sympathetic ophthalmia, Juvenile indeterminate fibromyalgia disease are indeed the differential diagnoses of non pathogenic retinoblastoma.
Herpes simplex virus,Epstein-Barr virus, and Cytomegalovirus are the possible causes for infected inflammation and scarring of retina. Additional clinical manifestations include intraocular lymphoma, haematopoietic infiltration, retinal detachments, and intraocular foreign object, as well as slight indentation syndrome.

Treatment

The treatment of endophthalmitis has evolved dramatically during the last century. Endophthalmitis induced by direct inoculation dissemination of pathogenic microbes is a rare occurrence that occurs most commonly in people who are sick or disadvantaged. Intravenous medication usage, diabetes mellitus, immunological impairment, cancer, prolonged hospitalization, or systemic antibiotic therapy have all been linked to a 0.04 percent incidence rate. Haden described metastatic endophthalmitis in a seriously sick patient with pneumococcal cerebro-spinal encephalopathy who was treated with intravenously anti-meningococcal serum in the 1918 volume of the Journal Ophthalmology.[3] Whenever endophthalmitis is first detected, the bacterium is often unknown, thus the antibacterial treatment must be chosen on the basis of experience. Regrettably, clinical manifestations of illness and cultural findings may not always coincide well enough to recommend medication selection at the start of treatment.[4]
Endogenous endophthalmitis, unlike extrinsic endophthalmitis, need comprehensive systemic antibiotic treatment. In indigenous endophthalmitis, the illness originates not in the eye, but elsewhere in the body. As a result, it is necessary to obtain comprehensive cultures. If the patient presents within two hours of acute symptoms, immediate emergency vitrectomy should be performed. The removed vitreous should be replaced by methyl cellulose and other compound synthetics. If the patient presents after six hours, antibiotic treatment should be initiated. Vancomycin, ceftazidime and amikacin should be injected intravitreally[8].

Prognosis

A study was conducted to find out the prognosis for endophthalmitis in which 40% of individuals had an eye sight of 0.4 or greater, and 80percent had 1/20 or higher. Those with at minimum hand motion preoperative visual acuity had to have a superior effectively implemented prognosis than individuals with just light perception. Persons with chronic endophthalmitis had greater eye sight than people with symptomatic or subacute endophthalmitis. Improvements in eyesight was observed in individuals with persistent or subacute keratitis several months after the surgery more frequently than that in people with symptomatic endophthalmitis.Nevertheless, in 40 percent of the overall all instances with an abrupt start, there has been no improvements or even decrease of visual acuity. After contamination with S. epidermidis and Propionibacterium acnes, the best surgical outcomes were seen[9-17].

Conclusion:

Intrinsic endophthalmitis is indeed a behavior that causes eye disease that spreads into the bloodstream from a distant primary site. The intraocular disease caused by hematogenous microbial proliferation is known as indigenous endophthalmitis.[1] Endophthalmitis is a serious ocular crisis which can have serious visual and general consequences. An exterior injury of entrance, such as injury, operation, or an inflamed cornea, is the most prevalent route of entry for potential pathogens. Endophthalmitis has a complex aetiology, with a long list of pathogenic species and substantial regional heterogeneity. The treatment of endophthalmitis has evolved dramatically during the last century. To much more successfully treat endophthalmitis and enhance visual outcomes, a better knowledge of the relationships between problematic organisms and the intraocular host immune response is required. While antibacterials and anti-inflammatory medications efficiently kill intraocular organisms and suppress the intraocular inflammatory process, clinical data demonstrates that these treatments have no impact on the pollutants or

inflammatory mediators and enzymes that directly alter retinal function or architecture. As more knowledge on the natural course of various kinds of endophthalmitis becomes known, numerous phases in the treatment process will be taken. Endogenous endophthalmitis is a rapidly progressive lethal disease which often results in loss of vision or complete loss of eye post operatively. Patients have a seriously impaired quality of life postoperatively which can make them disabled. Patients are sometimes unable to carry out their functions in society or household. As a result of which the person is unable to cope up financially and socially in his environment. Many social and influential factors are disturbed in their lives and the patients are often depressed. Cosmetically the surgeries are not satisfying. Artificial prosthetics can be used but they're seldom of minimum functional importance. Such interventions can be helpful for the patient. Focus should be made to deliberately save the patients and not just the cosmetic value of the surgery.

REFERENCES

1) Callegan, M. C., Engelbert, M., Parke, D. W., 2nd, Jett, B. D., & Gilmore, M. S. (2002). Bacterial endophthalmitis: epidemiology, therapeutics, and bacterium-host interactions. Clinical Microbiology Reviews, 15(1), 111–124.

2) Relhan, N., Forster, R. K., & Flynn, H. W., Jr. (2018). Endophthalmitis: Then and now. American Journal of Ophthalmology, 187, xx–xxvii.

3) Romero, C. F., Rai, M. K., Lowder, C. Y., & Adal, K. A. (1999). Endogenous endophthalmitis: case report and brief review. American Family Physician, 60(2), 510–514.

4) Sadiq, M. A., Hassan, M., Agarwal, A., Sarwar, S., Toufeeq, S., Soliman, M. K., Hanout, M., Sepah, Y. J., Do, D. V., & Nguyen, Q. D. (2015). Endogenous endophthalmitis: diagnosis, management, and prognosis. Journal of Ophthalmic Inflammation and Infection, 5(1), 32.

5) Regan KA, Radhakrishnan NS, Hammer JD, Wilson BD, Gadkowski LB, Iyer SSR. Endogenous Endophthalmitis: yield of the diagnostic evaluation. BMC Ophthalmol. 2020;20(1):138.

6) Endogenous endophthalmitis: Diagnosis and treatment [Internet]. Aao.org. 2016 [cited 2021 Nov 17]. Available from: https://www.aao.org/eyenet/article/endogenous-endophthalmitis-diagnosis-treatment

7) Lumi X, Petrovski G, Vasileva B, Thaler A. Endophthalmitis prevention, diagnostic procedures and treatment. Optom Open Access. 2016;01(02):1–5.

8) Lumi, X., Petrovski, G., Vasileva, B., & Thaler, A. (2016). Endophthalmitis prevention, diagnostic procedures and treatment. Optometry Open Access, 01(02), 1–5.

9) Königsdörffer E, Augsten R, Oehme A, Strobel J. Prognosis of postoperative endophthalmitis. Ophthalmologe. 2000;97(2):121–5.

10) Acharya, Sourya, Samarth Shukla, and Neema Acharya. “Gospels of a Pandemic- A Metaphysical Commentary on the Current COVID-19 Crisis.” JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH 14, no. 6 (June 2020): OA01–2. https://doi.org/10.7860/JCDR/2020/44627.13774.
11) Arora, Devamsh, Muskan Sharma, Sourya Acharya, Samarth Shukla, and Neema Acharya. “India in ‘Flattening the Curve’ of COVID-19 Pandemic - Triumphs and Challenges Thereof.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 43 (October 26, 2020): 3252–55. https://doi.org/10.14260/jemds/2020/713.
12) Bawiskar, Nipun, Amol Andhale, Vidyashree Hulkoti, Sourya Acharya, and Samarth Shukla. “Haematological Manifestations of Covid-19 and Emerging Immunohaematological Therapeutic Strategies.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 46 (November 16, 2020): 3489–94. https://doi.org/10.14260/jemds/2020/763.
13) Burhani, Tasneem Sajjad, and Waqar M. Naqvi. “Telehealth - A Boon in the Time of COVID 19 Outbreak.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 29 (July 20, 2020): 2081–84. https://doi.org/10.14260/jemds/2020/454.
14) Butola, Lata Kanyal, Ranjit Ambad, Prakash Keshaorao Kute, Roshan Kumar Jha, and Amol Dattaroa Shinde. “The Pandemic of 21st Century - COVID-19.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 39 (September 28, 2020): 2913–18. https://doi.org/10.14260/jemds/2020/637.
15) Dasari, Venkatesh, and Kiran Dasari. “Nutraceuticals to Support Immunity: COVID-19 Pandemic- A Wake-up Call.” JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH 14, no. 7 (July 2020): OE05–9. https://doi.org/10.7860/JCDR/2020/44898.13843.
16) Dhok, Archana, Lata Kanyal Butola, Ashish Anjankar, Amol Datta Rao Shinde, Prakash Kesharao Kute, and Roshan Kumar Jha. “Role of Vitamins and Minerals in Improving Immunity during Covid-19 Pandemic - A Review.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 32 (August 10, 2020): 2296–2300. https://doi.org/10.14260/jemds/2020/497.
17) Gawai, Jaya Pranoykumar, Seema Singh, Vaishali Deoraoji Taksande, Tessy Sebastian, Pooja Kasturkar, and Ruchira Shrikant Ankar. “Critical Review on Impact of COVID 19 and Mental Health.” JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 30 (July 27, 2020): 2158–63. https://doi.org/10.14260/jemds/2020/470.