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Diabetic Retenopathy Management - A Case Study

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ABSTRACT

Diabetic retinopathy is a complication of diabetes, caused by high blood sugar levels damaging Retina. It usually takes several years for diabetic retinopathy to reach a stage where it could threaten the sight, if left undiagnosed and untreated. Starting with only a mild vision problem, retinopathy usually appears five years after a type 1 diabetes diagnosis. But it may already be present when type 2 diabetes is diagnosed. We present one such case in a lady of 38 years old, tailor by profession, diagnosed as Type 2 diabetes since 2019, suspected to have had proliferative diabetic retinopathy in January 2020, reported at a Medical College Hospital on 15th December 2020 with periorbital headache for fifteen days. Fundal examination revealed hard exudates and Neo vascularization in both eyes. She was advised Photocoagulation but after her blood sugar was controlled. In the meantime, she was advised to use Nepafenac eye suspension four times daily for pain and redness of the right eye. Investigations had revealed her RBS was 392mg/dl, for which a general physician (internal medicine) was consulted who put her Tab. Metformin 500mg 1-1-1 B/F, Tab. Teneligliptin 20mg 0-1-0 A/F. Unfortunately, 2 months of follow up and diabetes management did not allow her to be taken up for photocoagulation. The institution was firm on their decision to plan her laser photocoagulation for both eyes only when the blood sugar levels come to a range of 140 to 160mg/dl. On 26th March 2021, she was rushed to the Medical College hospital as she complained of loss of vision in the Right eye. The fundus examination revealed multiple dot and blot hemorrhages in both eyes, bleed in oculus dexter and oculus sinister, hard exudates in the right eye that needed Vitreoretinal surgery. Since the Medical College Hospital did not have the Vitreoretinal surgery facility, she was taken to a private dedicated eye hospital, where she underwent laser photocoagulation of left eye on 12/04/21 followed by Vitrectomy of right eye for proliferative diabetic retinopathy on 24th April 2021. There were no postoperative hemorrhages until three days or any other complications after surgery. Now she can recognize some shapes with her right eye by closing left eye.

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Introduction

International Diabetes Federation (IDF) estimated 463 million people in the age group of 20-79 years to have had diabetes in 2019 worldwide and of them 77 million in India [1,2]. The prevalence of diabetes in India has remained at 11.8% in the last four years, according to the National Diabetes and Diabetic Retinopathy Survey [2]. The rise in diabetes prevalence is a global public health issues, as IDF estimates India to have more than 100 million people with type 2 diabetes mellitus by 2030 [3].

Diabetic retinopathy is a common and potentially disabling long-term complication of diabetes. Consistently elevated levels of blood sugar damage the tiny blood vessels that supply oxygen and nutrients to the retina, usually both eyes are affected. Retinopathy may lead to glaucoma, that in turn threatens vision. This condition is the leading cause of blindness in people between the ages of 20 and 60. The good message is retinopathy if diagnosed early and treated, blindness can be prevented.

Many diabetics develop impaired vision, but less than 5% suffer severe vision to warrant urgency for seeking care thus, they are not diagnosed in time or treated. Retinopathy development is causally related to the length of time that they had diabetes. It usually does not manifest for approximately five years after a type 1 diabetes diagnosis, but it may already be present when type 2 diabetes is diagnosed. After 15 years of having diabetes, 98% of those with type 1 diabetes and 78% of those with type 2 have some degree of retinal damage.

Diabetic retinopathy is usually silent, as multiple severe and permanent retinal damage may occur before any of the alerting symptoms like Blurred vision that does not improve with glasses, vision that worsens, improves, then worsens again, sudden loss of vision, particularly following events such as coughing or sneezing, seeing "cobwebs," "spots," or a "hole" in the field of vision and eye pain [4]. In a community cluster sampling-based study in Tamil Nadu of 4917 of 5150 persons examined, the prevalence of any Vitreo-retinal disorder was about 10%, among them bilateral blindness was 0.3% and the prevalence of diabetic retinopathy was 0.5% [5]

Case Presentation

On 12th April 2021, a young lady of 38 years old, tailor by profession, advised a Vitreo-retinal surgery by the head of the Ophthalmology department of the Government Medical

College Hospital reports in a private dedicated eye hospital. After a detailed examination of dilated fundus and doing laser tomography diagnosed the vision impairment as Proliferative Diabetic Retinopathy (PDR) + Vitreous hemorrhage (VH) + Tractional Retinal Detachment (TRD).

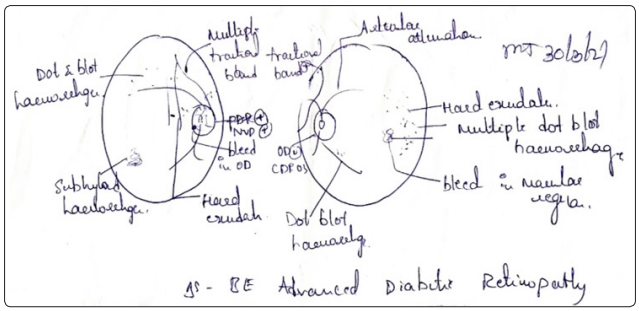

Figure 1: Showing dot and blot hemorrhage, hard exudates and sub hyaloid hemorrhage, bleed in OD and OS of right and left eye, respectively.

Investigations

CBC: Hb- 12.2 gm/dl, WBC-13,000 cells/mm^3, Platelet-3.59 lakhs/mm^3,

Biochemistry: RBS – 300 mg/dl, Serum creatinine-0.9

Serology and immunology: HBSAG- NON -REACTIVE, TRI DOT TEST- NON -REACTIVE, HbA1c - 9.0%

Peripheral smear: Normocytic normochromic blood picture with leukocytosis.

Tomography

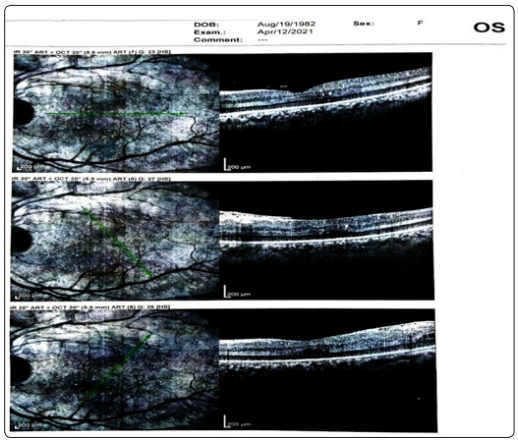

Figure 2: Tomography showing Oculus sinister

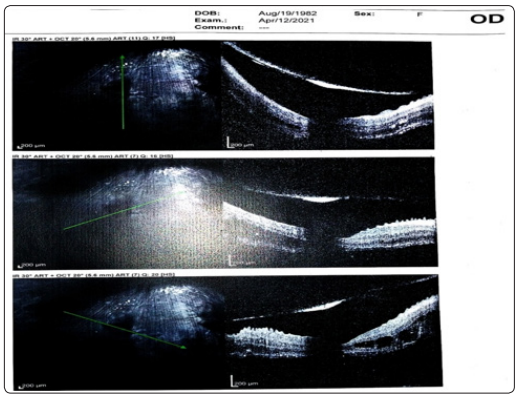

Figure 3: Tomography showing Oculus dexter

After the requisite investigations they suggested her laser photocoagulation of left eye and vitrectomy for right eye. For the future course of action of taking her for the recommended interventions she was advised to control the blood sugar levels.

The observed blood sugar levels between 14/04/21 to 24/04/21 were as follows

Highest FBS - 265mg/dl (before breakfast), Lowest FBS - 103mg/dl (before lunch)
Highest PPBS - 327mg/dl (after breakfast), Lowest PPBS - 153mg/dl (after dinner)

On 12th April 2021, photocoagulation of the left eye was done and was advised to continue to monitor and control the blood sugar for the Invasive Vitrectomy surgery scheduling it for 24th April 2021. On 20th April, the blood sugar levels were FBS – 141mg/dl and PPBS – 170mg/dl, therefore pre-op procedures like Intravitreal injection given before vitrectomy for PDR was done that facilitates the surgery and decreases the postoperative vitreous hemorrhage and improve the visual acuity results of the operation. On 24th April 2021 she was taken for the Vitrectomy for PDR, the procedure "VIT+BIMANUAL MS+CAUTERY+EL+FAE" done under local anesthesia.

Surgery in brief

Insertion of pars plana cannula, micro incision vitrectomy system (MIVS) – 23, 25, 27 Gauge, 38 was procedure followed. Three sclerotomies are placed around 3.5–4.00 mm from the limbus. After displacing the conjunctiva, a biplanar incision was fashioned, keeping trocar-cannula system obliquely around 25–30° angle, parallel to the limbus and then perpendicularly. Standard diabetic vitrectomy was carried out for VMT.

Post-Operative Treatment

Tab. Diclofenac potassium and Serrao peptidase 1-0-1 × 1 week
Tab. Acetazolamide 1-0-1 × 3days, Tab. Alprazolam 0.5mg 0-0-1 × 2days
Tab. Pantoprazole + domperidone - one tab immediately after operation and one after 12 hrs.
Eye drop - Gatifloxacin + Prednisolone Acetate - Every 2hrs 1 week, followed by every 4 hrs. 1 week, every 6 hrs. 1 week and every 8 hrs. 1 week.
Eye drop – Tropicamide + Phenylephrine HCL – once at night × 1 week
Cap. Antioxidant 0-0-1× 30 days
To continue diabetic drug regimen with diet management to control blood sugar levels.

A bit of Past History

For the first time in January 2020, she had reported to a private ophthalmologist with swelling and severe pain in the right eye. He had prescribed anti-inflammatory drugs for three days and eye drops for fifteen days and advised to control the BSL After the use of these prescribed drugs she was relieved her pain of right eye. Patient had developed diabetic foot ulcer in the month of February 2020 on left lateral malleolus, for which a surgical debridement and approximation of the edges of the ulcer was done, post-surgery wound healing took three months because of uncontrolled blood glucose levels, that compelled to take lot of Insulin injection along with oral antidiabetics, between March 2020 to June 2020. She had no complaints of her eyes from February 2020 to September 2020. During the first week of September 2020, she went to the same ophthalmologist for the second time with complaints of floaters and cobweb like sensation in the right eye for which she

was prescribed spectacles for the visual acuity.

In the third episode she had developed severe pricking pain and swelling over the right eye in the last week of October 2020 and visited another private ophthalmologist in second week of November 2020. It is here for the first time that she was diagnosed as having Diabetic retinopathy and asked to undergo laser photocoagulation or a steroid injection in the eye to reduce swelling in the macula to improve the vision. The fourth episode on 15th of December 2020, made her to report at a Medical College Hospital with periorbital headache for fifteen days. On fundus examination they found hard exudates and neo-vascularization in both eyes.

She was advised for a photocoagulation but after the blood sugar stabilizes around 150 mg/dl. In the meantime, she was prescribed Nepafenac eye suspension to use four times daily as for pain and redness of the right eye. As her random blood sugar was 392mg/dl, Physician (internal medicine) was consulted, who put her on Tab. MF 500mg 1-1-1 B/F, Tab. Teneligliptin 20mg 0-1-0 A/F. Two successive months of treatment and monitoring with tests of FBS, PPBS and HbA1c failed to be eligible for laser photocoagulation and she was asked to return for the same after BSL comes in the range of 140 to 160mg/dl.

On 26th of March 2021 she noticed sudden and complete loss of vision in the right eye and she went back to the government medical college hospital. After a detailed check-up she was diagnosed as having Vireo-retinal hemorrhages and needed a Vitreo-retinal surgery that they did not have. Mobilizing the resources, she visits a dedicated private eye hospital on 12/04/21.

Discussion

Diabetic retinopathy is the most frequent microvascular complication of diabetes mellitus and the most common cause of blindness in the working-age population. The prevalence of early age-related macular degeneration was 0.6% and only 6.7% of diabetic retinopathy patients had previous ophthalmic examinations [5]. Main reasons for loss of vision in patients with diabetes mellitus are diabetic macular and proliferative diabetic retinopathy [6]. Diabetic retinopathy is a progressive eye disease classified by two types and four stages.

There are two types a) non-proliferative and b) proliferative.

Stage1: Mild non-proliferative diabetic retinopathy: This is the earliest stage of diabetic retinopathy, characterized by tiny areas of swelling in the blood vessels of the retina known as micro aneurysms. Small amounts of fluid may leak into the retina at the stage, triggering swelling of the macula, in the middle of the retina. Probably our patient was in this stage in her first visit.
Stage 2: Moderate no-proliferative diabetic retinopathy: Increased swelling of tiny blood vessels starts to interfere with blood flow to the retina, preventing proper nourishment with an accumulation of blood and other fluids in the macula.
Stage 3: Severe no proliferative diabetic retinopathy: A larger section of blood vessels in the retina become blocked, causing a significant decrease in blood flow to this area and beginning of growing new blood vessels in the retina.
Stage 4: Proliferative diabetic retinopathy: This is an advanced stage of the disease, with new often fragile blood vessels with a higher risk of fluid leakage. This triggers different vision problems such as blurriness, reduced field of vision, and even blindness, that our patient exhibited in her second and third visit.

The following are the plan of treatment for Diabetic retinopathy globally including India

a) **Laser Photocoagulation:** this procedure reduces the drive for abnormal blood vessels and swelling in the retina and further limits the damage of the visual acuity.
b) **Steroid injection:** Intraocular Steroid injection can stop inflammation and prevent the formation of new blood vessels.
c) **Vitrectomy:** In case of proliferative diabetic retinopathy, an eye surgery called vitrectomy might be needed. It is an invasive surgery usually done under local anesthesia. This surgery treats problems with the retina and vitreous, a jellylike substance in the middle of the eye. Through this surgery scar tissues, blood or fluid can be removed, and some of the vitreous gel can also be removed so that light rays can focus properly on the retina [7,8]. At the same time, traction in the retina or retinal detachments can be corrected, as was done in our case study.

Vitreoretinal procedures have grown many folds in the last decade across the world and India. Intravitreal corticosteroid injections saw the primary growth. Vitrectomy for retinal detachment increased since late 2009-10 in place of laser photocoagulation [9].

The macroeconomics of Vitreoretinal diseases

Vitreo-retinal interventions account for only a small portion of total health care in developing countries. The rising demand due to ageing population, increasing trend of diabetes and silent nature of the disease will put pressure on the families [10].

Conclusion

Vitreo-retinal diseases appear to be a major public health problem in India. The prevalence of early age-related macular degeneration is less than 1% and only 6.7% of diabetic retinopathy patients would have had previous ophthalmic examinations. Diabetic screening, treatment, and appropriate laser therapy provision for retinopathy at least at each district level and Vitrectomy and Vitreo-retinal laser surgery facilities at the divisional (a group of 3-5 districts) level need to be explored. Despite advances in the instrumentation and refinement of surgical technique, diabetic vitrectomy remains one of the most challenging conditions, even to the most experienced surgeons; because of variability in the surgical anatomy that each case presents. The Triad of informed patient, primary Ophthalmologists and Vitreoretinal surgeons can save many people going blind in developing countries.

Take home messages

1. Screening for diabetes after thirty years is the need of the time to identify undiagnosed cases in the community.
2. Regular monitoring and good control of blood sugar levels will almost stop the havoc that an uncontrolled diabetes can create.
3. Visiting an ophthalmologist once in a year, for fundal examination to identify diabetic changes if any is crucial to prevent Retinal damages.
4. Identified at an early stage, photocoagulation, intra-ocular steroid injections, and Vitrectomies are the best intervention options.
5. Reaching appropriate Dedicated eye specialty hospitals is a stich in time to save blindness is the only option.

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