Clinically Significant Macular Edema (CSME)

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Clinically Significant Macular Edema (CSME)

PATIENT HISTORY

A 71 year old white male initially presented to clinic at age 62 with a chief complaint of distorted vision in his left eye for over six months. The patient reveals he was diagnosed with insulin dependent diabetes mellitus over ten years ago and admits his blood sugars have never been under control (BS 140-210), but he states his blood sugar levels are getting better. The patient has no family history of glaucoma or diabetes; however, his father had age-related macular degeneration.

On examination, the patient’s visual acuity without correction was 20/20 in the right eye and 20/60 in the left eye (with no improvement with pinhole). Intraocular pressures were 11 mm Hg right eye and 12 mm Hg left eye. The dilated funduscopic exam (DFE) showed trace macular edema in the right eye that needs to be monitored. The left eye revealed significant macular edema with hard exudates (explaining the decreased vision of 20/60). A diagnosis of 1) clinically significant macular edema (CSME) left eye and 2) non-proliferative diabetic retinopathy (both eyes) was made.
Figure 1. Fundus photo of patient’s right eye showing little to no signs of macular edema.

Figure 2. Fundus photo of patient’s left eye revealing macular edema with hard exudates as well as dot/blot and flame hemorrhages.
The patient was advised to continue with regular follow-up visits to monitor progression of CSME. In order to evaluate progression, optical coherence tomography (OCT) was performed to capture the anatomical changes of the macula in both eyes.

Over the course of the years, the patient developed worsening non-proliferative diabetic retinopathy in the right eye with signs of CSME. The left eye developed severe non-proliferative diabetic retinopathy along with recurrent CSME. The visual acuity in the right eye is no longer 20/20, fluctuating between 20/30-20/50 and the left eye visual acuity has decreased to 20/200. Macular thickness is stabilized depending on patient’s reaction to treatment.

The patient received focal laser treatments to both eyes for the CSME over the course of 8 years. The ophthalmologist also used Avastin occasionally in the right eye, Lucentis alternating between both eyes (every two months), and Triescence mainly used for the left eye to reduce ocular inflammation. The patient responded well to the focal laser plus Lucentis injections in the right eye given every two months. The left eye is also having a good response to the focal laser with the combination of Triescence. Below are Pre and Post-treatment OCTs.

**Figure 3: OCT of patient’s right eye, Before treatment. Fluid in the macula.**
Figure 4: OCT of patient’s right eye, **After** treatment. Notice reduction of fluid in macula.

Figure 5: OCT of patient’s left eye, **Before** treatment. Fluid in the macula.
Clinically Significant Macular Edema (CSME) is a common occurrence in diabetic retinopathy seen in many patients. Approximately 500,000 Americans have macular edema (1). Up to 75,000 new cases of diabetic macular edema develop each year, and about 30% of patients with clinically significant macular edema will develop moderate visual loss (1).

Diabetic retinopathy occurs in patients with a long duration (10-20 years) of insulin dependent diabetes mellitus (IDDM) or non-insulin dependent diabetes mellitus (NIDDM). Diabetic retinopathy can occur in two stages: non-proliferative diabetic retinopathy (NPDR) and proliferative diabetic retinopathy (PDR). NPDR is considered the early stage of the disease and usually causes no visual symptoms (2). In NPDR blood vessels in the retina develop weak spots that bulge outward (microaneurysms) which then leak fluid and blood into the surrounding retinal layers.
retinal tissue (2). Lipid deposits then occur in the retina which are called hard exudates. In addition, the occurrence of macular edema and macular ischemia can affect visual acuity (2).

PDR is the severe stage of the disease. It occurs when abnormal new vessels (neovascularization) start to grow on the surface of the retina or optic nerve (2). These fragile irregular blood vessels are easily ruptured, causing recurrent retinal and vitreous hemorrhages (4). Neovascularization can lead to fibrovascular traction on the retina, causing retinal detachment. New vessel formation due to ischemia can also occur on the iris and trabecular meshwork. This can lead to neovascular glaucoma, a painful and potentially blinding condition.

**DIAGNOSIS**

Macular edema occurs when blood vessels in the retina leak into the macula causing it to thicken and swell, gradually distorting central vision. In order to diagnosis CSME, one of the following physical characteristics must be seen during a clinical fundus examination:

1) Retinal thickening at or within 500 microns or 1/3 disc diameter of center of macula (1).

2) Hard exudates at or within 500 microns of the center of the macula with adjacent retinal thickening (1).

3) Retinal thickening greater than 1 disc diameter in size which is within 1 disc diameter from the center of the macula (1).
TREATMENT

The clinical tests and treatments used to manage CSME include fluorescein angiography, laser treatments, and intravitreal injections.

Fluorescein angiography (FA) is used to identify which microaneurysms are leaking and causing the edema and to help locate focal lesions that may not have been obvious on clinical examination (1). FA does not treat CSME; however, it is important to perform before treatment of photocoagulation (1).

There are two types of laser treatments: focal and grid. The focal laser is used to treat localized macular edema. The main objective in using this laser is to close leaky microaneurysms by thermal coagulation. Green and yellow wavelengths contribute to the absorption of laser light energy inside the microaneurysms (1). The grid laser is used to treat diffuse macular edema. One theory behind how the grid laser works is that the laser destroys some retinal photoreceptors and decreases oxygen consumption, which in turn decreases blood flow within the leaking vessels (1). Another theory is that the grid laser stimulates the RPE cells to pump out the macular edema.

Intravitreal injections such as: Avastin (bevacizumab), Lucentis (ranibizumab), and Eylea (afibercept), are used to reduce swelling of the macula. In addition, Triescence (triamcinolone) is a steroid injection used to reduce inflammation in the eye. It is often used after steroid drops are no longer effective. According to different studies, intravitreal injections provide significant improvement to visual acuity and macular edema in diabetic patients (3).
CONCLUSION

In treating a patient with CSME, it is important for an Ophthalmic Medical Technologist to have an understanding of diabetes and how it can affect the eyes. During clinic work-ups it is essential to obtain relevant patient information like chief complaint, history of present illness, duration of diabetes, blood sugar readings, A1C levels, medications, visual acuity, intraocular pressure, fundus photos, and OCTs (upon request) to better assist the ophthalmologist. This can also help with tracking treatment progress as well as hopefully stabilizing the disease from causing further damage.

REFERENCES


• Diabetes Mellitus: type 1 and type 2