

Complete Closure of a Full-thickness Macular Hole Associated with Diabetic Macular Edema and Vitreo-retinal Adhesion During Treatment with Bevacizumab and Hemodialysis - A Case Report

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Abstract

Idiopathic full-thickness macular hole closure is a well-documented observation. Total posterior vitreous detachment is what presumed to lead to the macular hole closure. Diabetic retinopathy is known to worsen the prognosis of FTMH compared to that of an idiopathic etiology. We report a case of a 60-year-old male with severe non proliferative diabetic retinopathy, diabetic macular edema and epi-retinal membrane who developed a full-thickness macular hole. The patient had spontaneous closure of the macular hole during treatment with anti-vascular endothelial growth factor bevacizumab regular injections almost 6 months after starting 3 weekly hemodialysis for kidney failure.

Keywords: Macular Edema; Case Report; Hemodialysis; Diabetic Retinopathy; Retina

Abbreviations

VRA: Vitreo-Retinal Adhesion; DME: Diabetic Macular Edema; OCT: Optical Coherence Tomography; ERM: Epi Retinal Membrane; HD: Hemodialysis; VGEF: Vascular Endothelial Growth Factor; VMT: Vitreo Macular Traction; FTMH: Full Thickness Macular Hole; TCA: Triamcinolone Acetate Injection

Introduction

Macular hole defined as breakdown of the macula which is part of the retina. It causes disturbance of the eye vision and central vision loss. Idiopathic vitreous traction, diabetes, trauma can contribute to development of this pathology [1]. It has several stages which known as stage 1 and stage 2 characterized by fovea depression and in the later < 400 μm in size full thickness breakage. While stage 3 is progressive hole $\geq 400 \mu\text{m}$ in size and stage 4 has complete vitreous detachment [2]. For stage 1 many studies suggested observation [3] and for stage 2,3 and 4 surgery

was the mainstay of treatment [4]. Other therapeutic options such as intravitreal injection by anti-vascular endothelial growth factor (Anti-VEGF), autologous serum, whole blood, and autologous concentrated platelets can help the closure of macular hole [5]. In this paper we report a case of full thickness macular hole (FTMH) complete resolution with anti-VGEF injections and hemodialysis (HD).

Case Report

We present a 60-year-old male patient with history of diabetes mellitus, hypertension and chronic kidney disease not on dialysis. On his first presentation to the ophthalmology clinic he had diffuse macular edema on his right eye which he received intravitreal triamcinolone acetate injection which his vision remains unchanged almost 1 month after the injection and was recorded at 20/70 on the right eye. Then patient returned 3 years later to the clinic with proliferative diabetic retinopathy with extensive

macular changes secondary to poorly controlled diabetes in both eyes, he had macular edema with epi-retinal membrane, vitreo-retinal adhesions, significant amount of diffuse intra retinal fluid and full thickness macular hole on the right eye with visual acuity of fingers counting at 4 feet. After his presentation to the clinic, patient was hospitalized with fluid retention and end stage renal disease that required urgent hemodialysis (HD). Since his hospitalization patient was on scheduled 3 days/week hemodialysis. Patient returned to the clinic 6 months after starting dialysis, OCT was showing partial closure of FTMH, patient was reassessed every 1 month for 3 consecutive months and was given regular Bevacizumab injections and was found that his FTMH was gradually closing with complete resolution after 6 months with resolution of intra-retinal fluids. Eventually, his vision improved in the right only to 20/400 three years later, and the hole remains closed.

Discussion

The etiology of FTMH formation associated with diabetic retinopathy is not well understood due to the complexity and infrequency of these holes [6], some spontaneous macular hole closure in patients with coexisting diabetic retinopathy has been reported before. But the incidence of spontaneous idiopathic macular hole closure that was reported as 11.5% were from non-diabetic patients [5].

Gandorfer, *et al.* states that the pathophysiological mechanisms of macular hole formation associated with diabetic retinopathy may be due to either vitreo macular traction or retinal edema [8]. He demonstrated that the pre-macular cortical vitreous is thickened due to the proliferation of fibroblasts and fibrous astrocytes along native vitreous collagen in 77% of patients with diabetic macular edema. In addition he demonstrated single or multilayered cellular membranes developing along native collagen, leading to tangential VMT. Furthermore according to Steel and Lotery VMT occurs in 24-32% of eyes with diabetic macular edema [9]. Brazitikos and Stangos postulate that intra-retinal exudation may lead to retinal atrophy and intra-retinal cyst formation [10]. The horizontal orientation of the Mueller cell processes and anatomically thin retinal tissue in the fovea, in conjunction with increasing pressure from the intra-retinal exudation, predisposes the fovea to macular

hole formation secondary to diabetic retinopathy [10,11].

In our case this patient started treatment with hemodialysis 6 months earlier to his macular hole closure, which we believe that HD might have an effect on macular hole closure. However, limited number of studies discussed the effects of HD in treating macular pathologies. There are some reports of HD having a good impact on reduction of choroidal thickness [12,13]. A study reported that HD can help improving macular edema [14]. Chang IB found that HD can lead to mild reduction in macular thickness in diabetic patients who had macular edema [15]. While a study done by Azem, *et al.* concluded that HD has shown trend towards reduction of retinal thickness around foveal area but no significant effect overall on retinal thickness [16]. Unfortunately, no current or previous case reports were found that discussed the direct effects of HD on macular hole closure, which warrant further research to understand the mechanism behind it and to approve its therapeutic effect. And the limitation of this case report that no OCT prior to his HD were obtained.

Conclusion

We believe both anti VGEF treatment and HD contributed to this patient full macular hole closure in addition to his foveal vitreo-retinal adhesion resolution during the course of his treatment.

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An optical coherence tomography (OCT) obtained 6 months after instating hemodialysis, then every 1 month for 3 consecutive months after HD.

Figure 1

Figure 2

Figure 3

Figure 4

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