Management of Diabetic Macular Edema in Vitrectomized Eyes

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Introduction

Diabetic retinopathy (DR) is the leading cause of visual impairment and vision loss in young and middle aged adult in the U.S.[1] Diabetic macular edema (DME) is the most common cause of visual impairment in DR, and is present in about 28% patients with diabetes ≥20years.[2] As shown by the ETDRS in 1985, macular focal/grid laser reduces the likelihood of moderate vision loss by 50% compared to no treatment, but rarely results in improvement of vision.[3]

Pharmacologic treatment of DME with intravitreal steroids and anti-VEGF agents have become popular in recent years.[4-9] Of these, intravitreal ranibizumab has been studied most extensively, and has been shown to be superior to both laser and intravitreal steroids. However, efficacy of intravitreal anti-VEGF agents is not established in vitrectomized eyes, as such eyes were excluded from clinical trials. Both ranibizumab and bevacizumab appear to have equal efficacy, at least in neovascular AMD.[10] Intravitreal bevacizumab was ineffective in the management of diabetic macular edema in eyes that had undergone a vitrectomy procedure.[11]

Methods

Retrospective chart review of 8 eyes of 8 patients presenting with DME between June 2009 and March 2011 who had previously undergone a PPV was performed. Baseline information collected included nature of treatment for DME prior to PPV, indication for PPV, time between PPV and diagnosis of DME, application of panretinal photocoagulation either before or during PPV and lens status.

All eyes underwent complete eye examination, spectral domain OCT and IVFA. Treatment was usually initiated with an anti-VEGF agent, and was modified based primarily on OCT. Patients with ≥4 months follow-up were included. Eyes with glaucoma and other eye disorders were excluded. Snellen VA was converted to logMAR for statistical analysis.VA and OCT at final follow-up were recorded and compared to baseline for statistical significance.

Results

Mean (SD) age of patients (M=7, F=1) was 60.75 (11.03) years, (range 45-70). PPV was performed 30 (18.6) weeks, (range 5-56) prior to diagnosis and treatment for DME.

Table 1: Indication for PPV n=8

Diagnosis	Number
Vitreous hemorrhage	5
Epiretinal membrane	2
DME (ILM peel)	1

Table 2: Treatment of DME Prior to PPV n=7

Treatment	Number
Grid laser	4
Grid+Avastin	3

Table 3: Baseline Characteristics

Characteristics	
VA, Median (range)	20/143 (20/70-20/400)
Central foveal thickness	
Mean (SD) microns	461(74)
Range	361-566
Pseudophakic	6
PRP for PDR	5

Table 4: Treatment Details

Treatment	Number of Eyes
Initial Treatment	
Avastin	6
IVTA	2
Subsequent Treatment	
IVTA	5
Grid	5

Of 6 eyes that were started on monthly intravitreal avastin, 5 showed no response and were switched to intravitreal triamcinolone (Triesence) 4 mg/0.1 mL after 1-4 injections.
IVTA was initial treatment in 2 eyes.
Six of seven eyes that received IVTA showed good response.
Retreatment was based on recurrence of edema on OCT with or without decrease in vision.
Over a mean (SD) follow-up of 99 (49), range 16-150 weeks, eyes received a mean of 4 (range 1-7) IVTA 2-6 months apart.
Five eyes received grid laser treatment 2-20 weeks after first IVTA injection. Grid was repeated in 2 eyes.

Table 4: Findings at Final Follow-up

Characteristics	
VA, Median (range)	20/70 (20/20-20/200) p=0.063
VA gain ≥0.3 logMAR	3 (37.5%)
Originally phakic gainers	2 (100%)
Central foveal thickness	
Mean (SD) microns	343(123)
Range	219-598
Mean Reduction in CFT	118, p=0.0658
Eyes with ≥100 microns reduction	7
Pseudophakic	8
Steroid induced Glaucoma	2

Conclusions

1. Intravitreal avastin was generally ineffective in vitrecomized eyes with DME.
2. IVTA showed good response in most eyes.
3. 3/8 (37.5%) gained equivalent of 3 or more ETDRS lines
4. Well known complications from IVTA observed in the study.
5. Possible explanations:
    1. DME in vitrectomized eyes may not be VEGF mediated, possibly because:
        1. PPV increases pO2 in vitreous cavity by 10 mm Hg reducing hypoxia, and decreasing VEGF.
        2. VEGF may clear the eye faster
        3. PRP during PPV (5 eyes) may reduce VEGF
    2. Anti-VEGF agent may exit the eye faster due to increased turnover in a vitrectomized eye.
6. IVTA followed by grid laser appears to be the best strategy for these eyes.

Limitations

1. Retrospective.
2. Noncomparative.
3. Snellen, rather than standardized ETDRS VA measurements
4. Small sample size.
5. Relatively small follow-up.

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