Choroidal Indices as Predictors of Visual Outcomes to anti-VEGF Treatment in DME patients, using Swept Source OCT

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Abstract

Purpose : To evaluate the associations between anti-VEGF therapy and central choroidal thickness (CCT), choroidal vascular density (CVD) and choroidal vascular volume (CVV), in patients with Diabetic Macular Edema (DME) using Swept Source OCT (SS-OCT), and to correlate these findings with treatment visual outcomes.

Methods : Prospective longitudinal study, including consecutive patients with treatment-naive DME. All patients received monthly ranibizumab intravitreal injections for 3 months (loading dose) followed by a treat-and-extend regimen during 12 months. BCVA and 3D horizontal volume macular SS-OCT scans (Topcon®DRI OCT-1 Atlantis) were obtained before 1st injection (M0), 1 month after loading dose (M3), and at 6 (M6) and 12 months (M12) after 1st injection. CCT was calculated as the mean central 1mm value of ETDRS grid.*Enface* SS-OCT images of choroidal vasculature were binarized to calculate CVD and CVV. CVD was defined as the percent area occupied by choroidal vessels in macular region (6-mm diameter circle centred on fovea) and CVV was calculated by multiplying the average CVD by the macular area and choroidal thickness. Treatment visual outcome was defined as BCVA improvement after M3 and categorized into 2 groups:Good Responders(≥5 letters) and Poor Responders(<5 letters).

Results : Twenty-three naïve DME eyes were included. After the loading dose of ranibizumab (M3), 17 eyes (73.9%) were good responders and 7 (30.4%) poor responders. At baseline, good responders showed a thicker choroid compared with poor responders (199.7±79.6µm *vs*182.5±60.4µm;p=0.134). Macular CVD and CVV were also significantly higher in good responders (CVD=0.26±0.06 *vs*0.21±0.03; CVV=1.73±0.95 *vs*1.28±0.48;p=0.151). After treatment, two distinct behaviors were observed: a significant decrease of CCT in good responders (-11.3%;p=0.014) and an increase in poor responders that did not reach statistical significance (+8.5%;p=0.576). CVD and CVV showed analogous changes with significant reductions in good responders (CVV= -13.8%;p=0.008) and increases in poor responders (CVD=+16.2%;p=0.006; CVV=+34.1%;p=0.134). CVD at baseline identified well the good responders to anti-VEGF treatment (ROC AUC=0.74;p=0.030).

Conclusions : Choroidal indices such as CVD and CVV, measured at baseline, discriminate the good and poor responders to anti-VEGF therapy in DME patients, and may be robust predictors of treatment response.