Impaired Endothelial Function and Increased Arterial Stiffness in Patients with Diabetic Retinopathy

Background: Diabetes Mellitus is associated with endothelial dysfunction and arterial stiffness. Diabetic Retinopathy (DR) is a complication of diabetes mellitus and remains a leading cause of irreversible blindness. We investigated the possible association of DR with endothelial function, arterial stiffness and inflammation.

Methods: We enrolled 100 consecutive subjects with diabetes mellitus and 102 (mean age 65±8y) healthy subjects. Patients with diabetes mellitus were divided in those with DR (53 subjects, mean age 68±9) and those with no evidence of DR (NDR) (mean age 66±6). An ophthalmologist made the diagnosis of DR by ophthalmoscopy after pupilary dilation. Endothelial function was evaluated by flow mediated dilation (FMD) in the brachial artery, carotid-femoral pulse wave velocity (PWV) was measured as an index of arterial stiffness and augmentation index (AIx) as an index of reflected waves. Creatinine clearance was estimated based on MDRD formula. Serum C-reactive protein levels were measured as inflammatory marker and glycosylated hemoglobin was used to evaluate adherence to treatment.

Results: Although there were no significant differences in sex, age and mean arterial pressure, ANOVA revealed that patients with DR compared to NDR patients and healthy subjects had impaired FMD (3.47±1.12% vs. 5.55±1.29% vs. 6.43±3.33%, p<0.001), increased PWV (10.52±2.86m/sec vs. 9.20±2.00m/sec vs. 8.77±1.94m/sec, p<0.001) and increased AIx (27.99±7.93% vs. 23.32±7.87% vs. 25.47±8.28%, p=0.02). Interestingly, in diabetes mellitus subjects, FMD was inversely correlated with C-reactive protein levels and glycosylated hemoglobin and positively correlated with creatinine clearance (p<0.005 for all). Moreover, DR compared to NDR subjects had impaired creatinine clearance (p=0.04), glycosylated hemoglobin (p<0.001) and log C-reactive protein levels (p=0.01).

Conclusion: This study showed that DR patients have significantly impaired endothelial function and increased arterial stiffness compared to NDR patients and to healthy people. Finally, we found an inverse association between vascular function, inflammation, renal function and adherence to treatment in DR patients.