Intensive glycemic control fails to improve indices of vascular dysfunction in patients with type 2 diabetes; results at 6-12 month follow-up.

Sofia Antoniou[1], Katerina Naka[2], Aris Bechlioulis[2], Lampros Michalis[2], Agathocles Tsatsoulis[1], Stelios Tigas[1]

[1]Dpt of Endocrinology, University of Ioannina, Ioannina, Greece
[2]Dpt of Cardiology, University of Ioannina, Ioannina, Greece

BACKGROUND

In subjects with long duration of type 2 diabetes (T2DM), strict glycemic control fails to decrease the incidence of cardiovascular disease (CVD). Impaired vascular indices have been associated with adverse cardiovascular prognosis in T2DM. We examined whether intensive glycemic control in T2DM patients improves vascular indices.

METHODS

We studied 68 patients with Type 2 Diabetes Mellitus (T2DM) ,age 64±9 yrs (52% males) and T2DM duration 14±10 years with poor glycemic control (HbA1c >7.5 %) at baseline and 6-12 months after intensive treatment to achieve optimal glycemic control (*Table 4*).

Brachial Artery flow mediated dilatation ***(FMD)***, carotid femoral pulse wave velocity***(PWV)***, central augmentation index ***(Aix)***, large and small artery distensibility indices, common carotid artery intima-media thickness (***c IMT***) and ankle- brachial index (***ABI***) were measured (*Images 1,2)*

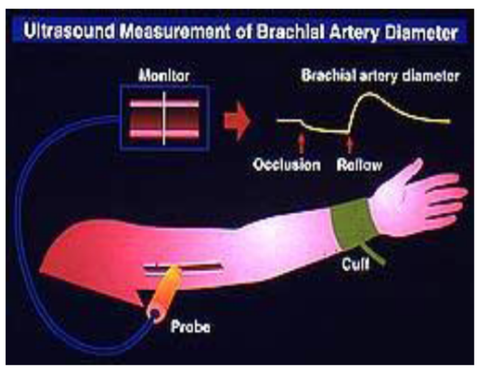

Image 1:
Measurement of brachial Artery Diameter at baseline and 5 min.after induced ischemia(Flow mediated dilatation,FMD)

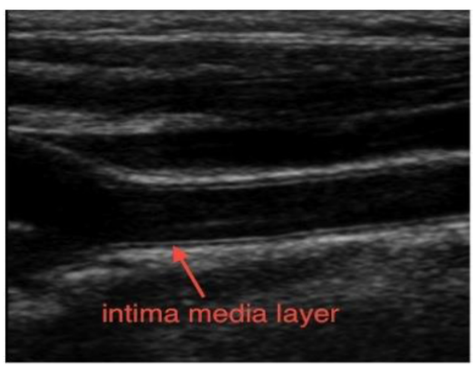

Image 2:
Measurement of Intima Media Thickness of the common Carotid Artery (c IMT)

RESULTS

Improvement of HbA1c >0.5% was achieved in 55 (81%) patients (HbA1c decrease from 9.6±1.8% to 7.3±1.0%, p<0.001). In this group of patients, triglycerides decreased (177±140 to 137±73 mg/dl, p=0.008), while no other changes in vascular indices, blood pressure, lipids or other laboratory values were found (Table 1,2). No difference in vascular indices' changes at follow-up was observed between patients with or without improved glycemic control (Repeated Measures RM-ANOVA, p=NS for all).

When patients with improved glycemic control were compared based on T2DM duration, AIx was decreased in those with short disease duration (<5 years), while it remained unchanged in those with >5 years duration (RM-ANOVA, p=0.013) (Table 3)

Vascular Indices	Baseline	Follow up	p value
c IMT (mm)	0,70 ± 0,20	0,74 ± 0,22	0.038
FMD (%)	4,29 ± 3,23	3,77 ± 3,44	0.055
C1(**ml/mmHgx10**)	14,2 ± 5,2	12,4 ± 4	0.045
C2 (**ml/mmHgx100**)	4,03 ± 2,02	4,53 ± 2,32	ns
PWV (m/s)	11,87 ± 3,54	11,68 ± 3,9	ns
AIx (%)	23,53 ± 8,3	21,87 ± 10,54	ns
ABI	0,94 ± 0,10	0,93 ± 0,11	ns

Table 1: Indices of Vascular Dysfunction in the studied population at baseline and after improvement of HbA1c (from 9.6±1.8% to 7.3±1.0%, p<0.001)

	Baseline	Follow-up	
HbA1c (%)	9,6 ± 1.8	7.3 ± 1.0	**p <0.001**
Total Chol (mg/dl)	193 ± 46	189 ± 43	p= ns*
TRG(mg/dl)	177 ± 140	137 ± 73	**p=0.008**
LDL(mg/dl)	111 ± 41	114 ± 37	p=ns
SBP/ DBP (mmHg)	132 ± 18 / 74 ± 12	133 ± 20 / 74 ± 10	p=ns
Waist to hip Ratio	0,96 ± 0,09	0,93 ±0,15	p=ns
BMI (Kg/ m²)	30,66 ±6,15	30,70 ± 6,14	p=ns

Table 2 : Levels of HbA1c,Chol,TRG ,Blood Pressure and BMI at baseline and follow-up

T2DM duration	Aix Baseline	Aix Follow up	P value
>5 years (n=56)	24,28±6,58	23,81±8,78	ns*
<5 years (n=12)	19,9±13,81	11,91±13,10	**0.013**

Table 3: Augmentation Index and its relation to Diabetes Type 2 duration (*non-significant)

	Baseline	Follow-up
HbA1c(%)	9.6±1.8	7.3 ±1.0
BMI	30,6 ±6,1	30,7 ± 6,1
Statins	42 (62%)	48 (70%)
Metformin	46 (67%)	61(90%)
Sulfonylureas	19 (28%)	21 (31%)
DPP4-Inhibitors	15 (22%)	17(25%)
GLP1-Analogues	-	4 (6%)
Insulin	23 (34%)	36 (53%)
Calcium Channel blockers	12 (18%)	20 (29%)
ACE Inhibitors	15(22%)	19(28%)
ARBs	33 (49%)	17(25%)
B-Blockers	23 (34%)	25 (38%)
Diuretics	21(31%)	30 (44%)

Table 4:Treatment differences at baseline and follow up

CONCLUSIONS

In T2DM patients, aggressive glycemic control without concomitant improvement in other cardiovascular risk factors was not associated with an improvement in vascular function indices at 6 -12 months.

However, in patients of <5 years duration, intensive glycemic control improved only augmentation index, a combined index of aortic stiffness and peripheral vascular function. Further studies are needed to investigate whether multifactorial interventions of longer duration are more effective in improving vascular function and cardiovascular risk in T2DM.

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Sofia Antoniou
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