

Arterial stiffness is an independent predictor of renal function decline in patients with type 2 diabetes younger than 60

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Arterial stiffness (impairment of the cushioning capacity of the aorta) leads to transmission of high pressure waves to the fragile microvasculature resulting in end organ damage¹. Aortic pulse wave velocity (Ao-PWV) the gold standard measure of arterial stiffness is an independent predictor of CVD in T2DM patients with advanced renal disease¹.

Attenuation of Ao-PWV improves survival in patients with ESRD¹.

We have previously demonstrated in T2DM subjects with preserved renal function that Ao-PWV has an inverse relationship with glomerular filtration rate (GFR) and that blood pressure independent reduction in Ao-PWV is possible^{2,3}.

The role of Ao-PWV as a predictor of glomerular filtration rate (GFR) decline in T2DM subjects with preserved renal function is unclear.

Aim

To evaluate if Ao-PWV is an independent predictor of renal function decline in European subjects with type 2 diabetes and relatively preserved renal function.

Methods

Observational study of 254 T2DM subjects attending a diabetes clinic in a university hospital. Median duration of follow up was 9 years (range 2-12). Subjects were followed at least annually with standardised clinical and laboratory assessments.

GFR was estimated by MDRD and CKD-EPI equations. Ao-PWV was measured by applanation tonometry (Sphygmocor system). As age is a strong determinant of Ao-PWV and affects renal function, subjects were divided into two groups above 60 years of age (n=138) or below 60 years (n=116). We determined median final eGFR for those above and below 60 years. Progression was defined as those subjects who had a final eGFR below the median for that age group.

Results

Baseline features of the cohort are shown in Table 1. Subjects below 60 years reaching an eGFR value below the median for this group at the end of the observation period (i.e. progressors) had a significantly higher Ao-PWV value at baseline and a higher rate of GFR decline (Table 2 and Figure 1). In those above 60 years baseline Ao-PWV was similar (12.2±2.7 vs. 12±2.8 m/s) in patients defined as progressors versus non-progressors.

Ao-PWV was an independent risk factor for decline of renal function after adjustment for risk factors in those below 60 years (Table 3)

Conclusions

Aortic pulse wave velocity is an independent predictor of eGFR decline in relatively younger (<60 years of age) subjects with T2DM and preserved renal function. Ao-PWV could be a treatment target for slowing the progression of renal dysfunction in younger patients with T2DM.

Table 1. Baseline characteristics of cohort (n=254)

Age (years)	60 (33-82)
Gender (M/%)	162/64%
Diabetes duration years	10.2±6.9
HTN(%)	88%
BMI (kg/m ²)	32.2±6.5
HbA1c % (mmol/mol)	7.8±1.4
SBP (mmHg)	141.8±17.2
DBP(mmHg)	79±9.5
PP(mmHg)	62.6±14.9
ACR (mmol/mg)b	2.4 (0.8-8.1)
Cholesterol (mmol/l)	4.6±3.1
E GFR (ml/min)	84.9±25.6
AoPWV (m/s)	11.1±2.7

Table 2 Baseline characteristics of subjects who are progressors vs. non progressors

	Progressors n = 54	Non-progressors n = 62	p-value
Age	51±6	49±6.2	0.25
Gender (M/%)	68	60	0.43
Diabetes duration	8.9±5.8	6.6±3.4	0.017
HTN(%)	98	79	0.003
PP(mmHg)	59.7±14.1	56.9±11	0.45
ACR(mmol/mg)	4.6 (1.05-19.1)	2.3(0.47-5.77)	0.011
HbA1c (%)	7.8±1.3	7.8±1.4	0.88
E GFR (ml/min)	87.7±16.2	99.6±14.9	<0.001
AoPWV (m/s)	10.7±2.6	9.6±2.2	0.01

Figure 1 and Table 3 Ao-PWV is an independent predictor of renal function decline in 'younger' subjects with T2DM

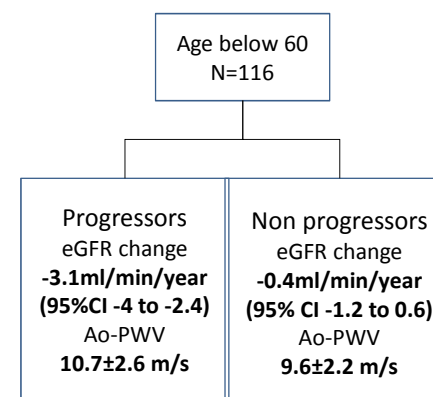


Table 3

	IRR	95%CI	p-value
Age (years)	0.97	0.93-1.01	0.18
Gender (male)	1.41	0.93-2.07	0.079
Diabetes duration (years)	0.98	0.96-0.99	0.014
eGFR(ml/min)	0.98	0.97-0.99	0.005
Albuminuria	0.65	0.35-1.21	0.175
No of antihypertensive medications	0.96	0.78-1.18	0.723
Ao-PWV(m/s)	1.14	1.01-1.28	0.028
Pulse pressure(mmHg)	0.99	0.97-1.01	0.653