Relationship between bladder, periarterial and somatic neuropathy in diabetes

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Objectives

■ Diabetes commonly affects bladder nerves. However, relation between bladder, periarterial and somatic neuropathy in diabetes is not well known. Here we studied such relations.

Methods

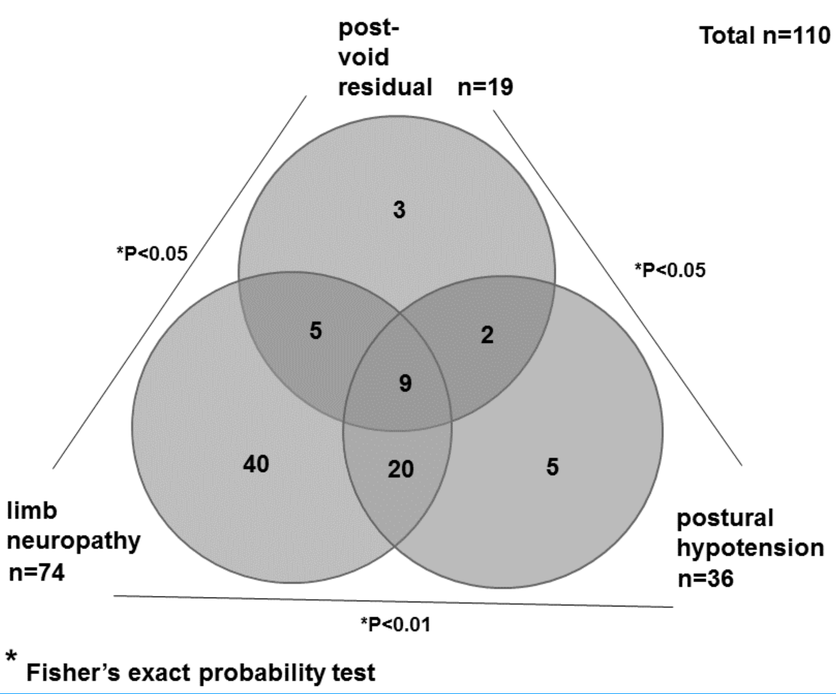
■ Total 110 diabetic subjects were enrolled in the study. All were referred patients in order to screen diabetic neuropathy irrespective of symptoms. They were 61 men, 49 women; mean age 59.3 years (31-85 years); mean disease duration 14.0 years (5-30 years); mean HbA1C 10.1% (5.1-16.3%). We performed nerve conduction study (NCS, A-alpha/beta and B fiber), ultrasound post-void residual measurement (PVR, abnormal>50 ml, mainly Adelta/C fiber) and postural blood pressure measurement (abnormal>-20 mmHg, Adelta/C fiber). Statistics was performed using Fisher's exact probability test and Student's *t*-test.

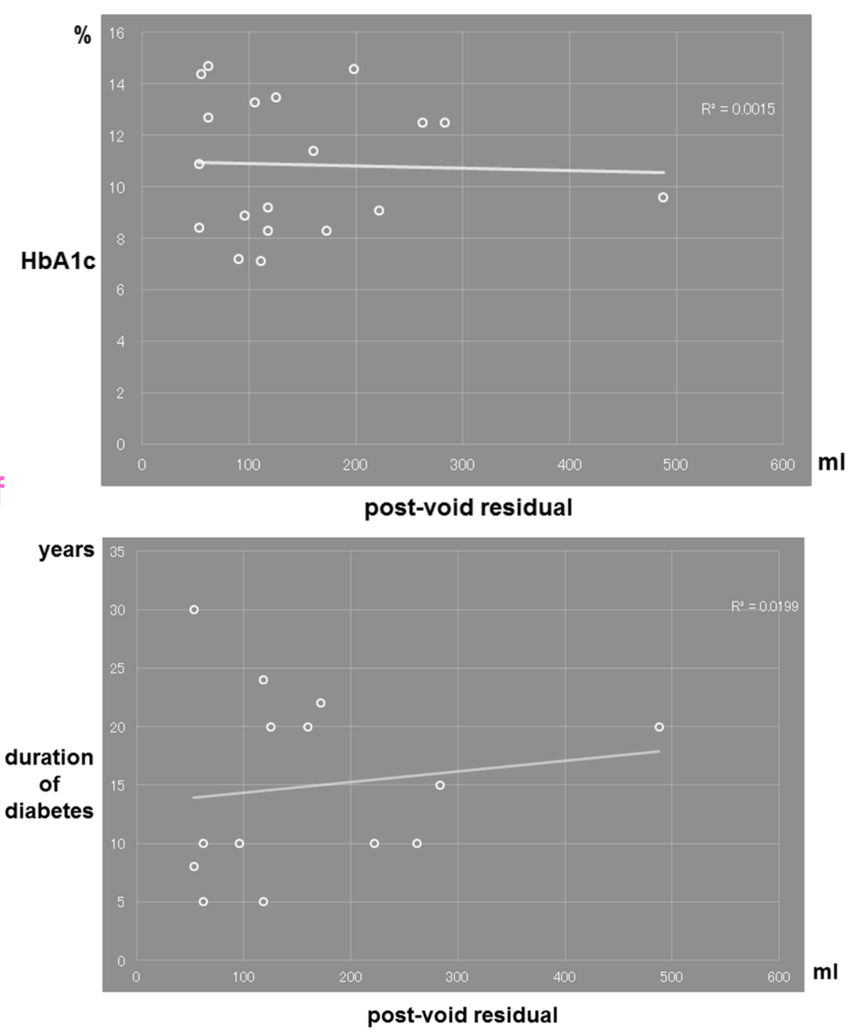
Results

■ NCS abnormality, PVR and postural hypotension were noted in 74, 19 and 36 of the subjects, respectively. There were clear relationship between NCS and PVR ($p<0.05$), postural hypotension and PVR ($p<0.05$) and NCS and postural hypotension ($p<0.01$), respectively. There were also subjects who had NCS abnormality alone, PVR alone and postural hypotension alone. PVR did not relate with HbA1C value, while it clearly related with duration of diabetes ($P<0.05$).

	method	abnormality	relevant nerves
nerve conduction study	motor & sensory nerves in the four extremities (median, ulnar, tibial, superficial peroneal, sural)	neuropathy in the limbs (poly-, mono-, multiple mono-neuropathy)	large diameter limb fiber: myelinated A[Aα-Aβ], B fibers (mean diameter 8-15 μm)
post-void residual urine measurement	transcutaneous bladder echography just after voiding	> 50ml residual	small diameter bladder fiber: myelinated, unmyelinated Adelta-C fibers (mean diameter 1-3 μm)
postural blood pressure measurement	blood pressure measurement on lying and 5 min after active standing	> -20mmHg systolic pressure fall	small diameter perivascular fiber: myelinated, unmyelinated Adelta-C fibers (mean diameter 1-3 μm)

Table 1 Three objective tests as a screening of diabetic neuropathy





•Figure 1 Relationship between post-void residual and HbA1C (A) and duration of diabetes (B).

•Post-void residual did not relate with HbA1C value, while it clearly related with duration of diabetes (P<0.05).

•Figure 2 Results of abnormality in three objective tests and their relationship.

Interpretation & Conclusion

■ Bladder dysfunction correlates with somatic and periarterial neuropathy.
On the other hand, 16% of bladder dysfunction occurs without somatic and periarterial neuropathy.

■ Therefore regular PVR measurement seems necessary.