Does Crossing the Legs Decrease Arterial Pressure In Diabetic Patients With Peripheral Vascular Disease?

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OBJECTIVE — To evaluate the effect of crossing the legs at the knee and the ankle on peripheral arterial pressures.

RESEARCH DESIGN AND METHODS — A prospective study of 6 diabetic patients with known peripheral vascular disease and 5 nondiabetic control subjects without peripheral vascular disease was conducted. Peripheral arterial pressures were taken at the ankle and at the great toe before and after crossing the legs at the knees and ankles. Comparisons were made of measurements obtained in the supine and sitting positions. All crossed leg measurements were taken in the sitting position.

RESULTS — Ankle arm indexes and digital arm indexes pressures taken in the sitting position were equal to or higher than supine pressures, with the exception of one subject, GB. In this patient, ankle arm indexes and digital arm indexes on the right extremity were lower in the sitting position, but increased with the legs crossed at the knees and ankles compared with the uncrossed sitting position. In all patients, lower extremity pressures that decreased slightly with crossing the legs remained higher than pressures obtained in the supine position. Statistical analyses showed no significant differences. Wave forms did not change even when there was a slight decrease in ankle arm indexes or digital arm indexes. Control subjects without peripheral vascular disease showed no change in pressures with crossing the legs.

CONCLUSIONS — Crossing the legs at the knees and ankles does not result in a significant decrease in peripheral arterial pressures in diabetic patients with peripheral vascular disease.

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PVD, peripheral vascular disease; AAI, ankle arm indexes; DAI, digital arm indexes; ANOVA, analysis of variance.

It has often been stated that individuals with PVD, especially those with diabetes mellitus, should not cross their legs while sitting because this would decrease arterial blood flow. Instruction lists given to patients frequently include this warning (1,2). However, objective evidence confirming the hypothesis that crossing the legs will decrease arterial blood flow and pressure is lacking. We believe that admonitions by health-care professionals and in foot instruction lists not to cross the legs are based on theory and tradition—not on scientific data. To test this null hypothesis we evaluated the effect of crossing the legs on Doppler peripheral arterial pressures and wave forms in 6 diabetic patients with PVD and 5 control subjects without diabetes or PVD.

RESEARCH DESIGN AND METHODS

— Six diabetic subjects with PVD were randomly chosen to participate in a prospective trial to evaluate whether or not crossing the legs at the knees and at the ankles caused a significant decrease in peripheral pressures. The trial was approved by the Washington University Human Studies Committee, and all patients signed informed consent forms. These patients were compared with 5 subjects without PVD or diabetes. Before leg crossing, baseline AAI were taken with standard Doppler techniques. DAI were taken using photoplethysmographic techniques. Wave forms were obtained from each anatomical area. AAI and DAI were evaluated in both the supine and sitting positions.

The subjects, while in the sitting position, were asked to cross their legs at the knee and then at the ankle; pressures were obtained in each position. The male subjects crossed their legs in the usual male configuration, with the legs at a right angle across the knee. The female subjects crossed their legs in the usual female configuration, with the legs completely crossed at the knees and essentially in a parallel fashion. The subjects were kept in the crossed leg position for 3–5 min before and during pressure

Table 1—*Effect of leg crossing on arterial circulation*

			Position							
			Supine position*		Sitting†‡		Sitting knees crossed		Sitting ankles crossed	
	Sex	Index	Right	Left	Right	Left	Right	Left	Right	Left
Patient										
LN	F	AAI	0.84	0.56	>1	0.79	>1	0.86	>1	0.88
		DAI	0.77	0.56	>1	0.84	>1	>1	>1	0.87
RL	M	AAI	>1	>1	>1	>1	>1	>1	>1	>1
		DAI	0.42	0.73	0.42	0.73	>1	>1	0.87	0.93
JE	M	AAI	0.75	0.77	0.75	0.76	>1	>1	>1	>1
		DAI	0.54	0.39	0.53	0.38	0.59	0.74	0.72	0.72
OR	M	AAI	0.94	1.0	>1	>1	>1	>1	>1	>1
		DAI	0.69	0.72	>1	>1	0.81	0.75	>1	>1
DT	F	AAI	0.60	0.60	0.85	1.0	0.78	0.71	0.92	0.92
		DAI	0.60	0.60	0.92	>1	0.85	0.64	0.78	>1
GB	F	AAI	0.77	0.44	0.61	0.44	0.90	0.87	0.90	0.87
		DAI	0.55	0.22	0.22	0.22	0.36	0.56	0.45	0.31
Mean ± SE			0.71 ± 0.05	0.63 ± 0.07	0.78 ± 0.07	0.76 ± 0.08	0.86 ± 0.05	0.84 ± 0.05	0.89 ± 0.05	0.88 ± 0.06

*$P > 0.05$ supine vs. sitting.
†$P > 0.05$ sitting vs. sitting with knees crossed.
‡$P > 0.05$ sitting vs. sitting with ankles crossed.

measurements. The pressure cuffs were placed below the crossed position. Using the repeated measures ANOVA, the 4 groups, i.e., lying, sitting, sitting with crossed knees, and sitting with crossed ankles, were compared. Individual comparisons were then made using the paired Student's *t* test with a Bonferroni correction for multiple comparisons. $P < 0.05$ was considered significant.

RESULTS — The results of pressure indexes are tabulated in Table 1. Pressures taken in the sitting position were equal to or higher than pressures obtained in the supine position, with the exception of subject GB. Subject RL had a slight decrease in DAI with the ankles crossed compared with pressures obtained with the legs crossed at the knees. However, these DAI were higher than those obtained while supine or sitting with the legs uncrossed. Subject OR's DAI pressure in the right and left extremity was >1 in the sitting position, but, with the legs crossed at the knees, fell to 0.81 and 0.75 on the right and left leg, respectively. However, when the ankles were crossed, the DAI pressure rose to >1. Subject DT showed a decrease in AAI and DAI pressure on the right and left legs with the knees crossed. However, the AAI pressure increased when the ankles were crossed. These pressures, with the knees and ankles crossed, were all higher than those measured in the supine position. The AAI on subject GB's right extremity, while in the sitting position, was 0.61, and 0.77 in the supine position. While in the sitting position, the DAI in the right extremity was 0.22 and 0.55 in the supine position. However, with the legs crossed at the knees and ankles, the AAI pressures were higher than in the supine and the uncrossed sitting positions. The DAI on the right and left extremities with the legs crossed at the knees and ankles were higher compared with the uncrossed sitting position.

No statistically significant differences were detected between values obtained while lying and those while sitting, $P > 0.05$. No differences were noted between the groups in the sitting position with the legs crossed at the knees or ankles compared with uncrossed legs, $P > 0.05$.

Wave forms and amplitude showed only minor variation with crossing the legs. Paradoxically, a slight decrease in wave forms was associated with increased pressure in subjects RL, JE, and GB. Subject LN showed improvement in wave form after crossing the legs at the knee and ankle. Slight decreases in pressures with crossing the legs were not associated with a decrease in wave-form configuration or amplitude.

No patient complained of any symptoms with the legs crossed, nor was there any objective evidence of ischemia, e.g., change in skin color.

CONCLUSIONS — Based on this small sample of diabetic patients with PVD characterized by a history of intermittent claudication and abnormal AAI and DAI, crossing the legs at the knees and the ankles in the sitting position did not significantly impair blood pressure at the ankle or toes. Therefore, the routine

warning to these patients not to cross their legs seems unwarranted. Patients who had previous vascular reconstruction below the knee were not included in this study and might be more predisposed to the effects of crossing the legs. Additional studies of these patients should be undertaken.

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