

ARTERIAL STIFFNESS AND OCCLUSIVENESS CONTRIBUTE TO THE DEVELOPMENT OF LOWER URINARY TRACT SYMPTOMS IN MEN

Hypothesis / aims of study

Recent studies suggest that cardiovascular disease such as atherosclerosis may cause lower urinary tract symptoms (LUTS). Ponholzer et al. (2006) reported the association of four major vascular risk factors (diabetes mellitus [DM], hypertension [HT], nicotine abuse, and hyperlipidemia) and LUTS in both sexes.¹⁾ According to their study, in men, the International Prostate Symptom Score (IPSS) was identical in those with no or one vascular risk factor, yet significantly increased in those with two or more risk factors. This study shows the possibility that atherosclerosis plays an important role in the development of male LUTS. One possible mechanism contributing to LUTS with atherosclerosis might be ischemia and hypoxia of the pelvic vascular system. Supporting this, many studies have been carried out in animal models.²⁾ These studies showed that atherosclerosis induced pelvic ischemia and hypoxia, which caused functional and structural alteration of the detrusor, leading to LUTS. Whereas several studies have demonstrated strong influence of atherosclerosis on LUTS, there is no direct clinical evidence showing the association between vascular condition and LUTS in humans.

As a screening for atherosclerosis, ultrasound examination of the carotid artery, pulse wave velocity (PWV) and ankle-brachial pressure index (ABI), which can assess stiffness and occlusiveness of arteries, are widely used. Thus, in the present study, by using these parameters, we investigated the contribution of peripheral arterial stiffness and occlusiveness to male LUTS.

Study design, materials and methods

From December 2008-April 2010, male patients with LUTS, aged 50 or older, were examined with routine investigation including measurement of prostate volume using transabdominal ultrasound, free uroflowmetry, post-void residual urine volume (PVR) measurement. All patients completed the validated Japanese version of the IPSS. In addition, occlusiveness of peripheral arteries was assessed by intima-media thickness (IMT) of the carotid artery. It was measured by recording ultrasonographic images of both the left and right carotid artery with a 11-MHz liner array transducer (SSA-770A TOSHIBA). A total plaque score was defined by summation of the IMT (mm) at both left and right carotid artery. Severity of occlusiveness is graded according to the following guideline: normal (score 0), mild (score 1 to 5), moderate (score 5.1 to 10), and severe (score over 10). Stiffness of peripheral arteries was estimated by PWV and ABI with blood pressure monitor unit (BP-203RPEIII Omron Healthcare). The PWV value and ABI value for a normal adult is 1400 cm/s and 0.9 to 1.3, respectively. Higher PWV value and/or ABI value than normal level means higher stiffness of the peripheral arteries.

Patients were divided into two groups, mild LUTS group (group A, IPSS 0 to 7) and moderate LUTS group (group B, IPSS 8 to 19). The plaque score, PWV value, and ABI value were compared between the two groups.

Results

A total of 56 male patients (69.9 ± 9.7 y.o) entered the study. The characteristics of two groups are shown in Table 1. There was no significant difference in age distribution between the two groups (group A : 68.5 ± 10.4 y.o, group B : 70.7 ± 8.5 y.o). Average prostate volume of group B (28.9 ± 17.8 ml) was significantly increased as compared to that of group A (21.3 ± 8.2 ml) (p<0.05). Maximum flow rate (Qmax) and PVR in the group A vs B were 17.7 ± 6.2 ml/s vs 11.4 ± 4.8 ml/s (p<0.01) and 40.0 ± 30.7 ml vs 95.7 ± 85.5ml (p<0.01), respectively.

Table 2 shows the vascular parameters of the two groups. Plaque score of the group B was 7.49 ± 5.75 and significantly higher than that in the group A (5.03 ± 3.46) (p<0.05). Moreover, PWV value of the group B (1632 ± 288 cm/s) was also significantly higher than that of the group A (1482 ± 234 cm/s)(p<0.05). ABI values of group A and B were 1.13 ± 0.10 and 1.16 ± 0.07, respectively; not significantly different (p=0.08).

Interpretation of results

In this study, the reduced Qmax and the increased PVR were observed in the patients with moderate LUTS. Moreover, according to the severity of LUTS, plaque score and PWV value were significantly getting higher, while prostate volume was significantly enlarged. These findings indicate the strong association of stiffness and occlusiveness of arteries in the development of male LUTS, as well as prostatic enlargement.

Concluding message

Our data demonstrated strong contribution of atherosclerosis to the development of male LUTS. Treatment of cardiovascular risk factors, such as HT, DM and hyperlipidemia, would therefore also contribute to the prevention of male LUTS.

Table 1- The characteristics of group A and B

Group	IPSS	n	Age (y.o)	Prostate volume (ml)	Qmax (ml/s)	PVR (ml)
A	0~7	22	68.5 ± 10.4	21.3 ± 8.2	17.6 ± 6.2	40.0 ± 30.7
B	8~19	34	70.7 ± 8.5	28.9 ± 17.8*	11.3 ± 4.8**	95.7 ± 85.5**

Values were Means ± SD * p<0.05 ** p<0.01

Table 2- The vascular parameters of group A and B

Group	Plaque score	PWV (cm/s)	ABI
A	5.03 ± 3.46	1482 ± 234	1.13 ± 0.10
B	7.49 ± 5.75*	1632 ± 288*	1.16 ± 0.07

Values were Means ± SD * p<0.05

References

1. Ponholzer A et al : The association between vascular risk factors and lower urinary tract symptoms in both sexes. Eur Urol 50 : 581, 2006
2. Azadzoi K. M et al : Effect of chronic ischemia on bladder structure and function. Adv Med Biol 539 : 271, 2003

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<i>Is this study registered in a public clinical trials registry?</i>	No
<i>Is this a Randomised Controlled Trial (RCT)?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	Yes
<i>Specify Name of Ethics Committee</i>	IRB of Ohta Nishinouchi Hospital
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes