

영아기에 대동맥 축착 교정술을 받은 어린 소아에서의 안정 시 혈압, 좌심실 기능과 질량의 평가

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Evaluation of Resting Blood Pressures, Left Ventricular Function and Mass in Young Children with Successful Coarctoplasty in Infancy

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ABSTRACT

Background and Objectives : Cardiovascular morbidities and mortalities due to persistent hypertension, left ventricular (LV) dysfunction and increased LV mass have been reported in adolescents and adults with successful coarctoplasty. We evaluated progressive properties by measuring resting blood pressures (BP), LV functions and the masses in young children with successful coarctoplasty in infancy. **Subjects and Methods :** BP in the right arm and the left ankle, LV function and mass, by the use of M-mode and pulsed wave Doppler ultrasound, were measured in 25 patients, with a mean age of 6.4 ± 3 years ; and a mean age at the time of repair of 0.22 ± 0.24 years, and in 22 control subjects, with a mean age of 5.8 ± 2.4 years. All subjects were divided into two groups based on age (more than 5 years of age and less than 5 years of age) and were analyzed independently. **Results :** BP in the right arm and left ankle, LV function and mass showed no consistent differences between the two groups. However, as age increased, there was a tendency of wide pulse pressure (PP) in the right arm of patients contrary to that in the control subjects. The relative increase in the PP was mainly due to a relative decrease in the diastolic BP. There was a significant increase in the LV mass index of patients with increasing age ($p < 0.01$). The LV mass index showed significant positive correlations with the systolic BP ($p < 0.05$) and the pulse pressure ($p < 0.05$) of the right arm of the patients. **Conclusion :** We recommend careful long-term follow-up through out adulthood to reduce morbidity and mortality, even for children who received successful coarctoplasty in early infancy. (Korean Circulation J 2002;32 (9):829-836)

KEY WORDS : Aortic coarctation ; Hypertension ; Ventricular function ; Hypertrophy, left ventricular.

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서 론

1944 Crafoord Nylin¹⁾
가
가

²⁾³⁾

3 1

⁴⁾⁵⁾ 30~60%

⁶⁾⁷⁾

가

⁸⁻¹⁰⁾

가가

¹¹⁾¹²⁾ 1

¹³⁾

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가

가

대상 및 방법

1989 1 1997 12
1

(6.4 ± 3)

16

9

0.22 ± 0.24

6.34 ± 2.99

가 20 mmHg

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23

(

, 18 ;

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resection and end -
to - end anastomosis가 17 , subclavian flap angio-
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22

12 , 10

5.8 ± 2.4

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혈압 측정

10

(Agilent

CMS V24 and V26, Germany)

(SBP),

(DBP)

5

95 percentile

¹⁴⁾

심장 초음파 검사

Acuson Sequoia C256 echocardiography system

Acuson 128XP echocardiography system

5 MHz 7 MHz transducer

American Society of Echocardi-
ography¹⁵⁾

25

가

apical 4 - chamber view

5

cycle 5

좌심실의 기능

가

Fractional shor-

tening(FS)

, Velocity of circumferen-

tial fiber shortening(VCF)¹⁶⁾ $FS/[ET/(RR)^{1/2}]$

. Peak systolic wall stress(WS)

Grossman¹⁷⁾

Wall stress(10^3 dynes/cm²)=SBP×LVIDs(mm)/
[LVPWs(mm)×(1LVPWs(mm)/LVIDs(mm))
; LVIDs, ; LVPWs,
; ET, ejection time ; RR, RR in-
terval
가
pulsed wave Doppler peak early and late
transmitral flow velocity(E and A velocities) de-
celeration time(DT) , E/A ratio
pulsed wave Doppler
isovolumic relaxation time(IVRT)
(18)

좌심실 질량의 측정

M - mode
(LVIDd),
(LVPWd), (Sd)
body surface area(BSA)
(19)
LV mass index(gm/m²) = {(0.8)[(1.04)(LVIDd +
LVPWd + Sd)³ - (LVIDd³)] + 0.6}/BSA.

통계학적 분석

SPSS (version 10)
±
Mann - Whitney
Spearman
general linear model
p가 0.05

결 과

5 5
(Table 1).
Table 2

5 5
3
가
12%)

Table 1. Clinical characteristics of subjects

	Patients	Control	p
Total			
Number (N)	25	22	
Age (year)	6.40 ± 2.99	5.86 ± 2.39	NS
BSA	0.79 ± 0.23	0.83 ± 0.15	NS
Subgroup (>5year)			
Number (N)	14	12	
Age (year)	8.43 ± 2.52	7.55 ± 1.84	NS
BSA	0.92 ± 0.24	0.92 ± 0.15	NS
Subgroup (<5year)			
Number (N)	11	10	
Age (year)	3.83 ± 0.55	3.83 ± 0.88	NS
BSA	0.64 ± 0.08	0.72 ± 0.07	NS

Values are mean ± SD. BSA : body surface area, NS : not significant

Table 2. Blood pressure profiles

	Patients	Control	p
Total			
SBP (arm)	99.3 ± 13.5	96 ± 8.4	NS
DBP (arm)	50 ± 6.9	51 ± 6.2	NS
PP (arm)	48.9 ± 12	45 ± 7.5	NS
SBP (leg)	108.9 ± 10.9	109.3 ± 7.2	NS
DBP (leg)	57.7 ± 6.7	56.7 ± 5.2	NS
PP (leg)	51.2 ± 7.5	52.6 ± 4.2	NS
Subgroup (>5year)			
SBP (arm)	101 ± 13.8	98 ± 9.6	NS
DBP (arm)	49.1 ± 6.4	53 ± 5.6	NS
PP (arm)	51.4 ± 13	44 ± 7.6	NS
SBP (leg)	110.4 ± 10.6	112.3 ± 7.3	NS
DBP (leg)	58.9 ± 6.4	58.7 ± 4.9	NS
PP (leg)	51.5 ± 7.3	53.6 ± 4.8	NS
Subgroup (<5year)			
SBP (arm)	97 ± 13.3	95 ± 7.1	NS
DBP (arm)	51 ± 7.7	49 ± 6.4	NS
PP (arm)	46 ± 10.3	46 ± 7.6	NS
SBP (leg)	107.1 ± 11.4	105.8 ± 5.4	NS
DBP (leg)	56.3 ± 7.0	54.4 ± 4.8	NS
PP (leg)	50.8 ± 8.0	51.4 ± 3.3	NS

Values are mean ± SD (mmHg). SBP : systolic blood pressure, DBP : diastolic blood pressure, PP : pulse pressure, NS : not significant

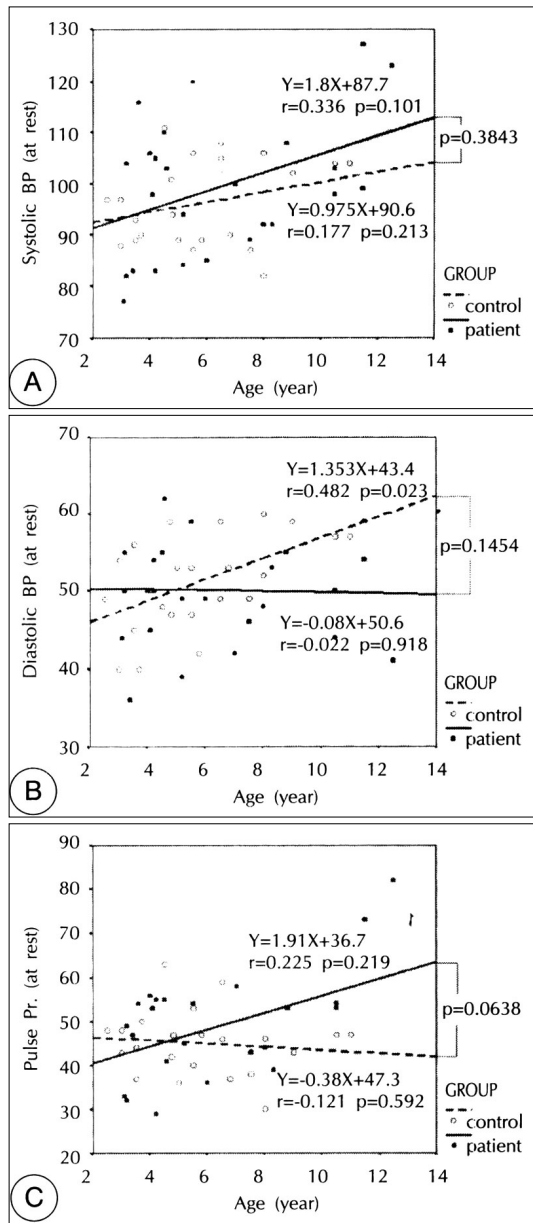


Fig. 1. Changes in systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse pressure (PP) of right arm with increasing age at rest (A, B, C). As subject's age increased, patients showed tendency towards a wider PP and a relative decrease in DBP. SBP showed the same increasing pattern in patients and control subjects.

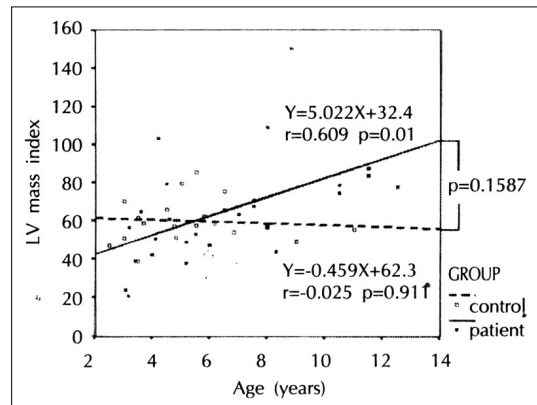


Fig. 2. Changes in left ventricular (LV) mass index with increasing age at rest. As subject's age increased, patients showed a significant increase of left ventricular mass index ($p<0.01$).

(Fig. 1).

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(Table 3).

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(Table 4)

가 가

($p<0.01$)

가

(Fig. 2).

(, $p<0.05$;

, $p=0.68$),

(, $p<0.05$; ,

$p=0.28$)

(Fig. 3).

고 찰

6.4

Table 3. LV systolic and diastolic function

	Total		Subgroup (>5year)		Subgroup (<5year)	
	Patients	Control	Patients	Control	Patients	Control
Systolic						
FS	0.33 ± 0.05 [†]	0.33 ± 0.05	0.313 ± 0.06 [†]	0.31 ± 0.04	0.345 ± 0.03 [†]	0.347 ± 0.05
ET (msec)	275 ± 20 [†]	275 ± 23	286 ± 16 [†]	278 ± 25	262 ± 18 [†]	271 ± 21
VCF (circ/sec)	0.94 ± 0.24 [†]	0.98 ± 0.14	0.94 ± 0.18 [†]	0.93 ± 0.12	0.95 ± 0.323 [†]	1.03 ± 0.138
WS (× 10 ³) (dynes/cm ²)	46 ± 12.8 [†]	48.6 ± 15.7	49.2 ± 14.2 [†]	50.7 ± 16.6	41.5 ± 9.3 [†]	46 ± 14.9
Diastolic						
IVRT (msec)	42.2 ± 5.3 [†]	41.1 ± 1.9	42.4 ± 5.4 [†]	41.1 ± 1	41.9 ± 5.5 [†]	41.2 ± 2.7
DT (msec)	139 ± 35 [†]	138 ± 11	143.4 ± 47.5 [†]	141.7 ± 83.5	134.5 ± 9.3 [†]	133.2 ± 11.6
A velocity (m · sec ⁻¹)	0.49 ± 0.14 [†]	0.46 ± 0.11	0.53 ± 0.12*	0.43 ± 0.07	0.45 ± 0.15 [†]	0.51 ± 0.13
E velocity (m · sec ⁻¹)	1.07 ± 0.19*	0.95 ± 0.15	1.04 ± 0.21 [†]	0.94 ± 0.14	1.11 ± 0.16 [†]	0.96 ± 0.16
E/A ratio	2.4 ± 1.06 [†]	2.12 ± 0.42	2.04 ± 0.45 [†]	2.26 ± 0.42	2.86 ± 1.43 [†]	1.95 ± 0.38

Values are mean ± SD. FS : fractional shortening, ET : ejection time, VCF : velocity of circumferential fiber shortening, WS : peak systolic wall stress, IVRT : isovolumic relaxation time, DT : deceleration time, * : p<0.05 vs control, † : p = NS vs control

Table 4. LV mass index

	Patients	Control	p
Total			
LV MI (gm/m ²)	65 ± 28.9	59.6 ± 11.6	0.792
Subgroup (>5year)			
LV MI (gm/m ²)	72.9 ± 29.7	60.9 ± 11.7	0.403
Subgroup (<5year)			
LV MI (gm/m ²)	53.9 ± 25	57.9 ± 11.9	0.481

Values are mean ± SD. LV MI : LV mass index

상지 고혈압

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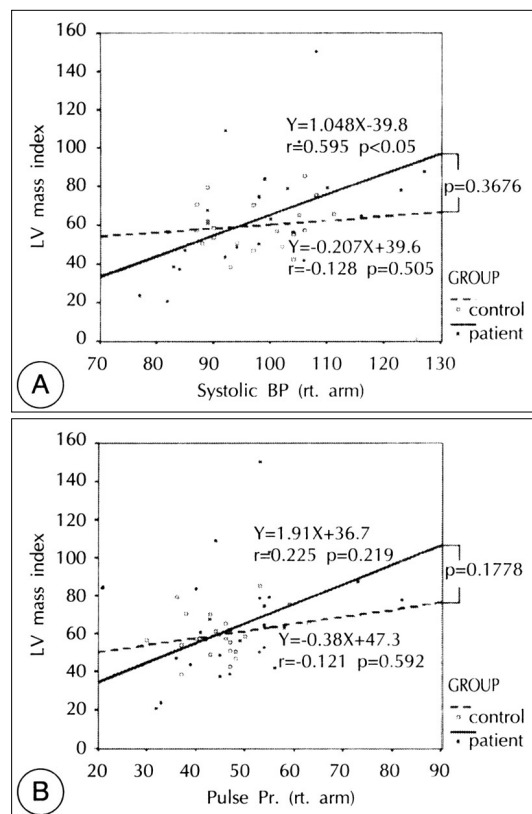


Fig. 3. Changes in left ventricular (LV) mass index with systolic blood pressure (A) and pulse pressure (B) of right arm at rest. LV mass index showed significant positive correlations with systolic BP (p<0.05) and pulse pressure (p<0.05) of right arm in patients.

22 (, 5.8±2.4) , M - mode pulsed wave Doppler

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결 과 : (12%) 가 가 가 (p<0.01), (, p<0.05 ; , p=0.68), (, p<0.05 ; , p=0.28)

결 론 :

중심 단어 : ; ; ;

감사문

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