

## 요골 동맥의 분지 변형 및 사행성에 관한 고찰

- Trans-radial Coronary Procedure를 위한 -

유병수<sup>1</sup> · 이한효<sup>1</sup> · 윤정환<sup>1</sup> · 이승환<sup>1</sup> · 김장영<sup>1</sup> · 이봉기<sup>1</sup>  
고지연<sup>1</sup> · 김승년<sup>1</sup> · 이명옥<sup>1</sup> · 황성오<sup>2</sup> · 최경훈<sup>1</sup>

## The Study of Branching Anomaly and Tortuosity of Radial Artery for Trans-Radial Coronary Procedure

Byung Su Yoo, MD<sup>1</sup>, Han-Hyo Lee, MD<sup>1</sup>, Junghan Yoon, MD<sup>1</sup>, Seung Hwan Lee, MD<sup>1</sup>,  
Jang Young Kim, MD<sup>1</sup>, Bong-Ki Lee, MD<sup>1</sup>, Ji Yean Ko, MD<sup>1</sup>, Seung Nyun Kim, RT<sup>1</sup>,  
Myung Ok Lee, RN<sup>1</sup>, Sung Oh Hwang, MD<sup>2</sup> and Kyung Hoon Choe, MD<sup>1</sup>

<sup>1</sup>Department of Internal Medicine and <sup>2</sup>Emergency Medicine, Wonju College of Medicine, Yonsei University, Wonju, Korea

## ABSTRACT

**Background and Purpose** : The radial artery has currently been regarded as a useful vascular access site for coronary procedures. We want to evaluate the incidence and clinical significance of anomalous branching pattern and tortuosity of radial artery. **Materials and Method** : From May 1997 to May 1999, retrograde radial artery angiography was performed in 1191 cases. Branching anomaly and tortuosity of upper extremity artery, procedure times and local vascular complications were analyzed. **Results** : 1) Anomalous radial arterial branching was found in 3.2%. Most common one was high origin of the radial artery (2.4%). 2) Tortuosity of radial artery was found in 4.2%. Most common tortuosity were S shape in 1.8% and omega shape in 1.8% of cases. 3) Cross over to other artery, radial artery occlusion and perforation occurred in 24 cases, 6 cases and 4 cases, respectively. Prolonged procedure times, crossover to other artery and radial artery perforation was related with tortuosity of radial artery, not with anomalous branching. **Conclusion** : The incidence in branching anomaly and tortuosity of radial artery was not frequent in our study. Radial artery tortuosity was associated with old age, prolonged procedure time and radial artery perforation. In selected cases, pre- or intra-procedural angiographic assessment of radial artery might be helpful in performing safe procedure. (Korean Circulation J 2000;30(1):82-89)

**KEY WORDS** : Radial artery · Branching anomaly · Tortuosity.

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: (0371) 741 - 0917 · : (0371) 741 - 0502  
E - mail : yoonj@wonju.yonsei.ac.kr

5)

서 론 1191 (

58.4%)

1989 Cam -

peau<sup>1)</sup>

방 법

가

(ULTRAMARK 9 ; Advanced Technology Laboratories Inc., Bothell, WA, U.S.A.)

2-6)

가

5)7)

가

11% 24.4% .<sup>8-11)</sup> (high origin of radial and ulnar artery), (double brachial artery) (double radial artery) (Fig. 1A, B and C).<sup>12)</sup>

가

(severe criteria)

<sup>13)</sup> styloid process

가

45

가 3 75

대상 및 방법 2 1 90

대 상

1997 4 1999 6 ( , Z, S, (Fig. 2A, B, C and D)



**Fig. 1.** The anomalous branching patterns of upper extremity artery. Retrograde angiogram showed high origin of radial artery (A), double radial artery (B) and double brachial artery (C).

## 결 과

### 대상 환자의 임상적 특징

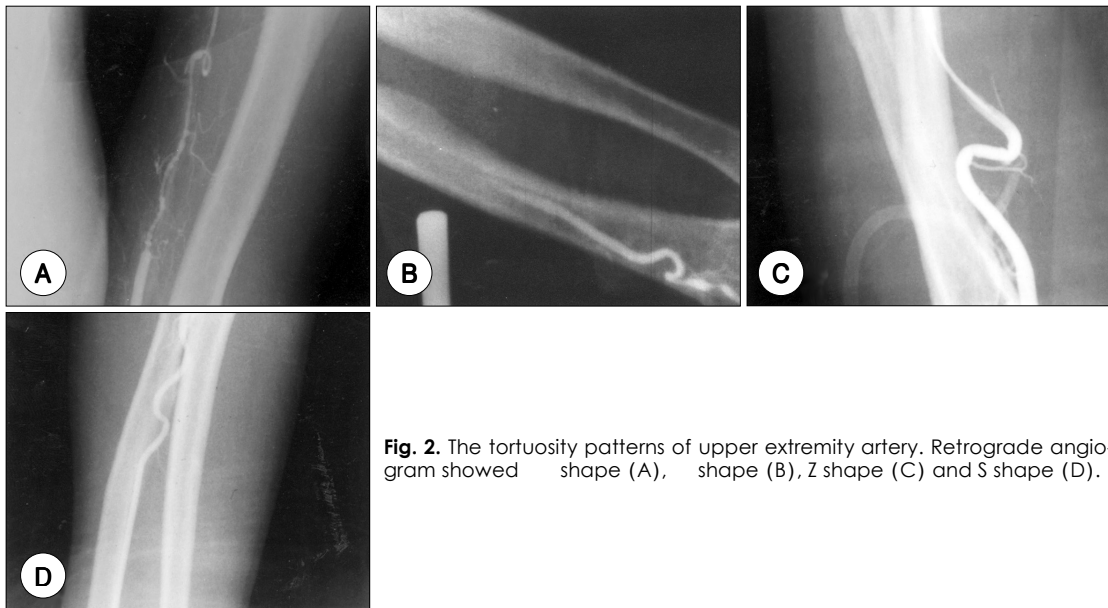
가 1191 ( : 1191 ,  
: 275 ) 60 ± 10 ,  
27.7%,  
25.5%, 11.6%,  
11.6%, 2.7%, 3.9%

. Yoon

5)6) 2.66 ± 0.44 mm( : 2.69 ± 0.40 mm,  
(vascular access time), (fluoroscopy time) : 2.43 ± 0.38 mm) (Table 1).  
(total procedure time)

### 관동맥 조영술 시 접근 동맥의 분포

자료 분석 및 통계 915 (76.8%) 276 (23.2%)  
SPSS 8.0 (SPSS Inc., Chi - 1175 (98.7%)  
cago. IL, USA) . 97.1% (  
: 79.1%) , 17 (1.4%)  
t -  
Chi - square , 12 (1.0%)  
. p 0.05



**Fig. 2.** The tortuosity patterns of upper extremity artery. Retrograde angiogram showed shape (A), shape (B), Z shape (C) and S shape (D).

**Table 1.** Baseline clinical data

	N	1191
Age (years)		60.0 ± 10.2
Male (%)		696 (58.4)
Clinical diagnosis		
Stable angina		330 (27.7)
Unstable angina		304 (25.5)
Vasospastic angina		32 ( 2.7)
Atypical chest pain		138 (11.6)
Acute MI		138 (11.6)
Old MI		46 ( 3.9)
Others*		203 (17.0)
Diameter of radial artery (mm)		2.66 ± 0.44
No. of Coronary Intervention		275

\* : silent ischemia, preoperative evaluation, follow-up, et al.

4 (0.3%) ,  
 275 95.3%  
 ( : 59.6%) ,  
 2 (0.7%)  
 11 (4.0%)  
 (Table 2).

#### 요골동맥의 분지 변형

1191 38 (3.2%) .  
 28 (2.4%) 가 가  
 , 6 (0.5%),  
 2 (0.2%) , 2 (0.2%)  
 (Table 3).

#### 요골동맥의 사행성

50 (4.2%) 67 가  
 S 21 (31.3%),  
 21 (31.3%) 가  
 8 (11.9%), Z 10 (14.9%) ,  
 ( , ) 7 (10.4%)  
 가 가  
 (55.2%) (Table 4).

**Table 2.** Distributions of vascular access site

	Coronary angiography (n = 1191)	Coronary intervention (n = 275)
Access site (%)		
Radial	1157 (97.1)	262 (95.3)
R/R (right to left)	17 ( 1.4)	2 ( 0.7)
R/B	1 ( 0.1)	0
R/F	12 ( 1.0)	11 ( 4.0)
R/R/F	4 ( 0.3)	0
Laterality of radial artery		
Right	915 (76.8)	111 (40.4)
Left	276 (23.2)	164 (59.6)

R : radial artery B : brachial artery F : femoral artery

**Table 3.** Anomalous branching of upper extremity artery

	Number (%)
Total number	38 (3.2)
High origin of radial artery	28 (2.4)
Double radial artery	2 (0.2)
Double brachial artery	6 (0.5)
High origin of ulnar artery	2 (0.2)

#### 요골동맥의 분지 변형 및 사행성과 환자의 나이, 체표면적 및 시술시간과의 관계

가  
 ( )  
 (66.9 ± 7.8 )  
 (59.7 ± 10.2)  
 가 , (1.57 ± 0.15 vs.  
 1.65 ± 0.17) (p<0.01),  
 (p<0.01, p<0.05)(Table 5).

#### 요골동맥의 분지 변형 및 사행성과 시술관련 합병증과의 관계

6  
 1  
 4 , 3  
 가 (p<0.01).

1

**Table 4.** Vessel tortuosity of upper extremity artery

	Prox-RA	mid-RA	Dist-RA	Ulnar A.	Brachial A.	Total (%)
-shape	3	1	1	-	3	8 (11.9)
-shape	9	4	2	4	2	21 (31.3)
Z shape	5	2	0	2	1	10 (14.9)
S shape	12	3	1	4	1	21 (31.3)
Others	6	-	-	1	-	7 (10.4)
Total (%)	35 (52.2)	10 (14.9)	4 (6.0)	11 (16.4)	7 (10.5)	67 (100)

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Prox-RA : proximal radial artery    Mid-RA : middle radial artery    Dist-RA : distal radial artery    A : artery

**Table 5.** Comparisons of procedure times depending on the radial artery anomaly and tortuosity

	RA tortuosity		RA anomaly		Total
	No (n = 1141)	Yes (n = 50)	No (n = 1151)	Yes (n = 36)	(n = 1191)
Age (years)	59.7 ± 10.2	66.9* ± 7.8	60.0 ± 10.26	61.5 ± 9.54	60.0 ± 10.21
BSA (m <sup>2</sup> )	1.65 ± 0.17	1.57* ± 0.15	1.65 ± 0.17	1.61 ± 0.16	1.65 ± 0.17
TPT (min)	21.8 ± 11.2	26.0* ± 9.92	21.9 ± 11.2	24.9 ± 10.5	22.0 ± 11.2
VAT (min)	2.95 ± 3.11	3.34 ± 3.58	2.94 ± 3.11	3.88 ± 4.45	2.97 ± 3.17
FT (min)	5.82 ± 4.12	7.14** ± 3.6	5.84 ± 4.09	6.97 ± 4.56	5.88 ± 4.11

\* : p<0.01    \*\* : p<0.05    TTP : total procedure time    VT : vascular access time    FT : fluoroscopy time

**Table 6.** Comparisons of complications depending on the radial artery anomaly and tortuosity

Radial artery Complication	RA tortuosity		RA anomaly	
	Yes (n = 50)	No (n = 1141)	Yes (n = 36)	No (n = 1151)
Occlusion	1	5	0	6
Perforation	3*	1	0	4
Cross-over	8**	26	2	32

\* :  $p < 0.01$ , 2 cases : Z shape, 1 case : shape

\*\* : p<0.01, 2 cases associated with subclavian tortuosity

### 요골동맥의 분지 변형

crossover 34 8 (p<0.01), 11 24.4% Uglietta 15) 9% , Karlsson 16) 11% , McCormack 8) 16.53% S 1 2 3 , Z 2 2 가 (Table 6).

고찰

가

가 Uglietta 가 3.2%

가 .

가 요골동맥의 사행성

Karlsson <sup>16)</sup> , 4.2% , 가

10% 1% McCorm - 14% 가 ,

ack <sup>10)</sup> 2.4% 가 가

가 가

가

2 , Baeza <sup>12)</sup> Lanz <sup>17)</sup> 1.2 가

3.27% , 2.89% <sup>23 - 25)</sup>

4 가 ,

(bilateral variation)

McCormack <sup>8)</sup> 6.3% Baeza <sup>12)</sup> crossover 34 가 , 10 24 8

35% (23.5%)가 2 , 3 , Z 2 ,

가 S 1 4

가 , 3 가

(aberrant vessel) <sup>21)</sup> 가

2 가

1 가

1 가 ,

가

2.63%(38 1 )

## 요 약

연구배경 :

방 법 :

결 과 :

- 1) 38 (3.2%)  
28 (2.4%) 가
- 2) 50 (4.2%) 67 가  
S 21 (31.3%),  
21 (31.3%) 가  
가 가 (55.2%)
- 3) 가  
( $p < 0.05$ ), ( $p < 0.01$ ).
- 4) 가 ( $p < 0.01$ ),  
crossover  
가 ( $p < 0.01$ ).

결 론 :

중심 단어 :

1998

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