



Iatrogenic Ulnar Neuropathy Following Coronary Angiography : A Case Report

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Introduction

Coronary angiography (CAG) is essential diagnostic tools for identifying coronary artery disease. Complications associated with radial access can include radial artery perforation, occlusion, pseudoaneurysm, arteriovenous fistula (AVF), hematoma, compartment syndrome and nerve injury. There has been no case report of ulnar neuropathy resulting from the radial approach for CAG; therefore, we introduce such a case in this discussion.

Case Report

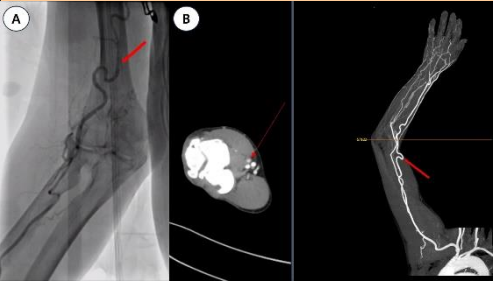
Patient information

- Age/Sex : 78-year-old / male
- Chief complaint : Right hand motor weakness
- Past history : Diabetes mellitus, hypertension, coronary artery disease

Hospital course

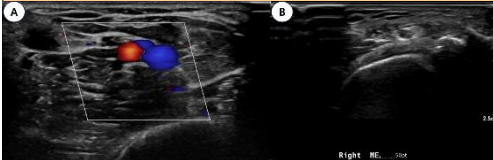
- Coronary angiography (CAG) : During right radial artery approach, the patient felt pain in elbow area with sudden edema of forearm
- Peripheral angiography (PAG) : Arteriovenous fistula (AVF) (Fig. 1-A)
- Doppler ultrasonography : AVF flow at right brachial vein with focal wall defect of right brachial artery (Fig. 2-A)
- CT angiography : Focal remnant AVF flow at basilic vein and brachial artery angulation (Fig. 1-B)
- Consultation to the rehabilitation medicine for further evaluation and treatment : six months after symptom onset, due to ongoing right hand motor weakness
- Physical examination : Hypoesthesia in the ulnar distribution, evident hand motor weakness of all hand intrinsic muscles with atrophy, no tenderness on the medial epicondyle

Fig 1. CAG and CT angiography



(A) CAG procedure. Contrast enhancement of the right brachial artery. Suspected AV fistula of the brachial artery is seen in the upper arm (B) CT angiography shows AV fistula remnant finding (left) and brachial artery angulation (right)

Fig 2. Doppler ultrasonography



(A) Doppler ultrasonography showed AVF flow at right brachial vein with focal wall defect of right brachial artery (B) An ultrasonography showed ulnar nerve swelling 2cm superior to the medial epicondyle

- Electrodiagnostic study : Spontaneous activity at rest in the right flexor carpi ulnaris (FCU), first dorsal interosseous (FDI), and abductor digiti minimi (ADM) muscles. Abnormal findings in motor and sensory nerve conduction study (NCS) on ulnar nerve (Table 1)
- Elbow ultrasonography : Ulnar nerve swelling 2cm superior to the medial epicondyle (Fig. 2-B)
→ Injection of 10mg of triamcinolone was administered
→ Mecobalamin, pregabalin PO medication were continued
→ no improvement of the symptoms and has been referred to the orthopedics department to consider ulnar nerve transposition surgery

Table 1. Findings of the nerve conduction study and electromyography (A-C)

(A) Motor nerve conduction study

Nerve / Sites	Muscle	Latency ms	Amp.2-4 mV	Duration ms	Segments	Distance cm	Lat Diff ms	Velocity m/s
L Median - APB								
Wrist	APB	3.27	14.5	5.33	Wrist - APB	7		
Elbow	APB	6.83	13.3	5.50	Elbow - Wrist	20	3.56	56
R Median - APB								
Wrist	APB	3.44	17.3	5.40	Wrist - APB	7		
Elbow	APB	7.33	16.5	5.56	Elbow - Wrist	21	3.90	54
L Ulnar - ADM								
Wrist	ADM	2.62	14.2	6.58	Wrist - ADM	7		
B.Elbow	ADM	5.69	13.6	6.42	B.Elbow - Wrist	17	3.06	56
A.Elbow	ADM	7.42	13.1	7.35	A.Elbow - B.Elbow	10	1.73	58
Axilla	ADM	8.92	12.6	7.19	Axilla - A.Elbow	9	1.50	60
R Ulnar - ADM								
Wrist	ADM	3.19	0.9	5.33	Wrist - ADM	7		
B.Elbow	ADM	6.83	0.6	6.27	B.Elbow - Wrist	17	3.65	47
A.Elbow	ADM	11.17	0.7	5.02	A.Elbow - B.Elbow	10	4.33	23
Axilla	ADM	14.02	0.8	3.46	Axilla - A.Elbow	7	2.85	25
L Radial - EIP								
Forearm	EIP	1.96	13.2	7.60	Forearm - EIP	7		
Elbow	EIP	5.31	13.0	7.52	Elbow - Forearm	17	3.35	51
R Radial - EIP								
Forearm	EIP	2.29	14.1	8.35	Forearm - EIP	7		
Elbow	EIP	5.00	13.4	8.06	Elbow - Forearm	14	2.71	52

(B) Sensory nerve conduction study

Nerve / Sites	Rec. Site	Pk Lat ms	Pk Amp µV	Segments	Distance cm	d Lat ms	Vel. Pk m/s
L Median - Digit II							
Palm	Digit II	1.67	26.1	Palm - Digit II	7		42.0
Wrist	Digit II	3.38	22.8	Wrist - Palm	7	1.71	41.0
R Median - Digit II							
Palm	Digit II	1.58	15.9	Palm - Digit II	7		44.2
Wrist	Digit II	3.48	17.6	Wrist - Palm	7	1.90	36.9
L Ulnar - Digit V							
Wrist	Digit V	3.44	22.5	Wrist - Digit V	14		40.7
R Ulnar - Digit V							
Wrist	Digit V	NR	NR	Wrist - Digit V	14		NR
L Radial - Anatomical snuff box (Forearm)							
Forearm	Wrist	2.00	14.7	Forearm - Wrist	10		47.5
R Radial - Anatomical snuff box (Forearm)							
Forearm	Wrist	2.21	22.7	Forearm - Wrist	10		45.3
L Dorsal ulnar cutaneous - Hand dorsum (Forearm)							
Forearm	Hand dorsum	2.04	28.6	Forearm - Hand dorsum	8		39.2
R Dorsal ulnar cutaneous - Hand dorsum (Forearm)							
Forearm	Hand dorsum	2.77	9.9	Forearm - Hand dorsum	8		28.9

(C) Needle EMG

EMG Summary Table		Spontaneous									
Muscle	Nerve	Roots	IA	Fib	PSW	Fasc	MUAP	Amp	Dur.	PPP	Recruitment
R. Abductor pollicis brevis	Median	C8-T1	N	None	None	None	N	N	N	N	N
R. Abductor digiti minimi (manus)	Ulnar	C8-T1	N	None	3+	None	N	N	poly	Discrete	
R. Pronator teres	Median	C6-C7	N	None	None	None	N	N	N	N	N
R. Flexor carpi radialis	Median	C6-C7	N	None	None	None	N	N	N	N	N
R. Flexor carpi ulnaris	Ulnar	C7-T1	N	None	2+	None	N	N	N	N	N
R. Extensor carpi radialis longus	Radial	C5-C6	N	None	None	None	N	N	N	N	N
R. Biceps brachii	Musculocutaneous	C5	N	None	None	None	N	N	N	N	N
R. Triceps brachii	Radial	C6-C8	N	None	None	None	N	N	N	N	N
R. Deltoid	Axillary	C5-C6	N	None	None	None	N	N	N	N	N
R. C5 paraspinal	Spinal	C5	N	None	None	None	N	N	N	N	N
R. C6 paraspinal	Spinal	C6	N	None	None	None	N	N	N	N	N
R. C7 paraspinal	Spinal	C7	N	None	None	None	N	N	N	N	N
R. First dorsal interosseous	Ulnar	C8-T1	N	3+	3+	None	N	N	N	N	Discrete

Conclusion

At the time of CAG, the absence of vascular obstruction or symptoms that are markedly severe negated the necessity for evaluation for ulnar neuropathy. This suggests that early multidisciplinary team approach might have led to a more favorable outcome. Given the angulation of the brachial artery, future coronary angiography (CAG) progression in this patient may necessitate the utilization of either an ulnar or femoral artery approach.