

[CASE REPORT]

Localized Right Subclavian Artery Dissection Detected by Accident on an Ultrasound Examination: A Case Report and Literature Review

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Abstract:

Right subclavian artery dissection was detected in a 78-year-old female victim of the Kumamoto earthquake during a carotid artery ultrasound examination. She was subsequently taken to hospital and diagnosed with localized subclavian artery dissection (LSAD) by contrast-enhanced computed tomography. There have been no previous reports of LSAD detected at a medical checkup. LSAD may progress and become severe, even in asymptomatic patients or patients with mild symptoms, and careful long-term follow-up is therefore required in all patients diagnosed with LSAD.

Key words: localized right subclavian artery dissection, carotid artery ultrasound examination, Kumamoto earthquake

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Introduction

The subclavian artery is relatively unsusceptible to damage because it is protected by the presence of the ribs and clavicles. Localized subclavian artery dissection (LSAD) is thus a rare condition usually associated with arterial catheterization or trauma (1-4), and few cases of spontaneous subclavian artery dissection have been reported in the literature (5-12). We identified a case of LSAD incidentally during a carotid artery ultrasound examination as part of a medical checkup carried out among temporary housing residents in the area affected by the Kumamoto earthquake (Mi-

namiaso Village), Japan. Subclavian aortic dissection with mild symptoms is rare, and there have been no previous reports of LSAD being detected accidentally during a medical checkup. The current case may thus help to determine suitable treatment plans for LSAD.

Case Report

The patient was a 78-year-old woman with mild pain in her right shoulder when moving it. Her family history was unknown. She had no history of smoking or drinking. Her medical history included cholelithiasis, hypertension, and hyperlipidemia (all before the earthquake), and depression,

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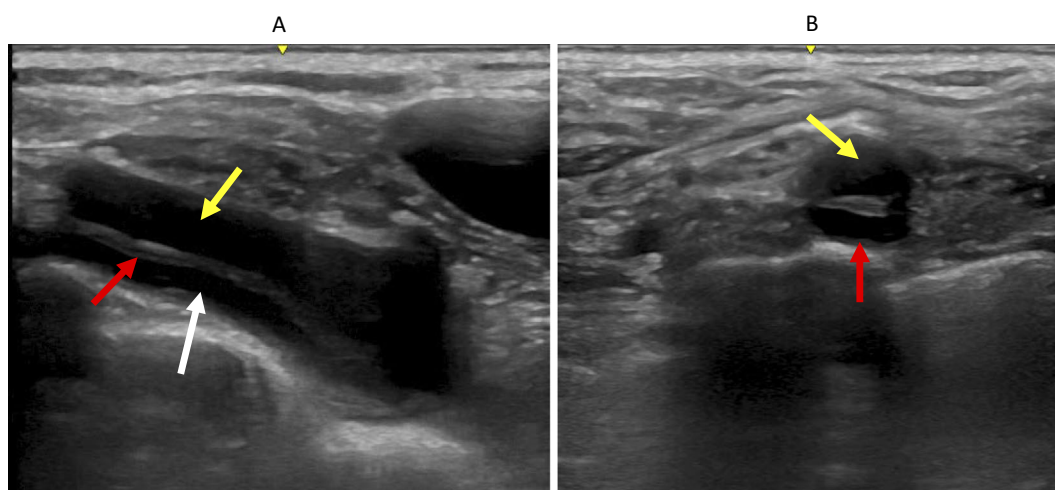


Figure 1. The carotid artery ultrasound examination (B-mode). B-mode ultrasound revealed an approximately 4-cm localized dissection with a false lumen from the root of the right subclavian artery to the axillary artery. The flap was slightly thicker with no motion. A: Long-axis view: right subclavian artery true lumen (yellow arrow), flap (red arrow), false lumen (white arrow). B: Short-axis view: right subclavian artery true lumen (yellow arrow), false lumen (red arrow).

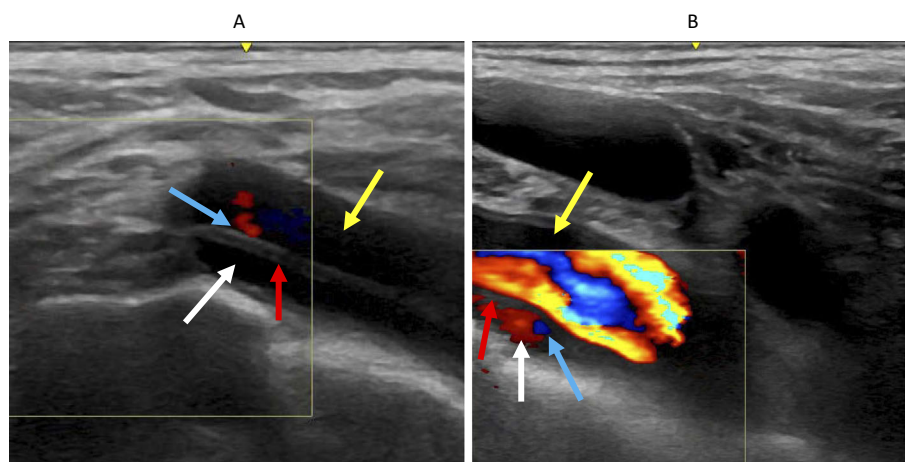


Figure 2. Carotid artery ultrasound examination (color mode). A: Color mode revealed an entry tear located at the brachiocephalic artery in the long-axis view. Right subclavian artery true lumen (yellow arrow), flap (red arrow), entry (blue arrow), false lumen (white arrow). Right subclavian artery true lumen (yellow arrow), flap (red arrow), entry (blue arrow), false lumen (white arrow). B: Color mode re-entry tear located at the axillary artery in the long-axis view. Right subclavian artery true lumen (yellow arrow), flap (red arrow), false lumen (white arrow). B: Right subclavian artery true lumen (yellow arrow), re-entry (blue arrow), flap (red arrow), false lumen (white arrow).

insomnia, glaucoma, and second and third rib fractures (all after the earthquake).

Localized artery dissection of approximately 4 cm from the root of the right subclavian artery to the axillary artery was detected by carotid artery ultrasound during a medical checkup conducted among temporary housing residents in November 2017 in Minamiaso Village, which was affected by the Kumamoto earthquake. No aortic regurgitation or dissection from the ascending to descending aorta was detected by echocardiography. There was no marked difference between the patient's left and right blood pressures at the time of the examination, and her vital signs were stable. How-

ever, she was taken to an emergency hospital to prevent progression of the dissection. Contrast-enhanced computed tomography was conducted after the hospital transfer on the same day as the medical checkup. A localized false lumen from the root of the right subclavian artery to the axillary artery was then confirmed and diagnosed as LSAD.

The medical checkup revealed the following: height 147 cm, weight 48 kg, pulse 74/min, percutaneous oxygen saturation (SpO₂) 96% (room air), right upper extremity blood pressure 144/77 mmHg, and left upper extremity blood pressure 144/78 mmHg. The blood biochemistry test results were as follows: D-dimer 0.26 µg/mL, N-terminal pro-brain

natriuretic peptide; NT-proBNP ≤ 60 pg/mL, total cholesterol 162 mg/dL, neutral fat 118 mg/dL, high-density lipoprotein cholesterol 65 mg/dL, low-density lipoprotein cholesterol 73 mg/dL, and hemoglobin A1C 6.2%. Echocardiography indicated a normal left ventricular wall motion. There was no pericardial effusion or aortic regurgitation and no dissection in the aortic root, descending aorta, aortic arch, brachiocephalic artery, left common carotid artery, or left subclavian artery. B-mode ultrasound of the carotid arteries revealed an approximately 4-cm-long localized dissection with a false lumen from the root of the right subclavian artery to the axillary artery. The flap was slightly thicker with no motion (Fig. 1). Color mode revealed an entry tear located at the brachiocephalic artery and re-entry tear at the axillary artery (Fig. 2).

At the examination after hospital transfer, her blood biochemistry test results were as follows: D-dimer 0.6 $\mu\text{g/mL}$, fibrin/fibrinogen degradation products (FDP) 2.5 $\mu\text{g/mL}$, white blood cells 7,200/ μL , red blood cells $519 \times 10^4/\mu\text{L}$, hemoglobin 14.8 g/dL, and C-reactive protein 0.02 g/dL. Contrast-enhanced computed tomography revealed localized

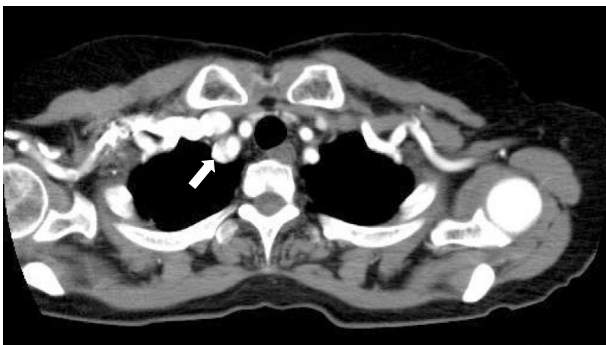


Figure 3. Contrast-enhanced computed tomography scan 1. Transverse image of subclavian artery dissection and flaps (arrow).

dissection from the right subclavian artery to the proximal axillary artery, with no vasodilatation. No dissection or vasodilatation was found in any other blood vessels. Her right vertebral artery and right thyroid artery arose from the true lumen, and no areas of abnormal density were found around the blood vessels (Fig. 3, 4).

Blood tests at the hospital revealed no abnormality, and she was diagnosed with right LSAD. She was treated conservatively and discharged home with outpatient follow-up.

Discussion

A PubMed search identified only 13 other cases of LSAD in the literature (Table). The natural history of spontaneous subclavian artery dissection thus remains poorly understood, and the present case may provide additional valuable information in relation to its prediction and follow-up. We discuss the natural history of LSAD based on the present and previous reports, including trauma cases.

The mean age of the 14 cases of LSAD was 48.0 ± 18.9 years, including 5 men and 9 women. The causes of LSAD in the previous reports were trauma in four cases (1-3, 5), vascular injury after insertion of an arterial catheter in one case (4), and spontaneous subclavian artery dissection in eight cases (6-13). The subclavian artery is usually less susceptible to damage than other arteries because of the presence of the ribs and clavicles, and all traumatic cases were associated with high-energy trauma, such as a traffic accident or compression (1-3, 5). The main symptoms were neurological disturbances, such as pain, paralysis, and numbness (1-3, 5). Subclavian artery injury should thus be suspected in patients with rib and clavicle fractures. If the subclavian artery is associated with arteriosclerotic disease, arterial catheter placement may damage the arterial wall and cause LSAD (4). LSAD should thus also be suspected in patients who experience an unusual sensation during arterial

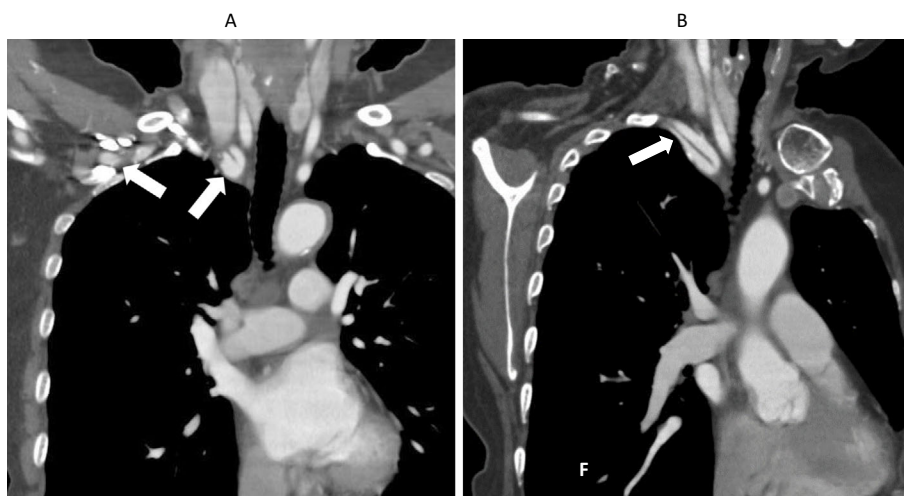


Figure 4. Contrast-enhanced computed tomography scan 2. Localized dissection was detected from the right subclavian artery to the proximal axillary artery (arrow). A: Coronal-plane image (front). B: Coronal-plane image (oblique position).

Table. LSAD: Comparison with Previously Reported.

	1	2	3	4	6	7	8	13	12	11	10	5	9	Our case
Ref no.														
age/gender	21/f	41/m	75/f	52/f	36/f	71/m	54/m	75/f	61/f	41/f	29/f	31/m	58/m	78/f
side	lt.	lt.	rt.	rt.	lt.	lt.	lt.	rt.	lt.	lt.	rt.	rt.	lt.	rt.
Incentive	traumatic	traumatic	traumatic		spontaneous	spontaneous	spontaneous	traumatic	spontaneous	spontaneous	spontaneous	traumatic	spontaneous	spontaneous
smoking	N/A	N/A	N/A	N/A	N/A	yes	N/A	N/A	N/A	N/A	none	N/A	yes	none
clinical manifestation	left interscapular pain	left shoulder palsy	numbness in right arm, pain in the right arm	moderate pain in the right clavicular region	left shoulder and neck pain	left facial hypesthesia, left arm ataxia and gait disturbance	left-sided facial numbness, left-sided occipital headache, left-sided neck pain, weakness and pain in his upper limbs	numbness in right arm, pain in the right arm	pain in the left arm	dullness in left arm	shortness of breath, chest pain, pain in the right arm	numbness in right arm	left shoulder and neck pain, left arm paresthesia, left arm numbness, vertigo, vomiting	right shoulder pain during operation, numbness
aneurysm	yes	N/A	N/A	N/A	N/A	none	N/A	N/A	N/A	N/A	none	N/A	none	none
medical history	chronic thyroiditis	hypertension	dyslipidemia	angina pectoris	hypertension	arteriosclerosis	hypertension	dyslipidemia	none	hypertension, arterial occlusion of the left upper limb	none	N/A	hypertension	hypertension, dyslipidemia, right 2, 3 rib fractures
complications (cerebellar infarction)	N/A	none	N/A	N/A	N/A	yes	yes	N/A	N/A	N/A	none	N/A	yes	none
complications (artery occlusion)	none	none	right subclavian artery, right axillary artery	none	none	vertebral artery	vertebral artery	right subclavian artery, right axillary artery	none	none	none	none	none	none
complications (bleeding from SAD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
blood pressure: left-right difference	yes	yes	yes	yes	none	none	none	yes	none	none	blood pressure control	yes	yes	yes
treatment	anticoagulant therapy, blood pressure control →antiplaquet therapy	vascular IVR, anticoagulant therapy →antiplaquet therapy	surgical treatment	vascular IVR	blood pressure control	antiplaquet therapy, statin therapy	anticoagulant therapy →antiplaquet therapy	surgical treatment	anticoagulant therapy →antiplaquet therapy	anticoagulant therapy, statin therapy	blood pressure control	good	good	good
prognosis	good	good	good	good	good	good	good	good	good	good	good	good	good	good
progressive SAD	none	none	yes	none	none	none	none	yes	none	none	none	none	yes	none
Ref no.														
age/gender														
side														
Incentive														
smoking														
clinical manifestation														
aneurysm														
medical history														
complications (cerebellar infarction)														
complications (artery occlusion)														
complications (bleeding from SAD)														
blood pressure: left-right difference														
treatment														
prognosis														
progressive SAD														

N/A(not applicable), SAD: subclavian artery dissection, IVR: Interventional Radiology

catheterization and who have pain near their clavicle. Among eight patients with spontaneous LSAD, four had high blood pressure (6, 8, 9, 11) one had arteriosclerotic disease (7), and the other four had no specific underlying disease. Left subclavian artery dissection was detected in seven cases (6-9, 11-13), possibly because the pulsatile flow is stronger in the left than in the right subclavian artery (14). The main symptoms were pain in the shoulder, neck, chest, and upper limbs on the affected side (6-10, 12). Three patients with cerebellar infarction also experienced dizziness and gait disturbances (7-9). However, the previously reported LSAD patients all experienced obvious symptoms, while the current patient only had mild symptoms and was continuing with her normal daily life; this suggests that many potential cases of LSAD may remain undetected. Although it is also possible that the trauma of moving into the temporary housing complex caused the LSAD in the present case, her relatively mild symptoms compared with previously reported traumatic LSAD cases meant that we could not determine the present case to be traumatic LSAD. It was also reported that elderly individuals in temporary housing complexes visited doctors because of bone fractures significantly more frequently than the general elderly population and that systolic hypertension occurring immediately after moving into temporary housing continued up to one year after the disaster (15-17). It is therefore also possible that the LSAD in the present case was associated with the living environment at the temporary housing complex.

Nine cases of LSAD with complications have been reported previously (3, 5, 7-13), including three cases of cerebellar infarction due to vertebral artery occlusion (7-9), three cases of axillary and brachial artery thromboembolism (anterograde) (3, 5, 12), one case of femoral artery thromboembolism (retrograde) (11), and two cases of hemorrhaging caused by arteriorrhesis, resulting in death (10, 13). Six patients showed progression of the dissection after stroke (3, 9-13), including five patients with spontaneous LSAD (9-13). Both of the patients who died had spontaneous LSAD (10, 13). Spontaneous LSAD is thus more likely to progress than traumatic LSAD and may become severe.

The prognosis of LSAD is generally favorable. However, the dissection progressed in six cases, with fatal results in two, suggesting that patients with LSAD should undergo careful follow-up and appropriate treatment. LSAD has been reported to resolve naturally following blood pressure management (6, 9), although invasive treatment may become necessary if progression of the false lumen causes upper limb ischemia. Endovascular treatment has been associated with a good outcome (12), while antithrombotic therapy (7, 8) and blood pressure management have also been associated with favorable prognoses in patients with LSAD and cerebellar infarction (9). In the event of accidental detection of LSAD in a patient with no neurologic manifestations, such as the present case, careful follow-up and conservative treatment, based on blood pressure management and

lifestyle guidance, is considered the best option, with continued monitoring to detect progression or complications.

Conclusion

We herein report a mild case of LSAD detected accidentally during a medical checkup. However, dissection may progress and become severe, even in patients with mild or no symptoms, indicating the need for careful and long-term follow-up of such patients.

Written informed consent for the publication of the clinical details and images was obtained from the patient.

The authors state that they have no Conflict of Interest (COI).

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