Left Distal Radial Approach for Stent-assisted Coiling of Left Vertebral Artery Aneurysm

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Objective: We report a first case of stent-assisted coiling for the left vertebral artery aneurysm via the left distal radial approach.

Case Presentation: The patient was a 47-year-old male with unruptured left vertebral artery aneurysm. Transfemoral approach was infeasible because of the history of thoracoabdominal aortic dissection, the left distal radial approach was selected. Distal radial artery in the left anatomical snuff box was punctured and a 4 Fr guiding sheath was introduced to the left vertebral artery, followed by successful coil embolization with stent.

Conclusion: The left distal radial approach via the anatomical snuff box is a feasible method for left vertebral artery lesions.

Keywords: distal radial approach, anatomical snuff box, stent-assisted coiling

Introduction

Coil embolization of cerebral aneurysm is mainly performed via transfemoral approach, but it is sometimes performed via transradial/brachial approach due to the presence of aortic diseases or anatomical variants. When the right transradial/brachial approach is used, the operator stands on the right side of the patient and performs the procedure in the usual posture, but when the left transradial/brachial approach is chosen, the operator may need to stand on the left side of the patient or may require a posture bending over patient’s body, which may influence the operability during the procedure. Recently, an approach through the anatomical snuff box at a site more distal than the usual radial artery puncture site, that is, the distal radial approach or snuffbox approach has been reported in the coronary interventions. Especially, in the left distal radial approach, the operator can perform treatment in the usual posture, and it is said that this approach has excellent operability and comfortability.

Here, we report a case of stent-assisted coil embolization of left vertebral artery aneurysm through the left distal radial approach in a patient for whom the transfemoral approach was infeasible.

Case Presentation

A 47-year-old male
Past medical history: Aortic replacement for thoracoabdominal aortic dissection at 41 years old
Familial medical history: Subarachnoid hemorrhage in his mother and younger sister
History of present illness: An unruptured left vertebral artery aneurysm with a size of 8 mm was found in the work-up of headache by MRI. Since subarachnoid hemorrhage was very likely due to the familial medical history, the patient requested endovascular treatment of the aneurysm, but the transfemoral approach was considered difficult because of the strong tortuosity in the thoracoabdominal aorta due to chronic aortic dissection (Fig. 1). Since the MRA showed the smooth origin of the left vertebral artery, the approach through the left radial or brachial artery was considered as feasible and

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appropriate, and the left distal radial approach was selected. Stent-assisted coil embolization was planned and daily aspirin 100 mg and clopidogrel 75 mg were administered from 10 days before treatment.

Endovascular treatment: Endovascular treatment was performed under local anesthesia. Patient’s left hand was placed on his abdomen in a natural posture and grasped with the thumb inside, and the wrist was set in slightly ulnar flexion. A 20 G needle was inserted at the palpable point of the radial artery in the anatomical snuffbox, a 0.025-inch guidewire was carefully advanced into the radial artery under fluoroscopy, and a 4 Fr short sheath was first inserted. After angiography of the radial artery (Fig. 2), a 0.035-inch wire was advanced to the brachial artery and the 4 Fr short sheath was exchanged for the 4 Fr/100 cm guiding sheath, ASAHI FUBUKI Dilator Kit (Asahi Intec, Aichi, Japan) (Fig. 3). The guiding sheath was guided to the left vertebral artery using a 4 Fr diagnostic catheter. Then, stent-assisted coil embolization of the vertebral artery aneurysm was performed.
Distal Radial Approach for Stent-assisted Coiling

using the jailing method. After LVIS-Jr 3.5 mm × 18 mm (MicroVention-Terumo, Tustin, CA, USA) was deployed in the vertebral artery using Headway-17 microcatheter (MicroVention-Terumo), 12 coils with 71 cm in length were inserted through the jailing Excelsior SL-10 microcatheter (Stryker Neurovascular, Fremont, CA, USA), and complete embolization was achieved (Fig. 4). Operability during the procedure was favorable and unnatural posture was not forced to both the patient and the operator. The activating clotting time immediately after coiling was 360 seconds, but the sheath was removed without heparin reversal, and the puncture site was compressed manually for 10 minutes and by bandage with gauze for 3 hours. Complete hemostasis was obtained after removal of compression. The patient became able to walk 3 hours after treatment and was discharged from the hospital 4 days after the operation. At the time of discharge, pulsation of the distal radial artery puncture site was favorable.

Discussion

Neuroendovascular surgeons sometimes encounter the cases that transfemoral approach is difficult or impossible, and for these cases transradial/brachial approach is selected. Normally, the right transradial/brachial approach is selected based on the dominant hand of the operator or monitor position in the angiography suite. When the lesion is located in the internal carotid artery or the right vertebral artery, the right transradial/brachial approach is feasible without a problem in many cases. However, when the lesion is located in the left vertebral artery, it is difficult to advance a guiding catheter to the left vertebral artery through the right upper limb, or even if it is possible, the catheter may lack stability for treatment. Therefore, for the left vertebral arterial lesions, the left transradial/brachial approach is desirable, but the operator may have to apply puncture standing on the left side of the patient or posture bending over patient’s body when standing on the right side of the patient. The operator would sometimes feel difficulty and discomfort in the different situations.

To solve these problems with the left upper limb approach, Kiemeneij reported the left distal radial approach or snuffbox approach for the coronary angiography and interventions. In this report, patient’s left hand was placed on the lower abdomen in a natural way and the distal radial artery in the anatomical snuff box was punctured. The anatomical snuffbox is a concavity formed on the radial side of the wrist when the thumb is extended. It is surrounded by the tendon of the extensor pollicis longus posteriorly and the tendons of the extensor pollicis brevis and abductor pollicis longus anteriorly. The deep palmar branch of the radial artery is running through this space (Fig. 5). When the hand is grasped with the thumb inside and set in ulnar flexion, the distance between the skin surface and the radial artery in the snuffbox becomes closer and palpation of the artery becomes favorable. Kiemeneij reported that the technical success rate of the coronary access through the distal radial approach with good palpable pulse in the snuffbox was 89% (62 of 70 cases), and 6 Fr, 5 Fr, and 4 Fr sheaths were used in 58%, 31%, and
11% of these, respectively. Of the eight unsuccessful cases, puncture failed in four cases and puncture succeeded but wire could not be guided to the radial artery in the forearm in four cases. Hemorrhagic complication at the puncture site requiring additional treatment was none. Ecchymosis of the hand was noted in one patient (1.4%) and forearm hematoma considered due to wire perforation was noted in one patient (1.4%). In addition, obstruction of the radial artery at the puncture site was noted in one patient, but patency of the radial artery in the forearm was confirmed in all cases. No patient complained of numbness or functional disorder of the hand.

The biggest advantage of the left distal radial approach is that the operator can perform the procedure in the same posture at the same position as the usual transfemoral or transradial/brachial approach. In addition, the patient’s left hand is simply placed on the lower abdomen in a natural way and uncomfortable extension or fixation for puncture are not necessary. Moreover, since the puncture site is close to the body surface, hemostasis is easy and requires compression for only a short time, and postoperative comfort of the patient is superior. Furthermore, the risk of radial artery occlusion might be low compared with the conventional radial artery puncture.

Nevertheless, there are some disadvantages of the distal radial approach. First, puncture is more difficult than that through the conventional radial approach because of smaller diameter of the vessel. In studies reported by researchers of the coronary interventions, the indication of this method was limited to cases with the presence of a palpable artery in the anatomical snuffbox, and cases with weak or absent pulse were excluded. When cases with favorable pulsation were selected, a technical success rate of 88%–100% was achieved. Although an ultrasound-guided distal radial artery puncture method has been reported, patient with weak or absent pulse in the snuffbox is not suitable for this approach. Second, even if puncture succeeds, it may be difficult to advance the guidewire due to tortuosity of the snuffbox radial artery with vasospasm. They discussed that guiding to the forearm may become possible using a thinner guidewire (0.018 inch), but it is obvious that careful wire operation is desirable.

Distal radial “snuffbox” approach has recently been reported mainly in the fields of the coronary artery and abdominal lesions, but this is the initial report for neuroendovascular treatment. The present case was an unruptured dissecting aneurysm of the left vertebral artery with very wide neck, hence stent-assisted technique was necessary to coil embolization. Transfemoral approach was risky because of the thoracoabdominal aortic dissection and strong tortuosity; therefore, the approach through the left upper limb was considered appropriate and the left distal radial approach was selected. For stent-assisted coil embolization using the jailing method, a minimum of 6 Fr size guiding catheter is necessary, but we used a 4 Fr guiding sheath (ASAHI FUBUKI Dilator Kit) in order to reduce the puncture size at the snuffbox. During the treatment, the patient placed his left hand on the abdomen in a natural way and the operator stood on the right side of the patient and performed puncture as usual. Puncture was achieved at the point where the strong pulsation was palpable in the anatomical snuffbox, and the wire was carefully guided under fluoroscopy. First, a 4 Fr short sheath was placed, and the radial arteriography demonstrates the absence of vasospasm or strong tortuosity, and then the 4 Fr short sheath was exchanged for a 4 Fr guiding sheath using 0.035-inch wire. After inserting the guiding sheath into the left vertebral artery, the procedure could be carried out in the same fashion as usual stent-assisted coiling. Catheter handling was favorable during the procedure and the posture of operator was as usual without feeling any stress. The operative time was about 2 hours, but the patient did not complain of pain or numbness near the puncture site or discomfort of the posture during the procedure. The patient was taking dual antiplatelet drugs and activating...
clotting time was extended by intraoperative heparin administration, but the sheath was removed without reversal of heparin, and complete hemostasis could be acquired with 10 minutes of manual compression and 3 hours of bandage. Early ambulation after treatment was possible and pulsation of the radial artery at the puncture site was favorable at the time of discharge.

It was suggested that the left distal radial approach for the left vertebral artery lesions is useful for both patient and operator. It can be a feasible method for patients requiring an endovascular treatment through the left upper limb in the presence of a palpable radial artery in the anatomical snuffbox.

**Conclusion**

Stent-assisted coiling via the left distal radial approach was performed in a patient with the left vertebral artery aneurysm for whom transfemoral approach was infeasible. Left distal radial approach enables favorable operability similarly as usual access and may be a useful method for cases requiring an approach via the left upper limb.

**Disclosure Statement**

There is no conflict of interest to be disclosed in this report.

**References**