Case Report

Endovascular Treatment of a Patient with Arteriovenous Malformation in the Parotid Region

Kensaku Yoshida1* and Hidenori Oishi2

1Department of Neurosurgery, Tokyo Metropolitan Hiroo Hospital, Japan
2Department of Neurosurgery, Juntendo University School of Medicine, Japan

Abstract

This report describes a rare case of a patient with arteriovenous malformation in the parotid region that received endovascular treatment. A 44-year-old female who presented with cardiac murmur in the left neck on close examination was referred to our hospital. Physical findings included left jugular vein distention, swelling of the left neck, and vascular murmur on auscultation. Cervical magnetic resonance imaging revealed flow voids in dilated vessels in the left parotid region. Angiography showed a high flow shunt between the dilated external carotid artery and the external jugular vein. The patient was diagnosed as having AVM in the parotid region due to AVM localization, and endovascular treatment was performed for the AVM. The postoperative course was uneventful and no recurrence occurred for five years postoperatively. AVM in the parotid region may develop in association with trauma or it may have a genetic predisposition. There are presently many reports on direct shunts. However, the AVM is generally a single channel shunt and some studies have reported that endovascular treatment is effective for the AVM. In the present patient, endovascular treatment was suitable because the AVM consisted of a single channel and the shunt site could be easily identified.

ABBREVIATIONS

AVM: Arteriovenous Malformation; HHT: Hereditary Hemorrhagic Telangiectasia; MRI: Magnetic Resonance Imaging; MRA: Magnetic Resonance Angiography; A-V shunt: Arteriovenous Shunt

INTRODUCTION

Arteriovenous malformation (AVM) in the parotid region is relatively rare and sometimes develops in association with congenital disorders, genetic diseases, or trauma [1,2]. We present here the case of a patient with idiopathic AVM with accompanying vascular murmur in the neck who obtained a good prognosis following endovascular treatment. In this article, we will discuss the diagnosis and treatment of parotid AVM with a review of the literature.

CASE PRESENTATION

A 44-years-old female reported with a complaint of swelling in the left side of the neck for 1 year. The patient was referred to our hospital because of vascular murmur detected in the neck on medical examination and suspected vascular abnormalities in the left neck on close examination. She has past medical history of rheumatoid arthritis and hypertension (no history of trauma). She has no family history of hereditary hemorrhagic telangiectasia (HHT). Physical findings showed left jugular vein distention and mild swelling of the left neck were observed. A pulsatile mass was palpable. There were no external abnormalities such as skin ulcers. Auscultation revealed vascular murmur at the same site. No neurologic deficit was recognized.

Neuroradiological findings

Cervical magnetic resonance imaging (MRI) showed flow voids were observed around the left parotid gland (Figure 1). Cervical magnetic resonance angiography (MRA) showed vasodilation was found from the left common carotid artery through the external carotid artery, and blood vessels aggregated around the left neck (Figure 2). Left external carotid artery angiography showed the lesion was diagnosed as AVM between the facial artery and the external jugular vein, which was a high flow shunt (Figure 3). No relationship with intracranial blood vessels and/or vertebral artery was observed.

angiography. Therefore, endovascular treatment was applied to the AVM under general anesthesia as follows; a 9 Fr long sheath was initially inserted into the right femoral artery. Then, guiding catheter was placed into the left external carotid artery and balloon catheter for test occlusion was inserted through the guiding catheter to dilate the fistula and block blood flow (Figure 4), which resulted in the complete occlusion of the shunt. We diagnosed single channel AVM and performed coil embolization for shunting point and feeding artery under blood flow control with proximal balloon occlusion (Figure 5). We selected platinum coils as embolic material due to avoiding migration of the material. Finally, the shunt was completely closed (Figure 6).

**Postoperative course**

Neurological deficits have not been observed thus far, and the swelling of the left neck was reduced. No reoccurrence of the lateral neck swelling or vascular murmur in the neck was observed at the five years. Furthermore, no apparent recurrent findings have been observed in the cervical MRA (Figure 7).

**DISCUSSION**

**Diagnosis**

AVM in the parotid region is likely to develop in early

**Endovascular treatment**

Based on the examinations, the patient was diagnosed as having AVM in the parotid region. We selected endovascular treatment because shunting point was easily identified on
childhood [3] and is reportedly due to genetic diseases [4], trauma (including iatrogenic trauma [5]), and infections. Furthermore, similar to this case, and it was accidentally found and reported as spontaneous in this patient [6]. The most common clinical manifestation of the AVM is the presence of a pulsatile mass around the ears, and there are also reports of skin ulceration due to a shunt [6], secondary heart failure caused by a high flow A-V shunt, and hypertension complications [3]. The diagnosis was quite evident through clinical findings confirmed by radiological examinations. Doppler examination was used mainly. MRI and angiography were mainly performed as diagnostic imaging procedures in our institution. The former demonstrated a honeycomb of flow voids around the lateral neck while the latter revealed the presence of an A-V shunt obviously. MRI can be used as an excellent technique in the diagnosis of vascular malformations [7].

### Indication for treatment

AVM in the parotid region appears benign, thus treatment is not emergent. Treatment was done mainly for functional and aesthetic considerations, but also because complications such as post-traumatic hemorrhage were feared [6]. Proper treatment of AVM was selected in clinical condition, including surgical excision and/or endovascular approach [8]. The pros and cons of each treatment were described next.

### Surgical treatment

In massive AVM with high flow shunt, embolic materials are at higher risk for pulmonary embolism [10]. Therefore, two steps operations, which are involved with the ligation of external carotid artery and removal of AVM was reported [11]. Direct surgery has been applied to any cases; however, the risk of facial nerve injury [4], difficulty in fistula identification perioperatively, and the need for a large field of operation for blood vessel removal have been pointed out [9].

### Endovascular treatment

On the other hand, the adverse events are less likely to occur in patients who undergo endovascular treatment. Endovascular treatment is easier and less traumatic in adult patient [6]. Moreover endovascular treatment has less invasive for the patients because of not bleeding and not leaving facial scars.

### Endovascular procedure

Endovascular treatment procedures include detachable balloon occlusion for closing fistulas [2,12], fistula occlusion using particulate embolic materials or liquid embolic agents [1,6,13], and coil embolization of the fistula [6,9]. Embolic material should be chosen according to size, location and shunting flow velocity of each AVM. In the present patient, platinum coils were used due to high flow shunting to avoid migration of embolic material. There is important factor of coil embolization to occlude AVM the microcatheter was placed in the distal portion of the shunting point to occlude the feeding artery and shunting point with platinum coils in order to completely occlude the fistula. Feeding artery occlusion alone was insufficient in the present patient because of the abundant collateral circulation of the external carotid artery. This suggested that accurate identification of shunting point is essential to perform the complete occlusion of AVM.

Angiography cannot accurately identify the fistula when there are many feeding arteries and draining veins. Therefore, a non-detachable balloon for test occlusion was applied to this patient, resulting in perfect identification of the fistula.

Furthermore, this patient was a high flow shunt case. Therefore, the control of the blood flow of the feeding artery using a balloon-tip catheter enabled the coil to be placed in the appropriate site [6].

### Prognosis

The prognosis of patients with the AVM is reportedly good owing to the benign nature of the disease [9]. Likewise, no recurrence has been reported in this patient for five years postoperatively.

### CONCLUSION

We described the case of a patient with AVM in the parotid region who received endovascular treatment. Similar to this patient, endovascular treatment may be indicated for patients with the AVM where the fistula can be identified.
ACKNOWLEDGEMENTS

The authors thank the members of the Juntedo University Neuro-Endovascular Treatment Team.

REFERENCES


