Successful Surgical Resection of Iatrogenic Antecubital Venous Pseudoaneurysm Following Venipuncture: A 2-Case Report

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ABSTRACT: Iatrogenic venous pseudoaneurysm (VP) formation after venipuncture is rare. This report showed 2 cases of VP following venipuncture, and VPs were resected surgically. A 58-year-old woman and a 56-year-old woman developed a soft antecubital mass after blood sampling from the basilic veins. One patient had the sensory disturbance of forearm. The mass was diagnosed as a VP with thrombus by duplex ultrasound and magnetic resonance imaging. The aneurysm was resected completely, and the sensory disturbance of the patient was improved. Surgical resection was the most appropriate treatment for the relief of symptoms due to compression.

KEYWORDS: Venous pseudoaneurysm, antecubital vein, iatrogenic

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Introduction

Pseudoaneurysm is a rare type of pathologic and localized vascular dilatation.[1] Although genuine aneurysms have all 3 layers of the vessels, pseudoaneurysm has a wall defect, which leads to the formation of an extravascular hematoma communicating with the intravascular space.[2] Therefore, pseudoaneurysm is defined histologically as a mass without vascular endothelium for lining the lesion.[3]

Although many reports have documented iatrogenic arterial pseudoaneurysms following the puncture of vessels such as the femoral artery,[4] iatrogenic venous pseudoaneurysm (VP) following antecubital venipuncture, a common medical procedure, is rare.[3,5,6] Diagnosis of VP is easily performed by duplex ultrasound and magnetic resonance imaging (MRI). This report showed 2 cases of VP following venipuncture. This study was performed with respect to high ethical standards and approved, when required, by the appropriate ethics committee. This study, therefore, was conducted in accordance with the World Medical Association Declaration of Helsinki (June 1964) and subsequent amendments. The patients voluntarily gave written informed consent to participate in this study.

Case Presentations

Case 1

A 58-year-old woman with no contributory history including any connective tissue disease history had developed a soft antecubital mass measuring 24 mm × 19 mm and the sensory disturbance on the medial aspect of the forearm, at 3 years after blood sampling from the right basilic vein at her routine health checkup. On examination, the mass was nonpulsatile and clear to auscultation. The size of mass decreased after the patient raised her arm (Figure 1). The mass was diagnosed as a VP with thrombus by duplex ultrasound and MRI (Figure 2A and B). Anticoagulant therapy for an intraluminal venous clot was unable to dissolve the thrombus in the VP at other hospital. Furthermore, the patient had noticed the sensory disturbance in the medial aspect of the forearm due to the compression of lateral antebrachial cutaneous nerve. Therefore, the surgical resection of the VP was planned. Because the VP was found to be close to the lateral antebrachial cutaneous nerve, resection surgery was performed with a surgical microscope. The VP was resected completely after the identification and ligation of the connecting afferent and efferent veins (Figure 2C).

Histopathologically, the resected mass was found to have a dilated vein with a thickened intima and media (Figure 3). These findings confirmed that the diagnosis of VP was proper. At 10 months after surgery, the sensory disturbance was completely disappeared, and there was no evidence of recurrence during the 2-year follow-up.

Case 2

A 56-year-old woman with no contributory medical history including any connective tissue disease history noticed a soft mass measuring 23 mm × 17 mm in the left antecubital fossa

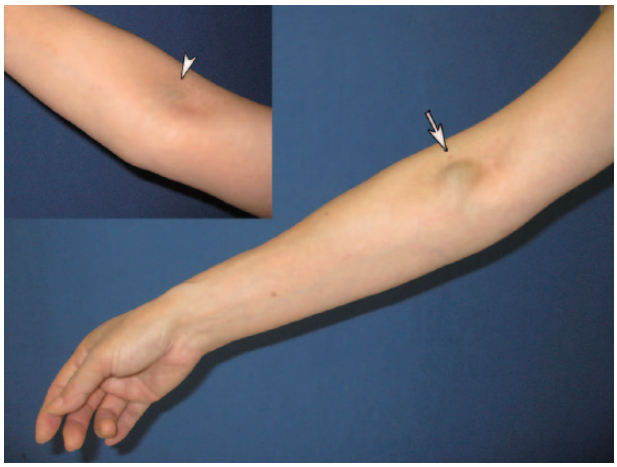

Figure 1. Physical examination of a soft mass on the right arm of a 58-year-old woman (case 1). A nonpulsatile soft cutaneous mass measuring 24 mm × 19 mm in the right elbow (white arrow). (Inset) A decrease in the size of the mass was noted after the patient raised the right arm above the head (arrowhead).

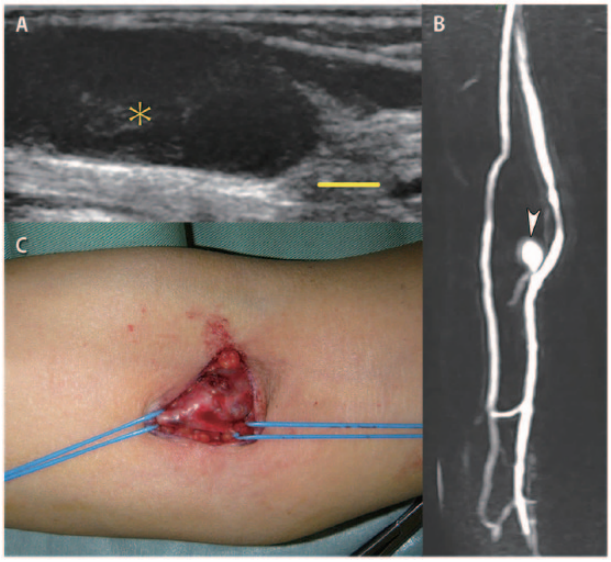

Figure 2. Duplex ultrasonogram, magnetic resonance imaging (MRI), and intraoperative findings of a soft mass (case 1). (A) Duplex ultrasonogram of the right basilic vein showing a venous pseudoaneurysm with intraluminal thrombosis (asterisk). Scale bar: 5 mm. (B) MRI shows a venous pseudoaneurysm in the basilic vein (arrowhead). (C) The aneurysm was resected after the identification and ligation of the feeding vessels of the basilic vein (blue vessel loops).

at 2 months after undergoing venipuncture for blood sampling from the basilic vein. On examination, the mass was nonpulsatile and clear to auscultation and diagnosed as a VP by duplex ultrasound and MRI at 2 months after venipuncture (Figure 4A). The VP was resected completely without complication (Figure 4B).

Histopathologic examination found the dilatation of vein, which was filled with coagulated blood. These findings confirmed that the diagnosis of VP was proper. At 6 months after surgery, no sign of recurrence was observed.

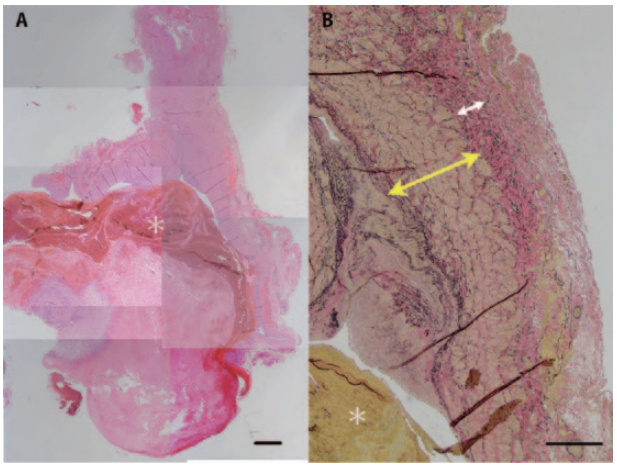

Figure 3. Histopathologic features of the specimen resected from the mass (case 1). (A) Hematoxylin-eosin–stained specimen. (B) In Elastica van Gieson–stained specimen. Scale bar: 1mm (Original magnification x 2). The yellow and white double-headed arrows show the thicknesses of the internal and medial vascular walls, respectively. No vascular endothelium for lining was also found. Both wall areas contain many hemosiderin-laden macrophages. The lumen of the pseudoaneurysm was filled with coagulated blood (asterisks). Scale bar: 500 μm (Original magnification x 4).

Discussion

Appearance of VP is known to be rare, and VP is defined as pathologic and localized venous dilatation either grossly or microscopically.[1] Osler et al[7] first report a case of VP in a popliteal vein in 1913, and since then, various types of VP including congenital and iatrogenic cases are reported.[8,9] However, a few cases of VP appearing after the venipuncture of the forearm are documented.[3,5,6] Although in 2 of those 3 cases, VP appeared in patients undergoing anticoagulation therapy,[3,6] both the patients in this study never received the therapy. Although 2 of 3 patients in the previous reports were men, the present 2 patients were women. The age of patients in the previous reports was 43 to 64 years old, which was similar to those of this study, 56 and 58 years old. The development time of PV in the previous reports was from 6 months to 3 years, which is slower than those of the 2 patients in this study. The size of VP in the reports was 30 to 45 mm. Schatz and Ward report a decrease in the size of the mass after the arm was raised because of the drainage of intraaneurysmal blood by gravity.[10] A decrease in the size of mass was also observed in the present case 1, which was helpful for diagnosis.

The usefulness of duplex ultrasound is already reported,[11–13] and the combinational use of duplex ultrasound and MRI was found to be effective for diagnosis in this study. By demonstrating a "swirling" pattern of blood flow and communication with the vein, as well as the presence of a thrombus, these procedures are diagnostically useful for venous aneurysm. Magnetic resonance imaging is also useful for identifying the connections between VP and adjacent vascular structures and can provide a precise diagnosis without contrast enhancement.[14–16,12,13] The imaging modalities can also exclude possible interfering

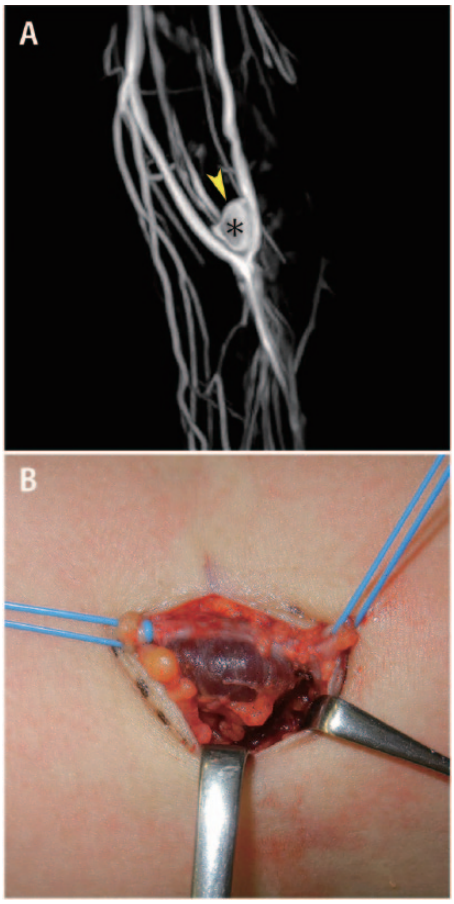

Figure 4. Magnetic resonance imaging (MRI) and intraoperative findings of a soft mass in the left antecubital fossa of a 55-year-old woman (case 2). (A) MRI shows a venous pseudoaneurysm (arrowhead) of the basilic vein with thrombosis (asterisk). (B) The aneurysm was resected after the identification and ligation of the feeding vessels of the basilic vein (blue vessel loops).

abnormalities such as soft tissue tumors, hematoma, and vascular-related anomalies.[10,13]

Surgical resection of VP can be considered to be effective for cases where anticoagulant therapy proves ineffective. Chakraborty reports that the symptoms of VP are venous thromboembolism, dilatation, and pressure on the adjacent organs and structures.[3] The patients in this study also had neurologic symptoms due to the compression of nerves by the dilated vein. Kassabian et al[9] report a case of VP associated with the sensory disturbance of the radial nerve, and the neurologic symptoms due to the compression of nerves were improved after the surgical resection of VP. When VP is left untreated, the risk of venous thromboembolic complications may increase.

Chakraborty reports successful coil embolization for VP in the antecubital fossa that has developed after venipuncture.[3] However, Calligaro et al[12] consider that only indication for the surgical resection of superficial VP in the extremity is an aesthetic purpose. In the present cases of VP, this study selected surgical resection because (1) the VP was located in the subcutaneous layer, making a surgical approach easy, (2) venous clots were already identifiable in the VP and embolization was considered to be contraindicated, and (3) there were neurologic pressure symptoms in case 1 due to the dilatation of VP by a thrombus.

Pathologic examination in the present cases revealed the irregular thickening of the media in the venous wall, suggesting arterialization. Blood pressure in the damaged vessels might increase when the patients moved their elbows. In fact, several reports show superficial venous aneurysms around joints in the finger,[17] ankle, and groin.[1] In the present cases, the aneurysms were filled with blood clots and recanalization was evident only in the center of the thrombus. This might indicate a possibility that thrombus dissolved on the application of anticoagulants. However, thrombosis was found to remain in VP, indicating that surgical resection was more effective than pharmacotherapy with adequate agents such as anticoagulants.

Because VP can be formed by applying inadequate pressure to venipuncture sites, for preventing VP, medical staff taking a blood sample should be required to press the venipuncture site after puncture until bleeding ceases completely. Medical staff should be mindful of VP as a possible complication of venipuncture, considering the anatomy of veins, arteries, and nerves.[18]

Conclusions

Two rare cases of iatrogenic VP that appeared after venipuncture for collection of blood samples were reported. The combined use of duplex ultrasound and MRI was useful for diagnosing VP containing thrombosis. Surgical excision was the most appropriate treatment for VP-related symptoms.

Author Contributions

YNi and TY conceived and designed the experiments. YNi, TY, KH, and MK analyzed and collected the data. YNi, TY, and YNa wrote the first draft of the manuscript. TY and YNa contributed to the writing of the manuscript. YNi, TY, KH, MK, YNa, and HS agree with manuscript results and conclusions. HS made critical revisions and approved final version. All authors reviewed and approved the final manuscript.

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