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Case Report

Fusiform Aneurysm Presenting with Cervical Radiculopathy in Ehlers-Danlos Syndrome

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Ehlers-Danlos syndrome (EDS) type IV is characterized by its clinical manifestations, which are easy bruising, thin skin with visible veins, and rupture of arteries, uterus, or intestines. Arterial complications are the leading cause of death in vascular EDS because they are unpredictable and surgical repair is difficult due to tissue fragility. The authors report a case presented with cervical radiculopathy due to a segmental fusiform aneurysm of the cervical vertebral artery. Transfemoral cerebral angiography (TFCA) was done to verify the aneurysmal dilatation. However, during TFCA, bleeding at the puncture site was not controlled, skin and underlying muscle was disrupted and profound bleeding occurred during manual compression after femoral catheter removal. Accordingly, surgical repair of the injured femoral artery was performed. At this time it was possible to diagnose it as an EDS with fusiform aneurysm on cervical vertebral artery. Particularly, cervical fusiform aneurysm is rare condition, and therefore, connective tissue disorder must be considered in such cases. If connective tissue disorder is suspected, the authors suggest that a noninvasive imaging modality, such as, high quality computed tomography angiography, be used to evaluate the vascular lesion to avoid potential arterial complications.

KEY WORDS : Ehlers-Danlos syndrome · Cervical radiculopathy · Fusiform aneurysm · Vascular reconstruction.

INTRODUCTION

Ehlers-Danlos syndrome (EDS) type IV (the vascular type) is the most serious form of this syndrome, due to its susceptibility to sudden death from spontaneous catastrophic bleeding or organ rupture[14]. Type IV EDS is characterized by its clinical manifestations, easy bruising, thin skin with visible veins, acrogeria, characteristic facial features, and rupture of arteries, uterus, or intestines[3]. Vasculopathy may progress to rupture or dissection of major vessels, aneurysm formation in the aorta or large arteries, carotid-cavernous fistula (CCF) or intracranial aneurysm formation. Most EDS type IV patients have a defect in either the synthesis or structure of type III procollagen and a concomitant genetic mutation in COL3A1[14]. Type IV EDS is inherited in an autosomal dominant fashion, but approximately 50% of patients harbor de novo mutations[8]. Arterial complications are the leading cause of death in vascular EDS, because they are unpredictable and surgical repair is difficult due to tissue fragility[9]. In a recent review of 131 patients, 79% of the 103 deaths resulted from arterial rupture, usually of the thoracic and abdominal vessels, but cerebral vessels are also involved[14]. The most common nonlethal central nervous system events are fistulae involving the carotid artery, cavernous sinus[10], carotid artery dissection[15], and carotid artery aneurysm[6]. Spinal manifestations have also been encountered due to dilatation of the vertebral artery, but are rare. Here, we report our experiences of a patient who presented with cervical radiculopathy associated with EDS.

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CASE REPORT

An 18-year-old man presented with a 2-week history of tingling sensation in the neck and left shoulder, and left upper extremity weakness. An ectatic cervical vertebral artery was detected by cervical magnetic resonance imaging (MRI) in a previous clinic (Fig. 1). He had no history of any traumatic event. A neurological examination performed on admission revealed mild motor weakness of the left deltoid-biceps muscle and sensory disturbance of the left C4, 5 dermatome.

Spurling's sign was detected on the left side, but there was no evidence of an upper motor neuron sign. 3-D CT (computed tomography) angiography demonstrated bead-like fusiform aneurysms of the left vertebral artery at the C2/3, 3/4 and 4/5 levels. Neural foraminal stenosis was prominent at the left C3/4 and 4/5 levels on the CT image (Fig. 3B). The luminal diameter of the fusiform dilated vertebral artery was greatest at the C4/5 level. Electromyography and nerve conduction velocity test findings revealed C4, 5 radiculopathy. Trans-femoral cerebral angiography (TFCA) was performed to confirm the fusiform aneurysms and the other combined vascular lesions; at this stage, we were considering the possibility of endovascular stent insertion into the lesion to reduce vascular stress or coil obliteration of the aneurysmal lesion of artery (Fig. 2). But, the therapeutic procedure could not be performed because of uncontrolled bleeding during TFCA. Surprisingly, the puncture site bleeding was not controlled after femoral catheter removal and during compression of the arterial puncture site, skin and underlying muscles were disrupted. Accordingly, an emergent operation was undertaken for femoral artery repair. Hematoma removal and meticulous skin approximation were performed under general anesthesia in the angio-room. Operative findings revealed the dissected arterial wall and patient's vasculature was extremely friable. Repair of the injured artery was difficult, but fortunately successful repair was achieved and dorsalis pedis arterial pulsation was noted. Bleeding was controlled and femoral artery was preserved without any more complications after surgery. Chest and abdominal CT were then performed to determine the presence and evaluate any other structure abnormalities, and pulmonary arterial dilatation and multiple bullas were detected in both lungs (Fig. 4A, B). A physical examination revealed normal facial features, hyperextensibility of fingers (Fig. 5) and elbow joints, but with little skin hyperextensibility. Multiple ecchymoses were observed at the site of restraint during TFCA. His vital signs and lab findings were within normal limits. He had a history of orthopedic surgery for clubfoot in childhood. His mother died at age 42 years of an intra-cranial hemorrhage of unknown etiology. We recommended a genetic study but it was refused by his mother's side of the family. Conservative treatment was performed during hospitalization. No other adverse events were occurred. Fortun-

Fig. 1. Cervical magnetic resonance image showing indentation of the cervical nerve root by a fusiform aneurysm of the vertebral artery.

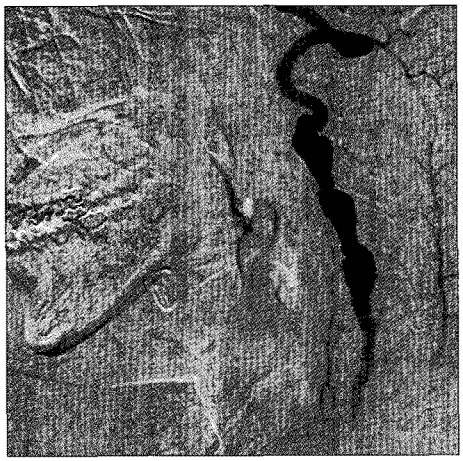

Fig. 2. Trans-femoral cerebral angiography showing segmental fusiform aneurysms of the left cervical vertebral artery.

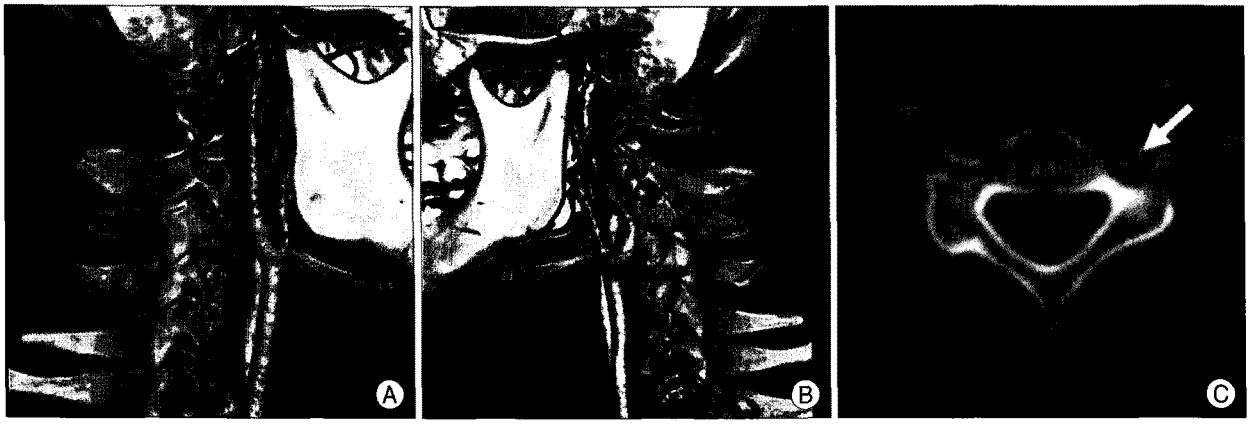

Fig. 3. Cervical computed tomograph, A : Normal patency of the cervical intervertebral foramen and vertebral artery. B : Multi-level fusiform aneurysms with intervertebral foraminal stenosis, especially at C3/4 and 4/5. C : Reactive erosion and dilatation of the left transverse foramen.

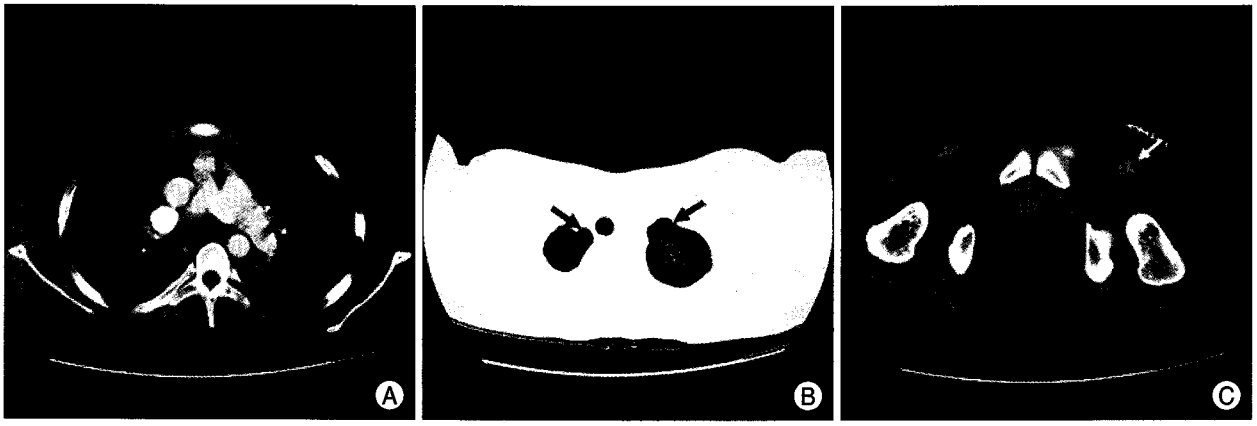

Fig. 4. Chest and abdominal computed tomograph. A : Dilatation of the left pulmonary artery. B : Bilateral apical bullae. C : Hematoma around the left femoral artery.

Fig. 5. Hyperextensibility of a finger.

ately, the operative wound healed well, and the pain and weakness of the left upper limb complained of at presentation were partially improved after medication on discharge.

DISCUSSION

Ehlers-Danlos syndrome is a collection of inherited connective tissue disorders characterized by skin extensibility, joint hypermobility, and tissue fragility. There are six major types, with prevalence between 1 : 5,000 and 1 : 560,000[1]. In particular, type IV EDS, also known as vascular EDS, is associated with a high incidence of vascular damage[14].

Patients with EDS type IV can have the following distinctive features; a long thin nose, sunken cheeks, bulging or protruding eyes, thin lips[14], translucent skin[5], a tendency to bruise easily, and delayed wound healing[7]. The arteries of these patients are extremely friable, and they can develop multiple aneurysms and spontaneous arterial rupture and dissection[13]. Furthermore, they have a high risk of bowel perforation and uterine rupture[12]. In our case, multiple cervical vertebral artery aneurysms and multiple pulmonary bullas were detected. Our patient showed hyperextensibility of articular joints and a tendency to bleed, but had normal facial features and skin.

Spontaneous arterial rupture is the most common presenting symptom of EDS type IV patients and most patients develop these complications before the age of 40; median survival age is 48 years[14]. Diagnosis of this syndrome is based mainly on the above four clinical features, but definitive diagnosis is made based on skin biopsy and skin fibroblast culture findings, the latter of which show mutations within the triple-helical coding region of COL3A1 (the collagen III gene). Glycine substitutions and axon skips are the most common mutations and sometimes deletions are encountered[5].

Coils and covered stent are used to treat vertebral dissecting aneurysms[11]. Barr et al, concluded that complex fibered platinum microcoils provide rapid and durable arterial occlusion[2]. Proximal ligation of the vertebral artery at the V2-V3 segment without reconstruction has also been reported for the treatment of aneurysmal disease[4], but in cases not affected by connective tissue disorder. Sultan et al.[16] reported the successful management of a symptomatic vertebral artery aneurysm in EDS using bypass surgery and an endovascular occlusion procedure. However, in our case, arteries were so friable, they were easily dissected during catheter and guidewire interventions. He also showed severe complications (giant groin hematoma, severe ecchymosis, disruption of skin and underlying muscle) at transfemoral puncture sites, and thus, we concluded that an invasive procedure was likely to be too dangerous.

The present case report is the first one on a patient with EDS type IV presenting with a spinal manifestation due to vertebral artery fusiform aneurysms.

CONCLUSION

We report a case of complicated TFCA due to underlying EDS type IV. Cervical radiculopathy caused by vertebral artery fusiform aneurysm is a rare condition. Nevertheless,

the possibility of underlying connective tissue disease, such as, EDS and Malfan syndrome must be considered. If these diseases are strongly suspected, we recommend that a noninvasive imaging modality, such as, high quality CT angiography, be adopted to avoid arterial complications. Furthermore, complete preparation for a catastrophic event is essential when treating any vascular lesion in an EDS type IV patient.

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