

CASE REPORTS

PRIKAZI SLUČAJEVA

University Clinical Center of Vojvodina, Novi Sad, Radiology Center¹
University of Novi Sad, Faculty of Medicine Novi Sad²
University Clinical Center of Vojvodina, Novi Sad
Neurology Clinic³

Case report
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POSTTRAUMATIC PSEUDOANEURYSM OF THE INTERNAL CAROTID ARTERY EX-
TRACRANIAL SEGMENT DUE TO CHRONIC INTIMAL
TRANSECTION – CASE REPORT

*POSTTRAUMATSKA PSEUDOANEURIZMA EKSTRAKRANIJALNOG SEGMENTA UNUTRAŠNJE
KAROTIDNE ARTERIJE USLED HRONIČNE TRANSEKCIJE INTIME – PRIKAZ SLUČAJA*

Tijana KOKOVIĆ¹, Željko ŽIVANOVIĆ^{2,3} and Viktor TILL^{1,2}

Summary

Introduction. Carotid artery pseudoaneurysms can refer to pseudoaneurysms involving any segment of the carotid arteries. Post-traumatic internal carotid artery pseudoaneurysm dilatation due to intimal transection is extremely rare entity that requires detailed clinical examination and multiple diagnostic modalities to confirm the diagnosis. The aim of the study is to present rare entity of post-traumatic extracranial internal carotid artery pseudoaneurysm dilatation due to intimal transection, diagnostic algorithm and diagnostic findings. **Case Report.** The patient was a 30-year-old, previously healthy, female who came to see a cardiologist due to intermittent tachycardia, which first appeared a week before the examination. Duplex ultrasound was performed, and aneurysm of extracranial segment of internal carotid artery was found. The patient had severe neck trauma due to bicycle accident in childhood, which was treated at home, without medical examination. Further computed tomography angiography and magnetic resonance angiography were performed. All imaging findings were in favor of chronic arterial wall small pseudoaneurysmal dilatation, with intimal transection, without signs of acute trauma. Based on the above, a decision was made to continue conservative treatment in accordance with the recommendations of current guidelines. Periodic clinical diagnostic follow-up was performed. After the applied therapy, the complaints in terms of intermittent tachycardia disappeared completely. **Conclusion.** Formation of extracranial internal carotid artery pseudoaneurysm due to intimal transection is a rare entity, and requires multiple imaging findings in order to evaluate if the trauma is acute or chronic. In most cases, chronic pseudoaneurysm does not require surgical intervention. It requires conservative medical treatment and diagnostic follow-up. **Key words:** Carotid Artery, Internal; Aneurysm, False; Carotid Artery Injuries; Ultrasonography, Doppler, Duplex; Computed Tomography Angiography; Magnetic Resonance Angiography

Sažetak

Uvod. Pseudoaneurizma karotidne arterije može zahvatiti bilo koji segment karotidnih arterija. Posttraumatska pseudoaneurizmatička dilatacija unutrašnje karotidne arterije usled transekcije intime je izuzetno redak entitet, koji zahteva detaljan klinički pregled i više dijagnostičkih modaliteta za potvrdu dijagnoze. Cilj ovog rada je prikaz retkog entiteta posttraumatske dilatacije pseudoaneurizme ekstrakranijalnog segmenta unutrašnje karotidne arterije usled transekcije intime, dijagnostički algoritam i dijagnostički nalaz. **Prikaz slučaja.** Pacijentkinja je bila 30-godišnjakinja, ranije zdrava, javila se kardiologu zbog intermitentne tahikardije, koja se prvi put javila nedelju dana pre pregleda. Urađen je dupleks ultrazvuk i utvrđena je aneurizma ekstrakranijalnog segmenta unutrašnje karotidne arterije. Pacijentkinja je u detinjstvu imala tešku traumu vrata usled nezgode na biciklu, koja je lečena u kućnim uslovima, bez lekarskog pregleda. Dalje je urađena kompjuterizovana tomografska angiografija i magnetna rezonantna angiografija. Svi nalazi su ukazivali na hroničnu malu pseudoaneurizmu, sa transekcijom intime, bez znakova akutne traume. Na osnovu navedenog, doneta je odluka o nastavku konzervativnog lečenja u skladu sa preporukama aktuelnih vodiča. Sprovedeno je periodično kliničko i dijagnostičko praćenje. Nakon primenjene terapije, tegobe u vidu intermitentne tahikardije su potpuno nestale. **Zaključak.** Formiranje pseudoaneurizme ekstrakranijalnog segmenta unutrašnje karotidne arterije usled transekcije intime je redak entitet i zahteva višestruke dijagnostičke nalaze da bi se procenilo da li je trauma akutna ili hronična. U slučaju nalaza hronične pseudoaneurizme, hirurška intervencija u većini slučajeva nije indikovana. Neophodno je konzervativno lečenje i periodični dijagnostički pregledi. **Ključne reči:** unutrašnja karotidna arterija; pseudoaneurizma; povrede karotidne arterije; Dopler ultrasonografija; CT angiografija; magnetno rezonantna angiografija

Abbreviations

ICA	– internal carotid artery
CT	– computerized tomography
DUS	– Duplex ultrasound
MR	– magnetic resonance
EICA	– extracranial internal carotid artery

Introduction

Carotid artery pseudoaneurysms can refer to pseudoaneurysms involving any segment of the carotid arteries.

As with pseudoaneurysms elsewhere, these lack all three layers of the arterial wall (intima, media and adventitia). Pseudoaneurysm development can occur within hours to several years after initial arterial injury, although normally presenting within five years [1].

Posttraumatic internal carotid artery (ICA) pseudoaneurysm dilatation due to intimal transection is extremely rare entity, which requires detailed clinical examination and multiple diagnostic modalities to confirm the diagnosis. These usually present with either “hard signs” of vascular injury or by identification of a pseudoaneurysm on imaging [2].

Pseudoaneurysms can arise from trauma, arterial dissection, vasculitis (e.g. Behcet’s disease) [3, 4], infection (e.g. mycotic pseudoaneurysm) [5], as an iatrogenic complication following procedures (carotid endarterectomy, transsphenoidal surgery, surgical neck dissections) [5–8], misplaced central venous lines [9].

Internal carotid artery pseudoaneurysms may be asymptomatic, accounting of 30 – 60% of cases, or symptomatic. ICA pseudoaneurysms can be partially or completely thrombosed and may lead to embolisation with cerebral infarction. The enlarging pseudoaneurysm may present as a pulsating neck mass with mass effect and resulting cranial nerve palsies. Other complications include ruptures with haemorrhage [10].

Imaging evaluation is often with initial Duplex ultrasound (DUS), computerized tomography (CT) and magnetic resonance (MR) angiography.

Management options can range from traditional surgical repair to endovascular repair (stent placement - combined stent placement and coil embolization) [11]. Mortality rates of up to 30% have been reported in the case of external carotid arterial pseudoaneurysms. In certain situations, more conservative approaches are taken (i.e. observation) [12].

The purpose was to present a rare entity of post-traumatic extracranial internal carotid artery pseudoaneurysm dilatation due to intimal transection, diagnostic algorithm and diagnostic findings.

Case Report

We present a case of delayed presentation of extracranial internal carotid artery (EICA) pseudoaneurysm due to transection of arterial intima. The patient was a 30-year-old, previously healthy, female who came to see a cardiologist due to intermittent tachycardia, which first appeared a week before the examination. The patient had no others comorbidities,

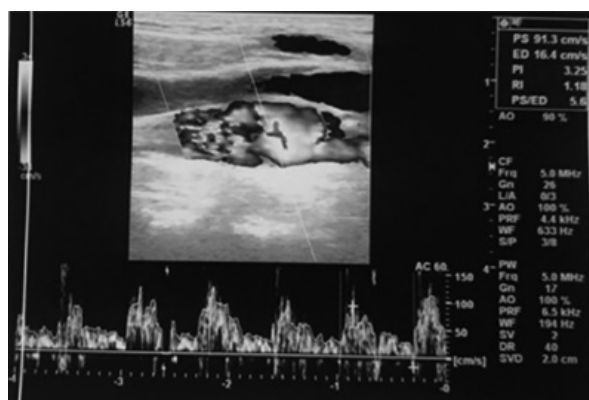


Figure 1. DUS findings showed turbulent blood flow in dilated EICA, with blood vessel wall thinning and intimal transection, and no locoregional hematoma

Slika 1. Nalazi dupleks ultrasonografije prikazuju turbulentan protok krvi kroz dilatirani ekstrakranijalni segment unutrašnje karotidne arterije, sa istanjivanjem debljine zida i transsekcijom intime, bez lokoregionalnog hematoma

except smoking. The patient had no previous births, and no surgery in that region. The local findings were normal, without swelling or hematoma. DUS was performed, and aneurysm of EICA was found. There was no acute neck trauma. Patient had severe neck trauma due to a bicycle accident in childhood, which was treated at home, without medical examination. Further CT angiography and MR were performed.



Figure 2. CT angiography showed fusiform EICA pseudoaneurysmal dilatation, without contrast extravasation and without locoregional hematoma

Slika 2. Kompjuterizovana tomografska angiografija prikazuje fuziformnu pseudoaneurizmu ekstrakranijalni segmenta unutrašnje karotidne arterije, bez ekstravazacije kontrasta i bez lokoregionalnog hematoma

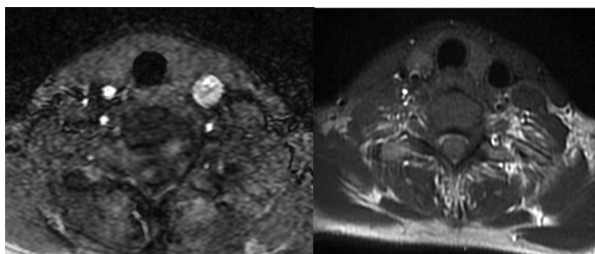


Figure 3. MR was performed with additional T1W fat/sat MRI sequence in order to evaluate the presence of intimal hematoma in the blood vessel wall known as 'crescent sign', which is seen in acute arterial wall dissection. This sign was absent.

Slika 3. MR je urađen sa dodatnom T1W fat/sat MRI sekvencom, kako bi se procenilo prisustvo hematoma intime u zidu krvnog suda poznatog kao „znak polumeseca“ koji se vidi kod akutne disekcije zida arterije. Ovaj znak je bio odsutan.

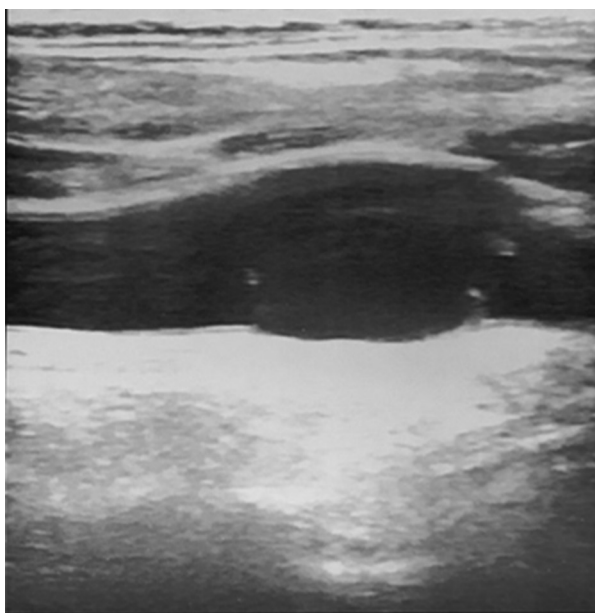


Figure 4. Two years after the initial diagnosis DUS finding did not change.

Slika 4. Dve godine nakon inicijalne dijagnoze nalaz DUS-a je bio nepromenjen.

Duplex ultrasound findings showed turbulent blood flow in dilated EICA, with blood vessel wall thinning and intimal transection, and no locoregional hematoma (**Figure 1**).

Computerized tomography angiography showed fusiform EICA pseudoaneurysmal dilatation, without contrast extravasation or locoregional hematoma, with diameter 12.5 x 19 mm (LL x CC) (**Figure 2**). The findings on the brain parenchyma were normal.

The MR was performed with additional T1W fat/sat MR sequence in order to evaluate presence of intimal hematoma in a blood vessel wall known as 'crescent sign', which is seen in acute arterial wall dissection. This sign was absent (**Figure 3**). The diameter was identical with the one on CT angiography.

All imaging findings were in favor of chronic arterial wall pseudoaneurysmal dilatation, with intimal transection, without signs of acute trauma.

Apart from intermittent tachycardia, the patient had no other complaints. She was a young patient with a small pseudoaneurysm. Based on the above, a decision was made to continue with conservative treatment in accordance with the recommendations of the current guidelines. Antiplatelet therapy (Aspirin) was introduced to the treatment.

Periodic clinical diagnostic follow-up was performed, with DUS 6 months later and then once a year. After the applied therapy, the complaints in terms of intermittent tachycardia disappeared completely. Two years after the initial diagnosis, DUS finding did not change (**Figure 4**).

Discussion

Ekstracranial internal carotid artery aneurysm is a rare entity, accounting for 0.8% to 1% of all arterial aneurysms [10]. They are defined as more than 50% focal dilatation of the ICA diameter as compared with the reference values (0.55 ± 0.06 cm in men; 0.49 ± 0.07 in women) [13]. There are two types of aneurysms - true aneurysms and pseudoaneurysms. Pseudoaneurysms of the internal carotid artery are less common than true aneurysms, comprising 14% of cases [13]. True aneurysms are most commonly due to atherosclerosis or fibromuscular dysplasia. The major cause of pseudoaneurysm is previous endarterectomy. Other causes include trauma and infections. Traumatic pseudoaneurysm is most often caused by a motor vehicle accident (69%), followed by stab-wounds, iatrogenic central venous cannulation, sport accident, a fight, a fall or cervical manipulation [13]. The incidence of EICA injury in patients with blunt trauma is about 0.08% [13]. Infection was the main cause of EICA aneurysms before the antibiotic era.

Traumatic pseudoaneurysms of EICA are either caused by compression and stretching of the artery on the lateral mass of the atlas or shearing of the artery before entering the carotid canal [14]. The diagnosis is often delayed due to other associated injury and delayed manifestation of the clinical signs [14]. Conservative treatment with anticoagulants and antiplatelets can be considered for young patients without symptoms [15]. The overall estimated complication rate ranges from 20–71% with medical treatment.

Surgery is recommended particularly for symptomatic pseudoaneurysms in patients of all ages. Total aneurysmectomy with end-to-end anastomosis is the surgery of choice. Alternatively, the gap can be interposed with a synthetic graft or a saphenous vein graft. For patients who undergo surgery, the mortality rate is 10% and the incidence of severe stroke is 3%, which are both relatively high [14]. Minimally invasive treatment with endovascular stenting with or without coiling of the pseudoaneurysm has become more popular in recent years [16].

Conclusion

Formation of extracranial internal carotid artery pseudoaneurysm due to intimal transection is rare entity and requires multiple imaging findings in

order to evaluate if the trauma is acute or chronic. In most cases, chronic pseudoaneurysm does not require surgical intervention. It requires conservative medical treatment and diagnostic follow-up.

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