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Successful retrograde recanalization of acute right dominant vertebral artery occlusion through the left posterior communicating artery in a patient with acute vertebrobasilar ischemic stroke

Anton A. Khilchuk MD[a,], Maksim V. Agarkov MD[a], Sergey V. Vlasenko MD, PhD[a,b], Sergey G. Scherbak MD, Doctor of Sciences, professor[b], Andrey M. Sarana MD, PhD[b], Svetlana V. Lebedeva MD[c]*

[a] *Department of Interventional Radiology, City Hospital №40, Borisova str. 9, Sestroretsk, Saint-Petersburg, 197706, Russian Federation*
[b] *Medical Faculty, Saint-Petersburg State University, Universitetskaya emb. 7-9, Saint-Petersburg, 199034, Russian Federation*
[c] *Regional cardiovascular center, City Hospital №40, Borisova str. 9, Sestroretsk, Saint-Petersburg, 197706, Russian Federation*

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ABSTRACT

Advanced endovascular technology and techniques allow interventional radiologists to utilize novel ways of basilar artery recanalization in the setting of acute ischemic stroke, especially when routine approaches are not eligible. Several authors described nonstandard revascularization techniques in acute ischemic strokes due to basilar and middle cerebral arteries occlusions with full technical and clinical success. In this report, we present retrograde right vertebral artery recanalization using left posterior communicating artery for subsequent anterograde balloon angioplasty and stenting of a right vertebral artery ostium followed by full vertebrobasilar blood flow restoration. The case underscores the complexity of arterial thrombotic events, the beneficial role of endovascular intervention in vertebral occlusions and the necessity of prospective studies that identify optimal methods of treating vertebrobasilar stroke due to large vessel occlusions and their effectiveness and safety.

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* *Corresponding author.*
E-mail address: anton.khilchuk@gmail.com (A.A. Khilchuk).
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Introduction

Acute occlusions of the large posterior circulation arteries, such as vertebral, basilar, and posterior cerebral cause about a fifth of all strokes. In basilar artery occlusion (BAO) clinical presentation differs from moderate symptoms to catastrophic strokes. BAO is a rare urgent situation and accounts for about 1% of all strokes and is reported in 8% of patients with acute vertebrobasilar ischemia [1,2]. Advanced endovascular technology and techniques allow interventional radiologists to utilize novel ways of BAO recanalization, especially when routine approaches are not eligible [1]. Several authors described nonstandard revascularization techniques in acute ischemic strokes due to basilar and middle cerebral arteries occlusions with full technical and clinical success [3–6]. We present the report of retrograde right vertebral artery (VA) recanalization using left posterior communicating artery (PCoA) for subsequent anterograde balloon angioplasty and stenting of a right VA ostium followed by full vertebrobasilar blood flow restoration.

Case report

A 73-year-old man presented in intensive care unit in critical condition. The patient was well an hour before presentation but quickly became unresponsive and was transported to the hospital. His National Institutes of Health Stroke Scale score was 25, native computed tomography (CT) showed no signs of hemorrhage or hyperdense intracranial arteries and CT-angiography revealed acute right VA occlusion, hypoplastic left vertebral artery, and poor basilar blood flow. Due to rapid progression of symptoms, critical condition, and CT-angiography data, we performed urgent thrombolysis with simultaneous angiography. Angiograms showed dominant right VA occlusion, poor collateral flow through the thyrocervical arteries, and patent left PCoA, which poorly supplied posterior circulation (Fig. 1). The patient was intubated and we unsuccessfully tried to utilize an anterograde approach with JR 4 6F guiding catheter (Cordis, Piscataway, NJ) and 0.014” Intermediate wire (Terumo, Tokyo, Japan) for 30 minutes to restore right vertebral artery flow. After multiple failed attempts, we switched to retrograde recanalization via left PCoA with MPA 6F (Cordis, Piscataway, NJ), 0.020”- 150 cm Stride microcatheter (Asahi Intecc, Nagoya, Japan) and 0.014” soft hydrophilic Whisper LS wire (Abbot, IL). Wire and microcatheter successfully passed through the PCoA and reached right vertebral ostium and then, without significant difficulties, right subclavian artery. Using 0.014” wire as a marker, we switched back to JR 4 6F and used 0.014” chronic total occlusion (CTO) Miracle 6 (Asahi Intecc, Nagoya, Japan) wire for a more aggressive approach. After few minutes, we managed to find the true lumen of right VA, Ryujin 3.0 × 20 mm balloon (Terumo, Tokyo, Japan) angioplasty was performed with good anterograde vertebral blood flow. Control angiography revealed significant ostium dissection and we proceeded with Kaname 4.0 × 24 mm bare-metal stent (Terumo, Tokyo, Japan) implantation (Fig. 2). In 3 hours patient was awake, extubated after 12 hours with significant improvement with 4/5 muscle tone in arms and legs. After 24 hours, his National Institutes of Health Stroke Scale improved to 4 and control CT showed no cerebral infarct (Fig. 3). Patient discharged on a 10th day with modified Rankin scale 2. Unfortunately, the patient died in 2 weeks due to ventricular fibrillation during his stroke rehab program, leaving no possibilities to assess his 90-day modified Rankin scale outcome.

Discussion

Recanalization of an LVO through the patent cerebral collateral vessels or cervical collaterals is a possible approach when direct access to the basilar and vertebral vessels is difficult or impossible. According to the morbidity and mortality data of BAO, anterograde and possible retrograde aggressive recanalization of the native posterior circulation is the feasible method of acute basilar ischemic stroke treatment [2].

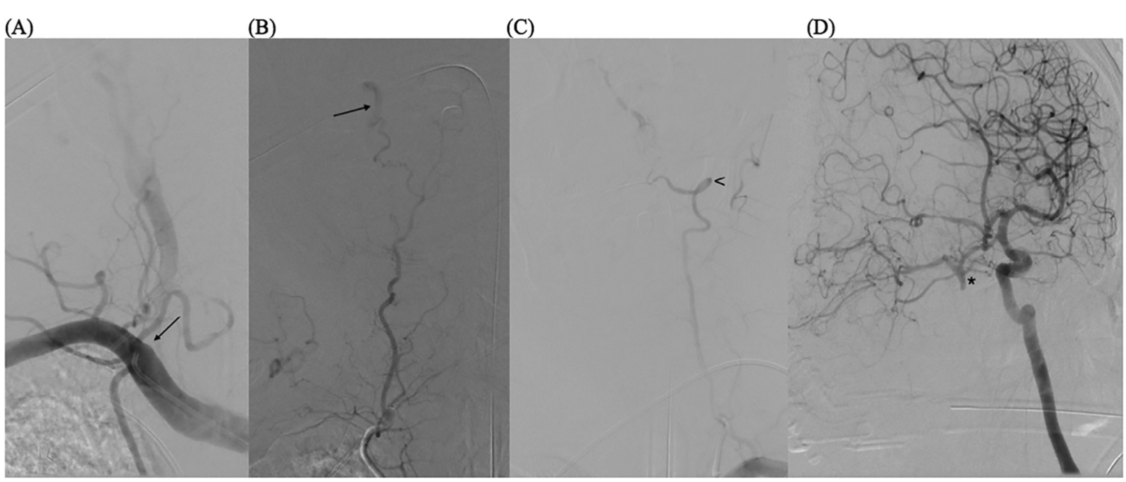

Fig. 1 – Right vertebral artery ostium occlusion (arrow) (A). Right vertebral collateral flow through cervical collaterals (arrow) (B). Hypoplastic left vertebral artery (arrowhead) (C). Posterior circulation supplied by left posterior communicating artery (asterisk) (D).