

Contralateral External Carotid Artery as Collateral to Internal Carotid Artery in a Patient with Common Carotid Artery Occlusion

M Nikanfar, M Farhoudi, M Kazem Tarzamni, R Mansoorizadeh

Citation

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Abstract

Common carotid artery (CCA) occlusion is sometimes associated with collateral flow through carotid bulb that preserves patency of internal carotid artery (ICA). Usually ipsilateral external carotid artery (ECA) anastomotic branches supply the ICA. But in this case, we found the contralateral ECA role in collateralization of the ipsilateral ICA to CCA occlusion using color carotid duplex.

INTRODUCTION

Occlusion of the common carotid artery (CCA) is generally associated with occlusion of the ipsilateral internal carotid artery (ICA) and external carotid artery (ECA). Sometimes, however, collateral circulation to the ECA may preserve patency of the ICA via retrograde perfusion through the bulb (1, 2, 3). This collateral flow can be maintained through ECA anastomotic branches such as superior and inferior thyroidal arteries, deep cervical artery, descending branch of occipital artery (4), superior and inferior labial arteries (5) or an aberrant ICA branch (6).

There is no patient report of natural connection of contralateral ECA to ipsilateral ICA as collateral in CCA occlusion patient to restore ICA flow. But this anastomosis surgically can be induced in some patients with CCA occlusion (7). This external carotid to external carotid crossover anastomosis may have application in the management of squamous cell carcinoma involving the common carotid or in the treatment of carotid artery blowout (8).

These patients may suffer ongoing transient ischemic attacks and risk for stroke (1). Most authors agree to say that color flow duplex imaging has now become the hallmark to detect a patent ICA in spite of a CCA occlusion (2). Recognition of this pathologic variant may allow for effective surgical intervention (1). Such situation should not be ignored since bypass surgery can easily allow for effective restoration of

flow (2).

CASE REPORT

A 60-year-old, white man presented with Broca aphasia and right central hemifacial weakness. He did not history of hypertension, diabetes mellitus, smoking, or transient ischemic attack. Physical examination showed only absent carotid pulsation in left side of his neck.

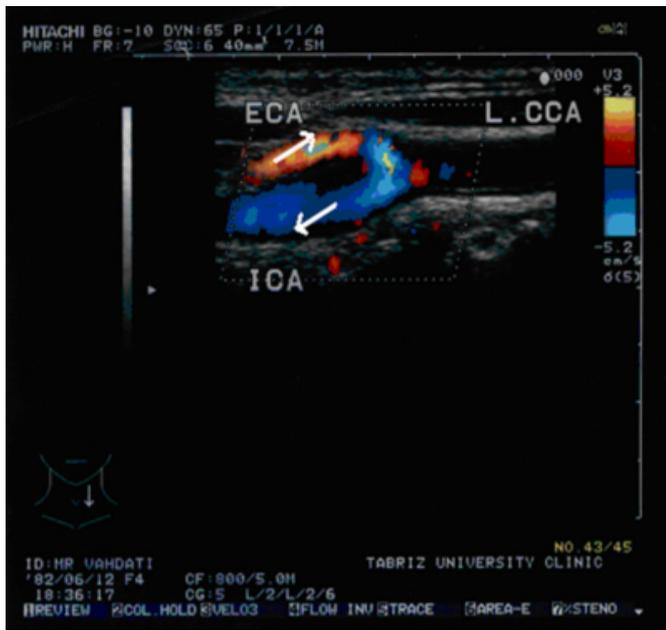
First day brain CT scan was normal. Subsequent brain CT obtained on 5th day of admission demonstrated a hypodense lesion in left paraventricular area.

Carotid duplex revealed the absence of the blood flow in left CCA. The blood flow in the left ECA was reversed and fed the left ICA (fig.1).

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Figure 1

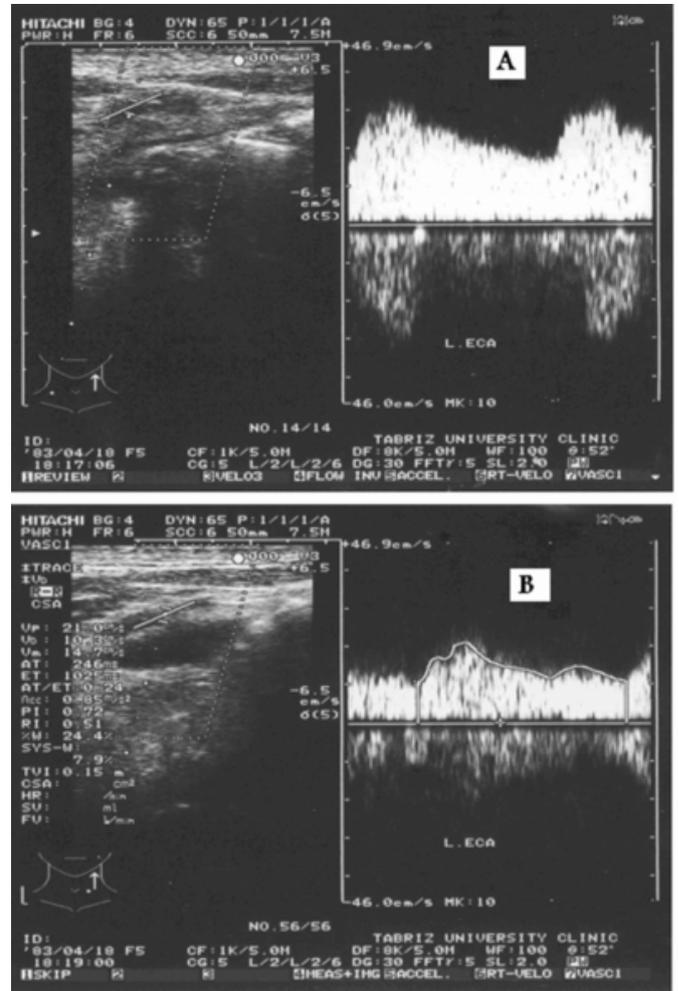
Figure 1: Retrograde flow in carotid bulb through external carotid artery (ECA).



With compression on the contralateral ECA in the mandibular angle blood flow in the left ECA was decreased (fig2 A,B).

Figure 2

Figure 2: Spectral wave of left external carotid artery before (A) and after (B) compression of the contralateral ECA in the mandibular angle that leads to decrease of blood flow velocity.

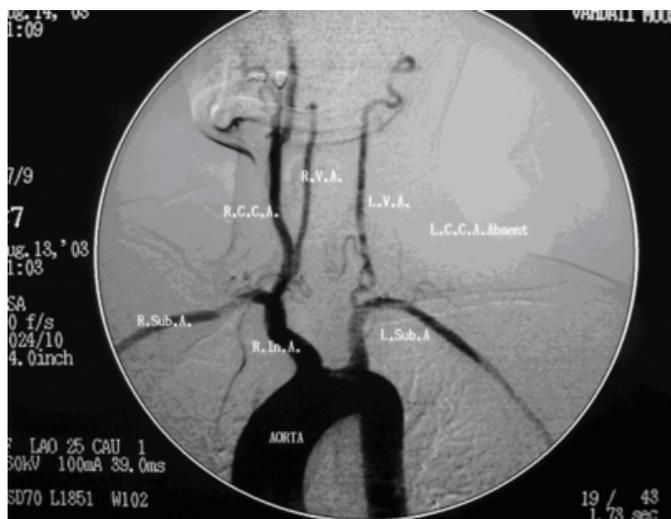


In transcranial Doppler, the left CCA flow could not be detected. Flow velocity of right anterior cerebral artery increased and direction of left anterior cerebral artery was reverse. The left middle cerebral flow velocity decreased.

In brain four vessels angiography, the left CCA could not be catheterized and the patency of ICA and ECA could not be shown (fig.3).

Figure 3

Figure 3: Aortic angiography: Left common carotid artery could not be catheterized.



DISCUSSION

In a swine model, occlusion of CCA alone was unable completely to halt ICA antegrade blood flow, while CCA and ECA occlusion completely stopped ICA antegrade flow (9). In a study for evaluation of the hemodynamic of the collateral circulation, the main collateral pathway to the ligated ECA region was the ipsilateral occipital artery through Richter's anastomosis from the vertebral artery in the case of unilateral ECA ligation, and was the contralateral carotid artery in the case of unilateral CCA, ECA, and internal carotid artery resection. The superior and inferior labial arteries were important as the collateral pathway from the contralateral ECA (3). Determination of a patent ICA in CCA occlusion is important in diagnosis and surgical treatment (1, 2, 3). Conventional angiography has some difficulties in detection of CCA occlusion and ICA patency, same as our reported case (10, 11, 12, 13). Delayed angiographic views of the bulb allowing for late collateral vessel filling can be informative (1). A data collection study including the review of angiograms and duplex scans suggests that carotid duplex is more sensitive for detecting ICA flow after common carotid artery occlusion than routine contrast angiography(6).

In recent studies Carotid duplex scanning is more sensitive in diagnosis of CCA occlusion and patent ICA (2,6, 11).

In our patient, it seems that the right ECA plays as an important collateral for the left ECA and patency of the left ICA.

CORRESPONDENCE TO

Mehdi Farhoudi, M.D. Department of Neurology, Neurological Sciences Research Team, Imam Hospital, Tabriz University of Medical Science, Tabriz, Iran. Tel -Fax: +98 411 3342889 E-mail: farhoudim@tbzmed.ac.ir

References

1. Belkin M, Mackey WC, Pessin MS, Caplan LR, O'Donnell TF. Common carotid artery occlusion with patent internal and external carotid arteries: diagnosis and surgical management. *J Vasc Surg.* 1993 Jun; 17(6): 1019-28.
2. Verbeeck NY, Vazquez RC. Patent internal and external carotid arteries beyond an occluded common carotid artery: report of a case diagnosed by color Doppler. *JBR-BTR.* 1999 Oct; 82(5): 219-21.
3. Blackshear WM, Phillips DJ, Bodily KC, Strandness DE. Ultrasonic demonstration of external and internal carotid patency with common carotid occlusion: a preliminary report. *Stroke.* 1980 May-Jun; 11(3): 249-52.
4. Williams W, Dyson B. *Gray's anatomy.* International student ed. 37th edition 1989; p 741.
5. Takeuchi Y, Numata T, Konno A, Suzuki H, Hino T, Kaneko T. Hemodynamic changes in the head and neck after ligation of the unilateral carotid arteries: a study using color Doppler imaging. *Ann Otol Rhinol Laryngol.* 1994 Jan; 103(1): 41-5.
6. Cull DL, Hansen JC, Taylor SM, Langan EM, Snyder BA, Coffey CB. Internal carotid artery patency following common carotid artery occlusion: management of the asymptomatic patient. *Ann Vasc Surg.* 1999 Jan; 13(1):73-6.
7. Nagasawa S, Tanaka H, Kawanishi M, Ohta T. Contralateral external carotid-to-external carotid artery (half-collar) saphenous vein graft for common carotid artery occlusion. *Surg Neurol.* 1996 Feb; 45(2): 138-42.
8. Bates MC, Dorros G, Parodi J, Ohki T. Reversal of the direction of internal carotid artery blood flow by occlusion of the common and external carotid arteries in a swine model. *Catheter Cardiovasc Interv.* 2003 Oct; 60(2): 270-5.
9. Chang YJ, Lin SK, Ryu SJ, Wai YY. Common carotid artery occlusion: evaluation with duplex sonography. *AJNR Am J Neuroradiol.* 1995 May; 16(5): 1099-105.
10. Podore PC, Rob CG, DeWeese JA, Green RM. Chronic common carotid occlusion. *Stroke.* 1981 Jan-Feb; 12(1): 98-100
11. Keller HM, Valavanis A, Imhof HG, Turina M. Patency of external and internal carotid artery in the presence of an occluded common carotid artery: noninvasive evaluation with combined cerebrovascular Doppler examination and sequential computed tomography. *Stroke.* 1984 Jan-Feb; 15(1): 149-57.
12. Riles TS, Imparato AM, Posner MP, Eikelboom BC. Common carotid occlusion, Assessment of the distal vessels. *Ann Surg.* 1984 Mar; 199(3):363-6.

Author Information

Masoud Nikanfar, M.D.

Assistant professor of Neurology, Department of Neurology, Razi Hospital, Tabriz University of Medical Science

Mehdi Farhoudi, M.D.

Assistant professor of Neurology, Department of Neurology, Imam Hospital, Tabriz University of Medical Science

Mohammad Kazem Tarzamni, M.D.

Assistant professor of Radiology, Department of Radiology, Imam Hospital, Tabriz University of Medical Science

Reza Mansoorizadeh, M.D.

Neurologist, Alinasab Hospital