

## Diagnosis of Spontaneous Internal Carotid and Vertebral Arteries Dissection

M. Dreval, L. Kalashnikova, L. Dobrynina, M. Krotenkova, E. Doronina, R. Konovalov, A. Suslin, V. Bryukhov, E. Kremneva, A. Sergeeva, S. Morozova, I. Krotenkova

FSSBI «Research center of neurology», Moscow

---

### Abstract

Internal carotid and vertebral arteries dissection has become increasingly recognized as a cause of stroke especially in young and middle aged individuals. Accurate and prompt diagnosis of this condition is crucial because timely and appropriate therapy can significantly reduce the risk of stroke and long-term sequelae. Because of the great diversity in the clinical features of internal carotid and vertebral artery dissection, imaging plays a primary role in its diagnosis. The purpose of this article is to evaluate the possibilities of magnetic resonance tomography and angiography in the diagnosis of this pathology. Special attention is paid to MRI and MR-angiographic pathologic features of dissection, their changes in dynamics, potential pitfalls in image interpretation, the differential diagnosis with other steno-occlusive lesions of the arteries. In conclusion, we offer MRI-protocol patients with suspected spontaneous dissection of the internal carotid and vertebral arteries.

**Key words:** Magnetic Resonance Imaging, Spontaneous Internal Carotid and Vertebral Artery Dissection, Ischemic Stroke.

---

### References

1. Kalashnikova L. A., Sakharova A. V., Dobrynina L. A., Mir-Kasimov M. F., Chaykovskaya R. P., Konovalov R. N., Protskiy S. V., Shabalina A. A., Kostyreva M. V. Mitochondrial arteriopathy as a cause of spontaneous dissection of cerebral arteries. Zhurnal nevrologii i psikiatrii im. S. S. Korsakova. 2010. No. 4. Stroke. P. 3–11.
2. Kalashnikova L. A., Dobrynina L. A. Cerebral Artery Dissection: ischemic stroke and other clinical manifestations. Moscow: Vako, 2013. P. 72–123.
3. Kalashnikova L. A., Dobrynina L. A., Dreval' M. V., Nazarova M. A. Clinical characteristics of internal carotid and vertebral arteries dissection. Zhurnal nevrologii i psikiatrii im. S. S. Korsakova. 2014. V. 114. No. 7. P. 4–8.
4. Stakhovskaya L. V., Kotov S. V. Stroke: Handbook for physicians. Moscow: OOO «Meditsinskoe informatsionnoe agentstvo», 2013. 13 p.
5. Tanashyan M. M., Lagoda O. V., Antonova K. V. Cerebrovascular diseases and metabolic syndrome. Moscow : OAO, 2011. 24 c.
6. Ben Hassen W., Machet A., Edjlali-Goujon M., Legrand L., Ladoux A., Mellerio C., Bodiguel E., Gobin-Metteil M. P., Trystram D., Rodriguez-Regent C., Mas J. L., Plat M., Oppenheim C., Meder J. F., Naggara O. Imaging of cervical artery dissection. Diagn. Interv. Imaging. 2014. Dec. V. 95. No. 12. P. 1151–1161.

7. *Coppenrath E. M., Lummel N., Linn J., Lenz O., Habs M., Nikolaou K., Reiser M. F., Dichgans M., Pfefferkorn T., Saam T.* Time-of-flight angiography: a viable alternative to contrast-enhanced MR angiography and fat-suppressed T1w images for the diagnosis of cervical artery dissection? *Eur. Radiol.* 2013. V. 23. No. 10. P. 2784–2792.
8. *Debette S., Grond-Ginsbach C., Bodenant M. et al.* Differential features of carotid and vertebral artery dissections: the CADISP study. *Neurology.* 2011. No. 77. V. 12. P. 1174–1181.
9. *Dreval M., Krotenkova M., Kalashnikova L., Dobryinina E., Konovalov R.* Differential diagnosis of cervical artery dissection and intra-arterial thrombosis using MRI and MRA. *Insights Imaging.* 2013. V. 4. Suppl. 1. P. 230.
10. *Dreval M., Krotenkova M., Kalashnikova L., Dobryinina L., Konovalov R.* Patency dynamics of spontaneous cervical arteries dissection. *Neuroradiology.* 2015. V. 57. Suppl. 1. P. S45.
11. *Engelster S. T., Traenka C., Von Hessling A., Lyrer P. A.* Diagnosis and treatment of cervical artery dissection. *Neurol. Clin.* 2015. May. V. 33. No. 2. P. 421–441.
12. *Habs M. T., Cyran C. C. et al.* Age determination of vessel wall hematoma in spontaneous cervical artery dissection: a multi-sequence 3T cardiovascular magnetic resonance study. *J. Cardiovascular magnetic resonance.* 2011. No. 13. P. 76–84.
13. *Kurosaki Yu., Yoshida K., Fukumitsu R., Sadamasa N., Handa A. Chin M., Yamagata S.* Carotid artery plaque assessment using quantitative expansive remodeling evaluation and MRI plaque signal intensity. *J. Neurosurg.* 2015. V. 11. No. 1–7.
14. *Medel R., Starke R. M., Valle-Giler E. P., Martin-Schild S., El Khoury R., Dumont A. S.* Diagnosis and treatment of arterial dissections. *Curr. Neurol. Neurosci. Rep.* 2014. Jan. V. 14. No. 1. P. 419.
15. *Naggara O., Louillet F., Touze E. et al.* Added value of high-resolution MR imaging in the diagnosis of vertebral artery dissection. *AJNR. Am. J. Neuroradiol.* 2010. V. 31. No. 9. P. 1707–1712.
16. *Rahme R.J., Aoun S.G., McClendon J. Jr., ElAhmadieh T. Yu., Bendok B.R.* Spontaneous cervical and cerebral arterial dissections: diagnosis and management. *Neuroimaging Clin. N. Am.* 2013. Nov. V. 23. No. 4. P. 661–671.
17. *Schievink W. I., Debette S.* Etiology of cervical artery dissections: the writing is in the wall. *Neurology.* 2011. Apr. V. 26. No. 76 (17). P. 1452–1453.

---

## Authors

**Dreval' Marina Vladimirovna**, Ph. D. Med., Junior Researcher of Radiology of Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: dreval@neuroradiology.ru

**Kalashnikova Lyudmila Andreevna**, M. D. Med., Professor, Principal Researcher Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-17. E-mail: kalashnikovancn@ya.ru

**Dobryinina Larisa Anatol'evna**, M. D. Med., Senior Research Scientist Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-24-17. E-mail: dobrla@mail.ru

**Krotenkova Marina Viktorovna**, M. D. Med., Head of Department of Neuroradiology, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: krotenkova\_mrt@mail.ru

**Доронина Елена Викторовна**, врач-рентгенолог отделения лучевой диагностики ФГБНУ «Научный центр неврологии».  
Адрес: 125367, г. Москва, Волоколамское шоссе, д.80.  
Тел.: +7 (495) 490-22-05. Электронная почта: dorel@yandex.ru

**Doronina Elena Viktorovna**, Radiologist, Neuroradiology Department, Research center of neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: dorel@yandex.ru

**Konovalov Rodion Nikolaevich**, Ph. D. Med., Senior Scientist, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: krn\_74@mail.ru

**Suslin Aleksandr Stanislavovich**, Ph. D. Med., Researcher, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: suslin@neuradiology.ru

**Bryukhov Vasiliy Valer'evich**, Ph. D. Med., Researcher, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: abdomen@rambler.ru

**Kremneva Elena Igorevna**, Ph. D. Med., Researcher, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: kremneva@neuradiology.ru

**Sergeeva Anastasiya Nikolaevna**, Ph. D. Med., Junior Researcher, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: lavrentevan@mail.ru

**Morozova Sof'ya Nikolaevna**, Junior Researcher, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7 (495) 490-22-05. E-mail: kulikovasn@gmail.ru

**Krotenkova Irina Andreevna**, Ph. D. Student, Neuroradiology Department, Research Center of Neurology.  
Address: 80, Volokolamskoe shosse, Moscow, 125367, Russia.  
Phone number: +7(495)490-22-05. E-mail: irina.krotenkova@mail.ru