

IMAGING OF THE CERVICAL ARTERIES DISSECTION USING ULTRASOUND CONTRAST AGENT (LEVOVIST)

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ABSTRACT

Introduction: The dissection of the cervical arteries is an important cause for the cerebrovascular disease in all age groups, predominantly in the young.

Objective: To determine the presence of a rare, rather atypical cervical artery dissection, using an ultrasound contrast agent (Levovist).

Method: A number of 15 patients with nonspecific neurological complaints (headache, vertigo, anxiety, etc.) have been complexly investigated (CT-scan, MRI, DSA, IVUS, Echo-Doppler contrast enhanced).

Results: There was found a nonspecific type of dissection – a double lumen, permeable, with two independent flows, with different Doppler flow characteristics. Ultrasound contrast agent (Levovist) permitted to clearly visualize the flapping septum within the vessel.

Conclusion: In a number of patients there is possible to find a peculiar type of cervical artery dissection. Ultrasound contrast agent has an important role and showed very effective in the imaging of the intravascular alterations of the vessel (in this case the flapping septum). Echo-Doppler examination with ultrasound contrast agent enhancement is a reliable and effective method for the diagnosis of the intravascular alterations.

Key words: Cervical arteries dissection, atypical cervical artery dissection, Echo-Doppler, Levovist, ultrasound contrast agent

Spontaneous dissection of the carotid and vertebral arteries affects all age groups, including children, but there is a distinct peak for the fifth decade of life. The extracranial segments of the carotid and vertebral arteries are much more likely to undergo dissection either their intracranial segments or extracranial arteries of similar size, such as coronary or renal arteries, mainly due to greater mobility and higher potential of injury in relation to the surrounding structures (bony structures if the cervical vertebrae etc.).

There will not be an exhaustive discussion on the “typical” carotid dissection which leads to stenosis or obstruction but we will describe an entity which is mostly unknown, with very rare and incomplete descriptions in the literature - the dissection of the cervical arteries with double, permeable lumen - this kind of dissection is separating the artery in two lumen, both permeable for the blood flow, separated by the intimal layer which is flapping into the artery.

The initial suspicion has been risen by a finding at the Echo-Doppler examination – a flapping septum has been described and a different flow pattern has been found in the 2 parts of the vessel separated by the septum. (Fig. 1)

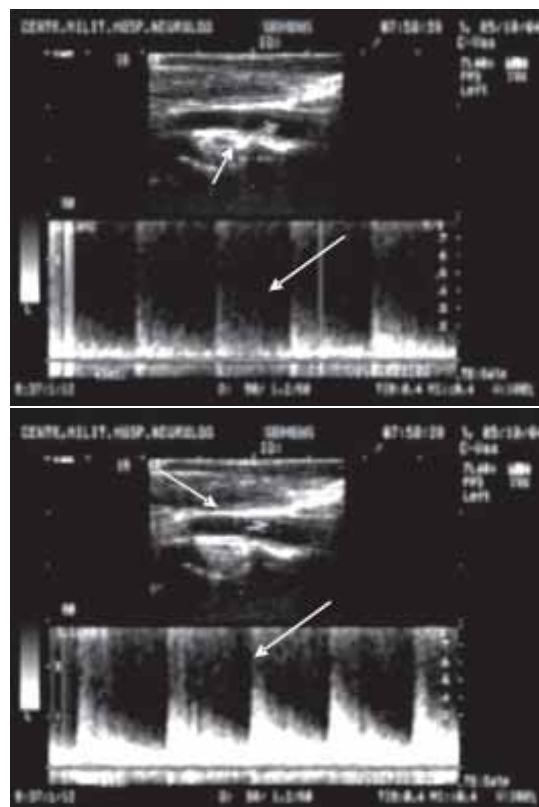


Figure 1. Echo – Doppler – a different flow pattern has been found in the 2 parts of the vessel separated by the septum (left – the “false” lumen, right – the artery lumen).

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The patients have been investigated extensively, CT scan, DSA (digital subtraction angiography), MRI, angio MRI have been performed. In a smaller number of patients IVUS (intravascular ultrasonography) has been performed too (fig. 2, 3, 4).

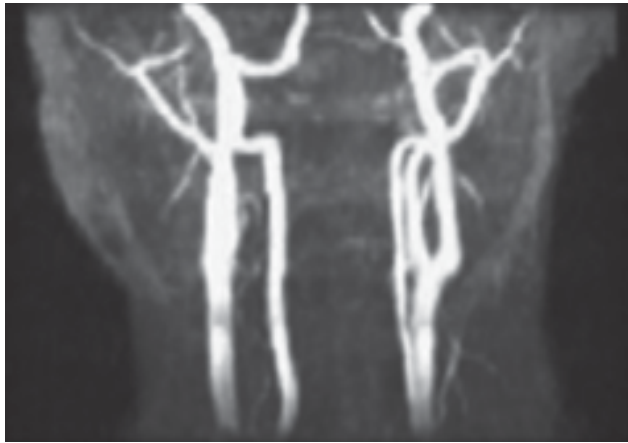


Figure 2
Angio MRI – shows nonspecific, minor flow modifications of the carotid arteries

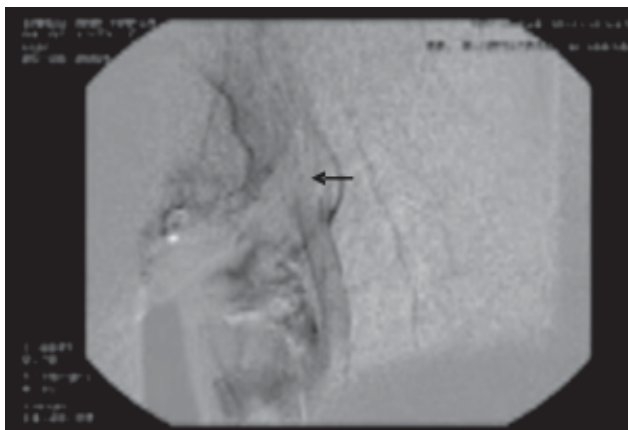
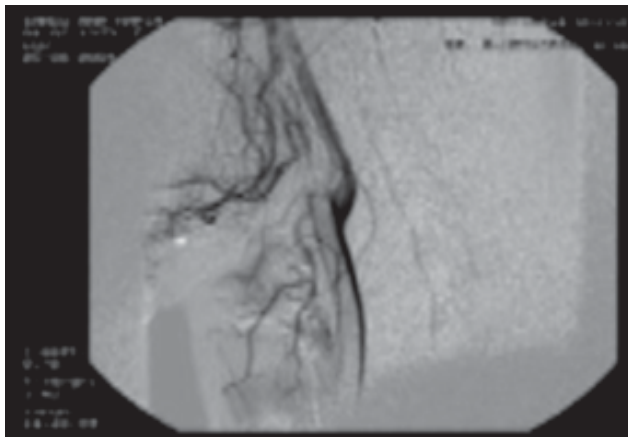


Figure 3
DSA – is showing a slower flow, lasting a time after the contrast agent has left the vessel

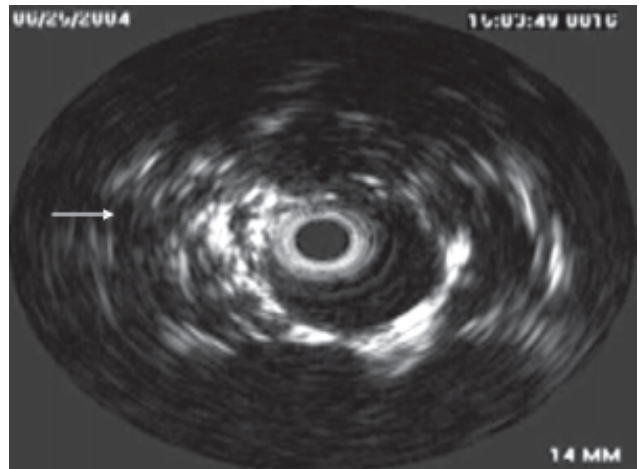
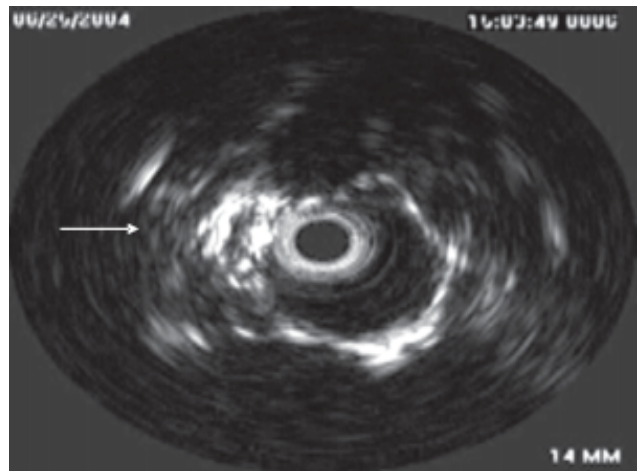


Figure 4
IVUS – a second smaller lumen is visible

In this patients we decided to have an enhanced ultrasound image so a ultrasonography contrast agent has been used (Levovist). Usually the ultrasonography contrast agents are used for enhancing the Doppler signal but also for the B-mode echocardiography. At this time it was tried to see if a better imaging of the artery itself would be obtained using the US contrast agent.

Levovist has been used, in a concentration of 400 mg / ml, administered in bolus. It was observed that in a few seconds (4 to 10 sec.) the carotid artery began to be filled by the contrast agent (fig. 4, 5, 6, 7, 8). After the concentration has risen to its peak, the movements of the septum described above are clearly demonstrated. The duration of the contrast agent effect depends of some factors (velocity, vessel caliber, metabolism), but usually it takes around 30 sec to 1 min for the effect to fading.

Instead of conclusions, we consider that the Echo-Doppler examination using an ultrasound contrast agent (Levovist) is a reliable and efficient method for visualizing the cervical arteries dissection mainly the cases where there is a double lumen permeable for the blood flow, and an intimal

septum that is separating the two lumen and is flapping in the artery.

Of course further studies are necessary on a higher number of patients in order to develop a protocol of investigation using this method.

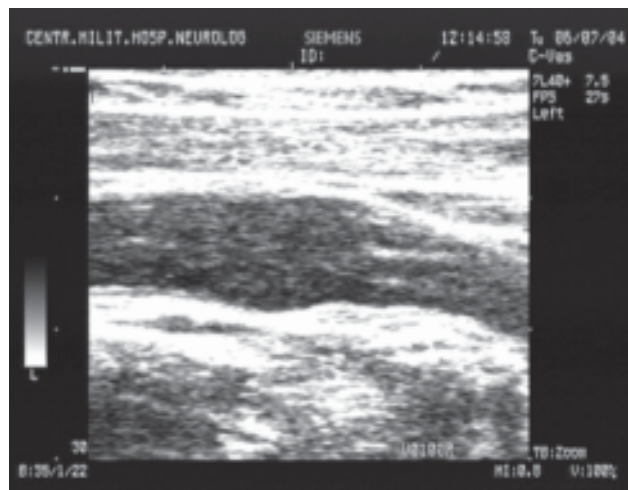


Figure 5
The contrast agent concentration in the vessel continues to rise

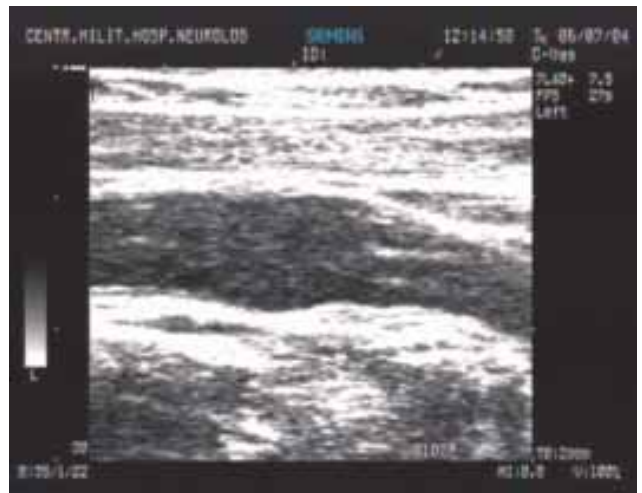


Figure 6
The flapping intimal septum begins to be visible as the vessel is more and more opaque

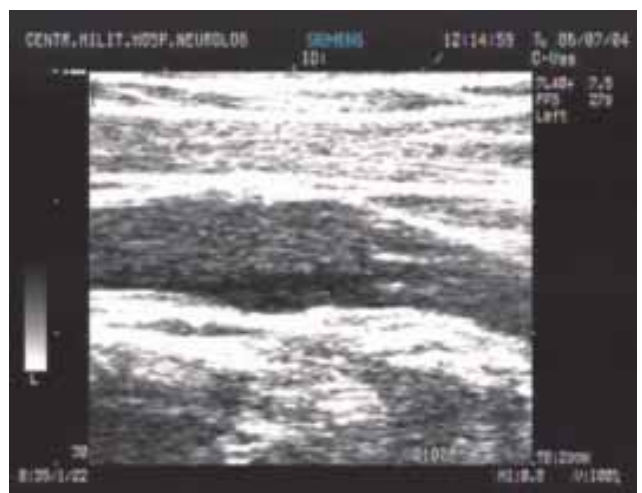


Figure 7
The carotid artery is now fully filled by the contrast agent and the flapping septum is clearly visualized

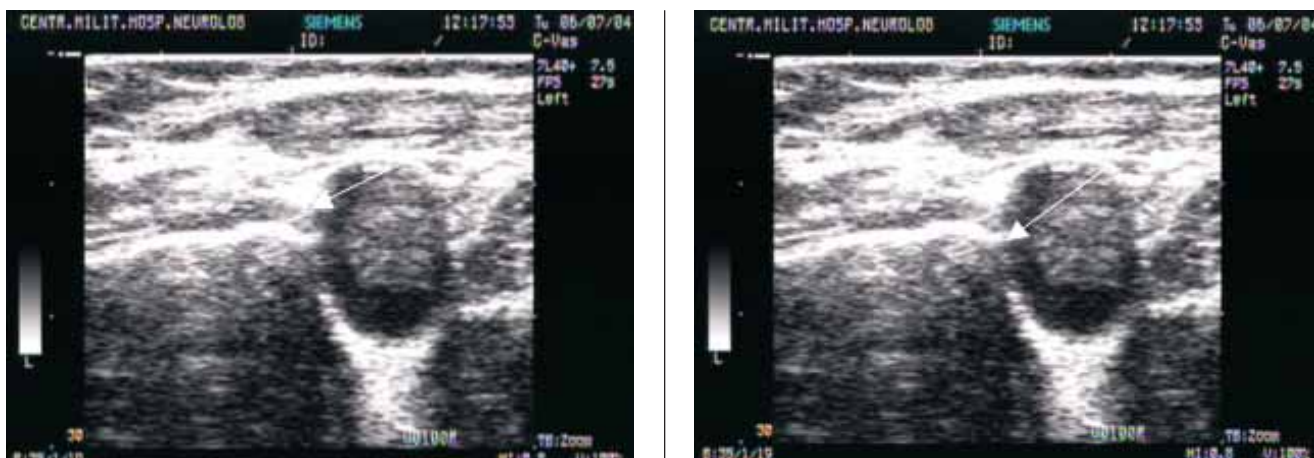


Figure 8. In the transverse section of the same carotid artery the flapping septum is visible too.

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