Modification in the imaging of the carotid body by means of the computed tomography angiography method – preliminary study

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The carotid body constitutes a small structure of up to 7×4×2 mm, located on both sides, slightly towards the back, of the bifurcation of the external and internal carotid artery [1].

The main function of the carotid body is chemical control of the regulation of respiratory action by means of a reflex from chemoreceptors [2]. It has also been revealed that chemoreceptors of the carotid body play a significant role in regulating functions of the circulatory system [3,4]. It has been proved that the carotid body reflex results in heightening sympathetic tension reflected in a contraction of blood vessels and increasing the rate of heartbeat [5].

Currently, the issue of particular interest is the influence of chronically increased activity of the carotid body on the progression of heart failure. It has been proved that the activity of the carotid body in patients with heart failure is chronically heightened [6,7]. The main mechanisms of this dependence include an incorrect stimulation of the chemoreceptor reflex by increased concentrations of angiotensin II and disorders of mechanisms controlling the activity of the carotid body, especially decreasing the activity of nitric oxide synthase and lowering the concentration of nitric oxide [8].

Due to the growing clinical significance of the carotid body, it seems necessary to optimize the methods of its diagnostics. In the authors' opinion, the existing computed tomography angiography (CTA) research protocol used in assessing the carotid body, proposed by Nguyen et al. [9] appears to be insufficient. The unsatisfactory visual quality of the image of the carotid body resulting from the use of the existing protocol in axial and sagittal projections is presented in Figures 1 and 2. The modification of the protocol proposed by the authors seems more applicable. On the basis of their own experience in assessing the carotid body, the authors suggest that the beginning of the scanning in the CTA protocol should be delayed after the intravenous bolus of the contrast agent (100 ml of IOMERON 400 at the rate of 4.5 ml/s). The delay should not be shorter than 90s and no longer than 120s from the moment of completing the application of the intravenous contrast agent. This modification of the protocol allows better saturation of the soft tissue carotid structures with the contrast medium, greatly improving the visualization of the carotid body.

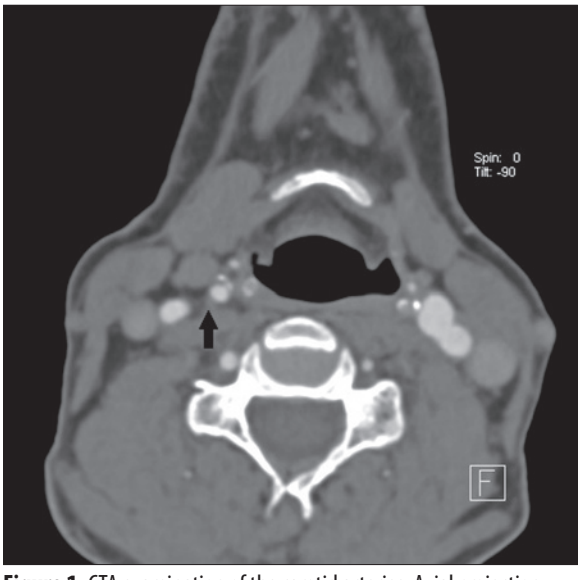

Figure 1. CTA examination of the carotid arteries. Axial projection. Standard protocol – beginning of acquisition: 60s from the moment of administering intravenous contrast agent.

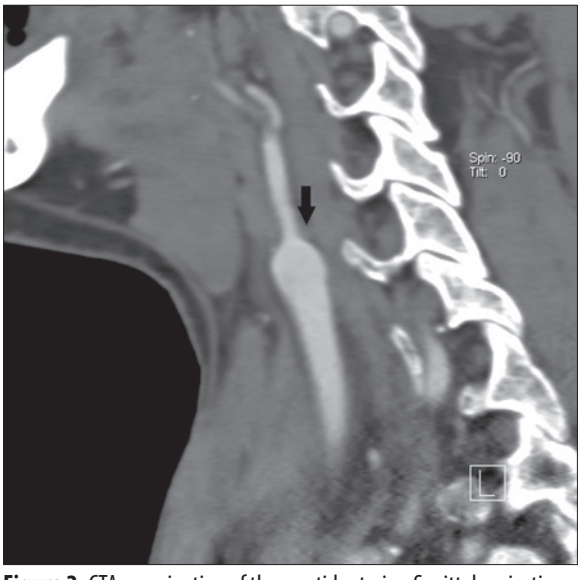

Figure 2. CTA examination of the carotid arteries. Sagittal projection. Standard protocol – beginning of acquisition: 60s from the moment of administering intravenous contrast agent.

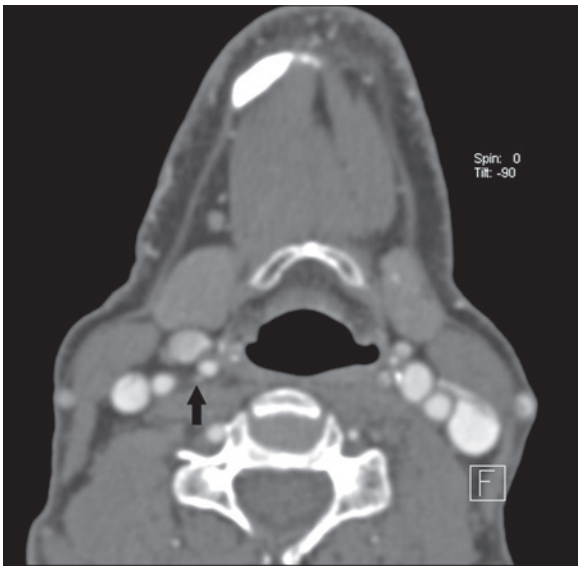

Figure 3. CTA examination of the carotid arteries. Axial projection. Modified protocol – beginning of acquisition: 90s from the moment of administering intravenous contrast agent.

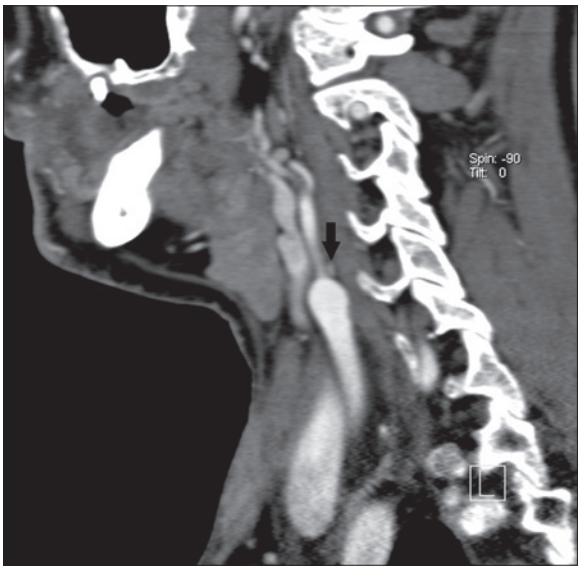

Figure 4. CTA examination of the carotid arteries. Sagittal projection. Modified protocol – beginning of acquisition: 90s from the moment of administering intravenous contrast agent.

Figures 3 and 4 show the significant improvement in the quality of visualization of the carotid body by means of the modified CTA protocol in the same patient, in axial and sagittal projections.

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