

## EARLY DIAGNOSIS AND TREATMENT OF CALL–FLEMING SYNDROME

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**Relevance:** The problem of headache remains one of the urgent issues of modern neurology. Despite numerous studies devoted to primary and secondary headaches, some clinical conditions are still not identified early enough.

One of these conditions is Call–Fleming syndrome, which is characterized by sudden onset of severe headache, segmental vasoconstriction of the cerebral arteries, and a reversible course. Timely diagnosis of the disease is essential for preventing serious complications.

**Objective:** To study the diagnostic criteria of Call–Fleming syndrome and to evaluate approaches to its early diagnosis and treatment.

**Materials and methods.** During the study, 54 patients aged 18–65 years were observed.

Among them, 42 were women with a mean age of  $37.8 \pm 10.9$  years, and 12 were men with a mean age of  $34.2 \pm 9.2$  years.

The diagnosis of Call–Fleming syndrome was confirmed in 13 patients. The diagnosis was established according to the diagnostic criteria recommended in ICHD-3. These included the presence of segmental vasoconstriction of the cerebral arteries with a “string-of-beads” appearance on MR angiography or CT angiography, regression of vasoconstriction signs within 12 weeks, the clinical presence of a sudden thunderclap headache, exclusion of subarachnoid hemorrhage, and near-normal cerebrospinal fluid analysis.

**Results and discussion.** Of the 13 patients diagnosed with Call–Fleming syndrome, 10 were women and 3 were men. Primary Call–Fleming syndrome was identified in 77% of the examined patients. In some patients, triggering factors were recorded, particularly physical and sexual activity, psychological stress, and visiting a sauna, after which clinical symptoms appeared.

The most common medications associated with the development of secondary Call–Fleming syndrome were identified as sympathomimetics (nasal sprays), drugs used in hormonal therapy in women (oral contraceptives), as well as selective serotonin reuptake inhibitors (paroxetine and others); these were assessed as trigger factors in 62.3% of cases. In two women, however, no definite trigger factor was identified.

According to neuroimaging findings, in the acute stage of Call–Fleming syndrome, brain MRI revealed no clear pathological changes in the majority of patients. The examination was performed in T1-, T2-, and T2-FLAIR sequences.

Magnetic resonance venography was performed in 46 patients. During the follow-up, a complicated course of Call–Fleming syndrome was recorded in 4 patients: a 28-year-old woman developed an intracerebral hematoma in the deep parts of the right temporal lobe against a background of headache that began after sexual intercourse; a 44-year-old man developed non-aneurysmal subarachnoid hemorrhage on the third day after using a nasal spray; a 36-year-old woman presented with a complicated clinical condition characterized by severe headache after visiting a sauna; and a 27-year-old woman developed headache typical of Call–Fleming syndrome

against a background of hemorrhagic changes after thrombolytic therapy performed for ischemic stroke.

**Conclusion.** These observations showed that Call–Fleming syndrome may rarely be recognized by radiologists in routine practice. The study confirmed that Call–Fleming syndrome occurs in patients aged 18–65 years and that women predominate among them. When establishing the diagnosis, it is important to determine the onset time of the thunderclap headache and to search for possible trigger factors.

At the same time, in-depth neuroimaging examinations, including brain MRI, MR venography, and, when necessary, lumbar puncture, are required to exclude other causes. The detection of bilateral multisegmental arterial narrowing on MR angiography within 3–4 weeks after disease onset greatly assists in confirming the diagnosis of Call–Fleming syndrome.

Timely administration of calcium channel blockers, particularly nimodipine, contributed not only to clinical improvement but also to regression of vasospasm signs on neuroimaging studies.

**Keywords.** Call–Fleming syndrome, early diagnosis, thunderclap headache, MR angiography, vasoconstriction, nimodipine.