

# **1. STRESZCZENIE W JĘZYKU ANGIELSKIM**

## **INTRODUCTION**

Neuroimaging studies such as angio-CT, angio-MR, and digital subtraction angiography (DSA) are commonly used with contrast agents to visualize blood vessels in the brain using advanced image reconstruction techniques. They are increasingly performed in patients suffering from chronic headaches, and in some cases, these studies suggest the presence of brain vascular abnormalities, such as aneurysms or vascular malformations. [3]

## **AIM OF THE STUDY**

The aim of this study is to evaluate the diagnostic reliability of angio-CT and angio-MR in detecting intracranial aneurysms and vascular malformations compared to digital subtraction angiography (DSA).

## **MATERIALS AND METHODS**

The study group consisted of 85 patients diagnosed with intracranial aneurysms or vascular malformations at the Department of Neurosurgery, University Clinical Hospital in Białystok, from March 2019 to March 2020. The study was conducted retrospectively and involved analyzing the medical records of the patients and the results of digital subtraction angiography (DSA), computed tomography angiography (angio-CT), and magnetic resonance angiography (angio-MR).

## **RESULTS**

The study group comprised 85 patients with diagnosed intracranial aneurysms or vascular malformations, including 66 women (78% of the group) aged between 23 and 76, and 19 men (22% of the group) aged between 21 and 83. The mean age in the study group was 55 years. Among the study group, 55% were overweight or obese. Headaches were present in 63 patients (74.11%) of the study group. In the angio-CT group with suspected aneurysm (62 examinations), the presence of an aneurysm was confirmed in 57 patients (91.9%) in both angio-CT and DSA. DSA excluded aneurysm in 4 patients (6.5%). One patient (1.6%) with a negative result in angio-CT had a confirmed aneurysm in DSA (false-negative result). In the angio-MR group (19 examinations), the presence of an aneurysm was confirmed in 15 patients (78.9%) in both angio-MR and DSA. DSA excluded aneurysm in 1 patient (5.3%). In

3 patients (15.8%) with a negative result in angio-MR, an aneurysm was found in DSA (false-negative result). In the angio-CT group with suspected vascular malformation (6 examinations), the presence of vascular malformation was confirmed in 3 patients (50%) in both angio-CT and DSA. DSA excluded vascular malformation in 3 patients (50%). In the angio-MR group (7 examinations), the presence of vascular malformation was confirmed in 3 patients (42.9%) in both angio-MR and DSA. DSA excluded vascular malformation in 3 patients (42.9%). One patient (14.3%) with a negative result in angio-MR had a confirmed vascular malformation in DSA (false-negative result). DSA confirmed the location of aneurysms diagnosed with angio-CT in 55 out of 57 cases (96.5%) and aneurysms diagnosed with angio-MR in 14 out of 15 cases (93.3%). Angio-CT was more accurate in assessing small-sized aneurysms' necks than DSA. Neck size differed significantly between both examinations ( $p = 0.009$ ). In DSA, aneurysm necks were wider (median = 2.70 mm) than in angio-CT (median = 2.50 mm). DSA also revealed multiple aneurysms in 9 patients (14.52%) who had no multiple aneurysms detected in angio-CT. DSA showed multiple aneurysms in 4 patients (21.05%), while no multiple aneurysms were found in angio-MR (false-negative result). In the group of patients with confirmed aneurysm or vascular malformation, observation was most frequently recommended for 46 patients (54% of the whole group), vascular treatment was applied in 25 patients (29% of the group), and surgical treatment was applied in the remaining 14 patients (17% of the group). There was a statistically significant relationship between the treatment method and the presence of an aneurysm in the right middle cerebral artery ( $p = 0.10$ ). The right middle cerebral artery was the location of an aneurysm for 31% of patients treated surgically, compared to 5.4% of patients for whom observation was recommended, and none of the patients in the vascular treatment group had an aneurysm in this location.

## CONCLUSIONS

The analysis of the study results of patients treated at the Department of Neurosurgery, University Clinical Hospital in Bialystok, showed that:

1. DSA is the most reliable method for detecting aneurysms and vascular malformations compared to angio-CT and angio-MR.
2. DSA is the most commonly used method to confirm or exclude the presence of abnormalities diagnosed by angio-CT and angio-MR.
3. DSA is a more accurate diagnostic method for vascular malformations compared to angio-CT and angio-MR (confirming or excluding the diagnosis in half of the cases).

4. Headaches were the main indication for diagnostic examinations such as angio-CT, angio-MR, and DSA.
5. The dimensions and locations of intracranial aneurysms obtained in DSA were consistent with the results obtained in angio-CT and angio-MR.
6. Angio-CT is a more accurate method for assessing small-sized aneurysms' necks than DSA.
7. DSA is an excellent technique for detecting multiple aneurysms.
8. Overweight and obesity predispose to the occurrence of intracranial aneurysms and vascular malformations.
9. Observation and follow-up examinations were most frequently recommended for patients with confirmed small aneurysms and asymptomatic vascular malformations.
10. Aneurysms located in the anterior part of the Willis circle were treated endovascularly, while aneurysms located in the right middle cerebral artery were most frequently treated surgically.
11. There was no association between the occurrence of single and multiple intracranial aneurysms and vascular malformations with the presence of coexisting diseases, substance abuse, or positive family history.