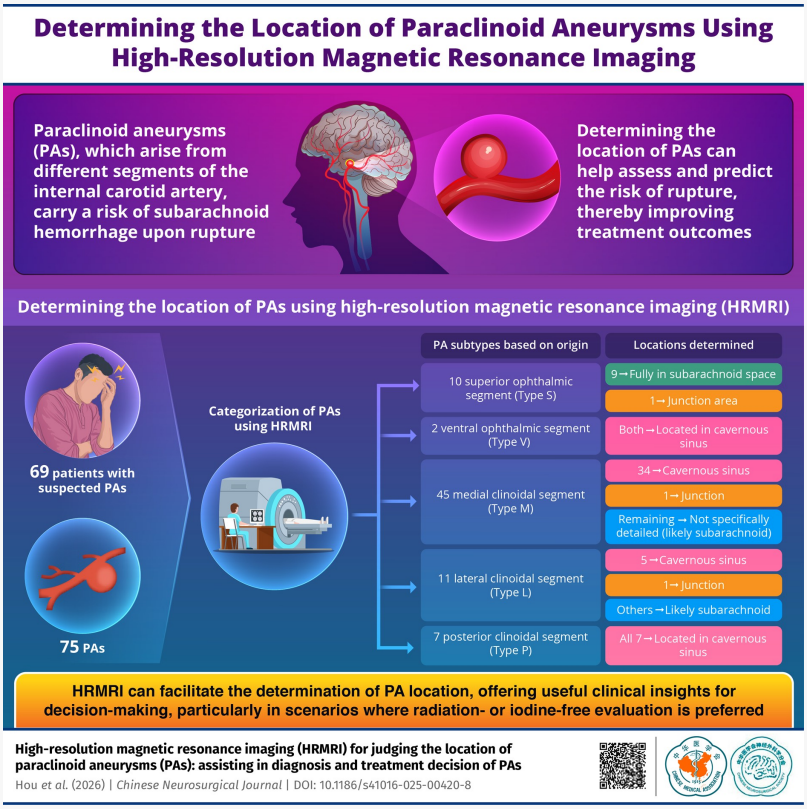
Chinese Neurosurgical Journal Study Develops a New Protocol for Determining Location of Paraclinoid Aneurysms

Researchers develop a modified high-resolution magnetic resonance imaging technique for determining the location of paraclinoid aneurysms



Researchers have developed a modified HRMRI technique which can help in determining the location of PAs and predicting rupture risk. The findings underscore the importance of individualized imaging assessment, which can further help in the development of

BEIJING, CHINA, March 12, 2026 /EINPresswire.com/ -- Unruptured intracranial aneurysms (UIAs), abnormal dilation of blood vessels in the brain that have not yet ruptured, pose a risk for potential hemorrhage. Paraclinoid aneurysms (PAs) are a specific type of UIA that arise from the ophthalmic segment of the internal carotid artery (ICA) extending to adjacent structures. For PAs located proximal to the dural ring or within the cavernous sinus, the risk for subarachnoid hemorrhage is minimal. Thus, determining the location of UIAs, specifically the PAs, is critical for evaluating and predicting the rupture risk, which can guide treatment decisions. However, the existing risk prediction models do not incorporate this criterion, leading to decision bias.

To address this challenge, a research team led by Professor Hongqi Zhang from Xuan Wu Hospital, Capital Medical University, China, developed a modified high-resolution magnetic resonance imaging (HRMRI) technique. The team focused on integrating existing imaging markers into a practical workflow to differentiate intra-dural from extra-dural PAs. The study was published online in Volume 12 of the Chinese Neurosurgical Journal on January 26, 2026.

The study included 69 adult patients who were diagnosed with untreated PAs and underwent HRMRI. A total of 75 PAs were considered for the study, which were classified into five subtypes based on the Barami classification, which includes aneurysms arising laterally and located in the posterior clinoidal segment. Based on their origin from the ICA, the five types of PAs include Type S, originating from the superior ophthalmic segment; Type V, originating from the ventral ophthalmic segment; Type M, originating from the medial clinoidal segment; Type L, originating from the lateral clinoidal segment; and Type P, originating from the posterior clinoidal segment. All participants underwent a modified HRMRI protocol that combined time-of-flight MR angiography, along with thin-slice T2-weighted and contrast-enhanced T1-weighted sequences in both coronal and sagittal planes.

Rather than relying on indirect bony landmarks, as is common in computed tomography angiography, the approach focused on direct visualization of cerebrospinal fluid spaces and contrast enhancement within the cavernous sinus. To determine whether the aneurysm was located in the cavernous sinus or subarachnoid space, reconstruction and interpretation were conducted using the open-source software Radiant Dicom Viewer.

“We detected the location of the PAs based on the T2-phase cerebrospinal fluid notch and cavernous sinus enhancement signal. Instead of relying on variable bony landmarks as in computed tomography angiography, our approach focuses on direct visualization of anatomical compartments, ensuring clear identification of the aneurysm regardless of its origin within the ICA or its directional orientation,” explains Prof. Zhang.

Most of the aneurysms in the study population arose from the medial clinoidal segment. A total of 48 out of the 75 aneurysms were located in the cavernous sinus, while 24 aneurysms were located in the subarachnoid space, and the rest were at the juncture area. Type S aneurysms were predominantly located within the subarachnoid space, suggesting a potentially higher clinical relevance in terms of rupture risk. In contrast, Type P and Type V aneurysms were mainly confined to the cavernous sinus, hinting at a lower risk of hemorrhage. Type M and Type L aneurysms showed more variable distributions, underscoring the importance of individualized imaging assessment.

“Our new protocol is particularly useful in patients who require radiation-free or iodine-free imaging. However, it is important to note that cavernous sinus aneurysms might enlarge over time, which increases the risk of rupture. Thus, long-term follow-up observation remains essential,” says Prof. Zhang.

The modified HRMRI approach can provide clinically meaningful details regarding the location of the PAs, leading to a refined risk assessment, which can help in clinical decision-making and guide individualized treatment strategies.

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Reference
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About Capital Medical University
Founded in 1960 as the Beijing Second Medical College, Capital Medical University is one of China's top medical universities. With 12 colleges and two research centers, the university houses over 7,900 postgraduate and over 7,400 undergraduate students. 21 hospitals in the Beijing region are affiliated with the university. Capital Medical University also houses several National Medical Centers that work closely with national ministries. The university also has exchange and cooperation agreements with 50 universities spanning 20 countries.

Website: https://www.ccmu.edu.cn/index.htm

About Professor Hongqi Zhang from Capital Medical University
Dr. Hongqi Zhang is a Professor at Xuan Wu Hospital, Capital Medical University, Beijing, China. He graduated from Peking University Health Science Center in 1993 and obtained his Doctor of Medicine degree from Peking Union Medical College in 2003. He has published 172 research articles. His primary focus is on the surgical and interventional treatment of cerebrovascular and spinal vascular diseases. He has conducted in-depth research and made innovative contributions in the development and clinical anatomy of spinal vasculature and has established the world's largest case database of spinal vascular malformation.

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