ISSN 2307-8960 (online)

World Journal of *Clinical Cases*

Thrice Monthly Volume 13 Number 6 February 26, 2025

Published by Baishideng Publishing Group Inc

World Journal of
Clinical Cases

Contents

Thrice Monthly Volume 13 Number 6 February 26, 2025

EDITORIAL

ORIGINAL ARTICLE

Retrospective Study

META-ANALYSIS

CASE REPORT

LETTER TO THE EDITOR

Contents

World Journal of Clinical Cases

Thrice Monthly Volume 13 Number 6 February 26, 2025

ABOUT COVER

Peer Reviewer of *World Journal of Clinical Cases*, Huseyin Kemal Rasa, MD, Doctor, President, Department of Surgery, Anadolu Medical Center, Kocaeli 41400, Türkiye. kemal.rasa@anadolusaglik.org

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now abstracted and indexed in PubMed, PubMed Central, *Reference Citation Analysis*, China Science and Technology Journal Database, and Superstar Journals Database. The 2024 Edition of Journal Citation Reports® cites the 2023 journal impact factor (JIF) for *WJCC* as 1.0; JIF without journal self cites: 0.9; 5-year JIF: 1.1; JIF Rank: 170/329 in medicine, general and internal; JIF Quartile: Q3; and 5-year JIF Quartile: Q3.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Lei Zhang*; **Production Department Director:** *Si Zhao*; **Cover Editor:** *Jin-Lei Wang*.

NAME OF JOURNAL
World Journal of Clinical Cases

ISSN
ISSN 2307-8960 (online)

LAUNCH DATE
April 16, 2013

FREQUENCY
Thrice Monthly

EDITORS-IN-CHIEF
Bao-Gan Peng, Salim Surani, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/2307-8960/editorialboard.htm

PUBLICATION DATE
February 26, 2025

COPYRIGHT
© 2025 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS
https://www.wjgnet.com/bpg/gerinfo/204

GUIDELINES FOR ETHICS DOCUMENTS
https://www.wjgnet.com/bpg/GerInfo/287

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH
https://www.wjgnet.com/bpg/gerinfo/240

PUBLICATION ETHICS
https://www.wjgnet.com/bpg/GerInfo/288

PUBLICATION MISCONDUCT
https://www.wjgnet.com/bpg/gerinfo/208

ARTICLE PROCESSING CHARGE
https://www.wjgnet.com/bpg/gerinfo/242

STEPS FOR SUBMITTING MANUSCRIPTS
https://www.wjgnet.com/bpg/GerInfo/239

ONLINE SUBMISSION
https://www.f6publishing.com

W J C C World Journal of Clinical Cases

Submit a Manuscript: https://www.f6publishing.com

World J Clin Cases 2025 February 26; 13(6): 98606

DOI: 10.12998/wjcc.v13.i6.98606

ISSN 2307-8960 (online)

LETTER TO THE EDITOR

Advancements and challenges in neuroimaging for the diagnosis of intracranial aneurysms: Addressing false positive diagnoses and emerging techniques

Nanthida Arora, Sombat Muengtaweepongsa

Specialty type: Medicine, research and experimental

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification

Scientific Quality: Grade D

Novelty: Grade D

Creativity or Innovation: Grade D

Scientific Significance: Grade D

P-Reviewer: Cui SL

Received: June 30, 2024

Revised: October 16, 2024

Accepted: November 12, 2024

Published online: February 26, 2025

Processing time: 147 Days and 17.3 Hours

Nanthida Arora, Center of Excellence in Stroke, Thammasat University, Pathum Thani 12120, Thailand

Sombat Muengtaweepongsa, Center of Excellence in Stroke, Division of Neurology, Department of Medicine, Faculty of Medicine, Thammasat University Rangsit Campus, Klonglaung 12120, Pathum Thani, Thailand

Corresponding author: Sombat Muengtaweepongsa, MD, Professor, Center of Excellence in Stroke, Division of Neurology, Department of Medicine, Faculty of Medicine, Thammasat University Rangsit Campus, No. 99/209 Paholyothin Road, Klonglaung 12120, Pathum Thani, Thailand. musombat@tu.ac.th

Abstract

Despite advancements in neuroimaging, false positive diagnoses of intracranial aneurysms remain a significant concern. This article examines the causes, prevalence, and implications of such false-positive diagnoses. We discuss how conditions like arterial occlusion with vascular stump formation and infundibular widening can mimic aneurysms, particularly in the anterior circulation. The article compares various imaging modalities, including computer tomography angiogram, magnetic resonance imaging/angiography, and digital subtraction angiogram, highlighting their strengths and limitations. We emphasize the importance of accurate differentiation to avoid unnecessary surgical interventions. The potential of emerging technologies, such as high-resolution vessel wall imaging and deep neural networks for automated detection, is explored as promising avenues for improving diagnostic accuracy. This manuscript underscores the need for continued research and clinical vigilance in the diagnosis of intracranial aneurysms.

Key Words: Intracranial aneurysms; Neuroimaging techniques; Computed tomographic angiography; Magnetic resonance angiography; Digital subtraction angiography; False positive diagnoses

Core Tip: Effective differentiation between true and false positive diagnoses of intracranial aneurysms is crucial to minimize unnecessary surgical risks. While advanced neuroimaging techniques like computer tomography angiogram and magnetic resonance angiography offer significant advantages, including lower costs and reduced procedural risks, understanding their limitations and continuing to rely on the gold standard, digital subtraction angiogram, where appropriate, remains essential for accurate diagnosis and treatment planning.

Citation: Arora N, Muengtaweepongsa S. Advancements and challenges in neuroimaging for the diagnosis of intracranial aneurysms: Addressing false positive diagnoses and emerging techniques. *World J Clin Cases* 2025; 13(6): 98606
URL: https://www.wjgnet.com/2307-8960/full/v13/i6/98606.htm
DOI: https://dx.doi.org/10.12998/wjcc.v13.i6.98606

TO THE EDITOR

Despite advancements in neuroimaging techniques, the false positive diagnoses of intracranial aneurysms remain a rare yet significant concern. Yang and Mai[1] reported a case where chronic middle cerebral artery (MCA) occlusion mimicked the appearance of an aneurysm on both computer tomography angiogram (CTA) and digital subtraction angiogram (DSA). False positive diagnoses of aneurysms often occur due to conditions that can mimic their appearance on imaging, such as arterial occlusion with vascular stump formation, infundibular widening, fenestration, arterial dissection, and venous varix. Accurate differentiation between unruptured aneurysms and other conditions is crucial to avoid unnecessary surgical interventions. Most studies on this topic are limited to case reports or small case series, making it difficult to establish the exact frequency of false positive diagnoses[2]. The incidence varies depending on imaging modality and the expertise of the interpreting professionals[3]. False-positive aneurysms are predominantly associated with the anterior circulation, notably at the bifurcation of the MCA, constituting 85% of reported cases. Within this category, 40% of instances specifically occur at the MCA bifurcation. Conversely, in the posterior circulation, false-positive aneurysms have been observed primarily at the basilar artery or the vertebrobasilar junction[2]. Arterial occlusion with vascular stump formation, often due to progressive atherosclerotic changes (36.7%), is the leading cause of aneurysm mimics, particularly at the origin of M2 from the MCA. Infundibular widening of the arterial orifice accounts for 20% of cases, making it the second most common cause[2].

Imaging modalities commonly used for detecting intracranial aneurysms include CTA, magnetic resonance imaging (MRI)/magnetic resonance angiography (MRA), and the gold standard, DSA. CTA and MRA provide numerous advantages over DSA, such as lower cost, reduced risks of arterial injury and stroke, faster data acquisition, and the capability for retrospective manipulation of imaging data. Despite these advantages, DSA continues to be regarded as the gold standard for diagnosing intracranial aneurysms[4]. MRA has been reported to have a sensitivity of 95% and a specificity of 85%[5], with some studies suggesting equivalent detection rates to DSA (a sensitivity of 87% and a specificity of 92%)[6]. MRI offers the advantage of evaluating vessel wall enhancement, aiding in the assessment of aneurysm evolution and rupture risk. However, MRI may produce false-negative results in small aneurysms (< 5 mm) or in certain locations, such as the internal carotid artery or anterior communicating artery. DSA, with its superior spatial resolution, remains more reliable[7]. Additional techniques, such as MRI three-dimensional constructive interference in steady state and three-dimensional fast imaging employing steady state acquisition fused with MRA[8], have been proposed to enhance vascular detail at occlusion points, aiding in differential diagnosis[6,7]. High-resolution vessel wall imaging also shows promise in detecting various intracranial vascular pathologies, including atherosclerosis and vasculitis[9]. DSA is widely recognized as the gold standard for diagnosing intracranial aneurysms. However, the potential for false positives remains. In clinical practice, it is crucial for clinicians to distinguish aneurysms from other anatomical structures or pathological conditions that may mimic aneurysms in imaging studies, in order to avoid false positive diagnoses[10]. The use of deep neural networks for automated detection and segmentation of aneurysms in DSA sequences has shown considerable promise in mitigating false positives. These networks leverage both spatial and temporal data, leading to notable improvements in detection accuracy and efficiency[11]. A two-stage convolutional neural network has been developed for automatic detection of intracranial aneurysms on DSA images, offering greater accuracy and faster detection times compared to traditional digital image processing methods[12].

In conclusion, while DSA remains the gold standard for diagnosing intracranial aneurysms, the challenge of false positive diagnoses persists, primarily due to conditions that mimic aneurysms. Accurate differentiation is vital to prevent unnecessary interventions, and advancements in imaging techniques and deep learning methods hold promise for improving diagnostic accuracy. Continued research and the development of enhanced imaging modalities are essential to further minimize false positive rates and optimize patient outcomes in the assessment of intracranial aneurysms.

FOOTNOTES

Author contributions: Arora N and Muengtaweepongsa S investigated, generated the conception and designed the study; Arora N prepared the original draft; Muengtaweepongsa S reviewed and edited the draft.

Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

Country of origin: Thailand

ORCID number: Nanthida Arora 0009-0003-5590-316X; Sombat Muengtaweepongsa 0000-0003-3715-4428.

S-Editor: Wei YF
L-Editor: A
P-Editor: Zhang L

REFERENCES

1 **Yang S**, Mai RK. Mimicking aneurysm in a patient with chronic occlusion of the left middle cerebral artery: A case report. *World J Clin Cases* 2024; **12**: 5145-5150 [PMID: 39109024 DOI: 10.12998/wjcc.v12.i22.5145]

2 **Konovalov A**, Gadzhiagaev V, Artemyev A, Okishev D, Pilipenko Y, Grebenev F, Eliava S. A Systematic Review and Case Illustrations of Misdiagnosing Intracranial Aneurysms. *Cureus* 2024; **16**: e59185 [PMID: 38807799 DOI: 10.7759/cureus.59185]

3 **Jang M**, Kim JH, Park JW, Roh H, Lee HJ, Seo J, Hwang SH, Yoon JH, Yoon SH, Cho BK. Features of "false positive" unruptured intracranial aneurysms on screening magnetic resonance angiography. *PLoS One* 2020; **15**: e0238597 [PMID: 32881975 DOI: 10.1371/journal.pone.0238597]

4 **Kouskouras C**, Charitanti A, Giavroglou C, Foroglou N, Selviaridis P, Kontopoulos V, Dimitriadis AS. Intracranial aneurysms: evaluation using CTA and MRA. Correlation with DSA and intraoperative findings. *Neuroradiology* 2004; **46**: 842-850 [PMID: 15448952 DOI: 10.1007/s00234-004-1259-2]

5 **Sailer AM**, Wagemans BA, Nelemans PJ, de Graaf R, van Zwam WH. Diagnosing intracranial aneurysms with MR angiography: systematic review and meta-analysis. *Stroke* 2014; **45**: 119-126 [PMID: 24326447 DOI: 10.1161/STROKEAHA.113.003133]

6 **Turan N**, Heider RA, Roy AK, Miller BA, Mullins ME, Barrow DL, Grossberg J, Pradilla G. Current Perspectives in Imaging Modalities for the Assessment of Unruptured Intracranial Aneurysms: A Comparative Analysis and Review. *World Neurosurg* 2018; **113**: 280-292 [PMID: 29360591 DOI: 10.1016/j.wneu.2018.01.054]

7 **Broekx S**, Keulen L, Menovsky T. Unraveling cerebral saccular aneurysm mimics: Case report and review of the literature. *Brain Spine* 2023; **3**: 101786 [PMID: 38020990 DOI: 10.1016/j.bas.2023.101786]

8 **Kuribara T**, Haraguchi K, Ogane K, Matsuura N, Ito T. 3D-FIESTA Magnetic Resonance Angiography Fusion Imaging of Distal Segment of Occluded Middle Cerebral Artery. *Neurol Med Chir (Tokyo)* 2015; **55**: 805-808 [PMID: 26369877 DOI: 10.2176/nmc.tn.2014-0439]

9 **Vranic JE**, Hartman JB, Mossa-Basha M. High-Resolution Magnetic Resonance Vessel Wall Imaging for the Evaluation of Intracranial Vascular Pathology. *Neuroimaging Clin N Am* 2021; **31**: 223-233 [PMID: 33902876 DOI: 10.1016/j.nic.2021.01.005]

10 **Xiao W**, Hou X, Li D, Yang D. False positive angiographic aneurysm of the anterior segment of the M1 bifurcation of the middle cerebral artery: a case report. *Front Neurol* 2023; **14**: 1327878 [PMID: 38192573 DOI: 10.3389/fneur.2023.1327878]

11 **Jin H**, Geng J, Yin Y, Hu M, Yang G, Xiang S, Zhai X, Ji Z, Fan X, Hu P, He C, Qin L, Zhang H. Fully automated intracranial aneurysm detection and segmentation from digital subtraction angiography series using an end-to-end spatiotemporal deep neural network. *J Neurointerv Surg* 2020; **12**: 1023-1027 [PMID: 32471827 DOI: 10.1136/neurintsurg-2020-015824]

12 **Duan H**, Huang Y, Liu L, Dai H, Chen L, Zhou L. Automatic detection on intracranial aneurysm from digital subtraction angiography with cascade convolutional neural networks. *Biomed Eng Online* 2019; **18**: 110 [PMID: 31727057 DOI: 10.1186/s12938-019-0726-2]

Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: office@baishideng.com
Help Desk: https://www.f6publishing.com/helpdesk
https://www.wjgnet.com