ISSN 1949-8470 (online)

World Journal of *Radiology*

World J Radiol 2024 November 28; 16(11): 629-707

Published by Baishideng Publishing Group Inc

World Journal of Radiology

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NAME OF JOURNAL
World Journal of Radiology

ISSN
ISSN 1949-8470 (online)

LAUNCH DATE
January 31, 2009

FREQUENCY
Monthly

EDITORS-IN-CHIEF
Thomas J Vogl

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/1949-8470/editorialboard.htm

PUBLICATION DATE
November 28, 2024

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World Journal of Radiology

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World J Radiol 2024 November 28; 16(11): 700-702

DOI: 10.4329/wjr.v16.i11.700

ISSN 1949-8470 (online)

LETTER TO THE EDITOR

Optimizing clinical decision-making for ruptured intracranial aneurysms: Current applications and future directions of computed tomography angiography

Xing-Yan Le, Jin-Rui Zhang, Jun-Bang Feng, Chuan-Ming Li

Specialty type: Radiology, nuclear medicine and medical imaging

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

Peer-review model: Single blind

Peer-review report's classification
Scientific Quality: Grade B
Novelty: Grade B
Creativity or Innovation: Grade B
Scientific Significance: Grade B

P-Reviewer: Nag DS

Received: September 4, 2024
Revised: November 8, 2024
Accepted: November 14, 2024
Published online: November 28, 2024
Processing time: 83 Days and 23.3 Hours

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Abstract

Ruptured intracranial aneurysms (RIAs) are a leading cause of subarachnoid haemorrhage (SAH) and are associated with a poor prognosis and high mortality rate. Computed tomography angiography (CTA) is the preferred imaging modality for the diagnosis of RIAs, as it is considered to be a fast, economical, and less invasive method. In this letter, regarding an original study presented by Elmokadem *et al*, we present our insights and discuss how CTA can better assist in clinical decision-making for patients with RIAs complicated by SAH.

Key Words: Computed tomography angiography; Ruptured intracranial aneurysms; Subarachnoid haemorrhage; Intracranial haemorrhage; Angiography

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Core Tip: For ruptured intracranial aneurysm (RIA) patients, computed tomography angiography (CTA) is crucial for clinical decision-making because of its convenience, low invasiveness, and reliability. However, there are still some problems with the current study, such as incomplete RIA parameters, a small number of patients, and a lack of external validation. In future research, more digital subtraction angiography and CTA-paired samples should be included; additionally, more comprehensive arterial aneurysm parameters should be included, and multiple artificial intelligence methods should be used to establish models to aid in the detection of RIAs and clinical decision-making.

Citation: Le XY, Zhang JR, Feng JB, Li CM. Optimizing clinical decision-making for ruptured intracranial aneurysms: Current applications and future directions of computed tomography angiography. *World J Radiol* 2024; 16(11): 700-702
URL: https://www.wjgnet.com/1949-8470/full/v16/i11/700.htm
DOI: https://dx.doi.org/10.4329/wjr.v16.i11.700

TO THE EDITOR

With great interest, we read the recent paper titled "Interobserver reliability of computed tomography angiography in the assessment of ruptured intracranial aneurysm and impact on patient management"[1]. In this study, Elmokadem *et al*[1] evaluated the interobserver reliability of computed tomography angiography (CTA) in assessing features of ruptured intracranial aneurysms (RIAs) and the impact on patient management. They highlighted the potential of CTA as a reliable imaging tool for assessing RIAs, which can influence clinical decision-making and management strategies in patients with aneurysmal subarachnoid haemorrhage (SAH).

RIAs are the leading cause of nontraumatic SAH. Almost 500000 patients experience aneurysmal SAH annually[2]. SAH has a distinctly poor prognosis, with a 30-day mortality rate of 45%, and nearly one-third of survivors suffer from long-term disability[3]. Previous studies have primarily focused on unruptured aneurysms, and relatively few studies have validated the accuracy of CTA for detecting RIAs[4]. Therefore, Elmokadem *et al*[1] provided a valuable addition to this field and supported the clinical utility of CTA in neurovascular emergencies. Based on the imaging features of RIAs, the authors proposed recommendations to guide clinical decision-making for endovascular intervention or surgical treatment. The authors emphasized that the two reviewers demonstrated good consistency in evaluating the features of the RIAs, including their location, morphology, and measurements. We agree with the authors in the sense that good consistency is crucial for clinical applications[1]. However, we have also observed some current issues that may have affected the quality of the study[1].

In this study[1], the authors included relatively few aneurysm features and ignored many features, such as volume, aspect ratio, and maternal vessel parameters. These features have been previously proven to be associated with RIA evaluation, rupture prediction, and surgical planning[5]. Therefore, if more feature parameters are included in future research, the results could be more reliable and clinically significant.

By using CTA, the author assisted RIA patients in making treatment decisions based on imaging features. However, the author did not provide detailed information on the decision-making process and feature values, such as guidelines or algorithms. In the Discussion section, the author mentioned that the location and size of the aneurysm were crucial for treatment selection; however, this was only a discussion of previous research and not the results of this study[1]. Therefore, the author needed to clearly explain the value of each feature to help readers better understand this study[1].

In addition, the author compared the results of CTA and digital subtraction angiography (DSA) in detecting the characteristics of aneurysms, which increased the reliability of this study[1]. Currently, DSA is the gold standard for aneurysm detection and diagnosis. Most studies have highlighted the fact that once SAH occurs in RIA patients, DSA becomes an inevitable choice for preoperative examination[6]. However, only 80 patients underwent both DSA and CTA examinations. This indicated that some patients had not received the gold standard DSA examination, which may raise doubts about the accuracy of the diagnosis.

Although the authors suggested that CTA was a promising and reproducible method for detecting and characterizing cerebral aneurysms, this study reported an aneurysm with a diameter of 3 mm in the posterior cerebral artery that was missed on CTA. Previous studies have also suggested that small aneurysms may be missed when CTA is used[7,8]. Furthermore, as this was a single-centre study, the sample source may have been biased. To address these limitations, future research should include more small aneurysms and larger data from multiple research institutions and devices in order to improve the accuracy and robustness of the results.

In conclusion, CTA has shown great clinical potential in RIA patients because of its convenience, low invasiveness, and reliability. In future research, more DSA and CTA paired samples should be included, more comprehensive arterial aneurysm parameters should be included, and multiple artificial intelligence methods should be used to establish models to aid in RIA detection and clinical decision-making.

FOOTNOTES

Author contributions: Le XY and Zhang JR proposed the letter, drafted the initial version of the manuscript and contributed equally to this letter; Feng JB and Li CM were responsible for the letter design, literature search, manuscript revision and language proofreading;

All the authors read and approved the final manuscript. Given their significant contributions to this letter, Feng JB and Li CM were designated as co-corresponding authors, overseeing the manuscript submission process and ensuring effective communication throughout the peer-review process.

Supported by Natural Science Foundation Project of Chongqing, No. CSTB2024NSCQ-MSX1265.

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

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Country of origin: China

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S-Editor: Li L
L-Editor: A
P-Editor: Wang WB

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