ISSN 1949-8470 (online)

World Journal of *Radiology*

World J Radiol 2024 May 28; 16(5): 109-138

Published by Baishideng Publishing Group Inc

World Journal of Radiology

Contents

Monthly Volume 16 Number 5 May 28, 2024

World Journal of Radiology

Monthly Volume 16 Number 5 May 28, 2024

Contents

ABOUT COVER

Editorial Board Member of *World Journal of Radiology*, Omar Islam, MD, FRCPC DABR, Assistant Professor, Head, Department of Diagnostic Radiology, Kingston Health Sciences Centre, Queen's University, Kingston, K7L 2V7, Ontario, Canada. omar.islam@kingstonhsc.ca

AIMS AND SCOPE

The primary aim of *World Journal of Radiology* (*WJR*, *World J Radiol*) is to provide scholars and readers from various fields of radiology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJR mainly publishes articles reporting research results and findings obtained in the field of radiology and covering a wide range of topics including state of the art information on cardiopulmonary imaging, gastrointestinal imaging, genitourinary imaging, musculoskeletal imaging, neuroradiology/head and neck imaging, nuclear medicine and molecular imaging, pediatric imaging, vascular and interventional radiology, and women's imaging.

INDEXING/ABSTRACTING

The *WJR* is now abstracted and indexed in PubMed, PubMed Central, Emerging Sources Citation Index (Web of Science), Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2023 Edition of Journal Citation Reports® cites the 2022 impact factor (IF) for *WJR* as 2.5; IF without journal self cites: 2.3; 5-year IF: 2.5; Journal Citation Indicator: 0.54.

RESPONSIBLE EDITORS FOR THIS ISSUE

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
May 28, 2024

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

World Journal of Radiology

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

World J Radiol 2024 May 28; 16(5): 136-138

DOI: 10.4329/wjr.v16.i5.136

ISSN 1949-8470 (online)

LETTER TO THE EDITOR

Is it a normal phenomenon for pediatric patients to have brain leptomeningeal contrast enhancement on 3-tesla magnetic resonance imaging?

Min Ai, Hang-Hang Zhang, Yi Guo, Jun-Bang Feng

Specialty type: Neuroimaging

Provenance and peer review: Unsolicited 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: Soreq L, United Kingdom

Received: March 24, 2024

Revised: April 27, 2024

Accepted: May 15, 2024

Published online: May 28, 2024

Min Ai, Department of Anesthesiology, Nanan District People's Hospital of Chongqing, Chongqing 400060, China

Hang-Hang Zhang, Department of Breast and Thyroid Surgery, Chongqing Bishan District Maternal and Child Health Care Hospital, Chongqing 402760, China

Yi Guo, Jun-Bang Feng, Medical Imaging Department, Chongqing University Central Hospital (Chongqing Emergency Medical Center), Chongqing 400014, China

Co-first authors: Min Ai and Hang-Hang Zhang.

Co-corresponding authors: Yi Guo and Jun-Bang Feng.

Corresponding author: Jun-Bang Feng, MM, Doctor, Medical Imaging Department, Chongqing University Central Hospital (Chongqing Emergency Medical Center), No. 1 Jiankang Road, Chongqing 400014, China. junbangfeng@163.com

Abstract

Determining whether sevoflurane sedation in children leads to "pseudo" prominent leptomeningeal contrast enhancement (pLMCE) on 3 Tesla magnetic resonance imaging will help reduce overdiagnosis by radiologists and clarify the pathophysiological changes of pLMCE.

Key Words: Pediatrics patients; Sevoflurane; Brain; Prominent leptomeningeal contrast enhancement; Magnetic resonance imaging

Core Tip: Prominent leptomeningeal contrast enhancement (pLMCE) often indicates the presence of intracranial infection, tumours, or other abnormal pathological changes. Researchers have frequently observed "pseudo" pLMCE in the brains of young pediatric patients anaesthetized with propofol during 3-tesla contra-spin echo T1-weighted imaging. This condition should not be misinterpreted as meningeal pathology. Currently, sevoflurane is a commonly used anaesthetic drug in pediatric patients. Therefore, it is important to identify the presence or absence of pLMCE during anaesthesia with sevoflurane to prevent misdiagnosis by radiologists and elucidate the physiological mechanisms associated with the anaesthesia process that led to pLMCE.

Citation: Ai M, Zhang HH, Guo Y, Feng JB. Is it a normal phenomenon for pediatric patients to have brain leptomeningeal contrast enhancement on 3-tesla magnetic resonance imaging? *World J Radiol* 2024; 16(5): 136-138
URL: https://www.wjgnet.com/1949-8470/full/v16/i5/136.htm
DOI: https://dx.doi.org/10.4329/wjr.v16.i5.136

TO THE EDITOR

We read with interest the paper by Hilal *et al*[1] entitled "Does sevoflurane sedation in pediatric patients lead to 'pseudo' leptomeningeal enhancement in the brain on 3 Tesla magnetic resonance imaging?"

We agree with the authors that due to vascular fragility and immaturity in sevoflurane-sedated pediatric patients, leptomeningeal contrast enhancement (LMCE) is common on postcontrast spin-echo T1-weighted MR images and is not a pathological change in the meninges.

Since the introduction of contrast material, numerous studies have demonstrated a correlation between LMCE and pathological conditions of the brain[2]. McKinney *et al*[3] discovered that prominent leptomeningeal contrast enhancement (pLMCE) can occur in pediatric patients who are under anaesthesia with propofol. However, in clinical practice, the administration of sevoflurane has become a common anaesthetic practice for pediatric patients undergoing magnetic resonance imaging (MRI) due to advantages such as rapid induction and recovery[4]. Nevertheless, whether sevoflurane can also induce pLMCE remains a scientific question that needs resolution. Therefore, through a retrospective analysis of 63 pediatric patients, we discovered that sevoflurane administration can indeed lead to pLMCE, and we clearly emphasized that this is a physiological rather than a pathological change.

The absence of clear evidence to support relevant examinations may cause unnecessary financial burdens for patients who may have meningeal enhancement. As radiologists, we should fully recognize the signs of pLMCE when evaluating patient images and carefully inquire about and document information such as symptoms, previous diseases, and drug use to more accurately assess specific signs of pLMCE, thereby assisting clinicians in determining whether further examination is necessary. Accordingly, it is crucial to obtain an in-depth understanding of the complex and diverse clinical history behind each pediatric patient presenting pLMCE signs and to combine expertise and skills to make informed decisions to avoid overdiagnosis. In doing so, we can provide more accurate, effective, and acceptable medical services to each individual.

We also found statistically significant associations between LMCE grades and patient age and weight. The younger the child is, the less mature their blood-brain barrier[5], vasculature[6], and dynamic perfusion[7]. The blood-brain barrier is an important protective layer that limits the entry of substances into the brain from the external environment to maintain normal neuronal function. However, in childhood, this barrier is relatively weak and susceptible to external factors such as anaesthesia. Additionally, the vasculature of children is not fully developed, which means that blood circulation that supplies oxygen and nutrients to the brain may be less efficient than that in adults, leading to instability under anaesthesia. Furthermore, there are differences in dynamic perfusion or the ability to adjust blood flow based on changes in the demand for oxygen and nutrients within specific regions or functional areas of the brain as a whole. This regulatory mechanism is not fully formed and fluctuates more dramatically in pediatric patients than in adults, which may be the underlying mechanism that leads to pLMCE.

In conclusion, this retrospective analysis revealed the true cause of pLMCE signs induced by sevoflurane. These imaging results should not be misinterpreted as meningeal pathology to prevent overdiagnosis by radiologists. The prevalence of pLMCE may be greater in young children because they have weak and immature blood vessels. To obtain a more comprehensive understanding of how pLMCE signs manifest across devices with different magnetic strengths, we can expand the current research and include additional experimental conditions. The scans were performed using MRI devices with different magnetic field intensities and models to determine whether there was a correlation between the results and pLMCE signs. Additionally, in the current study, complete avoidance of sedatives for MRI examinations could not be achieved due to the involvement of children. In future studies, a control group that did not receive anaesthesia but still underwent MRI could be considered. This approach will help with comparisons of potential differences between the two groups and eliminate any possible effects of sedatives. Further exploration of pLMCE signs in various magnetic fields and devices, introduction of nonsedated MRI examination as a control group along with other improved methods, and large-scale multicentre prospective studies to address these limitations can lead to more accurate, reliable, and universally applicable conclusions.

ACKNOWLEDGEMENTS

The authors thank the participants selfless and valuable assistance in this study. The authors thank the anonymous reviewers for their comments and suggestions.

FOOTNOTES

Author contributions: Ai M and Zhang HH have contributed equally to this study; Ai M and Zhang HH designed research; Ai M performed research; Zhang HH analyzed data; Ai M and Guo Y wrote the letter; Guo Y and Feng JB revised the letter and should be considered as co-corresponding authors.

Supported by the Chongqing Medical Scientific Research Project (Joint Project of Chongqing Health Commission and Science and Technology Bureau), No. 2022QNXM013 and No. 2023MSXM016.

Conflict-of-interest statement: All authors declared no competing interests.

Country of origin: China

ORCID number: Yi Guo 0000-0002-9441-8672; Jun-Bang Feng 0000-0001-7343-6612.

S-Editor: Chen YL
L-Editor: A
P-Editor: Zheng XM

REFERENCES

1 **Hilal K**, Khandwala K, Rashid S, Khan F, Anwar SSM. Does sevoflurane sedation in pediatric patients lead to "pseudo" leptomeningeal enhancement in the brain on 3 Tesla magnetic resonance imaging? *World J Radiol* 2023; **15**: 127-135 [PMID: 37181823 DOI: 10.4329/wjr.v15.i4.127]
2 **Kioumehr F**, Dadsetan MR, Feldman N, Mathison G, Moosavi H, Rooholamini SA, Verma RC. Postcontrast MRI of cranial meninges: leptomeningitis versus pachymeningitis. *J Comput Assist Tomogr* 1995; **19**: 713-720 [PMID: 7560315 DOI: 10.1097/00004728-199509000-00005]
3 **McKinney AM**, Chacko Achanaril A, Knoll B, Nascene DR, Gawande RS. Pseudo-Leptomeningeal Contrast Enhancement at 3T in Pediatric Patients Sedated by Propofol. *AJNR Am J Neuroradiol* 2018; **39**: 1739-1744 [PMID: 30049717 DOI: 10.3174/ajnr.A5736]
4 **Kangralkar G**, Jamale PB. Sevoflurane versus halothane for induction of anesthesia in pediatric and adult patients. *Med Gas Res* 2021; **11**: 53-57 [PMID: 33818443 DOI: 10.4103/2045-9912.311489]
5 **Wu D**, Chen Q, Chen X, Han F, Chen Z, Wang Y. The blood-brain barrier: structure, regulation, and drug delivery. *Signal Transduct Target Ther* 2023; **8**: 217 [PMID: 37231000 DOI: 10.1038/s41392-023-01481-w]
6 **Chappell J**, Aughwane R, Clark AR, Ourselin S, David AL, Melbourne A. A review of feto-placental vasculature flow modelling. *Placenta* 2023; **142**: 56-63 [PMID: 37639951 DOI: 10.1016/j.placenta.2023.08.068]
7 **Ibrahim M**, Ghazi TU, Bapuraj JR, Srinivasan A. Contrast Pediatric Brain Perfusion: Dynamic Susceptibility Contrast and Dynamic Contrast-Enhanced MR Imaging. *Magn Reson Imaging Clin N Am* 2021; **29**: 515-526 [PMID: 34717842 DOI: 10.1016/j.mric.2021.06.004]

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