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DOI: <https://doi.org/10.22141/2224-0713.17.5.2021.238517>Maria M. Prokopiv¹, Olena Ye. Fartushna²¹Bogomolets National Medical University, Kyiv, Ukraine²Ukrainian Military Medical Academy, Kyiv, Ukraine

Classification of posterior circulation stroke: a narrative review of terminology and history

Abstract. Background. Little is known about the history of classification of posterior circulation stroke. However, it helps in developing secondary prevention and treatment strategies. We purposed to provide a narrative review of terminology and history of classification of posterior circulation stroke. **Materials and methods.** A comprehensive electronic literature search was performed on Scopus, Web of Science, MEDLINE, ScieLo, PubMed, the Cochrane Library, EMBASE, Global Health, CyberLeninka, RINC databases, and databases of government scientific libraries of Ukraine, European Union, United Kingdom, and the USA for 1900–2021 to identify the articles and books that discussed the classification of posterior circulation stroke and its history. **Results.** A narrative review of terminology and two approaches to the classification of posterior circulation stroke are presented and discussed. **Conclusions.** We provided a comprehensive narrative review of terminology and history of classification of posterior circulation stroke.

Keywords: posterior circulation stroke; classification; history; review

Introduction

Posterior circulation stroke (PCS) was first studied in the 19th century. However, this branch of clinical vascular neurology remains poorly understood compared to anterior stroke. Moreover, there is not enough data about the classification of posterior circulation stroke, especially its history.

The purpose of this work is to provide a comprehensive narrative review of terminology and history of classification of posterior circulation stroke.

Materials and methods

A comprehensive electronic literature search was performed in Scopus, Web of Science, MEDLINE, ScieLo, PubMed, the Cochrane Library, EMBASE, Global Health, CyberLeninka, RINC databases, and databases of government scientific libraries of Ukraine, European Union, United Kingdom, and the USA for 1900–2021 to identify articles and books that discussed the classification of posterior circulation stroke and its history. The applicable articles are cited and referenced. No limit is placed on publication

time or the language of the article. All relevant articles were identified and screened by both authors, and disagreements were resolved by consensus. The results are summarized descriptively.

Results and discussion

Globally, stroke is a leading cause of mortality and disability with substantial economic costs for post-stroke care [1–9]. Stroke mortality is reported to be 3 to 4.5 times higher in Central and Eastern Europe compared to Northern, Southern, and Western Europe with the highest age-standardized stroke death rates in Ukraine [10–23].

Posterior circulation strokes account for approximately 20–25 % of ischemic strokes [24–26]. These strokes are less represented in the scientific literature, they are more difficult to diagnose, have a more severe clinical course, and higher mortality compared to anterior circulation stroke [18, 27–34]. Terminological definitions and classification of posterior circulation strokes have been discussed and changed

over the years. That is why we consider it necessary to focus the attention of medical doctors on the modern definition of posterior circulation stroke, conducting a historical analysis of its classification.

Definition of posterior circulation stroke

PCS, also referred to as posterior circulation infarction, corresponds to any infarction (ischemic or hemorrhagic) occurring within the vertebrobasilar vascular territory, which includes the brain stem, cerebellum, midbrain, thalami, and areas of temporal and occipital lobes [25].

Previously, physicians used the general term “vertebrobasilar insufficiency” to describe the cause of hemodynamic disorders in all cases of posterior circulation ischemia [35]. This concept was first proposed by American neurologists at the Mayo Clinic [36]. Around this time (the 1950s), D. Danny-Brown used the term “cerebrovascular insufficiency” to explain the mechanism of transient ischemia in patients with anterior and posterior circulation transient ischemic attacks [37]. These definitions only partially reveal the nature and origin of PCS, and the mechanism of its occurrence but do not reflect the duration and reversibility of neurological symptoms. The knowledge accumulated at that time on this problem and the existing views became the basis for the formulation of two approaches to the classification of PCS.

Classification of posterior circulation stroke

The first approach to the classification of PCS substantiated the definition of a brain stem infarction by the name of the artery in the area of which there was a lesion. This approach is typical for anterior stroke classification and is more often associated with thrombotic or embolic occlusion of the large and medium-sized arteries of the anterior circulation [21, 24, 25]. It is based on the peculiarities of the topographic structure of the carotid arteries and the functional insufficiency of the anastomosis system.

However, the patterns of blood supply in the brain stem are completely different. Such considerations have induced some authors to identify certain neurological syndromes that are typical for the impairment of various arteries of the posterior circulation, in particular, the syndromes of the posterior inferior cerebellar artery [38], superior cerebellar artery [39], anterior inferior cerebellar artery [40], the main artery in the area of branching [41], etc.

First of all, it should be noted that the approach to determining the diagnosis of PCS, taking into account the area of blood supply to a particular artery, has significant methodological shortcomings. In this case, the diagnosis of PCS of a certain part of the brain stem is replaced by a diagnosis of thrombosis or embolism of the corresponding posterior artery.

The accuracy and reliability of the diagnosis of cerebral stem infarction, which affects a certain area of arterial blood supply, is questionable. Adjacent areas of brain stem vascularization overlap and form a closely related vascular association [36, 42]. There are also differences in the topography of the arteries, anastomotic potential, and the possibility of collateral circulation in the brain stem [43].

It is also difficult to identify the area of arterial lesions in case of multiple brain stem infarctions that occur simultaneously in the area of blood supply to several arteries and are characterized by combined neurological symptoms [44, 45]. Crucial evidence for the impossibility of identifying cerebral stem infarction with occlusion of a specific artery was obtained in the late 20th century after the introduction of methods for visualization of brain tissue and vascular system [35, 45, 46].

The second approach to the classification of PCS was based on the syndromic principle, i.e. on determining the localization of the brain lesion depending on the existing alternative syndrome, with the name of the author who described it (eponymous classification).

It is known that alternative syndromes were considered pathognomonic for half of the lesions of the brain stem structures. The lesion of certain anatomical structures is accompanied by different syndromes depending on the involved vascular area: medulla, pons, and midbrain [47]. At the same time, the authors rightly point out that the isolated syndromes and their variants may be incomplete, and sometimes pontine infarctions can mask combined infarctions in other areas supplied by the posterior circulation arteries [25].

More specific information on this problem is given in the work published in 2009 by J.J. Marx and F. Thomke “Classical crossed brain stem syndromes: myth or reality?” [48]. Over three years, the authors examined 308 patients with signs or symptoms of acute brain stem infarction. Analysis of the results of the study, using clinical and neurological methods, cerebral, and vascular imaging, showed that only the alternating Wallenberg syndrome had clinical significance. At the same time, other clinical alternating syndromes were not significant in clinical practice. Weber, Claude, Raymond-Cestan, and Babinski-Nageotte syndromes were seldom found in ischemic stroke. Other syndromes (Foville, Millard-Gubler) are sometimes identified with each other in the literature [49, 50].

The presented literature data limit the clinical value of alternative syndromes in neurology for the topical diagnosis of lesions of the anatomical structures of the brain stem. Alternative syndromes isolated in different periods, except for Wallenberg syndrome, have no topical and diagnostic significance. Thus, topical alternating syndromes do not allow the medical doctor to correctly assess the clinical situation, neurological status, determine stroke nosology, which can lead to diagnostic errors.

Negative attitude towards the eponymous classification of PCS and its identification with occlusion of the infarction-dependent posterior circulation artery was expressed in previously published reviews of medulla oblongata syndrome [51], pons Varolii [52], midbrain [53] and substantiates the classification of PCS depending on the brain stem area. This classification is based on the results of a study of brain stem vascularization, according to which there is a very strict constancy of distribution of the median (paramedian), lateral, and dorsal parts of the brain stem and a clear correspondence among these areas in the localization of brain stem infarction [54–56].

The data obtained demonstrated that vascular trunk syndromes are classified by the condition of the internal arteries, not the superficial ones. According to the proposed classification, infarctions of the medulla oblongata, pons Varolii, and midbrain are divided into medial, lateral, and dorsal ones.

However, this classification reflects the distribution of PCS only in the brain stem. At the same time, vertebrobasilar system provides vascularization not only of the medulla oblongata, pons Varolii, and midbrain, but also to other intracranial anatomical areas of the brain: cerebellum, thalamus, occipital lobes, and the posterior temporal lobes of the cerebral hemispheres. Therefore, the classification of PCS according to the posterior circulation must be supplemented.

Conclusions

It is well known that each patient with posterior circulation stroke has his characteristics of the neurological course, which may differ from the generalized version. Therefore, it is often very difficult, especially for young neurologists, to form a clinical diagnosis. The difficulty lies in defining the modern terminology of posterior circulation stroke. Summarizing the above, we would like to highlight that in the case of PCS in different parts of the brain stem or cerebellum, it is preferable not to use the diagnosis “stroke in the vertebrobasilar territory”, as it only partially reveals the nature of stroke, including the presence of clinical neurological symptoms and mechanism of their occurrence. In case of medullary, pontine, mesencephalic, cerebellar, or thalamic stroke it is advisable to use a terminological formulation of the diagnosis that reflects the vascular area (proximal, medial, distal), clinical variant of infarction, anatomical, and topographic analysis.

References

1. Rajsic S., Gothe H., Borba H.H. et al. Economic burden of stroke: a systematic review on post-stroke care. *Eur. J. Health Econ.* 2018. doi: 10.1007/s10198-018-0984-0.
2. Slabkiy G.O., Prokopiv M.M. Epidemiolohiya tserebrovaskulyarnykh khvorob sered zhyteliv mista Kyryeva [Epidemiology of cerebrovascular diseases among Kyiv residents]. *Visnyk sotsial'noyi hihiyeny ta orhanizatsiyi okhorony zdorov'ya Ukrayiny.* 2019. 4(82). 10-15 (in Ukrainian).
3. Prokopiv M.M., Slabkiy G.O. Metodichni pidkhody do stvorennya suchasnoyi systemy nadannya medychnoyi dopomohy khvorym na tserebrovaskulyarni zakhvoryuvannya v mehopolisi [Methodical approaches to the creation of a modern system of medical care for patients with cerebrovascular diseases in the metropolis]. *Ukrayina. Zdorov'ya natsiyi.* 2019. 3(56). 16-19 (in Ukrainian).
4. Prokopiv M.M. Rezul'taty doslidzhennya yakosti medychnoyi dopomohy patsiyentam z tserebral'nymy insultamy [The results of a study of the quality of care for patients with cerebral stroke]. *Economics and Health Law.* 2020. 12. 11-14 (in Ukrainian).
5. Prokopiv M.M., Fartushna O.Y. Clinical syndromes of the thalamic stroke in the classical vascular territories: a prospective hospital-based cohort study. *Wiadomości Lekarskie.* 2020. 73(3). 489-493. doi: 10.36740/WLek202003115.
6. Vynychuk S.M., Fartushna O.Y. Osvitni prohramy profilaktyky tranzitorykh ishemichnykh atak ta/chy insultu [Educational programs for the prevention of transient ischemic attacks and/or stroke]. *Ukrainian Medical Journal.* 2014. 5. 49-51. Available from: http://nbuv.gov.ua/UJRN/UMCh_2014_5_15 (in Ukrainian).
7. Vynychuk S.M., Fartushna O.Y. Rannya reabilitatsiya pislya hostrykh ishemichnykh porushen' mozkovoho krovoobihu [Early rehabilitation after acute ischemic cerebrovascular events]. *International Neurological Journal.* 2016. 8(86). 34-39 (in Ukrainian). doi: 10.22141/2224-0713.8.86.2016.90909.
8. Fartushna O.Y., Vynychuk S.M. Vyyavlennya ta usunenneya vaskulyarnykh chynnykiv ryzyku — vazhlyvyi napryamok pervynnoyi profilaktyky tranzitorykh ishemichnykh atak ta/chy insultu [Detection and removal of vascular risk factors as important area of primary prevention of transient ischemic attack]. *Ukrainian Medical Journal.* 2015. 1(105). 23-27. Available from: http://nbuv.gov.ua/UJRN/UMCh_2015_1_8 (in Ukrainian).
9. Fartushna O.Ye., Vynychuk S.M. Modyfikatsiya povedinkovykh chynnykiv ryzyku yak skladova pervynnoyi profilaktyky tranzitorykh ishemichnykh atak ta/chy insultu [Behavioral risk factors modification as a component of primary prevention of transient ischemic attack and/or stroke]. *Ukrainian Medical Journal.* 2014. 6(104). 42-44. Available from: http://nbuv.gov.ua/UJRN/UMCh_2014_6_13 (in Ukrainian).
10. GBD 2016 Causes of Death Collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet.* 2017. 390(10100). 1151-1210.
11. Yevtushenko S.K. Geterogenyi ishemicheskiy insult u detei [Heterogenous ischemic stroke in children]. *International Neurological Journal.* 2011. 370. 92-100 (in Russian).
12. Yevtushenko S.K., Filimonov D.A., Simonyan V.A. et al. Osnovnyye i novyye faktory riska, sposobstvuyushchiye razvitiyu ishemicheskikh insultov u lits molodogo vozrasta [The main and new risk factors that contribute to the development of ischemic strokes in young adults]. *International Neurological Journal.* 2013. 6(60). 92-100.
13. Slabkiy G.O., Prokopiv M.M. Rezul'taty vyvchennya faktoriv ryzyku rozvytku tserebrovaskulyarnykh khvorob u zhinok mista Kyryeva [The results of the study of risk factors for the development of cerebrovascular diseases in women of Kyiv]. *Zdorov'e zhenshchyny.* 2020. 5–6(151–152). 54-57 (in Ukrainian).
14. Slabkiy G.O., Prokopiv M.M. Do pytannya zabezpechennya osib iz tserebrovaskulyarnymi khvorobami kompleksnoyu medychnoyu dopomohoyu na rivni pervynnoyi medyko-sanitarnoyi dopomohy (za danyymi sotsiolohichnoho doslidzhennya) [On the issue of providing people with cerebrovascular diseases with comprehensive medical care at the level of primary health care (according to a sociological study)]. *Semeynaya medytsyna.* 2020. 3(89). 57-60 (in Ukrainian).
15. Prokopiv M.M. Otsinka likaryamy-nevrolohamy stacionarnoyi medychnoyi dopomohy pry tserebral'nykh insultakh (za rezul'tatamy sotsiolohichnoho doslidzhennya) [Evaluation by neurologists of inpatient care for cerebral strokes (according to the results of a sociological study)]. *Ukrayina. Zdorov'ya natsiyi.* 2020. 3(60). 21-29 (in Ukrainian).
16. Prokopiv M.M. Kharakterystyka optymizovanoyi systemy nadannya medychnoyi dopomohy khvorym na tserebrovaskulyarni khvoroby na rivni mehopolisu — m. Kyryeva [Characteristics of the optimized system of medical care for patients with cerebrovascular

diseases at the level of the metropolis — Kyiv]. *Ukrayina. Zdorov'ya natsiyi*. 2020. 3—1(61). 18-22 (in Ukrainian).

17. Prokopiv M.M. Analiz roboty nevrolohichnoyi sluzhby dorosloyi merezhi m. Kyieva za 2016 rik [Analysis of the work of the neurological service of the adult network of Kyiv for 2016]. *International Neurological Journal*. 2017. 1. 82-86 (in Ukrainian).

18. Vynychuk S.M., Fartushna O.Ye. Cerebrospinal and commissural diaschisis in acute stroke patients: case analysis. *International Neurological Journal*. 2018. 5(99). 20-25. doi: 10.22141/2224-0713.5.99.2018.142959.

19. Vynychuk S.M., Fartushna O.Y. Prohnozuvannya ryzyku rozvytku povtornoho insultu pislya perenesenoyi tranzytornoyi ishemičnoy ataky u patsiyentiv z oseredkom infarktu za danymy MRT ta bez takoho [Prediction of the risk of recurrent stroke after a transient ischemic attack in patients with and without a brain lesion according to MRI]. *Ukrainian Medical Journal*. 2009. 5 (73). 53-57 (in Ukrainian).

20. Vynychuk S.M., Fartushna O.Y. Dyferentsiyovane likuvannya tranzytornykh ishemičnykh atak — efektyvnyy sposib profilaktyky povtornykh hostrykh tserebral'nykh podiy [Differentiated treatment of transient ischemic attacks — an effective way to prevent recurrent acute cerebral events]. *International Neurological Journal*. 2014. 6. 87-92. Available from: http://nbuv.gov.ua/UJRN/Mnzh_2014_6_15 (in Ukrainian).

21. Fartushna O.Ye., Vynychuk S.M. Tranzytorni ishemični ataky [Transient ischemic attacks]. Kyiv: PH "Avitsena", 2014. 216 p. (in Ukrainian).

22. Fartushna O.Ye., Vynychuk S.M. Epidemiolohiya tranzytornykh ishemičnykh atak u strukturi hostrykh porushen' mozkovoho krovoobihu v Ukrayini ta inshykh krayinakh [Epidemiology of transient ischemic attacks in the structure of acute cerebrovascular disorders in Ukraine and in other countries]. *International Neurological Journal*. 2017. 5(91). 105-111 (in Ukrainian). doi: 10.22141/2224-0713.5.91.2017.110863.

23. Fartushna O.Y. Patohenetychni pidtypy tranzytornykh ishemičnykh atak: osoblyvosti nevrolohichnoyi kliniky, hemodynamiky ta likuvannya [Pathogenetic subtypes of transient ischemic attacks: features of neurological clinic, hemodynamics, and treatment]. Ph.D. Thesis: 14.01.15/Fartushna Olena Yevhenivna. Bogomolets National Medical University. Kyiv, 2012. 217 p. (in Ukrainian).

24. Vynychuk S.M., Prokopiv M.M. Gostryj ishemičnyj insult [Acute ischemic stroke]. Kyiv: Naukova dumka, 2006. 286 p. (in Ukrainian).

25. Prokopiv M.M., Vynychuk S.M. Vertebroazylyarni insulty [Vertebrobasilar strokes]. Kyiv: PH "Avitsena", 2021. 240 p. (in Ukrainian).

26. Vynychuk S.M., Prokopiv M.M., Trepel L.M. et al. Thalamic stroke outcomes: a prospective hospital-based cohort study. *International Neurological Journal*. 2019. 8(110). 23-27. doi: 10.22141/2224-0713.8.110.2019.187888.

27. Prokopiv M.M. Yakist' zhyttya meshkantsiv mehapolisu, shcho perenesly tserebral'nyy insult [The quality of life of metropolitan residents who have suffered a cerebral stroke]. *Ukrayina. Zdorov'ya natsiyi*. 2020. 1(58). 43-46 (in Ukrainian).

28. Vynychuk S.M., Prokopiv M.M., Trepel L.M. et al. Clinical syndromes of thalamic stroke in the central vascular territory: a prospective hospital-based cohort study. *International Neurological Journal*. 2020. 5(16). 23-27. doi: 10.22141/2224-0713.16.5.2020.209245.

29. Vynychuk S.M., Prokopiv M.M., Trepel L.M. et al. Clinical syndromes of thalamic strokes in posterolateral vascular territory: a prospective hospital-based cohort study. *International Neurological Journal*. 2020. 4(16). 8-12. doi: 10.22141/2224-0713.16.4.2020.207344.

30. Vynychuk S.M., Prokopiv M.M., Trepel L.M. et al. Clinical syndromes of a thalamic stroke in the lower lateral vascular territory: a prospective hospital-based cohort study. *International Neurological Journal*. 2020. 3(16). 1-6. doi: 10.22141/2224-0713.16.3.2020.203443.

31. Vynychuk S.M., Prokopiv M.M., Trepel L.M. et al. Clinical vascular syndromes of thalamic strokes in anterior and paramedian vascular territories: a prospective hospital-based cohort study. *International Neurological Journal*. 2020. 2(16). 7-12. doi: 10.22141/2224-0713.16.2.2020.200957.

32. Vynychuk S.M., Fartushna O.Ye. Case analysis of crossed pontine-cerebellar diaschisis in acute stroke patients. *International Neurological Journal*. 2018. 8(102). 20-24. doi: 10.22141/2224-0713.8.102.2018.153537.

33. Vynychuk S.M., Fartushna O.Ye. Case analysis of crossed cerebellar hemispheric diaschisis in acute stroke patients. *International Neurological Journal*. 2018. 7(101). 12-16. doi: 10.22141/2224-0713.7.101.2018.149660.

34. Fartushna O.Ye., Prokopiv M.M. Aktual'nist' problemy tserebrovaskulyarnykh zakhvoryuvan', tranzytornykh ishemičnykh atak ta vdoskonalennya yikh diahnozyky v systemi okhorony zdorov'ya v Ukrayini [Actuality of the problem of cerebrovascular diseases, transient ischemic attacks, and improvement of their diagnostics in the health care system in Ukraine]. *Problemy viys'kovoyi okhorony pratsi: Zb. nauk. prats' Ukrayins'koyi viys'kovo-medychnoyi akademiyi* [Problems in military health care. Collection of Science of the Ukrainian Military Medical Academy]. Kyiv: UMMA, 2007. 19. 335-342 (in Ukrainian).

35. Caplan L.R. Posterior circulation ischemia: then, now, and tomorrow. *The Thomas Willis lecture. Stroke*. 2000. 31. 2011-2023.

36. Millikan C.H., Siekert R.G., Shick R. Studies in cerebrovascular disease, III: the use of anticoagulant drugs in the treatment of insufficiency or thrombosis within the basilar arterial system. *Proc. Staff. Meet. Mayo Clin*. 1955. 30. 111-126.

37. Denny-Brown D. The treatment of recurrent cerebrovascular symptoms and the question of "vasospasm". *Med. Clin. North Am*. 1951. 35. 1457-1474.

38. Wallenberg A. Acute bulbar affection (Embolie der Art cerebellar. Post. Inf. Sinistr.). *Arch. Psychiat. Nervenver.* 1895. 23(6). 504-540.

39. Davison C., Goodhart C.P., Savitsky N. The syndrome of the superior cerebellar artery and its branches. *Arch. Neurol. Psychiatr.* 1935. 33. 1143-1152.

40. Amarenco P., Hauco J. J. Cerebellar infarction in the territory of the anterior and inferior cerebellar artery. *Brain*. 1990. 113. 139-155.

41. Caplan L.R. "Top of the basilar" syndrome. *Neurology*. 1980. 30. 72-79.

42. Teasell R., Foley N., Doherty T.J., Finestone H. Clinical characteristics of patients with brainstem strokes admitted to a rehabilitation unit *Arch. Phys. Med. Rehabil.* 2002. 83. 1013-1016.

43. Виничук С.М., Ялынская Т.А., Виничук И.С. Инфаркты в вертебробазилярном бассейне: клиника и диагностика. *Международный неврологический журнал*. 2005. 3. 13-21.

44. Nadeau S., Jordan G., Mishra S. *Clinical presentation as a guide to early prognosis in vertebrobasilar stroke. Stroke.* 1992. 23. 165-170.
45. Sinha K.K. *Brain stem infarction: clinical clues to localise them. Indian Academy of Clinical Medicine.* 2000. 1(3). 213-221.
46. Kane I., Hand P.J., Rivers S. et al. *A practical assessment of magnetic resonance diffusion-perfusion mismatch in acute stroke: observer variation and outcome. Neurology.* 2009. 256(11). 1832-1838.
47. Hommel M., Besson G. *Brainstem and cerebellar infarctions. In: Ginsberg M., Bogousslavsky J., eds. Cerebrovascular disease: pathophysiology, diagnosis and management. Malden (MA): Blackwell Sci., 1998. 2. 1057-1074.*
48. Marx J.J., Thomke F. *Classical crossed brain stem syndromes: myth or reality? Neurology.* 2009. 256(6). 898-903.
49. Silverman I.E., Liu G.T., Volpe N.J., Galetta S.L. *The crossed paralyzes. The original brain-stem syndromes of Millard-Gubler, Fo-ville, Weber, and Raymond-Cestan. Arch. Neurol.* 1995. 52. 635-638.
50. Krasnianski M., Muller T., Stock K., Zierz S. *Between Wallenberg syndrome and hemimedullary lesion. J. Neurol.* 2006. 253. 1442-1446.
51. Curier R.D. *Syndromes of medulla oblongata. Handb. Clin. Neurol.* 1969. 2. 217-237.
52. Loeb C. *Clinical syndromes due to ischemia in the distribution of the vertebrobasilar arterial system. Cerebral Circulation and Stroke. Ed. Zulch.* 1971. 57-66.
53. Fog M., Hein-Serensen O. *Mesencephalic syndromes. Handb. Clin. Neurol.* 1969. 2. 272-285.
54. Fisher C.M. *Clinical syndromes in cerebral arterial occlusion. Pathogenetic treatment of cerebrovascular disease. Springfield, 1961. 151-177.*
55. Gillilan L. *The correlation of the blood supply to the human brain stem with clinical brainstem lesions. J. Neuropath. Exp. Neurol.* 1964. 23(2). 78-107.
56. Guirand B., David J. *La circulation vertebra-basilairo et ses syndromes. Rev. Med.* 1973. 14(43). 2861-2864.

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Класифікація вертебробазиллярних інсультів: огляд термінології та історії

Резюме. Актуальність. Про історію класифікації вертебробазиллярного інсульту відомо небагато. Однак і це допомагає в розробці стратегій вторинної профілактики та лікування. Ми прагнули надати огляд термінології та історії класифікації інсульту вертебробазиллярного басейну. **Матеріали та методи.** Було проведено комплексний електронний пошук літератури в базах даних Scopus, Web of Science, MEDLINE, ScieLo, PubMed, the Cochrane Library, EMBASE, Global Health, CyberLeninka, RINC, а також у базах даних державних науко-

вих бібліотек України, Європейського Союзу, Великобританії та США за період 1900–2021 рр. з метою знайти статті та книги, в яких обговорювалася термінологія і історія класифікації вертебробазиллярного інсульту. **Результати.** Подано огляд термінології і два підходи до класифікації інсульту вертебробазиллярного басейну. **Висновки.** Ми надали всебічний огляд термінології та історії класифікації вертебробазиллярного інсульту. **Ключові слова:** вертебробазиллярний інсульт; класифікація; історія; огляд