Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Brain, Behavior, and Immunity 91 (2021) 792–793

Contents lists available at ScienceDirect

Brain Behavior and Immunity

journal homepage: www.elsevier.com/locate/ybrbi

Letter to the Editor

The COVID-19 emergency does not rule out the diagnostic arsenal in intracerebral hemorrhage: Do not forget the old enemies

To the editor,

We read with great interest the article by Benger et al. (2020) and first of all we would like to congratulate the authors for their pioneering work in the field of COVID-19 pathology. In their paper, the authors present an interesting series of five patients with intracerebral hemorrhage (ICH) and COVID-19 from 1st February 2020 to 14th May 2020, emphasizing at the same time a number of clinical features of these patients (Benger et al., 2020). In the case of patient 2 and patient 3 it is not deduced whether the authors ruled out other possible causes of ICH, aspects that we will discuss in the following.

It is well known that depending on the etiology, non-traumatic intracerebral hemorrhages (ICHs) can be classified into primary ICHs and secondary ICHs, most commonly caused by: vascular malformations (arteriovenous malformation, aneurysms, cavernous malformation or dural arteriovenous fistula), Moyamoya disease, ischemic stroke (hemorrhagic conversion), cerebral venous sinus thrombosis, tumors and cerebral vasculitis (Elijovich et al., 2008). Although in his study, Benger et al. (2020) exclude most of these secondary causes, however, in the case of patient 2 and patient 3, the underlying existence of secondary causes of ICH may be considered.

Cases of ICHs caused by both benign or malignant brain tumors have been reported in the literature. Among malignant brain tumors, the most commonly associated with ICH are: glioblastoma, lymphoma and metastatic tumors. Among brain metastases, the most common tumors that can bleed are: melanoma, choriocarcinoma, renal cell carcinoma, hepatocellular or bronchogenic carcinoma (Velander et al., 2012). Hemorrhage into primary or metastatic brain tumors has an incidence of up to 7–10% (Velander et al., 2012), and moreover, some of the brain metastases can mimic ICH very well (Ma et al., 2018).

Also, another cause of ICH may be due to cerebral cavernous malformations (Gross and Du, 2017). The overall prevalence of cerebral cavernous malformations, based on multiple autopsy and MRI review studies is 0.4–0.8% (Gross and Du, 2017; Kurihara et al., 2020), and prospective studies have reported hemorrhage rates to be 0.8–3.8% per patient-year (Kurihara et al., 2020). Although these lesions are angiographically occult (Gross and Du, 2017), conventional MR imaging can accurately detect symptomatic cavernous malformations (Mouchtouris et al., 2015).

As the study does not mention that patients underwent MRI and there is no possible anatomopathological or necropsy diagnosis of patients, we consider that other causes of ICHs such as cavernous malformations or metastatic brain tumors with secondary hemorrhage cannot be ruled out. Although we fully agree with the authors' assertion that it remains to be confirmed whether there is a causal relationship between these ICHs and COVID-19, we consider that this characterization of the COVID-19 related ICH phenotype is questionable in two of the five cases presented.

We congratulate once again the authors for the pioneering work through this clinical, imaging and laboratory description of consecutive patients with ICH in association with COVID-19 and for the proposed pathogenic mechanisms.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Benger, M., Williams, O., Siddiqui, J., Sztriha, L., 2020. Intracerebral haemorrhage and COVID-19: Clinical characteristics from a case series. Brain Behav. Immun. 88, 940–944. https://doi.org/10.1016/j.bbi.2020.06.005.

Elijovich, L., Patel, P., Hemphill, J., 2008. Intracerebral hemorrhage. Semin. Neurol. 28 (05), 657–667. https://doi.org/10.1055/s-0028-1105974.

Velander, A.J., DeAngelis, L.M., Navi, B.B., 2012. Intracranial hemorrhage in patients with cancer. Curr. Atheroscler. Rep. 14 (4), 373–381. https://doi.org/10.1007/s11883-012-0250-3.

Ma, R., Fang, S.-K., Hou, S., Wang, X., Meng, H.-M., 2018. Suspected brain metastasis from lung cancer mimicking intracerebral hemorrhage: A case report. Medicine 97 (10), e0106. https://doi.org/10.1097/MD.0000000000010106.

Gross, B.A., Du, R., 2017. Hemorrhage from cerebral cavernous malformations: a systematic pooled analysis. JNS 126 (4), 1079–1087. https://doi.org/10.3171/2016.3.JNS152419.

Kurihara, N., Suzuki, H., Kato, Y., Rikimaru, H., Sato, A., Uenohara, H., 2020. Hemorrhage owing to cerebral cavernous malformation: imaging, clinical, and histopathological considerations. Jpn. J. Radiol. 38 (7), 613–621. https://doi.org/10.1007/s11604-020-00949-x.

Mouchtouris, N., Chalouhi, N., Chitale, A., Starke, R.M., Tjoumakaris, S.I., Rosenwasser, R.H., Jabbour, P.M., 2015. Management of cerebral cavernous malformations: from diagnosis to treatment. Sci. World J. 2015, 1–8. https://doi.org/10.1155/2015/808314.

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https://doi.org/10.1016/j.bbi.2020.11.020
Received 28 October 2020; Accepted 11 November 2020
Available online 14 November 2020

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