Neurological Sciences (2022) 43:6187–6188
https://doi.org/10.1007/s10072-022-06338-8

COVID-19

Are corticosteroids useful in the treatment of brain edema associated with venous cerebral thrombosis (CVT) in patients with COVID-19 vaccine-related CVT? A controversial topic

Martina Di Pietro[1,2] · Fedele Dono[1] · Stefano L. Sensi[1]

Received: 7 June 2022 / Accepted: 6 August 2022 / Published online: 20 August 2022

Dear Editor,

We read with great interest the response of Siang Kow et al. [1] to our article entitled *Cerebral venous thrombosis without thrombocytopenia after a single dose of COVID-19 (Ad26.COV2.S) vaccine injection: a case report* [2]. The authors pointed out their concern about corticosteroids (CS) use in the treatment of brain edema (BE) associated with venous cerebral thrombosis (VCT).

We acknowledge that the use of CS in the context of VCT is controversial. In fact, Canhão et al. [3] reported that the use of CS may be associated with a worse outcome in patients without parenchymal lesions. However, the authors also state that CS treatment may have a potentially beneficial role in BE treatment in patients with a known underlying CVT cause (as in our case in which vaccination has been considered a trigger factor for CVT). According to the European Stroke Organization guideline for the diagnosis and treatment of cerebral venous thrombosis [4], several risk factors may be associated with a worse response to CS treatment in patients with CVT which include the following: (1) age > 37 years, (2) male gender, (3) evidence of CVT-associated parenchymal hemorrhagic lesion at the admission, (4) deep cerebral venous thrombosis, (5) mental status disturbances, (6) comatose state (*GCS* < 9), (7) central nervous system infection, and (8) concomitant diagnosis of malignancy. Based on this classification, except for the age, our patient did not present any risk factors which could allow us to predict an unfavorable treatment outcome.

✉ Fedele Dono
fedele.dono@unich.it

[1] Department of Neuroscience, Imaging, and Clinical Sciences, "G. D'Annunzio" University of Chieti-Pescara, Chieti, Italy

[2] Department of Neurology, Stroke Unit, "SS Annunziata" Hospital, Chieti, Italy

Finally, our choice of CS treatment for CVT-associated BE was driven by the possible underlying mechanism which led to vaccine injection to the development of the thrombosis. As we stated in the discussion, the mechanism through which the COVID-19 vaccine might induce CVT without associated thrombocytopenia is largely unknown. Evidence supports that the vaccination may elicit a strong inflammatory response leading to platelet aggregation and clot formation. However, new experimental studies on vaccine-related thrombosis have suggested a new possible mechanism related to a soluble adenoviral protein spike variant, originating from splicing events, which can bind to endothelial cells expressing ACE2 enhancing the activation of ACE/AngII/AT1R pathway with a prothrombotic, pro-inflammatory, and vasoconstrictor effects [5]. Since a growing body of literature supports the favorable outcomes of CS treatment in vaccine-induced VCT, we confirm the rationale for the choice of this treatment.

In conclusion, CS treatment for BE in patients with CVT should be evaluated carefully and shaped on the patients' clinical characteristics and underlying causes. The lack of non-randomized studies does not allow us to give any conclusive recommendation about the choice of this treatment in the general population affected by CVT. Although our report showed that CS administration may be considered a safe and efficacy treatment of BE associated with post-vaccine CVT, future larger studies should confirm this observation.

Author contribution MDP contributed to the conception and design of the study. All authors contributed to manuscript revisions, read, and approved the submitted version.

Data availability Not applicable.

Declarations

Ethical approval Written informed consent was obtained from the patient for publication of this case report.

Competing interests The authors declare no competing interests.

References

1. Kow CS, Ramachandram DS, Hasan SS (2022) The use of corticosteroids in patients with COVID-19 vaccine-related cerebral venous thrombosis. Neurol Sci 1:1–2. https://doi.org/10.1007/s10072-022-06177-7
2. Di Pietro M, Dono F, Consoli S, Evangelista G, Pozzilli V, Calisi D, Barbone F, Bonanni L, Onofrj M, De Angelis MV, Sensi SL (2022) Cerebral venous thrombosis without thrombocytopenia after a single dose of COVID-19 (Ad26.COV2.S) vaccine injection: a case report. Neurol Sci 43(5):2951–2956. https://doi.org/10.1007/s10072-022-05965-5
3. Canhão P, Cortesão A, Cabral M, Ferro JM, Stam J, Bousser MG, Barinagarrementeria F, ISCVT Investigators (2008) Are steroids useful to treat cerebral venous thrombosis? Stroke 39(1):105–10
4. Ferro JM, Canhão P, Stam J, Bousser MG, Barinagarrementeria F, ISCVT Investigators (2004) Prognosis of cerebral vein and dural sinus thrombosis: results of the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT). Stroke 35(3):664–70
5. Divani AA, Andalib S, Di Napoli M, Lattanzi S, Hussain MS, Biller J, McCullough LD, Azarpazhooh MR, Seletska A, Mayer SA, Torbey M (2020) Coronavirus disease 2019 and stroke: clinical manifestations and pathophysiological insights. J Stroke Cerebrovasc Dis 29(8):104941. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.104941