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CASE REPORT

Homonymous Hemianopia Associated with COVID-19 Vaccination

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ABSTRAK

Pandemik wabak COVID-19 telah membawa kepada penghasilan vaksin bagi mencegah penularan virus SARS-CoV-2 secara global. Walau bagaimanapun, pelbagai jenis kes strok termasuk strok iskemik dan hemoragik, serta trombosis sinus vena serebrum (CVST), telah dilaporkan meningkat selepas vaksinasi COVID-19. Kami membentangkan kes yang melibatkan seorang lelaki berusia 55 tahun dengan sejarah penyakit jantung iskemik yang menghadapi gangguan medan penglihatan seminggu selepas pemberian vaksin COVID-19 Sinovac-CoronaVac. Pesakit juga mengalami sakit kepala ringan dan muntah selama dua hari sebelum gejala penglihatan bermula. Ketajaman penglihatan terbaik yang diperbetulkan (BCVA) diukur pada 6/24 di mata kanan dan 6/15 di mata kiri. Ujian medan penglihatan menunjukkan hemianopia homonimus bahagian kiri. CT venografi bahagian otak menunjukkan trombosis di sinus 'transverse' bahagian kanan berserta strok hemoragik oksipital. Ujian swab nasofarinks adalah negatif SARS-CoV-2, dan ujian darah asas berada dalam julat normal. Pesakit dirawat dengan heparin berat molekul rendah selama seminggu, diikuti dengan rawatan antikoagulan oral selama tiga bulan. Pasca rawatan, terdapat penambahbaikan yang sedikit, walaupun gangguan pada medan penglihatan kekal. Kesimpulannya, walaupun vaksinasi COVID-19 adalah mustahak dalam mencegah penyakit ini, para perawat klinikal haruslah berwaspada dengan kesan sampingan COVID-19 yang jarang berlaku seperti trombosis sinus vena serebrum, serta bersedia dalam menanganinya dengan segera bagi menjamin keselamatan pesakit.
Kata kunci: *Hemianopia homonimus; trombosis sinus vena serebrum; vaksin COVID-19*

ABSTRACT

The current COVID-19 pandemic has prompted the development of vaccines to control the spread and severity of SARS-CoV-2. However, there are growing reports of different types of strokes, including ischemic and hemorrhagic strokes, as well as cerebral venous sinus thrombosis (CVST), following COVID-19 vaccination. We presented a case involving a 55-year-old male with a history of ischemic heart disease who exhibited an atypical presentation of visual field impairment one week following

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Sinovac-CoronaVac COVID-19 vaccination. The patient also experienced mild headache and vomiting for two days preceding the onset of visual symptoms. Right eye's best-corrected visual acuity was 6/24, and left 6/15. A visual field confrontation test indicated left homonymous hemianopia. An urgent CT venography of the brain documented right transverse sinus thrombosis with occipital haemorrhagic infarct. A nasopharyngeal swab tested negative for SARS-CoV-2, and baseline blood investigations were within normal ranges. The patient was given one week of low-molecular-weight heparin, followed by a three-month course of oral anticoagulant. Post-treatment, there was marginal improvement, although a residual visual field defect persisted. In conclusion, while COVID-19 vaccination remains essential, clinicians must remain vigilant for rare adverse events like CVST and be prepared to manage these cases promptly to ensure patient safety.

Keywords: Cerebral venous sinus thrombosis; COVID-19 vaccine; homonymous hemianopia

INTRODUCTION

The advent of severe acute respiratory virus coronavirus 2 (SARS-CoV-2) in early December 2019 triggered a rapid pandemic of COVID-19 infections. This has significantly increased global mortality and morbidity, posing a serious threat to public health worldwide. COVID-19 vaccination has effectively reduced the disease burden and fatal outcomes. Common adverse effects include mild to severe pain at the injection site, fever, lethargy, headache, muscle pain, chills and diarrhea. Stroke, on the other hand, is a significant adverse event associated with COVID-19 vaccination, as evidenced by multiple studies. Strokes can be classified into two distinct categories: ischemic stroke and hemorrhagic stroke. Furthermore, cerebral venous sinus thrombosis (CVST) is a rare type of stroke, and its development following immunisation is exceedingly rarer. It typically manifests with symptoms such as headaches, neurological impairments and ocular signs like papilledema. We reported an uncommon occurrence of CVST presented with acute visual field impairment following Sinovac-CoronaVac COVID19 vaccination.

CASE REPORT

A 55-year-old gentleman with a history of stable ischemic heart disease and hypertension developed acute left homonymous hemianopia one week after receiving his first dose of the COVID-19 vaccine (Sinovac-CoronaVac). He described the symptom as non-progressive loss of the left visual field. He also experienced a mild headache and vomiting for two days prior to the onset of visual symptoms. He reported no history of recurring headaches or trauma. He had no fever, seizure, impaired speech or physical weakness.

On ocular examination, his right and left eyes had best corrected visual activity (BCVA) of 6/24 and 6/15, respectively. The relative afferent pupillary defect was negative. The confrontational visual field exam showed left homonymous hemianopia. The extra ocular muscles movement were full in all directions. There was no proptosis or eyelid swelling. Both anterior segments were unremarkable. Intraocular pressure was within normal range in both eyes. Fundoscopy showed optic discs and macula were normal. The rest of his systemic and neurological assessments were normal.

There was no SARS-CoV-2 detected in the nasopharyngeal swab sample. His coagulation profile was normal, and his total blood count was normal, with a platelet count of 237x10^9/L.

An urgent plain computed tomography (CT) scan of the brain showed acute focal haemorrhage at the right occipital lobe with peri-haemorrhagic hypodensity extending to the right parieto-occipital region. In view of its atypical location with cortical sparing, he underwent CT cerebral venography that revealed thin linear iso density within the right transverse sinus measuring 2.5

mm in thickness and 2.7 cm in length. This finding was consistent with right transverse venous sinus thrombosis complicated with haemorrhagic infarct (Figure 1). 30-2 Humphrey visual field test showed dense homonymous hemianopia with primary involvement of the left hemifield in both eyes. There was an extension of the defect into the right field of the left eye suggesting involvement of the right occipital lobe extending to the right parieto-occipital region (Figure 2).

The patient was diagnosed with right transverse sinus thrombosis, associated with COVID-19 vaccination, as determined by the physician. Initial treatment consisted of one week of low-molecular-weight heparin, followed by oral apixaban 5 mg once daily as per hospital protocol for cerebral venous thrombosis and continued for three months. In light of the underlying pre-existing ischaemic heart disease,

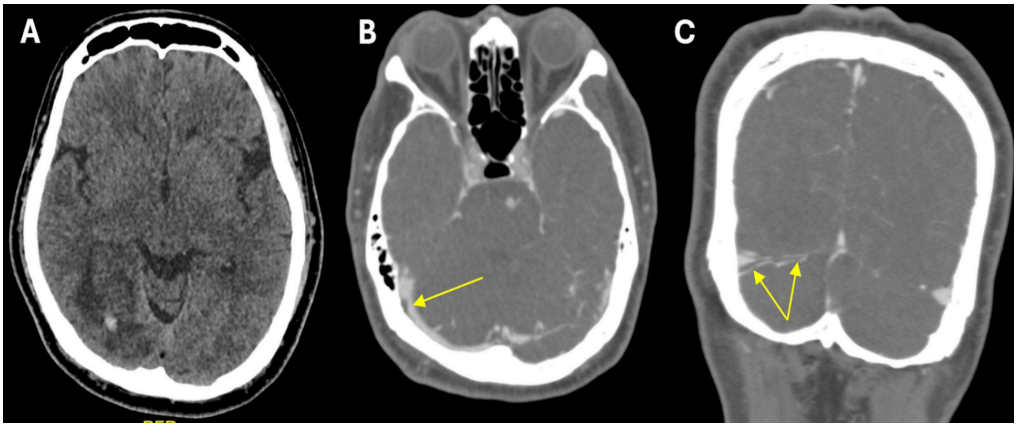

FIGURE 1: (A) Non-contrast CT brain demonstrated acute focal hemorrhage at the right occipital lobe withperi-hemorrhagic hypodensity extending to the right parieto-occipital region; (B) Subsequent CT venography in axial plane revealed thin linear isodensity within the right transverse sinus; (C) CT venography in coronal plane confirmed the filling defect within the right transverse sinus, consistent with thrombus

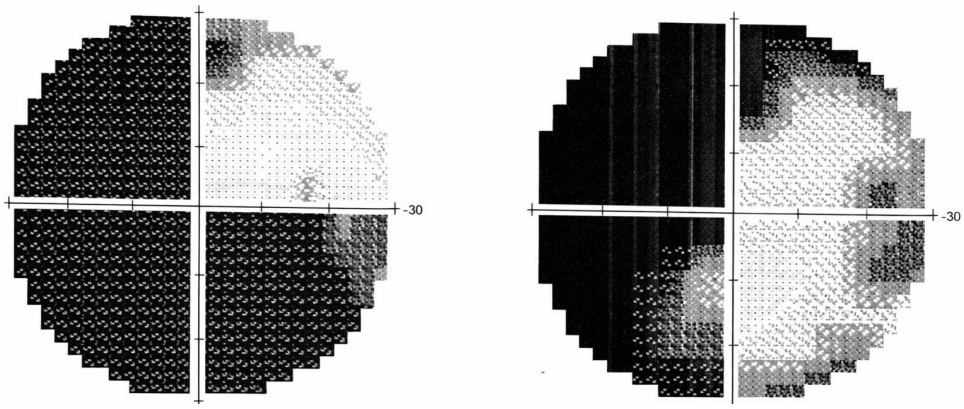

FIGURE 2: Humphrey Visual Field (HVF) 30-2 showed a dense homonymous hemianopia with primary involvement of the left hemifield in both eyes. There was an extension of the defect into the right field of the left eye suggesting involvement of the optic radiations or the visual cortex

a single antiplatelet treatment was added. During follow-up evaluations at three and six months, the patient exhibited a persistent left homonymous hemianopia visual field defect, with resolution of the headache.

DISCUSSION

CVST is an uncommon cerebrovascular illness, accounting for just 0.5% of all cases of strokes (Filippidis et al. 2009). CVST occurring after COVID-19 vaccination is an exceptionally rare occurrence that has been documented worldwide. CVST is linked to the emergence of vaccine-induced immune thrombotic thrombocytopenia (VITT), which is sometimes referred to as thrombosis-thrombocytopenia syndrome (TTS). A meta-analysis demonstrated a positive correlation between vector-based COVID-19 vaccinations, notably ChAdOx1 and Ad26.COV2.S, and an elevated likelihood of acquiring TTS-associated CVST (Palaiodimou et al. 2021). A higher incidence of mortality and illness has been associated with this condition. Conversely, vaccines that do not utilise vectors were primarily associated with non-TTS CVST (Palaiodimou et al. 2022). The patient received the Sinovac-CoronaVac vaccine, which is a non-vector-based vaccine, and subsequently developed non-TTS-CVST, characterised by a normal platelet count, and coagulation profile.

The interaction between the vaccine and platelet factor 4 (PF4) may contribute to the development of VITT (De Gregorio et al. 2022). It is hypothesised that adenovirus-based vaccines (AstraZeneca and Johnson & Johnson/ Janssen) contain free DNA that can bind to PF4, potentially triggering the production of PF4-reactive antibodies (Jaiswal et al. 2022). These findings are like those observed in autoimmune heparin-induced thrombocytopenia (HIT), which may be a primary underlying factor. Possible mechanisms of cerebral venous thrombosis (CVT) associated with inactivated vaccines are a disruption in the equilibrium between factors that promote blood clotting and those that prevent it, together with malfunction or activation of the vascular endothelium (Kumaravelu et al. 2008).

In terms of clinical presentation, the patient exhibited a unique pattern with predominant ocular symptoms and only a mild headache, which is relatively uncommon. Recent headache (95%), focal deficit (46%) and papilledema (41%) were identified as common neurological features, with homonymous hemianopia occurring in only 6% of cases (Kumaravelu et al. 2008). This condition arises when venous infarcts affect the geniculocalcarine tract, particularly the primary visual cortex, leading to significant visual impairment. This patient's presentation is similar to other non-TTS CVST cases reported after non-vector vaccination (Palaiodimou et al. 2022). Like those cases, the patient is middle-aged and experienced symptom onset at 14 days, consistent with the average reported onset of 15-28 days (Kakovan et al. 2022). To date, reported CVST cases associated with the SINOVAC vaccine are scarce. However, it is noteworthy that our patient developed symptoms following the first dose of this immunisation.

Therapeutic anticoagulation with non-heparin anticoagulants is the primary treatment for VITT with CVST. The use of heparin-containing anticoagulants is discouraged in order to prevent the exacerbation of thrombosis, as TTS-CVST and HIT are similar (Hameed et al. 2022). Nevertheless, in our case, the patient was initially administered low-molecular-weight heparin, which was subsequently replaced with a non-heparin anticoagulant. This method is consistent with the European Federation of Neurological Societies (EFNS) guideline for the treatment of non-thrombocytopenic thrombosis CVST (Einhäupl et al. 2010).

Overall, CVST typically results in a favourable outcome. Nevertheless, vaccine-induced CVST accompanied by thrombocytopenia exhibits greater morbidity when compared to CVST not related to vaccine-induced thrombotic thrombocytopenia syndrome (TTS). Four cases of non-TTS CVST following SINOVAC vaccination were reported in a case series, and all of them had positive outcomes (Hameed et al. 2022) . Our patient, on the other hand, showed very little

improvement and nonetheless had a chronic visual field impairment.

CONCLUSION

The transverse sinus, a crucial venous pathway that drains blood from both deep and superficial areas of the brain into the jugular vein, is the second most common site for thrombosis, following the superior sagittal sinus. While COVID-19 vaccination is essential in controlling the pandemic, it is equally important to remain vigilant for rare adverse events such as CVST, including thrombosis in the transverse sinus. Although these cases are exceedingly rare, clinicians must maintain a high index of suspicion and be prepared to identify and manage CVST promptly to prevent serious complications. Achieving optimal patient safety requires balancing the overwhelming benefits of vaccination with careful monitoring for these uncommon risks, ensuring timely intervention when necessary and enhancing treatment outcomes.

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Acknowledgement: Not applicable.

Ethical statement: Not applicable.

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