Bilateral multifocal choroiditis with disc edema in a 15-year-old girl following COVID-19 vaccination

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A few cases of posterior uveitis following COVID-19 vaccination have been reported but none in the pediatric age group. A 15-year-old girl presented with history of headache and bilateral blurred vision of five days duration. The symptoms developed five days after vaccination with the first dose of Covaxin (inactivated SARS-CoV-2 vaccine). Her anterior segment was normal in both eyes (BE), whereas the posterior segment showed mild vitritis with disc edema and multiple yellowish lesions at the level of choroid clustered at the macula and associated with multiple serous detachments. BE uveitis resolved, and the vision was completely recovered three weeks after treatment with steroids. Hence, ophthalmologists should be aware of uveitis following vaccination—a condition that is usually benign, transient, and results in excellent outcomes with timely diagnosis and early treatment with steroids.

Key words: Covaxin, Covid vaccination in paediatric age group, multifocal choroiditis following vaccination

The coronavirus disease 2019 (COVID-19) pandemic resulted in a global health crisis. With the aim of ending the pandemic, vaccines against the COVID-19 virus were authorized for use in adults through expedited clinical trials from December 2020. Children and adolescents usually demonstrated fewer and milder symptoms of COVID-19 infection compared to adults.[3] Despite their lower risk of severe disease, they can experience long COVID or post-acute sequelae of COVID-19 infection.[3] The government of India, keeping in view the recent worldwide surge of COVID-19 cases and detection of the Omicron variant, authorized COVID-19 vaccination for children in the age group of 15–18 years, Covaxin being the sole choice.

Post-vaccine uveitis is a well-reported entity and is usually anterior, mild, and treatable with steroids.[3] New-onset uveitis following vaccination may be the first sign of underlying autoimmune disease, and complete systemic evaluation should be done in these patients.[4] Here, we report a case of bilateral multifocal choroiditis, in a child following vaccination with the first dose of Covaxin. To the best of our knowledge, this is the first case report of its kind in a pediatric age group in our country and hence assumes its significance in literature.

Case Report

A 15-year-old, school-going, otherwise healthy female child was presented to us with complaints of headache and blurring of vision in both eyes (BE) since five days. She denied any past ocular disease or medication history. Ten days earlier, she had received the first dose of Covaxin (BBV 152) in her school as part of a community vaccination drive. One day post the vaccination, she had a mild headache. Five days post vaccination, she noticed an increase in severity of headache with the sudden blurring of vision in the BE. She had no history of systemic autoimmune disease or recent fever or any illness. Furthermore, there was no family history of uveitis or autoimmune disease. On examination, her best-corrected visual acuity was 6/12 in the right eye (RE) and 6/36 in the left eye (LE). Extraocular motility, pupillary reflex, intraocular pressure, and anterior segment examination were bilaterally normal. Fundus examination of BE showed vitritis grade 1 (SUN classification), disc edema, engorged veins with multiple yellowish oval lesions at the level of choroid clustered at the macula, and multiple serous detachments (LE > RE) [Fig.1]. Heidelberg Spectralis optical coherence tomography (HRA-OCT) of BE revealed an edematous optic nerve head with subretinal hyporeflective space and peripapillary subretinal fluid with multiple serous retinal detachments at the macula. Moreover, bacillary layer detachment was seen in LE with interspersed septations. Choroidal thickening with undulations was noted in OCT in BE [Fig. 1]. Fundus fluorescein angiography was not performed as the child and her parent did not give consent.

A diagnosis of bilateral multifocal choroiditis was made; the child was started on topical prednisolone six times a day and uveitis-related systemic workup was advised. Complete blood counts, C reactive protein, serum antinuclear antibody, renal, and liver function tests were normal except for a slight rise in erythrocyte sedimentation rate (ESR) (31 mm/hour). TORCH infections and syphilis screening and tuberculin sensitivity tests.
showed negative results. The digital chest x-ray was normal. On ruling out tuberculosis and obtaining clearance from our physician with informed consent from the child’s parents, we started her on a low dose of oral prednisolone 30 mg per day, tapering by 10 mg every week. After three weeks, the patient reported to us with significant improvement in her uncorrected visual acuity to 6/6 in BE with significant reduction in vitritis, choroiditis and a normal disc appearance. OCT in BE showed normal retinal and choroidal layers with trace subretinal fluid. Foveal contour was restored in LE [Fig. 2]. Her repeat ESR normalized.

Discussion

No case of uveitis has so far been reported in children following vaccination with Covaxin. Our case adds credence to the fact that COVID-19 vaccination can be responsible for signs of posterior uveitis, with acute onset of the disease within five days of vaccination, good response to steroids, and negative lab results for infectious and autoimmune causes of choroiditis. In their review on the ophthalmic manifestations of COVID-19 vaccines, Sen et al.[8] reported that uvea, choroid, and retinal vasculature were most commonly affected following COVID-19 vaccination and that the clinical features developed at a median of four days from the time of vaccination.

Pathogenesis of vaccine-associated uveitis remains unclear and may be attributed to molecular mimicry, antigen-specific cell, and antibody-mediated hypersensitivity reactions to spike antigen or other viral antigens or adjuvants present in vaccines that enhance immunogenic activity. Cunningham et al.[3] stated the immune response is typically triggered by the entry of adjuvants of inactivated or subunit vaccine into the body and subsequent production of IgE, which mediates hypersensitivity.

Multifocal choroiditis is an uncommon, chronic, and progressive bilateral inflammatory disease that affects predominantly young, healthy adults. The etiology is not known but may be due to sensitization of antigens within photoreceptors, retinal pigment epithelial cells, and choriocapillaris by an exogenous pathogen.[9]

Our literature search showed two published articles on bilateral choroiditis presenting 4–5 days after COVID-19 vaccination, which is similar to our case. The first case was a healthy 34-year-old man from India who received the second dose of Covishield (viral vector-based vaccine).[4] The second case was from China following the first dose of an inactivated vaccine.[7] The authors of both articles attributed the cause of uveitis to the immunologic response induced by aluminium hydroxide–based adjuvants.

Although vaccines containing aluminium hydroxide–based adjuvants are beneficial, they can at times cause adverse reactions.[8] In contrast to the widely used adjuvant aluminium hydroxide, which is known to induce a Th2 based response, Covaxin BBV152 is a whole-virion inactivated SARS-CoV-2 vaccine (3 μg or 6 μg) formulated with a toll-like receptor 7/8 agonist molecule adsorbed to alum (Algell-IMDG) (chemoabsorbed imidazoquinoline) and is known to induce a Th1 based response.[9]

Current evidence suggests that both Th1 and Th17 effector cells can independently induce tissue damage in mouse models of uveitis, largely through the production of the proinflammatory cytokine tumor necrosis factor[10] Interleukin-10 and tumor necrosis factor haplotype were known to be associated with idiopathic multifocal choroiditis.[3]

Covaxin received emergency use listing by the World Health Organization (WHO) for vaccination in adults and is awaited for children. The vaccine has shown promising efficacy and safety with <0.5% adverse side effects in adults.[39] Although uncommon and difficult to prove causality, there are numerous reports on vaccine-associated adverse events. Recurrence of uveitis following redosing with vaccines is known.[13] Careful
follow-up of these patients is required to document any similar episodes following further vaccinations.

Conclusion

In conclusion, the significant findings of our study are expected to allow ophthalmologists globally to become aware of post-COVID-19 vaccination uveitis, which is a rare, benign, and transient condition. Early treatment with steroids results in excellent outcomes and is by no means to be considered a deterrent for vaccination drives in children.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient’s parents have given their consent for their daughter’s images and other clinical information to be reported in the journal. The patient and her parents understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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