



## Case Report

## Isolated abducens nerve palsy following AstraZeneca vaccine: A case report

Krity Basnet<sup>a,\*</sup>, Rupa Bhandari<sup>a</sup>, Kushal Basnet<sup>b</sup>, Ananta Aryal<sup>c</sup>, Reshma Shrestha<sup>d</sup><sup>a</sup> Intern, MBBS, Kathmandu Medical College and Teaching Hospital, Sinamangal, Kathmandu, Nepal<sup>b</sup> Manipal College of Medical Sciences, Pokhara, Nepal<sup>c</sup> Department of Internal Medicine, Kathmandu Medical College and Teaching Hospital, Sinamangal, Kathmandu, Nepal<sup>d</sup> Department of Ophthalmology, Kathmandu Medical College and Teaching Hospital, Sinamangal, Kathmandu, Nepal

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## ABSTRACT

The corona virus disease 2019 (COVID-19) pandemic was triggered by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). SARS-CoV-2 infected millions of individuals globally. Despite the recent clearance of several medications, effective and safe COVID-19 vaccinations are still urgently needed, not only to prevent the disease from spreading but also to restore social and economic activity through mass vaccination. We present a case of a 72-year-old female who presented with sudden right abducens nerve palsy after receiving the 2nd dose of booster vaccine following the AstraZeneca COVID-19 vaccine. Because of the temporal association between vaccination and abducens nerve palsy, they assumed her vaccine caused it. The onset of symptoms, the absence of any prior medical conditions, and normal magnetic resonance imaging. This case highlights the importance of determining whether a COVID-19 vaccine could generate neurologic side effects similar to those found with the virus and previous vaccinations.

## 1. Introduction and importance

Abducens nerve palsy is the most common single ocular motor nerve palsy, with an annual incidence of 11.3/100,000. Trauma, excessive intracranial pressure, neoplasia, and viral infections are all common causes of abducens nerve palsy in children. In adults, the most common causes are micro vascular illness or tumors. Vaccination-induced ocular motor nerve palsies are becoming more common these days, notwithstanding their **rarity** [1].

In 1983, Werner and colleagues were the first to report abducens nerve palsies following vaccines for diphtheria-pertussis-tetanus and rubeolla-mumps-rubella virus, with two of four children developing abducens nerve palsies [2].

We present **you with** a case of a 72-years female from Gorkha **who has** presented with sudden binocular and painless diplopia **in** the right eye **since 3** days after receiving the booster dose **of the** AstraZeneca COVID-19 vaccine. On ophthalmologic examination, she had significant abduction limitations in the right eye and complete duction in the left. As a result, right-lateral rectus paralysis is a possibility. A dilated fundus examination revealed nothing abnormal. **After a thorough neurological assessment, only abducens nerve palsy was discovered.** The brain and orbits were scanned with and without contrast using magnetic

resonance imaging (MRI), which revealed no abnormalities.

## 2. Case presentation

We **report to** you a case of a 72-year-old female from Gorkha who developed double vision in her right eye for three days after getting the AstraZeneca COVID-19 vaccination. She reported a headache that was acute on onset **and** was present **in the** occipital region, throbbing in nature. It was also associated with fever, acute on onset, maximum temperature not **recorded, and** subsided on taking antipyretics. **There is no** significant past medical **or** surgical **history.** No history of trauma.

On general examination, her vitals were stable. It was observed that the right eye has primary position esotropia for near fixation. **During the initial orthoptic test, a right abduction deficit, lateral incomitance, and no palpebral fissure abnormalities were discovered.** Her ophthalmologic and neurologic exams were essentially unremarkable, with no symptoms or evidence of cranial nerve involvement.

Her best-corrected visual acuity in each eye was 6/18 at the time of the presentation.

Each eye's intraocular pressure was normal, and there was no afferent pupillary deficiency. The patient had a new right esotropia of 30 in primary gaze, 35 in right gaze, and 10 in left gaze, as well as a severe

\* Corresponding author.

E-mail address: [kritybasnet@gmail.com](mailto:kritybasnet@gmail.com) (K. Basnet).<https://doi.org/10.1016/j.amsu.2022.104434>

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Fig. 1. External pictures demonstrating esotropia and a restriction in right-eye abduction, consistent with abducens nerve paralysis.

abduction deficiency in the right eye, according to sensorimotor examination (Fig. 1). The fundus examination and slit-lamp examination were unremarkable. The laboratory findings were within the normal limit.

Optical coherence Tomography-OCT 3D Eye Scan was done, which came out to be **normal**, as shown in (Fig. 2).

Magnetic resonance imaging (MRI) of the brain at the time of presentation showed a few foci of discrete high signal changes seen involving the deep white matter of the cerebral hemisphere bilaterally. On MRI of the orbit (Fig. 3) the right lateral rectus appears asymmetrically smaller (atrophy) in size than the left side and other extra ocular muscles. A definite cause was not appreciated. Thus, MRI findings were nonspecific to the clinical findings.

Given the chronological relationship, the patient was diagnosed with abducens nerve palsy, with a likely association to the Astra-Zeneca COVID-19 vaccine, after ruling out all other possible causes. Her sensor motor examination is improving following alternate patching of the eye.

### 3. Clinical discussion

Vaccine-induced nerve palsy is an exceptional situation, but vaccine-induced ocular neuropathy has also been reported [3]. Recurrent abducens nerve palsy in children after vaccination with various live attenuated vaccines has been previously reported [4].

Post-immunization Abducen paralysis was first reported in 1983 after immunizations against pertussis, diphtheria, and rubella viruses. It has also been reported with measles, mumps, rubella, hepatitis B, and the annual flu vaccine, which develops 2–3 weeks after vaccination [1,4,5]. Failure to improve suggests intracranial pathology.

The pathophysiology behind post-immune optic nerve palsy is not yet clear but is thought to be associated with immune-mediated injury leading to demyelination or localized vasculitis [3].

The most common cause of sixth nerve palsy is damage to micro vessels or blood vessels in the nerves. However, tumors, infections, and inflammation can cause abducens nerve palsy, which is seen following routine vaccinations.

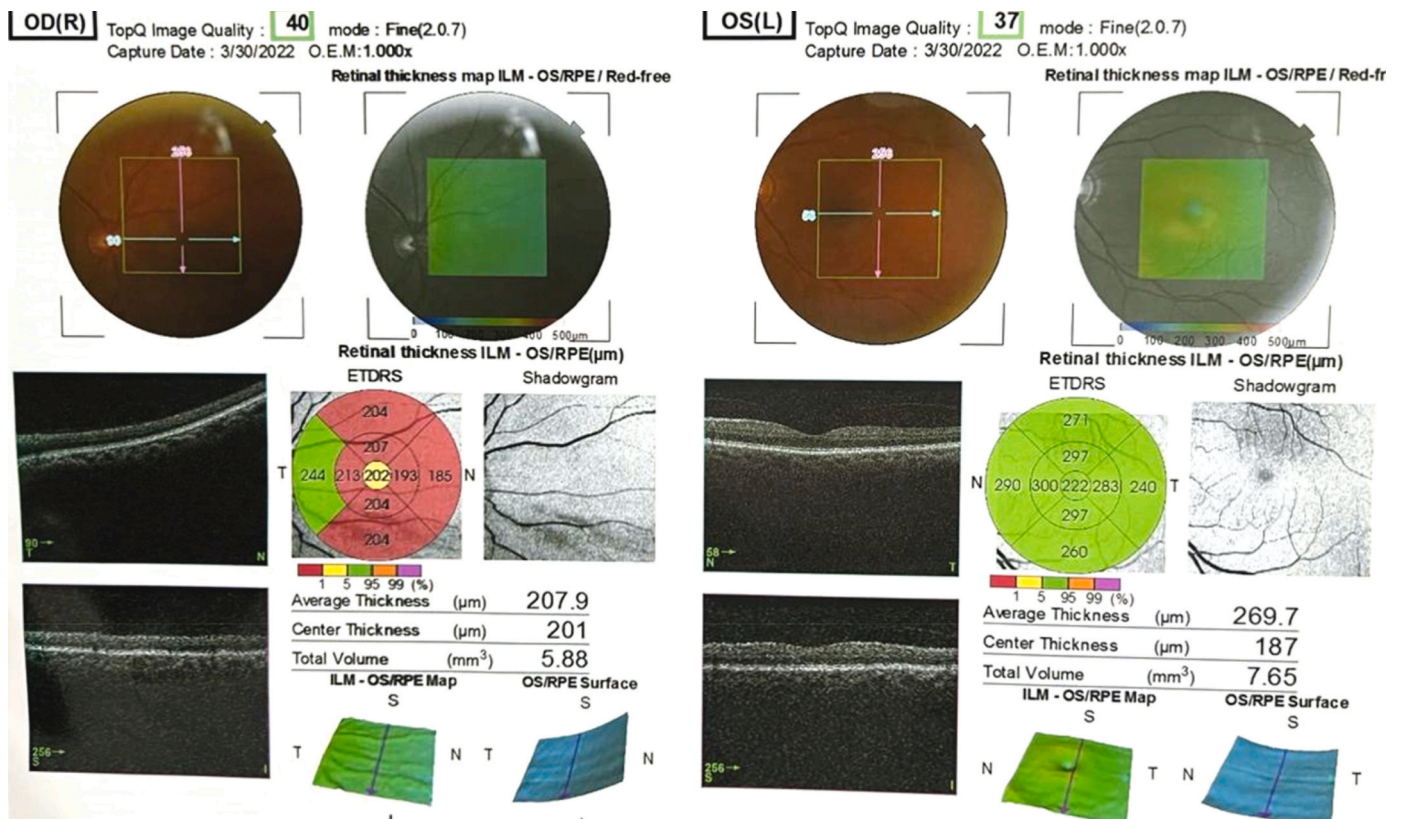


Fig. 2. Oct 3D eye scan.

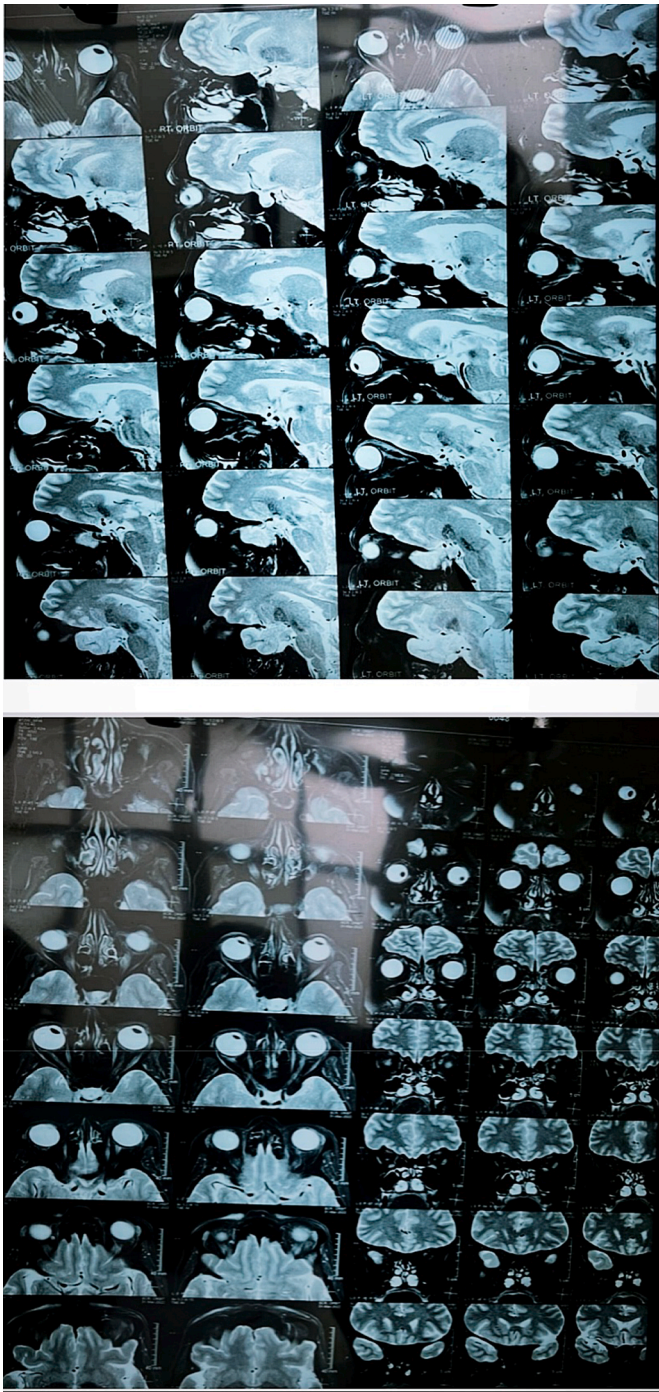


Fig. 3. MRI of orbit.

Malignant tumors are one of the most common causes leading to isolated abducens nerve palsy. Therefore, neuroimaging is recommended for all acute and chronic abducens nerve palsy. Lumbar puncture for CSF analysis of viral PCR may be useful for diagnosis. This was not done for the patient as it was considered too invasive. Other studies that may be justified based on a suggestive history include electrical diagnostic tests such as visual evoked potentials and electroretinograms and serum anti-ganglioside antibodies associated with Guillain-Barré syndrome [6].

In our case, a thorough examination and MRI were done before coming to a diagnosis of vaccination-associated palsy. Brain and orbital MRI with and without gadolinium at the time of presentation showed focus on discrete-signal changes that bilaterally affect the deep white

matter of the cerebral hemisphere, which is nonspecific to clinical findings. Thus, making **that** the diagnosis and treating it accordingly.

Children do not complain about diplopia but develop compensatory head **positions**, as in our case. It is important to turn your head to maintain a single vision in both eyes. If no improvement is seen, alternative treatment options such as alternative patches, prism therapy, strabismus surgery, and/or botulinum toxin injection should be considered. In our **case**, treatment, **steroids**, and eye patching were done.

#### 4. Conclusion

However, vaccination-induced nerve palsy is a diagnosis of exclusion. It is not something new; it has been reported since 1983. Before coming to a diagnosis, all other variables need to be ruled **out**, **i.e.**, post-immunization sixth nerve palsy recovers within 2 days–3 weeks. If it doesn't resolve, intracranial pathology needs to be suspected.

This case report has been reported in line with the SCARE Criteria [7].

#### Ethical approval

This is a case report that does not need an ethical approval.

#### Sources of funding

Not available.

#### Author contribution

Krity Basnet, Rupa Bhandari and Kushal Basnet worked for literature review, discussion of the case report and revision of the case report into its final version. Krity Basnet took the relevant history, clinical examination, collected relevant investigations of the patient and wrote the report. Ananta Aryal and Reshma Shrestha helped in the revision of the case report into its final version. They were directly involved in patient's management in the hospital.

#### Registration of research studies

This is a case report that does not need to be registered.

#### Consent

Written informed consent was obtained from the patient for publication of this case. A copy of written consent is available for review on request by the Editor-in-chief of this journal.

#### Guarantor

Dr. Krity Basnet.

#### Declaration of competing interest

None.

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