



## Case Report

## Bell's palsy as a possible complication of mRNA-1273 (Moderna) vaccine against COVID-19



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## ABSTRACT

**Introduction:** Vero Cell, AstraZeneca, Janssen, mRNA-1273 (Moderna), and Pfizer COVID-19 vaccines have been authorized for emergency use in Nepal. These vaccines have been linked to some adverse effects, including fever, myalgia, and headache. Furthermore Bell's Palsy a rare adverse effect was also reported to be associated with the use of mRNA-1273 (Moderna) vaccine in some patients.

**Case presentation:** In this case report we present a 17-year-old female who acquired Bell's Palsy following the administration of mRNA-1273 (Moderna) COVID-19 vaccination.

**Discussion:** The possible etiology of BP that has been suggested is infection by reactivated viruses, such as the varicella-zoster virus (VZV), herpes simplex virus type 1 (HSV-1), human herpesvirus 6, and the Usutu virus, [1] the most accepted hypothesis is the one with reactivation of latent Herpes Simplex Virus type 1 in the geniculate ganglia of the facial nerves, an autoimmune mechanism through the mimicry of host molecules by the antigens of the vaccines.

**Conclusion:** Though the extent of association between the mRNA vaccination and the development of Bell's Palsy has yet to be confirmed, this example highlights the need to closely monitor side effects and repercussions after receiving a new vaccine.

## 1. Introduction

Over the past two years, COVID-19 has evolved into different Variants of Concerns (VOC), including Alpha (B.1.1.7, United Kingdom), Beta (B.1.351, South Africa), and Gamma (P.1, Brazil), Delta (B.1.617.2, India), Omicron (B.1.1.529, South Africa), and Variants of Interest (VOI) including Lambda (C.37, Peru) and Mu (B.1.621, Colombia). [2] COVID vaccines have been developed to battle the pandemic, and they have been effective against VOC, leading to decreased severity and hospitalization rate in patients with Covid-19. Nepal has granted emergency use

authorization of COVID-19 vaccines such as Vero Cell, AstraZeneca, Janssen, and Pfizer-BioNTech [3], and a total of 31,642,503 vaccine doses have been administered as of 01/31/2022 [4].

Moderna vaccine got its authorization for use in Nepal on December 19, 2021, and more than 17.34 million children between ages 12–17 years from 57 different districts of Nepal have been vaccinated. [5] Moderna is a messenger RNA (mRNA) vaccine that instructs cells to create an immune response capable of combating the virus. After creating an immune response, the body eliminates the harmless mRNA and other vaccine components as part of regular bodily functioning. The

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mRNA (primary), fat, salt, sugar, acid stabilizer, and acids are among the vaccine constituents. Minor adverse effects such as fever, headache, and exhaustion may occur as an immunological response, most notably in the first seven days following immunization.

Bell's Palsy is a severe and unusual adverse effect of mRNA COVID-19 vaccines. It is believed to be immune-mediated, with a prevalence after mRNA-1273 (Moderna) vaccine not higher than the standard viral immunizations. [6] According to the World Health Organization's pharmacovigilance database, as of March 9, 2021, 95 of 844 facial paralysis-related occurrences were documented from the Moderna vaccine alone. The median age of patients affected was 49 years, and the average time to onset was two days. [6] This report describes a 17-year-old female who acquired Bell's Palsy after receiving the Moderna COVID-19 vaccination. This case has been reported as per SCARE 2020 guidelines. [7]

## 2. Case Presentation

In December 2021, a healthy 17-year-old female presented at Bhi-mad Primary Health Care Center with left-sided facial muscle weakness for three days and was referred to Western Regional tertiary care center for prompt therapy. She was unable to close her left eye. She also had a mouth deviation to the right, a smooth left-sided nasolabial fold while smiling, and blurry left eye vision (Fig. 1). Her body temperature was 98.2° Fahrenheit. She didn't have any triggers such as weariness, illness, or cold stimulation. She also didn't have any signs of a respiratory illness or the Melkersson-Rosenthal syndrome triad. Within 24 hours of taking the Moderna vaccination, she began to experience symptoms (vaccinated on December 24, 2021). She didn't have a fever, tinnitus, vertigo, vesicular rashes around her face, speech difficulties, or dysphagia. She had never experienced this condition before.

House-Brackmann (H-B) grade III isolated right 7th nerve palsy was found during a cranial nerve (CN) examination. Her motor, sensory, and cerebellar examinations were all normal. A thorough ENT examination revealed no significant findings. Patient Routine lab tests were unremarkable. She was diagnosed with isolated right 7th nerve palsy and was started on oral prednisolone in a tapering dosage. She was also urged to seek physiotherapy. After two weeks, her facial weakness had greatly improved, and her H-B grade had dropped from III to I. She was doing well at the most recent follow-up with no residual weakness.

## 3. Discussion

Bell's Palsy is an idiopathic, acute, unilateral paresis or paralysis of

the face in a pattern consistent with peripheral facial nerve dysfunction. It may be partial or complete, occurring with equal frequency on the right and left sides of the face with a peak incidence between the ages of 15 and 40 years and equally affecting both genders. [8] The Guideline Development Group (GDG) has identified the diagnosis of Bell's Palsy as one of the exclusion, requiring careful clinical elimination of other potential etiologies of facial paralysis/paresis. [9] Though the possible etiology of BP that has been suggested is infection by reactivated viruses, such as the varicella-zoster virus (VZV), herpes simplex virus type 1 (HSV-1), human herpesvirus 6, and the Usutu virus, [1] the most accepted hypothesis is the one with reactivation of latent Herpes Simplex Virus type 1 in the geniculate ganglia of the facial nerves, an autoimmune mechanism through the mimicry of host molecules by the antigens of the vaccines. [10] However, our patient had no history of HSV and the Usutu virus.

The product information of two vaccines developed with a novel mRNA technology has reported Bell's Palsy as an adverse effect. [11] For BNT162b2 (Pfizer-BioNTech) COVID-19 vaccine given in Israel, the meantime to the occurrence of Palsy was 9.3(3–14) days from the first dose and 14(1–23) days from the second dose. The adjusted odds ratio for exposure in the case-control study was 0.84(95% CI, 0.37–1.90; P = .67). [12] The findings from Eric Wan and colleagues' suggested a significantly increased risk of Bell's Palsy associated with receiving inactivated virus vaccine CoronaVac (adjusted OR 2.385 [95% CI 1.415–4.022]; p = 0.0011) for CoronaVac, but no significant difference in risk associated with receiving the mRNA vaccine BNT162b2 (1.755 [0.886–3.77]; p = 0.11). [10] Even though the WHO pharmacovigilance database showed mRNA COVID-19 vaccines did not confer an increased risk of facial paralysis when compared with other viral vaccines [6], Bell's Palsy appeared two days after the administration of the mRNA COVID-19 vaccine with clear evidence of a temporal association between the vaccine administration and the facial nerve palsy. [13]

The timing of Bell's palsy onset after mRNA vaccine administration is quite variable, with early manifestation occurring as early as 5 h after vaccination, as reported in a male patient who received BNT162b2 and developed recurrent Bell's Palsy after the second dose of vaccine. [14] The presentation in this patient was in 24 hours after the Moderna vaccination. The mechanism of Bell's palsy post-COVID-19 vaccination is still unclear. One theory is that there is autoimmune activation in the patient's body after the vaccine antigen exhibits molecular mimicry with the self-antigen of the body, which leads to activation of autoreactive T cells leading to facial Palsy. [15] Another hypothesis explains that the combination of mRNA in the COVID vaccine with lipids leads to innate immune activation, and it overwhelms the peripheral tolerance;



Fig. 1. Figure of patient's inability to close her left eye, had a mouth deviation to the right, a smooth left-sided nasolabial fold while smiling, and blurry left eye vision.

which it causes the involvement of the facial nerve and its Palsy. [16] Another explanation is regarding the reactivation of Herpes Simplex Virus type I from the previous infection in the geniculate ganglion of the facial nerve [17], which is corroborated by the better role of Acyclovir-Prednisone combination in preventing nerve degeneration compared to Placebo-Prednisone. [18]

The treatment provided is usually steroid with or without Acyclovir. For patients coming to the Emergency Department, intravenous methylprednisolone 500 mg twice a day for three days and Acyclovir 400 mg four times a day followed by prednisolone with Acyclovir 400 mg thrice a day is given. [19] The patients presenting at the outpatient department, prednisolone 50–60 mg once a week with or without Acyclovir 400 mg as mentioned above. [20] Our patient was provided with oral Prednisolone 50 mg once a day for three days and tapered by 10 mg every 4th day over two weeks period.

Regarding the prognosis of this condition, less than 20% reported recovery, around 0.5% had recovered with sequelae, and around 20% showed no recovery from Bell's Palsy. [6,21] Our patient recovered after five weeks.

#### 4. Conclusion

We describe a case of Bell's Palsy following the administration of the mRNA-1273 (Moderna) vaccine against COVID-19. Though the extent of association between the mRNA vaccination and the development of Bell's Palsy has yet to be confirmed, this example highlights the need to closely monitor side effects and repercussions after receiving a new vaccine.

#### Ethical approval

None.

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None.

#### Author contribution

PN and SN wrote the original manuscript, reviewed, and edited the original manuscript. SS reviewed and edited the original manuscript. SN, PN, SB, SS, SB,GN, RO, OE, GL, SK reviewed the manuscript and was in charge of case.

#### Please state any conflicts of interest

Authors have no conflict of interest to declare.

#### Registration of research studies

1. Name of the registry: None
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#### Consent

Written informed consent was obtained from the patient for

publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.103897>.

#### References

- [1] W. Zhang, L. Xu, T. Luo, F. Wu, B. Zhao, X. Li, The etiology of Bell's palsy: a review, *J. Neurol.* 267 (2020) 1896–1905, <https://doi.org/10.1007/s00415-019-09282-4>.
- [2] S. Poudel, A. Ishak, J. Perez-Fernandez, et al., Highly mutated SARS-CoV-2 Omicron variant sparks significant concern among global experts - what is known so far? *Trav. Med. Infect. Dis.* 45 (2022) <https://doi.org/10.1016/J.TMAID.2021.102234>.
- [3] Nepal receives 1,965,600 doses of Moderna vaccine from COVAX. <https://kathmandupost.com/health/2021/12/12/nepal-receives-1-965-600-doses-of-moderna-vaccine-from-covax>. (Accessed 8 February 2022).
- [4] World Health Organization, Indonesia: WHO Coronavirus Disease (COVID-19) Dashboard with Vaccination Data | WHO Coronavirus (COVID-19) Dashboard with Vaccination Data, World Heal. Organ., 2021. Accessed: <https://covid19.who.int/%0Ahttps://covid19.who.int/region/searo/country/bd>.
- [5] F.C.- Media, Focused COVID-19 Media Monitoring, WHO, Nepal, 2021.
- [6] L. Renoud, C. Khouri, B. Revol, M. Lepelley, J. Perez, M. Roustit, J.L. Cracowski, Association of facial paralysis with mRNA COVID-19 vaccines: a disproportionality analysis using the World Health Organization pharmacovigilance database, *JAMA Intern. Med.* 181 (2021) 1243–1245, <https://doi.org/10.1001/JAMAINTERNMED.2021.2219>.
- [7] R.A. Agha, T. Franchi, C. Sohrabi, et al., The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230, <https://doi.org/10.1016/J.IJSU.2020.10.034>.
- [8] J. Holland, J. Bernstein, Bell's palsy, *Clin. Evid.* 2011 (2011).
- [9] R.F. Baugh, G.J. Basura, L.E. Ishii, et al., Clinical practice guideline: Bell's palsy, *Otolaryngol. Head Neck Surg.* 149 (2013) S1–S27, <https://doi.org/10.1177/0194599813505967>.
- [10] E.Y.F. Wan, C.S.L. Chui, F.T.T. Lai, et al., Bell's palsy following vaccination with mRNA (BNT162b2) and inactivated (CoronaVac) SARS-CoV-2 vaccines: a case series and nested case-control study, *Lancet Infect. Dis.* 22 (2022) 64–72, [https://doi.org/10.1016/S1473-3099\(21\)00451-5](https://doi.org/10.1016/S1473-3099(21)00451-5).
- [11] N. Cirillo, R. Doan, The association between COVID-19 vaccination and Bell's palsy, *Lancet Infect. Dis.* 22 (2022) 5, [https://doi.org/10.1016/S1473-3099\(21\)00467-9](https://doi.org/10.1016/S1473-3099(21)00467-9).
- [12] A. Shemer, E. Pras, A. Einan-Lifshitz, B. Dubinsky-Pertsov, I. Hecht, Association of COVID-19 vaccination and facial nerve palsy: a case-control study, *JAMA Otolaryngol Head Neck Surg* 147 (2021) 739–743, <https://doi.org/10.1001/JAMAOTO.2021.1259>.
- [13] C. Martin-Villares, A. Vazquez-Feito, M.J. Gonzalez-Gimeno, B. de la Nogal-Fernandez, Bell's palsy following a single dose of mRNA SARS-CoV-2 vaccine: a case report, *J. Neurol.* 269 (2022) 47–48, <https://doi.org/10.1007/s00415-021-10617-3>.
- [14] A. Burrows, T. Bartholomew, J. Rudd, D. Walker, Sequential contralateral facial nerve palsies following COVID-19 vaccination first and second doses, *BMJ Case Rep.* CP 14 (2021), e243829, <https://doi.org/10.1136/BCR-2021-243829>.
- [15] N. Principi, S. Esposito, Do vaccines have a role as a cause of autoimmune neurological syndromes? *Front. Public Health* 8 (2020) 361, <https://doi.org/10.3389/fpubh.2020.00361>.
- [16] C. Alay, F.N. Yalçındâ, Bell's palsy during interferon alpha 2a treatment in a case with Behçet uveitis, *F1000Research* 2 (2013), <https://doi.org/10.12688/F1000RESEARCH.2-245.V1>.
- [17] S. Murakami, M. Mizobuchi, Y. Nakashiro, T. Doi, N. Hato, N. Yanagihara, Bell palsy and herpes simplex virus: identification of viral DNA in endoneurial fluid and muscle, *Ann. Intern. Med.* 124 (1996) 27–30, [https://doi.org/10.7326/0003-4819-124-1\\_PART\\_1-199601010-00005](https://doi.org/10.7326/0003-4819-124-1_PART_1-199601010-00005).
- [18] J.M. Ruboyanes, C.S. Trent, K.K. Adour, P.G. Von Doersten, C.P. Quesenberry, F. M. Byl, T. Hitchcock, Bell's palsy treatment with acyclovir and prednisone compared with prednisone alone: a double-blind, randomized, controlled trial, *Ann. Otol. Rhinol. Laryngol.* 105 (1996) 371–378, <https://doi.org/10.1177/000348949610500508>.
- [19] M.C. Mason, A. Liaqat, J. Morrow, R. Basso, Y. Gujrati, Bilateral facial nerve palsy and COVID-19 vaccination: causation or coincidence? *Cureus* 13 (2021) <https://doi.org/10.7759/CUREUS.17602>.
- [20] H. Iftikhar, S.M.U. Noor, M. Masood, K. Bashir, Bell's palsy after 24 hours of mRNA-1273 SARS-CoV-2 vaccine, *Cureus* 13 (2021), <https://doi.org/10.7759/CUREUS.15935>.
- [21] R. Nosedà, P. Ripellino, S. Ghidossi, R. Bertoli, A. Ceschi, Reporting of acute inflammatory neuropathies with COVID-19 vaccines: subgroup disproportionality analyses in VigiBase, *Vaccines* 9 (2021) 1022, 2021, 9:1022.10.3390/VACCINES9091022.