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Bell's Palsy Post COVID-19 Vaccination: An Unwanted Occurrence of Coincidence

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ABSTRACT

Introduction: One way to fight the COVID-19 pandemic is through vaccination. Indonesia widely uses a number of vaccines. The inactivated virus vaccine (Sinovac-CoronaVac), the recombinant adenovirus vector vaccine ChAdOx1-S/nCoV-19 (AstraZeneca), the mRNA-1273 vaccine (Moderna), and the BNT162b2 mRNA vaccine (Pfizer-BioNTech) are some of these. The COVID-19 vaccination has reported several cases of acute facial nerve paralysis as an adverse event. **Case:** A 34-year-old female patient complained of drooping lips to the left side and being unable to close the right eyelid three days after receiving the first dose of the COVID-19 vaccine inactivated virus type (CoronaVac). Physical examination revealed obesity, right lagophthalmos, and right peripheral facial nerve paralysis, but no extremity paresis. The patient was clinically diagnosed with Bell's palsy and received corticosteroid therapy. The patient's complaints improved after 2 weeks of treatment. Reports indicate that several types of COVID-19 vaccines have resulted in acute facial nerve paralysis. The mRNA-type COVID-19 vaccine led to the most widely reported cases of Bell's palsy. The incidence of Bell's palsy after the COVID-19 vaccine is very rare. **Conclusion:** Overall, the advantages and protective effects of the COVID-19 vaccine outweigh the risks.

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INTRODUCTION

The COVID-19 pandemic, an extremely dangerous respiratory illness caused by coronavirus 2 (SARS-CoV-2), could pose a significant threat to world wellbeing.¹ Most patients appear to have flu-like side effects such as fever, hacking, weariness, and, in extreme cases, shortness of breath.² The infection manifests neurological symptoms such as migraine, reduced sense of smell, hypogeusia, and, in rare cases, central and fringe apprehensive framework inclusion, which includes Bell's palsy.³ The COVID-19 vaccine is one of the methods used to combat the COVID-19 pandemic. More than 20 types of COVID-19 vaccinations are available worldwide, and BPOM has licensed 10 for emergency use in Indonesia. The inactivated virus vaccine (Sinovac-CoronaVac), the recombinant adenovirus vector vaccine ChAdOx1-S/nCoV-19 (AstraZeneca), the mRNA-1273 (Moderna) vaccine, and the BNT162b2mRNA vaccine (Pfizer-BioNTech) are the ones that are used the most. Public concerns about the possible side effects of the COVID-19 vaccine are still high enough.

An unwanted event happened when the product information for two vaccines developed using mRNA vaccine technology included a clinical trial of acute facial nerve paralysis or Bell's palsy.⁴ Bell's palsy was first named by Charles Chime, a Scottish anatomist. The main characteristic of Bell's palsy is an intense, one-sided, partial, or complete loss of facial nerve function resulting from a total or fragmented inability to move the muscles on one side of the face intentionally. This deformity is caused by edema and aggravation of nerve VII when it enters the bone, particularly the maze region, which can cause weight on the nerve and disturbance of the blood flow, resulting in temporary or permanent nerve harm.⁵

Several previous studies have indicated the possibility of developing Bell's palsy after influenza vaccination. Researchers have revealed a significant association between Bell's palsy and intranasal inactivated flu vaccination, parenteral flu vaccination, and widespread flu H1N1 vaccination, despite the questionable results.⁶ In the *Lancet Infectious Disease*, Eric Wan *et al.* showed that vaccination with the inactivated virus vaccine (Sinovac-CoronaVac) enhances the overall risk of Bell's palsy.⁷ In addition to the mRNA-type vaccine and inactivated virus, there were reports of acute facial neural paralysis following administration of the recombinant vaccine.^{7,8,9} So far, there is no clear evidence of a link between the COVID-19 vaccination and facial paralysis. This case report discussed patients who allegedly developed Bell's palsy due to the COVID-19 type of the inactivated virus vaccine, as well as additional insights into the general prevalence of COVID-19 vaccinations associated with Bell's palsy. The rate ratio is 25.3 per

1,000,000. However, among a large number of vaccinated people worldwide, only a small number of cases reported this condition. The benefits of vaccination far outweigh the potential risks.

CASE

A 34-year-old woman complained that for three days she had been unable to close her right eyelid, and that her lips were drooping to the left. The patient also stated that water spilled from the right side of her mouth while she was drinking. The patient denied having double vision, ear pain, skin lensing, and weakness in other limbs. The patient received her first dose of the COVID-19 type of inactivated virus vaccine (CoronaVac) 3 days before symptoms appeared. The patient denied having a history of type 2 diabetes, hypertension, or any other recent symptoms, including fever and diarrhea.

Obesity was detected during the general physical examination; however, the vital signs were within normal limits. Neurological examinations showed lagophthalmus dextra and LMN-dextra phasial nerve paralysis, but no paralysis of the extremities. [Figure 1](#) illustrates the patient's clinical symptoms. A clinical diagnosis of Bell's palsy was made, and the patient was prescribed corticosteroids. After the first two weeks of therapy, the patient started to feel better.



Figure 1. Patient's clinical symptoms: LMN left-hand paresis of the fascial nerve

DISCUSSION

Bell's palsy is an acute unilateral facial peripheral nerve disorder caused by an unknown reason. Bell's palsy affects the entire population, with a prevalence

of 11.5–53.3 per 100,000 individuals annually. Several factors, including anatomical structural abnormalities, viral infections, ischemia, inflammation, and cold-temperature stimulation responses, can cause Bell's palsy. Bell's palsy is strongly associated with the reactivation of viral infections, including HSV-1 and VZV. HSV-1 infection leads to neural dysfunction through axonal degradation and apoptosis. The inflammatory factor is also one of Bell's palsy's etiologies.¹⁰ On the histological picture, there was infiltration of inflammatory cells in the nerve area of the meatus acoustic internus, and there were also macrophages on the myelin cover. The inflammatory mechanisms of Bell's palsy are similar to those of Guillain-Barré's syndrome.¹¹

Bell's palsy on the mRNA vaccine

Global usage has been made of COVID-19 mRNA vaccines, including Moderna and Pfizer-BioNTech. During the clinical trial phase of the two vaccines, there were seven cases of facial nerve paralysis reported from 35,000 vaccine recipients.⁷ Bell's palsy developed in four people who received the Pfizer-BioNTech vaccine and three who received the Moderna vaccine, marking it as an unwanted occurrence. As a result, the Food and Drug Administration (FDA) and the United States Centers for Disease Control and Prevention (CDC) recommend monitoring the symptoms of facial nerve paralysis following the administration of the COVID-19 vaccine, as they have done with the influenza vaccine in the past.⁴ Acute facial nerve paralysis was also a rare unwanted occurrence of the Pfizer-BioNTech and Moderna vaccines, according to the European Medicines Agency.⁷ In a controlled case study of 37 patients with acute facial nerve paralysis in Israel, there was no significant association with the Pfizer-BioNTech vaccine.¹²

Bell's Palsy on an inactivated virus vaccine

The Chinese Ministry of Health has carried out passive surveys from the beginning of the vaccination campaign until May 4, 2021. Bell's palsy cases were reported in 28 patients following the CoronaVac vaccination and in 16 patients after the Pfizer-BioNTech vaccination. Based on clinical analysis, the incidence rate of Bell's palsy was 3.61 cases per 100,000 doses for the CoronaVac vaccine (95% CI 2.40–5.21) and 2.04 cases per 100,000 doses for the Pfizer-BioNTech vaccine (1.16–3.31 CI 95). Bell's palsy was diagnosed post-vaccination in 68% cases, with 89% occurring 21 days after vaccination. Bell's post-vaccine palsy patients were 47.5 years old on average (IQR 41.8–55.0). Post-vaccination palsy was

diagnosed in 50% of patients, with all cases occurring 21 days after vaccination. Fifty percent of patients develop left facial paralysis.⁷

Inactivated virus vaccines, the classic form of vaccination, protect against viral infection by inducing specific T cells and neutralizing antibody responses. An autoimmune process is believed to trigger Bell's palsy, either through vaccinal antigen mimicking host molecules or bystander activation of dormant autoreactive T cells. Other potential mechanisms include the reactivation of latent herpes simplex type 1 infections in the geniculate ganglia of facial nerves.⁷

According to another case report from China, two days after receiving the first dose of the inactivated Sinovac virus vaccine, a woman with a history of Bell's palsy experienced a recurrence.¹³ In India, a 50-year-old man had Bell's palsy three weeks after taking the second dose of the Coronavax vaccine, which belongs to the category of inactivated virus vaccines.¹⁵ In this case report, the patient claimed that symptoms started to show up three days after receiving the first dose of the COVID-19 vaccine.

Bell's Palsy on recombinant adenovirus vector vaccine

Case reports are currently the only studies of Bell's palsy post-combination adenovirus vector vaccine. Veisi *et al.* discovered a case of facial nerve paralysis in a patient in Iran, which occurred two days after receiving the AstraZeneca vaccine.⁸ Two patients in South Korea developed Bell's post-vaccine palsy within 3–4 days after getting the vaccination.⁹ Furthermore, apart from the AstraZeneca vaccination, there was a reported case of acute neurological palsy in a 62-year-old woman in Japan, which occurred 20 days after receiving the Janssen Ad26.COVID-19 vaccine. The Ad26.COVID-19 vaccine clinical trial phase has reported three cases of Bell's palsy; however, the placebo subject showed no significant changes, and the evidence to establish a causal relationship between the two is weak.¹⁰

Pathomechanism

The mechanisms of acute facial nerve paralysis after the COVID-19 vaccination are still unclear. It's supposed to be an autoimmune mechanism involving post-vaccination interferon.¹⁴ Facial nerve paralysis post-vaccination has been quite common. The incidence rate was 0.53% in 2009 and decreased to 0.23% in 2018. The influenza vaccine is the most common vaccine that causes facial nerve paralysis, accounting for 17.3% of cases. It was followed by the varicella vaccine (9.1%), and the human papilloma virus/HPV vaccination

(4.9%).¹⁵ According to other reports, the prevalence of Bell's palsy increased among patients who received inactive intranasal influenza vaccination between 2000 and 2001. The vaccine contains heat-sensitive E. coli toxins as a mucous adjuvant, which undergoes retrograde neuronal uptake. There's a fascial nerve interaction with toxins that are susceptible to heat.¹⁶

One theory suggests that vaccinations are linked to autoimmune disorders through host molecular mimicry mechanisms with vaccine antigens or by activating dormant autoreactive T cells. But the theory doesn't last. The COVID-19 vaccine doesn't contain exogenous adjuvants. The vaccine's sponsors (Pfizer) and the FDA's Vaccines and Related Biological Products Advisory Committee have both said that the vaccine might be able to activate the immune system through a combination of mRNA and lipid effects, including interferon production. Temporary interferon production is a hypothesis that applies to some reports of Bell's palsy and the COVID-19 vaccine, especially the mRNA type.¹⁶ Furthermore, it's important to note that research has already linked the flu antibody to a higher incidence of Bell's palsy. Researchers believed that the reactivation of idle HSV-1 within the geniculate ganglion of the facial nerve was the cause, leading to nerve irritation.¹² The vaccine's mRNA and lipids may activate intrinsic resistance, triggering the union of interferons and potentially damaging the myelin sheath.¹⁷

Given that the majority of detailed cases of Bell's palsy following COVID-19 vaccination either show differences in the time of onset or the severity of the displayed indications, it is safe to assume that multiple factors may simultaneously cause the pathophysiology of such a phenomenon, which may vary from individual to individual.¹⁸

Aside from having received the COVID-19 vaccine, this patient had no risk factors, previous infection history, or any supportive factors in this case report.

The risk of having COVID-19 infection vs Bell's Palsy

Any adverse effects of vaccination must be investigated, and in clinical practice, the possibility of disorders cannot be ignored in. Linking associated signs and symptoms to the COVID-19 vaccination history may ensure rapid diagnosis and early management of facial paralysis. However, considering that a COVID-19 infection carries a higher risk of developing a more serious medical condition than side effects from the COVID-19 vaccine, we should still opt for the vaccine.

Fortunately, a larger sample size that could accurately reflect the population revealed that facial

paralysis is a temporary disorder with an extremely low incidence. After receiving proper care, the majority of patients recover fully; thus, we advise patients to finish their vaccines as soon as their condition has improved.¹⁹

Early treatment

The French ENT guidelines recommend reporting cases of acute facial nerve paralysis or subacute post-vaccination COVID-19 to the authorities. Bell's palsy is an exclusion diagnosis, necessitating a standard physical examination and support to rule out the diagnosis. The treatment for Bell's palsy post-vaccination is the same as for the idiopathic Bell's palsy, with high doses of corticosteroids (1-2 mg/kgBB/day) for 8–10, followed by antiviral valacyclovir (3 g/day) for 7 days.¹⁸ In immunosuppressant doses of corticosteroids (Prednisone 10 mg/day for >2 weeks), the administration of a live vaccine is contraindicated. Patients on long-term corticosteroids who received the mRNA-type COVID-19 vaccine (Comirnaty and Pfizer-BioNTech) showed a reduced vaccine response. In different studies, the ChAdOx1-nCoV-19 adenovirus vector antibody (Vaxzevria, Oxford-AstraZeneca) was less effective in people who were taking short-term, low-dose corticosteroids. It is suggested that a serological examination must be done to measure the amount of antispike IgG in patients who are taking corticosteroid treatment at 260 BAU/mL. This level is thought to be adequate for the inoculation reaction. Re-monitoring is suggested when the understanding is still in an immunosuppressive condition.²⁰

CONCLUSION

This report is expected to increase the vaccinators' and doctors' awareness of the risk of Bell's palsy post-vaccination. The majority of Bell's palsy post-vaccine cases were caused by the mRNA vaccine.

The overall study concludes that the COVID-19 vaccine offers greater benefits and protective effects than its risks. Vaccinators are expected to be able to educate vaccine recipients about the possible side effects of post-vaccination facial nerve paralysis from COVID-19 vaccine. As the result, patients can get better treatment faster and have a better prognosis. Further studies are needed to find even better associations between the incidence of Bell's palsy and a history of COVID-19 vaccination

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Conflict of Interest

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Author Contributions

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