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Research article

Bell's palsy after inactivated COVID-19 vaccination in an adolescent: A case report

Manunya Tandhansakul[1]*, Naruporn Kasemlawan[1], Tanawat Petrutchatachart[2]

[1]Department of Pediatrics, Chulabhorn Hospital, Chulabhorn Royal Academy
[2]Department of Rehabilitation Medicine, Chulabhorn Hospital, Chulabhorn Royal Academy

*Corresponding author, e-mail: manunya.tan@cra.ac.th

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Abstract

Bell's palsy has been reported following COVID-19 vaccination in adults. Here, we report a case of an adolescent male with unilateral peripheral facial palsy after receiving the BBIBP-CorV vaccine. An electrodiagnostic study confirmed the diagnosis. The patient made a complete recovery after medical and rehabilitation treatment. **Objectives:** This is the first case report of Bell's palsy following the administration of an inactivated COVID-19 vaccine in an adolescent. **Study design:** A case report. **Setting:** Chulabhorn Hospital, Lak Si, Bangkok, Thailand. **Subject:** An adolescent male with unilateral peripheral facial palsy after receiving the BBIBP-CorV vaccine. **Methods:** We reviewed the patient's medical record and electrodiagnostic report. **Results:** A 14-year-old, previously healthy, adolescent male received his 1st dose of inactivated BBIBP-CorV (Sinopharm) COVID-19 vaccine. Five days later, he developed right peripheral facial palsy. He was diagnosed with Bell's palsy. Clinical signs and symptoms combined with initial and follow-up electrodiagnostic studies confirmed the diagnosis. He was treated for 5 days with oral prednisolone and vitamin B-complex. He received eye care with artificial tears and underwent a rehabilitation program using the bio-stimulation mode of high-power laser therapy (MLS®) combined with standard physiotherapy. Conclusions: Bell's palsy might be an adverse event associated with the inactivated BBIBP-CorV COVID-19 vaccine in adolescents.

Keywords: Bell's palsy, Facial palsy, COVID-19, BBIBP-CorV, Inactivated vaccine, High power laser therapy

Introduction

Bell's palsy is an idiopathic facial nerve palsy that occurs in 20–30 cases per 100,000 people with the highest incidence among adolescents and the elderly.[1] Between the ages of 10–20 years, the incidence is approximately 10 cases per 100,000 people.[2] A diagnosis is typically made on the basis of a consistent history of rapid onset and unilateral peripheral facial palsy by physical examination. Further investigations are rarely needed unless there are suggestions of other medical etiologies.[1,3,4] Electrodiagnostic studies are also used to predict the prognosis and are optimal when performed within 2 weeks after the onset of palsy. The best indicators for a good prognosis are a side-to-side determination of the compound muscle action potential (CMAP) and a percentage of facial nerve fiber degeneration that does not exceed 90%.[5] Bell's palsy is a self-limiting condition with a favorable prognosis. Treatment with oral corticosteroids is strongly

recommended within 72 hours of onset as previous evidence showed significant improvements in facial weakness.[1,4] Despite this, the evidence supporting corticosteroid treatment of children is still controversial.[6-8] Although viral infection by herpes simplex virus-1 or Epstein Barr virus is thought to be involved in the etiology, the underlying mechanism of Bell's palsy remains unknown.[2,4] However, Bell's palsy is commonly found following vaccination, especially with the influenza vaccine.[9,10]

The recent coronavirus disease 2019 (COVID-19) pandemic has had detrimental impacts on healthcare systems, global economics, and mental health. COVID-19 vaccines have become a major role in controlling this pandemic. The aim of vaccination is to decrease the risk of infection, spreading the virus, and reducing the chance of developing severe disease and serious complications. Various adverse events have been reported following vaccination. A study in Hong Kong between February 23 and May 4 2021 reported an overall increased risk for Bell's palsy after inactivated (CoronaVac) vaccination but not after mRNA (BNT162b2) vaccination.[11] The incidences of Bell's palsy following CoronaVac and BNT162b2 vaccination were 3.61 per 100,000 doses and 2.04 per 100,000 doses, respectively.[11] Currently, the mRNA vaccine is the recommended vaccine for adolescents. The inactivated COVID-19 vaccine has only been used in particular countries. In Thailand, researchers from Chulabhorn Royal Academy conducted a clinical trial of inactivated the BBIBP-CorV (Sinopharm) COVID-19 vaccine in an adolescent population aged 12–17 years.[12] They studied the incidence rate, risk factors, and safety profile after receiving the vaccine. Here, we report the case of an adolescent male who developed unilateral peripheral facial palsy after the 1st dose of BBIBP-CorV.

Case presentation

On 28 September 2021, a 14-year-old, previously healthy, adolescent male received his 1st dose of inactivated BBIBP-CorV (Sinopharm) COVID-19 vaccine. Five days later, he was unable to close his right eye completely. On 11 October 2021, he developed a right facial droop, drooling, and worsening of his ability to close his right eye. On that day, his father brought him to the pediatric department. His physical examination demonstrated his inability to raise his right eyebrow, right ptosis, loss of the right nasolabial fold, and numbness of the anterior two-thirds of the tongue, all compatible with right peripheral facial palsy (Figure 1). His pupillary reflex and other cranial nerve functions were intact. His neurological examination was otherwise unremarkable. He had no pre-existing medical condition or history of reaction to vaccines and was diagnosed with Bell's palsy. He was treated for 5 days with oral prednisolone, vitamin B-complex, and eye care with artificial tears. Additionally, he was sent to a physiatrist and scheduled for an electrodiagnostic investigation. Apart from the electrodiagnostic test, the patient received no further investigation.

Electrodiagnostic study and rehabilitation program

The initial nerve conduction study (NCS) and electromyography (EMG) were performed 13 days after the onset of symptoms. During the facial nerve stimulation, the active recording device was placed on the skin over the right nasalis muscle, the reference electrode was placed over the contralateral nasalis muscle, and the surface ground electrode was placed over his chin.[13] The physiatrist then applied a handheld bipolar device to stimulate the right facial nerve directly anterior to the tragus. The CMAP side-to-side determination NCS demonstrated 37% facial nerve degeneration (Figure 3A). A needle EMG was performed to examine the posterior auricular, frontalis, orbicularis oculi, zygomaticus, and orbicularis oris muscles.[14] A positive sharp wave and fibrillation potentials, as well as voluntary motor units, were observed in all five muscles tested (Figure 2). The conclusion was incomplete right facial nerve degeneration (axonopathy), all of which are indicative of a very good prognosis in recovery.

The rehabilitation program consisted of the biostimulation mode of high-power laser therapy (MLS®) along the right facial nerve and its branches combined with standard physiotherapy, including home electrical stimulation (ES), facial expressive exercise, and facial massage. The patient was scheduled for 10 weekly laser therapy sessions.

The proper location for home ES in this patient was just anterior to the right tragus, in which a compound action of the right facial expressive muscles was observed. During the treatment, this rehabilitation program provided a satisfying outcome. The patient reported that the numbness of the anterior two-thirds of the tongue had resolved before the 2nd high-power laser treatment session. After the 6th session, the patient reported the partial recovery of the right peripheral facial palsy. He finally reported complete recovery by the end of the 10th session (Figure 4). The physiatrist performed a follow-up electrodiagnostic study at the 6th and 10th visits. The percentages of degeneration after the 6th and 10th sessions decreased to 27% and 7%, respectively (Figure 3B and 3C). The patient was closely monitored for facial synkinesis, which did not occur throughout the treatment period.

Discussion

Although the underlying mechanism for Bell's palsy is not well-established, the occurrence of this condition after vaccination is not uncommon. In particular, Bell's palsy has been reported as an adverse event following vaccination, most often the influenza vaccine.[15] However, evidence for the increased risk of Bell's palsy varies among studies. Some studies demonstrated no evidence of increased risk in adult and pediatric populations.[9,16] Following the use of the newly developed inactivated and mRNA COVID-19 vaccines, Bell's palsy has been widely reported in adult populations older than 18 years of age.[11,17]

In this study, we reported the case of an adolescent male aged 14 years who developed unilateral peripheral facial paralysis approximately 1 week after the 1st dose of inactivated BBIBP-CorV vaccine. The patient had no history of potential precipitating factors of Bell's palsy. His neurological examination, besides unilateral peripheral facial palsy, was normal. In this patient, Although Bell's palsy might not have had much effect on his function, it might have affected his looks and self-confidence. Because Bell's palsy might have developed after receiving the inactivated vaccine, we concluded that this patient's condition was a potential adverse event of the inactivated BBIBP-CorV vaccine. The age of this patient was also compatible with the common age group described in a previous study.[1,2] Although the benefit of oral corticosteroids is still controversial for pediatric cases[6,8], we decided to prescribe a short course of prednisolone to our patient along with standard eye care. In addition, we suggested a facial rehabilitation program. After 10 weeks of medical and rehabilitation treatment, the patient had completely recovered from the facial paralysis. This excellent outcome was comparable with the natural history of the disease in conjunction with the positive indicator from the electrodiagnostic study. A percentage of muscle degeneration less than 50% and the detection of motor units in at least 4 out of 5 tested muscles indicate a satisfying return of function in most patients.[14] Both of these were observed in our case, even though the EMG was performed 13 days later instead of the recommended 72 hours after the onset. This rapid recovery might have been associated with the rehabilitation treatment because laser therapy can enhance nerve regeneration and decrease the post-traumatic retrograde degeneration of neurons.[18,19] In addition, the biostimulatory effects of the laser promote spontaneous regenerative and anti-inflammatory cellular activities.[20]

This is the first case report of Bell's palsy following the inactivated COVID-19 vaccination of an adolescent. The diagnosis was confirmed by clinical signs and symptoms combined with initial and follow-up electrodiagnostic studies. However, there were some limitations regarding the participant in our primary clinical trial regarding their representation of the general adolescent population. They voluntarily registered in the study and were generally in good health. This reported patient was also in the common age group for developing Bell's palsy. Thus, additional data on the risk of developing Bell's palsy following the inactivated vaccination of adolescents and younger children might be necessary, particularly if there is further implementation of inactivated COVID-19 vaccines for children and adolescents. Eventually, the potential benefits and risks of inactivated COVID-19 vaccines should be considered for pediatric patients.

Conclusion

We concluded that Bell's palsy might be an adverse event associated with the inactivated BBIBP-CorV (Sinopharm) COVID-19 vaccination of an adolescent. To the best of our knowledge, this is the first case report in the English literature of Bell's palsy in an adolescent.

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Publication Ethics

Written informed consent was obtained from the patient's parents for the publication of this case report and accompanying images.

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Figure 1. A 14-year-old adolescent with right peripheral facial palsy 13 days after the 1st dose of the BBIBP-CorV (Sinopharm) COVID-19 vaccine.

Muscle	Insertion Activity	Spontaneous Activity					Voluntary Activity				
		Fib	PSW	Fasc	CRD	H.F.	Amp (uV)	Dur	Morphology	Recruit	Notes
Right Orbicularis oculi	Increased	0	2+	0	0	0	Normal	Normal	Triphasic	Discrete	
Right Frontalis	Increased	2+	2+	0	0	0	Normal	Normal	Triphasic	Reduced	
Right Orbicularis oris	Increased	0	2+	0	0	1+	Normal	Increased	Complex	Reduced	
Right Zygomaticus	Increased	1+	1+	0	0	0	Normal	Increased	Complex	Discrete	
Right Post auricular	Increased	0	2+	0	0	0	Normal	Normal	Triphasic	-	

Figure 2. Results of electromyography conducted in five facial muscles.

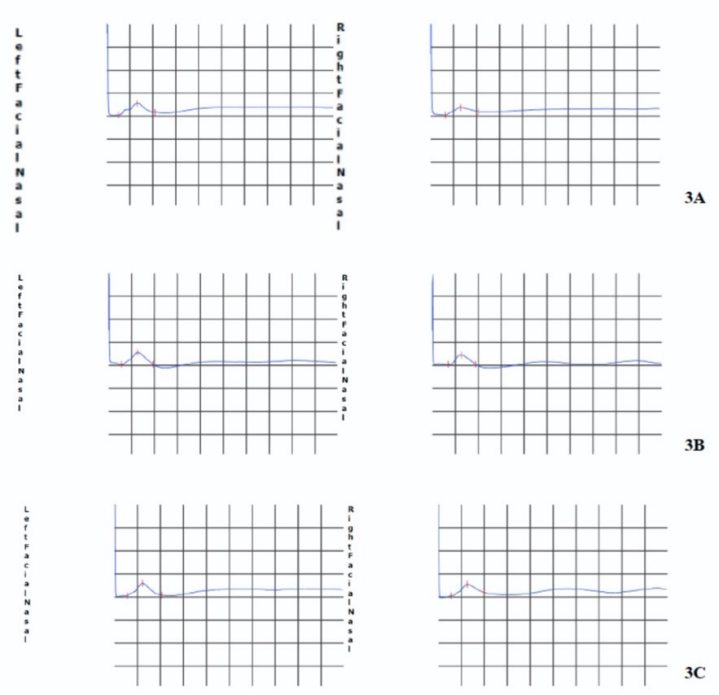

Figure 3. Results from the nerve conduction study (NCV). (A) The initial study showed 37% degeneration of the right facial nerve, (B) 27% facial nerve degeneration after the 6th session of laser therapy, (C) and 7% facial nerve degeneration after the 10th session.

Figure 4. Complete recovery from right peripheral facial palsy in this patient.