

World Journal of *Clinical Cases*

World J Clin Cases 2022 November 26; 10(33): 12066-12461



MINIREVIEWS

- 12066** Review of risk factors, clinical manifestations, rapid diagnosis, and emergency treatment of neonatal perioperative pneumothorax
Zhang X, Zhang N, Ren YY

ORIGINAL ARTICLE**Clinical and Translational Research**

- 12077** Integrative analysis of platelet-related genes for the prognosis of esophageal cancer
Du QC, Wang XY, Hu CK, Zhou L, Fu Z, Liu S, Wang J, Ma YY, Liu MY, Yu H
- 12089** Comprehensive analysis of the relationship between cuproptosis-related genes and esophageal cancer prognosis
Xu H, Du QC, Wang XY, Zhou L, Wang J, Ma YY, Liu MY, Yu H
- 12104** Molecular mechanisms of Baihedihuang decoction as a treatment for breast cancer related anxiety: A network pharmacology and molecular docking study
Li ZH, Yang GH, Wang F
- 12116** Single-cell RNA-sequencing combined with bulk RNA-sequencing analysis of peripheral blood reveals the characteristics and key immune cell genes of ulcerative colitis
Dai YC, Qiao D, Fang CY, Chen QQ, Que RY, Xiao TG, Zheng L, Wang LJ, Zhang YL

Retrospective Study

- 12136** Diagnosis and treatment of tubal endometriosis in women undergoing laparoscopy: A case series from a single hospital
Jiao HN, Song W, Feng WW, Liu H
- 12146** Different positive end expiratory pressure and tidal volume controls on lung protection and inflammatory factors during surgical anesthesia
Wang Y, Yang Y, Wang DM, Li J, Bao QT, Wang BB, Zhu SJ, Zou L
- 12156** Transarterial chemoembolization combined with radiofrequency ablation in the treatment of large hepatocellular carcinoma with stage C
Sun SS, Li WD, Chen JL
- 12164** Coexistence of anaplastic lymphoma kinase rearrangement in lung adenocarcinoma harbouring epidermal growth factor receptor mutation: A single-center study
Zhong WX, Wei XF

Observational Study

- 12175** Prognostic values of optic nerve sheath diameter for comatose patients with acute stroke: An observational study
Zhu S, Cheng C, Wang LL, Zhao DJ, Zhao YL, Liu XZ
- 12184** Quality of care in patients with inflammatory bowel disease from a public health center in Brazil
Takamune DM, Cury GSA, Ferrás G, Herrerias GSP, Rivera A, Barros JR, Baima JP, Saad-Hossne R, Sasaki LY
- 12200** Comparison of the prevalence of sarcopenia in geriatric patients in Xining based on three different diagnostic criteria
Pan SQ, Li XF, Luo MQ, Li YM

Prospective Study

- 12208** Predictors of bowel damage in the long-term progression of Crohn's disease
Fernández-Clotet A, Panés J, Ricart E, Castro-Poceiro J, Masamunt MC, Rodríguez S, Caballol B, Ordás I, Rimola J

Randomized Controlled Trial

- 12221** Protective effect of recombinant human brain natriuretic peptide against contrast-induced nephropathy in elderly acute myocardial infarction patients: A randomized controlled trial
Zhang YJ, Yin L, Li J

META-ANALYSIS

- 12230** Prognostic role of pretreatment serum ferritin concentration in lung cancer patients: A meta-analysis
Gao Y, Ge JT

CASE REPORT

- 12240** Non-surgical management of dens invaginatus type IIIB in maxillary lateral incisor with three root canals and 6-year follow-up: A case report and review of literature
Arora S, Gill GS, Saquib SA, Saluja P, Baba SM, Khateeb SU, Abdulla AM, Bavabeedu SS, Ali ABM, Elagib MFA
- 12247** Unusual presentation of Loeys-Dietz syndrome: A case report of clinical findings and treatment challenges
Azrad-Daniel S, Cupa-Galvan C, Farca-Soffer S, Perez-Zincer F, Lopez-Acosta ME
- 12257** Peroral endoscopic myotomy assisted with an elastic ring for achalasia with obvious submucosal fibrosis: A case report
Wang BH, Li RY
- 12261** Subclavian brachial plexus metastasis from breast cancer: A case report
Zeng Z, Lin N, Sun LT, Chen CX
- 12268** Case mistaken for leukemia after mRNA COVID-19 vaccine administration: A case report
Lee SB, Park CY, Park SG, Lee HJ
- 12278** Orthodontic-surgical treatment of an Angle Class II malocclusion patient with mandibular hypoplasia and missing maxillary first molars: A case report
Li GF, Zhang CX, Wen J, Huang ZW, Li H

- 12289** Multiple cranial nerve palsies with small angle exotropia following COVID-19 mRNA vaccination in an adolescent: A case report
Lee H, Byun JC, Kim WJ, Chang MC, Kim S
- 12295** Surgical and nutritional interventions for endometrial receptivity: A case report and review of literature
Hernández-Melchor D, Palafox-Gómez C, Madrazo I, Ortiz G, Padilla-Viveros A, López-Bayghen E
- 12305** Conversion therapy for advanced penile cancer with tislelizumab combined with chemotherapy: A case report and review of literature
Long XY, Zhang S, Tang LS, Li X, Liu JY
- 12313** Endoscopic magnetic compression stricturoplasty for congenital esophageal stenosis: A case report
Liu SQ, Lv Y, Luo RX
- 12319** Novel *hydroxymethylbilane synthase* gene mutation identified and confirmed in a woman with acute intermittent porphyria: A case report
Zhou YQ, Wang XQ, Jiang J, Huang SL, Dai ZJ, Kong QQ
- 12328** Modified fixation for periprosthetic supracondylar femur fractures: Two case reports and review of the literature
Li QW, Wu B, Chen B
- 12337** Erbium-doped yttrium aluminum garnet laser and advanced platelet-rich fibrin+ in periodontal diseases: Two case reports and review of the literature
Tan KS
- 12345** Segmental artery injury during transforaminal percutaneous endoscopic lumbar discectomy: Two case reports
Cho WJ, Kim KW, Park HY, Kim BH, Lee JS
- 12352** Pacemaker electrode rupture causes recurrent syncope: A case report
Zhu XY, Tang XH, Huang WY
- 12358** Hybrid intercalated duct lesion of the parotid: A case report
Stankevicius D, Petroska D, Zaleckas L, Kutanovaite O
- 12365** Clinical features and prognosis of multiple myeloma and orbital extramedullary disease: Seven cases report and review of literature
Hu WL, Song JY, Li X, Pei XJ, Zhang JJ, Shen M, Tang R, Pan ZY, Huang ZX
- 12375** Colon mucosal injury caused by water jet malfunction during a screening colonoscopy: A case report
Patel P, Chen CH
- 12380** Primary malignant pericardial mesothelioma with difficult antemortem diagnosis: A case report
Oka N, Orita Y, Oshita C, Nakayama H, Teragawa H
- 12388** Typical imaging manifestation of neuronal intranuclear inclusion disease in a man with unsteady gait: A case report
Gao X, Shao ZD, Zhu L

- 12395** Multimodality imaging and treatment of paranasal sinuses nuclear protein in testis carcinoma: A case report
Huang WP, Gao G, Qiu YK, Yang Q, Song LL, Chen Z, Gao JB, Kang L
- 12404** T1 rectal mucinous adenocarcinoma with bilateral enlarged lateral lymph nodes and unilateral metastasis: A case report
Liu XW, Zhou B, Wu XY, Yu WB, Zhu RF
- 12410** Influence of enhancing dynamic scapular recognition on shoulder disability, and pain in diabetics with frozen shoulder: A case report
Mohamed AA
- 12416** Acute myocardial necrosis caused by aconitine poisoning: A case report
Liao YP, Shen LH, Cai LH, Chen J, Shao HQ
- 12422** Danggui Sini decoction treatment of refractory allergic cutaneous vasculitis: A case report
Chen XY, Wu ZM, Wang R, Cao YH, Tao YL
- 12430** Phlegmonous gastritis after biloma drainage: A case report and review of the literature
Yang KC, Kuo HY, Kang JW
- 12440** Novel *TINF2* gene mutation in dyskeratosis congenita with extremely short telomeres: A case report
Picos-Cárdenas VJ, Beltrán-Ontiveros SA, Cruz-Ramos JA, Contreras-Gutiérrez JA, Arámbula-Meraz E, Angulo-Rojo C, Guadrón-Llanos AM, Leal-León EA, Cedano-Prieto DM, Meza-Espinoza JP
- 12447** Synchronous early gastric and intestinal mucosa-associated lymphoid tissue lymphoma in a *Helicobacter pylori*-negative patient: A case report
Lu SN, Huang C, Li LL, Di LJ, Yao J, Tuo BG, Xie R

LETTER TO THE EDITOR

- 12455** Diagnostic value of metagenomics next-generation sequencing technology in disseminated strongyloidiasis
Song P, Li X
- 12458** Diagnostic value of imaging examination in autoimmune pancreatitis
Wang F, Peng Y, Xiao B

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Cornelia Bala, MD, PhD, Professor, Department of Diabetes and Nutrition Diseases, "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca 400006, Romania. cbala@umfcluj.ro

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for *WJCC* as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The *WJCC*'s CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Ying-Yi Yuan*; Production Department Director: *Xiang Li*; Editorial Office Director: *Jin-Lei Wang*.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

November 26, 2022

COPYRIGHT

© 2022 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Multiple cranial nerve palsies with small angle exotropia following COVID-19 mRNA vaccination in an adolescent: A case report

Heejin Lee, Jun Chul Byun, Won Jae Kim, Min Cheol Chang, Saeyoon Kim

Specialty type: Pediatrics

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0

Grade B (Very good): B

Grade C (Good): 0

Grade D (Fair): 0

Grade E (Poor): 0

P-Reviewer: Freund O

Received: June 30, 2022

Peer-review started: June 30, 2022

First decision: August 1, 2022

Revised: August 8, 2022

Accepted: October 27, 2022

Article in press: October 27, 2022

Published online: November 26, 2022



Heejin Lee, Department of Pediatrics, Yeungnam University Medical Center, Daegu 42415, South Korea

Jun Chul Byun, Department of Pediatrics, Dongsan Hospital, Keimyung University School of Medicine, Daegu 42601, South Korea

Won Jae Kim, Department of Ophthalmology, Yeungnam University Medical Center, Yeungnam University College of Medicine, Daegu 42415, South Korea

Min Cheol Chang, Department of Physical Medicine and Rehabilitation, Yeungnam University Medical Center, Yeungnam University College of Medicine, Daegu 42415, South Korea

Saeyoon Kim, Department of Pediatrics, Yeungnam University Medical Center, Yeungnam University College of Medicine, Daegu 42415, South Korea

Corresponding author: Saeyoon Kim, MD, PhD, Associate Professor, Department of Pediatrics, Yeungnam University Medical Center, Yeungnam University College of Medicine, 170 Hyeonchung-ro, Nam-gu, Daegu 42415, South Korea. sysnow88@hanmail.net

Abstract

BACKGROUND

Several vaccines against the severe acute respiratory syndrome coronavirus 2 have been approved and widely distributed, raising public concerns regarding the side effects of immunization, as the incidence of ease. Although many adverse events following the coronavirus disease 2019 (COVID-19) vaccine have been reported, neurological complications are relatively uncommon. Herein, we report a rare case of multiple cranial palsies following COVID-19 vaccination in an adolescent patient.

CASE SUMMARY

A previously healthy, 14-year-old Asian girl with facial palsy presented to the emergency department with inability to close the right eye or wrinkle right side of the forehead, and pain in the right cheek. She had received second dose of the COVID-19 mRNA vaccine (Pfizer-BioNTech) 18 days before onset of symptoms. She was diagnosed with Bell's palsy and prescribed a steroid (1 mg/kg/day methylprednisolone) based on symptoms and magnetic resonance imaging findings. However, the next day, all sense of taste was lost with inability to swallow solid food; the gag reflex was absent. Horizontal diplopia was also present. Due to worsening of her condition, she was given high-dose steroids (1

g/day methylprednisolone) for 3 days and then discharged with oral steroids. Improvement in the symptoms was noted 4 days post steroid treatment completion. At the most recent follow-up, her general condition was good with no symptoms except diplopia; ocular motility disturbances were noted. Hence, prism glasses were prescribed for diplopia relief.

CONCLUSION

Small-angle exotropia was observed in the facial, trigeminal, and glossopharyngeal nerve palsies, in our patient. The etiology of this adverse effect following vaccination was thought to be immunological.

Key Words: SARS-CoV-2; COVID-19; COVID-19 vaccine; Multiple cranial nerve palsies; Facial nerve palsy; Diplopia; Exotropia; Case report

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Novel mRNA coronavirus disease 2019 (COVID-19) vaccines have been developed against severe acute respiratory syndrome coronavirus 2. These vaccines are highly effective in preventing COVID-19; however, many side effects have been reported following vaccination. Neurological complications are relatively uncommon but have been reported variously. However, the occurrence of multiple cranial nerve (CN) palsy is rare. Based on our knowledge, this is the first pediatric case of multiple CN palsies following COVID-19 vaccination. Our case demonstrated facial, trigeminal, glossopharyngeal nerve palsies with small-angle exotropia were observed. The etiology of CN palsy following vaccination may be immunological.

Citation: Lee H, Byun JC, Kim WJ, Chang MC, Kim S. Multiple cranial nerve palsies with small angle exotropia following COVID-19 mRNA vaccination in an adolescent: A case report. *World J Clin Cases* 2022; 10(33): 12289-12294

URL: <https://www.wjgnet.com/2307-8960/full/v10/i33/12289.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v10.i33.12289>

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The global pandemic has continued since the first case was reported in December 2019, and to address this issue, several vaccines against this virus have been approved and widely distributed, raising public concerns regarding the side effects of immunization. Many adverse events following messenger RNA COVID-19 vaccines have been reported, although the underlying mechanism is not fully understood[1,2]. Neurological complications are relatively uncommon but have been reported variously[3-6]. Cranial nerve (CN) palsies after vaccination are rare, and only one case of multiple CN palsies has been reported. There is no standard treatment for CN palsies as a side effect of vaccination; however, the use of steroids for treatment of CN palsy is mentioned in the existing scientific literature[5-7]. To the best of our knowledge, this is the first pediatric case of multiple CN palsies following COVID-19 vaccination. In this case, small-angle exotropia was observed not only in the facial, but also in the trigeminal and glossopharyngeal nerve palsies. The timeline is shown in [Table 1](#).

CASE PRESENTATION

Chief complaints

A previously healthy, 14-year-old Asian girl with facial palsy presented to the emergency department.

History of present illness

She had received a second dose of the mRNA COVID-19 vaccine (Pfizer-BioNTech) 18 days before the onset of symptoms.

History of past illness

Prior to this event, the patient had no history of any illness. She had received routine childhood

Table 1 Timeline of the case

	Time	Event	Evaluation	Management
	-18 day	COVID-19 vaccination; Second dose		
ER visit, admission	0	Right facial nerve palsy	Brain MRI + CISS: Focal enhancement at Right IAC	Methylprednisolone 1 mg/kg/day
	1	Right trigeminal nerve palsy; Right glossopharyngeal nerve palsy; Small angle exotropia	Extraocular muscle examination: Small angle exotropia	Methylprednisolone 1000 mg/day for 3 days
Discharge	3			Steroid tapering
	7	Symptoms started to improve		
Frist, follow-up	13			
Last, follow-up	+2 mo	All symptoms had disappeared except diplopia	Extraocular muscle examination: Small angle exotropia (improved)	Prescription of prism glasses

COVID-19: Coronavirus disease 2019; ER: Emergency room; MRI: Magnetic resonance imaging; CISS: Constructive interference in the steady state; IAC: Internal acoustic canal.

immunization in Korea and had suffered no side effects.

Personal and family history

The patient had no relevant personal or family history.

Physical examination

There were no abnormal findings on the general physical examination. Neurological examination revealed that her right eyelid did not completely close, and the corner of her right mouth was drooping. An asymmetric wrinkle was observed on her right forehead, and tenderness was observed on her right face.

Laboratory examinations

Reverse transcriptase polymerase chain reaction for the detection of SARS-CoV-2 from nasopharyngeal swabs was negative, and routine blood tests, including inflammatory markers, revealed no abnormalities. There were no symptoms or signs of infection, and the inflammation markers (CRP, ESR) were normal, so no other virus tests were performed.

Imaging examinations

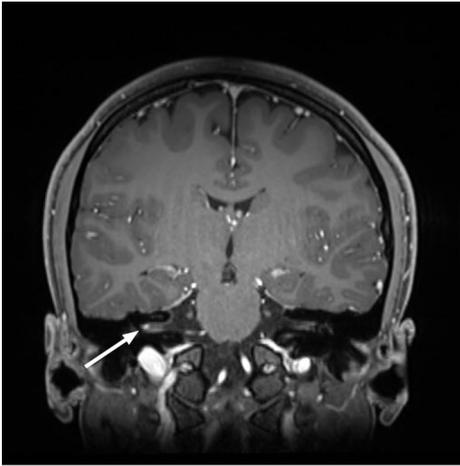
Brain magnetic resonance imaging (MRI) with constructive interference in the steady state was performed to assess the cranial nerves, and a focally enhancing lesion in the right internal acoustic canal was confirmed (Figure 1).

FINAL DIAGNOSIS

On the first day of admission, she was diagnosed with Bell's palsy based on the symptoms and MRI findings. However, the following day, trigeminal and glossopharyngeal nerve palsy were additionally confirmed with small-angle exotropia (Figure 2). Considering that there was no evidence of a specific infection and no suspicious history other than vaccination, the most probable etiology was immune-mediated neuropathy.

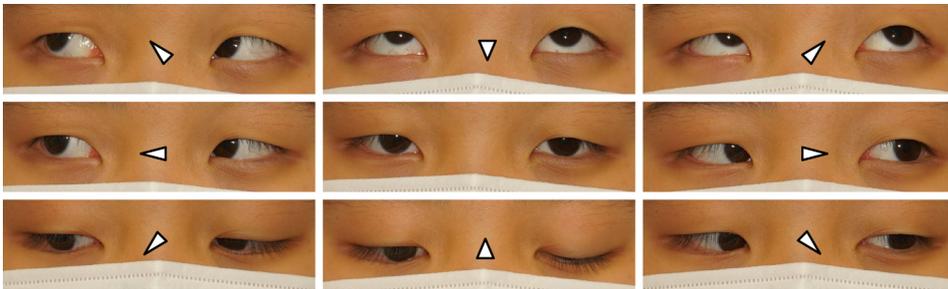
TREATMENT

The patient was diagnosed with Bell's palsy and received steroid administration (1 mg/kg/day methylprednisolone). However, this standard dose of steroid was ineffective and her condition worsened; therefore, she was given high-dose steroid administration (1 g/day methylprednisolone) for 3 days and was then discharged with oral steroids (with tapering from the high dose over 11 days).



DOI: 10.12998/wjcc.v10.i33.12289 Copyright ©The Author(s) 2022.

Figure 1 Brain magnetic resonance imaging. A focal enhancement revealed at right internal auditory canal (arrowed) in T1 weighted image.



DOI: 10.12998/wjcc.v10.i33.12289 Copyright ©The Author(s) 2022.

Figure 2 The extraocular muscle examination 4 prism diopters (PD) exotropia at distant and 8 PD exotropia at near fixation without definite adduction limitation were demonstrated.

OUTCOME AND FOLLOW-UP

The patient's symptoms improved 4 days post completion of the steroid course. At the most recent follow-up, her general condition was good, and all the symptoms (except diplopia) disappeared. Follow-up CN examination revealed no abnormal findings with an exception of an ocular motility disturbance; thus, prism glasses were prescribed for diplopia relief.

DISCUSSION

A novel mRNA COVID-19 vaccine has been developed against SARS-CoV-2, such as Pfizer-BioNTech and Moderna. mRNA induces an immune response against the spike protein present on the viral surface by producing copies of the fake spike protein, resulting in antibody production against this protein[1,7,8]. These vaccines are highly effective in preventing COVID-19; however, many side effects have been reported following vaccination. Local adverse reactions (such as pain and swelling) and systemic reactions (such as fatigue and headaches) are commonly reported[1,2]. Neurological complications are relatively uncommon but have been reported variously. Shafiq *et al*[3] reviewed 78 patients who experienced such side effects, and facial nerve palsy was the most common event. Other CN palsies have also been reported[4,5]. However, the occurrence of multiple cranial palsies is rare. To date, there has been only one case in which a 29-year-old male patient developed left oculomotor, abducens, trigeminal, and facial palsies 6 days after receiving the first dose of the Pfizer-BioNTech COVID-19 vaccine[6]. The neurological complications following other type of vaccines have also been reported. Cosby *et al*[9] reviewed immune-related vaccine adverse events by searching PubMed for articles published between January 1945 and August 2018 and reported neuromuscular phenomenon such as Guillain-Barré syndrome (GBS). Other Immunologically mediated neurological complications were also reported[10,11]. About cranial nerve palsies, there are several studies reporting CN palsies following other vaccines. According to US Vaccine Adverse Event reporting system, the most commonly reported vaccine was seasonal influenza vaccine, followed by Hemophilus influenzae type b and Human papillo-

mavirus vaccine[12,13].

To the best of our knowledge, this is the first pediatric case of multiple CN palsies following COVID-19 vaccination. Our case demonstrated facial, trigeminal, and glossopharyngeal nerve palsies. The etiology of CN palsy following vaccination is suspected to be immunological. Previous reports have suggested that the vaccine may damage the myelin sheaths and surrounding axons, causing demyelinating neuropathies such as Guillain-Barré syndrome (GBS), Bell's palsy, and acute disseminated encephalomyelitis[14]. In the present case, multiple CN palsies and small-angle exotropia were observed. The extraocular muscles are susceptible to neurotoxins because they have a higher ratio of nerve fibers to the extraocular muscle fibers (1:3 to 1:5) compared to that of other skeletal muscles (1:50 to 1:125)[9]. The ocular motility findings of our patient were similar to those of previous reports of exotropia and diplopia caused by snakebites or insect sting[15]. Immune-mediated toxin after vaccination may affect the neuromuscular junction of the extraocular muscles, which leads to exotropia and diplopia. In adults, cardiac complications such as myocarditis and cardiac dysfunction have been reported[16,17]. It is known that the disease course of COVID-19 in children is milder than in adults, but cardiac complications such as cardiogenic shock and myocardial dysfunction also have been[18-20]. Therefore, it is important to consider vaccination according to the patient's underlying disease and risk of complications.

CONCLUSION

This case highlights a rare adverse effect of the mRNA COVID-19 vaccine in children. Our patient developed multiple CN palsies with small angle exotropia and substantially recovered after a steroid treatment. The most suspected etiology is the vaccine-induced immune response. There are very few cases of side effects caused by COVID-19 vaccine in children. As the incidence of the COVID-19 pandemic continues to increase, more studies on the side effects of vaccination, especially in children, are crucial.

ACKNOWLEDGEMENTS

We would like to thank the patient for allowing us to share case information.

FOOTNOTES

Author contributions: Lee HJ and Byun JC contributed to manuscript writing, editing, and data collection. Kim WJ and Chang MC contributed to data analysis; Kim SY contributed to conceptualization and supervision; and all authors have read and approved the final manuscript.

Supported by 2015 Yeungnam University Research, Korea, No. 215A380222.

Informed consent statement: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no competing interests.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country/Territory of origin: South Korea

ORCID number: Heejin Lee 0000-0003-4363-2617; Jun Chul Byun 0000-0001-5600-6282; Won Jae Kim 0000-0001-8869-0349; Min Cheol Chang 0000-0002-7629-7213; Saeyoon Kim 0000-0002-2610-0574.

S-Editor: Ma YJ

L-Editor: A

P-Editor: Ma YJ

REFERENCES

- 1 **Anand P**, Stahel VP. Review the safety of Covid-19 mRNA vaccines: a review. *Patient Saf Surg* 2021; **15**: 20 [PMID: 33933145 DOI: 10.1186/s13037-021-00291-9]
- 2 **Xing K**, Tu XY, Liu M, Liang ZW, Chen JN, Li JJ, Jiang LG, Xing FQ, Jiang Y. Efficacy and safety of COVID-19 vaccines: a systematic review. *Zhongguo Dang Dai Er Ke Za Zhi* 2021; **23**: 221-228 [PMID: 33691913]
- 3 **Shafiq A**, Salameh MA, Laswi I, Mohammed I, Mhaimeed O, Mhaimeed N, Paul P, Mushannen M, Elshafeey A, Fares A, Holroyd S, Zakaria D. Neurological Immune-Related Adverse Events After COVID-19 Vaccination: A Systematic Review. *J Clin Pharmacol* 2022; **62**: 291-303 [PMID: 34921562 DOI: 10.1002/jcph.2017]
- 4 **Pawar N**, Ravindran M, Padmavathy S, Chakrabarty S. Acute abducens nerve palsy after COVID-19 vaccination in a young adult. *Indian J Ophthalmol* 2021; **69**: 3764-3766 [PMID: 34827043 DOI: 10.4103/ijo.IJO_1968_21]
- 5 **Kerbage A**, Haddad SF, Haddad F. Presumed oculomotor nerve palsy following COVID-19 vaccination. *SAGE Open Med Case Rep* 2022; **10**: 2050313X221074454 [PMID: 35251658 DOI: 10.1177/2050313X221074454]
- 6 **Manea MM**, Dragoş D, Enache I, Sirbu AG, Tuta S. Multiple cranial nerve palsies following COVID-19 vaccination-Case report. *Acta Neurol Scand* 2022; **145**: 257-259 [PMID: 34725821 DOI: 10.1111/ane.13548]
- 7 **Finsterer J**, Scorza FA, Scorza C, Fiorini A. COVID-19 associated cranial nerve neuropathy: A systematic review. *Bosn J Basic Med Sci* 2022; **22**: 39-45 [PMID: 34392827 DOI: 10.17305/bjbm.2021.6341]
- 8 **Chaudhary N**, Weissman D, Whitehead KA. mRNA vaccines for infectious diseases: principles, delivery and clinical translation. *Nat Rev Drug Discov* 2021; **20**: 817-838 [PMID: 34433919 DOI: 10.1038/s41573-021-00283-5]
- 9 **Stone CA Jr**, Rukasin CRF, Beachkofsky TM, Phillips EJ. Immune-mediated adverse reactions to vaccines. *Br J Clin Pharmacol* 2019; **85**: 2694-2706 [PMID: 31472022 DOI: 10.1111/bcp.14112]
- 10 **Williams SE**, Klein NP, Halsey N, Dekker CL, Baxter RP, Marchant CD, LaRussa PS, Sparks RC, Tokars JI, Pahud BA, Aukes L, Jakob K, Coronel S, Choi H, Slade BA, Edwards KM. Overview of the Clinical Consult Case Review of adverse events following immunization: Clinical Immunization Safety Assessment (CISA) network 2004-2009. *Vaccine* 2011; **29**: 6920-6927 [PMID: 21801776 DOI: 10.1016/j.vaccine.2011.07.044]
- 11 **Wajih Ullah M**, Qaseem A, Amray A. Post Vaccination Guillain Barre Syndrome: A Case Report. *Cureus* 2018; **10**: e2511 [PMID: 29930889 DOI: 10.7759/cureus.2511]
- 12 **Mutsch M**, Zhou W, Rhodes P, Bopp M, Chen RT, Linder T, Spyr C, Steffen R. Use of the inactivated intranasal influenza vaccine and the risk of Bell's palsy in Switzerland. *N Engl J Med* 2004; **350**: 896-903 [PMID: 14985487 DOI: 10.1056/NEJMoa030595]
- 13 **Woo EJ**, Winiacki SK, Ou AC. Motor palsies of cranial nerves (excluding VII) after vaccination: reports to the US Vaccine Adverse Event Reporting System. *Hum Vaccin Immunother* 2014; **10**: 301-305 [PMID: 24231288 DOI: 10.4161/hv.27032]
- 14 **Bettini E**, Locci M. SARS-CoV-2 mRNA Vaccines: Immunological Mechanism and Beyond. *Vaccines (Basel)* 2021; **9** [PMID: 33673048 DOI: 10.3390/vaccines9020147]
- 15 **Abdelhady A**, Patel BC, Aslam S, Al Aboud DM. Anatomy, Head and Neck, Eye Superior Oblique Muscle. 2021 Aug 11. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan- [PMID: 30725837]
- 16 **Freund O**, Eviatar T, Bornstein G. Concurrent myopathy and inflammatory cardiac disease in COVID-19 patients: a case series and literature review. *Rheumatol Int* 2022; **42**: 905-912 [PMID: 35275269 DOI: 10.1007/s00296-022-05106-3]
- 17 **Guidon AC**, Amato AA. COVID-19 and neuromuscular disorders. *Neurology* 2020; **94**: 959-969 [PMID: 32284362 DOI: 10.1212/WNL.00000000000009566]
- 18 **Rodriguez-Gonzalez M**, Castellano-Martinez A, Cascales-Poyatos HM, Perez-Reviriego AA. Cardiovascular impact of COVID-19 with a focus on children: A systematic review. *World J Clin Cases* 2020; **8**: 5250-5283 [PMID: 33269260 DOI: 10.12998/wjcc.v8.i21.5250]
- 19 **Zimmermann P**, Curtis N. Why is COVID-19 less severe in children? *Arch Dis Child* 2020 [PMID: 33262177 DOI: 10.1136/archdischild-2020-320338]
- 20 **Han MS**, Choi EH, Chang SH, Jin BL, Lee EJ, Kim BN, Kim MK, Doo K, Seo JH, Kim YJ, Park JY, Suh SB, Lee H, Cho EY, Kim DH, Kim JM, Kim HY, Park SE, Lee JK, Jo DS, Cho SM, Choi JH, Jo KJ, Choe YJ, Kim KH, Kim JH. Clinical Characteristics and Viral RNA Detection in Children With Coronavirus Disease 2019 in the Republic of Korea. *JAMA Pediatr* 2021; **175**: 73-80 [PMID: 32857112 DOI: 10.1001/jamapediatrics.2020.3988]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: bpgoffice@wjgnet.com
Help Desk: <https://www.f6publishing.com/helpdesk>
<https://www.wjgnet.com>

