Concurrent facial and trigeminal nerve palsies in a child following COVID-19 vaccination with the Pfizer vaccine

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SUMMARY

We present the case of a teenaged boy who attended our Ear, Nose and Throat Emergency clinic with a left-sided lower motor neuron (LMN) facial nerve paralysis associated with sensory loss in the distribution of the ophthalmic (V1) and maxillary (V2) divisions of the trigeminal nerve. This happened 3 days following a first dose of the Pfizer-BioNTech BNT162b2 vaccine. He had a House-Brackmann grade V facial palsy, with marked inability to close the left eye. He was treated with a 10-day course of oral steroids and referred to ophthalmology for eye care. He had an MRI scan of the head, which revealed no space occupying lesions or other abnormalities. Over the 6-week period of follow-up, the patient's V1 and V2 sensation gradually resolved, along with improvement of his LMN facial nerve palsy to House-Brackmann grade 3. Despite the potential temporal relationship, it is not possible to establish a causal relationship between the patient's symptoms and the Pfizer-BioNTech BNT162b2 vaccine, thus further research is required.

BACKGROUND

Facial nerve paralysis has been identified by the UK government as a side effect of the Pfizer-BioNTech BNT162b2 vaccine, with an incidence of up to 1 in 1000 vaccine recipients.[1] Indeed, there have been 1128 cases of facial paralysis reported in the UK's Yellow Card adverse drug reporting monitoring system between 9 December 2020 and 20 April 2022, with 26.9 million and 24.3 million first and second doses administered, respectively, by 25 May 2022.[2 3] However, no cases of trigeminal sensory loss were reported. Similarly, there were no cases of trigeminal sensory loss in the phase III clinical trials of the Pfizer-BioNTech BNT162b2 vaccine, which were performed on adults.[4] The UK's vaccine programme approved vaccination of children aged 12–15 years in June 2021 and there have not been any reported cases in the literature of paediatric facial nerve paralysis, or, indeed trigeminal hypoaesthesia, let alone any cases of both occurring concurrently in the same patient.[5]

CASE PRESENTATION

A previously fit and well adolescent boy presented to our emergency outpatient clinic having been referred with a left-sided facial droop and associated numbness and paraesthesia in the face on the left side. These had started 3 days after receiving his first dose of the Pfizer-BioNTech BNT162b2 vaccine. He had been seen in the Emergency Department and was given oral prednisolone, as well as standard eye care advice, including taping of the affected eye at night, along with Lacrilube ointment. He denied ear pain, rash, fever or foreign travel. He was up to date with his childhood immunisations and had not had any adverse reactions to these. He had no significant past medical history.

On examination he had a total left-sided lower motor neuron (LMN) facial palsy and was not able to close his eye, earning him a grade 5 on the House-Brackmann Scale. He also had Bell's phenomenon on attempt to close his eye.

He had reduced sensation to light and sharp touch in the V1 and V2 distributions of his face, but corneal reflexes were intact. Pupils were equal and reactive to light. The rest of his neurological, ear, nose and throat, abdominal and cardiorespiratory examinations were normal. His vital signs were also within normal limits.

INVESTIGATIONS

MRI of the brain was performed, and this revealed no structural abnormalities, including space occupying lesions or other changes.

DIFFERENTIAL DIAGNOSIS

The main differential diagnoses, at this stage, were Bell's palsy, an idiopathic LMN paralysis of the facial nerve, and an adverse reaction to the Pfizer-BioNTech BNT162b2 vaccine. The former was deemed to be unlikely as it is a diagnosis of exclusion which does not commonly affect children or involve the trigeminal nerve. The temporal relationship of the paralysis with vaccination made this a more likely hypothesis given the neurotropic nature of the underlying virus, as well as the number of documented cases of facial nerve paralysis in patients following administration of the Pfizer vaccine. However, there was no sufficient evidence to prove a causal relationship.

A space occupying lesion at or near the cerebellopontine angle was considered but this was ruled out by imaging, as was similarly a cerebrovascular accident. Lack of travel and other symptoms made a rarer diagnosis, such as Lyme disease, unlikely.

TREATMENT

The patient was treated in a multidisciplinary team (MDT) setting, with reviews by ENT, Ophthalmology and Paediatrics. Eye protection and oral steroid treatments were instituted, as above, and

both patient and parents were reassured, though it was noted that with such a novel and rare potential cause of facial paralysis, prognosis was unclear.

OUTCOME AND FOLLOW-UP

On ophthalmology follow-up, 1 month after onset of symptoms, he was noted to still have Bell's phenomenon in the left eye, but good orbicularis oculi function and no significant lagophthalmos. There was minimal conjunctival congestion in the left eye and no signs of exposure keratopathy. Unaided visual acuity in his right eye was 6/19, improving to 6/12 with pinhole. In the left eye it was 6/9.5, improving to 6/7.5 with pinhole.

At ENT follow-up, 6 weeks after onset of symptoms, he was found to have had an improvement but not complete resolution in his facial nerve function. This had improved to House-Brackmann grade 3. He had complete resolution of his paraesthesia and numbness.

DISCUSSION

This is the first report of a concurrent facial and trigeminal nerve paralysis possibly related to the Pfizer-BioNTech BNT162b2 vaccine in a paediatric patient.

Trigeminal neuropathy has been described to co-occur with Bell's palsy in the non-vaccine context. Although overt trigeminal neuralgia has been rarely reported among those with Bell's palsy, a literature review found that varying degrees of a more subtle involvement of the trigeminal nerve may be reasonably common.[6] Studies have found that up to a quarter of patients with Bell's palsy have evidence of hypoaesthesia in the trigeminal distribution.[7] This association may be explained by the common arterial supply of the seventh and fifth cranial nerves through the middle meningeal vascular system.[8] This makes a diagnosis of Bell's palsy possible in the case presented above, though it would still be quite a rare occurrence.

Isolated facial paralysis after vaccination has been reported as an adverse effect for decades with almost all viral vaccines, including most recently in adults after the Pfizer-BioNTech BNT162b2 vaccine.[9 10] Other neurological complications observed after the Pfizer-BioNTech vaccination include acute trigeminal neuritis, Guillain-Barre syndrome, transverse myelitis and multiple sclerosis.[11–13] The incidence of two or more of these neurological complications occurring contemporaneously in the same patient following any viral vaccination, including the Pfizer-BioNTech BNT162b2, is not well known.[11 14]

The specific mechanism of non-messenger RNA (non-mRNA) vaccine-related effects is debated, but it is thought to be immune-mediated, via either mimicry of host molecules or bystander activation of dormant autoreactive T cells.[9 15] This is in contrast to mRNA vaccines, which may lead to facial nerve palsy by a combined effect of lipids and direct interferon synthesis activation.[16] While the former takes at least 10–14 days to develop and cause effect, the latter requires less time. Therefore, in our case, immune-mediated inflammation is the most likely mechanism due to rapid onset of symptoms 3 days post mRNA vaccine administration, and the positive response to corticosteroids. Furthermore, an analysis of facial nerve paralysis reported in the WHO pharmacovigilance database demonstrated a median time of onset of 2 days.[17]

In the small existing current literature, there have been two reported cases of trigeminal nerve involvement following vaccination with Pfizer-BioNTech. Both patients presented with acute trigeminal neuritis, affecting all three branches of the trigeminal nerve.[18 19] Neither of these presented with concurrent facial nerve palsy and neither had symptoms that were solely restricted to individual branches of the trigeminal nerve. Both cases were treated with oral steroids and neuropathic pain agents. Both patients were observed to greatly improve on corticosteroids, with one patient experiencing persistent residual numbness over the left V3 distribution.[18]

Some studies have investigated facial nerve palsy as a possible adverse effect of mRNA vaccines. These studies suggest the incidence of facial paralysis after mRNA vaccines could be 1.5–3 times higher than expected in the general population and 2–3 times higher compared with those receiving traditional non-mRNA vaccines.[20] In contrast, other literature suggests, such as Renoud *et al*, no association between mRNA COVID-19 vaccines compared with other viral vaccines in a disproportionality analysis.[17] Although Wan *et al* describe a statistically significant risk of facial paralysis after CoronaVac vaccination, no such association could be made for the BNT162b2 vaccination.[21] Clearly, a causal association has not been established yet between the COVID-19 vaccines and facial nerve palsy. To this end, further studies would be required to show a convincing correlation and there is scope for ongoing reviews and analysis.

A population-based study suggested the association between the BNT162b2 vaccine and facial nerve palsy appears to be more pronounced in older women (>65 years) within a time interval of 21 days after the first vaccine dose.[22] Although the prognosis of BNT162b2 vaccine-related facial nerve paralysis remains unknown in adults and requires further investigation, it has generally been reported to have a good recovery rate, reaching 90% within 9 months if timely treated with corticosteroids.[23] This is similar to the recovery rates reported in the few cases of acute trigeminal neuritis developing after BNT162b2 vaccination in adults.[18] Given the lack of published data on facial nerve palsies following the BNT162b2 vaccination in children, prognosis in this population is also unknown. Furthermore, the lack of controlled clinical trials on children with facial nerve palsies contribute to limitations regarding drug therapy.

It is key to take a multidisciplinary approach when approaching children with facial nerve palsies. Such a team should involve otolaryngologists, paediatricians, neurologists, ophthalmologists and physiotherapists. Particular attention should be paid to corneal protection to prevent irreversible corneal lesions and subsequent visual loss. As with many paediatric problems, parental buy-in and understanding is imperative in order to achieve a successful outcome for the child.

In conclusion, we report the first paediatric case of combined facial nerve palsy and trigeminal nerve sensory loss which we

Learning points

- Cranial nerve paralysis is a rare complication of the Pfizer-BioNTech BNT162b2 vaccine, the prognosis of which is not yet clear at present.
- A causal association of facial palsy and trigeminal weakness with the Pfizer-BioNTech BNT162b2 vaccine cannot be established from a single isolated case.
- Bell's palsy is a diagnosis of exclusion and should only be diagnosed once other causes of a lower motor neuron facial paralysis have been ruled out.
- A multidisciplinary team approach is crucial in managing patients with facial nerve paralysis, whatever the cause, in order to ensure optimum protection of structures such as the eye along with holistic patient care.

suspect may be related to the Pfizer-BioNTech BNT162b2 vaccine, though a causal association has not been established. Fortunately, we observed a positive response to treatment with corticosteroids. Ophthalmological input to prevent eye dryness, including applying lubricating drops and blindfolds, was crucial in preventing eye complications, emphasizing the importance of an MDT approach to managing paediatric patients with facial nerve paralysis.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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REFERENCES

1 GOV.UK. Information for UK recipients on pfizer/biontech COVID-19 vaccine (Regulation 174). Available: https://www.gov.uk/government/publications/regulatory-approval-of-pfizer-biontech-vaccine-for-covid-19/information-for-uk-recipients-on-pfizerbiontech-covid-19-vaccine [Accessed 12 Jun 2022].
2 GOV.UK. COVID-19 mRNA pfizer- biontech vaccine analysis. 2022. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1072043/COVID-19_mRNA_Pfizer-_BioNTech_vaccine_analysis_print.pdf
3 GOV.UK. Coronavirus vaccine - weekly summary of yellow card reporting. 2022. Available: https://www.gov.uk/government/publications/coronavirus-covid-19-vaccine-adverse-reactions/coronavirus-vaccine-summary-of-yellow-card-reporting [Accessed 12 Jun 2022].
4 Covid PB. Vaccines and related biological products advisory committee meeting December 10; 2020. 53.
5 GOV.UK. The MHRA concludes positive safety profile for pfizer/biontech vaccine in 12- to 15-year-olds. 2022. Available: https://www.gov.uk/government/news/the-mhra-concludes-positive-safety-profile-for-pfizerbiontech-vaccine-in-12-to-15-year-olds [Accessed 12 Jun 2022].
6 Chu EC-P, Trager RJ, Chen AT-C. Concurrent Bell's palsy and facial pain improving with multimodal chiropractic therapy: a case report and literature review. *Am J Case Rep* 2022;23:e937511.
7 Benatar M, Edlow J. The spectrum of cranial neuropathy in patients with Bell's palsy. *Arch Intern Med* 2004;164:2383–5.
8 Lapresle J, Fernandez Manchola I, Lasjaunias P. L'atteinte trigéminale sensitive au cours de la paralysie faciale périphérique essentielle [trigeminal sensory involvement in bell's palsy (author's transl)]. *Nouv Presse Med* 1980;9:291–3.
9 Shemer A, Pras E, Hecht I. Peripheral facial nerve palsy following BNT162b2 (COVID-19) vaccination. *Isr Med Assoc J* 2021;23:143–4.
10 Shemer A, Pras E, Einan-Lifshitz A, *et al*. Association of COVID-19 vaccination and facial nerve palsy: a case-control study. *JAMA Otolaryngol Head Neck Surg* 2021;147:739–43.
11 Wan MM, Lee A, Kapadia R, *et al*. Case series of Guillain-Barré syndrome after the ChAdOx1 nCoV-19 (Oxford-AstraZeneca) vaccine. *Neurol Clin Pract* 2022;12:149–53.
12 Khayat-Khoei M, Bhattacharyya S, Katz J, *et al*. COVID-19 mRNA vaccination leading to CNS inflammation: a case series. *J Neurol* 2022;269:1093–106.
13 Havla J, Schultz Y, Zimmermann H, *et al*. First manifestation of multiple sclerosis after immunization with the pfizer-biontech COVID-19 vaccine. *J Neurol* 2022;269:55–8.
14 Fenichel GM. Neurological complications of immunization. *Ann Neurol* 1982;12:119–28.
15 Principi N, Esposito S. Do vaccines have a role as a cause of autoimmune neurological syndromes? *Front Public Health* 2020;8:361.
16 Hwang I, Calvit TB, Cash BD, *et al*. Bell's palsy: a rare complication of interferon therapy for hepatitis C. *Dig Dis Sci* 2004;49:619–20.
17 Renoud L, Khouri C, Revol B, *et al*. Association of facial paralysis with mRNA COVID-19 vaccines: a disproportionality analysis using the World Health Organization pharmacovigilance database. *JAMA Intern Med* 2021;181:1243–5.
18 Kaya A, Kaya SY. A case of trigeminal neuralgia developing after a COVID-19 vaccination. *J Neurovirol* 2022;28:181–2.
19 Narasimhalu K, Lee WC, Salkade PR, *et al*. Trigeminal and cervical radiculitis after tozinameran vaccination against COVID-19. *BMJ Case Rep* 2021;14:e242344.
20 Cirillo N, Doan R. Bell's palsy and SARS-CoV-2 vaccines-an unfolding story. *Lancet Infect Dis* 2021;21:1210–1.
21 Wan EYF, Chui CSL, Lai FTT, *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* 2022;22:64–72.
22 Shibli R, Barnett O, Abu-Full Z, *et al*. Association between vaccination with the BNT162b2 mRNA COVID-19 vaccine and bell's palsy: a population-based study. *Lancet Reg Health Eur* 2021;11:100236.
23 Sullivan FM, Swan IRC, Donnan PT, *et al*. Early treatment with prednisolone or acyclovir in Bell's palsy. *N Engl J Med* 2007;357:1598–607.