



Bell's palsy in a patient after contracting COVID-19 with signs of aberrant nerve regeneration

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ABSTRACT

Purpose: To report a 56-year-old male in Saudi Arabia who developed signs of aberrant facial nerve regeneration after recovering from Bell's palsy associated with COVID-19 infection.

Observations: The patient presented, months following recovery from Bell's palsy associated with COVID-19, with symptoms of aberrant seventh nerve regeneration in the form of tearing with eating "crocodile tears" and synchronous right eyelid closure with the jaw movement.

Conclusions and Importance: Case reports of Bell's palsy associated with COVID-19 are emerging, but association does not mean causation. That said, we need to report these cases to draw attention to the possible neuroinvasive propensity of this virus. It is also imperative to recognize Bell's palsy as a possible symptom of COVID-19.

1. Introduction

Bell's palsy is considered an acute idiopathic facial nerve palsy. Although the majority of patients with Bell's palsy achieve complete recovery without medical interventions, a subset of patients develop long-term sequelae, such as aberrant nerve regeneration where axons of regenerating nerve fibers reach different muscle targets than their original targets during the recovery process.¹⁻³ The incidence rate of this aberrant nerve regeneration after Bell's palsy ranged from 8.6% to 28%,^{1,4} and there is a potential correlation between the severity of Bell's palsy and this sequelae.⁴ Several reports have linked Bell's palsy with Coronavirus disease (COVID-19), caused by a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).⁵⁻⁷ The first Bell's palsy case after COVID-19 was reported early in the pandemic in the month of April 2020.⁸ However, the hypothesis regarding the neuropathogenesis of COVID-19 is still debatable.⁹

We present a case of a COVID-19 patient who developed Bell's palsy and signs of aberrant nerve regeneration as long-term sequelae.

2. Case report/findings

A 56-year-old patient with type 2 diabetes and hypertension -both well controlled with medications-, developed right-sided Bell's palsy

three days after the confirmation of COVID-19 using nasopharyngeal swab polymerase chain reaction (PCR) in the summer of 2020. Initially, the patient exhibited a sore throat and fever; afterward, his sense of smell and taste was lost. Eventually, the patient developed right facial weakness with an uneven smile that prompted him to get a tele-consultation with a neurologist who diagnosed the patient with Bell's palsy via video chat. However, due to the patient's uncomplicated and mild course of COVID-19, he was never hospitalized and was only managed on an outpatient basis. Approximately less than a month later the patient had an in-office visit with an otolaryngologist, who confirmed Bell's palsy diagnosis and referred the patient to a physiotherapist without pharmacological interventions.

Ten months after recovery from COVID-19, the patient presented to the ophthalmology clinic with symptoms of aberrant seventh nerve regeneration in the form of tearing while eating "crocodile tears" and synchronous right eyelid closure with jaw movement. After conducting a general examination, the patient showed a fairly symmetrical face with more dermatochalasis on the right side. The marginal reflex distance 1 of the right eye was 2 mm, and for the left eye was 5 mm. The palpebral fissure height of the right eye was 7 mm, and for the left eye was 10 mm. Levator function was excellent in the right eye and the left eye at 15 mm and 17 mm, respectively. The tear breakup time for the right eye was 2 seconds and for the left eye was 3 seconds. When asked to move the jaw

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Fig. 1. Image showing right palpebral fissure narrowing with lateral jaw movement to the right and normal right eyelid with lateral jaw movement to the left.

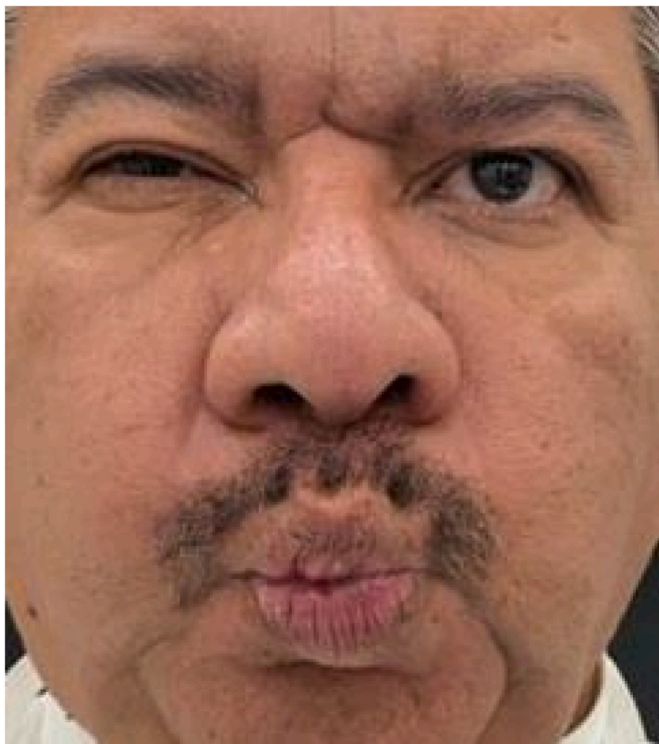


Fig. 2. Image showing the involuntary narrowing of the right palpebral fissure upon contraction of orbicularis oris muscle.

sideways (Fig. 1) or purse the lips (Fig. 2), the palpebral fissure of the right eyelid involuntarily narrowed. (video).

A few months after Bell's palsy and due to persistent right facial weakness, the neurologist ordered a magnetic resonance imaging (MRI) of the brain to rule out vascular and tumoral causes of seventh nerve palsy. The MRI revealed inflammatory changes of paranasal sinuses accompanied by nonspecific subcortical flat-attenuated inversion recovery signs on the white matter, but no significant intracranial findings were found.

As for the management, the patient was managed conservatively at the start of Bell's palsy with physiotherapy. Then, he continued the recommended exercises at home and exhibited significant improvement in the degree of facial weakness.

3. Discussion

Bell's palsy is currently the most common disorder affecting the seventh cranial nerve. The mechanism of Bell's palsy is still unclear, but viral, ischemic, and immune-mediated mechanisms have been postulated.^{10,11} Moreover, it is known that coronaviruses have neuroinvasive propensity and COVID-19 patients have presented with central and peripheral nervous system disorders "including Bell's palsy".¹² In a recent retrospective study, an estimated incidence of Bell's palsy was 0.08% higher in patients with COVID-19, which translates to approximately 82 per 100 000 patients with COVID-19.¹³ Multiple hypotheses regarding the pathogenesis of Bell's palsy in COVID-19 patients have been proposed. One of the most accepted hypotheses is molecular mimicry, where mimicry between microbial and nerve antigens is thought to be a major driving force behind the development of the disorder.¹⁴ The other hypothesis of neural ischemia cannot be ruled out in this case, especially since hypercoagulability has been demonstrated in some patients with COVID-19.¹⁵ Additionally, our patient already has vasculopathic risk factors; hence, the exact cause of the Bell's palsy in our patient cannot be pinpointed.

Aberrant seventh nerve regeneration can be a sequela of Bell's palsy and can present as an involuntary synchronous narrowing of the palpebral fissure with pursing of the lips due to the abnormal intrafacial connections between the orbicularis oculi and orbicularis oris both of which supplied by the seventh cranial nerve.^{11,14} This connection has been termed Marin-Amat syndrome in the previous literature.¹⁶ However, it has been heavily argued by Wartenberg et al. that this is solely an intrafacial associated movement that commonly occurs after facial paralysis.¹⁷ The argument made by Wartenberg et al. was supported by the available electromyography studies found in some case reports.¹⁸ Moreover, our patient exhibited tearing with eating, which can happen when the regenerating nerve redirects and reaches the lacrimal gland. This abnormal innervation will cause tearing with the taste or smell of food instead of causing salivation.¹⁹

Further studies regarding the surge in cases of Bell's palsy associated with COVID-19 are necessary to understand this connection, which also can shed a light on the possible emerging relationship between Bell's palsy and the COVID-19 vaccine as depicted in some published articles.²⁰

4. Conclusions

A causal relationship between COVID-19 and Bell's palsy still cannot be proven, but it is imperative to report these cases. With the reports of

Bell's palsy are emerging during the pandemic, larger observational studies are needed to investigate this connection and the possible neuroinvasive propensity of this virus.

Patient consent

The patient provided consent to use his images and clinical history for education and publication.

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Author agreement statement

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Author's contributions

Furat Alrajhi and Hadeel Seraj performed the literature review and writing of the manuscript. Nada Taher and Ahmed Alnabihi obtained pertinent clinical data and clinical images as well as editing of the manuscript.

Declaration of competing interest

The authors have no disclosures to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajoc.2022.101679>.

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