

## Main Article

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## Abstract

**Background.** Bell's palsy is a lower motor neurone facial weakness of unknown aetiology, although reactivation of a virus within the facial nerve has been proposed.

**Methods.** A prospective study was conducted of Bell's palsy cases presenting to our paediatric ENT unit over a 19-week period, from February to June 2020. Patients were invited for severe acute respiratory syndrome coronavirus-2 antibody testing. A text-message questionnaire was sent to other ENT centres to determine their observational experience.

**Results.** During the study period, 17 children presented with Bell's palsy, compared with only 3 children in the same time period in the previous year ( $p < 0.0001$ ). Five patients underwent severe acute respiratory syndrome coronavirus-2 antibody testing, the results of which were all negative. Four out of 15 centres questioned perceived an increased incidence in paediatric Bell's palsy.

**Conclusion.** Clinicians are encouraged to be vigilant to the increase in paediatric Bell's palsy seen during the coronavirus disease 2019 pandemic, which may represent a post-viral sequela of coronavirus disease 2019.

## Introduction

Bell's palsy, also known as idiopathic facial nerve palsy, is a lower motor neurone facial weakness of unknown aetiology. Despite being a diagnosis of exclusion, reactivation of a virus within the facial nerve (including herpes simplex virus type 1 amongst others) has been proposed in the literature as a possible aetiology.<sup>1</sup>

The true incidence of Bell's palsy is unknown and varies significantly, with 6.1–18.8 cases per 100 000 children per year reported in the literature.<sup>2</sup> It is frequently managed with oral corticosteroids and eye care, with or without adjuvant antiviral therapy.<sup>1</sup> In children, Bell's palsy has a good prognosis, with studies suggesting that 80–90 per cent of children gain full recovery within six months of symptom onset.<sup>1</sup>

The outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing coronavirus disease 2019 (Covid-19) has been declared a global health emergency. Typical clinical features include fever, cough and shortness of breath; however, other presentations, including anosmia, gastrointestinal disturbance and neurological symptoms, have also been reported and are becoming increasingly recognised.<sup>3</sup>

Coronavirus disease 2019 is thought to be less prevalent within the paediatric population and less is understood about the presenting features. These may be atypical, such as the proposed post-infectious inflammatory Kawasaki-like disease associated with Covid-19 that has been described.<sup>4,5</sup> In those reports, 8 of 10 children had a negative SARS-CoV-2 polymerase chain reaction swab result, and 2 of 10 children had a negative SARS-CoV-2 serology test result.<sup>4,5</sup>

Following the outbreak of Covid-19 in the UK, the authors have perceived an increase in the incidence of paediatric facial palsy presenting to our tertiary paediatric otorhinolaryngology unit. As such, this study aimed to ascertain if there was an increased incidence of paediatric Bell's palsy at our unit during the height of the Covid-19 pandemic and whether this could be confirmed as due to Covid-19.

## Materials and methods

A prospective study was conducted of patients presenting with acute onset unilateral facial weakness of unknown aetiology (Bell's palsy) to our paediatric otorhinolaryngology unit in the UK over a 19-week period, from 14 February to 24 June 2020. Patients with a known aetiology for their facial palsy, such as trauma, were excluded from the study. Only patients aged under 16 years at the time of presentation were included in the study. Patients presented either by referral from their general practitioner or self-presentation to the emergency department.

Incidence rates were compared with the same time period during the previous year at our centre. This information was derived from clinic coding data and by manually reviewing the

presenting complaints of patients presenting to the emergency department. Data from the two years were compared using the chi-square test. All patients from the 2020 cohort were subsequently invited to undergo SARS-CoV-2 antibody testing. Statistical analysis was performed using GraphPad Prism software (San Diego, California, USA).<sup>6</sup>

A text-message questionnaire distributed via WhatsApp messenger service in May 2020 was used to correspond with ENT colleagues at other centres (both nationally and internationally), to determine whether they had perceived an increased incidence in paediatric Bell's palsy at their centre. The ENT colleagues were asked two questions: (1) Have you noticed an increase in the incidence (new presentations) of idiopathic facial nerve weakness in children aged under 16 years?; and (2) If yes, estimate the magnitude in number of new cases compared to March/April/May in previous years?

The study was registered with Alder Hey Children's NHS Foundation Trust's clinical governance department. Health Research Authority ethical approval was not required for this study, as determined using the Health Research Authority decision toolkit.<sup>7</sup>

## Results

During the 19-week period from 14 February to 24 June 2020, there was a prospective collection of 17 patients who presented to our unit with acute onset unilateral facial weakness of unknown aetiology ('Bell's palsy'); 6 of these patients presented in April 2020. During the same time period in the previous year (14 February to 24 June 2019), there were only three cases of Bell's palsy that presented to our unit. Notably, there was a reduction in overall accident and emergency department (A&E) attendances in 2020 compared to 2019. Overall, there was a significant increase in incidence rates between the two years: 3 per 22 531 A&E attendances in 2019, compared with 19 per 13 642 A&E attendances in 2020 ( $p < 0.0001$ ). In the 2020 cohort, there were 12 female and 5 male patients, with a mean ( $\pm$  standard deviation) age at presentation of 9.88 ( $\pm$  3.05) years.

Swab polymerase chain reaction testing for SARS-CoV-2 was only performed in two patients; one was performed at the time of their initial presentation and the other 12 days after the onset of facial palsy. Neither patient reported symptoms of Covid-19 at the time of the onset of their facial palsy. The results for both patients were negative.

Subsequent SARS-CoV-2 antibody testing was undertaken by five patients. This was performed a mean of 22.7 weeks after the onset of their facial palsy. The remaining patients declined testing ( $n = 4$ ), did not attend their appointment ( $n = 3$ ) or were unable to be contacted after two attempts ( $n = 5$ ). Severe acute respiratory syndrome coronavirus 2 antibody testing results were negative in all five patients.

Correspondence with 15 ENT colleagues at other centres, both nationally and internationally, conducted in May 2020 via a text-message questionnaire, also confirmed a perceived increased incidence in idiopathic facial palsy in children at four other centres (26.7 per cent). The mean increase in incidence estimated at these centres was double the expected number of cases; this was observed at two centres in the UK, one centre in Colombia and by one respondent who did not disclose their location.

## Discussion

This paper demonstrates a significant increase in the incidence of paediatric Bell's palsy during the height of the Covid-19

pandemic at our unit in the UK ( $p < 0.0001$ ). Neurological manifestations of Covid-19 are being increasingly recognised. A study from Wuhan, China, demonstrated that over a third of patients exhibited neurological features.<sup>8</sup> As such, the National Health Service and UK government now recognise that a loss or change in a patient's sense of smell or taste is one of the three key symptoms of Covid-19, with studies estimating that 30–85 per cent of patients with Covid-19 exhibit this symptom.<sup>9,10</sup>

Although none of the patients in our study tested positive for Covid-19, by either polymerase chain reaction testing or SARS-CoV-2 antibody testing, the population assessed was small. In addition, the presence of Covid-19 related symptoms was not explored in this study. Despite this, similar increases in the incidence of paediatric Bell's palsy were perceived at 4 out of 15 other centres questioned via a text-message questionnaire.

Interestingly, there were a greater number of female patients in our cohort than male patients. The size of the cohort was too small to determine whether any conclusions could be drawn from this.

There have been reported case studies of patients with Covid-19 and concurrent idiopathic facial palsy in the adult population.<sup>3,11</sup> In China, a female adult patient with an isolated Bell's palsy tested positive for SARS-CoV-2 by real-time polymerase chain reaction.<sup>3</sup> There are further reports of patients who tested positive for SARS-CoV-2 who developed Guillain-Barré syndrome with facial paresis after their initial Covid-19 symptoms. In addition, there are reports of patients with Covid-19 who presented with facial palsy as either the first symptom of Covid-19 or alongside other clinical manifestations.<sup>12–14</sup> More recently, there is published literature reporting an increase in the incidence of Bell's palsy seen in the adult population in the UK during a similar time period.<sup>15</sup> In that case series, one patient had a positive polymerase chain reaction SARS-CoV-2 throat swab result and one patient tested positive with a Covid-19 antibody test.<sup>15</sup>

However, there are no such reports of facial palsy in the paediatric population. In addition, less is understood about the presenting features of Covid-19 within the paediatric population, which may be atypical.<sup>4,5</sup> Furthermore, studies have reported that children may be polymerase chain reaction negative but still be mounting an immune response to SARS-CoV-2.<sup>16</sup>

By the nature of the definition of the condition, the aetiology of Bell's palsy is unknown. However, possible pathophysiological mechanisms proposed in the literature include reactivation of a virus within the facial nerve, ischaemia, acute cold exposure and inflammation-driven demyelination.<sup>1,17</sup> Research is ongoing as to the mechanism that leads Covid-19 to result in other neurological sequelae, and this may shed light on its possible link to Bell's palsy.

## Limitations

The main limitation of this study was that only five patients underwent SARS-CoV-2 antibody testing. This was because some patients declined the test, did not attend the test appointment or could not be contacted. The reason for declining the test was not explored in the study; however, serology SARS-CoV-2 testing involves venous blood sampling, which is often disliked by the paediatric population.

In those patients tested, the mean time from symptom onset to the SARS-CoV-2 antibody test was 22.7 weeks. Studies have suggested that antibody levels in adults fall over

time, and there may be decreased sensitivity of SARS-CoV-2 antibody testing among the paediatric population in comparison with adults.<sup>18,19</sup>

- This study demonstrates a significant increase in paediatric Bell's palsy incidence during the coronavirus disease 2019 (Covid-19) pandemic, in comparison to the previous year
- A similar increase has been reported in the adult population
- This is the first paper to report this finding in children
- Clinicians should be vigilant to this increase in paediatric Bell's palsy seen during the Covid-19 pandemic
- Facial palsy may represent a post-viral sequela of Covid-19

## Conclusion

To the authors' knowledge, this is the first published study demonstrating a significant increase in the incidence of paediatric Bell's palsy during the Covid-19 pandemic. We encourage clinicians to be vigilant to this increase in idiopathic facial paresis in children, and recognise that subsequent multi-centre research is warranted over the forthcoming months to ascertain whether it may be a post-viral sequela of Covid-19.

**Competing interests.** None declared

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