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Case Report

Recurrent Right-side Bell's Palsy in Association with Neurovascular Cross-compression: A Case Report

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Abstract

Introduction: Bell's palsy is a lower motor neuron (LMN) palsy that affects the facial nerve (CN VII) and causes weakness or paralysis of the facial muscles. It can be associated with various causes, including neurovascular cross-compression (NVCC). This case report highlights the challenges in treating recurrent Bell's palsy caused by NVCC and the need for a multidisciplinary approach.

Case report: A 17-year-old girl presented with recurrent right-side Bell's palsy along with NVCC involving the right and left anterior inferior cerebellar artery forming a loop around the VII and VIII cranial nerve complex. Motor Nerve Conduction Studies (NCS) indicated a right-side facial nerve lesion with prolonged distal latency.

Discussion: Despite prior physiotherapy sessions, which proved effective, the patient showed no improvement after five sessions, leading to further investigations. This case also underscores the diagnostic and therapeutic complexities associated with NVCC-induced Bell's palsy, which emphasizes the urgency of quick diagnosis and intervention to prevent functional limitations.

Conclusion: Continued research and advancements in diagnostic and therapeutic modalities are required for better outcomes and improving the quality of life in such patients, particularly in such cases.

Keywords: Bell's palsy, neurovascular compression syndrome, recurrent

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1. Introduction

Bell's palsy is a common neurological disorder characterized by lower motor neuron lesions and weakness or paralysis of facial muscles, leading to various functional and cosmetic impairments. It is primarily idiopathic but can potentially be associated with viral infections (Herpes Simplex, Varicella Zoster), diabetes mellitus, pregnancy, cold exposure, certain autoimmune disorders, tumors, Lyme's disease, post-traumatic brain injury, pontine infarcts, and rarely neurovascular cross-compression (NVCC) [1, 2]. Although the condition is self-limiting, recurrence rates have been reported at 8–12% [1]. NVCC is a rare phenomenon that occurs when a blood vessel comes in contact with or compresses a nearby nerve at the root entry of the nerve, typically in cranial or spinal regions leading to neurological signs and symptoms that can be challenging due to unclear pathogenesis, nonspecific clinical presentation, and the need for advanced imaging techniques to confirm the diagnosis [3]. The management of NVCC-induced Bell's palsy requires a multidisciplinary approach. This case report presents a patient with recurrent Bell's palsy along with NVCC and discusses the diagnostic and therapeutic challenges associated with this condition and highlights the importance of considering NVCC as a potential etiology of Bell's palsy and the need for prompt diagnosis and intervention to prevent irreversible nerve damage and functional impairment [1, 3, 4].

2. Case Report

2.1. Patient Information

The patient was a 17-year-old girl with recurrent right-side Bell's palsy.

2.2. Presenting Concerns/Symptoms

The patient reported an inability to fully close the right eye. Additionally, she was unable to move the right side of her face while smiling and raising her eyebrows. However, no incident of fever, infection, or extreme exposure to cold prior to the onset of symptoms was reported. The patient did not report any balance deficits, ear infections, vision problems, or any systemic diseases. No other past medical conditions such as diabetes or hypertension were reported nor was she on any medications. Additionally, there were no genetic defects. The patient reported having three previous encounters with similar symptoms as presented in Figure **1**. The interval between the first and second episodes was three years and two months, and the interval between the second and third episodes was one year and seven months with all the episodes affecting the right facial nerve and right facial muscles (ipsilateral).

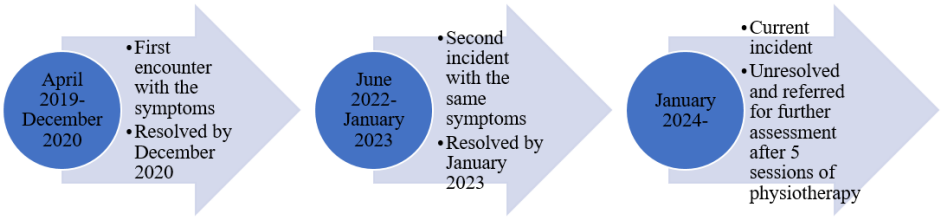


Figure 1: Timeline of events that occurred between April 2019 and January 2023.

2.3. Clinical Examination

The patient was conscious, alert, and well-oriented. There was facial asymmetry at rest and during movement. No evident contraction of the forehead muscle was noted on command. Grade 1 tenderness on palpation (mild) was seen at the entry of the facial nerve. Evident drooling was present when lying down on the affected side but not at rest. Besides the CN VII, all other cranial nerves tested were unremarkable. Static balance was tested using the Romberg Test, which turned out to be negative. Severity was measured using the House Brackman (HB) scale and was graded as grade 6 – total paralysis [3].

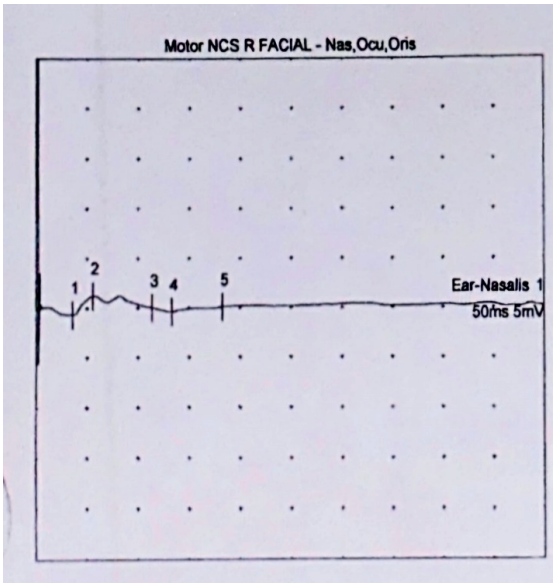
2.4. Diagnostic Findings

MRI of the brain was done with and without contrast, which revealed a vessel (right anterior inferior cerebellar artery) forming a loop around the right CN VII and VIII complex at 10 mm from the root entry zone. In the left IAC, the left anterior inferior cerebellar artery branch was forming a loop around the left CN VII and VIII complex at 10.6 mm from the root entry zone. This was suggestive of NVCC syndrome.

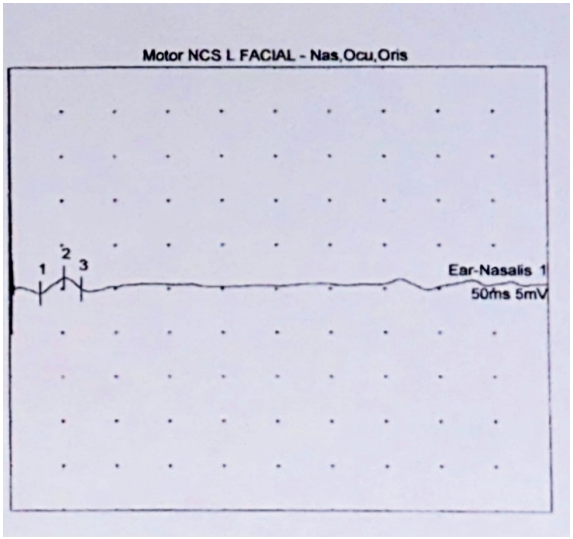
Figure **2**(a)–**2**(c) show motor nerve conduction studies. The left and right facial nerves were stimulated using an electrode over three sites (nasalis, orbicularis oculi, and orbicularis oris). The results showed prolonged delayed latency on the right facial nerve, suggestive of a right-sided facial nerve lesion (ipsilateral).

2.5. Therapeutic Interventions

Since the two previous encounters were successfully treated with physiotherapy, the patient proceeded with physiotherapy again. The treatment was done based on the recent studies and recommendations (mentioned and discussed in the Discussion section). It included electrical stimulation, low-level laser therapy, facial exercises using visual cues, and much more which are listed in Table **1**.



(a) NCS of right facial nerve.



(b) NCS of left facial nerve.

Motor NCS

Nerve / Sites	Latency ms	Ampl mV
R FACIAL - Nas,Ocu,Oris		
Ear-Nasalis	3.59	2.0
L FACIAL - Nas,Ocu,Oris		
Ear-Nasalis	2.97	1.8

(c) Latency and amplitude of the right and left facial nerves.

Figure 2

Table 1: Physiotherapy intervention according to FITT principle.

Structures	Frequency	Intensity	Type	Remarks
Frontalis, corrugator supercilii, nasalis, orbicularis oculi, zygomaticus major and minor, orbicularis oris, mentalis	3 times a week	As per patient tolerance	Electrical stimulation with Galvanic current (interrupted with rectangular pulse)	60 contractions to each muscle
Facial nerve	3 times a week	10 J/cm^2 for 6 mins at 8 points along the branches and course of facial nerve	Low-level laser therapy	As per evidence and guidelines
Right facial muscles	3 times a week	Moderate for 8 mins	Moist heat therapy	To increase blood flow
Right facial muscles	Every day, minimum 10–15 reps for 3–5 sets using mirror in front	As tolerated	Passive and active assisted facial exercise: 1. Eye opening and closing 2. Raising eyebrows 3. Smiling 4. Pouting 5. Filling air in mouth Patient education: 1. Regarding eye lubrication and wearing patch on the affected eye 2. Course of the disease and its self-limiting nature	To re-educate the muscles

2.6. Follow-up and Outcome

No improvement was noted after five physiotherapy sessions, leading to referral to the concerned neurologist for further investigations.

2.7. Patient Perspective

The last time the patient underwent physiotherapy, both she and the therapist noticed an improvement in her symptoms within four to five sessions, encouraging her to continue with additional sessions for complete recovery. However, despite following a similar treatment regimen, only minimal improvement was observed this time. The patient intends to consult her neurologist and will likely return to physiotherapy if approved by the neurologist.

3. Discussion

The diagnostic journey for NVCC syndrome presents notable challenges, mainly due to its nonspecific clinical presentation. The HB scale used in this has been evaluated by Mat Lazim et al. [5] and compared

with two other scales – Sydney and Sunnybrook – for assessing facial nerve paralysis through a systematic analysis. The HB scale showed responsiveness to the assessment and suggested the use of any of the three scales. The review of the literature was limited for this condition, although a case report by Anukoolwittaya et al. [4] reported a case with four NVCC, including the facial nerve, vestibulocochlear nerve, and glossopharyngeal nerve with a tortuous posterior inferior cerebellar artery. The intervention opted for was microvascular decompression which resolved the complaints with no recurrence for a year (follow-up). The patient in our case had a recurrent right-side facial nerve involvement with symptoms on the right side of the face. This observation falls in line with the study done by Traylor et al. [6], who performed a retrospective analysis of hemifacial spasm in order to find which portion of the facial nerve (symptomatic or asymptomatic) is more susceptible to be involved with NVCC. They concluded that it is majorly seen in the symptomatic portion and minorly in the asymptomatic. The physiotherapy intervention used for the patient was formed using evidence from the recent studies by Khan et al. [7] and Kim et al. [8]. These studies were systematic reviews of the effectiveness of facial exercise therapy and the efficacy of laser therapy in the management of facial palsy. In this case, the delayed diagnosis was influenced by the recurrent nature of the patient's Bell's palsy. Although pharmacological intervention with corticosteroids is the most commonly used treatment that has been shown effective in literature for the management of Bell's palsy, the role of physical therapy has shown limited evidence and effectiveness alone but it can be used as an adjunct [9]. Microvascular decompression surgery is a safe surgical intervention that has shown immediate effects in resolving the symptoms and is an important alternative to opt for in such cases as per the evidence [10, 11]. The reason why the surgical option was not considered by the family is perhaps due to the family and patient's preference of trying conservative management again rather than the surgical intervention. The recent body of evidence in physiotherapy has been supportive of low-level laser therapy, taping facial exercises, neuromuscular retraining along with biofeedback with the proven effects of other traditional interventions such as interrupted galvanic current, facial massage, and other electrophysical agents [12]. Other treatment options may also include proprioceptive neuromuscular facilitation and botulinum toxin injections. However, as seen in the case report, if there is an association with NVCC, the long-term prognosis remains uncertain with physical therapy alone. Thus, this case report emphasizes the utmost importance of ongoing monitoring and multidisciplinary care in order to optimize functional outcomes and improve the quality of life for such patients.

4. Conclusion

Bell's palsy is an idiopathic condition which is usually self-limiting but in some cases, the cause can be linked with certain conditions which can delay their course and disrupt the healing. NVCC syndrome occurs when a cranial nerve (facial nerve in this case) is compressed at the Redlich-Obersteiner's zone and poses a threat. The present case displays the diagnostic complexities and therapeutic uncertainties

that can occur in managing recurrent Bell's palsy along with NVCC. The collaborative approach from multiple disciplines and the thorough diagnostic investigation played an imperative role in discovering the root cause of the pathology. However, the limited response to physiotherapy was noted which is in correlation with limited evidence of its efficacy alone. Furthermore, there is a need for further research and innovation in treatment options for NVCC-related Bell's palsy. Further research into the efficacy of physiotherapy and alternative interventions and predictors of treatment response is essential to improve outcomes and enhance the long-term prognosis along with the quality of life for patients with NVCC-induced Bell's palsy.

Statement of Ethics

A written informed consent was obtained from the patient's parents and a verbal consent was taken from both the parents and the patient. The ethical approval was not required as per the hospital policies.

Conflict of Interest Statement

The authors declare no competing or conflict of interests.

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None.

Author Contributions

Mohamed Anas Mohamed contributed toward the conception, design, literature review, writing of the manuscript, data collection, and the analysis; Mizba Mohamed provided therapeutic intervention and supervision, and participated in the literature review, critical review, and writing of the abstract; and Waqar Naqvi contributed toward the design, analysis and interpretation, critical review, supervision, and review and revision of the manuscript. All the authors have agreed to the final manuscript.

Data Availability Statement

All data generated during this report have been included in the article.

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