

CASE REPORT

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# Facial nerve baroparesis: a case report

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## Abstract

**Background** Facial nerve baroparesis is a peripheral facial nerve injury resulting from barotrauma during activities such as diving, aviation, and mountain climbing. This condition occurs when increased pressure in the middle ear affects the facial nerve, leading to facial palsy. Despite being documented in otolaryngology literature, facial nerve baroparesis remains underreported and often misunderstood. Enhanced awareness and education about this condition are essential for effectively managing affected patients, helping to mitigate unnecessary panic and procedures during episodes.

**Case presentation** We present two cases of facial nerve baroparesis that occurred during flights. The first case involves a 25-year-old Arab male with no significant medical history who experienced a transient, one-time episode of right-sided facial nerve baroparesis during a flight from Kuwait to Syria; he reported nasal congestion and a sore throat prior to the flight, with the episode lasting approximately 30 min before resolving spontaneously. The second case is a 30-year-old Arab female with a history of chronic allergic rhinitis, who has experienced recurrent episodes of left-sided facial nerve baroparesis for the past 2 years, occurring during nearly every flight; each episode lasted around 5 min, caused severe facial pain, and also resolved spontaneously. Both patients exhibited varying degrees of Eustachian tube dysfunction. Treatment for the recurrent case included maneuvers to alleviate ear pressure and the use of nasal decongestants, which improved symptoms and decreased the frequency of episodes.

**Conclusion** Facial nerve baroparesis is frequently underestimated due to its temporary nature, yet it remains a significant cause of facial nerve palsy, especially after changes in pressure. Although the underlying mechanisms are not completely understood, dysfunction of the Eustachian tube is believed to be a contributing factor. Identifying the characteristic features of baroparesis—such as rapid onset, brief duration, and bilateral involvement of facial muscles—is essential for effective management. This highlights the necessity of educating healthcare professionals and flight personnel about this condition to prevent unnecessary treatments. For recurrent cases, management strategies should focus on alleviating Eustachian tube dysfunction.

**Keywords** Case report, Facial nerve, Baroparesis, Eustachian tube dysfunction

## Background

The facial nerve (FN), the seventh cranial nerve, is a complex structure encompassing sensory, motor, and parasympathetic fibers [1]. Injury to the FN can result in a spectrum of debilitating symptoms, including facial paresis, pain around the ear, facial numbness, altered taste,

dry eyes, hearing disturbances, and dizziness [2]. These manifestations arise from disruptions to the nerve's sensory, motor, and autonomic functions. FN injuries are categorized as either central or peripheral. Central lesions primarily affect the lower segment of the contralateral face, while peripheral lesions impact the upper and lower segments on the same side [3]. The specific location of a peripheral injury can further influence the symptoms experienced.

Peripheral FN injuries arise from diverse etiologies, including congenital factors, birth-related complications,

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idiopathic conditions (such as Bell's palsy), infections, trauma, iatrogenic factors, and metabolic disorders [4], with Bell's palsy representing the most common cause [3]. A less frequent but clinically significant etiology is barotrauma. This phenomenon, often associated with activities like diving, aviation, and mountain climbing [5], occurs due to impaired Eustachian tube function, leading to pressure imbalances within the middle ear during ascent. The resultant overpressure can then compress the FN, leading to a distinct form of peripheral palsy known as facial baroparesis [6].

Characterized by rapid onset and often transient nature, facial baroparesis is likely underreported in clinical practice. This underreporting may be attributed to the condition's tendency towards spontaneous resolution, often without the need for medical intervention [7]. However, accurate documentation and understanding of facial baroparesis is crucial for appropriate patient management and education. Failure to recognize this condition can lead to unnecessary anxiety for patients and may mask the need for interventions in more severe or persistent cases. This report presents two cases of flight-related baroparesis that highlight the varied presentations of this condition: one involving a single, isolated episode during a flight, and the other notable for recurrent episodes of FN palsy across multiple flights.

Case presentation

Case 1

A 25-year-old Arab male presented to the otolaryngology clinic at Al-Mouasat University Hospital following a single episode of FN baroparesis. While traveling from Kuwait to Syria, he experienced a sudden onset of FN paralysis that lasted approximately 30 min. His symptoms included an inability to move the right side of his face, particularly an inability to close his right eye, along with facial numbness and pain on the same side.

The patient denied any significant medical history, smoking, or alcohol consumption. He reported nasal congestion and a sore throat prior to the episode. At the time of presentation, he denied hearing loss, pain, or tinnitus. Neurological examination was unremarkable, with normal function of all FN-innervated muscles. However, examination revealed nasal congestion and pharyngeal erythema. Otoscopy was normal bilaterally, tympanometry revealed negative pressure within the right middle

ear, characterized by a type C tympanogram, with the peak occurring at -162 daPa. A nasal decongestant was prescribed, and the patient was advised to return if symptoms recurred. Follow-up of the patient is presented in Table 1

Of note, the patient remained calm during the episode, likely due to his prior knowledge of this condition.

Case 2

A 30-year-old Arab female with a history of recurrent left-sided FN baroparesis, specifically associated with air travel, presented to the otolaryngology clinic at Al-Mouasat University Hospital for evaluation. Her past medical history was significant only for chronic allergic rhinitis. Her initial episode occurred approximately 2 years ago during an air travel while experiencing flu-like symptoms. Since then, she has experienced episodes of FN baroparesis with nearly every flight.

Each episode lasted approximately 5 minutes and was characterized by severe left-sided facial pain and numbness, particularly in and around the left ear, accompanied by ipsilateral facial paralysis and excessive tearing. She notes a correlation between symptom severity and the intensity of her allergic rhinitis.

Physical and neurological examinations were unremarkable aside from nasal congestion. Otoscopy revealed no significant findings; however, tympanometry indicated negative pressure in the left middle ear characterized by a type C tympanogram, with the peak occurring at -170 daPa. Cetirizine was prescribed to manage the patient's chronic allergic rhinitis. She was also instructed on performing simple maneuvers to alleviate ear pressure during episodes and was prescribed a nasal decongestant for use both prophylactically before flights and as needed during episodes. These interventions led to significant improvement and a reduced frequency of baroparesis episodes for the patient. Follow-up of the patient is presented in Table 2

Discussion and conclusion

Discussion

The pathophysiology of FN baroparesis, while not fully understood, is believed to arise from a complex interplay between Eustachian tube dysfunction (ETD) and factors affecting the FN vulnerability to pressure changes within the temporal bone.

Table 1 Follow-up of patient 1

First visit	Second visit: after 2 weeks	Third visit: after 3 months
Cold symptoms with nasal congestion and pharyngeal erythema	Normalization of symptoms. The patient did not travel during this period	Normal physical exam. The patient had two flights during this period and did not experience any episodes of facial nerve baroparesis

**Table 2** Follow-up of patient 2

First visit	Second visit: after 2 weeks	Third visit: after 3 months
Nasal congestion, clear rhinorrhea, and nasal pruritus due to her chronic allergic rhinitis	Symptoms had improved, but she still experienced persistent symptoms of allergic rhinitis. The patient did not travel during this period	The patient had four flights during this period, and she experienced a baroparesis episode only during her second flight

ETD, often stemming from mucosal edema caused by irritation, infection, or allergy, disrupts the normal equalization of pressure between the middle ear and the surrounding atmosphere, particularly during activities involving rapid or significant pressure changes. This can lead to elevated middle ear pressure, primarily affecting the FN as it courses through the tympanic cavity.

Several hypotheses aim to explain how pressure differentials within the middle ear can lead to FN dysfunction in baroparesis. One prominent theory suggests that the pressure compresses the vasa nervorum—the delicate network of capillaries supplying the FN. This compression can lead to ischemic neuropraxia, a temporary paralysis resulting from reduced blood flow [8]. Another theory implicates temporal bone hyperpneumatization as an etiologic factor, as imaging studies frequently reveal areas of increased pneumatization in affected individuals [9].

ETD is likely present in both presented cases, as indicated by the negative pressure in the middle ear observed through tympanometry.

As demonstrated in our two cases and supported by existing literature, baroparesis presents with significant variability. Some individuals experience transient, isolated episodes, as seen in our first case, while others, like our second case, may contend with recurrent episodes [10]. The duration of these episodes can also vary widely.

Understanding the clinical presentation of baroparesis is crucial to avoid misdiagnosis and unnecessary interventions. The typically transient nature of the episode, its close association with pressure changes during flight, and the characteristic peripheral type—which affects both the upper and lower face—of FN injury are key distinguishing features. Misinterpreting these symptoms as a stroke could trigger a cascade of inappropriate actions, including emergency landings, unnecessary hospitalizations, extensive and costly neuroimaging, and undue anxiety for the patient. Conversely, failing to recognize the forehead-sparing characteristic of central facial palsy and mistakenly attributing the symptoms to baroparesis could lead to dangerous delays in diagnosing and treating potentially serious conditions such as stroke or other intracranial pathology [11].

As highlighted in our first case, awareness of baroparesis and its typically transient and self-limiting nature

played a crucial role in maintaining calm. Educating flight crews and physicians about this condition is essential not only to guide appropriate management but also to effectively reassure and alleviate anxiety in affected individuals, preventing unnecessary escalation of medical interventions.

While no standardized treatment for baroparesis exists due to its limited documentation and often transient nature, several management strategies have been explored, particularly for recurrent cases, primarily targeting ETD. During an episode, simple maneuvers such as yawning, swallowing, the Toynbee maneuver (pinching the nose and swallowing), the Valsalva maneuver (exhaling against a closed mouth and pinched nose), or chewing gum can help equalize pressure in the middle ear by opening the Eustachian tube [5]. Additionally, nasal decongestants used prophylactically before flights and during an episode can reduce Eustachian tube swelling, promoting drainage and pressure equalization [8]. In some cases, a grommet, a small ventilation tube, may be inserted into the eardrum to facilitate pressure regulation [10, 12].

**Conclusion**

FN baroparesis, though often overlooked due to its transient nature, is an important consideration in cases of FN palsy, particularly following pressure changes. While the exact mechanism is not fully understood, ETD plays a key role. Recognizing the typical presentation of baroparesis—which includes rapid onset, transient duration, and involvement of both the upper and lower face—is crucial for appropriate management. This underscores the importance of educating physicians and flight crews about this condition to help avoid unnecessary interventions. Recurrent cases can be managed with strategies aimed at addressing ETD.

**Abbreviations**

FN      Facial nerve  
ETD    Eustachian tube dysfunction

**Acknowledgements**

I would like to acknowledge the patients who participated in this study

**Author contributions**

Not applicable.

**Funding**

The study did not receive funding.

**Availability of data and materials**

All data are included in this article.

**Declarations****Ethics approval and consent to participate:**

This is a case report; therefore, it did not require ethical approval from the ethics committee.

**Consent**

Written informed consent was obtained from the patients for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal

**Competing interests**

The Author declares no competing interest.

Received: 30 August 2024 Accepted: 4 October 2024

Published online: 12 November 2024

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