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Case Report

Recurrent Facial Baroparesis Occurring on Commercial Flights in The United States

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Abstract

Background: Facial baroparesis was first described in 1985 and refers to transient facial neurapraxia due to barotrauma. We report a case of recurrent facial baroparesis occurring during domestic flights.

Methods: We describe a case of a 44 year-old male presenting with two episodes of transient facial paresis occurring on two separate domestic flights.

Results: Thyroid function, hemoglobin A1c, and rapid plasma reagin levels were normal or negative. Transthoracic echocardiogram, carotid ultrasound and brain MRI with gadolinium were normal. Audiometry revealed mild sensorineural hearing loss and tympanometry showed mild negative pressure. Since then he has been symptom-free hence warranting no further treatment.

Conclusions: Facial baroparesis is relatively unknown but can be easily diagnosed based on the history and knowledge of middle ear anatomy. More than 70 million people fly annually within the US, therefore facial baroparesis should be recognized by all physicians and not be confused with Bell's palsy.

Keywords: Facial Baroparesis; Neurapraxia; Commercial Flight; Eustachian Tube Dysfunction; Bony Canal Dehiscence

Introduction

Facial baroparesis was first described in 1985 and refers to transient facial neurapraxia due to barotrauma, resulting in facial nerve palsy. It can occur while deep sea diving, scuba diving or during civil aviation. We report a case of recurrent facial baroparesis occurring on either side while flying commercially. A 44 year-old businessman presented with two episodes of isolated transient facial paresis occurring on two separate domestic flights. The first episode occurred 7 years ago while flying with his wife from Ontario, California to Portland, Oregon. Halfway up in the air, he developed a left facial droop with difficulty closing his eye associated with numbness inside his mouth and tongue which completely resolved 30 minutes later. He had then flown from Ontario, California to Israel, London and Mexico over the course of one year without developing any symptoms. 6 years ago while flying alone from Ontario, California to Houston, Texas, halfway up in the air; he experienced a 30 min-episode of transient right facial droop with tongue numbness. He remembers having upper respiratory tract infections with difficulty clearing his ears during both episodes and started taking decongestants. He saw several primary care physicians and otolaryngologists without receiving a diagnosis. Past medical history was significant for hyperlipidemia and benign prostatic hypertrophy. Medications included lovastatin and

closing his eye associated with numbness inside his mouth and tongue which completely resolved 30 minutes later.

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He saw several primary care physicians and otolaryngologists without receiving a diagnosis.

Past medical history was significant for hyperlipidemia and benign prostatic hypertrophy. Medications included lovastatin and tamsulosin.

His ear and neurological exam were normal. Thyroid function, hemoglobin A1c, and rapid plasma reagin levels were normal or negative. Transthoracic echocardiogram, carotid ultrasound and brain MRI with gadolinium were normal.

Audiometry showed mild sensorineural hearing loss and tympanometry revealed mild negative pressure. Otolaryngology recommended continuing decongestants prior to flights and inserting ventilating tubes if symptoms recur. He remained symptom-free for the past 6 years without requiring further treatment.

Discussion

Facial nerve palsy due to barotrauma was first described in deep sea divers in 1985 [1] and later in scuba diving [2]. It was then described in a 24 year-old Israeli aviator in 2004 [3].

The facial nerve is most vulnerable along the medial wall of the middle ear, where only the thin bony covering of the fallopian canal provides protection.

Neurapraxia due to extremely elevated hydrostatic pressure in the middle ear were demonstrated in isolated nerve preparations, [4] and studies in guinea pigs suggested ischemic neurapraxia as the underlying mechanism [5].

In order for facial baroparesis to occur, two anatomical conditions must co-exist; 1. eustachian tube dysfunction/ obstruction and 2. dehiscence of the surface of the facial bony canal within the middle ear. Dehiscence of the facial nerve canal is present in 55% of the population, [6] and blood flow to the facial nerve also decreases if middle ear pressure is transmitted through a dehiscent facial nerve canal. Our patient most likely had bilateral dehiscence of the facial nerve canal; high-resolution CT may or may not reveal bony dehiscence of the facial nerve canal.

Transient Eustachian tube dysfunction (in this case due to congestion) prevents equalization of pressures between the middle ear and external atmosphere. An increase in altitude (on an ascending aircraft) would result in a decrease in the external atmospheric pressure, creating a pressure gradient to compress part of the facial nerve which is not covered by the bony canal.

Facial baroparesis is relatively unknown to most physicians but can be easily diagnosed based on the history and knowledge of middle ear anatomy. With over half of the all population have dehiscent facial nerve canal, which is relatively easy to identify (Figure 1), and more than 70 million people flying annually within the United States, facial baroparesis should be recognized by all physicians and not be confused with Bell's palsy.

Treatment options include decongestants to alleviate Eustachian tube dysfunction, or ventilating tubes, which would abolish the pressure gradient between the middle ear and external atmosphere. Bone cement to seal the dehisced facial canal could be a last resort.

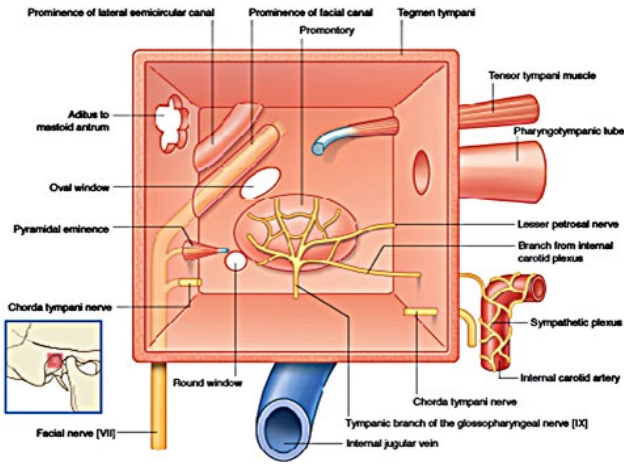

Figure 1. Middle ear anatomy. Note the prominence of the facial canal, which can be dehiscent and resulting in exposure of the facial nerve to the middle ear space, which connects to the pharyngotympanic tube, otherwise known as the Eustachian tube (used with permission from Drake et al: Gray's Anatomy for Students 3e9780702051319.)

Conclusions

1. Facial baroparesis is relatively unknown to most physicians but can be easily diagnosed based on the history and knowledge of middle ear anatomy.

2. In order for facial baroparesis to occur both eustachian tube dysfunction and facial bony dehiscence within the middle ear must co-exist.

3. More than 70 million people fly annually within the United States; therefore facial baroparesis should be

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