

Patulous eustachian tube after percutaneous balloon microcompression for trigeminal neuralgia: case report

M CRESSWELL¹, J BUCKLAND¹, P WEST², O SPARROW³

¹Departments of ENT, and ²Audiovestibular Medicine, Queen Alexandra Hospital, Portsmouth Hospitals NHS Trust, and ³Wessex Neurosurgical Centre, University Hospital Southampton NHS Trust, UK

Abstract

Objective: To report a case of patulous eustachian tube which occurred after percutaneous balloon microcompression of the Gasserian ganglion.

Method: Retrospective case review.

Results: A 41-year-old man was referred to our audiovestibular medicine department following episodes of autophony. These symptoms appeared two weeks after percutaneous balloon microcompression performed to treat severe trigeminal neuralgia secondary to multiple sclerosis. A diagnosis of patulous eustachian tube was indicated by clinical examination and tympanometry. The symptoms were present for less than six months and improved without any specific treatment.

Conclusion: Percutaneous balloon microcompression is a procedure used for refractory trigeminal neuralgia that can cause transient sensory and motor deficits of any of the trigeminal nerve branches. It is proposed that injury to the mandibular division in this case caused temporary tensor veli palatini dysfunction with consequent patulous eustachian tube.

Key words: Eustachian Tube; Trigeminal Neuralgia; Trigeminal Ganglion; Trigeminal Nerve Injuries; Multiple Sclerosis

Introduction

Percutaneous balloon microcompression is one of the methods used to treat trigeminal neuralgia. This procedure, which was first introduced by Mullan and Lichtor in 1983, is performed by inserting a balloon catheter through the foramen ovale into the region of the Gasserian ganglion and inflating the balloon for 1–10 minutes.^{1,2} Percutaneous balloon microcompression improves the symptoms of trigeminal neuralgia by selectively injuring the myelin sheath of the large myelinated fibres that mediate light touch.³ It is indicated for patients with trigeminal neuralgia which proves intractable despite medical therapy, or when the side effects of medications exceed the patient's tolerability.³

This paper reports a case in which patulous eustachian tube was a complication of percutaneous balloon microcompression performed for trigeminal neuralgia.

Case report

A 41-year-old man with highly active multiple sclerosis and left-sided trigeminal neuralgia was treated with percutaneous balloon microcompression of the left Gasserian ganglion. The treatment had good results in terms of pain relief. However, two weeks after the procedure, the patient experienced intermittent episodes of autophony (defined as an abnormal appreciation of one's own bodily sounds, notably voice, breathing and heartbeat) in the left ear that lasted from 30 minutes to 2 hours. He described hearing his own

voice and breath sounds, which could be relieved by lying down. He also developed left-sided facial numbness and experienced difficulty in mastication; these are recognised complications of percutaneous balloon microcompression (Table I).

The patient was seen in the audiovestibular medicine out-patient clinic. Otoscopic examination revealed free movement of the left tympanic membrane during respiration. The tympanic membrane (on either side) appeared

TABLE I
PERCUTANEOUS BALLOON MICROCOMPRESSION
COMPLICATIONS^{3,4}

Ipsilateral facial sensory loss
Weakness or atrophy of masseter muscle
Corneal anaesthesia
Dysaesthesia
Anaesthesia dolorosa
Corneal keratitis
Transient diplopia secondary to cranial nerve dysfunction
Transient sudden blindness
Cheek haematoma
Horner's syndrome
Arteriovenous fistula
Cerebrovascular event
Altered taste sensation or loss of olfactory sense
Hearing loss
Aseptic meningitis

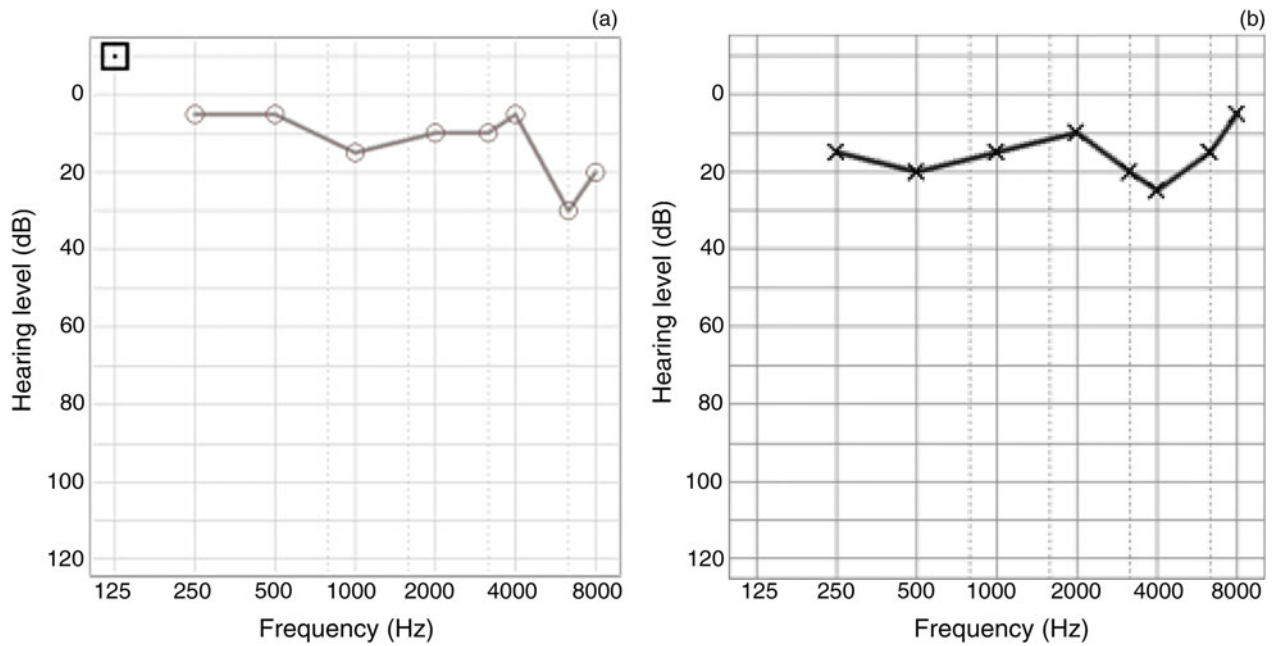


FIG. 1 Pure tone audiogram (250–8000 Hz).

otherwise normal. Audiometry was within normal limits (Figure 1). Compliance of the left middle ear was recorded; this showed a respiration-synchronous pattern (Figure 2). Subsequent examination of the postnasal space and palate was normal. These findings were consistent with a diagnosis of patulous eustachian tube.

The mechanism and benign nature of the symptoms were explained to the patient, and he was referred to the otolaryngology clinic. Here, at review six months after the percutaneous balloon microcompression, the patient reported that his symptoms had resolved.

Discussion

Patulous eustachian tube is defined as a permanently open eustachian tube. It was first described by Schwartz in 1864, following his observation of a fibrous and atrophic eardrum that moved synchronously with breathing.^{4,5} Typical symptoms are autophony, a sense of aural fullness

and tinnitus, often pulsatile.⁴ The cyclical changes in middle-ear compliance during the breath cycle can be recorded in patulous eustachian tube patients using tympanometry with steady pressure (Figures 2 and 3).

After percutaneous balloon microcompression, patients may experience sensory and motor deficit to areas innervated by the trigeminal nerve branches. The tensor veli palatini is innervated by the medial pterygoid nerve, a branch of the mandibular division of the trigeminal nerve, and is the

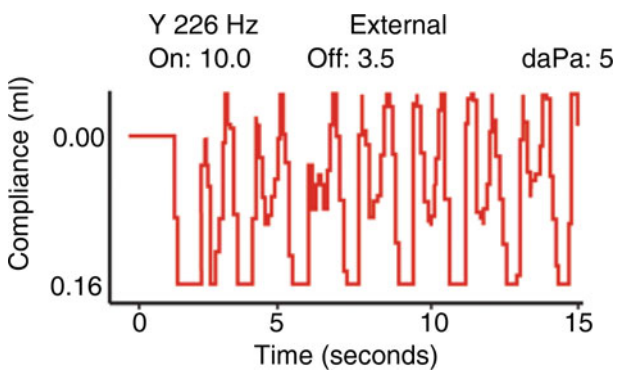


FIG. 2

Middle-ear compliance recording (left ear) showing a respiration-synchronous pattern (maximum compliance = 0.40 ml).

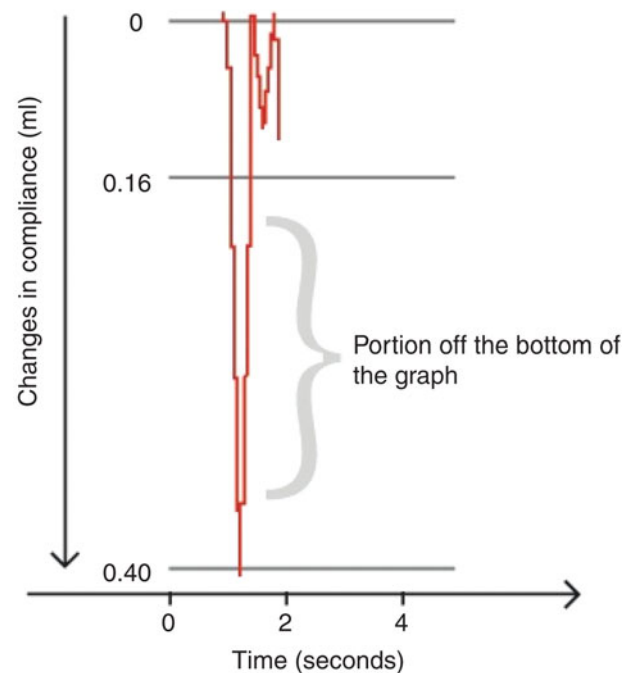


FIG. 3

Reconstruction of middle ear compliance during a complete breath cycle: inspiration (down slope) and expiration (up slope).

only muscle of the palate not innervated by the vagus nerve. This muscle is attached to the lateral cartilaginous lamina of the eustachian tube and assists in its opening during swallowing or yawning to allow air pressure to equalise across the tympanic membrane.⁶

Percutaneous balloon microcompression could cause dysfunction of the tensor veli palatini muscle secondary to injury of the medial pterygoid nerve. The exact pathophysiological mechanism in this case is unclear, but the eustachian tube orifice was clearly dysfunctional after percutaneous balloon microcompression. It is possible that the tensor veli palatini was in a (tonic) state of hyperfunction, rather than palsy, as a result of percutaneous balloon microcompression, thus giving rise to patulous eustachian tube.

- **Percutaneous balloon microcompression is used for refractory trigeminal neuralgia**
- **The procedure is associated with transient sensory and motor deficits of trigeminal nerve branches**
- **This case report shows an association between percutaneous balloon microcompression and patulous eustachian tube**
- **A history of intermittent autophony and measurement of middle-ear compliance are key for patulous eustachian tube diagnosis**
- **In this case report, the patulous eustachian tube symptoms resolved within six months**

We did not find any reports of similar cases. This suggests either that patulous eustachian tube is an extremely rare complication of percutaneous balloon microcompression or that it has not been reported because of the transient nature of the symptoms.

References

- 1 Mullan S, Lichtor T. Percutaneous microcompression of the trigeminal ganglion for trigeminal neuralgia. *J Neurosurg* 1983; **59**:1007–12
- 2 Lichtor T, Mullan JF. A 10-year follow-up review of percutaneous microcompression of the trigeminal ganglion. *J Neurosurg* 1990; **72**:49–54
- 3 Strojnik T, Smigoc T. Percutaneous trigeminal ganglion balloon compression rhizotomy: experience in 27 patients. *ScientificWorldJournal* 2012; **2012**:328936
- 4 Muñoz D, Aedo C, Der C. Patulous eustachian tube in bariatric surgery patients. *Otolaryngol Head Neck Surg* 2010; **143**:521–4
- 5 Grimmer JF, Poe DS. Update on eustachian tube dysfunction and the patulous eustachian tube. *Curr Opin Otolaryngol Head Neck Surg* 2005; **13**:277–82
- 6 Lopez BC, Hamlyn PJ, Zakzewska JM. Systematic review of ablative neurosurgical techniques for the treatment of trigeminal neuralgia. *Neurosurgery* 2004; **54**:973–82; discussion 982–3

Address for correspondence:

Dr M Cresswell,
12 Appleton Mews,
Colchester CO4 5ZQ, UK

E-mail: manucresswell@gmail.com

Dr M Cresswell takes responsibility for the integrity of the content of the paper
Competing interests: None declared
