Chiara De Angelis[‡,*], Roberto Compare [‡]

[‡] DDS, Private practitioner, Rome, Italy
** Corresponding author. Email: chiara86@gmail.com*

BARODONTALGIA:

CURRENT CONCEPTS OF PRESSURE-CHANGING RELATED DENTAL PAIN

INTRODUCTION

Barodontalgia is an important clinical entity caused by atmospheric pressure changes [1,2], defined as "a pain or trauma affecting teeth due to variations in pressure gradients" [1,3] or "an oral (dental or non-dental) pain caused by a change in barometric pressure in an otherwise asymptomatic organ" [1]. Barodontalgia commonly affects air crew and aircraft passengers as well as professional and amateur SCUBA divers. It presents with such overlapping signs and symptoms, that in normal clinical setup the pain due to barodontalgia goes unnoticed [1]. The aim of this study is to review the updated knowledge regarding this uncommon toothache.

MATERIALS & METHODS

The Authors searched on MEDLINE/PUBMED for literature review published about barodontalgia. We considered only some reviews published up to February 2013 regarding epidemiology, etiology and pathogenesis, clinical presentations and possible prevention of barodontalgia. No restrictions of publication dates were used.

RESULTS

EPIDEMIOLOGY

Most of the existing data were derived from the military [4]. Barodontalgia affects 0,26-2,8% in aircraft personnel, air passengers, and divers [5]. It was reported to occur during flying at altitudes of 600–1500m and during diving at depths of 10–25m [5]. No statistical difference between diving and flying personnel has been reported [5].

CLASSIFICATION

Barodontalgia is subgrouped into "direct" (pulp-related) and "indirect" (barosinusitis, barotitis media-induced) pain [6]. **TABLE 1** shows the currently accepted classification of direct barodontalgia, developed by Ferjentsik and Aker in 1982. **TABLE 2** compares the two forms of barodontalgia [7].

ETIOLOGY AND PATHOGENESIS

Most cases of barodontalgia are associated with teeth already affected by some sort of pathology [3]. In particular, pulpitis is the reported main cause of barodontalgia from the 1940s to date [7]. The pathophysiology of this pain is still not completely understood, and currently there is no consensus about the mechanism underlying pulpitis-induced barodontalgia. Several suggestions have been offered to explain the mechanism underlying barodontalgia in pulpitis [4,7]: direct ischaemia resulting from inflammation itself; indirect ischaemia resulting from intra-pulpal increased pressure as a result of vasodilatation and fluid diffusion to the tissue; the result of intra-pulpal gas expansion; the result of gas leakage through the vessels because of reduced gas solubility.

PREVENTION

One of the easiest ways to avoid barodontalgia is to maintain good oral health 1,2. The Fédération Dentaire Internationale (FDI) recommends an annual checkup for divers, submariners and pilots, 1,3. During periodic dental examination, special attention should be given to defective restorations, restorations with poor retention, secondary caries lesions, and signs of teeth attrition 2,3,6. Pulp testing and periapical radiographs should be performed in teeth with preexisting extensive restorations to rule out occult pulp necrosis 2. Also, ambulatory dental appointments should be scheduled for a date with a sufficient time interval before the next planned flight or dive 2. At the end, patients should not dive or fly in non-pressurized cabins within 24 hours of a dental treatment requiring anesthetic or 7 days following a surgical treatment.

Table 1: CLASSIFICATION OF DIRECT BARODONTALGIA [4,8]

Class	*Cause*	*Symptoms*	*Clinical findings*
I	Non-reversible pulpitis	Sharp momentary pain on ascent	Caries or restoration with inadequate base. Tooth is vital. Radiograph shows no periapical pathosis.
II	Reversible pulpitis	Dull throbbing pain on ascent	Deep caries or restoration. Tooth is vital/non-vital. Radiograph shows no periapical pathosis.
III	Necrotic pulpitis	Dull throbbing pain on descent	Caries or restoration. Tooth is non-vital. Radiograph shows no periapical pathosis.
IV	Periapical abscess or cyst	Severe persistent pain on ascent and descent	Caries or restoration. Tooth is non-vital. Radiograph shows no periapical pathosis.

Table 2: DIRECT VS INDIRECT BARODONTALGIA [7]

	Direct barodontalgia with or without periapical involvement	*Indirect barodontalgia*
Cause	Pulp/periapical disease	Barosinusitis, barotitis media.
Appearance	***Pulpitis*:** during take-off or ascent. Pain usually appears during landing at the appearance-level. ***Periapical periodontitis*:** usually at high altitude (≈11,5 km) during ascent or landing.	During landing. Pain usually continues on ground.
Symptoms	***Irreversible pulpitis*:** sudden sharp penetrating pain. ***Reversible pulpitis or necrotic pulp*:** beating dull pain. ***Periapical periodontitis*:** continuous strong pain, swelling.	Toothache in upper premolar/molar region.
History	Recent dental treatment. Recent dental sensitivity (e.g. to cold drinks, percussion/eating).	Present acute upper respiratory infection. Past sinusitis.
Clinical findings	Extensive caries lesions or (faulty) restoration. Acute pain upon cold or percussion test.	Pain on sinus palpation. Pain upon a sharp change in the head position.
Radiological findings	Pulpal caries lesions and/or restoration close to pulp-horn. Periapical radiolucency. Inadequate endodontic obturation.	Opacity (fluid) on the maxillary sinus image.

CONCLUSIONS

It appears that controversy still exists as to the exact etiology of barodontalgia and the mechanisms of the pain [3]. An agreement seems to be found on the influence of a pressure gradient and some sort of pathology in oral tissues or sinuses must both be present to result in symptoms of barodontalgia [3]. Although barodontalgia is currently quite rare, clinicians should be familiar with this condition [2] and should be prepared to take preventive measures in patients who have been specifically identified as having a high risk for barodontalgia [3]. Dentists will be able to provide more efficient diagnosis and care by referring to FDI guidelines, as well as knowing how certain dental materials respond to pressure gradients [3].

LITERATURE CITED:

1) Gaur TK, Shrivastava TV. Barodontalgia: a clinical entity. Journal of Oral Health & Community Dentistry 2012; 6(1)18-20 **2)** Zadik Y. Dental barotrauma. The International Journal of Prosthodontics 2009; 22:354-357 **3)** Robichaud R, McNally ME. Barodontalgia as a differential diagnosis: symptoms and findings. Journal of the Canadian Dental Association 2005; 71(1):39–42 **4)** Zadik Y. Barodontalgia. Journal of Endodontics 2009; 35:481-485 **5)** Stoetzer M, Kuehlhorn C, Ruecker M, Ziebolz D, Gellrich NC, von See C. Pathophysiology of barodontalgia: a case report and review of the literature. Case Reports in Dentistry 2012; 2012:453415 **6)** Zadik Y. Barodontalgia: what have we learned in the past decade? Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics 2010; 109:e65-e69 **7)** Zadik Y. Aviation dentistry: current concepts and practice. British Dental Journal 2009; 206:11-16 8) Brandt MT. Oral and maxillofacial aspects of diving medicine. Military Medicine 2004; 169(2):137-41