

Complicated suppurative otitis media in a Greek diver due to a marine halophilic *Vibrio* sp.

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Abstract

Halophilic vibrios are distinct from non-cholera vibrios and have been recognized increasingly as potentially pathogenic bacteria in extraintestinal infections. A case of suppurative chronic otitis media in a Greek diver with *Vibrio alginolyticus* recovered from an ear drainage culture, is reported. The patient received appropriate antimicrobial therapy and her hearing improved significantly after a tympanoplasty type I was performed.

The association of halophilic *Vibrio* spp. infections with prolonged seawater contact, particularly in subtropical climates, is discussed. In swimmers with extensive exposure to salt water, individual preventive measures and aetiological treatment of ear infections seems to be required in order to reduce the severity of possible *Vibrio* spp. ear infections.

Key words: Otitis media; *Vibrio* infections, *Vibrio alginolyticus*; Seawater; Sub-tropical climate

Introduction

Halophilic vibrios are one of the major groups of bacteria recognized in the marine environment. They are distinct from non-cholera vibrios and include *Vibrio parahaemolyticus*, *Vibrio vulnificus* and *Vibrio alginolyticus*. The latter microorganism is more halotolerant than other members of the group growing in eight per cent and in most cases in 10 per cent sodium chloride. It is also more thermostable cultivating readily at 42°C (Lennette *et al.*, 1985). Halophilic vibrios exhibit primary tropism for extraintestinal body sites and clinical incidence of disease has followed seafood ingestion or injuries sustained in seawater (Bonner *et al.*, 1983; Howard *et al.*, 1985; Janda *et al.*, 1988). However, in contrast to the others, *V. alginolyticus* has infrequently been isolated from human infections despite its widespread saprophytic existence in coastal waters (Chan *et al.*, 1986). In ear infections it has only been identified in a few mild and self-limited cases, particularly, from subtropical climatic zones (Hasyn *et al.*, 1987; Puy *et al.*, 1989; Levine *et al.*, 1993; Reina-Prieto and Hervás-Palazon, 1993). Prolonged contact with seawater has been noted as the most probable source in such cases.

We report the isolation of *V. alginolyticus* from a chronic purulent otitis media in a patient from the Mediterranean region of northern Greece. The epidemiology and pathogenesis of infection caused by marine vibrios is briefly reviewed. There is a paucity of data in the literature on this subject.

Case report

A 21-year-old female patient presented to the ENT Department of AHEPA University Hospital, with a history of suppurative otitis media which had been present since childhood. She mentioned she had had upper respiratory tract infections, constantly associated with

purulent ear infections (approximately once a month) over the past five years. She was usually administered antibiotic therapy without any causative rationale by the local GPs. Her main symptoms on admission were intermittent purulent otorrhoea and tinnitus with mild to moderate hearing loss. The latter was confirmed by pure tone audiometry which showed right conductive hearing impairment, ranging from 30–40 dB in the speech frequencies (Figure 1). Otoscopy showed a central tympanic membrane perforation while, roentgenographical examination (Schüller projection) showed a low mastoid

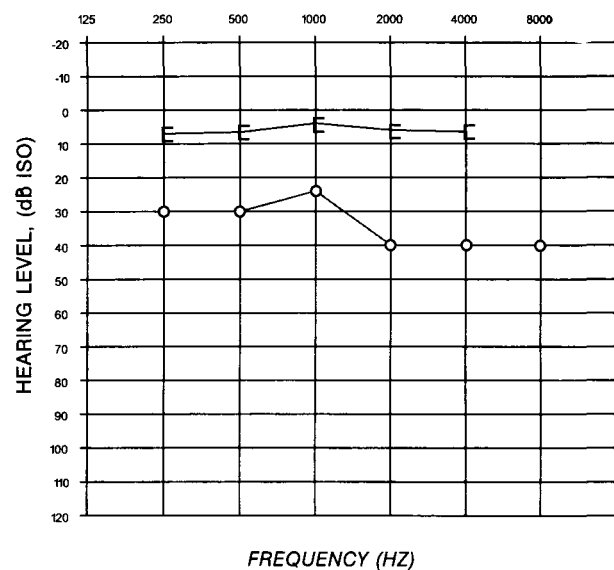


FIG. 1

□ = B.C. right ear; ○ = A.C. right ear.

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pneumatization (sclerotic mastoid). From the medical history an underlying illness was not identified but a prolonged and extensive contact with seawater at Thermaikos on the Gulf coast of northern Greece, was noted. The patient used to dive without taking any protective measures for her diseased ear.

Cultures of specimens from the ear infection drainage revealed a heavy growth of *Vibrio alginolyticus* in pure culture. The organism grew readily on the standard medium which contains sodium chloride (MacConkey medium) as well as on the selective thiosulphate–citrate bile salts – sucrose medium (Difco Laboratories, Detroit, MI). The bacterial isolate was identified using the PASCO system (Difco Laboratories) and identification was confirmed by testing for various properties (Lennette *et al.*, 1985). Determination of its susceptibility to a range of antimicrobial agents was performed by using the same system according to the instructions of the manufacturer. The susceptibility status was defined according to the recommendations of the National Committee for Clinical Laboratory Standards (1990). This microorganism was found resistant to ampicillin and ticarcillin but exhibited sensitivity to other (tested) classes of antimicrobials such as combinations of β -lactamase inhibitors with penicillins, cephalosporins, aminoglycosides, quinolones and tetracyclines.

On the basis of the susceptibility test the patient was started on amoxicillin/clavulanate 625 mg (eight-hourly) for two weeks. After ear drainage improvement, tympanoplasty type I was carried out in order to increase the hearing level.

Discussion

As revealed by a cluster of sporadic reports, *Vibrio alginolyticus* otitis seems to be a rare infection although it has an increased prevalence in subtropical climates (Hasyn *et al.*, 1987; Puy *et al.*, 1989; Levine *et al.*, 1993). The pathogenic potential of halophilic vibrios in extraintestinal infections has been recognized increasingly in clinical practice. *V. vulnificus* and *V. parahaemolyticus* are the most commonly isolated infective species while *V. alginolyticus* has been reported only rarely as the causative agent in such infections (Bonner *et al.*, 1983; Klontz *et al.*, 1988; Levine *et al.*, 1993). The latter organism, in contrast to the former, has not been associated with diarrhoeal illness.

Most clinical isolates of *V. alginolyticus* recovered from soft tissue infections are usually found in mixed flora (Janda *et al.*, 1988). In our case, the bacterium was isolated in pure culture and its role in infection cannot be disputed, despite the fact that previous ear cultures were not available. Serious *V. alginolyticus* infections may occur if they gain entrance through cuts or abrasions. Lacerations which occur in seawater are also particularly prone to infection by the bacterium. Opal and Saxon (1986) have reported a severe intracranial suppuration, due to *V. alginolyticus*, after a diving accident in salt water. A case of conjunctivitis from which the organism was isolated has also been described (Lessner *et al.*, 1985). In addition, fatal *V. alginolyticus* infections have been reported in severely immunocompromised patients as well as in a burn patient (English and Lindberg, 1977; Bonner *et al.*, 1983; Robert *et al.*, 1991). The above reports occurred after contact with seawater or marine products. These observations on wound infections caused by *V. alginolyticus* as well as the present report of a complicated otitis media provide clear evidence that the microbe is capable of producing severe infections. However, minor soft tissue infections probably occurring in normal patients may have been self-limited or treated without culture. It is known, that GPs in

some fishing areas prefer tetracycline for seawater-related infections, because of the possibility that a *Vibrio* sp. is involved. Moreover, less severe ear infections may have been missed due to the fact that most GPs do not routinely request ear drainage culture for mild to moderate ear infections. Also, some *Vibrio* spp. ear infections may not have been detected because selective media, which facilitate identification of *Vibrio* sp., are not routinely used in ear cultures. Previous soft tissue or ear *V. alginolyticus* infections have generally occurred in otherwise healthy seawater swimmers or fishermen and have responded well to appropriate antibiotics (Blake *et al.*, 1980). In our patient, the previous blind antibiotic courses as well as the extended contact with seawater might explain the complicated infection.

Infections attributed to halophilic vibrios tend to occur in the summer months when warmer temperatures promote higher counts of vibrios (Chan *et al.*, 1986). The clustering of *V. alginolyticus* infections in association with subtropical climatic zones is consistent with epidemiological findings from previous studies in coastal waters with similar geographical conditions (Colwell *et al.*, 1977; Chan *et al.*, 1986; Chan *et al.*, 1989). These reports showed that halophilic vibrios are recovered from seawater most readily during the summer, when mean seawater temperatures are high. Interestingly, the occurrence of these bacteria in the ecological flora was found unrelated to sewage contamination and coliform isolation. Also, *V. alginolyticus* was recovered in higher numbers than other halophilic vibrios from seawater as well as from marine animals. These findings suggest that, exposure to and asymptomatic infection with, *V. alginolyticus* may be commoner than previously recognized.

Overall, *V. alginolyticus* seems to be infrequently involved in human infections despite its saprophytic occurrence in coastal waters. This, might be due to the low pathogenicity of *V. alginolyticus* for humans. There is a little information about the invasive potential or virulence of this bacterium. However, extracellular collagenases and alkaline proteases produced by the organism have been described (Hare *et al.*, 1983). These substances may act as toxins enhancing the virulence of the organism.

It is known that colonization with facultative pathogenic microorganisms increases after exposure. Apart from this contamination, indirect factors such as the climate and intensive exposure to seawater may play an important role in the aetiology of *V. alginolyticus* otitis. Interest in the halophilic vibrios as potential otitis media pathogens, especially if there is epidemiological support, seems to be required. However, most *V. alginolyticus* ear infections may not be preventable because of the ubiquitous presence of the bacterium in the marine environment. A topical application of paraffin oil before, and an aqueous solution of alcohol and acetic acid after exposure should be recommended for divers or swimmers with extensive seawater contact. Aetiological treatment of patients with a history of exposure to saline aquatic environments may reduce the severity of potential *V. alginolyticus* ear infection.

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