Bilateral osteoradionecrosis of the temporal bones: a rare complication of radiotherapy

Masyita GAFFAR [1, 2], Roslinda ABDURRAHMAN [1], Suraya AZIZ [3], Abdullah ASMA [1]
[1] Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Kuala Lumpur, Universiti Kebangsaan Malaysia
[2] Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Hasanuddin University, Hospital Labuang Baji Makassar, Indonesia
[3] Department of Radiology, Faculty of Medicine, Kuala Lumpur, Universiti Kebangsaan Malaysia

ABSTRACT

Osteoradionecrosis of the temporal bone is a rare complication of radiotherapy treatment for nasopharyngeal carcinoma (NPC). We report the case of a 72-year-old man with osteoradionecrosis of bilateral temporal bones three years after completion of radiation therapy for NPC. He presented to us with chronic ear discharge secondary to persistent right chronic otitis media for the past 15 years. Pure tone audiometry showed bilateral moderate mixed hearing loss. A right cortical mastoidectomy showed extensive granulation tissue in the mastoid cavity. Recovery was uneventful but required the use of hearing aids.

Keywords: Nasopharyngeal cancer, radiotherapy, complication osteonecrosis

INTRODUCTION

Nasopharyngeal carcinoma (NPC) is one of the most common head and neck tumours in the East and radiation is the mainstay of NPC management. [1, 2] Osteoradionecrosis is a complication of radiotherapy treatment that is characterised by damage to the osteocytes and loss of bone vascularity leading to necrosis, often associated with chronic infection. [1] Signs and symptoms of the disease may manifest from a few months to many years after the radiotherap. Hearing loss, otalgia and otorrhoea, or extensive soft tissue sloughing may herald the onset of osteroradionecrosis. Potentially lethal intracranial complications include meningitis, temporal lobe and cerebellar abscess. [3, 4] Temporal bone osteoradionecrosis is rare and requires proper management and reconstructions. Morrissey *et al.*, reported an incidence of 8.5% of osteoradionecrosis affecting the temporal bones in a 10 years retrospective review. [5]

Correspondence author: Masyita GAFFAR, Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine, Hasanuddin University, Hospital Labuang Baji Makassar, Indonesia.
Tel: +603 91456045, Fax: +603 91456675.
E mail: sita_gaffar@yahoo.com

CASE REPORT

A 72-year-old Malay man presented with a 15 -year history of intermittent right ear discharge and three weeks history of left ear discharge. Eighteen years previously he had

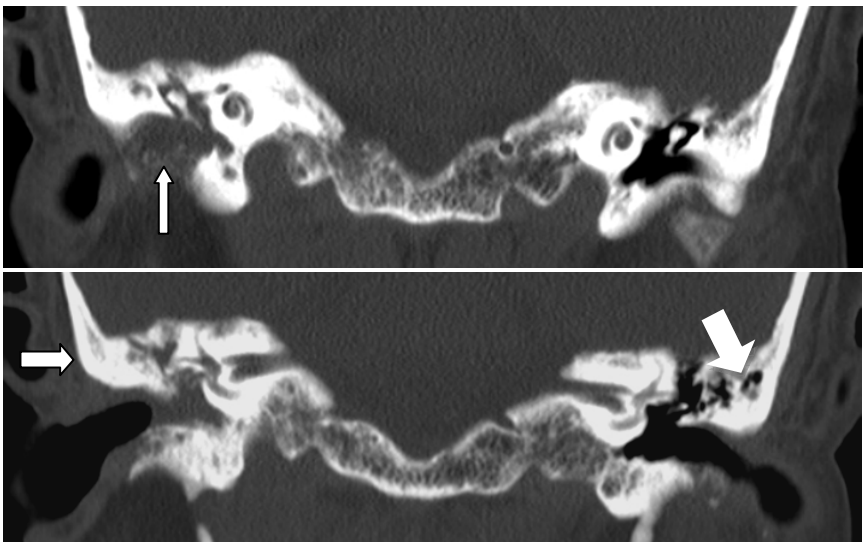

Fig. 1: a) Coronal HRCT image of the temporal bone showing the fluid filled right middle ear cavity with the tympanic membrane not visualised indicating communication between the two structures. The floor of the bony external auditory canal and hypotympanum was eroded (white arrow) and the tegmen tympani are thinned out and the ossicular chain is intact. b) A Coronal HRCT of the temporal bone showing sclerosis of the right mastoid air cells (white arrow), fluid density noted in the middle ear cavity, intact right semicircular canal with minimal soft tissue density are seen in the left mastoid air cells (black arrow); changes of osteoradionecrosis.

undergone radiotherapy and was successfully treated for NPC (70 Gy in 35 fractions).

Examination of the right ear revealed subtotal perforation of the tympanic membrane, inflamed middle ear mucosa with pus in the external ear canal (EAC). The left ear showed a retracted tympanic membrane and there was exposed bone on the floor of EAC. Examination of the nose and throat were otherwise normal. Pure tone audiometry (PTA) showed with bilateral moderate to profound mixed hearing loss. A high resolution computed tomography (HRCT) of the temporal bone demonstrated a sclerotic right mastoid bone, dehiscence of the tympanic portion of the VII cranial nerve (CN), fluid filled EAC and middle ear and destruction of floor of the EAC bony canal. There was communication between the hypotympanum and the external and middle ear, thinning of the tegmen and the anterior wall epytimpanum. The left ear showed erosion of the antero-inferior aspect of the EAC wall and soft tissue density in the mastoid cavity (Figures 1a and b).

A right ear swab isolated Pseudomonas species and he was treated with a combination of ceftazidime (four weeks oral antibiotic), topical antibiotic ear drops and frequent bilateral ear toileting. Despite these, the patient continued to have bilateral ear discharges. The patient proceeded to have a right cortical mastoidectomy. There were erosions of the anterior wall and floor of the right EAC along with sclerosis of the mastoid air cells, granulation tissue in the mastoid antrum and epi-tympanum around the incus and malleus but no cholesteatoma. Evaluation under the microscope of the left ear showed crusting

and pus on the floor of the EAC with an intact tympanic membrane. The procedure was uncomplicated. Postoperatively the patient had complete recovery and is currently using hearing aids on both sides.

DISCUSSION

Osteoradionecrosis of the temporal bone is rare and is potentially a serious complication of the radiation therapy to the head and neck region. It is the most commonly associated with NPC after radiotherapy. Typically, osteoradionecrosis is a late complication presenting many years after radiation insult. [3, 4, 6]

Radiotherapy initially results in vasculitis and mitosis inhibition. [7] It can also lead to changes in the soft tissue which include dermatitis of the EAC, inflammation of the mucosa in the middle ear, otitis media and aseptic labyrinthitis secondary to haemorrhage into the labyrinth and these cause changes into the bone. [4, 8]

Vigilant otoscopic examinations are advised even many years after the completion of radiation therapy. Purulent drainage, otalgia, headache, exposed necrotic bone, edematous mucosa or entrapped epithelium area clinical manifestations of temporal bone osteoradionecrosis and require radiographic assessment followed by medical and/or surgical treatment. [9-11] CT scanning is useful in determining areas of destruction and/or the extent of cholesteatoma invasion. [9] In our patient interestingly the osteoradionecrosis involved both the temporal bones. Several risk factors have been postulated for the development of osteoradionecrosis of the temporal bone. The relatively superficial position of the temporal bone, thin overlying skin cover with a relatively poor vascular supply especially in the region of the tympanic ring are potential local risk factors. Advance age, presence of diabetes mellitus and being immunosuppressant are suggested systemic risk factors. [10] In our case, the patient had multiple risk factors; advance age with systemic diseases such as hypertension and hypothyroidism.

Consistent with the literature, our patient presented with intermittent right ear discharge with chronic active otitis media, three years after completing the radiotherapy of NPC. He also had history of otitis external from Pseudomonas infection sensitive to ceftazidime. However, conservative management with long term oral ceftazidime, topical antibiotic ear drops and frequent ear toileting failed to control the infection and eventually led to a cortical mastoidectomy of the right ear. All the abnormal tissue and sequestrations were resected to reduce the spread of osteoradionecrosis. Surgery has been used in more evolved stages of osteoradionecrosis. [12] Frequent office visits for ear inspection and toileting may be necessary to promote re-epithelialisation to prevent further bone necrosis and infection. [9]

In conclusion, the management of temporal bone osteoradionecrosis is mastoidectomy after failed conservative treatment. Our patient underwent a successful cortical mastoidectomy without further recurrence of the problem.

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