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Case Report

Tympanic Membrane Perforation and COVID-19

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Abstract

Background: World Health Organization considers the outbreak of coronavirus disease 2019 (COVID-19) as a global pandemic. The perforation of Tympanic Membrane (TMP), followed by remission of COVID-19, can be an uncommon presentation.

Case Report: This report is an unusual case of COVID-19 in an elderly woman who did not have any past medical history. She was admitted to the hospital with an uncommon, but serious presentation of TMP after one week of remission from COVID-19 infection. Otoscopy of ear revealed clear external auditory canal and central perforation in the pars tensa with regular margins occupying the posteroinferior quadrant. Computed tomography scan (axial view) with thin cuts of the temporal bone revealed well pneumatized mastoid regions without any density or secretion and normal middle ears without any density or secretion. After 2 months, tympanoplasty without mastoidectomy was performed, the patient recovered fully, the TMP was healed, and an audiogram performed 2 months later was found to be normal.

Conclusion: This case highlighted the importance of attention to uncommon presentations, such as otalgia, and a sensation of fullness in the ear that can be subsequent to bacterial superinfection after Covid-19 infection.

Keywords: Tympanic membrane perforation; TMP; Otorrhea; Otalgia; SARS-CoV-2; COVID-19

Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic, caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, first emerged from Wuhan, China in late 2019 and demonstrates several pre-established and new symptoms and manifestations [1-3]. An emerging area, in which there is little information available, is the COVID-19-related otologic manifestations. Though previous studies have demonstrated otalgia and vertigo as the first presentation in COVID-19 patients, there is still no clear image of the spectrum of otologic symptoms of COVID-19 [4,5]. Furthermore, to the best of our knowledge, no paper has reported Tympanic Membrane Perforation (TMP) after COVID-19 patients that can be subsequent to bacterial superinfection.

Case Presentation

A 61-year-old female without any past medical history or any trauma to ear during childhood or adultness or any drug use presented in the emergency department of Shahid Modares, Saveh, Iran. With the chief complaints of otalgia and a sensation of fullness in left ear, that she claimed had started one week after remission from COVID-19 symptoms. Three weeks before this otologic problem, she was admitted to the hospital due to fever, headache, dyspnea, cough and gastrointestinal symptoms, which persisted for 14 days. She also reported Otorrhea at the first admission that did not receive any eardrop. She was then admitted to the hospital and received Hydroxychloroquine 200mg PO q12h and Oseltamivir 75mg PO q12h, both for the duration of five days for treatment of COVID-19, after a confirmed COVID-19 diagnosis through Reverse Transcription-Polymerase Chain Reaction (RT-PCR) assay. Then, she was discharged without any signs and symptoms except for weakness. Chest Computed tomography (CT) scan had the pattern normally observed in COVID-19 patients. Her vital signs were also reported to be normal. Upon second admission, she was afebrile, not pale, anicteric, acyanotic and without any past medical history of olfactory and gustatory dysfunction. There were no palpable lymphnodes, paedal edema or organomegaly witnessed. Chest was clear with bilateral air entry equal, normal heart sounds and no added sounds. Upon further examination, both pinnae appeared normal. Otoscopy of the ear revealed clear external auditory canal and central perforation in the pars tensa with regular margins occupying the posteroinferior quadrant and normal level of middle ear mucosa. Weber test lateralized to the affected side and Rinnie was negative on that side. The patient was examined by the auditory specialist and found to have a 50% posteroinferior quadrant left-sided TMP. The consultant obtained a temporal bone CT scan and audiogram. CT scan (axial view) with thin cuts of the temporal bone revealed well-pneumatized mastoid regions without any density or secretion, normal middle ear without any density or secretion, and normal soft tissue density (Figure 2). The audiogram showed tympanic membrane

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Figure 1: A perforated tympanic membrane over central part of right eardrum was noted by otoscope examination.

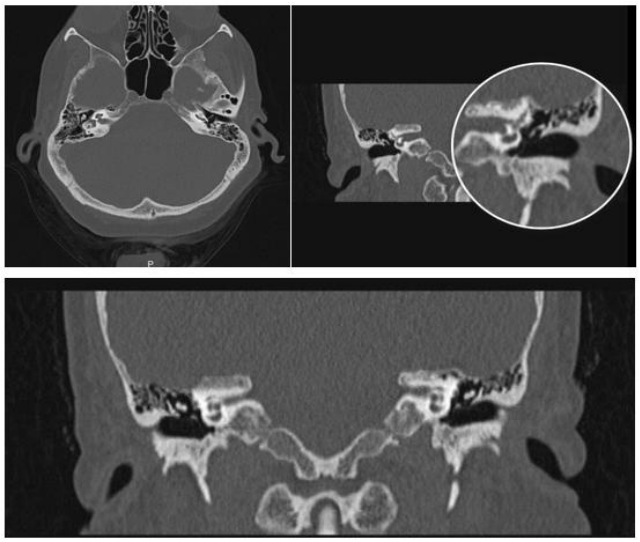

Figure 2: Computed tomography (axial view) with thin cuts of the temporal bone revealed well-pneumatized mastoid regions without any density or secretion and normal middle ears without any density or secretion.

velocity was found to be decreased in the high and low frequencies. The patient was elected for tympanoplasty without mastoidectomy 2 months as TMP was not fully healed (Figure 1). During her first day of visit, she was retested with PCR assay for COVID-19, and the result was found to be negative during the second hospitalization.

Outcomes and Follow-up

Tympanoplasty was performed without mastoidectomy by postauricular approach that was repaired *via* fascia tempolaris graft. Ossicular chains were checked intraoperatively and were found to be normal. She was advised to keep the affected ear dry and analgesics were given for pain relief. The patient's postoperative course was unremarkable, the TMP was healed and an audiogram performed 2 months later was normalized.

Discussion

While the incidence of TMP is increasing in developing countries [6] due to malnutrition, overcrowding, and frequent upper respiratory tract infections [6,7], it is encouraged by poverty and the ignorance of the health governance to this health defect. Accordingly, clinical features of TMP such as severe tinnitus, vertigo, sensorineural hearing loss, hemorrhagic otorrhea, and facial paralyses need special attention and there should be appropriate infrastructure established for patients to be referred to an otorhinolaryngologist by the general practitioners and family physicians [8-10].

Recent studies have suggested SARS-CoV-2 virus being found in the middle ear canal and mastoid process on biopsy [11]. Hearing loss is also reported in COVID-19 patients raising the possibility of developing neuropathy as a side effect of COVID-19 infection, similar to other viral diseases such as measles, mumps and meningitis. While, the presence of the virus in these areas are observed, literature search revealed no reported cases of TM perforation related to COVID-19 patients. Importantly, the pathologies of the external and middle ear with tympanic perforation are rarely of viral origin and typically from herpes zoster [12]. This perforation is subsequent to bacterial superinfection in most of the time. Furthermore, it is possible that our patient's tympanic membrane perforation was unrelated to the Covid-19; however, this is unlikely considering the timing of the perforation despite the absence of any upper respiratory tract symptoms or other likely cause of the otitis.

The present case report is among the first to report any associations between COVID-19 and TMP. We report here an unusual cause of acute TMP, which followed a remission of COVID-19 infection, while highlighting the need to add a separated category for TMP cases, named COVID-19-associated TMP.

While common in otolaryngological practice, TMPs can have infective causes, traumatic causes or be a consequent of chronic eustachian tube disorders [10,13]. Although she reported she had otorreha during the course of COVID-19 infection, it could be subsequent to bacterial superinfection. Also, our patient however did not report any history of slap injuries, scuba diving experiences, or entry of foreign bodies.

Otalgia, malodorous otorrhea, and hearing loss are the most frequent presenting symptoms regarding cholesteatomas that is a benign collection of keratinized squamous epithelium within the middle ear [14]. Our patient's otoscopy did not show any evidence to support cholesteatomas even though she had otalgia and a sensation of fullness in left ear. Moreover, she did not have ossicular chain disruption, oval window rupture or evidence of facial nerve injury to support traumatic TMP [15,16].

Although previous studies showed that Hydroxycholorochin had the potential of causing vestibulocochlear toxicity [17], our patient did not demonstrate any signs or symptoms of vestibulocochlear toxicity; the result of audiogram showed normal vestibulocochlear system.

Our patient, despite having no medical history and normal laboratory results after the second hospitalization, showed TMP presentation.

Overall, hearing loss due to otology involvement can be subsequent to bacterial superinfection after remission of COVID-19, which is difficult to detect in early stages and requires swift attention. Therefore, further global clinical studies with longer follow-ups are needed to determine if SARS-CoV-2 can cause TMP and any long-

term ear diseases.

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