



## A MISSED DIAGNOSIS OF SKULL BASE OSTEOMYELITIS PRESENTING AS POST MASTOIDECTOMY GRAFT INFECTION-A CASE REPORT

### Otolaryngology

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### ABSTRACT

Skull base osteomyelitis (SBO) of temporal bone is a life-threatening condition usually seen in immunocompromised individuals. Diagnosis of SBO is based on characteristic clinical and radiological findings. A 63 year old male presented with left ear ache for 3 weeks. On perusal of records, he had undergone intact Canal wall mastoidectomy with tympanoplasty for chronic otitis media in the same ear 4 weeks back. He was treated as post mastoidectomy graft infection for past 1 week with no improvement. On examination, his ear canal was completely stenosed. Computerised Tomography of temporal bone showed bone erosions around eustachian tube lateral to carotid canal with soft tissue density filling ear canal and mastoid cavity. SBO was diagnosed. He underwent canal wall down mastoidectomy and treated subsequently with long term anti-microbials. Co-existent SBO was missed during the initial surgery in this patient.

### KEYWORDS

#### INTRODUCTION:

Skull base osteomyelitis (SBO), synonymously known as malignant otitis externa (MOE) is described as a progressive osteomyelitis of the temporal bone and adjoining skull bones in patients with diabetes mellitus and immunocompromised status, (1). While pseudomonas remains as the most common causative organism, other bacteria and fungi can also cause this life-threatening condition. Prolonged antibiotics, aural toileting with adjuvant hyperbaric oxygen are usually the main stay of treatment. Though role of surgery is debatable, simple biopsy to extensive debridement and subtotal petrosectomy have been described in literatures, (2).

Radio isotope scans like Technitium 99 and Gallium 67 scans are useful in diagnosis of SBO which detect the osteoblastic activity and also helps in monitoring the treatment response, (3). In cases of coexistent chronic otitis media (COM), the presence of soft tissue density in middle ear on CT scans can be misleading especially if the SBO is originating from the middle ear. In this article, we have described a case of SBO which was missed during the initial canal wall up mastoidectomy surgery for COM and presented later as graft infection.

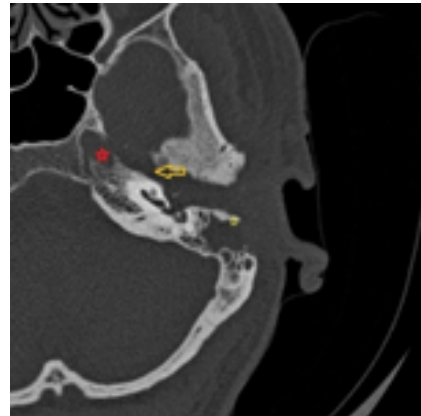
#### Case Presentation:

A 63 year old man presented with left ear ache for past 3 weeks. On examination, his ear canal was completely stenosed and tympanic membrane could not be visualized. He had House Brackmann Grade 2 facial weakness on left side and the other cranial nerves were normal. He was also receiving treatment for diabetes mellitus.

Perusal of his previous radiological investigations revealed that he had features of bilateral otomastoiditis without ossicular erosion for which he had undergone canal wall up mastoidectomy with type 1 tympanoplasty on right ear, 8 months back. He had undergone canal wall up mastoidectomy with type 1 tympanoplasty on left ear 4 weeks prior to admission. His intra-operative findings were mentioned as extensive granulation in middle ear and mastoid. The granulation tissue was sent for histopathological examination and was negative for tuberculosis and malignancy. He had developed graft infection in the post operative period and ear swab results showed Pseudomonas infection. He had been treated by intravenous antimicrobials for 1 week.

#### Investigations:

High resolution CT of temporal bone demonstrated homogenous soft tissue density completely filling the left ear bony external auditory canal, middle ear and mastoid (Figure 1). CT also demonstrated signs of previous mastoidectomy with erosions in anterior wall of middle ear, superior and lateral to the carotid canal. Subtle erosions were also noted on the floor of the tympanic cavity and distal part of the mastoid segment of facial nerve. His Erythrocyte sedimentation rate (ESR) was raised (73mm/hr).



**Figure 1-**CT scan of temporal bone (axial view) showing bone erosions in anterior wall of middle ear around eustachian tube opening (yellow arrow) and carotid canal (red star). Evidence of previous mastoidectomy with intact posterior canal wall (yellow star) is also seen.

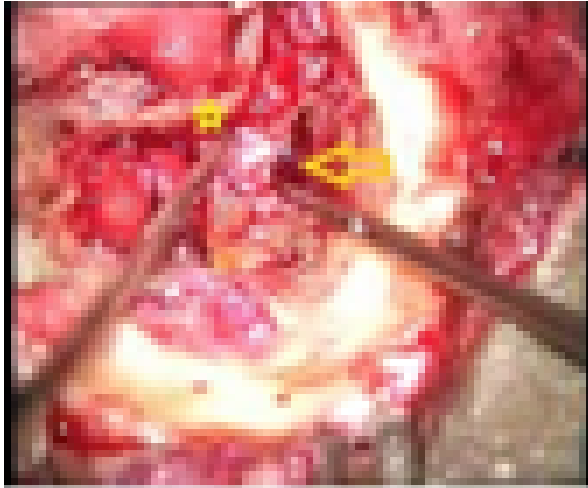
#### Differential Diagnosis:

Based on the CT findings, recurrent mastoiditis with graft infection, tuberculosis, SBO, eosinophilic granuloma, Paget's disease, primary malignancy and metastatic deposits of temporal bone were considered as possibilities. Tuberculosis, which is more common in this part of world was considered as initial diagnosis.

#### Treatment:

He was started on intravenous Piperacillin with Tazobactam 4.5g thrice a day based on culture and sensitivity reports of the ear swab,

which showed *Pseudomonas aeruginosa*. As the ear canal was completely stenosed, debridement of granulation and osteitic bone was planned under general anaesthesia. Canal wall down mastoidectomy was done. The pus in the middle ear was drained and the granulations were removed preserving the tympanic segment of the facial nerve (Figure 2 & 3). The bony defects present lateral to the Eustachian tube opening was sealed with bone wax. All the ossicles were removed except stapes footplate, as they were engulfed by granulations. A wide meatoplasty was done and cavity was covered with temporalis fascia to ensure faster epithelialization.



**Figure 2-** Intraoperative picture showing florid granulation tissues in mastoid cavity (yellow arrow). Yellow star represents the posterior canal wall.



**Figure 3-** Intraoperative picture showing granulation tissue completely occupying the external and middle ear (yellow arrow). Blue star represents the posterior canal wall.

#### Outcome And Follow Up:

The histopathological examination of granulation was rich in lymphocytes, giant cells and macrophages suggestive of chronic inflammatory process. RT-PCR for tuberculosis was negative. The patient received 3 weeks of intravenous Piperacillin-Tazobactam after surgery, and then started on oral and topical Ciprofloxacin based on culture and sensitivity reports from the intraoperative samples. Acetic acid irrigation was given as it is very effective against *Pseudomonas*. His ear ache has subsided and currently is on regular follow up for past 3 months.

#### DISCUSSION:

Malignant otitis externa (MOE), also known as skull base osteomyelitis (SBO) is a necrotizing infection of the external auditory canal, temporal bone, and surrounding soft tissue. MOE was first described by Meltzer and the term 'malignant otitis externa' was coined by Chandler, (4,5).

Though CT is superior in visualization of bone changes, it is poor in

detecting changes in soft tissues and intracranial involvement. MRI is the superior imaging technique to evaluate the exact anatomical location and extent of the soft tissue components of SBO. Tc 99 bone scan, the most sensitive test to detect osteoblastic activity, has been used to detect early onset of MOE. Gallium 67 citrate scan has been used to monitor treatment response as Ga 67 tends to accumulate in areas of active inflammation and its uptake becomes normal with complete resolution, (6).

SBO coexistent with chronic mastoiditis is usually rare and only few case reports are available in literature. Patel et al described a case of SBO following mastoidectomy, (7). The patient in their case report presented with multiple cranial nerve palsies involving the jugular foramen. He described that mastoidectomy created a potential pathway for the disease spread. Lee et al have described SBO in few patients of cholesteatoma, which were missed during initial mastoidectomy, (3). Similarly Kim et al have reported SBO following an intact canal wall mastoidectomy in a 81 year old female, (2). In all these patients, subtle bone erosions were present lateral to carotid canal which was missed in the CT scans performed before the initial mastoidectomy. The patient in this article presented with ear pain and extensive granulation in the external auditory canal post mastoidectomy. The CT scan showed homogenous soft tissue in ear canal, mastoid and middle ear with subtle bone erosions in ear canal and middle ear, which is suggestive of MOE. The authors suspect that SBO was missed during the initial treatment in this patient. Extensive granulation observed during initial surgery is suggestive of SBO, which could have coexisted with COM. Because of unavailability of Tc99 bone scan and other logistic reasons due to COVID-19 pandemic in the region, it was not performed.

The main stay of treatment for MOE in current era is long term antibiotics, aural toileting and treating co-morbidities. The indications for surgery are to take a representative tissue specimen for definitive diagnosis and debride the extensive necrotic tissues. In this patient, debridement was performed to establish the definitive diagnosis and to aid in the drainage of retained secretions. The extent of debridement varies from simple soft tissue debridement to extensive mastoidectomies like subtotal petrosectomy, (8). This patient required a canal wall down mastoidectomy, as there was extensive granulations, necrotic bone and exposed internal carotid artery. Hence all necrotic tissues were debrided and the dehiscence over internal carotid artery was closed with bone wax. Hyperbaric oxygen therapy (HBOT) has been used in refractory and advanced cases of SBO as adjuvant therapy. It increases the partial pressure of oxygen, relieving hypoxia and enhancing oxidative killing of microbes. A meta-analysis by Philips et al, however concluded that no strong evidence exists to demonstrate the efficacy of HBOT in SBO, (9).

#### CONCLUSION:

Malignant otitis externa can co-exist with chronic otitis media and can mislead the physician, especially in diabetic patients

Bone erosions over the petrous part of internal carotid artery can be useful in making the diagnosis of MOE.

Extensive debridement in form of mastoidectomy might be required in few patients along with long term antibiotics.

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