

Malignant Otitis Externa: An emerging complication

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ABSTRACT

Background: Malignant otitis externa (MOE) is a fatal infection of external auditory canal and potentially invasive to involve skull base. It progresses to life threatening condition due to necrotizing osteomyelitis of skull base. It is commonly seen in elderly diabetics, immunocompromised and immunosuppressed patients. Morbidity and mortality can be reduced by prolonged and appropriate use of antimicrobials.

Aim: To retrospectively analyse the extensive literature about the disease and summarised the implication for diagnosis and current treatment for malignant otitis externa.

Methodology: An extensive literature search was done to review the available studies and knowledge to evaluate the growing incidence of malignant otitis externa. Existing literature has been summarised for its prompt diagnosis and appropriate treatment.

Results: Malignant otitis externa (MOE) is an emerging life threatening complication. It is predominantly seen in immunocompromised and elderly diabetics. Its incidence is continuously rising in developing countries. Many microorganisms are responsible for this condition but *Pseudomonas aureginosa* is the most common causative organism. Prompt diagnosis needs high index of suspicion, culture of microorganisms and radiological investigations. Ct scan is the gold standard investigation to see the extent of soft tissue involvement and for detailed bony delineation. To monitor treatment, radio imaging is useful particularly Technetium 99m and Gallium 67 Singlelegi.

Conclusion: MOE is an extremely aggressive and life threatening infection which involves external auditory canal and rapidly spreads to skull base. It is commonly seen in elderly diabetics and immunocompromised patients. Mortality rate increases due to cranial nerve involvement. However its complications can be reduced by prompt diagnosis, radiological investigations and long term treatment with antibiotics.

Keywords: Malignant Otitis Externa (MOE), Elderly diabetics, immunocompromised, *Pseudomonas aureginosa*

INTRODUCTION

MOE is a fatal infection of external auditory canal which involves the skull base in later stage of disease due to its invasive nature¹. It normally occurs in diabetics and immunocompromised patients². This condition was first described in 1838 by Toulmouche as a case of progressive osteomyelitis^{1, 2}. Later on Chandler recognised it as a separate clinical entity as “Malignant Otitis Externa” and described its complications³. The infection is called “malignant” because its complication causes high mortality and morbidity⁴. The disease progression occurs from external auditory canal to aggressively invade middle ear and skull base^{4, 5}.

Many micro-organisms could be responsible for this disease but *Pseudomonas aureginosa* is the most common and widely involved organism⁶. It is an aggressive condition and clinical manifestation started off with otalgia, chronic otorrhea, headache and cranial nerve palsies⁵. Facial nerve is the fore most common nerve affected in this condition and later on glossopharyngeal, vagus, accessory and hypoglossal nerve could be involved^{6, 7}. It is complicated by parotitis, meningitis, mastoiditis, and jugular vein thrombosis. Death occurs due to involvement of intracranial structure⁸.

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The diagnosis of MOE is made by clinical and laboratory findings and confirmed by radiological and nuclear imaging. Long term antibiotics are an effective way of treatment and are followed by blood glucose levels and hyperbaric oxygen therapy^{9, 10}. Surgery is limited to debridement of necrotic tissue.

However with the advancement in radiological imaging and effective antibiotic treatment for MOE, the appropriate term “Necrotizing Otitis Externa” or “Skull Base Osteomyelitis” should be used and “malignant” term could be abandoned⁵.

The aim of this study is to analyse the extensive literature about MOE and summarised the implication for diagnosis and current treatment.

METHODOLOGY

In developing countries MOE is an emerging life threatening disease that occurs mostly in immune-compromised and diabetics⁶. The warm and humid climate in these countries provides an ideal environment for the invading organisms to proliferate, infect and cause complications in patients with previous compromised immune status. Its incidence is more common in females than males and elderly age group above 60 years¹¹. With the advancement of diagnostic modalities and better clinical knowledge and health awareness, its incidence has been decreased in elderly population¹².

Etiopathogenesis: Malignant otitis externa an aggressive disease starts as a soft tissue infection involving external auditory canal which later on invades deeper structure⁴. The progression of disease occurs via the fissure of Santorini and tympanomastoid sutures from preauricular cellulitis to osteomyelitis and ultimately ends up with multiple cranial nerve palsies⁵.

Many microorganisms involved in occurrence of this disease but *Pseudomonas aureginosa* is the most common gram negative organism that spreads rapidly in a moist external auditory canal of immunocompromised host¹³. *Pseudomonas* has a mucoid layer that is resistant to phagocytosis and it also produces many lytic enzymes that initiate a necrotic vasculitis and endarteritis which rapidly invade neighbouring structures¹⁴. Other bacterial organisms like *Staphylococcus aureus*, *Staphylococci epidermidis*, and *Proteus mirabilis* and *Klebsiella oxytoca* have also been associated with MOE^{13, 14}.

There is 10% incidence of fungal infections in MOE and most common fungi involved are *Aspergillus fumigatus*, *Malassezia sympodialis*, *Candida albicans* and *Scedosporium apiospermum*¹⁵. Antifungal treatment should be given in those cases, when there is no evidence of bacterial pathogenesis¹⁵.

In immunocompromised individuals like diabetics, the normal host immune defence system has been altered and they are susceptible to develop MOE because of microangiopathy and hypoperfusion¹⁶. Another important factor is reduction of effectiveness of cerumen in diabetics due to its high PH and decreased lysozyme content^{15, 16}.

DISCUSSION

In Malignant otitis externa, patients presents with continuous throbbing otalgia which is deep seated, hearing impairment and otorrhoea¹². The symptoms not relieved by medical treatment. Otagia radiates to temperomandibular joint especially at night¹³.

On otoscopic examination most frequent finding is presence of granulation tissue with an intact tympanic membrane¹⁶. It should be differentiated from otitis externa, tumours of external auditory canal, and granulomatous diseases¹⁷. A tissue diagnosis is imperative in patients unresponsive to medical treatment to rule out occult malignancy^{16, 17}.

Most common complication of MOE is involvement of cranial nerves and facial nerve is the first nerve involved in early phase of disease¹⁷. Later on lower cranial nerves palsy shows the progression of disease and poor prognosis. Other cranial nerves involved in the order of 7th, 9th, 10th, 11th and 12th¹⁷. Patient, histological confirmation of *Pseudomonas aureginosa* and positive bone scan. Ear swab culture is helpful to treat infection with appropriate antibiotics against aerobic, anaerobic and fungal organisms¹⁸. . Diagnosis and extent of disease is confirmed by radiological imaging studies. High resolution CT- scan and magnetic resonance imaging are useful for bony erosion, extent of soft tissue involvement and intracranial complications¹⁵. To monitor progression of disease and treatment response, nuclear imaging has been found useful^{15, 16}.

Technetium 99M scintigraphy and Gallium 67 photon emission CT are highly sensitive but less specific. Technetium 99M scintigraphy scan is effective in early detection of disease progression and monitoring treatment response¹⁸. Its sensitivity is 80 to 90% and it works by binding with leucocytes and neutrophils present at the site of inflammation¹⁹.

Treatment: Effective antimicrobial treatment and multi-disciplinary approach are the main stay methods of management^{6, 8, 11}. In treating MOE, blood sugar level should be controlled along with prolonged otoscopic and systemic antibiotic therapy (3-6 weeks). Regular aural toileting is needed to remove granulation tissues¹⁴. Improvement in immunocompetence with correction of electrolyte imbalance is required for the effective treatment of MOE⁸.

After clinical diagnosis, antimicrobial treatment should be started along with bacterial culturing for appropriate selection of antibiotic¹⁶. In MOE, antibiotics of choice are penicillin and ciprofloxacin, 6 to 8 hourly at a dose of 4.5 grams intravenously¹⁹. Quinolones can be safely administered in diabetic patients with deranged renal function. These combinations of drugs are effective in reducing complications like ototoxicity and nephrotoxicity. Most of cases reported resistance to Fluoroquinolones due to its widespread frequent use with incomplete course of treatment¹⁷. In case of ciprofloxacin resistance, combinations of cephalosporin with cefaperazone have been found effective to cover both gram positive and negative aerobes and anaerobes¹². Fungal culture is useful because this infection could be caused by *Aspergillus fumigatus*¹¹.

Surgical intervention is limited to drain abscesses and debridement of granulation tissues. Biopsy should be done to rule out malignancy¹⁸. Patients can be discharged on oral antibiotics and antifungals with regular two weeks follow up. Afterwards radiological follow-ups are essential for two months and every six months subsequently. The effective role of hyperbaric oxygen therapy occurs when it is used synergistically with antibiotics¹⁹.

CONCLUSION

Malignant otitis externa (MOE) is an aggressive disease of external auditory canal and skull base. Majority of patients are elderly, immunocompromised and diabetics and they are prone to get complicated due to the involvement of cranial nerves. Prompt diagnosis and timely radiological investigations are required for reduction in mortality and morbidity. A strict glycaemic control in diabetics with prolonged antimicrobial treatment is the initial mode of treatment. Surgical debridement is limited to remove granulation tissues. Regular radiological investigations for monitoring disease progression and treatment response.

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