Clinical Presentations and Risk Factors of Malignant Otitis Externa in a Tertiary Care Hospital

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ABSTRACT

Introduction: Malignant otitis externa (MOE) is one of the aggressive infections involving the external auditory canal, temporal bone and extending to skull base. A descriptive study was conducted to find out the clinical presentations and risk factors of MOE.

Materials and Methods: Sixteen patients with clinical presentations of MOE (age ranges from 40-79 years) were included in the study. Clinical presentations such as nocturnal ear pain, ear discharge, cranial nerve palsy, EAC stenosis, granulation and polyp were examined in all patients. Ear swab culture was done in patients with ear discharge. Detailed history for diabetic patients was taken using questionnaire. The prevalence and clinical presentations were subjected to statistical analysis.

Results: Results showed that male patients were dominant with mean age of 55 years. Only 2 Female patients were found. Bacterial infection by *Pseudomonas* was the major causative agent for the ear infection and the associated pain. All the patients had type 2 diabetes with duration of 5.25 ± 1.8 years in 40-59 age group which was significantly different ($p < 0.01$) from that of the 60-79 years age group (10.25 ± 2.5 years).

Conclusion: The result concluded that duration of diabetes was positively correlated with the incidence of MOE. Diabetes along with bacterial infection of ear was the major causative etiology for the incidence of MOE. A strict control of diabetes and ear swabs culture should be ensured in all patients with clinical presentation of MOE.

Keywords: Malignant otitis externa; Diabetes mellitus; Immuno compromised; *Pseudomonas*; *Aspergillus*

INTRODUCTION

Malignant otitis externa (MOE) is a rapidly progressing and aggressive infection of the soft tissues of the external ear. It is potentially fatal and spreads easily to surrounding structures like periostium and skull base and is also named as skull base osteomyelitis, necrotizing external otitis.[1] MOE is a misnomer as it is a benign yet life threatening condition.[2] Most commonly affected individuals are belonging to diabetics and patients in an immune compromised state. Infection is preceded by self manipulation of external ear or self inflicted trauma usually associated with ear cleaning. MOE is a serious disease associated with cranial nerve complications and high rate of morbidity as well as mortality. The treatment mainly aims at strict control of diabetes and control of infection with the proper antibiotic and debridement if necessary.[3]

The term 'MOE' was coined by Chandler in 1968.[4] Disease starts from the external auditory canal. It initially causes cellulitis, which then spreads and results in chondritis, periostitis, osteitis and finally osteomyelitis. Infection can spread through the fissures of Santorini and defects in the floor of the external auditory canal. *Pseudomonas aeruginosa* is responsible in 95 percent of cases. The rest 5% comprised of *Aspergillus*, other gram positive and gram negative organisms.[5] Nocturnal ear pain, granulations, otorrhoea and resistance to local therapy were reported as the common clinical features. Studies on the clinical presentation of patients were not yet been reported from this region. Therefore, this study is aimed to assess the various clinical presentation and risk factors of patients with MOE in order to help in early diagnosis and prompt management. Further, the result may help to create awareness among the people so as to reduce the morbidity and mortality.

MATERIAL AND METHOD

This descriptive study included patients with clinical suspicion of MOE who had presented to ENT department, Amala Institute of Medical Sciences, during the study period of 12 months were included. Patients with previous history of MOE on follow-up and patients who underwent surgery to rule out malignancy for MEO were excluded. A detailed history had taken by direct interview with the patient or patients' relatives in cases of diabetes patients. The diagnosis was confirmed with contrast computerized tomogram of the temporal bone. Consent was obtained from the patient or their relatives and the study design was approved by the Institutional ethics committee for research, Amala Institute of Medical Sciences. Ear swabs were taken for the culture and

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Age	Diabetes mellitus (n = 16)		Diabetes without immune- compromised conditions (n = 12)	Diabetes with immune- compromised conditions (n= 4)		
	Duration (Yrs)	FSG (mg/dl)		Drugs	HIV	Others
40-59	5.25 ± 1.8	207.75 ± 29.02	6	1	1	1
60-79	10.25 ± 6.7*	182.0 ± 24.79^{NS}	8	Nil	Nil	1

* $p < 0.01$ (Student *t* test) significantly and NS non-significantly different from each other. FSG: Fasting serum glucose.

Table-1: Distribution of risk factors for malignant otitis externa

sensitivity analysis. The duration and fasting serum glucose (FSG) level were subjected to statistical analysis. Informed written consent was obtained from the patients and the study design was approved by the Institutional Ethics committee.

STATISTICAL ANALYSIS

The statistical analysis was performed using SPSS (version 16.0). Student *t* test was applied to find the significant difference in the duration of diabetes and FSG between the groups. P less than 0.05 was considered as significant

RESULTS

Only sixteen patients of age ranges from 40-79 were enrolled in the study with male dominance of 87.5 % were noticed. Only 2 females presented with MEO during the one year of study (Fig 1). The prevalence was found in the age group of 60-79 years (Fig 2). All the patients were undergoing treatment for diabetes. Among them 81.25 % patients were without any immune compromised state, where as 18.75% were with immune compromised state. The multiple reasons including using steroid drug (1 case) and 2 with chronic kidney disease (CKD) were found as the risk factors for the immune compromised state (Table 1).

Among the clinical presentations, nocturnal ear pain and ear discharge was found to be prevalent (Table 1). All patients with MEO had nocturnal ear pain and ear discharge. Cranial nerve palsy was observed as the least clinical presentation (31.2%). Ear swab culture and sensitivity test indicated *Pseudomonas aeruginosa* in 68.75% cases and *Aspergilus* infection in one case. Mixed infection was manifested in 3 cases and one case with *Candida* (Fig 3). Duration of diabetes between the two group studied were found to be significant ($p < 0.01$).

DISCUSSION

Results of the study revealed that all the patients presented with clinical features such as nocturnal ear pain and ear discharge were diabetic. The duration of diabetes has direct association with the incidence of MOE. Furthermore, ear swab culture and sensitivity test indicate *Pseudomonas* as the major organism involved in the ear infection.

Though the MOE was reported as a rare infection of the external ear, it commonly affects elderly individuals who are diabetic or who are in an immune compromised state. In our

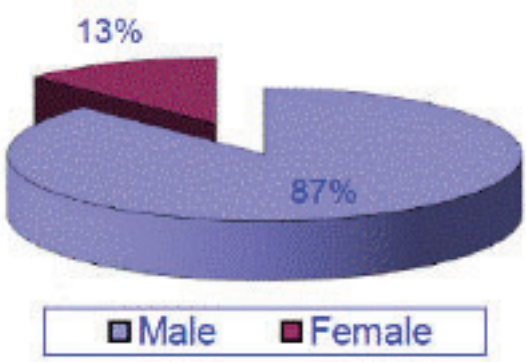

Figure-1: Distribution of age and gender

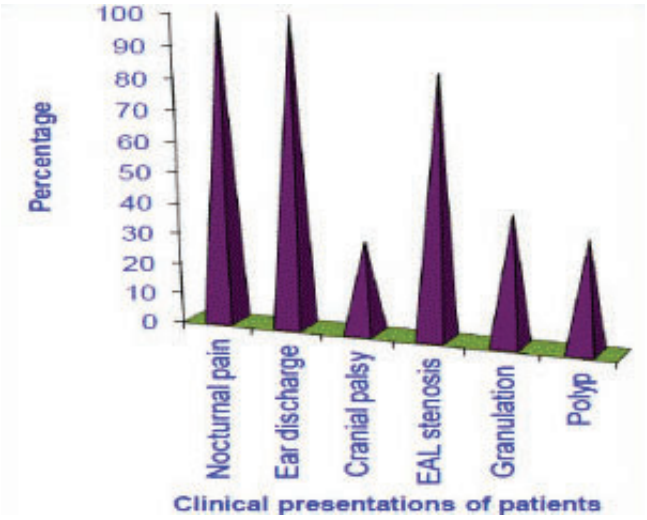

Figure-2: Clinical presentations of malignant otitis externa. EAL: External auditory canal

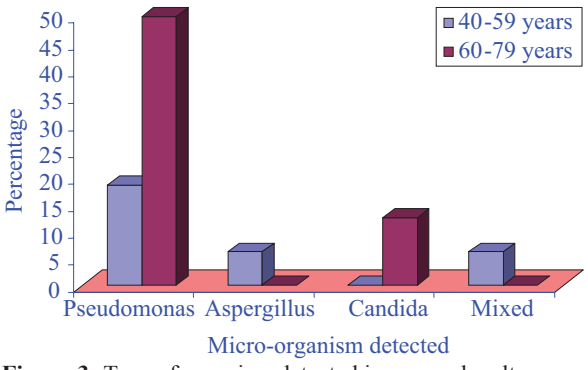

Figure-3: Type of organism detected in ear swab culture

study, all the patients had diabetes. Apart from diabetics, a few of the patients were on systemic steroids and CKD patients on dialysis. It is rapidly progressive and potentially life

threatening disease which can affect temporal bone, skull base and cranial nerves.[7,9-12] The reason behind this infection affecting mostly elderly and diabetics is proposed to be microangiopathic changes that occur in the small blood vessels of external auditory canal.[4,8] These changes along with defective function of phagocytes and macrophages can predispose to spread of infection. Infection can spread to temporal bone through the fissures of santorini and tympanomastoid suture involving jugular and stylomastoid foramina. Facial nerve gets most commonly affected because it comes out through the stylomastoid foramen.[9]

Diabetes or other immune compromised state, *Pseudomonas aeruginosa* on culture, a positive bone scan and cranial nerve palsy are confirmatory factors for the diagnosis.[1] Technetium (Tc-99m) radionuclide bone scans are useful in detecting bony involvement.[6] presence of bone erosions and soft tissue involvement of infratemporal fossa suggested the disease.[7] Diagnostic clinical features include nocturnal otalgia, otorrhea, external auditory canal oedema and stenosis, presence of granulation or polyp and cranial nerve palsies in later stages were reported.[10] C reactive protein and erythrocyte sedimentation rate were also found to be raised in MOE and with appropriate treatment they will start to decrease within 2 weeks and eventually return to normal. Marzo et al. reported that *P. aeruginosa* is the most common (99.2 %) organism involved in skull-base osteomyelitis. *Aspergilus* and *candida* are very rarely reported.[11]

In our study, we found only one case with cranial nerve palsy. This has been ascribed to the inflammation occurring along the skull base as the disease progresses as well as due to the neurotoxins from pseudomonas. Lling et al. reported that during the disease progression, the facial nerve is the most common and first cranial nerve involved at the stylomastoid foramen.[12] They reported 40% incidence of facial nerve palsies and 24% incidence of multiple cranial nerve palsies in patients with MOE.

Unusual presentation of MOE include involvement of temporomandibular joint and destruction of condyle of mandible as suggested by Ebenezer et al.[13] Squamous cell carcinoma and MOE have the clinical features in common. None of our patients in this study had malignancy. Biopsy of the granulation tissue in such cases is mandatory to rule out malignancy. Sometimes malignancy and MOE may coexist making the diagnosis more difficult.[14,15]

Treatment mainly is medical with antipseudomonal antibiotics like flouroquinolones and surgical debridement is needed in extensive disease.[16] Third generation cephalosporins were also found to be useful in controlling infection. Daily debridement and topical application of acetic acid drops helps in fighting the infection. Therefore, ear swabs are essential to guide the choice of antimicrobial therapy and should ideally be taken prior to commencing antibiotics, either topical or systemic. Cranial nerve palsies increase the mortality and morbidity. The infection of the external ear is rare which may probably explain the less number of cases found in this study. Hence, a multicentre large group study is warranted to establish the association of clinical features and risk factors of MOE.

CONCLUSION

Diabetes mellitus was the major risk factor observed in this study with clinical presentation of ear infection and ear discharge. Clinical suspicion can help in early diagnosis and prompt management thus helping in reducing the mortality and morbidity associated with this disease. A strict control of diabetes and ear swabs culture should be ensured in all patients with clinical presentation of MOE.

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