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Behavioural pattern of malignant otitis external: 10-year review in Ibadan

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Summary

Malignant externa otitis is a rapidly progressive infection of the external ear canal, mastoid and the base of the skull caused by *Pseudomonas aeruginosa* in elderly diabetics and other immunosuppressive conditions.Thirteen cases of malignant externa otitis seen in the E.N.T. Dept University College Hospital, Ibadan between 1988 and 1997 were reviewed. The mean age was 62 years and the mean duration of diabetes was 14 years. The most frequent symptoms were otalgia 13 (100%) and otorrhoea 12 (92%). The complications include multiple cranial neuropathy 11 (85%), meningitis (31%), brain abscess (8%), and infratemporal abscess 1(8%). There were 8 deaths (62%) showing that this is still a dangerous condition in our environment. The problems identified were late presentation of cases and inavailability of facilities for prompt control and monitoring of patients. It is hoped that the outlook of the disease can be improved if there are corrected.

Keywords: *Pattern, malignant otitis external diabetics mellitus, immunosuppression.*

Résumé

L'otite malique externe est une infection a progression rapide du canal externe de l'preille, mastoide et la base de craine causee par les pseudonomes aeruginose chez les diabetiques agee et antres conditions immunosuppressive. Treite cas d'otite malique externe ont ete nus on departement ENT du centre Hospitalier Universitaire d'Ibadan entre 1988 et 1997 out ele reexaminer. L'age moyene du diabete etait de 14 ans. Les symptomes. les plus frequent etaient l'ostalgie 13 (100%) et l'otorrhoe 12 (92%). Les complications comportaient la neuropathy multi-cranienne 11 (85%), la meningite (31%), l'abces du cervean (8%), et l'abces infratemporel 1(8%). Il yavait 8 cas de deces (62%) montrant que celle ci est encore une condition dangereuse dans notre environment. Le problem identifie etait la presentation tardive des cas et le manque de moyens disponibles pour un control prompt et un suiri des patients Il est espere que les perspectives de la maladie penvent etre ameliorees la-bas et carrigees.

Introduction

Malignant external otitis is an infection of the external ear canal, mastoid and base of the skull caused by *Pseudomonas aeruginosa* in elderly diabetic subjects and other immunosuppressive conditions [1].

Pyocyaneous osteomyelitis of the temporal bone, mandible and zygoma was first reported by Meltse and Kelemen in 1959 when they described the typical patient with an external otitis which is refractory to appropriate treatment. Chandler reported 13 patients in 1968 and he coined the word malignant otitis external [2]. Since then various reports of cases have been given but only isolated cases have been reported in Nigeria [3,4].

The causative agent is usually *Pseudomonas aeruginosa* although other organisms are often isolated con comitantly e.g. Diphtheroids, *Staphylococcus aureus, Staphylococcus. epidermidis, Candida albicans,* among others [5,7].

The present pathogenesis is unknown, however ageing, hyperglycaemia, altered immune function specifically polymorphonuclear phagocytosis have been postulated.

The clinical features include otalgia, otorrhoea facial and other cranial nerve paresis. The mean ages found in different studies were 67 [1], and 72 years [1,2] confirming that it is a disease of the elderly. Other symptoms include fever, tinnitus, hearing loss and features of intracranial extension.

The haematologic and chemical laboratory parameters are generally unaffected by this condition, which reflects the insiduous but localized nature of the disease [1]. However, the full blood count, serum electrolytes, urea and creatinine, the random, fasting and 2 hours post prandial blood sugar are still necessary to assess the general clinical status of the patient [8,9].

The erythrocyte sedimentation rate is valuable in assisting diagnosis and follow-up of the patient. It was elevated in 100% of cases reported by Rubin *et al.* [1].

The radiologic investigation is used in localising the disease and assessing the extent of spread. This includes plain radiograph of the mastoid and petrous temporal bone, transmission radiography, Technetium 99 bone scanning, Gallium scanning, computed tomography scanning and magnetic resonance imaging [9,11].

The treatment includes meticulous control of the serum glucose level, prolonged, high dose, broad spectrum parenteral antibiotics and surgical excision of necrotic tissues. The use of hyperbaric oxygen chamber has also been reported with varying success in anecdotal reports [1].

The prognosis is poor. The poor prognostic signs identified are mental status deterioration, cranial polyneuropathies and recurrence.

Methodology

This is a ten-year retrospective study (1988 to 1997) done at the Department of Otorhinolaryngology, University College Hospital, Ibadan.

The cases with clinical diagnosis of malignant external otitis were collated using the records of the outpatient clinic, inpatient wards and operating theatre. The case notes were retrieved and analysed.

The appropriate statistical method was used to analyse the data.

Results

Thirteen cases of malignant otitis externa were found within 10 years from 1988 to 1997. The ages of the patients ranged from 48 to 76 years with an average of 62 years. The males were 11 while the females were only 2.

Eight (8) out of 13 patients had retrovirus screening and were found to be negative. Only 10 patients could

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afford a computerised Tomography Scan of the brain and petrous bone. Findings are as in Table 3.

Table 1: Clinical findings

Symptoms	Frequency
Otalgia/Headache	13 (100%)
Otorrhoea	12 (92%)
Hearing loss	10 (77%)
Tinnitus	13 (100%)
Trismus	8 (62%)
Facial nerve palsy	10 (77%)
Vertigo	5 (39%)
Dysphagia	6 (46%)
Fever	11 (85%)
Oedema of the EAM	13 (70%)
Granulation tissue in the EAM	11 (85%)
Parotid swelling	7 (54%)
Bilateral disease	2 (15%)
Hemiparesis	2 (15%)
Miningitis	4 (31%)
Hypertension	3 (28%)
Urethral stricture	1 (8%)

The patients had had diabetes mellitus for between 10 and 24 years with an average of 14 years. Diabetic control worsened with the onset of malignant otitis externa in 9 out of the 13 patients. One patient had associated urethral stricture of 15- year duration and 3 had hypertension in addition. There was past history of diabetic ketoacidosis in 2 of the patients. Six of them had evidence of diabetic microangiopathy in form of retinopathy.

Table 2: Cranial nerve frequency

None	2 (15%)	V - I
VI	6 (46%)	III - 4 (32%)
VII	10-(77%)	IV - 3 (23%)
VIII	8 (62%)	II - 2 (13%)
Ix. X	7 (54%)	
XI	5 (39%)	
XII	4 (31%)	

The most common symptoms are otalgia 13(100%) and otorrhoea (12 (92%) Table 1) while granulation in the external auditory meatus was found in 11(85%). The Sign of extension outside the temporal bone include hemiparesis 2 (15%), meningitis 4(31%) infratemporal abscess and brain abscess as in Table 1. The Facial nerve was the most frequently affected (77%) followed by cranial nerve VIII, IX, X in descending order Table 2.

Table 3: Radiologic finding

Soft tissue shadow localised in the external auditory canal	2 (15%)
Extension to the parotid and TMJ	3 (23%)
Extension to the infratemporal space and intracranial space	5 (39%)
CT Scan of the mastoid with positive findings	10 (77%)

Pseudomonas spp. only was responsible for infection in 11(85%) patients and the erythrocyte sedimentation rate was high in all the patients.

Seven (54%) patients had surgery (radical mastoidectomy) while the rest were managed on daily aural toileting, antibiotics and diabetic control Table 4.

Table 4: Treatment

Outpatient aural toileting + antibiotics + diabetic control	2 (15%)
Surgical excision (Radical mastoidectomy)	7 (54%)
In patient and aural toileting + antibiotics + diabetic control	3 (23%)

There were 8 deaths (76%) while the others were cured and discharged home (Table 5).

Table 5: Outcome of disease in patients with neurologic deficit

Deficit	Outcome
1). VII, VIII, IX, X, XI, Osteomyelitis of the temporal bone	Dead
2). VI, VII, VIII, IX, XI, XII, Meningitis	Dead
3). V, VI, VII, VIII, IX, XI, Meningitis	Dead
4). VI, VII, IX, X, Meningitis	Dead
5). II, III, IV, VI, VII, X, XI, XII, Meningitis	Dead
6). VII, VIII, IX, XI, XII, Infratemporal abcess.	Dead
7). V, VI, VII,	Dead
8). V, VI, VII, Brain abscess	Dead
9). VI, VII,	Cured
10). III, IV, VI, VII,	Cured
11). III, IV, VI, VII,	Cured

Discussion

There were 11 males (85%) and 2 females (15%), showing it is commoner in males. This is similar to the finding of Doroghazi *et. al.* [12] who found 17 males and 4 females in the 21 cases he reported. The average age in this study is 62 years, similar to that of Doroghasi et. al. of 66 years, though in their own study the age range was between 11 to 89 years, no patient less than 40 years was found in our study. This is probably due to the fact that the diabetics in this environment are largely non-insulin dependent (adult onset) diabetics.

The clinical history is largely similar to that of the other serie [1,2,5,8] with Otalgia and Otorrhoea accounting for 100% and 92%, respectively. Other features are fever, hearing loss and cranial neuropathy. However, the patients in our own series presented to the hospital in a more advanced state. Compared to the report by Chandler of facial nerve paresis 32%, other cranial neuropathy, 17%, in our study, 10 out of 13 (77%) had facial nerve palsy while 62% had other cranial neuropathy, 8 out of 13 (62%) had trismus which is evidence of extension to the infratemporal space or the temporomandilar joint. Other evidence of advanced disease were meningitis 4 (31%), brain abscess 1 (8%) and osteomyelitis of the temporal bone 1 (8%).

Late presentation could be due to various factors ranging from ignorance of the populace, poverty and paucity of specialist ENT Surgeons in the country. The hearing loss found on pure tone audiogram was pure conductive hearing deficit of moderate severity in 3 patients (23%) while it was mixed hearing loss in 10 patients (71%). This may be because most of the patient are elderly, so there may be associated presbyacusis, also the prolonged diabetes may be associated with vestibulocochlear microangiopathy with sensorineural hearing loss, thus producing a mixed pattern.

Two patients had facial nerve palsy without radiologic evidence of bone erosion, this may be due to wide spread

inflammation involving the temporal bone with oedema and nerve compression.

Pseudomonas aeruginosa only was isolated from 11 (85%) of the patient, 1 had culture yield of mixed organism of *Pseudomonas* spp, *Staphylococcus aureus* and *Staphylococcus* albus while 1 yielded *Staphylococcus aureus*. This is similar to the finding of Doroghasi in which *Psudomonas* spp was identified in 21 out of 21 cases, though the other isolated such as diphtheroid, fungi were not found in this series.

The white blood cell count was raised in 10 (7%) with relative neutrophilia suggesting an acute severe infection though it was normal in 3 (23%). The erythrocyte sedimentation rate was high greater than 100mm/hr in all the patients. This is similar to other studies [1]..

Anaemia (PCV) 30% was found in only 3 of the patients, probably due to a combination of severe sepsis and background malnutrition.

All the patients had a grossly elevated serum sugar with a random blood sugar of >300mg% in 11 (85%), fasting blood sugar > 180mg% in 10 (77%) and 2-hour postprandial of >350mg% on admission. This is similar to the findings of other workers [5,9], suggesting that the control is more difficult once there is onset of malignant external otitis. However none of the patients had a recent diabetic ketoacidosis, suggesting that ketoacidosis may not be related to this condition as it is found with rhinoobitococerebral mycormylosis.

Two of the patients with simple oedema of the external auditory meatus and not cranial nerve involvement were managed conservatively in the ENT clinic. Eleven patients were admitted. Out of this, 7 had radical mastoidectomy and 1 had simple excision of external auditory canal granuloma and wound debridement, 3 of the patients could not be operated upon due to poor control of the diabetes and general clinical state, they were managed on daily aural toileting; diabetic control regime and parenteral antibiotics (Table 4). The antibiotics used in our series include Ampiclox, Augmentin, Metronidazole, Zinacef, Fortum and Rocephine. based on sensitivity studies.

Outcome

Out of the 13 patients in our study, there were 8 deaths (62%) ,3 (23%) patients had residual cranial nerves deficits after treatment for at least six weeks while 2 (15%) were cured.

There was good correlation between the presence of cranial nerve palsy or other central nervous system complications and mortality. This is also found in our study as all the deaths were found in patient with multiple cranial neuropathy and other central nervous system complications (Table 5). The two who were completely cured presented early.

From this study the features suggesting poor prognosis are:

1. Persistence of granulation tissues in the external auditory canal.
2. Development of cranial neuropathy.
3. Other signs or symptoms of active infection, e.g., infratemporal abscess, parotid abscess.
4. Presence of other medical conditions, e.g., hypertension, urinary tract obstruction.

This is similar to the study by *Raines et al.* [13]who found three factors (1-3 as above) as features of aggressive disease and indications for radical surgery.

Conclusion

It could be inferred from this study that malignant external otitis, though not common is a grave complication of diabetes mellitus in this environment.

Cases commonly seen are advanced with crainal neuropathy and systemic signs. This couples with scarce specialist personnel, and poor facilities make it a condition with poor prognosis. It is hoped that with time there will be improved awareness and health education of the populace as well as better diabetic control of our patients. This will no doubt improve the course of the disease in our patients.

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