

Surgical Management of Otitis Media with Effusion in a Tertiary Care Hospital in Kaduna

Usman Ibrahim Dansani¹, Abdullahi Adamu², Zahra Aliyu³, Mubarak Bawa Musa¹, Naima Aliyu Ibrahim³

¹Department of Clinical Services, National Ear Care Centre, Kaduna, ²Department of Ear, Nose, and Throat Surgery, Federal Teaching Hospital, Katsina, ³Accident and Emergency Department/General Outpatient Department, National Ear Care Centre, Kaduna, Nigeria.

Abstract

Background: Otitis media with effusion (OME) is a significant cause of hearing impairment, particularly among children. Surgical management is indicated when medical treatment has failed. The surgical treatment may target the underlying cause or the affected ear. This study aimed to review the surgical management of patients with OME in a tertiary care hospital in Kaduna, North West Nigeria. **Materials and Methods:** A retrospective cross-sectional study that reviewed patients with OME who had a surgical operation from January 2019 to December 2023. Clinical features, audiometric findings, type of surgery and treatment outcomes were extracted from medical records. Information was analysed using Statistical Package for the Social Sciences version 27. Fisher's exact test was used to assess the relationship between categorical variables. A *P* value was set at <0.05 . **Results:** There were 661 OME cases during the period under review; only 44 (6.7%) had surgery. Most patients were children under 10 years (75%). The male gender constituted 56.8%. Moderate conductive hearing loss was predominant in both right and left ears (39.4% and 36.4%, respectively). Hearing loss (88.6%) and nasal discharge (70.5%) were the most common presenting symptoms. The most common surgery was myringotomy with adenoidectomy $\pm$ tonsillectomy, done in 36.4% of patients, and 31.8% of patients had ventilation tube insertion with adenoidectomy $\pm$ tonsillectomy. Post-operative symptom resolution occurred in 87.9% of patients. No statistically significant association was found between surgical modality and symptom resolution ($P = 0.057$). **Conclusion:** Surgical management of OME is highly successful in patients with failed medical treatment.

Keywords: Otitis media effusion, surgical management, ventilation tube

INTRODUCTION

Otitis media with effusion (OME) is a non-suppurative condition characterised by the presence of fluid in the middle ear without signs of acute infection.^[1] The prevalence of OME in developing countries is estimated to range between 2% and 10%.^[2,3] Adenoid hypertrophy and allergic rhinitis have been identified as significant risk factors for OME, contributing to Eustachian tube dysfunction and middle ear effusion.^[2,4,5]

OME poses a considerable public health challenge, particularly in the paediatric population.^[3] Ibekwe and Nwaorgu^[6] concluded that there was a better outcome in OME managed with a tympanostomy tube compared with those managed conservatively.

The treatment of OME includes medical and conservative treatment with decongestants, antihistamines, manoeuvres like Toynbee, Valsalva manoeuvre and autoinflation. Surgical intervention is indicated in failed conservative treatment, either on the ear to restore normal ventilation or to address the underlying pathology.^[1,6-10]

There is a paucity of local research on the surgical management of OME, necessitating this research.

Address for correspondence: Dr. Usman Ibrahim Dansani, Department of Clinical Services, National Ear Care Centre, Kaduna 800283, Kaduna State, Nigeria. E-mail: usmandansani@gmail.com

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The objectives of this study were to determine the clinical profile of patients diagnosed with OME who had surgical treatment, to determine their audiometric findings and to review the surgical treatment carried out in them.

MATERIALS AND METHODS

It was a descriptive retrospective cross-sectional study of patients with OME who had surgical treatment over five years (January 2019 to December 2023) in a tertiary care hospital.

Patients of all ages with a clinical diagnosis of OME who had surgical treatment (on the ears or underlying risk factor for the OME were included in the study). Diagnosis confirmed by otoscopic examination showing an intact tympanic membrane with a type B tympanogram. Patients who did not undergo any form of surgery and those with incomplete medical records were excluded from this study.

Medical records were systematically reviewed using the hospital's electronic database. All patients with OME or suspected cases were initially identified and then screened. Data were extracted from patients' medical records. Variables included demographics, symptoms, otoscopy, audiometric tests, surgical intervention and outcome of surgery. Descriptive statistics included frequencies, percentages, median, interquartile range and means ($\pm$ standard deviation). Categorical variables were compared using chi-square tests and Fisher's exact test. Continuous variables were compared using a *t* test. The level of significance was set at $P < 0.05$. Analysis was performed using Statistical Package for the Social Sciences version 27 (IBM Corp., Armonk, NY, USA). Ethical clearance was obtained for this study.

RESULTS

Medical records identified 661 patients who had the diagnosis of OME, out of which 50 had surgical intervention, of which only 44 had complete data and thus were included in the analysis. The age of patients ranged from 2 to 92 years, with a median of 5.5 years and an interquartile range of 8 years, a mean of 13.5 ± 18.9 years [see Table 1 for age distribution]. There were 25 (56.8%) males and 19 (43.2%) females, with a male-to-female ratio of 1.3:1.

Duration of symptoms ranged from 2 months to 20 years, with a mean of 37.1 ± 42 months. Forty-three (97.7%) of the patients had affection of both ears, with only one having unilateral affection of the left ear, 1 (2.3%) [see Table 2].

Fifty-five (62.5%) of patients had dull tympanic membranes; it was bulging in 29 (33%) of ears, retracted in 3 (3.4%) of the ears and shining in the only ear (1.1%) that had no OME.

Table 1: Age group distribution of patients who had surgical management (N = 44)

Age group (years)	Frequency	Percentage (%)
≤ 10	33	75.0
11–20	3	6.8
21–30	0	0.0
31–40	3	6.8
>40	5	11.4
Total	44	100

Table 2: Symptoms of patients (N = 44)

Symptoms	Yes	No	Total
Hearing loss	39 (88.6%)	5 (11.4%)	44 (100%)
Otalgia	6 (13.6%)	38 (86.4%)	44 (100%)
Ear fullness	4 (9.1%)	40 (91.9%)	44 (100%)
Tinnitus	7 (15.9%)	37 (84.4%)	44 (100%)
Nasal discharge	31 (70.5%)	13 (29.5%)	44 (100%)
Nasal blockage	27 (61.4%)	17 (38.6%)	44 (100%)
Allergy	10 (22.7%)	34 (77.3%)	44 (100%)

Table 3: Degree of hearing loss for patients who had preoperative pure tone audiometry

Degree of hearing loss	Right ear frequency	Left ear frequency	All ears
Normal: 0–25 dBHL	5 (15.2%)	4 (12.1%)	9 (13.6%)
Mild: 26–40 dBHL	8 (24.2%)	11 (33.3%)	19 (28.8%)
Moderate: 41–60 dBHL	13 (39.4%)	12 (36.4%)	25 (37.8%)
Severe: 61–80 dBHL	5 (15.2%)	5 (15.2%)	10 (15.2%)
Profound: >80 dBHL	2 (6.1%)	1 (3.0%)	3 (4.5%)
Total	33 (100.0%)	33 (100.0%)	66 (100.0%)

dBHL: decibel hearing level

All patients had tympanometry done, and all had a type B tympanogram. For the hearing sensitivity, 33 (75%) of the patients had pure tone audiometry, 7 (15.9%) had free field audiometry (FFA), 1 (2.3%) had play audiometry and 3 (6.8%) did not do any hearing sensitivity test. The pure tone average ranged from 15 to 90 decibel hearing level (dBHL), with a mean of 47.7 ± 20.9 dBHL for the right ears and 46.5 ± 18.7 dBHL for the left ears [see Table 3].

Fifty-five (86.4%) of the ears that had pure tone audiometry (PTA) demonstrated conductive hearing loss, whereas 9 (13.6%) had normal hearing threshold; none of the ears had mixed hearing loss.

Mean response for FFA was 67.14 ± 18 decibel sound pressure level (dB SPL) (range: 30–80 dB SPL) in the right ear, and the left was 70 ± 19.1 dB SPL (range: 30–80

Table 4: Type of surgical interventions received by patients (N = 44)

Type of surgical intervention	Frequency	Percentage (%)
Myringotomy only	5	11.4
Ventilation tube insertion only	6	13.6
Myringotomy, adenoidectomy ± tonsillectomy	16	36.4
Ventilation tube insertion, adenoidectomy ± tonsillectomy	14	31.8
Myringotomy with clearance (or nasal biopsy)	1	2.3
Adenoidectomy alone	2	4.5
Total	44	100

dB SPL). Play audiometry was done on one patient with a mean hearing threshold of 38 dB HL in the right ear and 45 dB HL in the left ear.

Thirty-one (70.5%) of the patients had surgery for an underlying condition in addition to myringotomy or ventilation tube insertion, 11 (25%) had myringotomy or ventilation tube insertion and only 2 (4.5%) had no otologic surgery; both had only adenoidectomy [see Table 4 for details].

There was a statistically significant difference between the age group and the surgical intervention done (Fisher's exact value is 30.206, $P < 0.001$). Most of the adenotonsillectomies were carried out in the younger age group.

Twenty-nine (87.9%) of the patients had resolution of symptoms.

There was no statistically significant difference between surgical intervention and resolution of symptoms (Fisher's exact value is 7.224, $P = 0.057$).

There was no statistically significant difference between the appearance of the tympanic membrane and the resolution of symptoms (Fisher's exact value is 3.834, $P = 0.130$).

DISCUSSION

The younger age group constituted the majority of the patients. Tukur *et al.*,^[11] Liu *et al.*^[12] and Yousaf *et al.*^[13] all studied OME in children, which indicates the preponderance of OME in this age group. This may be due to the anatomical and physiological characteristics of the Eustachian tube in children.^[1] There were more males in this study, in contrast to a community-based study by Onwughalu *et al.*^[14] in Calabar, Nigeria, who found more females. This may be due to population dynamics between the two study areas.

Hearing loss (88.6%) and nasal discharge (70.5%) were the main presenting symptoms consistent with findings

by Galić and Klančnik.^[15] Liu *et al.*^[12] reported snoring and mouth breathing as the most common presenting complaints among children with OME associated with adenoidal hypertrophy.

Bilateral involvement of symptoms (97.7%) was noted in most cases, aligning with findings by Bamaraki *et al.*,^[16] who found all the participants had bilateral ear involvement; this was in contrast to the finding of Sogebi and Oyewole,^[17] who found only 32.5%. It is worthy of note that Sogebi and Oyewole^[17] studied only adult-onset OME, although Nwosu *et al.*,^[18] in a community-based study among preschool children, reported higher unilateral ear involvement (54.4%). Despite their study being in children, the discrepancy with our study may reflect an earlier stage of disease seen in a community-based study.

In this study, the tympanic membrane was dull in the majority of ears, which was similar to the findings of Yousaf *et al.*^[13] and Bandyopadhyay and Raman,^[19] where the majority had a dull tympanic membrane. This is likely due to the effect of the effusion on the tympanic membrane.

All patients had type B tympanogram, similar to studies by Onwughalu *et al.*,^[14] Galić and Klančnik,^[15] Bamaraki *et al.*^[16] and Muhammad *et al.*^[20]

The majority of the ears had moderate hearing, 37.8% on PTA, consistent with findings by Abdullah *et al.*^[21] who found a preponderance of 48% of moderate hearing loss. In contrast, Yousaf *et al.*^[13] found a preponderance of mild conductive hearing loss among participants with a pure-tone average ranging from 20 to 40 dB. This is more likely due to the patient in the study by Yousaf *et al.*^[13] having milder disease, as most had medical therapy, with only a few having surgical treatments. Al-Salim *et al.*^[22] found mild hearing loss in partial effusion, whereas they found moderate hearing loss in those with full effusion. This finding has further strengthened the fact that studies on the severe form of effusion would demonstrate poorer hearing thresholds.

In this study, 9 (13.6%) ears had normal hearing threshold 0–25 dB HL, which may appear contradictory since OME is classically associated with conductive hearing loss. This is because effusion volume and viscosity vary over time.^[1]

The majority of the patients had combined surgeries targeting the ear as well as the underlying pathology. This aligns with clinical guidelines and studies such as Rosenfeld *et al.*,^[1] which recommended adenoidectomy in cases of OME with adenoid enlargement. The lower frequency of adenoidectomy alone or ear surgeries alone reflects the severity of the patient's disease. In contrast, Yousaf *et al.*^[13] reported grommet insertion as the only procedure as the most frequent surgical intervention, possibly reflecting differences in the severity of cases.

In this study, the most common surgical intervention offered was myringotomy with adenoidectomy $\pm$ tonsillectomy. This conforms with current evidence suggesting that addressing both the middle ear pathology and the underlying nasopharyngeal obstruction, such as adenoidal hypertrophy, offers improved outcomes in patients with OME.

Several studies have examined various combinations of surgical interventions to determine efficacy.

Tao *et al.*^[23] conducted a comparative study in which patients were grouped into those undergoing adenoidectomy plus myringotomy and those undergoing adenoidectomy plus tympanostomy tube insertion. They found that the latter group had a lower rate of recurrence, supporting the benefit of ventilation tube insertion in select cases.

Upadhy and Datar^[24] reported medical and surgical treatment options for OME. For patients who underwent surgical therapy as the first choice, adenoidectomy alone was the most frequently performed procedure; others underwent adenoidectomy with myringotomy and adenoidectomy with ventilation tube insertion. For patients who had initial medical treatment that failed, they all had ventilation tube insertion, with five out of six having satisfactory outcomes, whereas one had extrusion of the ventilation tube with residual perforation.

In this study, there was a statistically significant relationship between age group and the type of surgical intervention performed. This finding is likely because adenoidectomy or adenotonsillectomy was predominantly performed in younger age groups.

Surgical removal of the adenoids, often with or without tonsillectomy, is frequently indicated in paediatric patients with recurrent or persistent OME.^[9,24] In contrast, adults presenting with OME are less likely to have significant adenoidal tissue and are therefore managed differently, often with myringotomy and/or grommet insertion alone.

In this study, resolution of symptoms was observed in the majority of the patients (87.9%) post-surgical intervention. This was similar to the findings of Upadhy and Datar.^[24] Although Ungkanont^[25] reported a lower success rate, in which 62.1% had resolution of symptoms following adenoidectomy with tympanostomy tube insertion, the reason for the lower rate is unknown.

These findings are likely representative of OME presentations at tertiary care hospitals in northern Nigeria. However, generalisability to primary care settings or community populations may be limited due to referral bias towards more severe cases. The demographic patterns and symptom profiles align with previous African studies, suggesting broader regional applicability.^[11,13]

CONCLUSION

The majority of patients presented with hearing loss, which was of a moderate degree in most patients. Myringotomy with or without ventilation tube insertion in combination with adenoidectomy with or without tonsillectomy was the most common surgical treatment carried out in this study, with comparatively similar outcomes.

Overall, surgical management of OME is highly successful in patients with failed medical treatment in a tertiary care setting.

Recommendations

Individualisation of surgical management should be done for patient-centred care. Future studies should prospectively compare different modalities.

Author contributions

UID: conceptualisation, data collection, analysis, write-up and review. AA, ZA, MBM and NAI: data collection, analysis, write-up and review.

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Conflicts of interest

There are no conflicts of interest.

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