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Patient satisfaction with endoscopic ear surgery technique: a comparative study with the postauricular incision microscopic technique

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Abstract

Background Endoscopic ear surgery has numerous benefits, such as the capacity to obtain high-resolution pictures and visualize normally inaccessible locations such as the retrotympanum, sinus tympani, and facial recess. These areas are generally difficult to access with traditional microscopic techniques. Endoscopic ear surgery reduces operating time when performed by skilled surgeons, without the need for a postauricular incision wound.

An essential aspect to consider when evaluating the effects of any procedure on individual satisfaction is the assessment of health-associated quality of life. It is a tool used for subjective assessment, which is regarded as a reliable measure of the satisfaction perceived—whether physically or mentally—resulting from a certain procedure.

The goal of this study was to identify the benefits of middle ear surgery when done endoscopically compared to postauricular microscopic techniques in middle ear surgery. This was achieved by evaluating and comparing the level of satisfaction among patients who underwent either microscopic or endoscopic ear surgery.

Methods The Chronic Ear Surgery Survey (CESS), a 13-point Likert scale survey designed specifically for assessing outcomes of surgery for chronic middle ear disease, was implemented to measure patient satisfaction. The survey comprises three subscales. We performed a retrospective study at the Otorhinolaryngology Department, Cairo University, Egypt. The study encompassed individuals who underwent surgery on the middle ear between March 2018 and September 2021.

The patients were scheduled into two categories according to the technique of surgery (whether endoscopic or microscopic) in order to assess postoperative satisfaction using the Chronic Ear Surgery Survey (CESS).

Results Our research findings demonstrated a statistically significant difference between the two categories in terms of the overall scores and all subscale scores of the Chronic Ear Surgery Survey (CESS), with patients who had middle ear surgery endoscopically (EES) showing better outcomes.

Conclusions Identifying the elements that are strongly associated with subjective outcomes can assist surgeons in identifying patients who are more likely to have poorer satisfaction. This knowledge can be valuable in preoperative counseling. Endoscopic ear surgery (EES) seems to have a higher level of cosmetic acceptability, especially in terms of enhancing the socially related aspects of a patient's pleasure. This work thus supports the ongoing integration of endoscope utilization in otological surgical procedures.

Keywords Satisfaction, Quality of life, Chronic Ear Surgery Survey, Endoscopic ear surgery

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Background

The use of endoscopes in ear surgery was first documented in the literature almost forty years ago. However, it is only in recent times that there has been an increased interest in this technique [1]. Endoscopic ear surgery offers a panoramic and comprehensive view, allowing for convenient observation of various areas such as the facial recess, anterior epitympanum, Eustachian tube orifice, and sinus tympani. This eliminates the need for the surgeon to constantly reposition the patient's head and the microscope, resulting in lower rates of residual disease and recurrence compared to surgeries that solely rely on the microscope [2–4]. The quality of endoscopic photos has greatly increased in recent decades thanks to high-definition (HD) video imaging and wide-field endoscopy. As a result, endoscopic vision is now comparable to, and in some ways even better than, microscopic visibility [5]. Another significant advantage is that training juniors is facilitated, as both the trainer and trainee have an identical perspective of the surgical field. Additionally, the entire crew of the operation was more engaged when doing endoscopic surgery, as they were able to observe all surgical procedures on a screen, providing a visual perspective from the surgeon's eye [5, 6]. One important advantage to remember, particularly for patients, is that endoscopic techniques are less invasive without the need for postauricular or endaural incisions [7]. However, endoscopic ear surgeries are believed to have certain limitations, such as the inability to use both hands, the risks of mechanical and thermal trauma to the middle ear, and the difficulty in managing bleeding within the surgical field [7].

The concept of health-related quality of life (QoL) has been undergoing revisions and developments since the 1980s [8]. The measurement of patient satisfaction with medical or surgical procedures is highly dependent on the quality of life (QoL). It is a technique used to subjectively evaluate and analyze the perceived physical and mental consequences of a certain intervention and is regarded as a valid indicator of these outcomes. Patient-oriented outcome metrics assist healthcare providers in conducting research to determine the most effective therapies [9]. Several validated health-related quality of life (QoL) measures have been created in the literature, including the quality of life scale (QoLS) [10] and various diseases-oriented surveys [11, 12].

Nadol et al. (2000) developed a 13-point Likert scale questionnaire called the Chronic Ear Surgery Survey (CESS) to assess the quality of life (QoL) of individuals who have undergone surgery for a middle ear chronic illness [13]. The survey comprises three divisions: a symptom subscale subdivision (ST), a medical resource use subdivision (MR), and an activity restriction-based

subdivision (AR). This survey is the sole validated quality of life (QOL) evaluation tool that is sensitive to and specific for people with chronic ear illness. Several articles have utilized this questionnaire to characterize different elements of subjective results following surgery for a middle ear chronic condition [14].

Objective

The objective of this study was to measure and compare the postoperative quality of life in patients who underwent the Endoscopic ear surgery technique to the postauricular incision Microscopic technique, in order to determine patient satisfaction with the two surgical approaches.

Methods

Study population

Individuals, regardless of gender, who were at least 18 years old and received ear surgery at Cairo University Hospitals, from March 2018 to September 2021.

Location of study

Cairo University Hospitals, Egypt.

Criteria for inclusion

- Patients that are at least 18 years old.
- De novo ear surgery for chronic suppurative otitis media (CSOM).

Criteria for exclusion

- Patients who are under the age of eighteen or who are unable to respond to the questionnaire due to mental problems or dementia are excluded.
- Those having recurrent ear surgeries.
- Those with complicated unsafe chronic supportive otitis media (CSOM) or middle ear masses.
- Those who experienced persistent chronic suppurative otitis media (CSOM) after their surgery at the time of the questionnaire.
- Patients who have severe hearing loss before undergoing surgery.

A study was conducted at Cairo University Hospitals, Egypt, retrospectively. The study encompassed patients aged eighteen years old and above who underwent middle ear surgery, specifically tympanoplasty and cholesteatoma excision, between March 2018 and September 2021.

Based on the medical records of the operating theater, a total of 440 patients who underwent surgery between

March 2018 and September 2021 were included in the study. These patients conveyed the inclusion criteria and did not have any of the exclusion criteria.

The patients were categorized into two groups depending on the surgical approach used (endoscopic or post-auricular incision microscopic technique) in order to evaluate the postoperative quality of life (QoL). The assessment of QoL was done using the Chronic Ear Surgery Survey (CESS), which consisted of a questionnaire with 13 questions. The CES questionnaire was completed either through an outpatient clinic interview or a telephone call.

The Chronic Ear Surgery Survey (CESS) is a survey consisting of 13 items that assess the frequency, duration, and severity of issues related to chronic otitis media. It analyzes the sum score and three subscale points (symptoms, medical resource utilization, and activity restriction) to objectively evaluate the overall discomfort experienced by patients with chronic

suppurative non-recurrent middle ear diseases (CSOM) and the impact of medical or surgical interventions. The ultimate point spans from 0 to 100, with the highest degree representing optimal health and the lowest degree indicating subpar health. The purpose of the Chronic Ear Surgery Survey (CESS) score is to quantify objective discomforts experienced by patients and evaluate the impact of medical or surgical interventions on patients with chronic suppurative non-recurrent otitis media (CSOM) (Table 1).

The activity restriction (AR) subscale assesses the influence of chronic suppurative otitis media (CSOM) on the patient's everyday activities. The symptom subscale (ST) assesses the occurrence of symptoms associated with chronic suppurative otitis media (CSOM), namely hearing loss and discharge. On the other hand, the medical resource utilization subscale (MR) evaluates the extent of antibiotic use and visits to the physician's office.

Table 1 The Chronic Ear Surgery Survey (CESS)

Chronic Ear Surgery Survey					
Activity restriction subscale					
a1. Avoid swimming or showering without protecting the infected ear					
extremely true (25)	True (50)	False (75)	extremely false (100)		
a2. How severe is the necessity to keep your diseased ears dry now?					
extremely severe (0)	Severe (20)	Moderate (40)	Mild (60)	Very mild (80)	None (100)
a3. How much the ear problem interfered with social activities with friends or family during the last month?					
All of the time (0)	Most of the time (20)	A good bit (40)	Some (60)	A little (80)	None (100)
Symptom subscale					
s1. Your diminution of hearing is:					
extremely severe (0)	Severe (20)	Moderate (40)	Mild (60)	Very mild (80)	None (100)
s2. Your ear discharge is:					
extremely severe (0)	Severe (20)	Moderate (40)	Mild (60)	Very mild (80)	None (100)
s3. Your ear pain is:					
extremely severe (0)	Severe (20)	Moderate (40)	Mild (60)	Very mild (80)	None (100)
s4. Odor from your ear is very annoying to you and/or others:					
Definitely True (0)	true (20)	Don't know (40)	false (60)	False sure (80)	
s5. The diminution of hearing in your affected ear annoys you:					
All of the time (0)	Most of the time (20)	A good bit of the time (40)	Some of the time (60)	A little (80)	None (100)
s6. Please determine the frequency that your affected ear has been wet during the last 6 months:					
Constantly (0)	5 or more (20)	3–4 times (40)	1–2 (60)	Never (80)	
s7. The odor from affected ear annoys you and/or surroundings:					
All of the time (0)	Most of the time (20)	A good bit (40)	Some of the time (60)	A little (80)	None (100)
Medical resources subscale					
m1. How many times have you visited your Ear doctor during the last 6 months?					
More than 6 (20)	5–6 times (40)	3–4 times (60)	1–2 times (80)	None (100)	
m2. How many times have you needed systemic antimicrobials to treat your infected ear during the last 6 months?					
More than 6 (20)	5–6 times (40)	3–4 times (60)	1–2 times (80)	None (100)	
m3. How many times have you used ear drops to treat your infected ear during the last 6 months?					
More than 6 (20)	5–6 times (40)	3–4 times (60)	1–2 times (80)	None (100)	

Sex

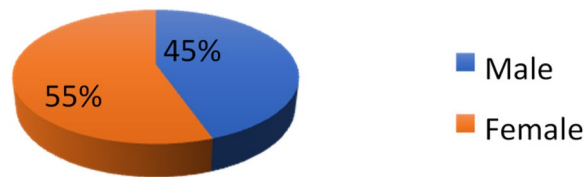


Fig. 1 Sample divisions according to gender

Groups

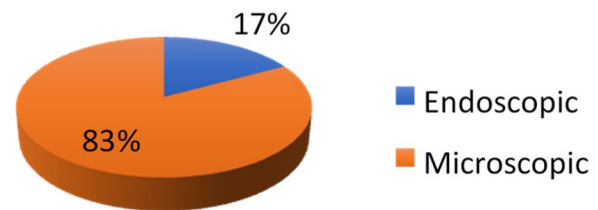


Fig. 2 Sample divisions according to surgical approach

In order to determine the overall score of the Chronic Ear Surgery Survey (CESS), it is essential to assign a specific value ranging from 0 to 100 to each given answer (as shown in Table 1). The cumulative results gained from each subdivision (symptom subscale subdivision (ST), a medical resource use subdivision (MR), and an activity restriction-based subdivision (AR)) are divided by the number of questions in each section. For example, in the “The symptom subscale (ST)” section, the values are added up and then divided by seven. The final value of the survey is obtained by summing the total values for the three subdivisions and then dividing by three.

Statistical analysis

The data will be encoded and inputted utilizing the statistical software SPSS (Statistical Package for the Social Sciences) version 26. Quantitative data will be summarized using measures such as mean, standard deviation, median, minimum, and maximum. Categorical data, on the other hand, will be summarized using frequency (count) and relative frequency (%). Comparisons between quantitative variables will be conducted using an unpaired *t*-test for normally distributed variables and a non-parametric Mann–Whitney test for non-normally distributed variables. The exact test will be employed instead if the anticipated frequency is below 5. Statistical significance will be attributed to *P* values that are below 0.05.

Results

Demographic data

Based on the medical records of the operating theater, a total of 440 patients who met the inclusion criteria and did not have any exclusion criteria were included in the study conducted from January 2018 to July 2021. A total of 363 patients (82.5%) responded to the survey, consisting of 162 males (45%) and 201 females (55%). The male-to-female ratio was 1:1.24 (Fig. 1). The patients’ ages ranged from 21 to 55 years, with a mean age of 39.2 years.

Out of the entire sample, 62 patients (17%) received endoscopic ear surgery (EES), while 301 patients (83%) received microscopic ear surgery (Fig. 2). Out of the 62 patients who had TEES, 40 patients (64.5%) had tympanoplasty to treat perforation with active inflammatory illness, and 22 patients (35.5%) received endoscopic excision to remove cholesteatoma. Out of the 301 patients who had microscopic ear surgery, 171 patients (56.8%) had a perforation and received tympanoplasty, whereas 130 patients (43.2%) had cholesteatoma and underwent either canal wall up mastoidectomy (CWUM) or canal wall down mastoidectomy (CWDM) (Fig. 3).

Demographic comparison

The findings revealed that the average age in the endoscopic group was 38.85 ± 8.18 , whereas it was 39.27 ± 8.11 in the microscopic group. No statistically significant disparity neither in sex nor age was found between the two groups.

A statistically significant disparity was observed in terms of the overall number of surgeons who preferred microscopic ear surgery, despite the several advantages offered by the endoscopic facility ($p=0.002$) (Table 2).

Chronic ear survey score comparison

A comparison was conducted in terms of the total score of the Chronic Ear Surgery Survey (CESS) and each of its three distinct subscales, which include activity restriction, symptoms, and medical resource utilization categories.

Activity restriction–based subscale (AR)

The results indicated that the average total score for the activity restriction-based subscale was 45.13 ± 8.53 in the endoscopic group and 23.54 ± 9.41 in the microscopic group. There was a statistically significant disparity ($p<0.001$), indicating that patients in the microscopic group experienced more activity and social restriction,

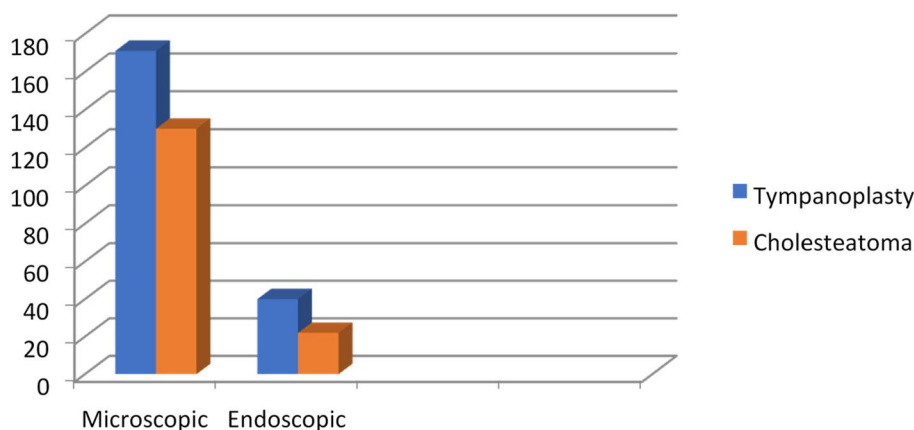


Fig. 3 Sample divisions according to the type of surgery in each group

Table 2 Demographic comparison between both groups

		EES		Microscopic		P value
		Count	%	Count	%	
Operation	Tympanoplasty	40	64.5%	171	56.8%	0.002
	Cholesteatoma	22	35.5%	130	43.2%	
Sex	Male	26	41.9%	136	45.2%	0.640
	Female	36	58.1%	165	54.8%	
Age	Mean	38.85	SD	39.27	SD	0.690
			8.18		8.11	

Table 3 Comparison between both groups regarding activity restriction-based subscale score

	EES		Microscopic		P value
	Mean	SD	Mean	SD	
A1	46.37	11.84	22.59	13.09	<0.001
A2	43.52	13.69	25.07	10.75	<0.001
A3	44.52	11.69	24.05	10.75	<0.001
A total	45.13	8.53	23.54	9.41	<0.001

particularly with a longer recovery period. This information is presented in Table 3.

The symptom subscale (ST)

The results indicated that the average total score for the symptom subscale was 45.05 ± 8.83 in the endoscopic group and 23.61 ± 9.46 in patients with microscopic surgery. There was a statistically significant disparity between the two groups ($p < 0.001$), indicating that patients in the endoscopic group had higher satisfaction with symptomatic outcomes, particularly in terms of ear dryness and hearing improvement (Table 4).

Table 4 Comparison between both groups regarding symptom subscale score

	EES		Microscopic		P value
	Mean	SD	Mean	SD	
S1	50.02	14.69	30.15	12.15	<0.001
S2	48.23	12.45	28.03	11.25	<0.001
S3	45.54	11.09	22.18	10.05	<0.001
S4	46.31	11.82	21.59	13.09	<0.001
S5	42.52	11.06	21.75	13.15	<0.001
S6	46.24	11.12	20.09	9.07	<0.001
S7	44.50	11.69	24.15	10.75	<0.001
S total	45.05	8.83	23.61	9.46	<0.001

Medical resource utilization subscale (MR)

The results indicated that the average total score for the symptom subscale was 46.37 ± 11.84 in the endoscopic group and 22.59 ± 13.09 in the other side. A statistically significant difference was found between the two groups ($p < 0.001$), suggesting that patients in the microscopic group required more medical treatment and postoperative follow-up visits. This information is summarized in Table 5.

Table 5 Comparison between both groups regarding medical resource subscale score

	EES		Microscopic		P value
	Mean	SD	Mean	SD	
M1	45.07	12.04	21.09	14.07	<0.001
M2	47.03	14.14	24.15	11.09	<0.001
M3	42.31	10.03	20.02	13.89	<0.001
M total	46.37	11.84	22.59	13.09	<0.001

Table 6 Comparison between both groups regarding the Total Chronic Ear Surgery Survey (CESS) score

	EES		Microscopic		P value
	Mean	SD	Mean	SD	
Total score	45.52	8.12	23.22	9.74	<0.001

Total Chronic Ear Surgery Survey (CESS) score

Statistically, we found that the average total Chronic Ear Surgery Survey (CESS) score was 45.52 ± 8.12 in the endoscopic group and 23.22 ± 9.74 on the other side, with a significant difference ($p < 0.001$). This suggests that patients with the endoscopic intervention had an apparently better quality of life. Please refer to Table 6 for more details.

The results of our study showed a substantial statistical difference in the total scores and scores of all subscales between the two groups. The patients who underwent endoscopic ear surgery (EES) had higher scores in all areas.

Discussion

Endoscopic procedures in ear surgery provide superior image quality and enhanced access to the middle ear space, which cannot be adequately viewed with a microscope, regardless of the surgical route. It is a procedure that involves minimum intervention, resulting in improved cosmetic outcomes for patients who prefer to avoid scarring.

The assessment of the effects of therapies, cost-effectiveness analysis, and implementation of new procedures such as endoscopic ear surgery (EES) in health care often relies on the measurement of quality of life (QoL).

The selection of the Chronic Ear Surgery Survey (CESS) score was based on its convenient and efficient administration process, as well as its ability to specifically assess individuals with chronic suppurative otitis media (CSOM).

In 2012, Choi et al. conducted an assessment of the factors that impact the health-related quality of life

(HRQOL) in patients with chronic suppurative otitis media (CSOM) following ear surgery. A prospective study was conducted utilizing the Chronic Ear Surgery (CES), which was performed both prior to and 12 months following the surgical procedure [15]. For our study, we utilized the identical survey but employed a retrospective approach instead of a prospective one. This decision was made since we required a somewhat extended time of post-operative follow-up.

Following middle ear surgery, there was a significant improvement in the Chronic Ear Surgery Survey (CESS) score among patients with CSOM, both overall and in all subscales of the CES ($P < 0.001$). In our study, we utilized the Chronic Ear Surgery Survey (CESS) score to evaluate the postoperative quality of life (QoL) in patients who underwent middle ear surgery. We compared the outcomes of endoscopic and microscopic approaches and found a significant disparity. The total and subscale scores were higher in those with endoscopic middle ear surgery (EES), indicating a higher QoL in this group.

In 2020, Taneja et al. conducted a study that examined the quality of life (QoL) in those who underwent either middle ear endoscopic or open surgery. The research focused on various otological procedures, such as tympanoplasty, stapedectomy, and cholesteatoma surgery. The researchers used the validated Glasgow Benefit Inventory (GBI) to assess the QoL of 152 consecutive adult patients. Our study can cover a total of 440 patients. However, a response was obtained from 363 patients, which accounts for 82.5% of the total [16].

The GBI is an 18-item tool that has been validated for monitoring outcomes following otolaryngological operations. The assessment quantifies the quality of life in three specific areas: social, physical, and general. The research found that patients who underwent Endoscopic Ear Surgery (EES) saw a significant increase in their overall quality of life (QoL) across three areas of the GBI: Total, General, and Social. Our research utilized the Chronic Ear Surgery Survey (CESS), a highly sensitive and disease-oriented quality of life (QoL) assessment tool for patients with otitis media. In contrast, the Glasgow Benefit Inventory (GBI) is less specific and may be applied to measure QoL in various other areas.

Conclusion

Patient satisfaction and overall quality of life (QoL) have been significantly improved in individuals who underwent endoscopic ear surgery compared to those who underwent the postauricular incision Microscopic approach. This improvement is observed in various facets of QoL, including total, general, and social well-being.

This work thus promotes the ongoing integration of endoscope utilization in otological surgical procedures.

Abbreviations

CSOM	Chronic Suppurative Otitis Media
CESS	Chronic Ear Surgery Survey
CWDM	Canal Wall Up Mastoidectomy
CWUM	Canal Wall Down Mastoidectomy
GBI	General Benefit Inventory
MES	Microscopic Ear Surgery
QoL	Quality of Life
EES	Endoscopic Ear Surgery

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Authors' contributions

OM provided the concept and design with the definition of the intellectual content, AA conducted clinical studies, data collection and analysis, and manuscript editing. MS conducted literature research, clinical studies, data collection, data analysis, and manuscript preparation. All authors have read and approved the manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations**Ethics approval and consent to participate**

All procedures performed in this study were in accordance with the ethical standards of the research committee of the ENT Department, Cairo University, Egypt, in 2021. Ethical committee approval of Otorhinolaryngology, Head and Neck Surgery Department, at Cairo University, Egypt, in 2021 was granted before embarking on the study (registration number 87–2021). Informed written consent to participate in the study was provided by all participants or their legal guardians.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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