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The postoperative emotional effects of external auditory canal packing following ear surgery: A comparison of endoscopic, endaural, and postauricular approaches in Type I tympanoplasty

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Abstract

This prospective study aimed to investigate the effect of external auditory canal packing for different surgical approaches on short-term postoperative anxiety, depression, and pain in type I tympanoplasty patients. A total of 52 patients (mean age 42.9±14.1 years; 18 male, 34 female) underwent endoscopic (n=15), endaural (n=10), or postauricular (n=27) tympanoplasty between September 2023 and September 2024. Preoperative and postoperative anxiety and depression levels were assessed using the Turkish version of the Hospital Anxiety and Depression Scale. Postoperative pain was measured using the Visual Analog Scale, and associations with psychological parameters were analyzed. The endoscopic group had the lowest mean pain scores (23.3±10.4) and the postauricular group the highest (34.8±19.8), but these differences were not statistically significant (p=0.177). Higher preoperative anxiety scores were moderately associated with greater postoperative pain (p=0.006), and increased postoperative pain correlated with greater increases in depression scores (p=0.027). No significant differences in changes in anxiety or depression scores were found between surgical techniques (p>0.05). In conclusion, surgical approach did not significantly affect short-term anxiety, depression, or pain outcomes, while preoperative anxiety and postoperative pain were more important factors influencing early psychological recovery. Addressing psychological status before surgery may improve postoperative well-being.

Keywords: Tympanoplasty, postoperative pain, anxiety, depression

Introduction

Tympanoplasty is a commonly performed otologic procedure aimed at reconstructing the tympanic membrane and ossicular chain, with the aim of restoring hearing and preventing recurrent infections. Advances in surgical technology have enabled the use of both microscopic and endoscopic approaches, each offering distinct advantages in visualization and surgical manipulation [1,2]. While success rates in hearing improvement and tympanic membrane closure are generally comparable, endoscopic techniques may offer reduced surgical trauma, shorter operative times, and faster recovery in selected cases [1,3]. These differences could influence postoperative experiences, including pain perception and psychological recovery, particularly in patients

with elevated preoperative anxiety or depressive symptoms. Moreover, tympanoplasty involves delicate manipulation within the middle ear, requiring meticulous postoperative care, which may further interact with patients' emotional state and satisfaction. Understanding how surgical technique affects psychological outcomes is therefore important for optimizing postoperative care in middle ear surgery

With an incidence reaching 29%, depression and anxiety are among the most common health problems in the population [4]. Anxiety and depression levels are one of the most important determinants of postoperative pain in surgical patients [5,6]. Additionally, there are studies suggesting that patients' anxiety and depression levels may have an impact on postoperative

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satisfaction and medical complications [4,7,8].

Postoperative pain not only affects patient satisfaction but also may predispose to chronic pain-related disorders [9-11]. Although there are studies that have identified a direct relationship between preoperative anxiety and depressive symptoms and postoperative pain, studies on this subject are limited in the otological literature [6,12,13].

This study aims to investigate the impact of middle ear surgery on postoperative anxiety and depression levels, as well as to explore the correlation between pain and both pre- and postoperative anxiety and depression. To the best of our knowledge, there are only a few studies in the literature evaluating changes in anxiety and depression following middle ear surgery, and this study further investigates whether the choice between endoscopic and microscopic approaches influences these outcomes.

Material and Methods

The study was approved by the Committee of Ethics (KA EK-163-28.08.2023) of the Giresun Training and Research Hospital.

Patients who underwent tympanoplasty at the Giresun Education and Research Hospital, Department of Ear, Nose, and Throat Diseases, between September 2023 and September 2024 were included in the study. Only patients who signed the informed consent form and agreed to participate were included. Anxiety and depression levels of all participants were assessed using the Turkish version of the Hospital Anxiety and Depression (HAD) Scale. The Hospital Anxiety and Depression Scale (HADS) was developed by Zigmond and Snaith [14]. The scale consists of 14 items, 7 of which assess anxiety symptoms and the other 7 assess depression symptoms. The items are evaluated using a 4-point Likert scale and are scored on a system ranging from 0 to 3. To minimize the influence of existing physical illnesses on the results, the scale does not include any questions about physical symptoms. It has been found that the scale provides more sensitive results in patient groups compared to healthy individuals. The Turkish adaptation study, along with validity and reliability analyses, was conducted by Aydemir and colleagues [15]. Postoperative pain in the patients was evaluated using a visual analogue scale (VAS) ranging from 0 to 100. All patients were evaluated preoperatively and postoperatively, one week before the surgery date and one week after the surgery. Approximately 85% of patients with depression also experience significant anxiety, while up to 90% of those with anxiety report depressive symptoms [16]. Therefore, a scale that evaluates depression and anxiety together was preferred.

In postauricular and endaural approaches, an external auditory canal (EAC) packing was placed at the end of the procedure, while no packing was applied in the endoscopic approach. The presence or absence of EAC packing was considered as a potential factor influencing postoperative emotional state and pain perception.

Gender differences in changes in HAD-A and HAD-D scores (preoperative vs. postoperative) were compared using the

Mann–Whitney U test. The relationship between surgical type (endoscopic vs. microscopic) and changes in HAD-A and HAD-D scores was analyzed using the Kruskal–Wallis test. Associations between postoperative pain and changes in HAD-A and HAD-D scores were examined with Spearman's rank correlation. Preoperative HAD-A and HAD-D scores were also correlated with postoperative pain using Spearman's rank correlation. Postoperative pain levels were compared between surgical types using the Kruskal–Wallis test, and between genders using the Mann–Whitney U test. The relationship between postoperative pain and age was assessed using Spearman's rank correlation. Correlations between age and changes in HAD-A and HAD-D scores were also examined using Spearman's rank correlation.

The statistical analysis was performed using R Program 4.3.2 R Core Team, 2023. and the rrcov package v1.7-5, Todorov, & Filzmoser 2009. All p-values under 0.05 were regarded as statistically significant.

Result

Before surgery, the depression level (DL) assessed by the Hospital Anxiety and Depression Scale (HADS) showed considerable variability, ranging from 1 to 28 points. Regarding anxiety, 37 patients (66%) presented with no symptoms (0–7 points), 15 patients (27%) demonstrated subclinical anxiety (8–10 points), and 4 patients (7%) met the criteria for clinical anxiety (>11 points). Similarly, preoperative depression levels (HADS-D) ranged from 1 to 12 points. Thirty-five patients (67%) had no signs of depression (0–7 points), 13 patients (25%) exhibited subclinical depression (8–10 points), and 4 patients (8%) met the criteria for clinical depression (≥ 11 points).

Spearman correlation analysis revealed a moderate positive and statistically significant association between preoperative anxiety scores (pre HAD-A) and postoperative pain ($p=0.006$). Likewise, a weak but significant positive correlation was observed, indicating that higher postoperative pain scores were associated with greater increases in depression scores (ΔDep) ($p=0.027$). In contrast, no significant correlations were found between postoperative pain and preoperative depression scores (pre HAD-D) ($p=0.053$), change in anxiety scores (ΔAnk) ($p=0.443$), age ($p=0.536$), or gender ($p=0.091$). Although the endoscopic group demonstrated the lowest mean pain scores and the postauricular group the highest, these differences were not statistically significant ($p=0.177$). Table 2 summarizes the factors examined for their association with postoperative pain.

Regarding psychological outcomes, changes in anxiety and depression scores from the preoperative to postoperative period did not significantly differ between surgical techniques (Kruskal–Wallis tests: ΔAnk $p=0.952$; ΔDep $p=0.174$), indicating that the surgical approach had no substantial effect on postoperative psychological status. Eighteen patients showed no change in HAD scores, seven demonstrated a decrease, and twenty-seven exhibited an increase. These findings suggest that surgical technique does not exert a notable influence on psychological recovery after surgery.

Table 1. HAD and pain scores by surgical technique

Surgical Technique	Mean Age	Gender (Male/Female)	Pain Score (Mean ± SD)	Pre-op HAD-A (Mean ± SD)	Pre-op HAD-D (Mean ± SD)	Δ HAD-A (Mean ± SD)	Δ HAD-D (Mean ± SD)
Endoscopic(15)	46.9 ± 14.5	7/8	23.3(10.4)	5.5 (3.0)	6.4 (3.3)	-0.9 (1.6)	0.0 (1.2)
Endaural(10)	42.0 ± 14.9	2/8	28.0 (14.7)	7.1 (2.5)	5.2 (2.8)	-0.3(2.7)	-1.3(2.0)
Postauricular(27)	40.6 ± 13.7	9/18	34.8(19.8)	6.0 (3.0)	5.3 (3.4)	-0.8 (1.4)	-0.5 (1.5)
Total(52)	42.9 ± 14.1	18/34	30.1 (17.2)	6.1 (2.9)	5.6 (3.2)	-0.7 (1.7)	-0.5 (1.6)

*: Values are presented as mean (± standard deviation)

Table 2. Factors associated with postoperative pain

Variable 1	Variable 2	Direction	p-value
Postoperative Pain	Increase in Depression Scores (ΔDep)	Positive (weak)	0.027*
Postoperative Pain	Preoperative Depression (pre HAD-D)	Positive (negligible)	0.53
Postoperative Pain	Change in Anxiety Scores (ΔAnk)	None	0.443
Postoperative Pain	Preoperative Anxiety (pre HAD-A)	Positive (moderate)	0.006*
Postoperative Pain	Gender	None	0.91
Postoperative Pain	Age	None	0.536

*: p-values under 0.05 were regarded as statistically significant

Discussion

In the present study, preoperative and postoperative assessments revealed that type I tympanoplasty, regardless of whether performed via endoscopic, endaural, or postauricular approaches, did not result in significant differences in short-term changes in anxiety or depression levels. Although the endoscopic group demonstrated the lowest mean postoperative pain scores and the postauricular group the highest, these differences did not reach statistical significance. It should be noted that an external auditory canal (EAC) packing was placed in the postauricular and endaural approaches, whereas no packing was applied in the endoscopic group. The absence of EAC packing in the endoscopic approach may have contributed to the trend toward lower pain scores in this group, although statistical significance was not achieved. A moderate positive correlation was observed between higher preoperative anxiety scores and greater postoperative pain, and a weaker but significant association was found between increased postoperative pain and greater increases in depression scores. No significant correlations were identified between postoperative pain and preoperative depression scores, changes in anxiety scores, age, or gender. These findings suggest that, in the short term, surgical approach may have limited influence on psychological recovery following type I tympanoplasty, while preoperative anxiety and postoperative pain appear to play a

more prominent role in shaping early emotional outcomes.

Over recent years, endoscopic ear surgery (EES) has made significant progress, including its application in cholesteatoma surgery and complex approaches to the skull base. In addition to providing access to recesses and pockets that are difficult to visualize with the microscope, Endoscop offers advantages such as eliminating the need for skin incisions and enabling targeted surgical interventions. These advantages have contributed to its growing popularity. However, studies examining the additional postoperative psychological problems associated with different ear surgery approaches—particularly comparing endoscopic with other methods—remain limited in the literature. Taneja et al. [17] compared various surgical techniques for ear surgery and evaluated postoperative quality of life using the Glasgow Benefit Inventory. Their study found that transcanal endoscopic ear surgery produced significantly higher total, general, and social Glasgow Benefit Inventory scores compared to microscopic or combined approaches, with the most notable improvements observed in stapedectomy and tympanoplasty cases. In the context of cholesteatoma and chronic otitis media (COM) surgery, no statistically significant difference was found between endoscopic and retroauricular/combined approaches; nevertheless, the endoscopic group still achieved higher mean scores across all domains. The authors noted that the study was

limited by the small number of open microscopic procedures—especially in the tympanoplasty and stapedectomy groups—and the lack of randomized allocation, which may have affected the comparability of the results.

Similarly, Lucidi et al. [18] investigated disease-specific quality of life and psycho-emotional distress in patients undergoing endoscopic tympanoplasty for chronic otitis media and cholesteatoma, using the Chronic Ear Survey and the Depression Anxiety Stress Scale administered preoperatively and at one-year follow-up. They reported significant postoperative improvements in all domains of the Chronic Ear Survey and in all subscales of the Depression Anxiety Stress Scale, despite no patient meeting criteria for psychological distress at either time point. They identified higher preoperative depression scores and longer follow-up duration as the only factors significantly associated with greater improvement in Chronic Ear Survey scores. No significant differences in outcomes were found between disease types, between primary and revision surgeries, or between endoscopic transcanal tympanoplasty and open centrifugal endoscopic tympanoplasty techniques.

The present study differs from previous investigations in several important aspects. Unlike the work of Taneja et al., which examined a mixed cohort of endoscopic ear surgeries including procedures such as stapedectomy and tympanoplasty, and the study by Lucidi et al., which evaluated chronic otitis media and cholesteatoma cases undergoing endoscopic tympanoplasty with assessments at a one-year follow-up, the current research focused exclusively on type I tympanoplasty cases. Moreover, the present study assessed patients in the very early postoperative period, with anxiety and depression levels measured one week before surgery and again one week after the operation, allowing for the evaluation of short-term psychological changes rather than long-term outcomes. Another distinguishing feature is the inclusion of postoperative pain assessment and the analysis of its correlation with pre- and postoperative anxiety and depression scores. By restricting the surgical spectrum to a single tympanoplasty type and concentrating on immediate psychological and pain-related outcomes, this study provides a more controlled assessment of how surgical approach—endoscopic, endaural, or postauricular—may influence early postoperative emotional well-being.

Neiderman et al. [6] demonstrated that higher preoperative anxiety scores were significantly associated with greater postoperative pain following middle ear surgery, whereas patient age and sex showed no significant correlation with pain levels. In their study, mean postoperative pain scores were lowest in the endoscopic group and highest in the postauricular group; however, these differences did not reach statistical significance. Similarly, in our cohort, higher preoperative anxiety levels were moderately correlated with increased postoperative pain, while no significant associations were observed with patient age or sex. In addition, although mean pain scores were lowest in the endoscopic group and highest in the postauricular group, these differences were not statistically significant.

This study has several limitations that should be acknowledged. First, the follow-up period was restricted to one week after surgery, precluding the evaluation of long-term psychological and pain outcomes. Second, patients were not randomized to surgical approaches, and the choice of technique may have been influenced by anatomical or surgeon-related factors. Third, the use of an external auditory canal packing was inherent to the postauricular and endaural approaches but absent in the endoscopic group, making it difficult to isolate the independent effect of packing on postoperative emotional and pain outcomes. Finally, anxiety, depression, and pain were assessed using self-reported scales, which are subject to patient perception and potential reporting bias. Future multicenter randomized controlled studies with longer follow-up periods are warranted to confirm and expand upon these findings.

Conclusion

Our study demonstrates that, in the context of type I tympanoplasty, the choice of surgical approach and usage of external auditory canal packing—whether endoscopic, endaural, or postauricular—does not significantly influence short-term changes in anxiety and depression levels or postoperative pain scores. However, higher preoperative anxiety was moderately associated with increased postoperative pain, and elevated postoperative pain correlated with greater increases in depression scores. These findings suggest that psychological factors, particularly preoperative anxiety, may play a more critical role than surgical technique in shaping early postoperative emotional and pain-related outcomes. Addressing patients' psychological status prior to surgery may therefore be an important component of perioperative care to enhance recovery and improve overall patient well-being.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The study received ethical approval from the the Committee of Ethics (KAEK-163-28.08.2023) of the Giresun Training and Research Hospital.

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