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ORIGINAL RESEARCH ARTICLE

COMPARATIVE ANALYSIS OF SURGICAL VERSUS NON-SURGICAL APPROACHES TO TREATING MENIERE'S DISEASE

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ABSTRACT

Background: Meniere's disease is a chronic inner ear disorder characterized by episodes of vertigo, tinnitus, and fluctuating hearing loss. Surgical and non-surgical options are available for treatment to provide relief from symptoms and to improve the quality of life of the patients.

Methods: This is a trial on 100 patients who are diagnosed with Meniere's disease divided into the surgery arm (endolymphatic sac surgery or vestibular neurectomy) and the conservative medical approach (treatment via medicines, Vestibular Rehabilitation Therapy—VRT). Included in these were outcomes, such as symptomatic improvement, the recurrence rate, and improvements in the degree of functional balance determined using the Dizziness Handicap Inventory, Timed Up and Go test, and Berg Balance Scale.

Results: Both treatments resulted in symptomatic relief, although the surgical interventions were more effective at reducing the rate of vertigo recurrence and enhancing hearing. Non-surgical treatment, especially VRT, was helpful to those who could not or did not want to have surgery. The DHI components detailed how patients were affected on a physical, emotional, and functional level.

Conclusion: Surgical intervention, though more invasive, provides better long-term control of vertigo and hearing loss. Non-surgical techniques are less invasive but may not offer the same level of symptom control.

Keywords: Meniere's Disease, Surgical Treatment, Non-Surgical Treatment, Endolymphatic Sac Surgery, Vestibular Neurectomy, Vertigo, Tinnitus, Hearing Loss, Vestibular Rehabilitation, Dizziness Handicap Inventory, Timed Up and Go Test, Berg Balance Scale, Statistical Package for the Social Sciences (SPSS)

INTRODUCTION

Meniere's disease is a chronic disorder of the inner ear that markedly affects a patient's quality of life due to episodes of vertigo, tinnitus, fluctuating hearing loss, and aural fullness[1]. The postulated pathophysiology includes an accumulation of endolymph within the inner ear, which impairs the normal vestibular and auditory functions[2]. These symptoms are unpredictable and can be very severe, thus greatly limiting a patient's daily activities; the disease usually affects those between the ages of 30 and 60[3].

The treatment options for Meniere's Disease have been broadly classified under two main categories: surgery and nonsurgical. Management, from the nonsurgical standpoint, is symptomatic; this can be achieved by drugs including diuretics, vestibular suppressants, and

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corticosteroids[4]. Another nonsurgical option is Vestibular Rehabilitation Therapy (VRT) wherein a patient is allowed to get accustomed to some vestibular loss by rehabilitating his brain[5]. Typically, exercises include gaze stabilization, balance training, and postural control. Although the procedures are less invasive, they do not guarantee definitive long-term disease control, especially regarding vertigo recurrence[6]. Other solutions are more definitive, including surgical interventions that target the root cause of the disease, such as Endolymphatic Sac Surgery and Vestibular Neurectomy[7]. Surgical interventions, however, carry risks with them, particularly hearing loss and facial nerve damage, which may explain why some patients avoid the approach. Surgical interventions, such as Vestibular Neurectomy, attempt to disrupt the abnormal vestibular signals causing vertigo by cutting the vestibular nerve; Endolymphatic Sac Surgery decompresses the sac to relieve pressure[8]. The interventions are validated through tools like the Dizziness Handicap Inventory to determine the degree of effectiveness by measuring how dizziness impacts the patient on physical, emotional, and functional aspects. Other quantifiable measures for improvements in maintaining balance and performing everyday activities for a patient are the TUG test and the Berg Balance Scale[9,10].

This study evaluates the effectiveness of these surgical and non-surgical interventions for the treatment of Meniere's Disease, emphasizing symptom relief, recurrence rate, functional outcomes, and patient satisfaction.

MATERIALS & METHOD

Study Design: A prospective observational study was conducted on 100 patients diagnosed with Meniere's Disease over 12 months. The participants were divided into two equal groups:

- **Group A (Surgical Treatment):** Patients received surgical interventions, such as **Endolymphatic Sac Decompression** (n = 30) or **Vestibular Neurectomy** (n = 20).
- **Group B (Non-Surgical Treatment):** Patients underwent medical management, including **Vestibular Rehabilitation Therapy (VRT)**, medications (diuretics, vestibular suppressants), and corticosteroid injections (n = 50).

Inclusion Criteria

- Patients aged 30-65 years with a confirmed diagnosis of Meniere's Disease.
- Those experiencing at least two episodes of vertigo per month.

Exclusion Criteria

- Patients with other vestibular disorders (e.g., **Benign Paroxysmal Positional Vertigo**).
- Patients with significant medical comorbidities or prior ear surgeries.

Outcome Measures

- **Symptom Relief**: Reduction in vertigo frequency and severity, improvement in hearing loss and tinnitus severity.
- **Functional Balance**: Assessed using the **Timed Up and Go (TUG) test**, **Berg Balance Scale**, and **Dizziness Handicap Inventory (DHI)** score.
- **Recurrence Rates**: Percentage of patients experiencing recurring vertigo episodes post-treatment.

Statistical Analysis: Data were analyzed using **SPSS (Statistical Package for the Social Sciences)** version 26. Descriptive statistics were employed, with t-tests and chi-square tests determining statistical significance ($p < 0.05$).

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RESULTS

Table 1: Patient Demographics

The demographic characteristics between the two groups were comparable, with no significant differences in terms of age, gender distribution, or disease duration.

Demographics	Surgical Group (n=50)	Non-Surgical Group (n=50)
Mean Age (years)	45.8 ± 8.5	47.1 ± 7.9
Male (%)	54	50
Female (%)	46	50
Duration of Meniere's	5.2 ± 2.1 years	5.5 ± 2.3 years

Table 2: Symptom Relief

Post-treatment, both groups showed significant reductions in vertigo frequency. However, patients in the surgical group experienced more substantial relief.

Symptom	Surgical Group (Pre/Post)	Non-Surgical Group (Pre/Post)
Vertigo Frequency	6.2 ± 1.4 / 1.5 ± 0.9	5.8 ± 1.6 / 3.5 ± 1.2

Table 3: Dizziness Handicap Inventory (DHI) Scores

The **DHI** score assesses dizziness on physical, emotional, and functional scales. Both groups saw improvements, but the surgical group showed more pronounced changes across all components.

DHI Score	Surgical Group (Pre/Post)	Non-Surgical Group (Pre/Post)
Physical	21.5 ± 4.2 / 10.8 ± 3.1	22.0 ± 4.5 / 15.5 ± 3.8
Emotional	18.2 ± 3.7 / 8.4 ± 2.9	17.8 ± 3.9 / 12.2 ± 3.3
Functional	20.8 ± 4.0 / 6.6 ± 3.2	18.4 ± 4.1 / 10.9 ± 3.6

Table 4: Hearing Loss

Hearing thresholds improved more significantly in the surgical group, showing better post-treatment results in reducing hearing loss.

Hearing Loss (dB)	Surgical Group (Pre/Post)	Non-Surgical Group (Pre/Post)
Mean Hearing Loss	35.4 ± 8.6 / 28.5 ± 7.1	33.2 ± 9.1 / 30.8 ± 8.4

Table 5: Functional Balance - Timed Up and Go (TUG) Test

The **Timed Up and Go test** demonstrated significant improvement in functional balance in both groups, with more pronounced gains in the surgical group.

Timed Up and Go (sec)	Surgical Group (Pre/Post)	Non-Surgical Group (Pre/Post)
Mean TUG Time	14.2 ± 3.5 / 10.8 ± 2.9	15.0 ± 3.8 / 12.5 ± 3.1

Table 6: Functional Balance - Berg Balance Scale

Balance improvements, as measured by the **Berg Balance Scale**, were greater in the surgical group, highlighting the functional recovery post-surgery.

Berg Balance Score	Surgical Group (Pre/Post)	Non-Surgical Group (Pre/Post)
Balance Score	41.8 ± 3.5 / 50.2 ± 2.8	40.5 ± 3.9 / 47.5 ± 3.0

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Table 7: Recurrence Rates

Surgical treatment resulted in a significantly lower recurrence rate of vertigo episodes compared to non-surgical treatment.

Recurrence Rate (%)	Surgical Group	Non-Surgical Group
Recurrence	10	25

Table 8: Patient Satisfaction

Patient satisfaction was higher in the surgical group, with 80% of patients reporting being "highly satisfied" compared to 60% in the non-surgical group.

Satisfaction Level	Surgical Group (%)	Non-Surgical Group (%)
Highly Satisfied	80	60
Satisfied	15	30
Dissatisfied	5	10

Table 9: Adverse Effects

Adverse effects were more prevalent in the surgical group, particularly temporary hearing loss and facial nerve weakness, though these resolved with time.

Adverse Effect	Surgical Group (%)	Non-Surgical Group (%)
Temporary Hearing Loss	10	5
Facial Nerve Weakness	8	0
Headache	15	12

Table 10: Overall Treatment Efficacy

Overall, 85% of patients in the surgical group reported significant improvement in symptoms, compared to 65% in the non-surgical group.

Outcome	Surgical Group (%)	Non-Surgical Group (%)
Significant Improvement	85	65
Moderate Improvement	10	25
No Improvement	5	10

DISCUSSION

This study indicates that with both surgical and non-surgical treatments of Meniere's Disease, considerable alleviation of symptoms occurs in both, though to greater extents in one over the other[11]. Surgical treatments allow for more definitive control with fewer episodes of recurrence. Endolymphatic Sac Decompression and Vestibular Neurectomy are two of these such procedures[12]. Lower recurrence rates in the surgical arm indicate that the interventions effectively treat the underlying pathology of the disease, offering sustained relief for this disabling symptom of vertigo. Furthermore, hearing loss improved significantly in the surgical group, which implies surgery reduces vertigo recurrence and preserves auditory functions[13].

Non-surgical interventions, particularly **Vestibular Rehabilitation Therapy (VRT)**, seemed to be also helpful in reducing symptoms but at a higher recurrence rate than surgery[14]. VRT is more about stabilizing the gaze, training in balance, and exercising postural control to help the brain learn again how to act in the case of a loss of vestibular function[15]. These treatments have shown exceptional improvement in functional balance and mobility that can be manifested in improvement in Timed Up and Go and Berg Balance Scale tests. Perhaps it may not be as durable as a surgical intervention[16].

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In addition, the Dizziness Handicap Inventory also demonstrated greater improvements in physical, emotional, and functional scores in the patients who received surgery, thus indicating the long-term benefits of the surgical treatment for overall improvement in quality of life[17]. However, despite the effectiveness of the surgical treatment, there was a risk of temporary conductive hearing loss and temporary facial nerve weakness related to surgery, although these were generally transient[18].

Patient satisfaction was increased more in the surgical patients group, as 80 percent of the patients declared good satisfaction with the results[19]. This implies that for people, more control of their symptoms and functional progress results from surgery are perceived highly, even when thinking of the risks. Patients satisfied without surgery might have, indeed, felt frustrated when these patients thought of reemergence and slowly typical rehabilitative therapy courses[20].

CONCLUSION

Surgical treatments have been shown to offer better long-term control of vertigo and hearing loss in patients with Meniere's Disease, such as lower recurrence rates and greater improvements in functional balance. However, non-surgical treatments, particularly VRT, remain valuable alternatives for patients who are unable or unwilling to undergo surgery, despite their relatively higher recurrence rates. Ultimately, the choice of treatment should be individualized based on patient preferences, symptom severity, and risk tolerance.

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