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Review Article

Ménière's Disease: Evaluation of Psychological Aspects in Patients Submitted to the Duct and Sac Decompression (DASD) Surgical Technique

Fabrizio Salvinelli[1-4], Maurizio Trivelli[1], Antonella Sisto[2], Francesca Bonifacio[1*], Flavia Vicinanza[2], Giuseppe Curcio[3], Ilaria Bertoncini[2], Valentina Pasquarelli[2], Carlotta Catena[2], Livia Quintiliani[2]

[1]Department of Otolaryngology, Campus Bio-Medico University Hospital Foundation of Rome, Italy

[2]Clinical Psychological Service, Campus Bio-Medico University Hospital Foundation of Rome, Italy

[3]Department of Biotechnological and Applied Clinical Sciences, University of L'Aquila, Italy

[4]Department of Otolaryngology, Campus Bio-Medico University, Italy

[*]**Corresponding author:** Francesca Bonifacio, Department of Otolaryngology, Campus Bio-Medico University Hospital Foundation of Rome, Italy

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Abstract

Purpose: Measuring the quality of life and psychological distress is essential for setting up adequate health care. The study aims to evaluate the quality of life and the presence of psychological distress in subjects with Ménière's Disease (MD) and to identify the protective factors that contribute to psychological well-being. Furthermore, it is proposed to evaluate whether Duct and Sac Decompression (DASD) surgery improves the quality of life and the perceived psychological distress.

Methods: A sample of 50 patients with MD and indication to DASD between October 2020 and November 2021 was collected. Structured questionnaires before and after surgery were used to measure quality of life (DHI-I), general distress and symptoms of depression, anxiety, stress (DASS-21) as well as Resilience Skills (RS-14).

Results: Significant differences were found before and after DASD surgery technique. More specifically Student's t test showed an improvement of DHI-I total score as well as of emotional, physical and functional subscales. Also, mood (anxiety and depression) and stress resulted all improved as a function of surgery intervention. No relevant change has been observed on resilience scores.

Conclusion: The study shows the impact of vertigo on the quality of life and psychological well-being of the patient with Ménière's disease before surgery. DASD surgery technique showed to be able to improve several psychological aspects among which mood, emotional aspects linked to dizziness, and stress. Therefore, improving quality of life and psychological well-being should be a major goal of any therapeutic intervention, and clinicians should consider additional treatment strategies in addition to pharmacological and surgical ones. Among these, psychological therapies may also be needed to improve outcomes in both surgical and non-surgical treatments.

Keywords: Distress Psychological; Ménière's Disease; Resilience; Quality of Life Vertigo

Introduction

Ménière's Disease (MD), was first described by Prosper Ménière in 1861, is an idiopathic disease that mainly affects adults between the ages of 30 and 70 [1]. The American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) has introduced the following criteria for the diagnosis of MD: the triad of vertigo, fluctuating hearing loss and tinnitus or aural fullness [2,3]. Generally, it is associated with an Endolymphatic Hydrops (EH) which consists of an increase in the volume of the fluid contained in the membranous labyrinth. Endolymph is rich in potassium and poor in sodium. The membranous labyrinth is housed within the temporal bone (bone labyrinth). During the hydrops crisis, the increase in volume of the endolymph transiently damages the auditory and vestibular sensory cells resulting in vertigo and hearing loss, ear fullness sensation, tinnitus on the affected ear side. The recurrence of hydrops crisis can irreversibly damage cochlea and vestibular labyrinth over time. It occurs at an incidence of 15–50 per 100,000 individuals; it affects only one ear in 90% of cases and symptoms may improve within ten years in 60-70% of patients [4]. Furthermore, 80–90% of cases can be controlled by medication and/or modification lifestyle. Despite this, 10-40% gradually become bilateral with the development of profound bilateral sensorineural hearing loss and subsequent onset of mental distress [5,6]. The clinical course of MD is highly variable. It can be asymptomatic for years and suddenly worsen to compromise the quality of life of the subject also from the point of view of social relationships. Vertigo has been reported to be the most disabling of symptoms owing to its unpredictable nature. It has been shown that, compared with the general population, the general health status in vertigo sufferers is significantly affected by both the presence and severity of vertigo [7,8]. In addition, dizziness, instability and imbalances experienced by patients can lead to psychological and psychiatric disorders such as depression, anxiety and panic. Although stressors have been shown to be relevant in triggering episodes of dizziness, there is no agreement that the presence of stress can affect vestibular disability [9]. Further, it is also suspected that comorbidity of psychopathological factors and vestibular disorders is involved in the experience of vertigo.

The literature highlights the presence of psychological distress associated with balance disorders of many patients; in particular, neurosis and depression are diagnosed in about 40-60% of intractable MD and can contribute to the persistence of symptoms [10,11]. In the study by Gufoni et al. [12] it has been shown that almost 50% of patients with vertigo present psychopathological symptoms, with a prevalence of panic and agoraphobia symptoms in 25% of cases. It remains to be better understood whether these symptoms are reactive or casual. Although there is currently no definitive cure, over 85% of patients with Meniere's disease benefit from lifestyle changes, medical care, or minimally invasive surgical procedures such as steroid and gentamicin intratympanic therapy, and endolymphatic sac surgery. Drug therapy is generally used to treat symptoms, but surgery remains a viable alternative if symptoms are severe [13,14]. Mental disorder is often one of the causes to make treatments for MD more difficult [15]. Therefore, identifying the risk factors and protective factors that contribute to psychological well-being in subjects with vertiginous syndrome can be of particular importance in order to adopt preventive, curative and supportive strategies in this category of patients. The primary objective of this study is to detect the presence of psychological distress caused by the vertiginous syndrome and to identify the protective factors that contribute to psychological well-being in subjects with vertiginous syndrome. The secondary purpose is to evaluate the impact of surgical technique on improving the quality of life and psychological distress in terms of reducing previously detected symptoms. The technique is designed to functional restoration of the endolymph discharge valve. The modifications of temporal bone in MD, as periductal fibrosis, hypoplasia of the vestibular aqueduct, atrophy of the endolymphatic sac produce an incorrect channelling of the duct and endolymphatic sac. This alterations could be consequent to infections in paediatric age, head trauma or chronic insult of an autoimmune nature [16,17]. Duct and the endolymphatic sac represent a morphs-functional unit; the periductal channels that surround it could play a role in the reabsorption of endolymph such as the cochlea spiral ligament which is responsible for the potassium recirculation. In the animal model, the duct and endolymphatic sac obliteration also caused hydrops. [18,19] Removal of bone in the intraosseous portion and decompression may facilitate distension of the duct and sac, therefore endolymphatic outflow.

Methods

Methodology

An observational study was carried out at the Campus Bio-Medico University Hospital Foundation in Rome. Fifty patients with MD who underwent surgery with Duct and Sac Decompression Technique (DASD) in ENT unit [20,14] were randomly enrolled in a consecutive random manner during hospitalization from October 2020 to November 2021. All patients over 18 years of age able to voluntarily provide consent were enrolled while people with previous psychiatric diagnoses or inability to provide informed consent were excluded.

The study involved the following phases:

- Phases 1 (T0 Test): we collection of socio-personal and clinical data and the administration of specific scales to detect

psychological and physical variables during hospitalization before surgery.

- Phases 2 (T1 re-test): at the 12-months after surgery the psychological and physical variables were again detected using the same scales used previously through a telephone call.

The Ethics Committee of the University Hospital Campus Biomedico Foundation of Rome approved this study and its development (Prot.82/20 OSS ComEt CBM). All the procedures performed in the study complied with the ethical standards of the institutional and/or national research committee and the Helsinki Declaration of 1964 and its subsequent amendments or comparable ethical standards. All the participants were assured of their anonymity and confidentiality. Written informed consent was obtained from all participants prior to enrolment.

Participants and Measures

We recruited a sample of 50 patients to a consecutive random enrolment for a period of 1 year.

The study involved the administration of validated questionnaires for the assessment of psychological functioning, resilience skills and symptoms related to MD and a form for the collection of socio-demographic and clinical data (age, sex and duration of symptoms).

The questionnaires are listed below:

- Dizziness Handicap Inventory (DHI-I)

The Dizziness Handicap Inventory (DHI-I) is a questionnaire used to evaluate the effects of vestibular diseases. It includes 25 items with a total score ranging between 0 and 100 points divided into physical, functional and emotional. A >54 score indicates a more severe handicap [21].

- Depression Anxiety Stress Scales-21 (DASS-21)

The Depression Anxiety Stress Scales-21 (DASS-21) is a self-report questionnaire that investigates the level of general distress and the presence of symptoms of depression, anxiety, and stress [22].

- Resilience Scale (RS-14)

The Resilience Scale (RS-14) is a self-report questionnaire that evaluates five characteristics of resilience (purpose, perseverance, self-resilience, equanimity and existential loneliness (authenticity) [23]. All the questionnaires were validated in Italian and their reliability fully acknowledged.

Surgical Technique

After mastoidectomy, the surgeon visualizes the lateral and posterior semi-circular canal prominence, then proceeds to the identification and exposure of the sigmoid sinus and identification of the dura mater of the middle and posterior cranial fossa. The surgeon carries on to the skeletonization of the dura mater which appears thickened in correspondence of the endolymphatic duct and sac. Bone patè and Tissucol are placed below the posterior semi-circular canal, near a thicker and paler pink dura, in order to decompress the duct and sac. The authors describe the detachment of the bone from the meninges. The dura detachment occurs through the fibrillar (Surgicel™) and its decompression through the bone patè. The bone patè is positioned as a spacer between the dura mater and the bone by the side of the duct and endolymphatic sac, to avoid the subsequent ascent of the dura. Its autologous and soft material does not tear the meninges and allows dural scarring, moving the endolymphatic duct and sac in a new position. The tissucol (Tisseel) is used to fix the structure. The temporalis muscle fascia and rotation flap of the Sternocleidomastoid muscle is aimed to avoid the re-growth of bone in the mastoid and the treated area.

Data Analysis

As a first, in order to characterize the sample, the whole database underwent to descriptive statistics. Then, a comparison between pre- and post-DASD surgical technique has been done on measures of quality of life and psychological distress, with the aim to assess the usefulness of the intervention. Namely, a Student's t-test has been calculated on scores derived by Resilience scale, Dizziness Handicap Inventory, and Depression Anxiety Stress Scales-21.

Results

General Population Characteristics

A total of 50 patients were evaluated. The mean age of the patients was 50.5 ± 10.7 years (range 21-76 years). The female to male ratio was 31 (62%) to 19 (38%). Regarding the duration of symptoms, 1 person (2%) had vertigo for less than 1 year, 19 people (38%) from 1 to 3 years, 11 (22%) from 4 to 6 years while 19 (38%) for more than 6 years (Table 1).

	composition	percentage
Gender	M=19	38%
	F=31	62%
	Mean ± st. dev.	range
Age Years of the Symptoms	45,82 ± 10,78 ys	18-74 ys
	1,96 ± 0,92 ys	0-6 ys

Table 1: Demographic and descriptive information on the sample.

Quality of Life and Psychological Impact of Vertigo between Pre- and Post-Surgery

The results obtained through the DHI-I, DASS-21 and RS-14 questionnaires relating to the total patient sample are summarized

below. More specifically Student's t test on DHI-I total score appeared significantly improved between pre- and post-surgery (t_{49}=4.91; p<.001; mean diff.= 15.8; Cohen's d=0.695). In the same vein, subscales DHI-I Emot (t_{49}=4.18; p<.001; mean diff.= 5.54; Cohen's d=0.591) DHI-I Phys (t_{49}=3.56; p<.001; mean diff.= 3.84; Cohen's d=0.504) and DHI-I Funct (t_{49}=4.28; p<.001; mean diff.= 6.12; Cohen's d=0.605) resulted improved between the two time points.

When looking at DASS-21, total score indicated an improvement in general distress between pre- and post-surgery (t_{49}=3.84; p<.001; mean diff.= 9.52; Cohen's d=0.543) (Figure1). More specifically Student's t test on DHI-I Total score appeared significantly improved between pre- and post-surgery (t_{49}=4.91; p<.001; mean diff.= 15.8; Cohen's d=0.695). Similarly, a significant improvement was observed in Anxiety (t_{49}=4.98; p<.001; mean diff.= 4.34; Cohen's d=0.705), Depression (t_{49}=3.65; p<.001; mean diff.= 3.82; Cohen's d=0.516), and Stress (t_{49}=4.43; p<.001; mean diff.= 5.40; Cohen's d=0.626), subscales (Figure 2). No statistically significant difference was instead observed for Resilience scale total score (t_{49}=-0.173; p= n.s.; mean diff.= -0.420; Cohen's d=-0.025).

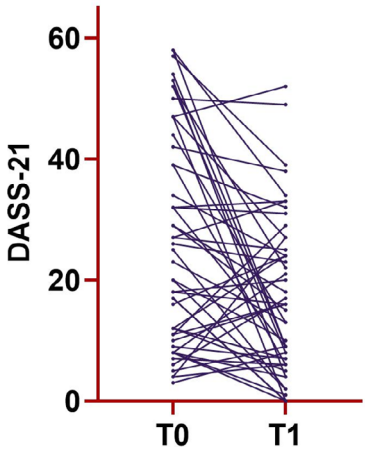

Figure 1: Paired T test graph; DASS-21 total score for each patients in T0 time and T1 time.

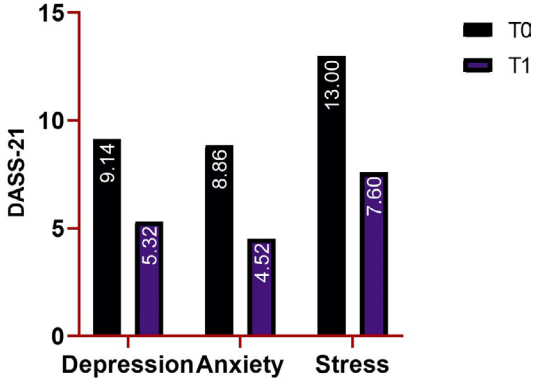

Figure 2: Mean (□ standard error) of DASS-21 General Distress score assessed before (T0) and after (T1) surgery (Depression scale, Anxiety scale, Stress scale).

Discussion

Vertigo is a cause of significant morbidity in people with MD; it can be treated with a variety of drugs or, when this fail, with surgery. In this study, psychological distress, depression, anxiety and quality of life were measured before and after surgery. The results of this study support the hypothesis that there is a two-way relationship between neurotological conditions and psychiatric disorders. Vertigo, dizziness and imbalance are the main symptoms of vestibular disorders. They can lead to physical consequences, such as reduced postural control and falls, to psychologic/psychiatric consequences, such as anxiety-depression symptoms, panic and agoraphobia, and to cognitive defects, especially in the elderly. Consequently, the general health status and the Quality of Life (QoL) of vestibular patients can be significantly impaired. Several questionnaires have been developed, attempting to quantify the degree of handicap and disability, the self-perceived health status and the quality of life in patients with vestibular disorders. Additionally, the main goal of the treatments of vestibular disorders should be to control symptoms, reduce functional disability and to improve patients' QoL [24]. In this study, it's investigated through DHI-I the impact that vestibular symptoms have on the

quality of life of patients, investigating the emotional, physical and functional impact. The results show that after surgery, patients have an overall improvement in quality of life. An association between MD and psychopathology is frequently reported and distress may occur secondary to the disease or act as its primary cause or provoking factor.

Correia et al. [25] have found the MD patients showed a high prevalence of anxious and mood disorders and dysfunctional personality traits. DASS-21 scores, used for evaluation the level of general distress and the presence of symptoms of depression, anxiety, and stress were found to be higher before surgery while after the level of psychological distress was significantly lower. As the literature suggests, it is possible that there is a double relation exists: fear of new crisis and sense of control loss and its associated anxiety increases with a high number of crises; stress and anxiety state may work as contributing factors to provoke a crisis [26]. The DASS's results show that the percentage of subjects reporting psychological distress has decreased significantly from pre-intervention to post-intervention. Particularly, patients who had achieved a high score in the items of depression in the post-surgery reported a significant improvement in depressive symptoms. Zdenjk Cada et al. in a study conducted in 2016, showed that following treatment with gentamicin, patients diagnosed with MD were shown to have a higher resilience than before treatment with gentamicin. This study suggests that patients have a higher resilience following treatment for the symptoms associated with MD [27]. The results obtained show resilience levels that tend to be unchanged in the pre and post intervention. This data can be explained by the observation that resilience tends to maintain relatively stable levels of psychological and physical functioning [28].

Limitations

Our study has some limitations. It is necessary to increase the sample and perform a randomized controlled study comparing the surgical / non-surgical and psychological / non-psychological treatment groups.

Conclusions

Appropriate pharmacotherapy and rehabilitation programmes can be used to effectively reduce the vertigo patients' functional disability and perceived handicap. Improving the QoL of these patients should be a major goal of any therapeutic intervention. The study shows the psychological impact that MD has on the patient. Therefore, improving the quality of life of patients with MD should be a major goal of any therapeutic intervention, and physicians should consider additional treatment strategies in addition to pharmacological and surgical ones. Therefore, routine psychological evaluation is desirable in patients presenting with dizziness and psychological therapies are needed to improve outcomes in both surgical and non-surgical treatments for patients. The duct and sac decompression surgery (DASD) has proved to be a valid new therapeutic option in the long struggle against MD. Patients suffering from MD and operated of DASD showed good clinical results and a significant reduction of psychological impact of this disabling disease.

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