



The Impact of Primary Treatment Strategy on the Quality of Life in Patients with Vestibular Schwannoma

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■ **OBJECTIVE:** To assess the quality of life (QoL) in a representative sample of patients with vestibular schwannoma and to ascertain the differences in outcomes associated with distinct management strategies.

■ **PATIENTS AND METHODS:** Patients with vestibular schwannoma attending a tertiary referral center were asked to complete the Functional Assessment of Chronic Illness Therapy—Brain Questionnaire, which assesses QoL in 5 domains: physical, social, emotional and functional, and a brain cancer—specific domain. Results were analyzed in the overall cohort and in surgery, stereotactic radiosurgery, and conservative management subgroups. The relationship between patient clinical characteristics and QoL outcome also was analyzed by univariable and multivariable logistic regression.

■ **RESULTS:** There were 83 survey respondents with an average age of participants of 57 years and a mean follow-up of 4.9 years. QoL was statistically significantly lower in the surgery subgroup within the Physical QoL domain ($P = 0.039$); however, there was no significant difference in overall QoL between the 3 subgroups of surgery, radiosurgery, and conservative management ($P = 0.17$). A poor QoL outcome was associated with the number of symptoms at diagnosis, greater tumor size, and a surgical management strategy.

■ **CONCLUSIONS:** The QoL within this patient cohort was extremely variable in each management group, mirroring

the heterogeneous natural history of this disease process. QoL in patients with vestibular schwannoma cannot be predicted based on management strategy alone, but a poor QoL outcome is more likely in patients with larger, symptomatic tumors that are treated surgically.

INTRODUCTION

Vestibular schwannoma (VS), or acoustic neuroma, refers to a benign tumor of the Schwann cell arising from the VIIIth cranial nerve.¹ They account for 6% of all intracranial tumors² and have an incidence of approximately 1.2 per 100,000.³ There are 3 main treatment options for VS: microsurgical resection, stereotactic radiosurgery, and a conservative approach with serial imaging.^{3,4} Currently, the decision regarding management is based on patient factors such as age, functional status, symptoms at presentation, and patient preference as well as tumor-specific factors, namely size, location, and growth velocity.^{3,5} There are a lack of randomized control trials, however, comparing the treatment approaches for VS,⁶ and it is unlikely that such a study would be performed.

Efforts must be made to find other sources of meaningful comparison, and quality of life (QoL) outcomes represent one such source. In view of the management options, we set out to identify the impact of the diagnosis and subsequent management of the subgroups of patients within our practice. Most patients present with sensorineural hearing loss or tinnitus and because VS is a benign disease with troublesome symptoms that may not

Key words

- Microsurgery
- Stereotactic radiosurgery
- Observation
- Quality of life
- Questionnaire
- Vestibular schwannoma

Abbreviations and Acronyms

- CI:** Confidence interval
FACT-Br: Functional Assessment of Chronic Illness Therapy—Brain
PANQOL: Penn Acoustic Neuroma Quality-of-Life
OR: Odds ratio
QoL: Quality of life
VS: Vestibular schwannoma

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improve with intervention,⁵ it has the potential to cause a profound impact on the psychosocial well being of the patient. Patient self-reported QoL has thus become a large area of interest within the literature. Patients with VS, in particular those treated with microsurgery, have been demonstrated to have lower QoL scores⁷⁻¹⁰ and lower emotional intelligence scores¹¹ compared with age- and sex-matched controls.

QoL is defined by the World Health Organization as “an individual’s perception of their position in life...affected in a complex way by the person’s physical health, psychological state, level of independence, social relationships and their relationship to salient features of their environment.”¹² This definition increasingly is important because chronic illnesses, such as VS, are associated with comorbid mental health illnesses, with depression and anxiety states the most commonly described.^{13,14} Providing one’s patients with accurate, evidence-based information regarding QoL outcomes after a diagnosis of VS is an important step towards personalized medicine and can allow for an informed decision regarding treatment on an individual basis. This is particularly important in cases of small tumors, where patient preferences may dictate management.⁴ Indeed, with the evolving paradigm of VS management moving toward a more conservative approach to treatment, the results of studies regarding QoL outcomes take on greater significance.

Thus, we sought to assess the psychosocial impact of a VS diagnosis and to ascertain which treatment strategy offers patients the best QoL outcome. Furthermore, we sought to study which patient characteristics are associated with poor QoL.

PATIENTS AND METHODS

The present study is an anonymous cross-sectional questionnaire-based cohort design. Ninety-five patients with VS attending the Skull-Base clinic (Beaumont Hospital, Dublin, Ireland) between September 2014 and June 2015 with variable lengths of follow-up were asked to complete the Functional Assessment of Chronic Illness Therapy-Brain (FACT-Br) questionnaire in the outpatient center before their appointment. Written informed consent was obtained from all the study participants, and this study received ethical approval from the Beaumont Hospital Ethics Committee Board. Permission to use this tool for the present study was acquired from the FACIT organization (<http://www.facit.org/TransHome>). A total of 83 of the 95 individuals were surveyed, providing a response rate of 87%. Ten patients declined to participate, one patient had to stop due to reading difficulties, and one patient withdrew consent after an emotional reaction to the survey contents. Patients with neurofibromatosis type 2, comorbid psychiatric conditions, or those with a new diagnosis (<6 months) were excluded from the study.

The FACT-Br is a 50-item questionnaire that allows for a multi-dimensional assessment of QoL and is easy to administer.¹⁵ The FACT-Br questionnaire assesses QoL measures in terms of health-related QoL rather than just health function and has domains to assess for physical, social/family, emotional, functional, and general well-being.¹⁶ Thus, it is a combination of the 2 most common approaches to QoL assessment with the opportunity to assess core QoL measures as well as disease specific QoL components.¹⁶ The questionnaire is based on Likert scale questions and was

analyzed according to the FACT-Br instructions to ascertain scores for each QoL domain and overall QoL.

Results were analyzed in the overall cohort and in microsurgery, radiosurgery, and conservative management subgroups. A subgroup analysis also was performed in those patients with smaller tumors (<2.5 cm). Differences between each QoL domain in patient subgroups were analyzed with one-way analysis of variance. Sample size estimation using a 95% confidence interval, 90% power, and a standard deviation of .5 estimated an adequate sample size of 86.

To analyze those patients with good versus poor QoL outcomes, the total score on the FACT-Br was dichotomized, with those falling below the median value defined as having a “poor QoL outcome” and those above the median value a “good QoL outcome.” The minimal clinically significant difference published for the FACT-general is between 3 and 7. Therefore, those patients with a total FACT-Br score that fell within the minimal clinically significant difference were excluded from the logistic regression analysis. The relationship between patient clinical characteristics and QoL outcome was analyzed by univariable and multivariable logistic regression. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated, and a P value of <0.05 was considered statistically significant. Statistical analysis was performed with R software vo.98.¹⁴

RESULTS

The study cohort characteristics are summarized in **Table 1**. Eighty-three patients completed the questionnaire, and the

Table 1. Clinical Characteristics of the Patient Cohort

	All	Conservative	Surgery	Radiotherapy
Patients, n (%)	83	49 (59%)	20 (24%)	14 (17%)
Mean age, years (range)	57.2 (20–83)	60.3 (30–83)	51.3 (20–70)	54.9 (35–73)
<50	24 (29%)	12 (25%)	8 (40%)	4 (29%)
50–59	22 (27%)	10 (20%)	6 (30%)	6 (43%)
60–69	20 (24%)	15 (31%)	3 (15%)	2 (14%)
70+	17 (20%)	12 (24%)	3 (15%)	2 (14%)
Mean time since diagnosis, years	4.9	4.5	4.8	6.42
Sex				
Female	55 (66%)	33 (67%)	12 (60%)	10 (71%)
Male	28 (34%)	16 (33%)	8 (40%)	4 (29%)
Tumor size, cm				
<1.5	41 (49%)	36 (73%)	0 (0%)	5 (36%)
1.5–2.4	21 (25%)	12 (24%)	4 (20%)	6 (43%)
2.5–3.4	7 (9%)	0 (0%)	6 (30%)	1 (7%)
3.5–4.4	4 (5%)	1 (2%)	2 (10%)	1 (7%)
≥4.5	9 (11%)	0 (0%)	8 (40%)	1 (7%)

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