

Vocal symptoms, anxiety and depression pre and post thyroidectomy

Sintomas vocais, ansiedade e depressão pré e pós-tireoidectomia

Síntomas vocales, ansiedad y depresión pre y post tiroidectomía

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Abstract

Introduction: Thyroid alterations and thyroidectomy can lead to vocal and emotional symptoms. **Purpose:** To correlate vocal symptoms and anxiety and depression traits pre and post-thyroidectomy. **Methods:** Observational, longitudinal study. Participants were 20 patients who underwent thyroidectomy, laryngeal visual examination and the Voice Symptom Scale (VoiSS) and Hospital Anxiety and Depression Scale (HADS) preoperatively, 1 week and 3 months after, with a mean age of 54.5 years, higher prevalence of female gender (85%) and partial thyroidectomy (70%). **Results:** The patients self-reported vocal symptoms at all times, more frequently after one week and a significant difference between the physical domain pre and post 1 week. In HADS, there was a higher total score in the preoperative period and a

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TO: project design, data collection/analysis and article writing.

GBO: data collection/analysis and article writing

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Received: 11/16/2021

Accepted: 03/01/2023

significant difference in the three moments, in all domains, with a greater difference between pre and post 1 week. There was a weak positive correlation between the limitation, emotional and total score of the ESV domains with the anxiety subscale after 1 week, between the total score of the ESV and the total score of the HADS, and a moderate positive correlation between the limitation and emotional domains of the ESV with the HADS total score after one week. **Conclusion:** Patients undergoing thyroidectomy self-perceived vocal symptoms and mild anxiety traits both before and after 1 week and after 3 months of surgery with worse self-report after one week. The greater the self-report of vocal symptoms, the more traces of anxiety the patient may present.

Keywords: Signs and symptoms; Thyroidectomy; Voice; Anxiety; Depression.

Resumo

Introdução: Alterações na tireoide e a tireoidectomia podem levar à sintomatologia vocal e emocional. **Objetivo:** Correlacionar sintomas vocais e traços de ansiedade e depressão pré e pós-tireoidectomia. **Métodos:** Estudo observacional, longitudinal. Participaram 20 pacientes submetidos à tireoidectomia, ao exame visual laríngeo e à Escala de Sintomas Vocais (ESV) e Escala Hospitalar de Ansiedade e Depressão (HADS) no pré-operatório, pós 1 semana e pós 3 meses, com média de idade de 54,5 anos, maior prevalência do sexo feminino (85%) e tireoidectomia parcial (70%). **Resultados:** Os pacientes autorreferiram sintomas vocais em todos os momentos, com maior frequência após uma semana e diferença significativa entre o domínio físico pré e pós 1 semana. Na HADS, observou-se maior escore total no pré-operatório e diferença significante nos três momentos, em todos os domínios, com maior diferença entre pré e pós 1 semana. Houve correlação positiva fraca entre os domínios limitação, emocional e escore total da ESV com a subescala de ansiedade pós 1 semana, entre o escore total da ESV e o escore total da HADS e correlação positiva moderada entre os domínios limitação e emocional da ESV com o escore total da HADS após uma semana. **Conclusão:** Pacientes submetidos à tireoidectomia autopercebem sintomas vocais e traços de grau leve de ansiedade tanto no pré quanto pós 1 semana e após 3 meses de cirurgia com pior autorreferência após uma semana. Quanto maior a autorreferência de sintomas vocais, mais traços de ansiedade o paciente pode apresentar.

Palavras-chave: Sinais e Sintomas; Tireoidectomia; Voz; Ansiedade; Depressão.

Resumen

Introducción: Cambios en la tiroides y tiroidectomía pueden provocar síntomas vocales y emocionales. **Objetivo:** Correlacionar síntomas vocales y rasgos de ansiedad y depresión antes y después de tiroidectomía. **Metodos:** Estudio observacional/longitudinal. Participaron 20 pacientes que se les realizó tiroidectomía, examen visual laríngeo, Escala de Sintomas Vocales (ESV) y Escala Hospitalaria de Ansiedad y Depresión (HADS) en preoperatorio, 1 semana y 3 meses después, con edad media de 54,5 años, prevalencia del género femenino (85%) y tiroidectomía parcial (70%). **Resultados:** Los pacientes informaron síntomas vocales en todo momento, con mayor frecuencia después de una semana y una diferencia significativa entre el dominio físico antes y después de 1 semana. En HADS, hubo mayor puntaje total en el preoperatorio y diferencia significativa en los tres momentos, con mayor diferencia entre pre y post 1 semana. Hubo una correlación positiva débil entre limitación, emocional y total de los dominios de la ESV con la subescala de ansiedad después de 1 semana, entre el total de la ESV y el total de la HADS, y una correlación positiva moderada entre la puntuación de limitación y dominios emocionales de la ESV con la puntuación total de HADS después de una semana. **Conclusión:** Los pacientes sometidos a tiroidectomía autopercebieron síntomas vocales y rasgos de ansiedad leve tanto antes como después de 1 semana y después de 3 meses de la cirugía con peor autoinforme después de una semana. Cuanto mayor es el autoinforme de síntomas vocales, más rastros de ansiedad puede presentar el paciente.

Palabras clave: Signos y síntomas; Tiroidectomía; Voz; Ansiedad; Depresión.

Introduction

With regard to thyroid diseases, partial or total thyroidectomy may lead to vocal alterations due to several reasons, such as the extent of the surgery, technique used, orotracheal intubation, dissection of the cervical muscles, bruises and/or handling of the laryngeal nerves^{1,2}.

Vocal symptoms may be present in the pre-operative period^{3,4}, with a prevalence of physical symptoms, mainly laryngeal sensations, such as throat clearing, pain, discomfort, and swollen nodules in the neck region, among others⁴. Patients may have sensory symptoms of upper digestive tract and vocal tract discomfort (VTD) both pre- and postoperatively, which are characterized by self-reported hoarseness, vocal fatigue, feeling of a lump in the throat and throat clearing, as well as dryness, sore throat and sensitive throat⁵.

There is also evidence that thyroid disorders may cause emotional symptoms^{6,7}. This relationship is a result of the intimate association between thyroid function and the metabolism of the human body, as it acts on the noradrenergic and serotonergic systems, which contain neurotransmitters that are important for mood^{8,9}. However, it should be noted that its role in mood swings is little explored.

In addition, studies carried out with patients diagnosed with autoimmune diseases^{10,11} and in women who underwent total thyroidectomy¹² found an association between thyroid changes, and emotional and vocal symptoms. Thus, longitudinal studies, such as this one, may contribute to understanding the relationship between pre- and post-thyroidectomy symptoms.

Therefore, in addition to the functional aspects, it is important to consider the emotional issues associated with the diagnosis of thyroid nodules and their treatment^{6,13}. The long waiting time for the surgery and the diagnosis of malignancy are determining factors for the severity of the patient's anxiety/depression symptoms¹⁴.

Thus, this study aimed to correlate vocal symptoms with anxiety and depression traits in patients undergoing thyroidectomy.

Material and Methods

This was an observational, longitudinal, prospective and quantitative study evaluated and approved by the Research Ethics Committee of the Institution under Decision No. 2.868.455. All individuals who participated in the research were previously informed of the procedures and signed the Informed Consent Form (ICF).

Data collection was carried out in person with patients who are assisted by the medical team in the Head and Neck Surgery Department of a University Hospital, at three different times: preoperatively, after 1 week (1W) and after 3 months (3M) of surgery and who were not in multidisciplinary care.

Vocal symptoms may be present both short and long term after thyroidectomy, but these symptoms are expected to reduce after about three months, although they may persist over time^{2,15}. There are no similar data regarding emotional symptoms. For this reason, the researchers selected a follow-up period of three months postoperatively.

Data from 84 individuals recommended for thyroidectomy were collected preoperatively. Over the period defined for data collection, 31 individuals underwent the surgical procedure, which were followed up to the 1W moment. Among the 31 individuals followed by the study who had data collected both preoperatively and at 1W, 20 continued to collect data at the 3M postoperative period. The reduction of the "n" from the preoperative period to the 1W period is explained by the fact that the surgery was not performed in a timely manner. In turn, the loss of the "n" from the 1W postoperative period to the 3M postoperative period is explained by the difficulty in contacting individuals for follow-up visits.

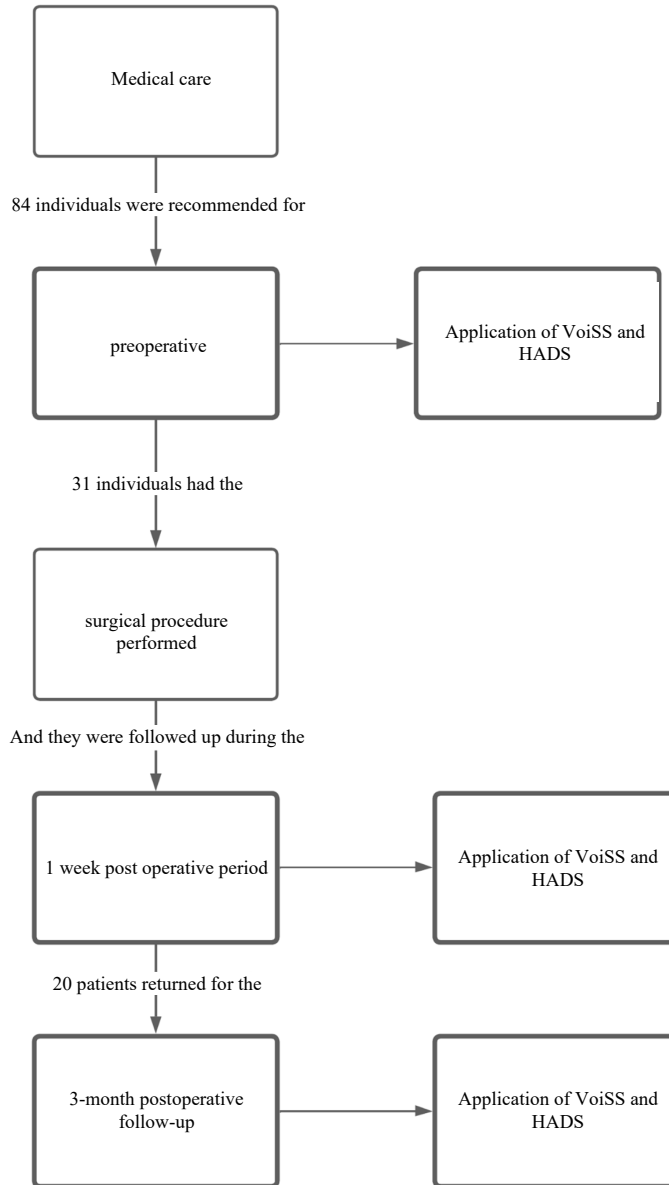


Figure 1. Flowchart about the procedures and moments of the study.

Therefore, the study included 20 patients with thyroid disease, with a higher prevalence of females (85%; n=17), partial thyroidectomy (70%; n=14) and mean age of 54 years (± 16.9). It should be noted that the study excluded patients with laryngeal alterations and endolaryngeal signs of laryngopharyngeal reflux, visualized through videolaryngoscopy, such as the presence of hyperemia and edema in the posterior third of the glottic and interarytenoid region, and thyroid hormone

alterations obtained by measuring TSH (thyroid-stimulating hormone) and free T4 in the blood, routinely requested in the outpatient follow-up of patients and collected from the medical records at all times.

The patients were evaluated using the Voice Symptom Scale (VoiSS)¹⁶ and the Hospital Anxiety and Depression Scale (HADS)¹⁷. The VoiSS is understood as the most rigorous and psychometrically robust protocol for vocal self-assessment¹⁶,

providing information on knowledge regarding the self-perception of vocal symptoms and their impact on the voice. The scale consists of 30 questions divided into three domains: limitation (15 questions), emotional (8 questions) and physical (7 questions), scored according to the frequency of symptoms in: never (zero), rarely (one point), sometimes (two points), almost always (three points) and always (four points). A simple sum of the scores of the questions is made for analysis, which can range from zero to 120 points. The higher the score, the greater the self-report of vocal symptoms. The cutoff score of the VoiSS to differentiate vocally healthy individuals from dysphonic individuals is 16 points¹⁶.

The HADS scale is a tool that has been widely used to assess mood disorders in patients with physical illnesses. This tool includes 14 multiple-choice questions divided into two subscales, one for anxiety and the other for depression, with seven items each. The overall score on each subscale ranges from 0 to 21. Anxiety and depression scores are categorized into normal (0-7), mild (8-10), moderate (11-14), and severe (15-21). A cutoff of 8 or more points represents possible cases of anxiety/depression, while 11 or more points represents probable cases of anxiety/depression¹⁷.

Descriptive statistics of the studied variables was performed for data analysis. Friedman's Test was used to compare the pre- and post-surgery moments, Conover Post-hoc Test was used to identify the exact moments of the study that differed from the others, and the Spearman's rank correlation coefficient was applied to measure the correlation between the scores of the applied scales. A significance level of 5% ($p\text{-value} \leq 0.05$) was adopted for all analyzes. Within the scope of the correlation magnitude analysis, correlations below 0.50 were considered weak, while correlations between 0.50 and 0.70 were considered moderate, between 0.70 and 0.90 were considered strong and above 0.90 were considered very strong¹⁸. All statistical analyzes were performed using the R v3.6.1 software¹⁹.

Results

As for the VoiSS, only the "physical" domain had a statistically significant result, with the greatest statistical difference being observed between pre and post 1W of thyroidectomy. A higher frequency of vocal symptoms was found one week after the procedure.

Table 1. Comparison of the scores of the VoiSS domains, at different times, in patients undergoing thyroidectomy.

VoiSS	Time			p-value
	Pre	After 1W	After 3M	
Limitation	11.8	20.2	14.3	0.130
Emotional	4.5	1.4	2.4	0.802
Physical	5.5	9.5	5.7	0.009**
Total	21.8	31.2	22.4	0.115

Abbreviation: VoiSS: Voice Symptom Scale (** $p \leq 0.05$); Pre: preoperative; After 1W: After one week; After 3M: After three months.

Analysis using the HADS scale found a statistically significant difference between the scores at the three time points, in all domains, with the greatest difference observed between preoperative and 1W after surgery, with signs of mild anxiety in the preoperative time. With regard to the analysis

of depression, there was a reduction between the pre and 1W after the procedure, and there was an increase between the moment 1W after and 3M after the procedure, although categorized as "normal sign".

Table 2. Comparison of the scores of HADS domains, at different times, in patients undergoing thyroidectomy.

HADS	Time			p-value
	Pre	After 1W	After 3M	
Anxiety	8.1	5.0	6.7	0.012**
Depression	5.4	3.7	4.1	0.010**
Total	13.5	8.7	10.8	0.014**

Abbreviations: Friedman test (** $p \leq 0.05$); HADS: Hospital Anxiety and Depression Scale; Pre: preoperative; After 1W: After one week; After 3M: After three months.

A statistically significant difference was observed between all moments in the anxiety domain and in the total score of the HADS scale when performing the comparative analysis of moments in

two by two. *HADS*. In the depression domain, there was a statistically significant difference between pre and post 1W and 3M (1W/3M).

Table 3. Multiple comparison of the scores of HADS domains, at different times, in patients undergoing thyroidectomy.

HADS	Time		
	Before/After 1W	Before/After 3M	After 1W/After 3M
Anxiety	<0.001**	<0.001**	<0.001**
Depression	<0.001**	<0.001**	0.5
Total	<0.001**	<0.001**	<0.001**

Abbreviations: Conover Post-hoc test (** $p \leq .05$); HADS: Hospital Anxiety and Depression Scale; Pre: preoperative; After 1W: After one week; After 3M: After three months.

There were weak positive correlations for the Limitation, Emotional, and Total domains of the VoiSS with the anxiety subscale and the Total HADS subscale after 1W, in addition to a moderate

positive correlation for the Limitation and Emotional domains of the VoiSS with the Total HADS subscale after 1W.

Table 4. Correlation between VoiSS domain scores and HADS items, at different times, in patients undergoing thyroidectomy.

VoiSS	HADS-A			HADS-D			HADS-T		
	Pre	After 1W	After 3M	Pre	After 1W	3M	Pre	After 1W	3M
Limitation	0.137	0.497**	0.212	-0.292	0.344	0.344	-0.122	0.510**	0.324
Emotional	0.137	0.471**	0.328	-0.292	0.373	0.334	-0.122	0.525**	0.384
Physical	0.137	0.443	0.225	-0.292	0.242	0.090	-0.122	0.419	0.173
Total	0.137	0.490**	0.242	-0.292	0.289	0.266	-0.122	0.482**	0.305

Abbreviation: Spearman's rank correlation coefficient (** $p \leq 0.05$); VoiSS: Voice Symptom Scale; HADS-A: Anxiety domain of the Hospital Anxiety and Depression Scale; HADS-D: Depression domain of the Hospital Anxiety and Depression Scale; HADS-T: Total domain of the Hospital Anxiety and Depression Scale; Pre: preoperative; After 1W: After one week; After 3M: After three months.

Discussion

Patients submitted to thyroidectomy commonly have, transient or not, vocal symptoms, both pre- and postoperatively, even with the preservation of the laryngeal nerves^{2,5,20-23}, in addition to

emotional symptoms impacting quality of life^{2,24}. However, there is still little material available in the literature regarding vocal parameters associated with thyroidectomy²⁵.

There was a score above the cutoff point on the VoiSS in all three moments, with the highest value

found after 1 week, and decreasing after 3 months, but remaining above the cutoff point. The greatest difference observed in the comparison between the scores obtained was at the moment after 1W for the physical domain, which evaluates symptoms such as pain, infection, presence of lumps in the throat, coughing and throat clearing. This data is in line with recent studies that reported a higher frequency of vocal symptoms in the recent postoperative period with a reduction after 6 months^{2,5}. Other studies^{20,21} also show the presence of vocal alterations after recent thyroidectomy. It should be noted that at this time patients are still recovering and generally the symptoms are more evident.

In turn, scores above the cut-off point were observed in the three moments in the signs of anxiety/depression measured by the HADS, with a higher value in the preoperative period, decreasing after 1W and increasing after 3M. There was a significant difference between the scores, at the three moments in all HADS domains. In addition, mild signs of anxiety were detected, higher than those of depression, with higher values in the preoperative period, a reduction between preoperative moment and 1W after and an increase between 1W after and 3M after. This result corroborates a study, in which a prevalence of anxiety before surgery was observed in patients with thyroid diseases²⁶. The postoperative pain symptom is related to the presence of anxiety in the preoperative period, so anxiety is a significant predictive factor for the onset of pain in the postoperative period²⁷.

Scores within the normal range were observed for the symptoms of depression, although with later reduction and increase in values, which indicates a need for attention to this parameter at different evaluation times.

When comparing the different moments, a statistically significant difference was observed between all moments for anxiety and for the total HADS domain. However, there was a statistically significant difference only between the preoperative moments and after 1W and 3M. This difference shows the relevance of investigating before treatment, sometimes with less attention than necessary, with greater emphasis on anxiety, emphasizing the need to observe this symptomatology at all stages of treatment.

A number of associated physiological and psychological reactions are major stressors for patients, especially before diagnosis. Furthermore, different

levels of anxiety can impair physiological health and social skills. And it should be noted that anxiety disorders are highly prevalent in this population and may impair their ability to cope with surgery and other treatments, impacting their quality of life²⁶.

In this sense, patients with thyroid disease who are waiting for surgery have a high level of preoperative anxiety, regardless of the severity of the disease and the complexity of the surgery, which may occur due to lack of information before the procedure and future expectations²⁶. However, a recent study²⁸ reported that preoperative guidance through leaflets did not change postoperative anxiety levels. Thus, future studies should aim at effective ways of informing and raising awareness among patients undergoing thyroidectomy, minimizing the lack of information on the part of patients and their families.

The weak positive correlation for the Limitations, Emotional and Total domains of the VoiSS with the Anxiety subscale of the HADS, and between both total scores after 1W, and the moderate positive correlation for the limitations and emotional domains of the VoiSS with the total score of the HADS after 1W, show that the greater the vocal self-reference, the more anxiety signs the patient may present.

The relationship between thyroid disorders and emotional symptoms has already been described in the literature on patients diagnosed with autoimmune diseases^{10,11} and in women who underwent total thyroidectomy¹². More specifically, a study¹² found an association between thyroid changes, vocal and emotional symptoms after thyroidectomy when assessing the impact on quality of life in women undergoing total thyroidectomy. The study also showed that the onset of vocal changes after thyroidectomy may have caused the onset of physical and psychological changes, which may have affected quality of life¹². In addition, hypothyroidism, which may be present after removal of the gland, may have symptoms characterized by a depressive condition, which are associated with slow speech, decreased intellectual performance, fatigue, insomnia, decreased appetite and apathy¹².

Thus, this study is in line with the previously mentioned studies, in the sense that self-identified vocal alterations before or after thyroidectomy may be correlated with emotional symptoms.

Therefore, psychological intervention can be an effective alternative to attenuate the emotional

symptoms of patients undergoing the procedure. In this context, a randomized clinical trial²⁹ showed that the psychological intervention of the nursing team in patients diagnosed with thyroid cancer improved psychological distress and maximized the patients' quality of life. However, clinical trials are still needed to analyze the effectiveness of psychological intervention in patients diagnosed with thyroid disorders.

The voice is an important tool for the process of communication and human socialization, since it improves the transmission of the articulated message, adding emotional content and expressiveness³⁰. Normally, the physical symptoms appear before the emotional ones, which can lead to the idea that dysphonia can be reactive to emotional issues such as anxiety.

The study had some limitations. The sample could have been larger if patients had returned regularly to the outpatient clinic. But, with the COVID-19 pandemic, the outpatient clinic was suspended and there was difficulty in telephone communication, as some calls were not completed or patients were not found to complete data collection. In addition, the sample could have been better detailed, since it was not possible to obtain the reasons why the patients underwent thyroidectomy, and there was no investigation of mental disorders and/or use of psychotropic medications.

Conclusion

Patients submitted to thyroidectomy self-reported vocal symptoms and signs of a mild degree of anxiety both before and after 1 week and 3 months, with worse self-report after 1 week of surgery. There was a moderate correlation between the limitation and emotional domains of the VoiSS with the total HADS score, which means that the higher the vocal self-assessment, the more signs of anxiety the patient may present.

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