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REEDUCAÇÃO FUNCIONAL RESPIRATÓRIA NA PESSOA SUBMETIDA A LARINGECTOMIA TOTAL: UM ESTUDO DE CASO

RESPIRATORY FUNCTIONAL RE-EDUCATION IN THE PERSON SUBMITTED TO TOTAL LARYNGECTOMIZY: A CASE STUDY

REEDUCACIÓN FUNCIONAL RESPIRATORIA EN LA PERSONA SOMETIDA A LARINGECTOMÍA TOTAL: ESTUDIO DE UN CASO

Joana Silva[1]; Lucinda Santos[1];
Maria Céu Simões[1]; Patrícia Reis[1]

[1] *Centro Hospitalar e Universitário de Coimbra, Coimbra, Portugal*

Corresponding Author: Joana Silva, joanasilva226@hotmail.com

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RESUMO

Introdução: A laringectomia total é um procedimento cirúrgico mutilante, que provoca alterações funcionais irrecuperáveis, tendo a pessoa que se adaptar a uma nova condição de saúde, bem como à exigência dos cuidados pós-operatórios.

Objetivo: Identificar os ganhos sensíveis à atuação do Enfermeiro Especialista em Enfermagem de Reabilitação, na prevenção de complicações respiratórias na pessoa laringectomizada total.

Metodologia: Estudo descritivo do tipo estudo de caso elaborado de acordo com as guidelines da Case REport. Apresentado o caso de uma pessoa submetida a laringectomia total, admitida numa Unidade de Internamento de um Centro Hospitalar, tendo sido respeitados os princípios éticos na sua abordagem. A recolha de dados foi efetuada através da anamnese, consulta do processo clínico da pessoa, exame físico (inspeção e auscultação) e avaliação dos sinais vitais.

Resultados: Com a implementação de cinco sessões de reeducação funcional respiratória verificou-se ganhos na ventilação, limpeza das vias aéreas e capacidade para promover a limpeza das vias aéreas, prevenindo, deste modo, complicações respiratórias no pós-operatório e promovendo a adaptação à sua nova condição de saúde.

Conclusão: Após a implementação de um programa de reeducação funcional respiratória à pessoa em estudo, submetida a laringectomia total, verificaram-se ganhos na ventilação, limpeza das vias aéreas e capacidade para promover a limpeza da vias aéreas. Será vantajoso realizar outros estudos nesta área, para perceber o efeito dos programas de reeducação funcional respiratória numa amostra representativa.

Descritores: exercícios respiratórios; enfermeiro especialista de reabilitação; traqueostomia; estudo de caso.

ABSTRACT

Introduction: Total laryngectomy is a maiming surgical procedure, that causes irrecoverable functional changes, and the person has to adapt to a new health condition, as well as the requirement for postoperative care.

Objective: To identify sensitive outcomes to the performance of Rehabilitation Nurse in the prevention of respiratory complications in total laryngectomized person.

Methodology: Descriptive study of the case study type, elaborated according to the guidelines of case report. Presented the case of a person submitted to total laryngectomy, admitted to an inpatient unit of a hospital center, with respect for ethical principles in their approach. Data collection was carried out through anamnesis, consultation of the person's clinical file, physical examination (inspection and auscultation) and evaluation of vital signs.

Results: With the implementation of five respiratory functional re-education sessions, there were gains in ventilation, airway cleaning and the ability to promote airway cleaning, preventing postoperative respiratory complications and promoting adaptation to their new health condition.

Conclusion: After implementing a respiratory functional re-education program for the person under study, who underwent total laryngectomy, there were gains in ventilation, airway cleaning and the ability to promote airway cleaning. it will be advantageous to carry out further studies in this area, to understand the effect of respiratory functional re-education programs on a representative sample.

Descriptors: breathing exercises; rehabilitation nurse; tracheostoma; case study.

RESUMEN

Introducción: La laringectomía total es un procedimiento quirúrgico mutilar, que provoca cambios funcionales irrecuperables y que requiere que la persona se adapte a una nueva condición de salud, así como a la exigencia de los cuidados postoperatorios.

Objetivo: Identificar las ventajas relacionadas con el papel de la Enfermera Especialista en Enfermería de Rehabilitación en la prevención de complicaciones respiratorias en personas con laringectomía total.

Metodología: Estudio descriptivo del tipo estudio de caso elaborado de acuerdo con las directrices del Case REport. Se presenta el caso de un paciente sometido a una laringectomía total, ingresado en una Unidad de Internamiento de un Centro Hospitalario, respetando los principios éticos en su abordaje. La recolección de datos se realizó a través de anamnesis, consulta del expediente clínico de la persona, examen físico (inspección y auscultación) y evaluación de signos vitales.

Resultados: Con la implementación de cinco sesiones de reeducación funcional respiratoria, se constataron beneficios en cuanto a ventilación, limpieza de las vías respiratorias y la capacidad de promover la limpieza de las vías aéreas, evitando así complicaciones respiratorias en el postoperatorio y promoviendo la adaptación a su nuevo estado de salud.

Conclusión: Después de implementar un programa reeducación funcional respiratoria para el persona en estudio, que se sometió a laringectomía total, hubo ganancias en la ventilación, la limpieza de las vías aéreas y la capacidad para promover la

limpieza de las vías aéreas. Será ventajoso realizar más estudios en esta área, para comprender el efecto de los programas de reeducación funcional respiratoria en una muestra representativa.

Descriptores: ejercicios respiratorios; enfermera especialista en rehabilitación; traqueotomía; estudio de caso.

INTRODUCTION

Laryngeal cancer is a multifactorial disease, influenced by environmental issues and lifestyles.

In 2020, in Portugal, laryngeal cancer was the 22nd most common neoplasm, with 529 new cases and 329 deaths due to this pathology [1].

Over the years, there has been a decrease in new cases of malignant neoplasia of the larynx in the national context, translated into 621 in 2010, 586 in 2018 and 529 new cases in 2020[1].

There are numerous risk factors associated with laryngeal cancer, namely the interaction of individual and collective environmental factors, such as: smoking, alcohol consumption, viral infection, physical inactivity, dyslipidemia, inadequate diet and occupational exposure (to asbestos, strong inorganic acids, cement dust and silica) [2,3]. Some studies already carried out on this issue point to the following as risk cofactors: low education, infection with the Human Papilloma Virus (HPV) and gastroesophageal reflux [2].

The most important risk factor for laryngeal cancer is smoking, and it is uncommon for this disease to be diagnosed in non-smokers. Smoking cessation is the best way to prevent this oncological disease. Another equally important measure is to reduce the amount of alcohol consumed, especially in people who smoke (4).

The main symptoms of the disease include dysphonia, dysphagia, cervical lump, stridor, hemorrhage, odynophagia, otalgia and weight loss. Changes in phonatory and respiratory functions are the first warning signs for the diagnosis. In situations of supraglottic tumors, people often experience dyspnea, dysphagia, foreign body sensation, odynophagia, otalgia, risk of aspiration and cervical adenopathies with swelling of the neck (cervical metastases). In glottic tumors, dysphonia, dyspnea, dysphagia, odynophagia and otalgia may occur, often indicating an advanced stage of the disease. Subglottic tumors manifest with late signs, with frequent dyspneic symptoms, and are rarely exposed by dysphonia [2].

The forms of treatment for this type of cancer are surgery, chemotherapy and radiotherapy. The combination of these therapeutic modalities depends on several factors, namely: tumor staging, anatomical location, size, histology and involvement or not of cervical lymph nodes, bone and muscle involvement, person data such as age, general condition and comorbidities [5,6].

Total laryngectomy is one of the most apprehensive surgical interventions for patients, as it is a mutilating procedure and because of the need for the person to adapt to a new way of breathing and speaking/communication [4].

This surgical intervention consists of the total removal of the larynx, hyoid bone, epiglottis, cricoid cartilage, thyroid cartilage and two or three rings of the trachea [7]. Total laryngectomy is usually accompanied by cervical lymph node dissection. Radical neck dissection (implying the ablation of the salivary gland, sternocleidomastoid muscle, internal jugular vein and spinal nerve), selective or modified radical, can be performed, in which the described structures can be spared[7]. After removing the larynx, the pharynx is reconstituted and the trachea is sutured to the neck, creating a tracheostoma[8], which allows the passage of unconditioned airflow directly to the trachea, interfering with the protection, resistance and humidification properties of the air. The entry of cold, dry air, microorganisms and dust directly into the lower airways increases the incidence of respiratory infections [7,9].

The post-total laryngectomy condition presents several changes in lung function. The air inhaled through the tracheostoma does not pass through the natural conditioning of the upper respiratory tract, causing the filtration of solid particles transmitted by air and aerosols to be reduced. Furthermore, the inhaled air is neither humidified nor heated. Compared to breathing through the upper respiratory tract, patients with a respiratory ostomy experience an aerodynamic reduction in resistance to air flow during inspiration and expiration, which has a negative effect on peripheral pulmonary ventilation. One of the most important negative factors in the survival of people undergoing total laryngectomy is the progressive deterioration of lung function [10].

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The presence of a tracheostoma is associated with complications and changes in ventilation mechanics. The exclusion of glottic function associated with low lung volume is related to the appearance of micro-atelectasis of the lung bases (6).

The use of intraoperative mechanical ventilation, combined with pulmonary depression caused by drugs used in patients undergoing general anesthesia, contributes to the accumulation of pulmonary secretions and, consequently, the formation of atelectasis. In some situations, it may be necessary to perform myocutaneous flaps of the pectoralis major muscle, causing pain in the donor region and, consequently, a decrease in thoraco-pulmonary expansibility and the formation of atelectasis (6).

Postoperatively, patients may also present changes in posture, due to shortening of the cervical muscles and the presence of pain (7,11, 12).

The literature points out the following main respiratory complications in patients undergoing this type of surgery: pneumonia; respiratory failure; atelectasis; diaphragm paralysis; pulmonary hypersecretivity; hypoxia and accumulation of secretions (plugs) in the tracheostomy tube (6).

Post-operatively, a tracheostomy tube is often used at an early stage. There are several types of cannulas, the most frequently used in the immediate post-operative period being the cuffed plastic cannula (figure 1).

Figure 1 – Plastic cannula with balloon (with cuff)

To try to minimize the effects of the lack of air conditioning (heating, filtration and air humidification), it is advisable that these patients use a heat and moisture exchange device, the Heat and Moisture Exchange (HME filter), which is placed on the device that the person uses (cannula, adhesive plate, button) and whose main functions are: the exchange of heat and humidity; increasing resistance to air flow and filtering particles compatible with the function of the nose (air conditioning) [9].

The nurse specialist in rehabilitation nursing (NSRN) "designs, implements and monitors differentiated rehabilitation nursing plans, based on people's real and potential problems. The high level of knowledge and increased experience allow you to make decisions regarding health promotion, prevention of secondary complications, treatment and rehabilitation, maximizing the person's potential" [13].

Specialized rehabilitation nursing care for patients undergoing total laryngectomy should focus on preventing complications, particularly respiratory complications, as well as adapting them to their

new health condition, making them more autonomous and independent as much as possible. . The NSRN, due to the skills they are recognized for, are qualified to assess the person's clinical condition and develop respiratory functional re-education plans, where improving ventilatory function and reducing tracheobronchial secretions are priorities.

There is a scarcity of studies that analyze the potential benefit of functional respiratory re-education techniques in patients undergoing total laryngectomy [14], with no evidence of sensitive results for rehabilitation nursing care in this context.

This study focused on the implementation of a respiratory functional re-education program consisting of rehabilitation nursing interventions for people with compromised ventilation, ineffective airway clearance and the potential to improve the ability to promote airway clearance. Strategies based on the Nursing Process and the Documentary Standard of Specialized Care of the Rehabilitation Nursing Specialty were implemented [15].

Therefore, the following guiding question was formulated "What are the health gains, in the person undergoing total laryngectomy, with the implementation of a respiratory functional re-education program?"

The general aim of this case study is to identify the significant gains made by the Specialist Nurse in Rehabilitation Nursing, in preventing respiratory complications in total laryngectomized patients.

METHODOLOGY

Descriptive case study, which allows complex life phenomena to be studied in an intensive and in-depth way, using various sources of evidence [16].

The case study was prepared in accordance with the Case REport (CARE) guidelines [17].

The present study describes the case of a person diagnosed with laryngeal cancer, who underwent scheduled surgery, total laryngectomy, to which a functional respiratory re-education plan was instituted, with the aim of optimizing ventilation and cleaning the airways, thus preventing , postoperative respiratory complications.

The functional respiratory re-education program was carried out during the month of November 2021, in a surgical service of a Hospital Center in the Central Region, between the 2nd and 6th post-t-operative day (five sessions) Each session lasted approximately 30 minutes. This program began on the 2nd post-surgical day, at which point we obtained the patient's collaboration, after becoming aware of the main changes resulting from the surgery, namely the presence of the tracheostomy. The duration of the program, five daily sessions, is due to the fact that it was the period in which we were able to evaluate and intervene with the patient, continuously, without interruptions (optimization of human resources).

The person's assessment was carried out using clinical history, disease evolution, symptoms, therapeutic regimen, family history and psychosocial history. The assessment of bodily processes included physical examination (inspection and auscultation) and monitoring of vital parameters. To assess the person's respiratory function, we follow the recommendations of the Good Practice Guide – Respiratory Rehabilitation, prepared by the Board of the College of Rehabilitation Nursing [18].

During the study, the ethical principles that should guide an investigation were respected: Beneficence; Non-Maleficence; Fidelity; Justice; Veracity and Confidentiality [17]. The person was informed of their rights to participate in the study, and free and informed consent was obtained before data collection

CASE PRESENTATION

The person under study is male, 75 years old, Caucasian and Portuguese nationality. He lives with his wife and a daughter, and his daughter who took on the role of caregiver during hospitalization and in preparation for returning home. Currently he is retired.

Personal history includes: heart transplant in 2010 (due to ischemic cardiomyopathy in the dilated phase), chronic renal failure, obesity, osteoporosis, dyslipidemia, obstructive sleep apnea syndrome (OSAS), right vocal cord neoplasm (diagnosed in 2009, subjected to radiotherapy). Ex-smoker patient, consuming two packs/day (suspended 15 years ago). He drinks alcohol socially.

At home, he performs long-term oxygen therapy (2l/min), for 16 hours/day. He presents with lip cyanosis and fatigue on medium exertion, a situation that he maintains post-operatively. Independent in activities of daily living and instrumental life activities.

He was followed up in an Otorhinolaryngology consultation, due to dysphonia. Ancillary diagnostic tests were carried out, namely positron emission tomography (PET), which revealed malignant neoplasia of the left vocal cord.

Regarding nutritional status, the person under study, upon admission, weighed 79 kg and was 1.80 m tall (BMI 24.38 kg/m2). After 7 days, the person showed significant weight loss, objectively 4kg (75kg).

REHABILITATION NURSING ASSESSMENT

The assessment of a person with respiratory pathology must be pertinent, objective and aim to determine nursing diagnoses, given the person's changed

needs. This assessment should allow the healthcare professional to intervene according to the changes identified in functionality [20].

Rehabilitation specialist nurses have the ability, given a set of therapeutic interventions, to provide recovery for people with respiratory pathology [19].

Clinical assessment, using physical examination, allowed the elaboration of rehabilitation nursing diagnoses and the prescription of real interventions to meet the person's needs.

The different evaluation parameters were obtained before and after the implementation of the respiratory functional re-education program, as recommended by the American Association of Cardiovascular & Pulmonary Rehabilitation [19], which made it possible to identify significant gains in rehabilitation nursing care.

The intervention consisted of functional respiratory re-education exercises, continuously monitored, namely through lung auscultation, oxygen saturation values, vital signs and assessment of the respiratory pattern (chest symmetry, type of breathing, rhythm, amplitude, recruitment assessment accessory muscles and lip cyanosis).

Preoperatively, vital signs (Table 1) and respiratory function (Table 1) were assessed.

Table 1 - Vital signs before surgical intervention (Total Laryngectomy)

Date	Blood pressure (mmHg)	Respiratory frequency (ciclos/min)	Cardiac frequency (bpm)	Axillary Temperature (ºC)	Peripheral oxygen saturation (%)
7/11/2021	129/60	16	84	36.0	95

Chart 1– Assessment before surgical intervention (Total Laryngectomy)

Date	7/11/2021
Auscultation	No adventitious noises
Oxygen therapy	2l/min
Chest symmetry	Symmetrical
Type of Breathing	Mixed
Rhythm	Rhythmic
Amplitude	Without changes
Accessory muscles	No
Cyanosis	Lip

REHABILITATION NURSING DIAGNOSES

Based on the assessment of the patient's clinical condition, nursing diagnoses were identified, according to the ICNP® taxonomy, and subsequently, the rehabilitation intervention plan was drawn up. The nursing diagnoses identified were:

- Compromised ventilation
- Compromised airway clearance
- Potential to improve the ability to promote airway clearance.

RESPIRATORY REHABILITATION PROGRAM

The interventions that are part of the respiratory functional re-education program are appropriate to the defined diagnoses, through assessment of the person. They were based on what is recommended by the Documentary Standard of Nursing Care of the Rehabilitation Nursing Specialty [15] and by the Guiding Guide for Good Practice in Respiratory Rehabilitation [19] and are represented in the following tables:

Table 2 – Rehabilitation nursing interventions in view of the diagnosis: Compromised ventilation

Nursing Diagnosis: Compromised ventilation	
Nursing Interventions	• To assess ventilation (chest symmetry, type, rhythm, amplitude, use of accessory muscles) – before and 30 minutes after the rehabilitation session; • To monitor O2 saturation; • To monitor respiratory rate; • To optimize ventilation through positioning (rest and relaxation position – sitting); • To perform respiratory kinesitherapy: - control and dissociation of breathing times; - abdominal-diaphragmatic re-education (2 sets of 10 repetitions); - posture correction technique in front of a mirror; - global rib opening (2 sets of 10 repetitions) and right rib opening (2 sets of 10 repetitions); - compression maneuvers (lower rib cage) during exhalation and sudden decompression of the chest (when inspiration begins) (2 sets of 10 repetitions).

Table 3 – Rehabilitation nursing interventions given the diagnosis: Ineffective airway clearance

Nursing Diagnosis: Compromised Airway Clearance	
Nursing Interventions	• To assess airway cleanliness; • To perform respiratory kinesitherapy: - drenagem postural modificada; - accessory maneuvers (thoracic vibrocompression); - technique of accelerating expiratory flow. • To aspirate secretions through the tracheostomy; • To optimize tracheotomy cannula; • To monitor secretions.

Table 4 – Rehabilitation nursing interventions in light of the diagnosis: Potential to improve the ability to promote airway clearance

Nursing Diagnosis: Potential to improve the ability to promote airway clearance	
Nursing Interventions	• To assess the ability to promote airway clearance; • To instruct to promote airway cleaning: - Flexion of the trunk and abdominal compression during the mobilization of secretions; • To train to promote airway clearance.

RESULTS

The respiratory functional re-education program included a total of five sessions, implemented daily, between the 2nd and 6th postoperative day.

The assessment of vital signs made it possible to assess tolerance to the rehabilitation plan and detect changes that would require it to be readjusted or interrupted, should significant changes arise in terms of vital parameters.

Table 5 – Monitoring of vital signs throughout the implemented rehabilitation program

Date	11/11/2021		12/11/2021		13/11/2021		14/11/2021		15/11/2021	
	Start	End	Start	End	Start	End	Start	End	Start	End
Blood pressure (mmHg)	124/89	133/91	121/81	128/85	139/70	132/68	136/89	129/89	132/84	122/75
Heart Rate (bpm)	84	81	83	81	93	93	95	92	90	92
Respiratory Rate (ciclos/min)	20	20	19	18	19	17	18	17	19	17
Temperature (ºC)	36,1	36,1	36,2	36,1	36,2	36,2	36,1	36,2	36,0	36,1
Peripheral oxygen saturation (%)	92	92	92	93	92	94	91	94	92	94

Blood pressure and heart rate values remained stable throughout the rehabilitation program, which reflects the person's tolerance towards the plan carried out.

The respiratory rate ranged between values of 17-20 cycles/minute, considered normal values - eupneic [19].

The main indications for the respiratory techniques performed are: optimizing ventilation, increasing respiratory control, promoting diaphragmatic mechanics, improving gas exchange and oxygenation, promoting lung re-expansion and airway cleaning. Its benefit can be evidenced by the improvement in peripheral oxygen saturation values after its implementation.

The assessment of respiratory function, namely: type, rhythm, amplitude, frequency and symmetry of the ventilation pattern are important aspects that guide the rehabilitation specialist nurse in their decision-making.

Breathing, predominantly thoraco-abdominal, in all rehabilitation sessions, led to the need to implement abdominal-diaphragmatic re-education techniques, with the aim of improving diaphragmatic excursion and promoting muscle strengthening of the different portions of the diaphragm.

Regarding breathing amplitude, there was a decrease on the right side, confirmed by lung auscultation. The implementation of techniques that promote lung expansion, such as global costal openings, selective costal opening on the right and compression maneuvers (lower costal grille) during expiration and sudden decompression at the beginning of inspiration, made it possible to improve ventilation in the lung bases. The sudden change in pressure causes an increase in expiratory flow and a sudden variation in inspiratory flow, which favors lung re-expansion and airway clearance19.

The results described previously were evidenced by inspection at the end of the fourth rehabilitation session, as well as through auscultation, with improvement in chest expansibility at the end of the third session of the program (Table 6)

Positioning techniques (rest and relaxation) associated with maneuvers to control and dissociate breathing times and postural correction, allowed for optimization of ventilation, through awareness and control of breathing, correction of asymmetries, better coordination and effectiveness of the respiratory muscles and of diaphragmatic mechanics.

Table 6 – Assessment of respiratory function throughout the implemented rehabilitation program

Date	11/11/2021		12/11/2021		13/11/2021		14/11/2021		15/11/2021	
	Start	End	Start	End	Start	End	Start	End	Start	End
Oxygen therapy	4	4	4	4	4	2	2	2	2	2
Chest symmetry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type of breathing	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
Ritmo	Irregular	Irregular	Irregular	Irregular	Regular	Regular	Regular	Regular	Regular	Regular
Amplitude	↓ Right	↓ Right	↓ Right	↓ Right	↓ Right	↓ Right	↓ Right	Normal	↓ Right	Normal
Accessory Muscles	Yes	No	Yes	No	No	No	No	No	No	No

Auscultation was also an important stage of the physical examination, as it made it possible to confirm data obtained by inspection and identify regions with ventilatory changes, due to the reduction of vesicular murmurs in the lung bases and the presence of secretions, listening for adventitious noises, such as crackles (Table 7).

Respiratory functional re-education techniques aimed at clearing the airways, such as modified postural drainage in association with thoracic vibrocompression maneuvers and acceleration of

expiratory flow, enhanced the displacement of bronchial secretions and their mobilization to a more proximal airway, such as highlight the results of the consultation.

The person demonstrated the ability to adopt strategies that facilitate airway cleaning, namely trunk flexion and abdominal compression, with or without the use of a pillow, when expulsion of secretions through the tracheostomy.

The person was instructed to use a heat and humidity exchanger (HME), a device that connects to the tracheostomy tube and allows the inhaled air to be humidified and filtered.

Table 7 – Results of lung auscultation throughout the implemented rehabilitation program

Date	Lung Auscultation	
	Start	End
11/11/2021	• RUL crackles • ↓ VM in the lung bases and ML	• RUL crackles • ↓ VM in the lung bases and ML
12/11/2021	• RUL crackles • ↓ VM in the lung bases and ML	• ↓ VM in the lung bases and ML
13/11/2021	• RUL crackles • ↓ VM in the lung bases and ML	• ↓ VM in the lung bases
14/11/2021	• RUL crackles • ↓ VM in the lung bases	• ↓ VM right lung bases
15/11/2021	• ↓ VM right lung base	• ↓ VM right lung bases (better)

Subtitle: RUL – right upper lobe; ML– middle lobe; VM– vesicular murmur

DISCUSSION

The presentation of this case study showed that the specialized care provided by the rehabilitation nurse has the potential to prevent respiratory complications in people undergoing total laryngectomy.

It is unanimous that, according to the literature, the success of functional respiratory re-education programs is based on three essential pillars, namely: multidisciplinarity, individuality and physical, social and psychological factors [19].

There are many studies that address the topic of speech rehabilitation and swallowing in laryngectomized patients, however, in a national context, there are few or even non-existent studies that highlight the importance of functional respiratory re-education in people undergoing total laryngectomy.

Total laryngectomy is an aggressive surgical procedure, which causes irrecoverable aesthetic and functional changes, with the person having to adapt to a new health condition, namely a permanent tracheostoma [9].

Systematized assessment of the person is essential for the provision of specialized rehabilitation nursing care, facilitating the nurse's decision-making.

The functional respiratory re-education plan began with the exercise of control and dissociation of breathing times, as indicated in the Good Practice Guidance Guide [19], as it allows awareness of breathing and control of it (frequency, amplitude and respiratory rhythm), improves the coordination and effectiveness of respiratory muscles. Techniques aimed at lung expansion (impaired ventilation) and bronchial hygiene (impaired airway clearance and potential to improve the ability to promote airway clearance) were subsequently developed.

The functional respiratory re-education techniques developed to improve the ventilation process were: control and dissociation of respiratory times, abdominal-diaphragmatic re-education, postural correction techniques in front of a mirror, costal openings and compression maneuvers of the lower costal grid. during expiration and sudden decompression of the chest at the beginning of inspiration. These techniques were well tolerated by the patient and effective in improving alveolar ventilation, particularly in terms of improving lung capacity, gas exchange, oxygenation, breathing control (frequency, amplitude and respiratory rhythms) and improving ventilation in atelectatic lung areas, in line with what is described in the literature [19].

The lung condition after total laryngectomy is affected, as the air that enters the lungs is not filtered, heated and humidified, resulting in an increase in mucus production. The accumulation/excess of secretions in the airway increases their deterioration, as a consequence of the inflammatory process, increasing the risk of infection. Therefore, it is essential to maintain airway patency to prevent infectious processes and improve lung function [14,19]. It was in this sense that airway cleaning techniques were carried out (postural drainage, accessory maneuvers, techniques for accelerating expiratory flow and aspiration of secretions), with the aim of increasing the volume and speed of expiratory airflow, favoring the movement of airways. secretions from the small distal airways to the proximal airways, until their removal by coughing or, in more complex situations, by aspiration of secretions through the tracheostomy [14,19].

These techniques aimed at cleaning the airways and the permanent use of the Heat and Moisture Exchange (HME filter) allowed gains in the patient's health condition, visible in the findings of lung auscultation and a reduction in the need for aspiration of secretions.

In order to improve the ability to promote airway cleaning, emphasis was placed on the educational component, within the scope of instruction and training in techniques for accelerating expiratory flow. In addition to maximizing the person's independence, improving their physical condition, the aim is for them to become active, more participatory and informed about treatment options, contributing to improving their quality of life [19].

Postoperative respiratory complications are defined as events or complications that occur within 30 days after surgery and are described in the literature as: pneumonia; respiratory failure; atelectasis; bronchial hypersecretivity; hypoxia and presence of "plugs" of secretions in the tracheostoma [21,22,23,24]. The most common postoperative complication is pulmonary atelectasis, which can have a diverse etiology, namely: loss of glottal function (closing during exhalation in an attempt to maintain adequate lung volume) associated with low lung volume; the use of intraoperative mechanical ventilation combined with pulmonary depression caused by general anesthesia; and pain, which can cause decreased chest expansion [6]. In this sense, at the beginning of the respiratory functional re-education program, we observed a decrease in breath sounds in the middle lobe and lung bases, findings that can be justified by what was previously described. During the rehabilitation nurse's intervention, there was a significant improvement in lung auscultation, particularly at the level of the aforementioned lung lobes. With a view to improving the ventilation process, the literature suggests lung re-expansion exercises as one of the main interventions in the postoperative period, in order to prevent atelectasis and pneumonia (6,22).

We consider that it would have been advantageous for this study to develop a more prolonged respiratory functional re-education program; however, it was possible to demonstrate the importance of specialized intervention by a nurse specializing in rehabilitation nursing, in preventing respiratory complications in people undergoing total laryngectomy.

CONCLUSION

This case study made it possible to identify significant gains in the role of the Nurse Specialist in Rehabilitation Nursing in preventing respiratory complications in patients undergoing total laryngectomy.

There are few scientific publications in the area of respiratory functional re-education of patients undergoing total laryngectomy, particularly work carried out by rehabilitation nurses, where there is evidence of the contribution of their intervention. According to the literature, the function of cough after surgery (total laryngectomy), as well as the potential benefit of rehabilitation techniques, are still poorly studied [14].

With this work, we intend to give visibility to the intervention of the specialist nurse in rehabilitation nursing with these patients.

We consider it pertinent that nurses specializing in rehabilitation nursing replicate more rehabilitation programs aimed at these patients, identifying significant gains in their care.

In a future approach, we believe it is important to start the respiratory functional re-education program as early as possible, ideally in the preoperative period. A rigorous, systematic and timely assessment of the person would contribute to better results and health gains.

It would also be advantageous if similar functional respiratory re-education programs were implemented in order to cover a greater number of people undergoing total laryngectomy, up to the moment of hospital discharge, with subsequent referral to healthcare in the community, ensuring continuity of specialized care.

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