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Impact of Septoplasty with Inferior Turbinate Reduction on Quality of Life and Symptom Relief: A Retrospective Study

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Impact of Septoplasty with Inferior Turbinate Reduction on Quality of Life and Symptom Relief: A Retrospective Study

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DECLARAÇÃO DE INTEGRIDADE

Eu, João Paulo Dias Moreira, n.º 201905697, aluno do Mestrado Integrado em Medicina, declaro ter atuado segundo os princípios sobre integridade académica da Universidade do Porto na elaboração da presente dissertação. Nesse sentido, confirmo que na totalidade da elaboração deste trabalho não incorri na prática de plágio, de falsificação ou manipulação de resultados e com o cuidado necessário para o respeito aos grupos vulneráveis nele incluídos.

João Moreira

(João Paulo Dias Moreira)
Universidade do Porto, 08 de junho de 2025

DEDICATÓRIA

Era uma vez um rapaz. Ele vivia com a sua mãe e irmã e desde pequenino que sempre sentiu que a sua caminhada não seria comum. Ele cresceu com medo, medo porque o mundo lá fora podia ser hostil, porque os outros meninos podiam não gostar dele, ou porque não era esperto o suficiente, ou porque não era giro o suficiente ou porque não era atlético o suficiente. Contudo esse rapazinho tinha a mãe e a irmã. E apesar de não ser o mais giro, o mais esperto ou o mais atlético, o rapazinho sabia que sempre que tivesse o amor da sua mãe e irmã estaria bem. Esse rapazinho sou eu e toda esta jornada não seria possível sem aquelas duas que considero família, OBRIGADO, mama e mana, sem vocês não teria chegado até aqui.

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RESUMO

Introdução

A obstrução nasal é um sintoma comum e pode afetar a respiração, o sono e a qualidade de vida em geral. Quando existe desvio do septo nasal e/ou hipertrofia dos cornetos inferiores, a correção cirúrgica pode melhorar vários aspetos do bem-estar do paciente, sendo os questionários de autoavaliação fundamentais para avaliar estas melhorias.

Objetivos

O principal objetivo deste estudo é avaliar de forma abrangente o impacto a longo prazo da septoplastia com turbinoplastia inferior nos sintomas nasais, na qualidade do sono e na qualidade de vida global, utilizando uma combinação de instrumentos de avaliação validados e baseados na perceção dos próprios doentes. Através desta abordagem, o estudo pretende contribuir para uma compreensão mais profunda do valor terapêutico desta cirurgia, salientando a sua importância na melhoria da saúde global e na promoção do bem-estar psicossocial dos pacientes.

Métodos e Materiais

Foi realizado um estudo retrospetivo de doentes submetidos a septoplastia com turbinoplastia inferior. Os resultados foram avaliados antes e após a cirurgia, utilizando o questionário de avaliação dos sintomas sinonasais (SNOT-22), a Escala de Sonolência de Epworth (ESS), o Questionário de Berlim, o *Short Form 36* versão 2 (SF-36v2) e uma escala visual analógica (EVA) para avaliar a satisfação com a respiração nasal. Foram feitas comparações estatísticas entre os resultados pré e pós-operatórios, bem como análises de correlação.

Resultados

Vinte e dois doentes foram incluídos consecutivamente no estudo, dos quais 10 eram mulheres (45,5%) e 12 eram homens (54,5%). Observou-se uma melhoria estatisticamente significativa nos resultados pós-operatórios dos questionários SNOT-22 e ESS. O alívio sintomático mais significativo ocorreu na obstrução/congestão nasal, enquanto sintomas como rinorreia apresentaram melhorias modestas. O Questionário de Berlim manteve-se inalterado antes e após o procedimento. O SF-36 demonstrou melhorias significativas no funcionamento físico, embora os cuidados básicos de autocuidado se tenham mantido inalterados. Foi encontrada uma correlação positiva moderada e estatisticamente significativa entre a diferença pré-operatória e pós-operatória(Δ) do SNOT-22 e ESS. Não foram observadas correlações significativas entre as restantes variações. Notavelmente, o ΔSNOT-22 e o ΔSF-36 apresentaram uma tendência negativa não significativa. Adicionalmente, foi encontrada uma correlação positiva moderada e estatisticamente significativa entre os valores de EVA e o ΔSNOT-22.

Conclusão

A septoplastia com turbinoplastia inferior é capaz de melhorar sintomas sinonasais, queixas relacionadas com o sono e com a qualidade de vida, independentemente da idade ou do sexo. Estes resultados reforçam a importância da septoplastia com turbinoplastia inferior em doentes devidamente selecionados.

Palavras-chave: sintomas sinonasais; qualidade de vida; perturbação do sono; septoplastia com turbinoplastia inferior.

ABSTRACT

Introduction
Nasal congestion is a common symptom that may affect breathing, sleep, and overall quality of life. If a nasal septum deviation and/or hypertrophy of the nasal turbinates are present in these patients, surgical correction may enhance various aspects of their well-being. Patient-reported outcome measures are essential for assessing these improvements.

Objectives
The primary objective of this study is to comprehensively evaluate the long-term impact of septoplasty with inferior turbinate reduction (ITR) on nasal symptoms, sleep quality, and global quality of life using a combination of validated patient-reported outcome measures. Through this approach, the study hopes to contribute to a deeper understanding of the therapeutic value of this surgery, highlighting its importance in enhancing overall health and promoting patients' psychosocial well-being.

Methods and Materials
A retrospective study was conducted on patients undergoing septoplasty with ITR. Outcomes were assessed before and after surgery using the 22-item sinonasal outcome test (SNOT-22), Epworth Sleepiness Scale (ESS), Berlin Questionnaire, Short Form 36 version 2 (SF3-6v2), and a Visual Analogue Scale (VAS) for satisfaction with nasal breathing. Statistical comparisons were made between preoperative and postoperative scores, and correlation analyses were performed.

Results
Twenty-two patients were consecutively included in the study, comprising 10 women (45.5%) and 12 men (54.5%). A statistically significant postoperative improvement was observed in SNOT-22 and ESS scores. The most significant symptom relief in SNOT-22 occurred in nasal obstruction/congestion, while symptoms like thick nasal discharge showed modest improvement. The Berlin questionnaire remained unchanged before and after the procedure. The SF-36 demonstrated significant gains in physical functioning, although basic self-care remained unchanged. A moderate and statistically significant positive correlation was found in the difference between preoperative and postoperative score (Δ) of SNOT-22 and Epworth Sleepiness Scale. No significant correlations were found among the postoperative improvements of the other scores. Notably, ΔSNOT-22 and ΔSF-36 showed a negative, non-significant trend. Additionally, a statistically significant moderate positive correlation was found between VAS scores and ΔSNOT-22.

Conclusion
Septoplasty with ITR is able to improve sinonasal symptoms, sleep-related complaints, and quality of life, regardless of age or sex. These findings support the importance of septoplasty with ITR in appropriately selected patients.

Key Words: sinonasal symptoms; quality of life; sleep disturbance; septoplasty with inferior turbinate reduction.

List of Abbreviations

Δ	Difference between preoperative and postoperative scores
AERD	Aspirin Exacerbated Respiratory Disease
CPAP	Continuous Positive Airway Pressure
CRS	Chronic Rhinosinusitis
ESS	Epworth Sleepiness Scale
FESS	Functional Endoscopic Sinus Surgery
INCS	Intranasal Corticosteroids
ITR	Inferior Turbinate Reduction
MCID	Minimal Clinically Important Difference
NC	Nasal Congestion
OSAS	Obstructive Sleep Apnea Syndrome
PROMs	Patient-Reported Outcome Measures
SF3-6v2	Short Form 36 version 2
SNOT-22	The 22-item Sino-Nasal Outcome Test
ULSSA	Unidade Local de Saúde de Santo António
VAS	Visual Analogue Scale

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Background

Nasal congestion (NC) is a common term that refers to the subjective sensation of having a full/blocked nose, typically caused by mucosal edema resulting from capillary dilation, increased permeability, and plasma exudation into the submucosa. We commonly associate it with the term of nasal obstruction, and even if they have similar meanings, nasal obstruction refers to the blockage of the passage of air through the nose. NC is the most frequently observed symptom in the nasal mucosa's inflammatory and/or infectious conditions, with allergic rhinitis being the leading cause. Other potential causes include acute viral or bacterial rhinosinusitis, chemical, drug-induced, or endocrine rhinitis, nasal polyposis, and, less commonly, autoimmune or granulomatous diseases[1].

A nationwide study conducted in 2007 with 1,037 adult participants reported that approximately 17.9% of the portuguese adult population experiences significant nasal congestion. Of these, 4.6% suffer from severe symptoms, and 13.3% report mild to moderate congestion. NC has been found to negatively affect daily activities such as work and study[2].Anatomical alterations such as septal deviation, nasal pyramid deformities, intranasal masses (e.g., nasal polyposis or tumors), and postnasal obstruction due to adenoid hypertrophy often result in a fixed sensation of nasal blockage. Symptoms typically associated with allergic or inflammatory rhinitis, such as rhinorrhea, nasal pruritus, and sneezing, tend to manifest only in the presence of concurrent rhinitis[1,3].NC can affect all age groups and may represent an urgent condition in infants, as it interferes with breastfeeding and growth. Whether acute or chronic, and as referred it leads to reduced quality of life by disrupting sleep, daily functioning, academic performance, and work performance. It may also contribute to snoring and precipitate obstructive sleep apnea syndrome (OSAS) in predisposed individuals[3], and it is one of the most frequently reported symptoms in patients with OSAS.

Medical therapy alone does not address structural abnormalities of the nasal cavity. In selected patients, surgical interventions such as septoplasty and/or inferior turbinate reduction (ITR) have been shown to improve quality of life in these patients [3,4].

In this sense, this study aims to contribute to a better understanding of septoplasty with ITR, not only assessing the sinonasal symptoms, but also to get a deeper insight into the benefits that this kind of procedure brings in terms of improving sleep disturbance and quality of life and how all these domains correlate with each other.

Introduction

1 – Nose Anatomy and Physiology

1.1 - Nose Anatomy

A basic understanding of the anatomy of the nose and paranasal sinuses is essential for the clinician to evaluate nasal symptoms.

The nose constitutes the initial segment of the upper respiratory tract and plays a key role in warming, humidifying, and partially filtering the air we inhale. Additionally, it contains the olfactory epithelium, which houses sensory neurons responsible for detecting airborne odorant molecules. Anatomically, the nose can be divided into the external nose, which opens to the face via the nostrils (nares), and the internal nasal cavity, which is split into right and left halves by the nasal septum. These cavities open posteriorly into the nasopharynx through the choanae (posterior nasal apertures). The nasal cavities are supported by a structural framework of bones and fibrocartilage. Several of the larger bones in this framework contain air-filled chambers lined with respiratory epithelium, collectively known as the paranasal sinuses. These sinuses, along with the nasolacrimal ducts, drain into the nasal cavity through various openings in its lateral walls[5].

External nose - The external nose is a pyramidal structure formed by skin, the dorsal nasal bones, and the upper and lower lateral cartilages. Additionally, the medial and lateral crura, along with the columella, play a role in shaping the nasal tip[6].

Internal Nose - The nasal septum is the midline structure that divides the nose into two nostrils and is composed of membranous, cartilaginous, and bony parts[7]. The lateral nasal wall contains the superior, middle, and inferior turbinates, which are erectile structures made up of mucosa and spongy bone, covered by a mucous membrane. These structures warm, humidify, and filter inspired air before it reaches the lungs. These turbinates also expand or contract in response to changes in temperature, humidity, allergen exposure, and emotional stimuli. There is also a regular cyclical pattern of turbinate congestion, alternating between sides every two to five hours, a phenomenon known as the nasal cycle. The external nasal valve is formed by the lower lateral cartilage and soft tissues, while the internal nasal valve is bounded by the septum, the caudal edge of the upper lateral cartilage, the head of the inferior turbinate, and the floor of the nasal cavity[6]. The nasal septum itself is composed of the quadrangular cartilage, the perpendicular plate of the ethmoid bone (superiorly), and the vomer (inferiorly). It plays a critical role in structural support, and its posterior extension can vary between individuals. During surgery, careful dissection within the subperichondrial and subperiosteal planes is essential to preserve anatomical integrity and minimize complications[7].

From a surgical perspective, the nose can be divided into specific anatomical regions that guide both functional and aesthetic approaches. Structurally, it is split into three parts: the upper third, which is fixed and composed of bone, and the middle and lower thirds, which are mobile and made up of cartilage[7].

The **upper third** consists of the nasal bones, which articulate with the frontal bone and the frontal processes of the maxillae. These bones define the superior boundary of the piriform aperture[7].The **middle third** is formed by the upper lateral (also called triangular) cartilages and the nasal septum. These triangular cartilages are positioned beneath the nasal bones, attach laterally to the piriform aperture, and connect inferiorly to the cephalic margin of the lateral crus of the alar cartilage, near the plica nasi. The internal nasal valve, located between the septum and triangular cartilages, represents the narrowest segment of the nasal airway, with an angle of approximately 10 to 15 degrees[7]. The **lower third**, often referred to as the nasal tip, consists of the alar cartilages and the anterior portion of the septum. These structures form a tripod-like configuration composed of the medial crura, lateral crura, and the columella. The alar cartilage is classically subdivided into the medial, intermediate, and lateral crura. The nasal tip's shape is defined by the intermediate crura, which are joined by the interdomal ligament. The distance between these crura significantly influences the tip's aesthetic appearance, determining whether it appears bulbous, boxy, or pinched[7].

In terms of **vascular supply**, the nose receives arterial blood from both the external and internal carotid systems. The columellar and angular arteries, branches of the external carotid, anastomose with branches of the ophthalmic artery, which arises from the internal carotid system. If both the columellar and angular arteries get compromised, it may lead to columellar necrosis. The septal mucosa is vascularized by the ethmoidal, greater palatine, superior labial and sphenopalatine arteries. Of note is the "vascular spot" or *tache vasculaire*, an area of anterior septal vascular ectasia that is prone to bleeding[7].

Innervation of the nose arises from the ophthalmic (V1) and maxillary (V2) branches of the trigeminal nerve. The upper dorsum is innervated by V1, particularly the anterior ethmoidal nerve, which provides sensation to the nasal tip. The alae, columella, and upper lip receive sensory input from V2, while the nasopalatine nerve innervates the base of the columella which is an important consideration when achieving complete local anesthesia[7].

1.2 – Nasal Physiology

The nose plays a crucial role in respiratory function. It filters inspired air through nasal hairs (vibrissae) located in the vestibule, capturing large particles such as dust and pollen. The respiratory epithelium, composed of ciliated cells and goblet cells, traps smaller particles in mucus, which is then transported by cilia toward the nasopharynx, where it is swallowed.

The nasal mucosa contains an extensive subepithelial vascular plexus, described above, that warms the inspired air to near body temperature. Humidification occurs through secretions from seromucous glands and goblet cells, which maintain both the moisture of the mucosa and the air[8]. As explained above the nasal turbinates (inferior, middle, and superior conchae) create turbulence in the airflow, increasing the surface area for filtration, warming, humidification, and olfactory exposure. They also regulate nasal airflow resistance. The olfactory function is in the upper portion of the nasal cavity, covering the superior nasal septum, upper part of the middle turbinate, superior turbinate, and the roof of the nasal cavity. This olfactory epithelium contains receptor neurons, sustentacular cells, and basal stem cells capable of regenerating the epithelium.

Odor molecules dissolve in the mucus and bind to olfactory binding proteins, reaching specific receptors on the cilia of bipolar olfactory neurons. Olfactory signals are processed in the olfactory bulb and further transmitted to the hippocampus and amygdala for emotional and memory-related processing, and to the cortex (superior temporal gyrus, orbitofrontal cortex, and insular region) for conscious perception[8]. The nasal mucosa also plays a major immunological role. The mucus contains immune molecules like IgA, lysozyme, and lactoferrin. The mucociliary system continuously clears pathogens. Additionally, lymphoid tissue in the nasopharynx (e.g., adenoids) activates immune responses[9]. Protective reflexes such as sneezing and reflex congestion occur in response to irritants. The nose can restrict airflow or initiate expulsive responses to protect the lower airways.

An important matter is that the nose contributes to vocal resonance. The nasal cavities and paranasal sinuses act as resonance chambers, shaping the quality and tone of the voice. Nasal obstruction often leads to a characteristic nasal tone[9].

As described previously, the nasal cavity is richly innervated. Sensory innervation is provided by the trigeminal nerve (V1 and V2), olfactory function by cranial nerve I, and autonomic control (secretion and blood flow) by sympathetic and parasympathetic fibers. The olfactory system adapts rapidly to persistent stimuli. With constant exposure to an odor, the sensory response diminishes. Hunger also enhances olfactory sensitivity, acting as a physiological mechanism to promote food-seeking[8]. Normal Airflow:

A key aspect is that airflow in the nose begins at the entrance that corresponds to the nostrils. When a person inspires, the negative pressure draws air back through the nasal passage, to the choanae, and then into the larynx, trachea, and bronchi. During airflow through the nose, the turbinates and the septum contribute to natural turbulence of the air column. Physiologically, this turbulence is important because if there is an alteration of any of these internal structures it can affect the perception of airflow. To exemplify, a person with a large septal perforation will have a constant sensation of nasal obstruction due to disruption of the normal turbulence patterns, even though the nasal passage itself is widely patent[9].

2 – Nasal Obstruction and Congestion

We can divide the causes of nasal obstruction into congenital causes of nasal obstruction and acquired causes of nasal obstruction. The first ones correspond to congenital abnormalities that cause nasal obstruction, such as congenital pyriform aperture stenosis, choanal atresia, and congenital deviation of the septum, which may present emergently after birth as neonates are obligate nasal breathers. We will not go further into detail because our study encompasses only adults who are not affected by these pathologies[10].

Acquired structural causes of nasal symptoms include enlarged adenoids, foreign bodies, disorders of the nasal septum, abnormalities of the nasal valve, inflammatory conditions, nasal polyps, and neoplastic disorders. If we investigate infants and small children, then nasal trauma during delivery, adenoidal hypertrophy, and foreign bodies inserted into the nose are common causes of nasal symptoms. We will also not explore more deeply these causes since they are out of the range of diseases that were treated by nasal surgery in this study.

In older children and adults, the most frequent causes are generalized swelling due to rhinitis, obstruction from septal disorders, nasal polyps, or overly aggressive sinus surgery. These ones are often treated with a different range of nasal surgeries[10].

We also must remember that benign and malignant tumors can cause nasal symptoms as well, although these conditions are more uncommon and should be considered in patients who present with nasal symptoms accompanied by localized pain in the head or neck, numbness, bleeding, proptosis, diplopia, or cranial nerve abnormalities[10].

So, one of the most common causes of nasal obstruction is the acquired deviation of the septum. It can be easily injured, and even minor blunt trauma may cause alteration in the cartilage and/or bone of the septum. Traumatic or forceps delivery may result in damage to the septal cartilage at birth. Some situations associated with trauma such as sports, motor vehicle accidents, and other traumatic events that occur during a person's lifetime are common causes in older individuals. In addition, cartilage suffers from a normal aging process that results in worsening deviation with time. Concomitant diseases, such as allergic or vasomotor rhinitis or chronic rhinosinusitis (CRS), may potentiate the obstruction caused by a deviated septum. Perforation of this structure can also cause a sensation of obstruction. It is a condition often seen in those who use intranasal cocaine. It may also result from septal surgery, atrophic rhinitis, granulomatosis with polyangiitis, and several other disorders. Here there is an alteration in the normal airflow through the perforated septum. Excess crusting and bleeding are also common in these patients, contributing to a sense of congestion and discomfort[10,11].

Another very common cause is the existence of nasal polyps. They consist of abnormal, gray, glistening masses filled with inflammatory material, which may form in the nasal cavity or paranasal sinuses. Polyps may be diagnosed clinically by their characteristic appearance on exam with a nasal speculum or rhinoscope and are also identifiable on computed tomography examination. In adults, nasal polyps are frequently associated with CRS, asthma, and aspirin sensitivity in the syndrome of aspirin-exacerbated respiratory disease (AERD). Some patients have concomitant allergic rhinitis or allergic fungal rhinosinusitis. In children, nasal polyps are most associated with cystic fibrosis. Usually, symptoms occur because large or extensive polyps cause congestion or blockage of the nasal airway, thick discharge, and anosmia. Surgery can offer temporary relief, although polyps tend to recur within a few months to years following this intervention alone. Continued medical management of the underlying etiology is therefore mandatory after surgery[10].

2.1 - Medical Approach

While structural issues like a deviated septum are usually addressed surgically, medical treatment focuses on reducing inflammation and swelling of the nasal mucosa to improve airflow[12].

Intranasal corticosteroids (INCS) are the most prescribed and successful first-line treatment, according to studies, because of their potent anti-inflammatory effects and favorable safety record. They are useful for both allergic and nonallergic forms of rhinitis and work by controlling gene expression to lower pro-inflammatory mediators. Fluticasone, mometasone, budesonide, and triamcinolone are examples of common agents. Nasal dryness, irritation, and sporadic nosebleeds are possible side effects, despite the medications' general safety[12].

Oral corticosteroids, like prednisone or methylprednisolone, are potent but have an increased risk of systemic side effects (including weight gain, or growth delay in children) and are generally reserved for brief usage in severe situations, such as nasal polyposis.

Intranasal steroid injections (such as triamcinolone) used to be more prevalent but are currently less preferred because of the associated risks of severe complications, including rare instances of blindness from embolization[12].

Antihistamines, whether taken orally or intranasally, are beneficial, particularly for allergic rhinitis. Second-generation oral antihistamines (such as loratadine or cetirizine) are favored over first-generation antihistamines because they have fewer sedative effects. Azelastine and other intranasal antihistamines offer effective symptom relief while causing fewer systemic side effects[12].

Decongestants, whether taken orally (e.g., pseudoephedrine) or applied topically (e.g., oxymetazoline), offer quick relief through vasoconstriction, but they need to be used carefully. Oral medications can elevate blood pressure and lead to insomnia, whereas topical applications may trigger rebound congestion (medicamentosa rhinitis) if excessively utilized[12].

Nasal saline irrigation is a non-drug therapy that aids in removing allergens and irritants, and although it is not as strong as steroids, it is quite safe and frequently employed as a supplementary treatment[13].

There are also evaluations of new treatments like intranasal botulinum toxin injections, which have demonstrated encouraging outcomes in certain studies for managing allergic and vasomotor rhinitis, although this method remains experimental[13].

Ultimately, oral leukotriene receptor antagonists such as montelukast can aid in alleviating nasal inflammation, particularly in cases of allergic rhinitis; however, their effectiveness is typically not as high as that of corticosteroids or antihistamines, making them suitable as second or third-line treatments[13].

2.2 - Surgical Approach

Septoplasty

This is a surgical procedure performed to correct deformities or deviations of the nasal septum. The primary goal of septoplasty is to improve nasal airflow and relieve symptoms caused by nasal obstruction. The most common indication is nasal airway obstruction due to a deviated septum that does not respond to medical management, such as intranasal corticosteroids or antihistamines. This obstruction often results in chronic mouth breathing, snoring, or impaired sleep quality, and in some cases contributes to OSAS as pointed above. Another clear indication is recurrent epistaxis, particularly when caused by septal spurs (sharp bony projections or ridges on the nasal septum, usually formed where the cartilage meets the bone) or asymmetries leading to localized mucosal trauma. Patients with septal deviations also frequently report headaches, attributed to mucosal contact points within the nasal cavity, and in these cases, septoplasty may provide relief. Furthermore, septoplasty may be indicated to facilitate surgical access to the paranasal sinuses during endoscopic sinus surgery or to correct nasal deformities prior to functional or aesthetic nasal procedures. In patients undergoing continuous positive airway pressure (CPAP) therapy for OSAS, significant septal deviation may hinder device tolerance, and surgical correction can improve compliance[11,14,15].

Inferior Turbinate Reduction (ITR)

ITR refers to surgical reduction of the inferior nasal turbinate. The primary indication is chronic nasal obstruction due to hypertrophy of the inferior turbinates, which is one of the most common causes of chronic nasal obstruction, particularly when associated with conditions such as allergic rhinitis, non-allergic rhinitis, or rhinitis medicamentosa. This condition, as seen, may lead to significant breathing difficulties, poor sleep quality, and impaired daily function. Another clinical indication is nasal obstruction contributing to OSAS or snoring, particularly in patients where medical therapy has proven ineffective. This procedure is also considered in patients with difficulty using CPAP devices, as enlarged turbinates can prevent effective airflow delivery. This surgery is often performed in conjunction with septoplasty when turbinate hypertrophy coexists with septal deviation. Techniques vary, ranging from submucosal resection to radiofrequency ablation, with the aim of reducing turbinate volume while preserving mucosal function[16-18].

Rhinoseptoplasty

It combines the objectives of septoplasty and rhinoplasty, addressing both functional and aesthetic concerns. This surgery is indicated when nasal obstruction is associated with external nasal deformity or when both internal and external nasal structures require correction. A primary indication is nasal obstruction associated with deformity of the nasal pyramid, such as deviation, collapse, or trauma-induced asymmetry. This surgery allows the surgeon to correct both septal deviation and external nasal contours to restore function and appearance. It is also commonly indicated in post-traumatic nasal deformities, where patients may experience both cosmetic dissatisfaction and compromised nasal airflow. Rhinoseptoplasty is further indicated in revision surgeries, where prior nasal surgery has resulted in persistent obstruction, aesthetic issues, and both. In these complex cases, a comprehensive approach is necessary to restore structural integrity and patient satisfaction[18,19].

Functional Endoscopic Sinus Surgery (FESS)

FESS is performed to enlarge the sinus ostia and re-establish normal sinus ventilation and drainage[20]. According to the Messerklinger technique, FESS is primarily indicated for patients with chronic or recurrent rhinosinusitis originating from the anterior ethmoidal cells, particularly when imaging and nasal endoscopy reveal obstruction of natural drainage pathways. The procedure targets the underlying pathophysiology rather than the secondarily involved larger sinuses, making it suitable for individualized, minimally invasive interventions[21].

3 – Patient Reported Outcome Measures

There is a broad consensus that quality of life should be evaluated through direct patient self-reporting, rather than by external observers, and that this should be done at relevant time point, such as before and after medical intervention. Patient Reported Outcome Measures (PROMs) are structured and validated tools designed to capture the patient's own perspective on their quality of life. A wide range of PROMs exists in the literature, including both general and disease-specific instruments, aimed at assessing how symptoms affect daily functioning and overall well-being. While initially developed for use in clinical research, PROMs are now increasingly adopted worldwide as part of routine healthcare evaluation, providing insights into care quality and consistency at both individual and population levels when used alongside traditional clinical outcomes[22,23]. This study utilized validated PROMs to comprehensively evaluate the effectiveness of septoplasty with ITR, aiming to quantify changes in sinonasal symptoms, sleep quality, and health-related quality of life as experienced and reported by the patients themselves.

SNOT-22(Appendix 1)

The 22-item Sino-Nasal Outcome Test (SNOT-22) corresponds to a modification of the SNOT-20, and it is widely used to self-report outcomes for patients with CRS. Besides its use to identify patients with CRS, it is also correlated with quality of life. However, beyond its original purpose as an instrument to assess CRS management, this tool has evolved to become a more meaningful outcomes assessment tool. Studies have shown it can be used in several conditions. Despite its use in differential diagnosis between CRS and other pathologies such as obstructive sleep apnea, and septal deviation, it can be used to predict outcomes and manage patients based on this score. This tool is composed of a wide variety of questions that aim to analyse the Nasal / Rhinologic Symptoms; Otologic Symptoms; Sleep Disturbance; General / Systemic Symptoms and Emotional/Social Impact. It is important to note that a higher score is correlated with a worse quality of life[24].

Epworth Sleepiness Scale (ESS) (Appendix 2)

Nasal obstruction is recognized as an independent risk factor for reduced sleep quality, even in the absence of OSAS. Clinically, impaired nasal airflow can also aggravate existing OSAS. The ESS is commonly used to assess subjective daytime sleepiness, which may be associated with nasal obstruction. The ESS asks subjects to rate their likelihood of falling asleep in 8 different scenarios. Higher scores indicate a higher propensity to fall asleep. The ESS is high in patients with OSAS and narcolepsy and is low in patients with insomnia. This scale evaluates the propensity to fall asleep in common daily situations (e.g., watching TV, reading, sitting in traffic) and it reflects a person's sleep drive or excessive daytime sleepiness over recent weeks. The score ranges from 0 to 24: 0–10: Normal sleepiness; 11–12: Mild excessive sleepiness; 13–15: Moderate excessive sleepiness; 16–24: Severe excessive sleepiness. Studies have shown that it can be used to screen for sleep disorders as monitoring treatment effectiveness[25,26].

Berlin Questionnaire (Appendix 3)

Unlike the ESS, which focuses on daytime sleepiness, the Berlin Questionnaire evaluates a broader range of risk factors related to OSAS. This tool is divided into: Snoring and breathing pauses; Daytime sleepiness and fatigue; Presence of risk factors as high blood pressure (hypertension) and Body Mass Index (BMI > 30). Each category is scored individually as positive or negative. If two or more categories are positive, the individual is considered at high risk for OSAS. If fewer than two are positive, the risk is considered low. In terms of its clinical use, articles have shown that it can be useful in primary care and sleep clinics to screen for OSAS and also helps prioritize who should get further diagnostic testing, like a sleep study as polysomnography[26,27].

Short Form 36 version 2 (SF-36v2) health questionnaire (Appendix 4)

SF-36 is a patient-reported instrument built to assess overall health status; it is usually utilized to measure patients' quality of life and used primarily in research. The SF-36 is not disease-specific, although it has been validated in numerous diseases, implying different fields, as well as in Otorhinolaryngology, where it can be applied in CRS, allergic rhinitis, septal deviation / nasal obstruction, and OSAS. Since it has a generic type of questions, it allows comparisons between different diseases, across treatments, and versus healthy populations. This tool measures 8 domains (physical function, pain, vitality, social function, etc.) and summarizes into physical and mental component scores. A higher score points to a better state of health[28,29].

Visual Analogue Scale (VAS) (Appendix 5)

VAS is a widely used tool for assessing the subjective intensity of symptoms. It consists of a straight horizontal or vertical line, typically 10 cm in length, with one end representing "no symptom" and the other "the worst imaginable intensity". Patients are asked to mark a point on the line that best reflects their current perception. The score is calculated by measuring the distance from the "no symptom" end to the patient's mark, usually expressed in centimeters or millimeters. VAS is valued for its simplicity, sensitivity to change, and applicability across various clinical settings, including pain management, postoperative care, and chronic disease monitoring[30].

Objectives

The primary objective of this study is to comprehensively evaluate the long-term impact of septoplasty with ITR on nasal symptoms, sleep quality, and global quality of life using a combination of validated patient-reported outcome measures. Through this approach, the study hopes to contribute to a deeper understanding of the therapeutic value of this surgery, highlighting its importance in enhancing overall health and promoting patients' psychosocial well-being.

Methods and Materials

1 - Study Design

This retrospective study aimed to analyze the responses to selected PROMs given to consecutive patients who underwent septoplasty using Cottle technique with ITR using radiofrequency with BONSS® from 02/02/2023 to 10/10/2023 at the Department of Otorhinolaryngology, Unidade Local de Saúde de Santo António (ULSSA). The study included only patients who had surgery performed by the same surgeon. The patients received the questionnaires from the surgeon and completed them before surgery, and one year or more after, during consultation following surgery.

Data on sex, age, surgical intervention, the procedure's date, and the questionnaires' answers were collected from the patient's electronic medical records (SClínico).

2 - Patient Selection

Inclusion Criteria: Patients aged ≥18 years who underwent septoplasty with inferior turbinoplasty at the Otorhinolaryngology Department of the Unidade Local de Saúde de Santo António, performed by the same surgeon on an outpatient basis, and who completed the self-assessment questionnaires before surgery and at least one year post-surgery.

Exclusion Criteria: patients who underwent other surgeries combined with septoplasty and inferior turbinoplasty, such as sinus surgery and /or a history of nasal surgery, revision septoplasty, or palatoplasty. Congenital abnormalities that cause nasal obstruction, such as congenital pyriform aperture stenosis and choanal atresia were also excluded.

3 – Patient Reported Outcome Measures

The questionnaires used were SNOT-22, ESS, Berlin Questionnaire, the SF-36v2 and VAS – satisfaction with nasal breathing (only completed in the postoperative period), which allowed for self-assessment regarding nasal and sinus symptoms as well as overall quality of life.

4 - Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics version 27. Demographic data, including age, sex, and postoperative follow-up time, were described. Differences in pre- and postoperative questionnaire scores were analyzed, and item-level changes were explored.

For participants who completed both assessments, paired-sample tests were used to compare pre- and postoperative scores, as the same individuals were measured twice. The Shapiro-Wilk test was applied to assess normality. When normality was confirmed, paired t-tests were used (e.g., for SNOT-22 and ESS); otherwise, the Wilcoxon signed-rank test was applied (e.g., for Berlin and SF-36).

Δ scores (preoperative scores - postoperative scores) were computed for SNOT-22, Epworth, Berlin, and SF-36. ΔSNOT22 and ΔESS followed a normal distribution and were correlated using Pearson's test; the remaining were analyzed with Spearman's correlation. To assess the impact of sex, t-tests were used for normally distributed deltas, and Mann-Whitney tests for the others. Age, being normally distributed, was correlated with ΔSNOT22 and ΔEpworth via Pearson's, and with ΔBerlin and ΔSF-36 using Spearman's. Lastly, since VAS was non-normally distributed, its correlation with all Δ scores was assessed using Spearmans' method.

Results

1 - Study Population

This study includes the answers of 22 patients, 10 women (45,5%) and 12 men (54,5%).The mean age of participants at the time of surgery was 37.27 ± 12.665 years (Table I). Scores on the SNOT-22, ESS, Berlin questionnaire, and SF-36 did not exhibit statistically significant differences between males and females (all $p > .05$). Similarly, age did not influence the measured parameters, since no significant associations were found between age and any measured variables (all $p > .05$).
The mean follow-up time was 18.77 ± 2.31 months with a minimum of 15 months and a maximum of 23 months.

2 - Patient-reported outcome measures (PROMs)

2.1 - SNOT – 22 Questionnaire:

SNOT-22 score was 47,05 ± 19,80, while the mean postoperative score decreased to 27,18 ± 20,12 (Table II). Statistically significant reduction in SNOT-22 scores was shown following surgery ($p < 0.01$) (Table III). Among the individual items of the SNOT-22, the greatest postoperative improvement was observed in the symptom of "nasal obstruction/congestion" (mean difference = 1.864, $p < 0.001$). In contrast, the smallest change was noted for "thick nasal discharge" (mean difference = 0.190, $p = 0.612$).

2.2 - Epworth Sleepiness Scale (ESS)

For the Epworth Sleepiness Scale, the mean preoperative score was 9,18 ± 4,82, which decreased to 5,41 ± 4,38 postoperatively (Table II). A significant difference was observed ($p = 0.04$) (Table 3). The activity showing the most significant improvement postoperatively was "lying down to rest in the afternoon" (mean difference = 0.727, $p = 0.003$). Similarly, "watching television" (mean diff = 0.818, $p = 0.005$) and "being a passenger in a car for an hour without a break" (mean diff = 0.727, $p = 0.005$) also demonstrated statistically significant improvements. On the other hand, the smallest and non-significant change was observed in the item “stopped in traffic while driving” (mean diff = –0.136, p = 0.083).

2.3 - Berlin Questionnaire

In the Berlin Questionnaire, the mean preoperative score was 0,23 ± 0,43, and the postoperative score was 0,23 ± 0,43 (Table II), (p=1,00) indicating stability in this measure. Scores in the Berlin questionnaire remained the same in all patients before and 12 months or more after surgery (Table IV).

2.4 - SF-36 Score

Regarding quality of life, the mean SF-36 score increased from 25,27 ± 3,95 preoperatively to 27,73 ± 3,91 postoperatively (table II) with a statistically significant improvement after surgery (*p* = 0.03) (table IV). The most significant postoperative improvement was observed in the task “climbing several flights of stairs” (mean diff = –0.545, p = 0.002), Other tasks that showed statistically significant improvements include “bending, kneeling or stooping” (mean diff = –0.273, p = 0.011), “walking more than 1 km” (mean diff = –0.318, p = 0.031), and “walking several hundred meters” (mean diff = –0.273, p = 0.030). Furthermore, “walking 100 meters” also demonstrated a significant difference (mean diff = –0.182, p = 0.042). In contrast, changes in activities such as “bathing or dressing oneself” (p = 0.329) and “climbing one flight of stairs” (p = 0.492) were not statistically significant.

2.5 - Visual Analog Scale (VAS) – Satisfaction with nasal breathing

The mean satisfaction score was 7,05 ± 0,540 (Table II).

2.6 - Correlation Analysis

For the ΔSNOT-22, the mean change score was 19.86 ± 20.15. The ESS showed a mean difference of 3.77 points ± 5.49. Finally, the ΔSF-36 had a mean change score of - 2.45 ± 3.29 (table II).

A moderate and statistically significant positive correlation was found between ΔSNOT-22 and ΔESS ($\rho = 0.460$, $p = 0.031$) (table VI). No significant correlations were observed between the remaining change scores (table VII). Notably, ΔSNOT-22 and ΔSF-36 showed a negative, non-significant trend ($\rho = –0.381$, $p = 0.080$) (table VII). Also, a statistically significant moderate positive correlation was found between VAS scores and ΔSNOT-22 ($\rho = 0.518$, $p = 0.013$) (table VI). No statistically significant correlations were observed between VAS and the other scores. While ΔESS ($\rho = 0.189$, $p = 0.400$), ΔBerlin ($\rho = 0.162$, $p = 0.471$), and ΔSF-36 ($\rho = –0.323$, $p = 0.143$) showed weak or inverse relationships, none of these reached statistical significance (table VII).

Discussion

The objective of this study was to evaluate the long-term impact of surgical intervention, specifically septoplasty with ITR, on sinonasal symptoms, sleep quality, and global quality of life in patients using a combination of validated patient-reported outcome measures. The findings indicated statistically significant improvements in sinonasal symptoms, as measured by the SNOT-22, and in daytime sleepiness, as assessed by the ESS. According to the SF-36 scores, there was a substantial enhancement in quality of life. These results suggest a positive influence of septoplasty with ITR on multiple dimensions of patient well-being.

SNOT-22

The substantial decrease in SNOT-22 scores postoperatively substantiates the efficacy of the surgical approach in ameliorating upper airway symptoms.

The most significant enhancement was observed in the domain of nasal obstruction/congestion, which is consistent with the findings of prior studies that identified nasal blockage as the most responsive symptom to intervention after a nasal surgery [31]. The modest shift in the "thick nasal discharge" finding aligns with the extant literature suggesting that certain symptoms may be less influenced by structural correction alone.

In previous literature, a reduction of 8.9 points in the SNOT-22 score has been identified as the minimal clinically important difference (MCID) in patients undergoing surgical management for CRS[32]. Although originally established for CRS, as explained above, it is reasonable to extend this threshold to individuals with nasal congestion due to other underlying causes. In our study, the average score improvement almost reached 20 points, which strongly suggests a meaningful enhancement in patient-reported quality of life following the procedure. A systematic review revealed that even though all patients submitted to surgery had beneficial effects in these symptoms, the ones with nasal polyps had a better response, potentially reflecting that the extent of symptom improvement also depends on the underlying cause[33].

In this study, the postoperative SNOT-22 score was slightly lower than that of patients evaluated 3 months after surgery, suggesting that the perceived benefit of surgery may plateau, diminish slightly over time, or be influenced by patient expectations or the placebo effect[34].

ESS

A statistically significant postoperative reduction was observed on the ESS, with a particularly marked decrease seen in activities linked to passive wakefulness, such as afternoon rest and television viewing. This finding aligns with previous research suggesting that improved nasal patency may positively affect sleep quality and reduce subjective daytime sleepiness in patients with impaired breathing[35]. The strong correlation between ΔSNOT-22 and ΔEpworth reinforces the interdependence of nasal symptoms and sleep disturbances, highlighting the beneficial effects of surgery in patients experiencing both nasal obstruction and daytime sleepiness, and supporting a more integrated approach to managing these coexisting symptoms.

Berlin Questionnaire

The Berlin Questionnaire scores did not exhibit any significant alterations, indicating that while the subjective sleepiness diminished, the overall risk categorization for OSAS remained constant. This outcome may be indicative of the Berlin Questionnaire's limited sensitivity to subtle improvements or the presence of multifactorial OSAS components that are not fully addressed by nasal surgery alone. We should also consider that this tool is categorical, classifying patients into risk categories rather than detecting gradual improvements[27]. Moreover, the Berlin Questionnaire includes non-nasal factors such as BMI and systemic hypertension, which are not directly influenced by nasal surgery. As a result, its sensitivity to improvements specifically related to nasal airflow or upper airway patency may be limited.

SF-36

The SF-36 results revealed significant improvement in general physical functioning, particularly in tasks like climbing stairs, walking long distances, and bending. These findings align with other research indicating that improved nasal airflow and sleep quality may contribute to better perceived physical functioning and overall quality of life[36]. However, some tasks, such as basic self-care, did not change significantly, likely due to ceiling effects, as these functions were often normal preoperatively. Even though it didn’t reach a significant relation, the correlation between ΔSNOT-22 and ΔSF-36 supports the hypothesis that improvements in sinonasal symptoms directly and positively impact general functionality and physical well-being. This finding may be particularly relevant when considering surgical timing in patients with substantial functional impairment.

Limitations:

There are some limitations on this study that should be acknowledged. First, although the use of validated PROMs such as the SNOT-22, ESS, SF-36, and provided robust insights into subjective symptomatology and quality of life, the lack of objective physiological measurements (e.g., polysomnography, rhinomanometry) limits the ability to correlate structural or functional improvements with the reported outcomes. The sample size, although adequate for detecting statistical significance in primary outcome measures, may not be sufficient to explore more refined subgroup analyses, for example, outcomes based on specific comorbidities. Also, even if we evaluated patients 12 months or more after intervention, there is still potential that over time some symptoms either improve or get worse. An important limitation of this study is its retrospective design, which inherently restricts control over data collection and introduces potential sources of bias, such as selection bias. Furthermore, the lack of consistent and detailed documentation in the clinical records made it harder to adequately assess the role of patients with different comorbidities in influencing surgical outcomes. As a result, different conditions such as allergic rhinitis, septum deviation or nasal polyps could not be systematically analyzed, limiting the ability to draw conclusions about how these factors may have impacted postoperative symptom improvement or overall quality of life.

Future Perspectives

Future research should focus on prospective studies that systematically evaluate patient comorbidities, such as asthma or obesity, and their potential influence on postoperative outcomes, including symptom improvement and overall quality of life. Conditions such as allergic rhinitis, chronic rhinosinusitis, and obstructive sleep apnea may also significantly affect both the baseline severity of symptoms and the extent of benefit experienced after septoplasty with ITR. In the future, their effects could be explored. Additionally, comparative studies should be performed to assess the relative effectiveness of different nasal surgical techniques, such as septoplasty, ITR, and FESS, in addressing specific symptom domains. Identifying which procedures offer the greatest improvements in PROMs would provide valuable insights for personalized treatment strategies and long-term care planning.

Conclusion:

Septoplasty with ITR effectively improves sinonasal symptoms, sleep-related complaints, and quality of life, regardless of age or sex. These findings support the importance of this surgical procedure in appropriately selected patients. Sleep-related complaints and improvement in sinonasal symptoms showed an important correlation, which can lead us to evaluate these types of patients in a more integrated way. This study also showed that reducing nasal symptoms was associated with higher satisfaction reports, highlighting the importance of this procedure in our patients' quality of life.

Tables and Figures

Table I: Demographic Characteristics of the Participants (N = 22)

Characteristic	Value
Sex – Female, n (%)	10 (45.5%)
Age, mean ± SD (years)	37.27 ± 12.67

SD- standard deviation

Table II: Pre- and Postoperative Assessments

MEASURE	PREOPERATIVE (MEAN ± SD)	POSTOPERATIVE (MEAN ± SD)	Δ CHANGE (MEAN ± SD)
SNOT-22	47.05 ± 19.80	27.18 ± 20.12	19.86 ± 20.15
ESS	9.18 ± 4.82	5.41 ± 4.38	3.77 ± 5.49
BERLIN QUESTIONNAIRE	0.23 ± 0.43	0.23 ± 0.43	0.00 ± 0.44
SF-36	25.27 ± 3.95	27.73 ± 3.91	-2.45 ± 3.29
VAS	—	6.94 ± 2.68	—

Table III: Preoperative vs 12-Month Postoperative SNOT-22 and ESS Scores – Paired Samples Test

Measure	Mean Difference	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	p-value
SNOTpre – SNOT12m	19.864	20.148	4.296	10.931	28.797	< 0.001
ESSpre – ESS12m	3.773	5.485	1.169	1.341	6.205	0.004

SNOTpre - Preoperative SNOT-22 score; SNOT12m – 12 months or more postoperative SNOT-22 score.

ESSpre - Preoperative ESS score; ESS12m – 12 months or more postoperative ESS score.

CI- Confidence Interval

Table IV – Wilcoxon Test Results

Comparison	p-value
BERLIN (Pre vs. Post-op)	1.000
SF-36 (Pre vs. Post-op)	0.002

Pre - Preoperative score; Post- postoperative score.

Table V – Statistical Correlation between ΔSNOT-22 and ΔESS Scores

ΔSNOT-22 vs ΔESS	
Correlation Coefficient	0.460*
Sig. (2-tailed)	0.031
N	22

*. Correlation is significant at the 0.05 level (2-tailed).

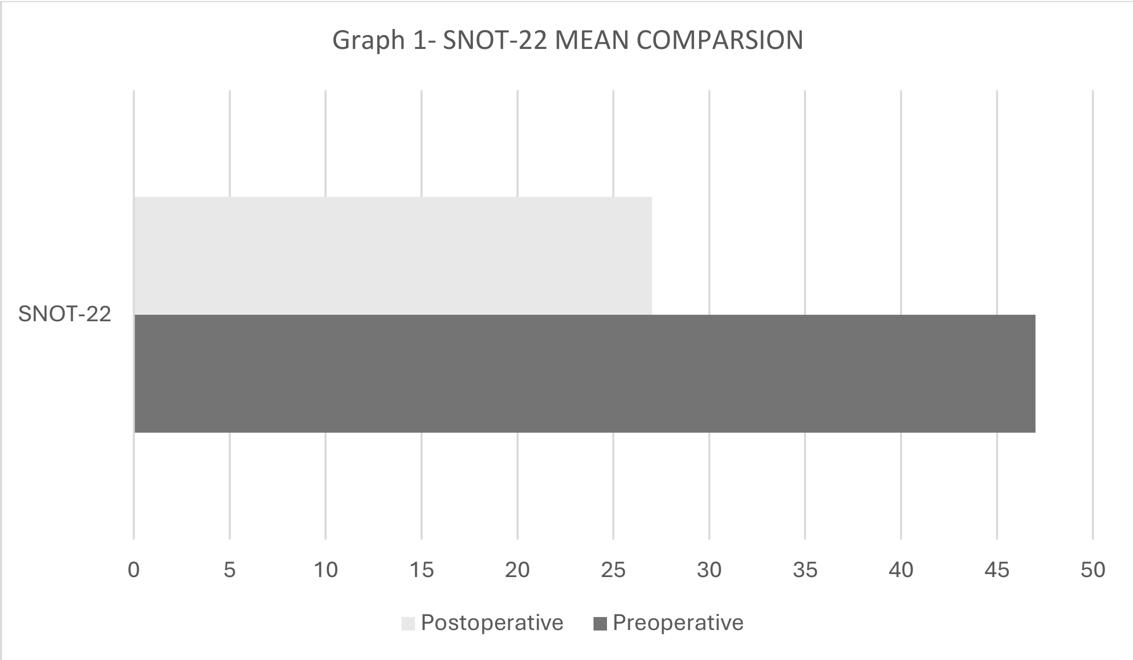
Table VI – Statistical Correlation between ΔSNOT-22 and VAS Score

ΔSNOT-22 vs VAS	
Correlation Coefficient	0.518*
Sig. (2-tailed)	0.013
N	22

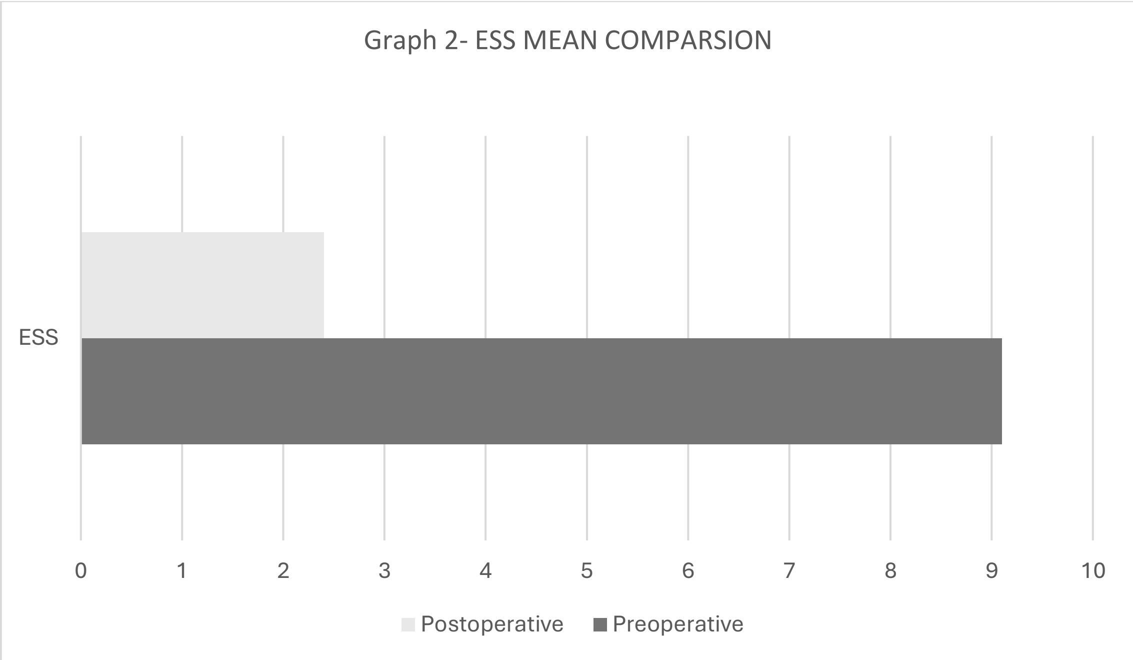
*. Correlation is significant at the 0.05 level (2-tailed).

Table VII – Spearman Correlation Between Delta Scores (Δ)

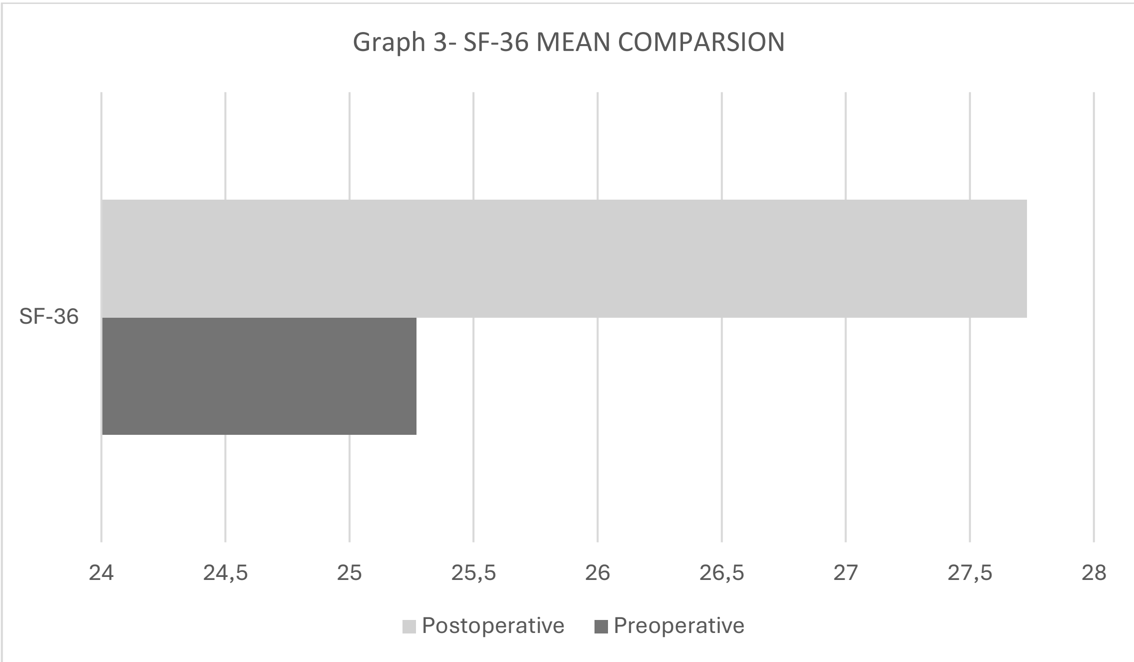
Comparison	Correlation Coefficient	p-value
ΔSNOT-22 vs ΔBerlin	0.143	0.525
ΔSNOT-22 vs ΔSF-36	–0.381	0.080
ΔEpworth vs ΔBerlin	–0.320	0.146
ΔEpworth vs ΔSF-36	0.009	0.970
ΔBerlin vs ΔSF-36	–0.289	0.193
VAS vs ΔEpworth	0.189	0.400
VAS vs ΔBerlin	0.162	0.471
VAS vs ΔSF-36	–0.323	0.143



Graph 1- SNOT-22 Mean Comparison Between Preoperative and Postoperative (mean follow-up time: 18.77 months) Scores



Graph 2- ESS Mean Comparison Between Preoperative and Postoperative (mean follow-up time: 18.77 months) Scores



Graph 3- SF-36 Mean Comparison Between Preoperative and Postoperative (mean follow-up time: 18.77 months) Scores

Appendix

Appendix 1

SNOT-22 (Sino-Nasal Outcome Test)/ Questionário de Avaliação Sino-Nasal
Por favor, responda considerando as últimas DUAS SEMANAS. Classifique a gravidade de cada problema selecionando o número correspondente.

- Necessidade de assoar o nariz
- Espirros
- Corrimento nasal / gotejamento nasal
- Tosse
- Secreção pós-nasal (muco que vai da parte de trás do nariz para a garganta)
- Secreção nasal espessa
- Sensação de ouvido cheio ou bloqueado
- Tontura ou vertigem
- Dor de ouvido
- Dor ou pressão facial
- Dificuldade em adormecer
- Acordar durante a noite
- Falta de uma boa noite de sono
- Acordar cansado/a
- Fadiga ou cansaço durante o dia
- Baixa produtividade durante o dia
- Falta de concentração
- Frustração, irritabilidade ou inquietação
- Tristeza
- Embaraço
- Perda de apetite, paladar ou olfato

- Obstrução ou congestão nasal

Escala: 0 – Sem problema 1 – muito ligeiro, 2 - Ligeiro, 3 - Moderado, 4 - Severo, 5 – Muito severo

Appendix 2

Epworth Sleepiness Scale (ESS)/Escala de Sonolência de Epworth

Qual a probabilidade de dormitar ("passar pelas brasas”) ou de adormecer - e não apenas sentir-se cansado, nas seguintes situações?

Situação | Probabilidade: 0 - Nunca 1 - Pouca probabilidade, 2 - Probabilidade moderada, 3 - Alta probabilidade

Sentado a ler
A ver televisão
Sentado inativo num lugar público (ex.: teatro, reunião)
Como passageiro num carro durante uma hora sem paragens
Deitado a descansar à tarde, se as circunstâncias permitirem
Sentado a conversar com alguém
Sentado calmamente após almoço sem ter bebido álcool
No carro, parado no trânsito durante alguns minutos

Appendix 3

Berlin Questionnaire (Sleep Apnea Screening)/Questionário de Berlim

Você ressona?
Sim / Não / Não sei

Se sim, quão alto é o seu ressonar?

- Um pouco mais alto do que a sua respiração
- Tão alto como quando fala
- Mais alto do que quando fala
- Tão alto que pode ser ouvido noutras divisões da casa

Com que frequência ressona?

- Quase todos os dias
- 3-4 vezes por semana
- 1-2 vezes por semana
- 1-2 vezes por mês
- Nunca ou quase nunca

O seu ressonar alguma vez incomodou outras pessoas?
Sim / Não / Não sei

Alguma pessoa já reparou que pára de respirar durante o sono?
(mesma escala de frequência)

Com que frequência se sente cansado ou fatigado depois de dormir?
(mesma escala de frequência)

Com que frequência se sente cansado ou fatigado durante o dia?
(mesma escala de frequência)

Alguma vez adormeceu ou "passou pelas brasas" enquanto conduzia?
Sim / Não

Se sim, com que frequência?
(mesma escala de frequência)

Tem hipertensão arterial?
Sim / Não / Não sei

Appendix 4

SF-36v2 Health Survey/Questionário de Saúde

Nas últimas 4 semanas, a sua saúde limitou-o(a) nas seguintes atividades? Se sim, quanto?

- Atividades vigorosas (ex.: correr, levantar objetos pesados, praticar desportos intensos)
- Atividades moderadas (ex.: mover uma mesa, aspirar a casa)
- Levantar ou carregar compras
- Subir vários andares de escadas
- Subir um andar de escadas
- Inclinar-se, ajoelhar-se ou curvar-se
- Andar mais de 1 km
- Andar várias centenas de metros
- Andar 100 metros
- Tomar banho ou vestir-se sozinho(a)

Escala de resposta:
1 - Sim, muito limitado(a)
2 - Sim, um pouco limitado(a)
3 - Não, nada limitado(a)

Appendix 5

Visual Analogue Scale (VAS)/Escala Visual Analógica (EVA)

Quão Satisfeito está com a sua respiração?

Completamente insatisfeito 0 1 2 3 4 5 6 7 8 9 10 Muito satisfeito

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