




SURGICAL APPROACHES AND MULTIDISCIPLINARY MANAGEMENT IN THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA

ABORDAGENS CIRÚRGICAS E MANEJO MULTIDISCIPLINAR NO TRATAMENTO DA APNEIA OBSTRUTIVA DO SONO

ABORDAJES QUIRÚRGICOS Y MANEJO MULTIDISCIPLINARIO EN EL TRATAMIENTO DE LA APNEA OBSTRUCTIVA DEL SUEÑO

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ABSTRACT

This study consists of a narrative literature review aimed at analyzing contemporary scientific evidence regarding surgical approaches and multidisciplinary management in the treatment of Obstructive Sleep Apnea (OSA). OSA is a prevalent chronic respiratory disorder associated with severe cardiovascular morbidities, with continuous positive airway pressure (CPAP) therapy being the gold-standard management for moderate to severe cases, despite its low long-term adherence. Data collection was carried out in the PubMed database using the descriptors “Sleep Apnea, Obstructive” and “Orthognathic Surgery” in articles published within the last five years. The results highlight maxillomandibular advancement (MMA), performed with the assistance of virtual surgical planning (VSP) and CAD/CAM technology, as the key procedure for upper airway expansion and significant reduction of the Apnea-Hypopnea Index (AHI). Although accuracy analyses indicate a small discrepancy between the planned and achieved sagittal movements, the evaluation of patient-reported outcome measures (PROMs) confirms a substantial and stable long-term improvement in subjective quality of life and reduction of daytime sleepiness. Multidisciplinary management is essential, in which the orthodontist plays a central role in screening and referral for definitive diagnosis through polysomnography, with the need for monitoring patients undergoing mandibular setback surgeries due to the risk of inducing OSA.

Keywords: Obstructive Sleep Apnea. Maxillomandibular Advancement. Orthognathic Surgery. Virtual Surgical Planning. Multidisciplinary Management.

RESUMO

Este estudo constitui uma revisão bibliográfica narrativa com o propósito de analisar as evidências científicas contemporâneas acerca das abordagens cirúrgicas e do gerenciamento multidisciplinar no tratamento da Apneia Obstrutiva do Sono (AOS). A AOS é um distúrbio respiratório crônico prevalente que se associa a morbidades cardiovasculares severas, sendo a terapia com pressão positiva contínua nas vias aéreas (CPAP) o manejo padrão-ouro para casos moderados a graves, apesar da baixa adesão a longo prazo. A prospecção dos dados foi efetuada na base PubMed,

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empregando os descritores "Sleep Apnea, Obstructive" e "Orthognathic Surgery" em artigos publicados no último quinquênio. Os resultados consolidam o avanço maxilomandibular (AMM), executado com o auxílio do planejamento cirúrgico virtual (PCV) e tecnologia CAD/CAM, como o procedimento-chave para a expansão da via aérea superior e a redução significativa do Índice de Apneia e Hipopneia (IAH). Embora análises de acurácia apontem uma pequena discrepância entre os movimentos sagitais planejados e os alcançados, a avaliação dos desfechos relatados pelos pacientes (PROMs) confirma uma melhoria substancial e estável a longo prazo na qualidade de vida subjetiva e na redução da sonolência diurna. É crucial o manejo multidisciplinar, no qual o ortodontista atua centralmente na triagem e no encaminhamento para o diagnóstico definitivo via polissonografia, com a necessidade de monitoramento de pacientes submetidos a cirurgias de recuo mandibular devido ao risco de causarem AOS.

Palavras-chave: Apneia Obstrutiva do Sono. Avanço Maxilomandibular. Cirurgia Ortognática. Planejamento Cirúrgico Virtual. Manejo Multidisciplinar.

RESUMEN

Este estudio consiste en una revisión bibliográfica narrativa con el propósito de analizar las evidencias científicas contemporáneas acerca de los abordajes quirúrgicos y el manejo multidisciplinario en el tratamiento de la Apnea Obstructiva del Sueño (AOS). La AOS es un trastorno respiratorio crónico prevalente asociado a morbilidades cardiovasculares severas, siendo la terapia con presión positiva continua en las vías respiratorias (CPAP) el manejo estándar de oro para los casos moderados a graves, a pesar de la baja adherencia a largo plazo. La recopilación de datos se realizó en la base de datos PubMed utilizando los descriptores "Sleep Apnea, Obstructive" y "Orthognathic Surgery" en artículos publicados durante el último quinquenio. Los resultados destacan el avance maxilomandibular (AMM), realizado con la ayuda de la planificación quirúrgica virtual (PQV) y la tecnología CAD/CAM, como el procedimiento clave para la expansión de la vía aérea superior y la reducción significativa del Índice de Apnea e Hipopnea (IAH). Aunque los análisis de precisión señalan una pequeña discrepancia entre los movimientos sagitales planificados y los alcanzados, la evaluación de los resultados reportados por los pacientes (PROMs) confirma una mejora sustancial y estable a largo plazo en la calidad de vida subjetiva y en la reducción de la somnolencia diurna. Es fundamental el manejo multidisciplinario, en el cual el ortodoncista actúa de manera central en el cribado y la derivación para el diagnóstico definitivo mediante polisomnografía, además de la necesidad de monitoreo de pacientes sometidos a cirugías de retroceso mandibular debido al riesgo de provocar AOS.

Palabras clave: Apnea Obstructiva del Sueño. Avance Maxilomandibular. Cirugía Ortognática. Planificación Quirúrgica Virtual. Manejo Multidisciplinario.



1 INTRODUCTION

Obstructive sleep apnea (OSA) is a prevalent chronic respiratory disorder, affecting approximately between 9% and 38% of the global adult population. The pathology is characterized by recurrent episodes of partial or total obstruction of the upper airways during rest, resulting in intermittent hypoxia, sleep fragmentation, and significant clinical manifestations, such as excessive daytime sleepiness, fatigue, and impairment in cognitive function. In addition to the immediate impacts on quality of life, OSA is recognized as a critical risk factor for severe cardiovascular morbidities, including systemic hypertension, heart failure, and stroke (Kazmierski, 2024).

The gold standard management for moderate to severe cases lies in continuous positive airway pressure (CPAP) therapy, however, low long-term adherence drives the search for definitive alternatives. In this scenario, surgical treatment gains relevance, with maxillomandibular advancement (MMA) standing out as the most effective intervention, with surgical success rates close to 85% (Francisco et al., 2025). The role of the orthodontist is fundamental in this multidisciplinary context, working in the screening and preparation of patients who need orthognathic surgery. Recently, the integration of digital technologies, such as virtual surgical planning (PCV) and the use of customized guides and plates, has sought to increase the accuracy and predictability of structural and functional results (Martinovic et al., 2023).

2 METHODOLOGY

The present investigation is a bibliographic review of a narrative nature, articulated with the purpose of synthesizing and examining contemporary scientific evidence about surgical approaches and multidisciplinary management in the treatment of obstructive sleep apnea. Data were prospected in the PubMed database, using the descriptors "Sleep Apnea, Obstructive" and "Orthognathic Surgery", which were operationalized using the logical connectors AND and OR, in strict accordance with the structured vocabulary of Medical Subject Headings (MeSH). The inclusion of academic productions published in the last five years, made available in full and written in Portuguese or English, which had direct adherence to the central theme, was delimited. Duplicate studies, narrative reviews with methodological fragility, and articles not indexed on the aforementioned platform were discarded. The selection process was structured in two distinct phases: the preliminary screening of titles and abstracts, followed by the full



scrutiny of the texts to ratify their relevance. The consolidation of the findings followed a descriptive and systematic organization.

3 RESULTS AND DISCUSSION

Recent scientific literature demonstrates that the treatment of OSA has evolved towards a highly technological and patient-centered approach, prioritizing both the resolution of respiratory obstruction and the improvement of quality of life.

3.1 SURGICAL APPROACHES AND TECHNOLOGICAL INNOVATION

The AMM advancement, performed by means of Le Fort I osteotomy and bilateral sagittal osteotomy of the mandibular branch (OSBM), remains as the surgical pillar to expand the dimensions of the airway. The implementation of virtual surgical planning (PCV) associated with CAD/CAM (computer-aided design and manufacturing) technology has enabled the development of customized cutting guides and titanium plates. Case series studies demonstrate that this technique results in significant reductions in the Apnea-Hypopnea Index (AHI), with preoperative averages of 48.8 reducing to 12.4 episodes per hour. However, accuracy analyses suggest that the sagittal movements achieved are usually slightly smaller than those planned virtually, showing a median discrepancy of 3.1 mm in the maxilla and 2.3 mm in the mandible (Ho et al., 2023; Francisco et al., 2025).

3.2 QUALITY OF LIFE AND PATIENT PERCEPTION

The efficacy of surgical treatment is not limited to polysomnographic parameters. Assessment of patient-reported outcome measures (PROMs) reveals a substantial improvement in subjective quality of life. Systematic reviews quantified a mean gain of 6.36 points in quality of life questionnaires after advancement orthognathic surgery, demonstrating long-term stability. Instruments such as the Epworth Sleepiness Scale (ESS) and the Functional Sleep Outcomes Questionnaire (FOSQ) confirm the reduction of excessive daytime sleepiness and the increase in productivity. It was also observed that volumetric gains in the airway have a strong correlation with improvement in subjective sleep perception (Francisco et al., 2024).



3.3 MULTIDISCIPLINARY MANAGEMENT AND POTENTIAL RISKS

The role of the orthodontist extends beyond dental alignment; it acts as a key player in the screening, using clinical and radiographic examinations to identify suspected OSA and refer to the sleep medicine specialist for definitive diagnosis via polysomnography. It is important to note that, while skeletal advancement is therapeutic, mandibular setback surgeries in patients with prognathism may act as a possible causative factor of OSA due to the reduction of the retrolingual airway, requiring careful monitoring. Furthermore, although palatal expansion is effective in children, current evidence in adult patients indicates that OSA alone is not a sufficient indication for this procedure without other associated orthodontic clinical diagnoses (Martinovic et al., 2023).

4 CONCLUSION

The present review demonstrated that the treatment of OSA through surgical interventions and multidisciplinary management represents an advanced and effective strategy, particularly for patients with CPAP failure or intolerance. The AMM advancement, performed with the aid of PCV and CAD/CAM technology, is consolidated as the key procedure for upper airway expansion, resulting in significant reductions in AHI.

Despite the high efficacy in augmenting the airway, accuracy studies indicate a small discrepancy between virtually planned and actually achieved sagittal movements, suggesting the need for continuous optimization of technical precision. Crucially, the PROMs assessment validates the intervention, confirming a substantial and stable long-term improvement in subjective quality of life and reduced daytime sleepiness.

In addition, the indispensability of multidisciplinary management is emphasized, in which the orthodontist plays a central role in the screening of patients and in the referral for definitive diagnosis. It is vital to monitor patients undergoing mandibular setback surgeries, which may be an etiologic factor for OSA. In short, the integration of advanced surgical techniques and digital planning, combined with a cohesive and patient-centered clinical approach, is critical to the therapeutic success of OSA.



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