

Treatment Stability of Maxillomandibular Advancement Surgery for Obstructive Sleep Apnea - Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION**Support** - None.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202510084**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 January 2025 and was last updated on 21 January 2025.**INTRODUCTION**

Review question / Objective By synthesizing the available evidence, we aimed to provide a comprehensive assessment of the long-term efficacy, stability and potential limitations of MMA.

Rationale Obstructive sleep apnea (OSA) is a prevalent sleep disorder characterized by recurrent episodes of upper airway collapse during sleep, leading to intermittent hypoxia and sleep fragmentation. A recent systematic review reported that the prevalence of OSA ranges from 9% to 38% in the general adult population. While various treatment modalities exist, including continuous positive airway pressure (CPAP) therapy, myofunctional therapy, oral appliances, and lifestyle modifications such as weight loss, surgical interventions, particularly maxillomandibular advancement (MMA), have emerged as a

promising option for patients with moderate to severe OSA, especially those who are non-compliant with conservative therapies.

MMA involves surgically repositioning the upper and lower jaws forward, thereby expanding the upper airway and reducing the risk of airway collapse. Numerous studies have demonstrated the efficacy of MMA in improving sleep apnea severity, reducing daytime sleepiness, and enhancing quality of life. However, a critical question remains: How long do these benefits persist over time?

While short-term outcomes of MMA have been extensively studied, there is a paucity of data on the long-term stability and durability of its effects. Understanding the long-term trajectory of improvement is crucial for patient counseling and treatment planning. To address this knowledge gap, we conducted a comprehensive systematic review and meta-analysis to evaluate the stability of MMA in the short, intermediate, long, and very

long term as a treatment for OSA. By synthesizing the available evidence, we aimed to provide a comprehensive assessment of the long-term efficacy, stability and potential limitations of MMA.

Condition being studied By synthesizing the available evidence, we aimed to provide a comprehensive assessment of the long-term efficacy, stability and potential limitations of Maxillo-Mandibular Advancement Surgery.

METHODS

Participant or population Patients: any patient with OSA.

Intervention MMA surgery.

Comparator Comparison: pre- and postsurgical sleep study data for short term follow-up (< 1 year), intermediate-term follow-up (1 to < 4 years), long-term follow-up (4 to < 8 years), and very long-term (≥ 8 years) outcomes.

Study designs to be included Study design: controlled trials, randomized or non-randomized clinical trials, prospective or retrospective studies with control group.

Eligibility criteria The inclusion criteria for this study have been : controlled trials, randomized or non-randomized clinical trials, prospective or retrospective studies with control group, studies related to the treatment of obstructive sleep apnea (OSA) by maxillomandibular advancement (MMA), sample of patients with OSA requiring MMA, studies with pre- and post-treatment polysomnographic data, no restrictions regarding year or language of publication were applied. The exclusion criteria for this study have been: studies not related to the treatment of obstructive sleep apnea (OSA) by maxillomandibular advancement (MMA), interviews of authors, case studies, reviews and updates of knowledge and systematic studies due to not having a comparable analysis.

Information sources Electronic databases: PubMed, Scopus, Web Of Science, Cochrane.

Main outcome(s) Outcomes: apnea-hypopnea index (AHI), body mass index (BMI), mean oxygen saturation (MSAT), lowest oxygen saturation (LSAT), sleepiness data (Epworth Sleepiness Scale [ESS]).

Quality assessment / Risk of bias analysis The risk of bias in the selected studies was assessed

using the Cochrane Collaboration tool for methodological quality assessment of clinical trials. Specifically, it was used the RoB2 for assessing randomized clinical trials and the ROBINS-1 for retrospective studies with control group. This tool consists of 7 items that evaluate sequence generation, allocation concealment, participant blinding, assessment blinding, incomplete data, free selective reporting, and other sources of bias.

Strategy of data synthesis Three authors (A.E., A.O., R.G.) independently searched for articles to include in this review. Studies that were potentially relevant, were downloaded in full-text form. The authors then determined which articles to include in this review, with any discrepancy going to A.E. for a final decision on inclusion. The data analyzed with polysomnography were taken for each study before, after treatment and at the end of the follow-up. The data were then placed into a table, and statistical software was used for data analysis.

Subgroup analysis A meta-analysis by subgroups was performed to determine the existence of significant differences between the four time points (6-12 months, 1-4 years, 4-8 years and >8 years) with the Q test for the difference between subgroups for a p-value <0.01.

Sensitivity analysis The heterogeneity between the combined studies in each subgroup has been evaluated using the I² considering a slight heterogeneity if it is between 25-50%, moderate between 50-75% and high if >75%.

Country(ies) involved Spain.

Keywords "MMA", "maxillomandibular", "orthognatic", "bimaxilar", "long-term", "apnea", "OSA".

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