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Skeletal, Dentoalveolar, and Periodontal Effects of Miniscrew-Assisted Rapid Palatal Expansion Compared with Conventional Rapid Palatal Expansion: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - No support.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 June 2026 and was last updated on 23 June 2026.

INTRODUCTION

Review question / Objective The focused research question was formulated according to the Population, Intervention, Comparison, and Outcome (PICO) framework as follows: “In patients undergoing orthodontic maxillary expansion, does miniscrew-assisted rapid palatal expansion (MARPE) produce different dentoalveolar, skeletal, and periodontal effects compared with conventional rapid palatal expansion (RPE)?”.

Condition being studied To compare the dentoalveolar and skeletal effects of miniscrew-assisted rapid palatal expansion (MARPE) and conventional rapid palatal expansion (RPE) through a systematic review and meta-analysis.

METHODS

Search strategy A systematic review was conducted according to the PRISMA guidelines. The risk of bias of the included studies was assessed using the CRIS scale. Electronic searches were performed in PubMed, Scopus, Web of Science, EBSCO, and ProQuest databases. When possible, meta-analyses were conducted using a random-effects model and the inverse variance method to estimate the mean difference (MD) between MARPE and conventional RPE.

Participant or population The population of interest comprised patients diagnosed with transverse maxillary deficiency requiring orthopedic maxillary expansion.

Intervention The intervention evaluated was MARPE, whereas conventional tooth-borne RPE served as the comparator.

Comparator The intervention evaluated was MARPE, whereas conventional tooth-borne RPE served as the comparator.

Study designs to be included Controlled and not randomized trial.

Eligibility criteria The inclusion criteria were as follows: controlled and not randomized trial studies witch compare the maxillary expansion with MARPE and RPE measuring the alveolar bucal bone.Studies were restricted by the year of publication 2020. In addition, the search for articles was carried out in both Spanish and English, the latter having a greater weight due to the greater number of studies and information that exists in this language. Studies were not restricted by language or year of publication. The exclusion criteria were as follows: systematic literature reviews, clinical trials, clinical cases, case series, and editorials.Only studies directly comparing MARPE and conventional RPE and reporting quantitative radiographic measurements were considered eligible for inclusion.

Information sources Electronic searches were performed in PubMed, Scopus, Web of Science, EBSCO, and ProQuest databases.

Main outcome(s) The primary outcome of interest was the change in buccal alveolar bone dimensions following expansion. Secondary outcomes included skeletal and dentoalveolar changes assessed by cone-beam computed tomography (CBCT), including molar dental inclination, intermolar width, maxillary width, posterior midpalatal suture opening, zygomaticomaxillary suture changes, and nasal width.

Quality assessment / Risk of bias analysis The risk of bias of the included in vitro studies was assessed using the CRIS (Checklist for Reporting In Vitro Studies) tool, which evaluates key methodological domains including sample preparation and handling, standardization of experimental conditions, blinding of outcome assessment, and adequacy of statistical analysis. Studies were qualitatively assessed according to these criteria.

Strategy of data synthesis The following data were recorded: author, year, title, journal, and sample size (n). The results were obtained from studies witch evaluate buccal alveolar bone loss in maxillary expansion procedures comparing MARPE and RPE.

Subgroup analysis The meta-analyses were presented using forest plots.
Heterogeneity among the included studies was assessed using the I^2 statistic, considering low heterogeneity when values ranged between 25–50%, moderate between 50–75%, and high when >75%. Differences between the analyzed subgroups (FHT, s-CAIS, AR, and d-CAIS) were evaluated using the Q test, with statistical significance set at $p < 0.05$.
Heterogeneity (within designs) and inconsistency (between designs) was assessed by the Q test with a significance level of $p < 0.05$.

Sensitivity analysis Two different researchers (A.V.-S. and A.Z.-M.) searched the databases simultaneously. The inclusion and exclusion criteria were applied to titles, and a single researcher (A.V.-S.) extracted the data regarding the relevant variables. A.Z.-M. conducted the systematic review, and two researchers who had not participated in the selection process (A.V.-S. and A.Z.-M.) performed the subsequent meta-analysis.
The inclusion criteria were as follows: controlled and not randomized trial studies witch compare the maxillary expansion with MARPE and RPE measuring the alveolar bucal bone.Studies were restricted by the year of publication 2020. In addition, the search for articles was carried out in both Spanish and English, the latter having a greater weight due to the greater number of studies and information that exists in this language. Studies were not restricted by language or year of publication. The exclusion criteria were as follows: systematic literature reviews, clinical trials, clinical cases, case series, and editorials.

Language restriction No.

Country(ies) involved Spain.

Keywords Palatal Expansion Technique; Rapid Maxillary Expansion; Miniscrew-Assisted Rapid Palatal Expansion; Orthodontics; Cone-Beam Computed Tomography; Alveolar Bone Loss; Craniofacial Development; Systematic.

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