International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

Successful placement of microimplants in orthodontics according to their location and degree of insertion. A systematic review

INPLASY202490096
doi: 10.37766/inplasy2024.9.0096
Received: 22 September 2024
Published: 23 September 2024

Romero, P; Campoverde, C.

Corresponding author:
Paula Romero

paula.romero.32@est.ucacue.edu.ec

Author Affiliation:
Universidad Católica de Cuenca.

ADMINISTRATIVE INFORMATION

Support - Own financing.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202490096

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 September 2024 and was last updated on 23 September 2024.

INTRODUCTION

Review question / Objective What is the success rate in the placement of microimplants in orthodontics according to their location and degree of insertion?

Rationale The use of micro-implants for the application of forces by anchorage has simplified and improved the effectiveness of many orthodontic treatments, reducing unwanted movement of other teeth, especially in adult patients. For this reason, bone anchorage is becoming one of the most commonly used techniques during orthodontic treatment. If an adequate study of the case is performed, the technique is mastered and it is carried out in a precise manner, it is very difficult for complications to occur, however, there is a risk of loss of biological stability of the mini implants, which is still a topic of discussion among orthodontists. The failure of a micro screw is considered when there is mobility (eventual loss), inflammation or infection. Although orthodontic mini-implants achieve biological stability when they are successful, osseointegration does not occur in this type of implants since they are temporary devices. There is some controversy as to which risk factors affect secondary stability of the mini-implant.

The aim of this systematic review of the literature is to analyze the factors that influence the success of microimplant placement in orthodontics, taking into account the variables that affect the biological stability of the use of mini-implants. The main hypothesis of the present study was that multiple factors can affect secondary or biological stability: patient dependent (age, sex, hygiene), mini-implant dependent (length and diameter) or technique dependent (clinical experience, location). time, pre-drilled or not). The null hypothesis was that there are no variables that significantly affect the biological stability of microscrews.

The present research is of relevance to the scientific community in the field of orthodontics, since through this resource it is expected to help professionals to perfect the placement of micro-implants mitigating the adverse effects that may cause the loss of their biological stability.

Condition being studied The use of implants in dentistry began in the 1980s. Since the invention of the first fixed orthodontic appliance, knowledge of the biophysics of tooth movement has been essential in all treatment. On many occasions the orthodontist's need for a stable anchorage has arisen, but the alveolar bone was not available. However, the main problem has always been Newton's third law, which states that “every movement generates another of equal intensity and opposite sign”. This physical phenomenon explains the difficulty of moving teeth by pulling other teeth that do not want to move. This is why micro-screws appeared. Although we have to say that they were developed specifically from 1997 by Kanomi with the onplants eliminating the need for two surgical times. Moreover, they can be installed anywhere in the jaws, taking into account anatomical conditions of soft tissue and bone. The micro-implant for orthodontic anchorage must be small enough to be placed in the alveolar bone area, even in the apical bone. The technique of micro-screws for orthodontic anchorage is a very simple technique with great therapeutic effectiveness. However, although it is a minimal surgical technique, the patient will always be somewhat reluctant. To counteract the possible doubts raised by this treatment, the greatest advantage, highlighted by most authors, is the absence of patient collaboration. They are resistant to orthodontic forces. Even forces of 50-250 g can be applied as soon as the implant is placed. For higher forces, some authors recommend waiting a certain time for the stabilization of the micro-implant. This stability depends broadly on: the miniscrew factor and the host factor. In planning the insertion of the miniscrew, a tool that is not only useful but essential is the CT scan, in addition to the panoramic scan. The use of CT facilitates the determination of the appropriate location, angulation and length of the miniscrew. We check the density of the bone, the distance between the bone and the root and the interradicular space. In this way we were able to determine that the largest interradicular distance is between the upper second premolar and first molar. It was also found that the soft tissue and cortical tissue are of better quality in this space. Continuing with the ease of the surgical process, it should be noted that most of the authors state that they do not require premedication to place the micro-screw, nor the subsequent use of antibiotics or analgesics.

METHODS

Search strategy Articles published in digital databases: Scopus, PubMed, Web of Science.

Participant or population Adolescent patients aged 11 to 25 years wearing fixed orthodontic appliances.

Intervention Intra- and extra-alveolar micro-implants.

Comparator Location and degree of insertion.

Study designs to be included -Randomized and non-randomized clinical trials -Qualitative, prospective, cohort and retrospective -In vitro studies -Observational studies -Bibliographic reviews -Systematic reviews.

Eligibility criteria
-Articles in English, Spanish, Portuguese and Spanish.
- Articles published in the following digital databases: Scopus, PubMed, Web of Science
- Articles without year restriction.

Information sources Articles published in the following digital databases: Scopus, PubMed, Web of Science, Web ofScience Qualitative randomized and non-randomized clinical trials, prospective, cohort and retrospective clinical trials.
- In vitro studies
- Observational studies
- Literature reviews
- Systematic reviews.

Main outcome(s) All associations between specific maximum insertion torque values and location are based on literature.
Location are based on the literature. The reasons for these judgments included subjective definitions of success, poor quality of torque sensors and high risk for detection risk to detect selection biases, were analyzed according to the Cochrane Clinical Trials Cochrane clinical trials tool (RoB 2). All associations between maximum insertion torque and location were taken as main variables. primary variables.

Additional outcome(s) The diameter, microscrew material and age of the patient were the secondary variables. Secondary variables, few studies reported on adverse effects and practitioner clinical adverse effects and clinical experience of the practitioner.

Data management SPSS, Excel.

Quality assessment / Risk of bias analysis To detect selection bias, they were analyzed according to the Cochrane clinical trials tool (RoB2).

Strategy of data synthesis A systematic search of the information will be carried out in three digital databases; Scopus, PubMed, Web of Science, through the health sciences descriptors in English MeSH and Boolean operators AND, OR, the information responded to a clinical question based on the IOP question, duplicate articles, narrative reviews, articles that are not related to the topic of study were excluded.

Subgroup analysis Chi-square statistical analysis.

Sensitivity analysis Chi-square and ANNOVA statistical analysis.

Language restriction Articles in English, Spanish, Portuguese language only.

Country(ies) involved Ecuador.

Keywords Micro-screws, orthodontics, temporary anchorage devices, placement, insertion.

Contributions of each author

Author 1 - Paula Dayana Romero Chica - Bibliographic search and article writing.
Email: paula.romero.32@est.ucacue.edu.ec
Author 2 - Cristian Hernán Campoverde Torres - Revision of the information and correction of the article's form and content.
Email: crisodont30@hotmail.com