Title of metanalysis : Safety and Accuracy of Guided Interradicular Miniscrew Insertion: A Systematic Review and Meta-Analysis

PubMed ID of metaanalysis: 39768624

**Search terms**:

For PubMed:

("Orthodontic Anchorage Procedures"[Mesh] OR (Miniscrew\* OR "Mini screw\*" OR Mini-screw\* OR

Mini- implant\* OR "Mini implant\*" OR "Temporary anchorage\*" OR TAD OR TADs OR "skeletal anchorage"

OR "bone anchorage")) AND Orthodon\* AND ("Surgery, Computer-Assisted" [Mesh] OR

"computer navigation system" OR "computer guided surgery" OR "surgical guide" OR "surgical template"

OR "Dimensional Measurement Accuracy"[Mesh] OR "accuracy" OR "free-hand" OR "freehand"

OR "conventional technique\*" OR "conventional procedure\*" OR "conventional surgical guide\*" OR

"conventional free-hand method\*" OR "radiographic reference\*" OR "periapical radiograph\*" OR

"panoramic radiograph" OR "radiographic surgical guide" OR "radiographic guide" OR "cast\*" OR

"wire guide" OR "visible guide"

**Inclusion Criteria:**

All published studies evaluating the safety and/or accuracy of orthodontic MSs placed in the buccal interradicular area using any type of guidance were included, regardless of the MS type. Eligible studies comprised randomized (RCT) or non-randomized clinical trials, case-control studies, prospective or retrospective cohort studies, case series, animal, ex vivo, and in vitro studies with at least 10 interradicular MSs.

**Exclusion Criteria:**

**Directly mentioned:**

* case reports or technical notes
* studies assessing MS accuracy or safety without any guidance or those examining MSs placed in locations other than the interradicular space (e.g., palatal vault, retromolar region, infrazygomatic crest, or the nasal process)

**Indirectly mentioned:**

From 784 papers 363 were excluded due to:

* Duplicate records removed (n=363)
* Records marked as ineligible by automation tools (n=0)
* Records removed for other reasons (n=0)

From 421 screened papers 379 were excluded (reason not listed!) and 2 could not be retrieved.

From 40 preselected papers 29 were excluded due to:

* Technique description (n=8)
* No deviation outcome (n=7)
* No guided insertion (n=4)
* No miniscrew inserted (n=3)
* Less than 10 miniscrews assessed (n=3)
* No interradicular miniscrew (n=3)
* Duplicated sample (n=1)

Search Date: 4 March 2024

Included studies:

11 studies comprised of two in vitro studies [32,33], one animal study [31], one cadaver study [30], and seven human studies [12,26–29,34,35]. Among the human studies, there was one split-mouth RCT [35], five prospective cohort studies [12,27–29,34], and one retrospective cohort study.

| Study title | Pubmed ID of included study |
| --- | --- |
| Bae, M.J.; Kim, J.Y.; Park, J.T.; Cha, J.Y.; Kim, H.J.; Yu, H.S.; Hwang, C.-J. Accuracy of miniscrew surgical guides assessed from cone-beam computed tomography and digital models. Am. J. Orthod. Dentofac. Orthop. 2013, 143, 893–901. | * 23726340 |
| Estelita, S.S.; Janson, G.; Chiqueto, K.; Janson, M.; de Freitas, M.R. Predictable drill-free screw positioning with a graduated 3-dimensional radiographic-surgical guide: A preliminary report. Am. J. Orthod. Dentofac. Orthop. 2009, 136, 722–735. | * 19892291 |
| Kalra, S.; Tripathi, T.; Rai, P.; Kanase, A. Evaluation of orthodontic mini-implant placement: A CBCT study. Prog. Orthod. 2014, 15, 61. | * 25406652 |
| Liu, H.; Liu, D.; Wang, G.; Wang, C.; Zhao, Z. Accuracy of surgical positioning of orthodontic miniscrews with a computer-aided design and manufacturing template. Am. J. Orthod. Dentofac. Orthop. 2010, 137, 728.e1–728.e10. | * 20685519 |
| Morea, C.; Hayek, J.E.; Oleskovicz, C.; Dominguez, G.C.; Chilvarquer, I. Precise insertion of orthodontic miniscrews with a stereolithographic surgical guide based on cone beam computed tomography data: A pilot study. Int. J. Oral Maxillofac. Implant. 2011, 26, 860–865 | * 21841996 |
| Qiu, L.; Haruyama, N.; Suzuki, S.; Yamada, D.; Obayashi, N.; Kurabayashi, T.; Moriyama, K. Accuracy of orthodontic miniscrew implantation guided by stereolithographic surgical stent based on cone-beam CT-derived 3D images. Angle Orthod. 2012, 82, 284–293. | * 21848407 |
| Qiu, L.; Xu, H.; Feng, P.; Sha, X.; Zhang, H. Clinical effectiveness of orthodontic miniscrew implantation guided by a novel cone beam CT image-based CAD-CAM template. Ann. Transl. Med. 2021, 9, 1025. | * 34277825 |
| Riad-Deglow, E.; Toledano-Gil, S.; Zubizarreta-Macho, Á.; Bufalá-Pérez, M.; Rodríguez Torres, P.; Tzironi, G.; Albaladejo-Martínez, A.; López-Román, A.; Hernández-Montero, S. Influence of the computer-aided static navigation technique and mixed reality technology on the accuracy of the orthodontic micro-screws placement. An in vitro study. J Pers Med. 2021, 11, 964. | * 34683105 |
| Suzuki, E.Y.; Suzuki, B. Accuracy of miniscrew implant placement with a 3-dimensional surgical guide. J. Oral Maxillofac. Surg. 2008, 66, 1245–1252. | * 18486791 |
| Thakur, A.; Toshniwal, N.; Misal, A.; Mathur, A. Comparison of accuracy of various positioning guides used for determination of implant placement site using RVG. J. Indian. Orthod. Soc. 2012, 46, 70–76. | not found |
| Yu, J.J.; Kim, G.T.; Choi, Y.S.; Hwang, E.H.; Paek, J.; Kim, S.H.; Huang, J.C. Accuracy of a cone beam computed tomography-guided surgical stent for orthodontic mini-implant placement. Angle Orthod. 2012, 82, 275–283. | * 21875317 |