Exploring the relationship between tinnitus and somatosensory disorders

Andrea Palermo[1]*
Gerardo Cazzato[2]*
Roberta Sardano[2],
Laura Ferrante[2]
Francesco Sabatelli[2]
Ioana Roxana Bordea[3]*
Gustavo Vincentis Oliveira Fernandes[4]
Ahmed Abdelwahed Shaaban[5]
Edit Xhajanka[6]
Lwai Almasri[7]
Marwa Alkassab[8]
Islam Amer[9]
Maher Almasri[8]
Francesco Sampalmieri[10]
Fabrizio Bambini[10]
Lucia Memè[11]*

[1] Department of Medicine, University of Salento, Lecce, Italy
[2] Department of Interdisciplinary Medicine, University of Bari "Aldo Moro" Bari, Italy
[3] Department of Oral Rehabilitation, Faculty of Dentistry, Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
[4] Missouri School of Dentistry & Oral Health, A. T. Still University, St. Louis, MO, United States States
[5] Prosthodontics Faculty of Oral and Dental Medicine, Future University, New Cairo, Egypt
[6] Department of Dental Medicine, Medical University of Tirana, Rruga E Dibres, Albania
[7] King's College London, U.K.
[8] The University of Buckingham, U.K.
[9] Faculty of Medicine, Sohag University, Sohag, Egypt
[10] D.I.S.C.O. School of Dentistry, Polytechnic University of Marche, Ancona, Italy
[11] Dipartimento di Scienze della Vita, della Salute e delle Professioni Sanitarie, Perugia, Italy

Corresponding author: Ioana Roxana Bordea
e-mail: roxana.bordea@ymail.com

*These authors contributed equally as first authors.
**These authors contributed equally as the last authors

Abstract

***Aim*. This review investigates the bidirectional relationship between subjective tinnitus and somatosensory disorders, focusing on temporomandibular disorders (TMD) and cervical spine dysfunctions (CSD). It seeks to identify underlying mechanisms, evaluate therapeutic interventions, and propose directions for future research. *Materials and Methods*. The systematic review adhered to PRISMA guidelines and searched PubMed, Scopus, and Web of Science for studies using the keywords "TINNITUS" and "TMJ." Publications between October 2014 and October 2024 were considered. Eligible studies included human participants, open-access articles in English, and adult populations. Exclusion criteria encompassed case reports, animal or in vitro studies, pediatric research, and unrelated reviews. The screening process involved duplicate removal, title and abstract evaluation, and full-text analysis, culminating in selecting 26 articles for qualitative synthesis. Discrepancies during selection were resolved by consensus from the reviewer. Conclusions. This review highlights the**

Authors

Andrea Palermo - Department of Medicine, University of Salento, Lecce, Italy
Gerardo Cazzato - Roberta Sardano - Laura Ferrante - Francesco Sabatelli - Department of Interdisciplinary Medicine, University of Bari "Aldo Moro" Bari, Italy
Ioana Roxana Bordea - Department of Oral Rehabilitation, Faculty of Dentistry, Iuliu Hațieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania
Gustavo Vincentis Oliveira Fernandes - Missouri School of Dentistry & Oral Health, A. T. Still University, St. Louis, MO, United States
Ahmed Abdelwahed Shaaban - Prosthodontics Faculty of Oral and Dental Medicine, Future University, New Cairo, Egypt
Edit Xajanka - Department of Dental Medicine, Medical University of Tirana, Rruga E Dibres, Albania
Lwai Almasri - King's College London, U.K
Marwa Alkassab - Maher Almasri - The University of Buckingham, U.K.
Islam Amer - Faculty of Medicine, Sohag University, Sohag, Egypt
Francesco Sampalmieri - D.I.S.C.O. School of Dentistry, Polytechnic University of Marche, Ancona, Italy
Fabrizio Bambini - D.I.S.C.O. School of Dentistry, Polytechnic University of Marche, Ancona, Italy
Lucia Memè - Dipartimento di Scienze della Vita, della Salute e delle Professioni Sanitarie, Perugia, Italy

How to Cite
A. Palermo, G. Cazzato,, R. Sardano, L. Ferrante, F. Sabatelli,I.R. Bordea, G.V.O.Fernandes, A.A.Shaaban, E. Xhajanka, L. Almasri, M. Alkassab, I.Amer, M. Almasri, F. Sampalmieri, F. Bambini1, L. Memè. Exploring the relationship between tinnitus and somatosensory disorders.
Oral and Implantology
Vol. 16 No. 3 (S1) (2024), 522-536.
https://doi.org/10.11138/oi.v16i3 (S1).101

interconnectedness of tinnitus with TMD and CSD, emphasizing the role of somatosensory-auditory pathways. While therapeutic approaches, such as manual therapy and mandibular exercises, demonstrate potential in mitigating tinnitus symptoms, significant variability in patient outcomes underscores the need for personalized treatment. Methodological issues, including small sample sizes, heterogeneity in diagnostic protocols, and cross-sectional designs, limit the generalizability of findings. Moving forward, large-scale, longitudinal studies with multidisciplinary collaboration are essential to refine diagnostic criteria, elucidate causal mechanisms, and enhance treatment efficacy for individuals with tinnitus and associated somatosensory disorders.

Keywords: Tinnitus, Temporomandibular Disorders (TMD), Cervical Spine Dysfunctions (CSD), Somatosensory-Auditory Interaction, Neuroplasticity, Temporomandibular Joint (TMJ), Pain Management, Multidisciplinary Therapy, Manual Therapy, Pathophysiological Mechanismss

Introduction

Tinnitus, commonly called the perception of sound without an external auditory stimulus, is a complex and often debilitating condition affecting a significant portion of the adult population worldwide. It is characterized by the sensation of hearing sounds, such as ringing, buzzing, or hissing, without any corresponding external noise (1–17). These sounds can range from a mild background noise to a loud, constant disturbance, varying significantly in intensity and frequency. For many individuals, tinnitus is a persistent condition that can fluctuate over time, often becoming more pronounced in quiet environments or during moments of stress. The perception of these phantom sounds can profoundly impact an individual's quality of life, leading to difficulties in concentration, sleep disturbances, and emotional distress. Epidemiological studies indicate that its prevalence in the general adult population ranges between 10% and 15%, with an even higher incidence up to 18%in individuals over 60 (18–25).This prevalence underscores its importance as a public health issue, particularly in aging societies where the burden of tinnitus is expected to increase. Tinnitus is broadly classified into two distinct categories: objective and subjective(26–33). Objective tinnitus, a rare subtype, is audible to an external observer using specialized equipment and is often associated with vascular or muscular anomalies (3,34–40). In contrast, subjective tinnitus, the more common form, is perceptible only to the affected individual and is frequently linked to neuroplastic alterations in the central auditory system (6–8,10,41–53). These changes are thought to arise as a compensatory mechanism following damage to the peripheral auditory system, such as noise exposure, ototoxic medications, or age-related hearing loss (54–65). One intriguing feature of subjective tinnitus is its modulation by somatosensory inputs (66–77). Patients often report changes in tinnitus intensity or pitch during neck, head, or jaw (78–83)movements. This phenomenon has increased interest in the potential relationship between tinnitus and somatosensory disorders, such as temporomandibular disorders (TMD) and cervical spine dysfunctions (CSD) (84–94). TMD involves disorders of the jaw joint and associated musculature, and CSD encompasses issues with the cervical spine, sharing complex neural pathways with auditory systems [284–296]. This anatomical and functional overlap suggests that dysfunctions in these regions may influence tinnitus perception or contribute to its onset. Despite the growing body of research exploring the interplay between tinnitus and somatosensory systems, the evidence remains inconsistent (108–114). Some studies highlight a clear association, suggesting that TMD or CSD treatment can alleviate tinnitus symptoms in certain cases (115–118). Others fail to establish a significant link, reflecting the heterogeneity of tinnitus etiology and the multifactorial nature of TMD and CSD. Consequently, these interactions' mechanisms are poorly understood, and their clinical implications remain uncertain (119–126). Given the complexity of tinnitus and its potential somatosensory connections, this systematic review seeks to comprehensively evaluate the current evidence regarding the bidirectional relationship between subjective tinnitus and symptoms of TMD and CSD (127,128). The research on the "Bidirectional Relationship Between Tinnitus and Somatosensory Disorders" was undertaken for several reasons, responding to the growing evidence of a connection between these two phenomena, previously studied separately (9,11,13,15–17,129–133). Connection Between Auditory and Somatosensory Systems: Previous studies have suggested that tinnitus is not only an auditory condition but can also be influenced by somatosensory inputs, such as those from the jaw (associated with TMD) and the neck (CSD). The research explored in depth how mechanical or postural stimulation might interact with tinnitus perception and whether these somatosensory disorders play a role in initiating or exacerbating tinnitus symptoms. Improving Therapeutic Options: Another key reason for this research is the potential to develop more targeted and multidisciplinary treatments for tinnitus (134–138). Observations that certain treatments for temporomandibular disorders (such as manual therapy or mandibular exercises) appear to alleviate tinnitus symptoms have prompted researchers to examine how combined therapeutic approaches could be more effective. Treating auditory and somatosensory aspects may lead to better clinical outcomes. Variability in Clinical Outcomes: Despite the clear link between tinnitus and somatosensory disorders, patient responses to treatments vary significantly. Research is essential to identify the underlying pathophysiological mechanisms of these interactions and how they can be addressed personalized, improving the effectiveness of treatments (121,139–143). Need for a Better Understanding of Underlying Mechanisms: There are still significant gaps in understanding the neurophysiological mechanisms behind tinnitus, particularly regarding the role of neuroplastic changes

and central sensitization (144–153). Research into the bidirectional relationship between tinnitus and somatosensory disorders could provide crucial insights into how sound perception is influenced by physical factors such as postural alignment or muscle tension.By synthesizing existing research, identifying gaps in knowledge, and highlighting methodological limitations, the review aims to clarify the nature of these associations. Furthermore, it proposes future research directions to enhance understanding and improve clinical management strategies for individuals affected by this challenging condition (154–160)..

Materials and Methods

The literature search encompassed three significant databases: PubMed, Scopus, and Web of Science, using the keywords “TINNITUS” and “TMJ” to identify relevant studies published between October 2014 and October 2024. Specific inclusion and exclusion criteria were applied to ensure a focused and high-quality analysis. The review included studies conducted on human participants, written in English, openly accessible, and focusing on adult populations. On the other hand, case reports, animal or in vitro studies, reviews, articles unrelated to the topic, and studies involving pediatric populations were excluded from consideration. The data processing stage began with the identification of articles. The predetermined criteria guided the selection process, and disagreements were resolved through discussion among the reviewers. This rigorous approach ensured the inclusion of studies most relevant to the research question.

Discussion

Several studies have highlighted the association between TMD and otologic symptoms, including tinnitus (161–166). Research indicates that individuals with TMD often experience tinnitus at higher rates than the general population (140,143,167–170). Tinnitus severity has also been linked to the presence of bruxism, stress, and psychological discomfort, suggesting a multifactorial nature of the relationship (56,171–179). Painful TMD conditions, in particular, are strongly associated with tinnitus symptoms, and there is evidence that addressing TMD-related pain may alleviate tinnitus (28,180–185). Dysfunction of the masticatory muscles, anatomical abnormalities, and alterations in the temporomandibular joint (TMJ) structures are proposed as contributing factors (92,186–190). Structural changes, such as those involving the petrotympanic fissure, may predispose individuals with TMD to tinnitus by altering auditory pathways or introducing somatosensory inputs that interact with auditory processing (29,84,84,184,191,192). These findings underline the importance of further exploring the anatomical and physiological links between TMD and tinnitus (87,193–201).

Therapeutic Approaches

Interventions targeting TMD symptoms have Interventions targeting TMD symptoms have demonstrated promising outcomes for managing tinnitus, particularly in cases with a somatosensory component (202–208). Manual therapy, mandibular exercises, and functional education programs have been shown to improve both pain and tinnitus-related distress (209–213). Additionally, the initial severity of tinnitus has been identified as a significant predictor of treatment outcomes, emphasizing the need for personalized and multidisciplinary treatment plans (214–220). Comparisons of different therapeutic strategies reveal that combined approaches, such as manual therapy integrated with patient education, yield better outcomes in reducing pain and tinnitus intensity (221–225, 328,329). After these treatments, improvements in the mandibular range of motion and quality of life further support their effectiveness (226,227). However, these findings also highlight the variability in patient responses, necessitating further research to optimize intervention protocols (228–236).

Pathophysiological Mechanisms and Multidisciplinary Approaches

The mechanisms underlying the relationship between TMD and tinnitus remain complex and multifaceted (237–244). Neuroplastic changes, somatosensory-auditory interactions, and anatomical factors are all implicated (245–251). For instance, the position of the mandibular condyle and its proximity to auditory structures may influence the perception of tinnitus [274–283]. Additionally, the role of central sensitization and the modulation of auditory signals by somatosensory inputs are key areas of interest (263–271). Evidence supports the integration of dental, physiotherapeutic, and psychological interventions in managing tinnitus with somatic components (252,272–282). Multidisciplinary approaches have been found to improve outcomes by addressing the interconnected nature of somatosensory and auditory dysfunctions (3,4,27,283–290). These strategies are particularly beneficial in cases where tinnitus perception is modulated by head or jaw movements (34,54,54,291–298).

Study Limitations and Future Directions

Despite significant progress, many studies in this field are limited by small sample sizes, lack of control groups, and cross-sectional designs, which restrict the ability to assess symptom progression over time (35,95,247,299–306). Additionally, heterogeneity in diagnostic criteria and the absence of standardized audiometric assessments complicate the comparison of findings across studies (306–310). Future research should address these limitations by employing larger, longitudinal studies with uniform diagnostic protocols (50,311–316). Exploring the effects of targeted interventions on TMD and tinnitus symptoms could provide valuable insights into causal relationships and effective treatments (317). Collaborative efforts between audiologists, dentists, and physiotherapists will also be essential to develop comprehensive management strategies (95,318–327).

Conclusions

This narrative review explores the bidirectional

relationship between tinnitus and somatosensory disorders, particularly TMD and CSD. The findings emphasize the significant role of shared neural pathways and somatosensory-auditory interactions in modulating tinnitus perception. Tinnitus is often influenced by somatosensory inputs, such as jaw or neck movements, which underscores its association with TMD and CSD. Therapeutic interventions for TMD, including manual therapy, mandibular exercises, and functional education programs, show promise in alleviating tinnitus symptoms, particularly in cases with a somatosensory component. These treatments reduce pain, improve mandibular range of motion, and enhance the overall quality of life. Personalized and multidisciplinary approaches that integrate dental, physiotherapeutic, and psychological care are particularly effective in addressing the multifaceted nature of tinnitus. However, variability in patient responses highlights the need for individualized treatment plans.

Despite these promising insights, the current body of research is limited by several methodological challenges. Small sample sizes, the absence of control groups, and heterogeneity in diagnostic criteria hinder the generalizability of findings. The lack of standardized audiometric assessments further complicates comparisons across studies. Future research should prioritize more extensive, longitudinal studies with uniform diagnostic protocols to clarify causal mechanisms and refine therapeutic approaches. Exploring the role of neuroplastic changes, central sensitization, and anatomical factors, such as mandibular joint proximity to auditory structures, will enhance understanding.

Additionally, investigating the effects of combined interventions, such as manual therapy and psychological support, could improve clinical outcomes. Collaborative efforts among audiologists, physiotherapists, dentists, and psychologists are essential for developing comprehensive management strategies. By addressing these research gaps, the field can progress toward more effective diagnostic tools and personalized treatment protocols, ultimately improving the quality of life for individuals affected by tinnitus and associated somatosensory disorders.

Abbreviations:

Cervical spine dysfunctions (CSD)
Temporomandibular disorders (TMD)
Temporomandibular Joint (TMJ)

Funding

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

Authors declare no conflict of interest.

References

1. Carnevalli ACR, Dias da Silva SMS, da Silva Leite LS, de Moura VT, Kitakawa D, da Silva Peralta F, et al. A Clinical Appearance of Traumatic Fibroma with a Distinct and Rare Histological Diagnosis –insights of Pseudo Perineurioma – Case Report. [cited 2025 Jan 7]; Available from: https://opendentistryjournal.com/VOLUME/18/ELOCATOR/e18742106284558/
2. Inchingolo F, Tatullo M, Abenavoli FM, Marrelli M, Inchingolo AD, Servili A, et al. A hypothetical correlation between hyaluronic acid gel and development of cutaneous metaplastic synovial cyst. Head Face Med. 2010 Jul 15;6:13.
3. Arezzo F, Cormio G, La Forgia D, Santarsiero CM, Mongelli M, Lombardi C, et al. A machine learning approach applied to gynecological ultrasound to predict progression-free survival in ovarian cancer patients. Arch Gynecol Obstet. 2022 Dec;306(6):2143–54.
4. Romasco T, Tumedei M, Inchingolo F, Pignatelli P, Montesani L, Iezzi G, et al. A Narrative Review on the Effectiveness of Bone Regeneration Procedures with OsteoBiol® Collagenated Porcine Grafts: The Translational Research Experience over 20 Years. J Funct Biomater. 2022 Sep;13(3):121.
5. A Novel Design for Full-coverage Crown to Assist for Future Endodontic Treatment: A Survey on Difficulties of Access Cavity through Crowns and Pilot In-vitro Study Testing the New Design [Internet]. [cited 2025 Jan 7]. Available from: https://opendentistryjournal.com/VOLUME/18/ELOCATOR/e18742106288080/FULLTEXT/
6. Pisacane A, Cascardi E, Berrino E, Polidori A, Sarotto I, Casorzo L, et al. Real-world histopathological approach to malignancy of undefined primary origin (MUO) to diagnose cancers of unknown primary (CUPs). Virchows Arch Int J Pathol. 2023 Mar;482(3):463–75.
7. Dellino M, Vimercati A, D'Amato A, Damiani GR, Laganà AS, Cicinelli E, et al. "GONE WITH THE WIND": The Transitory Effects of COVID-19 on the Gynecological System. J Pers Med. 2023 Feb;13(2):312.
8. Cazzato G, Colagrande A, Ingravallo G, Lettini T, Filoni A, Ambrogio F, et al. PRAME Immuno-Expression in Cutaneous Sebaceous Carcinoma: A Single Institutional Experience. J Clin Med. 2022 Jan;11(23):6936.
9. Communications Is Time for Care: An Italian Monocentric Survey on Human Papillomavirus (HPV) Risk Information as Part of Cervical Cancer Screening [Internet]. [cited 2025 Jan 9]. Available from: https://www.mdpi.com/2075-4426/12/9/1387
10. SARS-CoV-2 and Skin: New Insights and Perspectives [Internet]. [cited 2025 Jan 9]. Available from: https://www.mdpi.com/2218-273X/12/9/1212
11. Dioguardi M, Spirito F, Caloro GA, Lo Muzio L, Cantore S, Ballini A, et al. Is the Non-Coding RNA miR-195 a Biodynamic Marker in the Pathogenesis of Head and Neck Squamous Cell Carcinoma? A Prognostic Meta-Analysis. J Pers Med. 2023 Jan 31;13(2):275.
12. The Thousand Faces of Malignant Melanoma: A Systematic Review of the Primary Malignant Melanoma of the Esophagus [Internet]. [cited 2025 Jan 9]. Available from: https://www.mdpi.com/2072-6694/14/15/3725
13. Spontaneous Uterine Rupture and Adenomyosis, a Rare

com/2075-4418/12/7/1574
14. Loizzi V, Dellino M, Cerbone M, Arezzo F, Chiariello G, Lepera A, et al. Hormone replacement therapy in BRCA mutation carriers: how shall we do no harm? Horm Athens Greece. 2023 Mar;22(1):19–23.
15. Malvasi A, Cicinelli E, Baldini GM, Vimercati A, Beck R, Dellino M, et al. Prolonged Dystocic Labor in Neuraxial Analgesia and the Role of Enkephalin Neurotransmitters: An Experimental Study. Int J Mol Sci. 2023 Feb 13;24(4):3767.
16. Vimercati A, Santarsiero CM, Esposito A, Putino C, Malvasi A, Damiani GR, et al. An Extremely Rare Case of Disseminated Peritoneal Leiomyomatosis with a Pelvic Leiomyosarcoma and Omental Metastasis after Laparoscopic Morcellation: Systematic Review of the Literature. Diagnostics. 2022 Dec 19;12(12):3219.
17. T Cell Immunoglobulin and Mucin Domain 3 (TIM-3) in Cutaneous Melanoma: A Narrative Review [Internet]. [cited 2025 Jan 9]. Available from: https://www.mdpi.com/2072-6694/15/6/1697
18. Ajwa N. Orthodontists' Knowledge and Perception of the Prolonged Use of Rapid Palatal Expanders (RPEs) in the Saudi Arabian Population: A Cross-Sectional Study. Cureus. 2024 Oct;16(10):e71207.
19. Bud ES, Bică CI, Păcurar M, Vaida P, Vlasa A, Martha K, et al. Observational Study Regarding Possible Side Effects of Miniscrew-Assisted Rapid Palatal Expander (MARPE) with or without the Use of Corticopuncture Therapy. Biology. 2021 Mar 3;10(3).
20. Akan B, Gökçe G, Şahan AO, Veli İ. Tooth-borne versus tooth-bone-borne rapid maxillary expanders according to a stereophotogrammetric evaluation of facial soft tissues: A randomized clinical trial. Orthod Craniofac Res. 2021 Aug;24(3):438–48.
21. Barone S, Bennardo F, Diodati F, Salviati M, Calabria E, Colangeli W, et al. Short- and Long-Term Effects of Maxillary Expander with Tongue Crib in Growing Open-Bite and Skeletal Class II Patients: A Retrospective Study. Dent J. 2024 Jan 24;12(2).
22. Dalessandri D, Tonni I, Dianiskova S, Migliorati M, Bonetti S, Visconti L, et al. Rapid palatal expander vs. quad-helix in the orthodontic treatment of cleft lip and palate patients. Minerva Stomatol. 2016 Apr;65(2):97–103.
23. Bistaffa AGI, Belomo-Yamaguchi L, Almeida MR de, Conti AC de CF, Oltramari PVP, Fernandes TMF. Immediate skeletal effects of rapid maxillary expansion at midpalatal suture opening with Differential, Hyrax and Haas expanders. Dent Press J Orthod. 2023;27(6):e2220525.
24. Cantarella D, Savio G, Grigolato L, Zanata P, Berveglieri C, Lo Giudice A, et al. A New Methodology for the Digital Planning of Micro-Implant-Supported Maxillary Skeletal Expansion. Med Devices Auckl NZ. 2020;13:93–106.
25. Chang JY, McNamara JAJ, Herberger TA. A longitudinal study of skeletal side effects induced by rapid maxillary expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 1997 Sep;112(3):330–7.
26. Cozzani M, Antonini S, Lupini D, Decesari D, Anelli F, Doldo T. A New Proposal: a Digital Flow for the Construction of a Haas-Inspired Rapid Maxillary Expander (HIRME). Mater Basel Switz. 2020 Jun 28;13(13).
27. Bud E, Vlasa A, Pacurar M, Matei A, Bud A, Szoke AR, et al. A Retrospective Histological Study on Palatal and Gingival Mucosa Changes during a Rapid Palatal Expansion Procedure. Biomedicines. 2023 Dec 7;11(12).
28. Alkhayer A, Becsei R, Hegedűs L, Párkányi L, Piffkó J, Braunitzer G, et al. Evaluation of the Soft Tissue Changes after Rapid Maxillary Expansion Using a Handheld Three-Dimensional Scanner: A Prospective Study. Int J Environ Res Public Health. 2021 Mar 24;18(7).
29. Garib DG, Henriques JFC, Janson G, de Freitas MR, Fernandes AY. Periodontal effects of rapid maxillary expansion with tooth-tissue-borne and tooth-borne expanders: a computed tomography evaluation. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2006 Jun;129(6):749–58.
30. Porseo M, Monaco B, Festa F, Fiorillo G. A Vestibular Rapid Palatal Expander. J Clin Orthod JCO. 2016 Feb;50(2):110–7.
31. Pary A, Cal-Neto JP. A simple method to treat asymmetric expansions in three-segment surgically assisted rapid maxillary expansion. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2013 Dec;71(12):2130–6.
32. Sfondrini MF, Cacciafesta V, Lena A. Accidental ingestion of a rapid palatal expander. J Clin Orthod JCO. 2003 Apr;37(4):201–2; quiz 203.
33. Türker G, Çoban G, Bayraktar AÜ, Kurt G, Kılıç E, Alkan A. Three-dimensional palatal morphology and upper arch changes following nonsurgical and surgical maxillary expansion in adults. Oral Surg Oral Med Oral Pathol Oral Radiol. 2022 Oct;134(4):425–31.
34. Arrigoni R, Ballini A, Santacroce L, Cantore S, Inchingolo A, Inchingolo F, et al. Another Look at Dietary Polyphenols: Challenges in Cancer Prevention and Treatment. Curr Med Chem. 2022;29(6):1061–82.
35. Ballini A, Cantore S, Fotopoulou EA, Georgakopoulos IP, Athanasiou E, Bellos D, et al. Combined sea salt-based oral rinse with xylitol in orthodontic patients: clinical and microbiological study. J Biol Regul Homeost Agents. 2019 Feb;33(1):263–8.
36. Arezzo F, Loizzi V, La Forgia D, Moschetta M, Tagliafico AS, Cataldo V, et al. Radiomics Analysis in Ovarian Cancer: A Narrative Review. Appl Sci. 2021 Jan;11(17):7833.
37. Abreu RR, Rocha RL, Lamounier JA, Guerra AFM. Etiology, clinical manifestations and concurrent findings in mouth-breathing children. J Pediatr (Rio J). 2008;84(6):529–35.
38. Alfieri V, Myasoedova VA, Vinci MC, Rondinelli M, Songia P, Massaiu I, et al. The Role of Glycemic Variability in Cardiovascular Disorders. Int J Mol Sci. 2021 Aug 4;22(16):8393.
39. Alzahabi R, Becker MW. The association between media multitasking, task-switching, and dual-task performance. J Exp Psychol Hum Percept Perform. 2013 Oct;39(5):1485–95.
40. Avvanzo P, Ciavarella D, Avvanzo A, Giannone N, Carella M, Lo Muzio L. Immediate placement and temporization of implants: three- to five-year retrospective results. J Oral Implantol. 2009;35(3):136–42.
41. Abdelsalam R, Nucci L, Carrino R, Shahen S, Abdelaziz F, Fahim F, et al. Comparison of palatal volume and surface changes between bone-borne and tooth-tissue-borne maxillary expansion on cone beam computed tomography digital cast models. Angle Orthod. 2023 Jan 31;93(3):282–8.
42. Diab AMI, Mohammed BBH, Ghoneim MM, Ali MAM, Özdemir S, Shendy MAM, et al. Effect of Slow Maxillary Expansion and Alternative Rapid Maxillary Expansion Protocols on Airway Volume in Cleft Palate Cases: A Cone Beam Computed Tomography Based Study. Cureus. 2024 May;16(5):e59534.
43. Arveda N, Colonna A, Palone M, Lombardo L. Aligner hybrid orthodontic approach to treat severe transverse divergence in an adolescent girl: A case report. Int Orthod. 2022 Dec;20(4):100686.
44. Bruni A, Ferrillo M, Gallo V, Parrini S, Garino F, Castroflorio T, et al. Efficacy of clear aligners vs rapid

palatal expanders on palatal volume and surface area in mixed dentition patients: A randomized controlled trial. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2024 Sep;166(3):203–14.
45. Conroy-Piskai C, Galang-Boquiren MTS, Obrez A, Viana MGC, Oppermann N, Sanchez F, et al. Assessment of vertical changes during maxillary expansion using quad helix or bonded rapid maxillary expander. Angle Orthod. 2016 Nov;86(6):925–33.
46. Abedini S, Elkenawy I, Kim E, Moon W. Three-dimensional soft tissue analysis of the face following micro-implant-supported maxillary skeletal expansion. Prog Orthod. 2018 Nov 19;19(1):46.
47. Alwadei SH, Almotiry K, AlMawash A, Alwadei FH, Alwadei AH. Parental Satisfaction with Their Children's Rapid Palatal Expansion Treatment Provided by Orthodontists and Pediatric Dentists. Patient Prefer Adherence. 2021;15:251–8.
48. Kim KA, Oh SH, Kim BH, Kim SJ. Asymmetric nasomaxillary expansion induced by tooth-bone-borne expander producing differential craniofacial changes. Orthod Craniofac Res. 2019 Nov;22(4):296–303.
49. Lin JH, Li C, Wong H, Chamberland S, Le AD, Chung CH. Asymmetric Maxillary Expansion Introduced by Surgically Assisted Rapid Palatal Expansion: A Systematic Review. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2022 Dec;80(12):1902–11.
50. Cazzato G, Massaro A, Colagrande A, Lettini T, Cicco S, Parente P, et al. Dermatopathology of Malignant Melanoma in the Era of Artificial Intelligence: A Single Institutional Experience. Diagnostics. 2022 Aug 15;12(8):1972.
51. Limongelli L, Cascardi E, Capodiferro S, Favia G, Corsalini M, Tempesta A, et al. Multifocal Amelanotic Melanoma of the Hard Palate: A Challenging Case. Diagn Basel Switz. 2020 Jun 22;10(6):424.
52. Loizzi V, Dellino M, Cerbone M, Arezzo F, Cazzato G, Damiani GR, et al. The Role of Hormonal Replacement Therapy in BRCA Mutated Patients: Lights and Shadows. Int J Mol Sci. 2023 Jan 1;24(1):764.
53. Pugliese D, Melfa F, Guarino E, Cascardi E, Maggi M, Ferrari E, et al. Histopathological Features of Tissue Alterations Induced by Cryolipolysis on Human Adipose Tissue. Aesthet Surg J. 2020 Jun 15;40(7):761–6.
54. Ouldyerou A, Ngan P, Alsharif K, Merdji A, Mukdadi OM. Biomechanical performance of ATOZ expander: Finite-element analysis. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2024 Dec 14;S0889-5406(24)00481-5.
55. Wysocki M, Kobus K, Szotek S, Kobielarz M, Kuropka P, Będziński R. Biomechanical effect of rapid mucoperiosteal palatal tissue expansion with the use of osmotic expanders. J Biomech. 2011 Apr 29;44(7):1313–20.
56. Kenworthy CR, Sheats RD. A bonded functional ramp to aid in asymmetric expansion of unilateral posterior crossbites. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2001 Mar;119(3):320–2.
57. Lione R, Huanca Ghislanzoni LT, Defraia E, Franchi L, Cozza P. Bonded versus banded rapid palatal expander followed by facial mask therapy: analysis on digital dental casts. Eur J Orthod. 2016 Apr;38(2):217–22.
58. Sitzia E, Santarsiero S, Tucci FM, De Vincentiis G, Galeotti A, Festa P. Balloon dilation and rapid maxillary expansion: a novel combination treatment for congenital nasal pyriform aperture stenosis in an infant. Ital J Pediatr. 2021 Sep 16;47(1):189.
59. Lemos Rinaldi MR, Azeredo F, Martinelli de Lima E, Deon Rizzatto SM, Sameshima G, Macedo de Menezes L. Cone-beam computed tomography evaluation of bone plate and root length after maxillary expansion using tooth-borne and tooth-tissue-borne banded expanders. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2018 Oct;154(4):504–16.
60. Maschio M, Gaffuri F, Ugolini A, Lanteri V, Abate A, Caprioglio A. Buccal Alveolar Bone changes and upper first molar displacement after maxillary expansion with RME, Ni-Ti leaf springs expander and Tooth- Bone-borne Expander. A CBCT based analysis. Eur J Paediatr Dent. 2023 Sep 1;24(3):211–5.
61. Sperl A, Gaalaas L, Beyer J, Grünheid T. Buccal alveolar bone changes following rapid maxillary expansion and fixed appliance therapy. Angle Orthod. 2021 Mar 1;91(2):171–7.
62. Luzi C, Szabò E, Carletti P. CAD/CAM sheath for attaching a cantilever spring to a metal-printed rapid palatal expander. J Clin Orthod JCO. 2023 Feb;57(2):119–20.
63. Wang C, Xiang X, Mao Q, Liu C. CAD/CAM design and 3D printing of a personalised rapid palatal expander for maxillary transverse deficiency. JPMA J Pak Med Assoc. 2024 Jan;74(1):153–7.
64. Seo YJ, Chung KR, Kim SH, Nelson G. Camouflage treatment of skeletal class III malocclusion with asymmetry using a bone-borne rapid maxillary expander. Angle Orthod. 2015 Mar;85(2):322–34.
65. Amm EW, Antoszewska-Smith J, Boley J. Canine substitution of congenitally missing maxillary lateral incisors in Class I and Class III malocclusions by using skeletal anchorage. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2019 Oct;156(4):512-521.e6.
66. Kanomi R, Deguchi T, Kakuno E, Takano-Yamamoto T, Roberts WE. CBCT of skeletal changes following rapid maxillary expansion to increase arch-length with a development-dependent bonded or banded appliance. Angle Orthod. 2013 Sep;83(5):851–7.
67. Pangrazio-Kulbersh V, Jezdimir B, de Deus Haughey M, Kulbersh R, Wine P, Kaczynski R. CBCT assessment of alveolar buccal bone level after RME. Angle Orthod. 2013 Jan;83(1):110–6.
68. Cerruto C, Ugolini A, Di Vece L, Doldo T, Caprioglio A, Silvestrini-Biavati A. Cephalometric and dental arch changes to Haas-type rapid maxillary expander anchored to deciduous vs permanent molars: a multicenter, randomized controlled trial. J Orofac Orthop Fortschritte Kieferorthopadie Organofficial J Dtsch Ges Kieferorthopadie. 2017 Sep;78(5):385–93.
69. Gregório L, de Medeiros Alves AC, de Almeida AM, Naveda R, Janson G, Garib D. Cephalometric evaluation of rapid and slow maxillary expansion in patients with BCLP: Secondary data analysis from a randomized clinical trial. Angle Orthod. 2019 Jul;89(4):583–9.
70. Tepedino M, Esposito R, Montaruli G, Monaco A, Chimenti C, Ciavarella D. Changes in hyoid bone and tongue position in Class I subjects after orthodontic treatment with rapid palatal expander. Cranio J Craniomandib Pract. 2022 Sep 13;1–10.
71. Liu P, Jiao D, Wang X, Liu J, Martin D, Guo J. Changes in maxillary width and upper airway spaces in young adults after surgically assisted rapid palatal expansion with surgically facilitated orthodontic therapy. Oral Surg Oral Med Oral Pathol Oral Radiol. 2019 May;127(5):381–6.
72. Echarri-Nicolás J, González-Olmo MJ, Echarri-Labiondo P, Romero M. Changes in Molar Tipping and Surrounding Alveolar Bone with Different Designs of Skeletal Maxillary

Expanders. Biomedicines. 2023 Aug 25;11(9).
73. McNamara JAJ, Sigler LM, Franchi L, Guest SS, Baccetti T. Changes in occlusal relationships in mixed dentition patients treated with rapid maxillary expansion. A prospective clinical study. Angle Orthod. 2010 Mar;80(2):230–8.
74. Gul Amuk N, Kurt G, Baysal A, Turker G. Changes in pharyngeal airway dimensions following incremental and maximum bite advancement during Herbst-rapid palatal expander appliance therapy in late adolescent and young adult patients: a randomized non-controlled prospective clinical study. Eur J Orthod. 2019 May 24;41(3):322–30.
75. Baratieri C, Alves MJ, Mattos CT, Souza MMG de, Ruellas AC de O. Changes of pulp-chamber dimensions 1 year after rapid maxillary expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2013 Apr;143(4):471–8.
76. Lombardo L, Carlucci A, Maino BG, Colonna A, Paoletto E, Siciliani G. Class III malocclusion and bilateral cross-bite in an adult patient treated with miniscrew-assisted rapid palatal expander and aligners. Angle Orthod. 2018 Sep;88(5):649–64.
77. Buschang PH, Carrillo R, Rossouw PE. Orthopedic correction of growing hyperdivergent, retrognathic patients with miniscrew implants. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2011 Mar;69(3):754–62.
78. Küçükönder A, Hatipoğlu Ö. Comparison between a glass ionomer cement and a compomer concerning bonded acrylic expander retention and white spot formation : A randomized clinical trial. J Orofac Orthop Fortschritte Kieferorthopadie Organofficial J Dtsch Ges Kieferorthopadie. 2023 May;84(3):157–63.
79. Nieri M, Paoloni V, Lione R, Barone V, Marino Merlo M, Giuntini V, et al. Comparison between two screws for maxillary expansion: a multicenter randomized controlled trial on patient's reported outcome measures. Eur J Orthod. 2021 Jun 8;43(3):293–300.
80. Mummolo S, Marchetti E, Albani F, Campanella V, Pugliese F, Di Martino S, et al. Comparison between rapid and slow palatal expansion: evaluation of selected periodontal indices. Head Face Med. 2014 Aug 15;10:30.
81. Comparison between CBCT superimposition protocol and S.T.A.P. method to evaluate the accuracy in implant insertion in guided surgery | Request PDF. ResearchGate [Internet]. 2024 Oct 22 [cited 2024 Dec 28]; Available from: https://www.researchgate.net/publication/351252986_Comparison_between_CBCT_superimposition_protocol_and_STAP_method_to_evaluate_the_accuracy_in_implant_insertion_in_guided_surgery
82. Stakenborg N, Gomez-Pinilla PJ, Verlinden TJM, Wolthuis AM, D'Hoore A, Farré R, et al. Comparison between the cervical and abdominal vagus nerves in mice, pigs, and humans. Neurogastroenterol Motil [Internet]. 2020 Sep [cited 2024 Nov 27];32(9):e13889. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7507132/
83. Lanteri V, Cossellu G, Gianolio A, Beretta M, Lanteri C, Cherchi C, et al. Comparison between RME, SME and Leaf Expander in growing patients: a retrospective postero-anterior cephalometric study. Eur J Paediatr Dent. 2018 Sep;19(3):199–204.
84. Annarumma F, Posadino M, De Mari A, Drago S, Aghazada H, Gravina GM, et al. Skeletal and dental changes after maxillary expansion with a bone-borne appliance in young and late adolescent patients. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2021 Apr;159(4):e363–75.
85. D'Souza IM, Kumar HCK, Shetty KS. Dental arch changes associated with rapid maxillary expansion: A retrospective model analysis study. Contemp Clin Dent. 2015 Mar;6(1):51–7.
86. Seker ED, Yagci A, Kurt Demirsoy K. Dental root development associated with treatments by rapid maxillary expansion/reverse headgear and slow maxillary expansion. Eur J Orthod. 2019 Sep 21;41(5):544–50.
87. Chung CH, Goldman AM. Dental tipping and rotation immediately after surgically assisted rapid palatal expansion. Eur J Orthod. 2003 Aug;25(4):353–8.
88. Carter A, Mohamed A. Dento-skeletal effects of different rapid maxillary expanders for growing patients-which is better? Evid Based Dent. 2023 Sep;24(3):104–5.
89. Babacan H. Diversified rapid maxillary expander or utility maxillary expander? Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2015 Oct;148(4):529.
90. McMullen C, Al Turkestani NN, Ruellas ACO, Massaro C, Rego MVNN, Yatabe MS, et al. Three-dimensional evaluation of skeletal and dental effects of treatment with maxillary skeletal expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2022 May;161(5):666–78.
91. Hsu LF, Moon W, Chen SC, Chang KWC. Digital workflow for mini-implant-assisted rapid palatal expander fabrication-a case report. BMC Oral Health. 2023 Nov 20;23(1):887.
92. Hartono N, Soegiharto BM, Widayati R. The difference of stress distribution of maxillary expansion using rapid maxillary expander (RME) and maxillary skeletal expander (MSE)-a finite element analysis. Prog Orthod. 2018 Oct 3;19(1):33.
93. Cantarella D, Karanxha L, Zanata P, Moschik C, Torres A, Savio G, et al. Digital Planning and Manufacturing of Maxillary Skeletal Expander for Patients with Thin Palatal Bone. Med Devices Auckl NZ. 2021;14:299–311.
94. de Melo M de FB, Melo SLS, Zanet TG, Fenyo-Pereira M. Digital radiographic evaluation of the midpalatal suture in patients submitted to rapid maxillary expansion. Indian J Dent Res Off Publ Indian Soc Dent Res. 2013 Feb;24(1):76–80.
95. Ballini A, Cantore S, Signorini L, Saini R, Scacco S, Gnoni A, et al. Efficacy of Sea Salt-Based Mouthwash and Xylitol in Improving Oral Hygiene among Adolescent Population: A Pilot Study. Int J Environ Res Public Health. 2020 Dec 23;18(1):44.
96. Contaldo M, Itro A, Lajolo C, Gioco G, Inchingolo F, Serpico R. Overview on Osteoporosis, Periodontitis and Oral Dysbiosis: The Emerging Role of Oral Microbiota. Appl Sci. 2020 Jan;10(17):6000.
97. Inchingolo F, Cantore S, Dipalma G, Georgakopoulos I, Almasri M, Gheno E, et al. Platelet rich fibrin in the management of medication-related osteonecrosis of the jaw: a clinical and histopathological evaluation. J Biol Regul Homeost Agents. 2017;31(3):811–6.
98. Inchingolo AM, Malcangi G, Inchingolo AD, Mancini A, Palmieri G, Di Pede C, et al. Potential of Graphene-Functionalized Titanium Surfaces for Dental Implantology: Systematic Review. Coatings. 2023 Apr;13(4):725.
99. Malcangi G, Patano A, Guglielmo M, Sardano R, Palmieri G, Di Pede C, et al. Precision Medicine in Oral Health and Diseases: A Systematic Review. J Pers Med. 2023 Apr 25;13(5):725.
100. Inchingolo F, Santacroce L, Cantore S, Ballini A, Del Prete R, Topi S, et al. Probiotics and EpiCor® in human health. J Biol Regul Homeost Agents. 2019;33(6):1973–9.
101. Scarano A, Inchingolo F, Rapone B, Lucchina AG, Qorri E, Lorusso F. Role of Autologous Platelet Gel (APG) in Bone Healing: A Rabbit Study. Appl Sci. 2021 Jan;11(1):395.
102. Balzanelli MG, Distratis P, Dipalma G, Vimercati L,

Inchingolo AD, Lazzaro R, et al. Sars-CoV-2 Virus Infection May Interfere CD34+ Hematopoietic Stem Cells and Megakaryocyte-Erythroid Progenitors Differentiation Contributing to Platelet Defection towards Insurgence of Thrombocytopenia and Thrombophilia. Microorganisms. 2021 Jul 30;9(8):1632.
103. Inchingolo AD, Inchingolo AM, Bordea IR, Malcangi G, Xhajanka E, Scarano A, et al. SARS-CoV-2 Disease through Viral Genomic and Receptor Implications: An Overview of Diagnostic and Immunology Breakthroughs. Microorganisms. 2021 Apr 10;9(4):793.
104. Scarano A, Noumbissi S, Gupta S, Inchingolo F, Stilla P, Lorusso F. Scanning Electron Microscopy Analysis and Energy Dispersion X-ray Microanalysis to Evaluate the Effects of Decontamination Chemicals and Heat Sterilization on Implant Surgical Drills: Zirconia vs. Steel. Appl Sci. 2019 Jan;9(14):2837.
105. Baldini A, Nota A, Santariello C, Caruso S, Assi V, Ballanti F, et al. Sagittal dentoskeletal modifications associated with different activation protocols of rapid maxillary expansion. Eur J Paediatr Dent. 2018 Jun;19(2):151–5.
106. Contaldo M, Boccellino M, Zannini G, Romano A, Sciarra A, Sacco A, et al. Sex Hormones and Inflammation Role in Oral Cancer Progression: A Molecular and Biological Point of View. J Oncol. 2020;2020:9587971.
107. Minetti E, Palermo A, Savadori P, Patano A, Inchingolo AD, Rapone B, et al. Socket Preservation Using Dentin Mixed with Xenograft Materials: A Pilot Study. Mater Basel Switz. 2023 Jul 11;16(14):4945.
108. Lombardo L, Albertini P, Cervinara F, Brucculeri L, Siciliani G. Early class III treatment with hybrid rapid palatal expander combined with facemask. Int Orthod. 2020 Sep;18(3):624–35.
109. Luzzi V, Marasca B, Mazur M, Ndokaj A, Pirro V, Guaragna M, et al. Early Class III Treatment Using a Hybrid Rapid Palatal Expander and Facemask in a Patient with Partially Edentulous Maxilla Post MNTI Removal: A Case Report. Healthc Basel Switz. 2022 Sep 12;10(9).
110. Janosy AM, Moca AE, Juncar RI. Early Diagnosis and Treatment of Mandibular Second Premolar Impaction: A Case Report. Diagn Basel Switz. 2024 Jul 26;14(15).
111. Leonardi R, Sicurezza E, Cutrera A, Barbato E. Early post-treatment changes of circumaxillary sutures in young patients treated with rapid maxillary expansion. Angle Orthod. 2011 Jan;81(1):36–41.
112. Lambot T, Van Steenberghe PR, Vanmuylder N, De Maertelaer V, Glineur R. [Early treatment with rapid palatal expander and 3D Quad Action mandibular appliance: evaluation of a comprehensive approach in 22 patients]. Orthod Francaise. 2008 Jun;79(2):107–14.
113. Yagci A, Korkmaz YN, Yagci F, Atilla AO, Buyuk SK. Effect of 3 cements on white spot lesion formation after full-coverage rapid maxillary expander: A comparative in-vivo study. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2016 Dec;150(6):1005–13.
114. Villa-Obando YA, Correa-Osorio SM, Castrillon-Marin RA, Vivares-Builes AM, Ardila CM. Effect of Anchorage Modifications on the Efficacy of Miniscrew-Assisted Rapid Palatal Expansion: A Systematic Review and Meta-Analysis. Cureus. 2024 Oct;16(10):e72008.
115. Alyessary AS, Yap AUJ, Othman SA, Rahman MT, Radzi Z. Effect of Piezoelectric Sutural Ostectomies on Accelerated Bone-Borne Sutural Expansion. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2018 Mar;76(3):616–30.
116. Caldas LD, Takeshita WM, Machado AW, Bittencourt MAV. Effect of rapid maxillary expansion on nasal cavity assessed with cone-beam computed tomography. Dent Press J Orthod. 2020 May;25(3):39–45.
117. Liu W tao, Zhou Y heng. [Effect of repetitive rapid palatal expansions and constrictions by double hinged expander in maxillary protraction cases]. Beijing Da Xue Xue Bao. 2013 Feb 18;45(1):69–76.
118. Wang MH, Ge ZL, Tian L, Li PR, Che YQ. [Effect of three types of rapid maxillary expansion: a three-dimensional finite element study]. Zhonghua Kou Qiang Yi Xue Za Zhi Zhonghua Kouqiang Yixue Zazhi Chin J Stomatol. 2017 Nov 9;52(11):678–83.
119. Wolff J, Rinkenbach R, Grollemund B, Wagner D. [Effects of maxillary disjunction on canine impaction in patients presenting a maxillary transverse skeletal deficiency]. Orthod Francaise. 2017 Sep;88(3):243–50.
120. Garcez AS, Suzuki SS, Storto CJ, Cusmanich KG, Elkenawy I, Moon W. Effects of maxillary skeletal expansion on respiratory function and sport performance in a para-athlete - A case report. Phys Ther Sport Off J Assoc Chart Physiother Sports Med. 2019 Mar;36:70–7.
121. Bastos RM, Haas Junior OL, Piccoli V, da Rosa BM, de Oliveira RB, de Menezes LM. Effects of minimally invasive surgical and miniscrew-assisted rapid palatal expansion (MISMARPE) on the nasal cavity and upper airway: a comparative cohort study. Int J Oral Maxillofac Surg. 2024 Oct;53(10):821–8.
122. Sermboonsang C, Benjakul S, Chantarapanich N, Inglam S, Insee K. Effects of miniscrew location on biomechanical performances of bone-borne rapid palatal expander to midpalatal suture: A finite element study. Med Eng Phys. 2022 Sep;107:103872.
123. Pan S, Gao X, Sun J, Yang Z, Hu B, Song J. Effects of novel microimplant-assisted rapid palatal expanders manufactured by 3-dimensional printing technology: A finite element study. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2023 Nov;164(5):700–11.
124. Cordasco G, Nucera R, Fastuca R, Matarese G, Lindauer SJ, Leone P, et al. Effects of orthopedic maxillary expansion on nasal cavity size in growing subjects: a low dose computer tomography clinical trial. Int J Pediatr Otorhinolaryngol. 2012 Nov;76(11):1547–51.
125. Figueiredo DSF, Cardinal L, Bartolomeo FUC, Palomo JM, Horta MCR, Andrade IJ, et al. Effects of rapid maxillary expansion in cleft patients resulting from the use of two different expanders. Dent Press J Orthod. 2016 Dec;21(6):82–90.
126. Lineberger MW, McNamara JA, Baccetti T, Herberger T, Franchi L. Effects of rapid maxillary expansion in hyperdivergent patients. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2012 Jul;142(1):60–9.
127. de Oliveira Chami V, da Rocha JG, Knorst JK, Fensterseifer CK, Ferrazzo VA, Serra-Negra JMC, et al. Effects of rapid maxillary expansion on sleep disturbance scale for children: A longitudinal CASE-series study. Orthod Craniofac Res. 2024 Feb;27(1):27–32.
128. Habeeb M, Boucher N, Chung CH. Effects of rapid palatal expansion on the sagittal and vertical dimensions of the maxilla: a study on cephalograms derived from cone-beam computed tomography. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2013 Sep;144(3):398–403.
129. Inchingolo AM, Patano A, De Santis M, Del Vecchio G, Ferrante L, Morolla R, et al. Comparison of Different Types of Palatal Expanders: Scoping Review. Child Basel Switz. 2023 Jul 21;10(7).
130. Inchingolo AD, Pezzolla C, Patano A, Ceci S, Ciocia AM, Marinelli G, et al. Experimental Analysis of the Use of Cranial Electromyography in Athletes and Clinical

Implications. Int J Environ Res Public Health. 2022 Jun 29;19(13):7975.
131. Malcangi G, Patano A, Palmieri G, Riccaldo L, Pezzolla C, Mancini A, et al. Oral Piercing: A Pretty Risk-A Scoping Review of Local and Systemic Complications of This Current Widespread Fashion. Int J Environ Res Public Health. 2023 May 8;20(9):5744.
132. Malcangi G, Patano A, Pezzolla C, Riccaldo L, Mancini A, Di Pede C, et al. Bruxism and Botulinum Injection: Challenges and Insights. J Clin Med. 2023 Jul 10;12(14):4586.
133. Dellino M, Cerbone M, Laganà AS, Vitagliano A, Vimercati A, Marinaccio M, et al. Upgrading Treatment and Molecular Diagnosis in Endometrial Cancer—Driving New Tools for Endometrial Preservation? Int J Mol Sci. 2023 Jun 5;24(11):9780.
134. Abdelwassie SH, Kaddah MA, El-Dakroury AE, El-Boghdady D, El-Ghafour MA, Seifeldin NF. Effectiveness of low-level laser therapy in facilitating maxillary expansion using bone-borne hyrax expander: A randomized clinical trial. Korean J Orthod. 2022 Nov 25;52(6):399–411.
135. Marañón-Vásquez GA, de Andrade ACDV, Maia LC, Dos Santos RL, Tanaka OM, Paranhos LR, et al. Effect of treatment of transverse maxillary deficiency using rapid palatal expansion on oral health-related quality of life in children: complementary results for a controlled clinical trial. Clin Oral Investig. 2024 Sep 13;28(10):525.
136. Keles A, Tokmak EC, Erverdi N, Nanda R. Effect of varying the force direction on maxillary orthopedic protraction. Angle Orthod. 2002 Oct;72(5):387–96.
137. Liou EJW. Effective maxillary orthopedic protraction for growing Class III patients: a clinical application simulates distraction osteogenesis. Prog Orthod. 2005;6(2):154–71.
138. Christie KF, Boucher N, Chung CH. Effects of bonded rapid palatal expansion on the transverse dimensions of the maxilla: a cone-beam computed tomography study. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2010 Apr;137(4 Suppl):S79-85.
139. Koç O, Koç N, Jacob HB. Effect of different palatal expanders with miniscrews in surgically assisted rapid palatal expansion: A non-linear finite element analysis. Dent Press J Orthod. 2024;29(1):e2423195.
140. Hoque T, Srinivasan D, Chakravarthi S, Kannan R. Evaluation and comparison of stresses and displacements generated by four different types of asymmetric maxillary expansion appliances in true unilateral crossbite using finite element method. Int Orthod. 2022 Sep;20(3):100668.
141. Fatima K, Chaudhari PK, Duggal R, Kharbanda OP, Thakar A. Effects of RME on Hearing in UCLP Patients: A Pilot Study. Cleft Palate-Craniofacial J Off Publ Am Cleft Palate-Craniofacial Assoc. 2023 Nov;60(11):1442–9.
142. Maddalone M, Nanussi A, Varisco M, Cortese M, Scali J, Bianco E. Electromyographic Evaluation of Masticatory Muscles in a Young Patient with Crossbite Treated with Rapid Palatal Expander: A Case Report. J Contemp Dent Pract. 2020 Nov 1;21(11):1279–83.
143. Baysal A, Karadede I, Hekimoglu S, Ucar F, Ozer T, Veli I, et al. Evaluation of root resorption following rapid maxillary expansion using cone-beam computed tomography. Angle Orthod. 2012 May;82(3):488–94.
144. Scivetti M, Pilolli GP, Corsalini M, Lucchese A, Favia G. Confocal laser scanning microscopy of human cementocytes: Analysis of three-dimensional image reconstruction. Ann Anat - Anat Anz [Internet]. 2007 Mar 12 [cited 2025 Jan 24];189(2):169–74. Available from: https://www.sciencedirect.com/science/article/pii/S0940960206001270
145. de Tommaso M, Lavolpe V, Di Venere D, Corsalini M, Vecchio E, Favia G, et al. A case of unilateral burning mouth syndrome of neuropathic origin. Headache. 2011 Mar;51(3):441–3.
146. Dimitrova M, Corsalini M, Kazakova R, Vlahova A, Barile G, Dell'Olio F, et al. Color Stability Determination of CAD/CAM Milled and 3D Printed Acrylic Resins for Denture Bases: A Narrative Review. J Compos Sci [Internet]. 2022 Jul [cited 2025 Jan 24];6(7):201. Available from: https://www.mdpi.com/2504-477X/6/7/201
147. Pettini F, Savino M, Corsalini M, Cantore S, Ballini A. Cytogenetic genotoxic investigation in peripheral blood lymphocytes of subjects with dental composite restorative filling materials. J Biol Regul Homeost Agents. 2015;29(1):229–33.
148. (PDF) Assessment of Psychopatologic Traits in a Group of Patients with Adult Chronic Periodontitis: Study on 108 Cases and Analysis of Compliance during and after Periodontal Treatment. ResearchGate [Internet]. 2024 Oct 22 [cited 2025 Jan 24]; Available from: https://www.researchgate.net/publication/283488135_Assessment_of_Psychopatologic_Traits_in_a_Group_of_Patients_with_Adult_Chronic_Periodontitis_Study_on_108_Cases_and_Analysis_of_Compliance_during_and_after_Periodontal_Treatment
149. Catapano S, Ferrari M, Mobilio N, Montanari M, Corsalini M, Grande F. Comparative Analysis of the Stability of Prosthetic Screws under Cyclic Loading in Implant Prosthodontics: An In Vitro Study. Appl Sci [Internet]. 2021 Jan [cited 2025 Jan 24];11(2):622. Available from: https://www.mdpi.com/2076-3417/11/2/622
150. Solarino B, Coppola F, Di Vella G, Corsalini M, Quaranta N. Vestibular evoked myogenic potentials (VEMPs) in whiplash injury: a prospective study. Acta Otolaryngol (Stockh). 2009 Sep;129(9):976–81.
151. Pettini F, Corsalini M, Savino MG, Stefanachi G, Venere DD, Pappalettere C, et al. Roughness Analysis on Composite Materials (Microfilled, Nanofilled and Silorane) After Different Finishing and Polishing Procedures. Open Dent J [Internet]. 2015 Oct 26 [cited 2025 Jan 24];9:357–67. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4645933/
152. Di Venere D, Corsalini M, Stefanachi G, Tafuri S, De Tommaso M, Cervinara F, et al. Quality of life in fibromyalgia patients with craniomandibular disorders. Open Dent J. 2015;9:9–14.
153. Favia G, Corsalini M, Di Venere D, Pettini F, Favia G, Capodiferro S, et al. Immunohistochemical evaluation of neuroreceptors in healthy and pathological temporo-mandibular joint. Int J Med Sci. 2013;10(12):1698–701.
154. Mahadevia S, Daruwala N, Vaghamshi M. eRME--rapid maxillary expansion in the economic way. Indian J Dent Res Off Publ Indian Soc Dent Res. 2011 Oct;22(5):734.
155. Thompson M. Esthetic versus Function in EarlyTreatment of Class III Malocclusion. Int J Orthod Milwaukee Wis. 2016 Autumn;27(3):49–50.
156. Dindaroğlu F, Doğan S. Evaluation and comparison of root resorption between tooth-borne and tooth-tissue borne rapid maxillary expansion appliances: A CBCT study. Angle Orthod. 2016 Jan;86(1):46–52.
157. De Santis D, Pancera P, Luciano U, Gelpi F, Causarano G, Formentini D, et al. Evaluation of bacterial flora composition on teeth and periodontal tissues in patients in treatment with rapid palatal expander. J Biol Regul Homeost Agents. 2018 Apr;32(2 Suppl. 2):31–6.
158. Baysal A, Ulusoy SN, Uysal T. Evaluation of enamel demineralization in adolescents after rapid maxillary expansion using the quantitative light-induced fluorescence method: A single-center, randomized

controlled clinical trial. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2016 Nov;150(5):731–9.
159. Walter A, de la Iglesia F, Winsauer H, Ploder O, Wendl B, Puigdollers Perez A. Evaluation of expansion forces of five pure bone-borne maxillary expander designs anchored with orthodontic mini-implants: An in vitro study. J Orthod. 2023 Dec;50(4):335–43.
160. Leonardi RM, Aboulazm K, Giudice AL, Ronsivalle V, D'Antò V, Lagravère M, et al. Evaluation of mandibular changes after rapid maxillary expansion: a CBCT study in youngsters with unilateral posterior crossbite using a surface-to-surface matching technique. Clin Oral Investig. 2021 Apr;25(4):1775–85.
161. Camporesi M, Franchi L, Doldo T, Defraia E. Evaluation of mechanical properties of three different screws for rapid maxillary expansion. Biomed Eng Online. 2013 Dec 11;12:128.
162. Celenk-Koca T, Erdinc AE, Hazar S, Harris L, English JD, Akyalcin S. Evaluation of miniscrew-supported rapid maxillary expansion in adolescents: A prospective randomized clinical trial. Angle Orthod. 2018 Nov;88(6):702–9.
163. Bruder C, Ortolani CLF, Lima TA de, Artese F, Faltin Junior K. Evaluation of palate area before and after rapid maxillary expansion, using cone-beam computed tomography. Dent Press J Orthod. 2019;24(5):40–5.
164. Matos DS, Palma-Dibb RG, de Oliveira Santos C, da Conceição Pereira Saraiva M, Marques FV, Matsumoto MAN, et al. Evaluation of photobiomodulation therapy to accelerate bone formation in the mid palatal suture after rapid palatal expansion: a randomized clinical trial. Lasers Med Sci. 2021 Jul;36(5):1039–46.
165. Lo Giudice A, Leonardi R, Ronsivalle V, Allegrini S, Lagravère M, Marzo G, et al. Evaluation of pulp cavity/chamber changes after tooth-borne and bone-borne rapid maxillary expansions: a CBCT study using surface-based superimposition and deviation analysis. Clin Oral Investig. 2021 Apr;25(4):2237–47.
166. Minervini G, Franco R, Marrapodi MM, Crimi S, Badnjević A, Cervino G, et al. Correlation between Temporomandibular Disorders (TMD) and Posture Evaluated trough the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD): A Systematic Review with Meta-Analysis. J Clin Med. 2023 Apr 2;12(7):2652.
167. Lo Giudice A, Rustico L, Ronsivalle V, Nicotra C, Lagravère M, Grippaudo C. Evaluation of the changes of orbital cavity volume and shape after tooth-borne and bone-borne rapid maxillary expansion (RME). Head Face Med. 2020 Sep 8;16(1):21.
168. Seong EH, Choi SH, Kim HJ, Yu HS, Park YC, Lee KJ. Evaluation of the effects of miniscrew incorporation in palatal expanders for young adults using finite element analysis. Korean J Orthod. 2018 Mar;48(2):81–9.
169. da Silva Filho OG, Lara TS, de Almeida AM, da Silav HC. Evaluation of the midpalatal suture during rapid palatal expansion in children: a CT study. J Clin Pediatr Dent. 2005 Spring;29(3):231–8.
170. Cossellu G, Ugolini A, Beretta M, Farronato M, Gianolio A, Maspero C, et al. Three-Dimensional Evaluation of Slow Maxillary Expansion with Leaf Expander vs. Rapid Maxillary Expansion in a Sample of Growing Patients: Direct Effects on Maxillary Arch and Spontaneous Mandibular Response. Appl Sci. 2020 Jan;10(13):4512.
171. Wu Z, Zhang X, Li Z, Liu Y, Jin H, Chen Q, et al. A Bayesian network meta-analysis of orthopaedic treatment in Class III malocclusion: Maxillary protraction with skeletal anchorage or a rapid maxillary expander. Orthod Craniofac Res. 2020 Feb;23(1):1–15.
172. Baratieri C, Alves MJ, Sant'anna EF, Nojima M da CG, Nojima LI. 3D mandibular positioning after rapid maxillary expansion in Class II malocclusion. Braz Dent J. 2011;22(5):428–34.
173. Serafin M, Fastuca R, Zecca PA, Lagravère M, Caprioglio A. 3D occlusal changes of upper first molars after rapid maxillary expansion on permanent versus deciduous teeth: a retrospective multicenter CBCT study. Prog Orthod. 2023 Jul 31;24(1):24.
174. Franchi L, Vichi A, Marti P, Lampus F, Guercio S, Recupero A, et al. 3D Printed Customized Facemask for Maxillary Protraction in the Early Treatment of a Class III Malocclusion: Proof-of-Concept Clinical Case. Mater Basel Switz. 2022 May 24;15(11).
175. Baldini A, Nota A, Santariello C, Assi V, Ballanti F, Cozza P. A comparative assessment of changes in dental arches associated with different activation protocols of rapid maxillary expansion. Eur J Paediatr Dent. 2018 Mar;19(1):35–9.
176. Façanha AJ de O, Lara TS, Garib DG, da Silva Filho OG. Transverse effect of Haas and Hyrax appliances on the upper dental arch in patients with unilateral complete cleft lip and palate: a comparative study. Dent Press J Orthod. 2014 Apr;19(2):39–45.
177. Cameron CG, Franchi L, Baccetti T, McNamara JAJ. Long-term effects of rapid maxillary expansion: a posteroanterior cephalometric evaluation. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2002 Feb;121(2):129–35; quiz 193.
178. Chamberland S, Proffit WR. Short-term and long-term stability of surgically assisted rapid palatal expansion revisited. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2011 Jun;139(6):815-822.e1.
179. Combs A, Paredes N, Dominguez-Mompell R, Romero-Maroto M, Zhang B, Elkenawy I, et al. Long-term effects of maxillary skeletal expander treatment on functional breathing. Korean J Orthod. 2024 Jan 25;54(1):59–68.
180. Lombardo L, Sacchi E, Larosa M, Mollica F, Mazzanti V, Spedicato GA, et al. Evaluation of the stiffness characteristics of rapid palatal expander screws. Prog Orthod. 2016 Dec;17(1):36.
181. Zuccati G, Casci S, Doldo T, Clauser C. Expansion of maxillary arches with crossbite: a systematic review of RCTs in the last 12 years. Eur J Orthod. 2013 Feb;35(1):29–37.
182. Mazzoleni S, Bonaldo G, Pontarolo E, Zuccon A, De Francesco M, Stellini E. Experimental assessment of oral hygiene achieved by children wearing rapid palatal expanders, comparing manual and electric toothbrushes. Int J Dent Hyg. 2014 Aug;12(3):187–92.
183. Liu Y, Zhong Y, Zheng B, Liu Y. Extracellular vesicles derived from M1 macrophages enhance rat midpalatal suture expansion by promoting initial bone turnover and inflammation. Prog Orthod. 2023 Sep 4;24(1):34.
184. Sfondrini MF, Gandini P, Alcozer R, Vallittu PK, Scribante A. Failure load and stress analysis of orthodontic miniscrews with different transmucosal collar diameter. J Mech Behav Biomed Mater. 2018 Nov;87:132–7.
185. Dietz H. FBN1-Related Marfan Syndrome. In: Adam MP, Feldman J, Mirzaa GM, Pagon RA, Wallace SE, Amemiya A, editors. GeneReviews(®). Seattle (WA): University of Washington, Seattle; 1993.
186. Liu SYC, Yoon A, Abdelwahab M, Yu MS. Feasibility of distraction osteogenesis maxillary expansion in patients with persistent nasal obstruction after septoplasty. Int Forum Allergy Rhinol. 2022 Jun;12(6):868–71.
187. Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both

of randomised and non-randomised studies of health care interventions. J Epidemiol Community Health. 1998 Jun;52(6):377–84.
188. Finite Element Analysis Model for Assessing Expansion Patterns from Surgically Assisted Rapid Palatal Expansion. United States; 2023.
189. de Assis DSFR, Xavier TA, Noritomi PY, Gonçales AGB, Ferreira OJ, de Carvalho PCP, et al. Finite element analysis of stress distribution in anchor teeth in surgically assisted rapid palatal expansion. Int J Oral Maxillofac Surg. 2013 Sep;42(9):1093–9.
190. Carvalho Trojan L, Andrés González-Torres L, Claudia Moreira Melo A, Barbosa de Las Casas E. Stresses and Strains Analysis Using Different Palatal Expander Appliances in Upper Jaw and Midpalatal Suture. Artif Organs. 2017 Jun;41(6):E41–51.
191. Scarano A, Rapone B, Amuso D, Inchingolo F, Lorusso F. Hyaluronic Acid Fillers Enriched with Glycine and Proline in Eyebrow Augmentation Procedure. Aesthetic Plast Surg. 2022 Feb;46(1):419–28.
192. Küçüker İ, Aksakal IA, Polat AV, Engin MS, Yosma E, Demir A. The Effect of Chemodenervation by Botulinum Neurotoxin on the Degradation of Hyaluronic Acid Fillers: An Experimental Study. Plast Reconstr Surg. 2016 Jan;137(1):109–13.
193. Lucchese A, Sfondrini MF, Manuelli M, Gangale S. Fixed space maintainer for use with a rapid palatal expander. J Clin Orthod JCO. 2005 Sep;39(9):557–8.
194. Ok UPD, Kaya TU. Fractal Perspective on the Rapid Maxillary Expansion Treatment; Evaluation of the Relationship Between Midpalatal Suture Opening and Dental Effects. J Stomatol Oral Maxillofac Surg. 2022 Sep;123(4):422–8.
195. Maino BG, Paoletto E, Lombardo L, Siciiani G. From Planning to Delivery of a Bone-Borne Rapid Maxillary Expander in One Visit. J Clin Orthod JCO. 2017 Apr;51(4):198–207.
196. Pompella A, Corti A. Gamma-glutamyltransferase (GGT) in tumor progression, drug resistance and targeted therapies. J Biol Regul Homeost Agents. 2018 Aug;32(4 Suppl. 1):27–8.
197. Maspero C, Cavagnetto D, Fama A, Giannini L, Galbiati G, Farronato M. Hyrax versus transverse sagittal maxillary expander: An assessment of arch changes on dental casts. A retrospective study. Saudi Dent J. 2020 Feb;32(2):93–100.
198. Garib DG, Menezes MHO, Silva Filho OG, Santos PBD. Immediate periodontal bone plate changes induced by rapid maxillary expansion in the early mixed dentition: CT findings. Dent Press J Orthod. 2014 Jun;19(3):36–43.
199. Melgaço CA, Columbano Neto J, Jurach EM, Nojima M da CG, Nojima LI. Immediate changes in condylar position after rapid maxillary expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2014 Jun;145(6):771–9.
200. Naveda R, Dos Santos AM, Miranda F, da Cunha Bastos JC, Garib D. Immediate dentoskeletal and periodontal effects of miniscrew-assisted rapid palatal expansion: Comparison between young vs middle-aged adults. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2023 Sep;164(3):416–22.
201. Gandedkar NH, Liou EJW. The immediate effect of alternate rapid maxillary expansions and constrictions on the alveolus: a retrospective cone beam computed tomography study. Prog Orthod. 2018 Oct 15;19(1):40.
202. Dhole P, Maheshwari D. In-office fabrication of a simple miniscrew-assisted rapid palatal expander. J Clin Orthod JCO. 2018 Jul;52(6–7):347–8.
203. Ouldyerou A, Mamboleo E, Gilchrist L, Alsharif K, Ngan P, Merdji A, et al. In-silico evaluation of orthodontic miniscrew-assisted rapid palatal expanders for patients with various stages of skeletal maturation. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2024 Dec;166(6):561–71.
204. Ierardo G, Luzzi V, Vozza I, Polimeni A, Bossù M. Skin irritation from a facial mask in Class III malocclusion: evaluation of individual silicone chin cups in a group of 100 children. Minerva Stomatol. 2018 Apr;67(2):45–8.
205. Kothari A. Indirect bonding technique. World J Orthod. 2006 Winter;7(4):389–93.
206. Yoon S, Lee DY, Jung SK. Influence of changing various parameters in miniscrew-assisted rapid palatal expansion: A three-dimensional finite element analysis. Korean J Orthod. 2019 May;49(3):150–60.
207. Pantuzo MCG, Nunes E, Pires LR, Pinto LS da MC, Oliveira DD. Ingestion of a RPE activation key: Why do these accidents still happen? Eur Arch Paediatr Dent Off J Eur Acad Paediatr Dent. 2017 Apr;18(2):119–21.
208. Caldas LD, Nigri AP, de Souza MMG. Inserting Auxiliary Springs into the Acrylic of Rapid Palatal Expanders. J Clin Orthod JCO. 2019;53(6):355–6.
209. Cardinal L, da Rosa Zimermann G, Mendes FM, Andrade IJ, Oliveira DD, Dominguez GC. The impact of rapid maxillary expansion on maxillary first molar root morphology of cleft subjects. Clin Oral Investig. 2018 Jan;22(1):369–76.
210. Kinzinger GSM, Lisson JA, Buschhoff C, Hourfar J, Korbmacher-Steiner H. Impact of rapid maxillary expansion on palatal morphology at different dentition stages. Clin Oral Investig. 2022 Jul;26(7):4715–25.
211. Gorbunkova A, Pagni G, Brizhak A, Farronato G, Rasperini G. Impact of Orthodontic Treatment on Periodontal Tissues: A Narrative Review of Multidisciplinary Literature. Int J Dent. 2016;2016:4723589.
212. Abdelwahab M, Yoon A, Okland T, Poomkonsarn S, Gouveia C, Liu SYC. Impact of Distraction Osteogenesis Maxillary Expansion on the Internal Nasal Valve in Obstructive Sleep Apnea. Otolaryngol--Head Neck Surg Off J Am Acad Otolaryngol-Head Neck Surg. 2019 Aug;161(2):362–7.
213. Bertucci V, Stevens K, Sidhu N, Suri S, Bressmann T. The Impact of Fan-Type Rapid Palatal Expanders on Speech in Patients With Unilateral Cleft Lip and Palate. Cleft Palate-Craniofacial J Off Publ Am Cleft Palate-Craniofacial Assoc. 2023 Jul;60(7):875–87.
214. Guo F, Li Q, Ngan P, Guan G, Chen X, Yang X, et al. Impact of tonsillectomy on the efficacy of Alt-RAMEC/PFM treatment protocols in children with class III malocclusion and tonsillar hypertrophy: protocol for a cluster randomised controlled trial. BMJ Open. 2024 Jul 1;14(6):e084703.
215. Harnick DJ. Impression material for rapid palatal expanders. J Clin Orthod JCO. 1995 Jul;29(7):428.
216. Fastuca R, Zecca PA, Caprioglio A. Role of mandibular displacement and airway size in improving breathing after rapid maxillary expansion. Prog Orthod. 2014 Apr 29;15(1):40.
217. Guest SS, McNamara JAJ, Baccetti T, Franchi L. Improving Class II malocclusion as a side-effect of rapid maxillary expansion: a prospective clinical study. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2010 Nov;138(5):582–91.
218. Cherian K, Cherian N, Cook C, Kaltenbach JA. Improving tinnitus with mechanical treatment of the cervical spine and jaw. J Am Acad Audiol. 2013;24(7):544–55.
219. Adamchic I, Langguth B, Hauptmann C, Tass PA. Psychometric evaluation of visual analog scale for the assessment of chronic tinnitus. Am J Audiol. 2012

Dec;21(2):215–25.
220. Algieri GMA, Leonardi A, Arangio P, Vellone V, Paolo CD, Cascone P. Tinnitus in Temporomandibular Joint Disorders: Is it a Specific Somatosensory Tinnitus Subtype? Int Tinnitus J. 2017 Apr 19;20(2):83–7.
221. Baccetti T, Mucedero M, Leonardi M, Cozza P. Interceptive treatment of palatal impaction of maxillary canines with rapid maxillary expansion: a randomized clinical trial. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2009 Nov;136(5):657–61.
222. Martinez S, Carletti P, Viscogliosi A. Interceptive therapy for maxillary constriction: a cast-metal-type splint expander. Prog Orthod. 2012 Sep;13(2):185–94.
223. Abramo AC, Viola JC, Angelo AJ. Intraoperative rapid expansion in cleft palate repair. Plast Reconstr Surg. 1993 Mar;91(3):441–5.
224. Alyessary AS, Yap AU, Othman SA, Rahman MT, Al-Namnam NM, Radzi Z. Is there an optimal initial amount of activation for midpalatal suture expansion? : A histomorphometric and immunohistochemical study in a rabbit model. J Orofac Orthop Fortschritte Kieferorthopadie Organofficial J Dtsch Ges Kieferorthopadie. 2018 May;79(3):169–79.
225. Keles A. Keles keyless expander: a new approach for rapid palatal expansion. World J Orthod. 2008 Winter;9(4):407–11.
226. Celli D, Manente A, DeCarlo A, Deli R. Long-term stability of anterior open bite correction in mixed dentition with a new treatment protocol. Eur J Paediatr Dent. 2014 Jun;15(2):158–62.
227. Davami K, Talma E, Harzer W, Lagravère MO. Long term skeletal and dental changes between tooth-anchored versus Dresden bone-anchored rapid maxillary expansion using CBCT images in adolescents: Randomized clinical trial. Int Orthod. 2020 Jun;18(2):317–29.
228. Shih SN, Ho KH, Wang CW, Wang KL, Hsieh SC, Chang HM. Management of Class III Malocclusion and Maxillary Transverse Deficiency with Microimplant-Assisted Rapid Palatal Expansion (MARPE): A Case Report. Med Kaunas Lith. 2022 Aug 4;58(8).
229. Chung CH, Woo A, Zagarinsky J, Vanarsdall RL, Fonseca RJ. Maxillary sagittal and vertical displacement induced by surgically assisted rapid palatal expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2001 Aug;120(2):144–8.
230. Vanarsdall RLJ, Secchi AG, Chung CH, Katz SH. Mandibular basal structure response to lip bumper treatment in the transverse dimension. Angle Orthod. 2004 Aug;74(4):473–9.
231. Baccetti T, Rey D, Angel D, Oberti G, McNamara JAJ. Mandibular cervical headgear vs rapid maxillary expander and facemask for orthopedic treatment of Class III malocclusion. Angle Orthod. 2007 Jul;77(4):619–24.
232. Orr JC, Li C, Shah S, Backstrand MR, Chung CH, Boucher NS. Mandibular transverse dentoalveolar and skeletal changes associated with lip bumper and rapid maxillary expander: A cone-beam computed tomography study. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2023 Mar;163(3):407–25.
233. Minervino BL, Barriviera M, Curado M de M, Gandini LG. MARPE Guide: A Case Report. J Contemp Dent Pract. 2019 Sep 1;20(9):1102–7.
234. Calil RC, Marin Ramirez CM, Otazu A, Torres DM, Gurgel J de A, Oliveira RC, et al. Maxillary dental and skeletal effects after treatment with self-ligating appliance and miniscrew-assisted rapid maxillary expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2021 Feb;159(2):e93–101.
235. O'Neill J. Maxillary expansion as an interceptive treatment for impacted canines. Evid Based Dent. 2010;11(3):86–7.
236. Montaruli G, Virgilio S, Laurenziello M, Tepedino M, Ciavarella D. Maxillary Transverse Deficit: A Retrospective Study of Two Biologically Oriented Devices through a Digital Workflow. Bioeng Basel Switz. 2022 Jan 12;9(1).
237. Suzuki H, Moon W, Previdente LH, Suzuki SS, Garcez AS, Consolaro A. Miniscrew-assisted rapid palatal expander (MARPE): the quest for pure orthopedic movement. Dent Press J Orthod. 2016 Aug;21(4):17–23.
238. Pimentel AC, Manzi MR, Prado Barbosa AJ, Cotrim-Ferreira FA, Guedes Carvalho PE, de Lima GF, et al. Mini-Implant Screws for Bone-Borne Anchorage: A Biomechanical In Vitro Study Comparing Three Diameters. Int J Oral Maxillofac Implants. 2016 Oct;31(5):1072–6.
239. Maia LGM, Monini A da C, Jacob HB, Gandini LGJ. Maxillary ulceration resulting from using a rapid maxillary expander in a diabetic patient. Angle Orthod. 2011 May;81(3):546–50.
240. Sun Z, Hueni S, Tee BC, Kim H. Mechanical strain at alveolar bone and circummaxillary sutures during acute rapid palatal expansion. Am J Orthod Dentofac Orthop Off Publ Am Assoc Orthod Its Const Soc Am Board Orthod. 2011 Mar;139(3):e219-228.
241. Silveira GS, Abreu LG, Palomo JM, da Matta Cid Pinto LS, de Sousa AA, Gribel BF, et al. Mini Hyrax vs Hyrax expanders in the rapid palatal expansion in adolescents with posterior crossbite: a randomized controlled clinical trial. Prog Orthod. 2021 Sep 1;22(1):30.
242. Brunetto DP, Moschik CE, Dominguez-Mompell R, Jaria E, Sant'Anna EF, Moon W. Mini-implant assisted rapid palatal expansion (MARPE) effects on adult obstructive sleep apnea (OSA) and quality of life: a multi-center prospective controlled trial. Prog Orthod. 2022 Feb 1;23(1):3.
243. Hernandez-Alfaro F, Mareque Bueno J, Diaz A, Pagés CM. Minimally invasive surgically assisted rapid palatal expansion with limited approach under sedation: a report of 283 consecutive cases. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2010 Sep;68(9):2154–8.
244. André CB, Pasqua B de PM, Jacquier G de A, Nascimento FD. Miniscrew-assisted rapid palatal expansion (MARPE): Factors influencing planning. Dent Press J Orthod. 2024;29(3):e242439.
245. Cunha AC da, Lee H, Nojima LI, Nojima M da CG, Lee KJ. Miniscrew-assisted rapid palatal expansion for managing arch perimeter in an adult patient. Dent Press J Orthod. 2017 Jun;22(3):97–108.
246. Baik HS, Kang YG, Choi YJ. Miniscrew-assisted rapid palatal expansion: A review of recent reports. J World Fed Orthod. 2020 Oct;9(3S):S54–8.
247. Haas Júnior OL, Matje PRB, Rosa BM da, Piccoli VD, Rizzatto SMD, Oliveira RB de, et al. MISMARPE protocol: minimally invasive surgical and miniscrew-assisted rapid palatal expansion. Dent Press J Orthod. 2024;29(3):e24spe3.
248. Andrade IJ, Paschoal MAB, Figueiredo NC. Modified Arnold expander: an alternative for mandibular arch expansion. Dent Press J Orthod. 2021;26(5):e21spe5.
249. Prabhat KC, Sandhya M, Sanjeev KV, Mohd T, Syed NZ. Modified fixed nanobite tandem appliance for rapid correction of developing Class III malocclusion. Orthod Art Pract Dentofac Enhanc. 2013;14(1):e178-185.
250. Farronato G, Giannini L, Galbiati G, Maspero C. Modified Hyrax expander for the correction of upper midline deviation: a case report. Minerva Stomatol. 2011 Apr;60(4):195–204.
251. Moon HW, Kim MJ, Ahn HW, Kim SJ, Kim SH, Chung KR, et al. Molar inclination and surrounding alveolar bone change relative to the design of bone-borne

maxillary expanders: A CBCT study. Angle Orthod. 2020 Jan;90(1):13–22.
252. Rapone B, Inchingolo AD, Trasarti S, Ferrara E, Qorri E, Mancini A, et al. Long-Term Outcomes of Implants Placed in Maxillary Sinus Floor Augmentation with Porous Fluorohydroxyapatite (Algipore® FRIOS®) in Comparison with Anorganic Bovine Bone (Bio-Oss®) and Platelet Rich Plasma (PRP): A Retrospective Study. J Clin Med. 2022 Apr 28;11(9):2491.
253. Inchingolo F, Inchingolo AD, Palumbo I, Guglielmo M, Balestriere L, Casamassima L, et al. Management of Physiological Gingival Melanosis by Diode Laser Depigmentation versus Surgical Scalpel: A Systematic Review. Dent Rev. 2024 Sep 1;4(3):100146.
254. Balzanelli MG, Distratis P, Catucci O, Cefalo A, Lazzaro R, Inchingolo F, et al. Mesenchymal Stem Cells: The Secret Children's Weapons against the SARS-CoV-2 Lethal Infection. Appl Sci. 2021 Jan;11(4):1696.
255. Casu C, Mosaico G, Natoli V, Scarano A, Lorusso F, Inchingolo F. Microbiota of the Tongue and Systemic Connections: The Examination of the Tongue as an Integrated Approach in Oral Medicine. Hygiene. 2021 Sep;1(2):56–68.
256. Cirulli N, Ballini A, Cantore S, Farronato D, Inchingolo F, Dipalma G, et al. MIXED DENTITION SPACE ANALYSIS OF A SOUTHERN ITALIAN POPULATION: NEW REGRESSION EQUATIONS FOR UNERUPTED TEETH. J Biol Regul Homeost Agents. 2015;29(2):515–20.
257. Inchingolo AM, Fatone MC, Malcangi G, Avantario P, Piras F, Patano A, et al. Modifiable Risk Factors of Non-Syndromic Orofacial Clefts: A Systematic Review. Child Basel Switz. 2022 Nov 28;9(12):1846.
258. Giordano M, Turatti G, Parodi G, Luciani M, Laganà D. The maxillary protraction treatment: description of a laser Er:Yag-assisted surgical technique. Case report. Minerva Stomatol. 2009 Jun;58(6):307–15.
259. Montemurro N, Pierozzi E, Inchingolo AM, Pahwa B, De Carlo A, Palermo A, et al. New biograft solution, growth factors and bone regenerative approaches in neurosurgery, dentistry, and orthopedics: a review. Eur Rev Med Pharmacol Sci. 2023 Aug;27(16):7653–64.
260. Contaldo M, Fusco A, Stiuso P, Lama S, Gravina AG, Itro A, et al. Oral Microbiota and Salivary Levels of Oral Pathogens in Gastro-Intestinal Diseases: Current Knowledge and Exploratory Study. Microorganisms. 2021 May 14;9(5):1064.
261. Pithon MM, Reyes AA, Mota-Júnior SL, Castilhos JS, Tanaka OM. Nonsurgical treatment of anterior crossbite in a cleft lip and palate patient using a fan-type rapid palatal expander and fixed appliances. J Clin Orthod JCO. 2023 Jul;57(7):397–406.
262. Mancini A, Chirico F, Inchingolo AM, Piras F, Colonna V, Marotti P, et al. Osteonecrosis of the Jaws Associated with Herpes Zoster Infection: A Systematic Review and a Rare Case Report. Microorganisms. 2024 Jul 23;12(8):1506.
263. Zhao Z, Zhang S, Zhang F, Duan Z, Wang Y. Monitoring the Opening of Rapid Palatal Expansion (RPE) in a 3D-Printed Skull Model Using Fiber Optic F-P Sensors. Sensors. 2023 Aug 14;23(16).
264. Mello-Moura ACV, Bonini GAVC, Suga SS, Navarro RS, Wanderley MT. Multidisciplinary approach on rehabilitation of primary teeth traumatism repercussion on the permanent successor: 6-year follow-up case report. J Indian Soc Pedod Prev Dent. 2009 Jun;27(2):125–30.
265. Silva FG, Campos PH, Rangel M, Alencar CJF, Novaes TF, Diniz MB, et al. Multidisciplinary approach to multiple dental anomalies in pediatric patients: a case report with 4-year follow-up. Gen Dent. 2024 Oct;72(5):27–30.
266. Fastuca R, Meneghel M, Zecca PA, Mangano F, Antonello M, Nucera R, et al. Multimodal airway evaluation in growing patients after rapid maxillary expansion. Eur J Paediatr Dent. 2015 Jun;16(2):129–34.
267. Olmez H, Akin E, Karaçay S. Multitomographic evaluation of the dental effects of two different rapid palatal expansion appliances. Eur J Orthod. 2007 Aug;29(4):379–85.
268. Kabalan O, Gordon J, Heo G, Lagravère MO. Nasal airway changes in bone-borne and tooth-borne rapid maxillary expansion treatments. Int Orthod. 2015 Mar;13(1):1–15.
269. Rosa M, Manti G, Lucchi P, Mutinelli S. Nasal bone modification compared to normal growth after rapid maxillary expansion anchored onto deciduous teeth: a CBCT retrospective study. Eur J Paediatr Dent. 2024 Dec 1;25(4):310–7.
270. Iwasaki T, Papageorgiou SN, Yamasaki Y, Ali Darendeliler M, Papadopoulou AK. Nasal ventilation and rapid maxillary expansion (RME): a randomized trial. Eur J Orthod. 2021 Jun 8;43(3):283–92.
271. Fleming PS. Need for further clarity on optimal approach to ectopic canines. Evid Based Dent. 2012;13(3):81.
272. Farì G, Megna M, Scacco S, Ranieri M, Raele MV, Chiaia Noya E, et al. Hemp Seed Oil in Association with β-Caryophyllene, Myrcene and Ginger Extract as a Nutraceutical Integration in Knee Osteoarthritis: A Double-Blind Prospective Case-Control Study. Med Kaunas Lith. 2023 Jan 18;59(2):191.
273. Dang QT, Huynh TD, Inchingolo F, Dipalma G, Inchingolo AD, Cantore S, et al. Human Chondrocytes from Human Adipose Tissue-Derived Mesenchymal Stem Cells Seeded on a Dermal-Derived Collagen Matrix Sheet: Our Preliminary Results for a Ready to Go Biotechnological Cartilage Graft in Clinical Practice. Stem Cells Int. 2021;2021:6664697.
274. Coscia MF, Monno R, Ballini A, Mirgaldi R, Dipalma G, Pettini F, et al. Human papilloma virus (HPV) genotypes prevalence in a region of South Italy (Apulia). Ann Ist Super Sanita. 2015;51(3):248–51.
275. Balzanelli MG, Distratis P, Dipalma G, Vimercati L, Catucci O, Amatulli F, et al. Immunity Profiling of COVID-19 Infection, Dynamic Variations of Lymphocyte Subsets, a Comparative Analysis on Four Different Groups. Microorganisms. 2021 Sep 26;9(10):2036.
276. Bonazza V, Borsani E, Buffoli B, Parolini S, Inchingolo F, Rezzani R, et al. In vitro treatment with concentrated growth factors (CGF) and sodium orthosilicate positively affects cell renewal in three different human cell lines. Cell Biol Int. 2018 Mar;42(3):353–64.
277. Borsani E, Buffoli B, Bonazza V, Brunelli G, Monini L, Inchingolo F, et al. In vitro effects of concentrated growth factors (CGF) on human SH-SY5Y neuronal cells. Eur Rev Med Pharmacol Sci. 2020 Jan;24(1):304–14.
278. Maspero C, Abate A, Inchingolo F, Dolci C, Cagetti MG, Tartaglia GM. Incidental Finding in Pre-Orthodontic Treatment Radiographs of an Aural Foreign Body: A Case Report. Child Basel Switz. 2022 Mar 15;9(3):421.
279. Cirulli N, Inchingolo AD, Patano A, Ceci S, Marinelli G, Malcangi G, et al. Innovative Application of Diathermy in Orthodontics: A Case Report. Int J Environ Res Public Health. 2022 Jun 17;19(12):7448.
280. Inchingolo F, Hazballa D, Inchingolo AD, Malcangi G, Marinelli G, Mancini A, et al. Innovative Concepts and Recent Breakthrough for Engineered Graft and Constructs for Bone Regeneration: A Literature Systematic Review. Mater Basel Switz. 2022 Jan 31;15(3):1120.
281. Maspero C, Cappella A, Dolci C, Cagetti MG, Inchingolo F, Sforza C. Is Orthodontic Treatment with Microperforations Worth It? A Scoping Review. Child Basel Switz. 2022 Feb 6;9(2):208.
282. Goldoni R, Scolaro A, Boccalari E, Dolci C, Scarano A,

Inchingolo F, et al. Malignancies and Biosensors: A Focus on Oral Cancer Detection through Salivary Biomarkers. Biosensors. 2021 Oct 15;11(10):396.
283. Inchingolo F, Tatullo M, Abenavoli FM, Marrelli M, Inchingolo AD, Servili A, et al. A hypothetical correlation between hyaluronic acid gel and development of cutaneous metaplastic synovial cyst. Head Face Med. 2010 Jul 15;6:13.
284. Mongardini C, Pilloni A, Farina R, Di Tanna G, Zeza B. Adjunctive efficacy of probiotics in the treatment of experimental peri-implant mucositis with mechanical and photodynamic therapy: a randomized, cross-over clinical trial. J Clin Periodontol. 2017 Apr;44(4):410–7.
285. Romita P, Foti C, Masciopinto L, Nettis E, Di Leo E, Calogiuri G, et al. Allergic contact dermatitis to acrylates. J Biol Regul Homeost Agents. 2017;31(2):529–34.
286. Gargiulo Isacco C, Balzanelli MG, Garzone S, Lorusso M, Inchingolo F, Nguyen KCD, et al. Alterations of Vaginal Microbiota and Chlamydia trachomatis as Crucial Co-Causative Factors in Cervical Cancer Genesis Procured by HPV. Microorganisms. 2023 Mar;11(3):662.
287. Balzanelli MG, Distratis P, Aityan SK, Amatulli F, Catucci O, Cefalo A, et al. An Alternative "Trojan Horse" Hypothesis for COVID-19: Immune Deficiency of IL-10 and SARS-CoV-2 Biology. Endocr Metab Immune Disord Drug Targets. 2022;22(1):1–5.
288. Malcangi G, Patano A, Morolla R, De Santis M, Piras F, Settanni V, et al. Analysis of Dental Enamel Remineralization: A Systematic Review of Technique Comparisons. Bioeng Basel Switz. 2023 Apr 12;10(4):472.
289. Balzanelli MG, Distratis P, Lazzaro R, Pham VH, Tran TC, Dipalma G, et al. Analysis of Gene Single Nucleotide Polymorphisms in COVID-19 Disease Highlighting the Susceptibility and the Severity towards the Infection. Diagnostics. 2022 Nov;12(11):2824.
290. Contaldo M, Lajolo C, Di Petrillo M, Ballini A, Inchingolo F, Serpico R, et al. Analysis of lip pigmentations by reflectance confocal microscopy: report of two cases. J Biol Regul Homeost Agents. 2019;33(3 Suppl. 1):19-25. DENTAL SUPPLEMENT.
291. Di Domenico M, Feola A, Ambrosio P, Pinto F, Galasso G, Zarrelli A, et al. Antioxidant Effect of Beer Polyphenols and Their Bioavailability in Dental-Derived Stem Cells (D-dSCs) and Human Intestinal Epithelial Lines (Caco-2) Cells. Stem Cells Int. 2020;2020:8835813.
292. Dipalma G, Inchingolo AD, Inchingolo AM, Piras F, Carpentiere V, Garofoli G, et al. Artificial Intelligence and Its Clinical Applications in Orthodontics: A Systematic Review. Diagn Basel Switz. 2023 Dec 15;13(24):3677.
293. Inchingolo AM, Patano A, Di Pede C, Inchingolo AD, Palmieri G, de Ruvo E, et al. Autologous Tooth Graft: Innovative Biomaterial for Bone Regeneration. Tooth Transformer® and the Role of Microbiota in Regenerative Dentistry. A Systematic Review. J Funct Biomater. 2023 Feb 27;14(3):132.
294. Minetti E, Palermo A, Inchingolo AD, Patano A, Viapiano F, Ciocia AM, et al. Autologous tooth for bone regeneration: dimensional examination of Tooth Transformer® granules. Eur Rev Med Pharmacol Sci. 2023 Jun;27(12):5421–30.
295. Malcangi G, Patano A, Ciocia AM, Netti A, Viapiano F, Palumbo I, et al. Benefits of Natural Antioxidants on Oral Health. Antioxid Basel Switz. 2023 Jun 20;12(6):1309.
296. Minetti E, Dipalma G, Palermo A, Patano A, Inchingolo AD, Inchingolo AM, et al. Biomolecular Mechanisms and Case Series Study of Socket Preservation with Tooth Grafts. J Clin Med. 2023 Aug 28;12(17):5611.
297. Contaldo M, Luzzi V, Ierardo G, Raimondo E, Boccellino M, Ferati K, et al. Bisphosphonate-related osteonecrosis of the jaws and dental surgery procedures in children and young people with osteogenesis imperfecta: A systematic review. J Stomatol Oral Maxillofac Surg. 2020 Nov;121(5):556–62.
298. Dimonte M, Inchingolo F, Minonne A, Arditi G, Dipalma G. Bone SPECT in management of mandibular condyle hyperplasia. Report of a case and review of literature. Minerva Stomatol. 2004 May;53(5):281–5.
299. Bellocchio L, Inchingolo AD, Inchingolo AM, Lorusso F, Malcangi G, Santacroce L, et al. Cannabinoids Drugs and Oral Health-From Recreational Side-Effects to Medicinal Purposes: A Systematic Review. Int J Mol Sci. 2021 Aug 3;22(15):8329.
300. Inchingolo AM, Inchingolo AD, Latini G, Garofoli G, Sardano R, De Leonardis N, et al. Caries prevention and treatment in early childhood: comparing strategies. A systematic review. Eur Rev Med Pharmacol Sci. 2023 Nov;27(22):11082–92.
301. Inchingolo F, Pacifici A, Gargari M, Acitores Garcia JI, Amantea M, Marrelli M, et al. CHARGE syndrome: an overview on dental and maxillofacial features. Eur Rev Med Pharmacol Sci. 2014;18(15):2089–93.
302. Balzanelli M, Distratis P, Catucci O, Amatulli F, Cefalo A, Lazzaro R, et al. Clinical and diagnostic findings in COVID-19 patients: an original research from SG Moscati Hospital in Taranto Italy. J Biol Regul Homeost Agents. 2021;35(1):171–83.
303. Inchingolo F, Tatullo M, Marrelli M, Inchingolo AD, Corelli R, Inchingolo AM, et al. Clinical case-study describing the use of skin-perichondrium-cartilage graft from the auricular concha to cover large defects of the nose. Head Face Med. 2012 Mar 19;8:10.
304. Inchingolo F, Tatullo M, Marrelli M, Inchingolo AM, Tarullo A, Inchingolo AD, et al. Combined occlusal and pharmacological therapy in the treatment of temporo-mandibular disorders. Eur Rev Med Pharmacol Sci. 2011 Nov;15(11):1296–300.
305. Inchingolo F, Tatullo M, Abenavoli FM, Marrelli M, Inchingolo AD, Inchingolo AM, et al. Comparison between traditional surgery, CO2 and Nd:Yag laser treatment for generalized gingival hyperplasia in Sturge-Weber syndrome: a retrospective study. J Investig Clin Dent. 2010 Nov;1(2):85–9.
306. Patianna AG, Ballini A, Meneghello M, Cantore S, Inchingolo AM, Dipalma G, et al. Comparison of conventional orthognathic surgery and "surgery-first" protocol: a new weapon against time. J Biol Regul Homeost Agents. 2019 Nov 1;33(6 Suppl. 2):59-67. DENTAL SUPPLEMENT.
307. Montenegro V, Inchingolo AD, Malcangi G, Limongelli L, Marinelli G, Coloccia G, et al. Compliance of children with removable functional appliance with microchip integrated during covid-19 pandemic: a systematic review. J Biol Regul Homeost Agents. 2021;35(2 Suppl. 1):365–77.
308. Inchingolo F, Dipalma G, Paduanelli G, De Oliveira LA, Inchingolo AM, Georgakopoulos PI, et al. Computer-based quantification of an atraumatic sinus augmentation technique using CBCT. J Biol Regul Homeost Agents. 2019;33(6 Suppl. 2):31-39. DENTAL SUPPLEMENT.
309. Ceratti C, Maspero C, Consonni D, Caprioglio A, Connelly ST, Inchingolo F, et al. Cone-Beam Computed Tomographic Assessment of the Mandibular Condylar Volume in Different Skeletal Patterns: A Retrospective Study in Adult Patients. Bioeng Basel Switz. 2022 Mar 2;9(3):102.
310. Patano A, Malcangi G, De Santis M, Morolla R, Settanni V, Piras F, et al. Conservative Treatment of Dental Non-Carious Cervical Lesions: A Scoping Review. Biomedicines. 2023 May 25;11(6):1530.
311. Pasciuti E, Coloccia G, Inchingolo AD, Patano A, Ceci S, Bordea IR, et al. Deep Bite Treatment with Aligners: A

New Protocol. Appl Sci. 2022 Jan;12(13):6709.
312. Ferrigno N, Laureti M, Fanali S. Dental implants placement in conjunction with osteotome sinus floor elevation: a 12-year life-table analysis from a prospective study on 588 ITI implants. Clin Oral Implants Res. 2006 Apr;17(2):194–205.
313. Minetti E, Palermo A, Malcangi G, Inchingolo AD, Mancini A, Dipalma G, et al. Dentin, Dentin Graft, and Bone Graft: Microscopic and Spectroscopic Analysis. J Funct Biomater. 2023 May 13;14(5):272.
314. d'Apuzzo F, Nucci L, Strangio BM, Inchingolo AD, Dipalma G, Minervini G, et al. Dento-Skeletal Class III Treatment with Mixed Anchored Palatal Expander: A Systematic Review. Appl Sci. 2022 Jan;12(9):4646.
315. Mandriani B, Pellè E, Mannavola F, Palazzo A, Marsano RM, Ingravallo G, et al. Development of anti-somatostatin receptors CAR T cells for treatment of neuroendocrine tumors. J Immunother Cancer. 2022 Jun;10(6):e004854.
316. Patano A, Inchingolo AD, Malcangi G, Garibaldi M, De Leonardis N, Campanelli M, et al. Direct and indirect bonding techniques in orthodontics: a systematic review. Eur Rev Med Pharmacol Sci. 2023 Sep;27(17):8039–54.
317. Patano A, Cirulli N, Beretta M, Plantamura P, Inchingolo AD, Inchingolo AM, et al. Education Technology in Orthodontics and Paediatric Dentistry during the COVID-19 Pandemic: A Systematic Review. Int J Environ Res Public Health. 2021 Jun 4;18(11):6056.
318. Grassi FR, Ciccolella F, D'Apolito G, Papa F, Iuso A, Salzo AE, et al. Effect of low-level laser irradiation on osteoblast proliferation and bone formation. J Biol Regul Homeost Agents. 2011;25(4):603–14.
319. Inchingolo AD, Patano A, Coloccia G, Ceci S, Inchingolo AM, Marinelli G, et al. The Efficacy of a New AMCOP® Elastodontic Protocol for Orthodontic Interceptive Treatment: A Case Series and Literature Overview. Int J Environ Res Public Health. 2022 Jan 16;19(2):988.
320. Patano A, Inchingolo AM, Cardarelli F, Inchingolo AD, Viapiano F, Giotta M, et al. Effects of Elastodontic Appliance on the Pharyngeal Airway Space in Class II Malocclusion. J Clin Med. 2023 Jun 26;12(13):4280.
321. Inchingolo AD, Inchingolo AM, Malcangi G, Avantario P, Azzollini D, Buongiorno S, et al. Effects of Resveratrol, Curcumin and Quercetin Supplementation on Bone Metabolism—A Systematic Review. Nutrients. 2022 Aug 26;14(17):3519.
322. Lauritano D, Bignozzi CA, Pazzi D, Cura F, Carinci F. Efficacy of a new coating of implant-abutment connections in reducing bacterial loading: an in vitro study. ORAL Implantol. 2017;10(1):1–10.
323. Quaranta A, Ronconi LF, Di Carlo F, Vozza I, Quaranta M. Electrochemical behaviour of titanium in ammine and stannous fluoride and chlorhexidine 0.2 percent mouthwashes. Int J Immunopathol Pharmacol. 2010;23(1):335–43.
324. Inchingolo F, Tatullo M, Abenavoli FM, Inchingolo AD, Inchingolo AM, Dipalma G. Fish-hook injuries: a risk for fishermen. Head Face Med. 2010 Dec 14;6:28.
325. Santacroce L, Di Cosola M, Bottalico L, Topi S, Charitos IA, Ballini A, et al. Focus on HPV Infection and the Molecular Mechanisms of Oral Carcinogenesis. Viruses. 2021 Mar 26;13(4):559.
326. Pacifici L, Santacroce L, Dipalma G, Haxhirexha K, Topi S, Cantore S, et al. Gender medicine: the impact of probiotics on male patients. Clin Ter. 2021;171(1):e8–15.
327. Inchingolo AD, Patano A, Coloccia G, Ceci S, Inchingolo AM, Marinelli G, et al. Genetic Pattern, Orthodontic and Surgical Management of Multiple Supplementary Impacted Teeth in a Rare, Cleidocranial Dysplasia Patient: A Case Report. Med Kaunas Lith. 2021 Dec 10;57(12):1350.
328. M. Martelli, W. Russomanno, S. Di Vecchio, P. Bollero, M. Gargari, L. Ottria, F. Gianfreda. Myofunctional therapy in occlusal and oro-facial disorders: multidisciplinary approach. Oral and Implantology, Vol.16 No. 3(2024), 153-155.
329. F. Gianfreda, L. Nucci, P. Bollera, A. Danieli, A. Palermo, P. Salvadori, M. Gargari, M. Martelli. A rare case of impacted mandibular premolar associated to dentigerous cyst and periodontal lesion: clinical management and histological analysis. Oral and Implantology, Vol. 16. No. 3 (2024), 113-118.