



SMART DENTAL UPDATES

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Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you “**SMART DENTAL UPDATES**” which contain latest and interesting news in the field of Dentistry.

This issue contains:

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- **Relationship Between Salivary Properties and Tooth Wear: A Comprehensive Review and Meta-Analysis**
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Impact of Mandibular Third Molars on Lower Teeth Crowding in Patients with or Without Prior Orthodontic Treatment

INTRODUCTION

Dental crowding is characterized by a misalignment between tooth size and arch dimensions, leading to malocclusion. This issue arises due to the mismatch in tooth size and arch dimensions.¹ It can be categorized as primary, secondary, and tertiary crowding. Tertiary crowding is often referred to as "late dental crowding" and typically affects the mandibular incisors. An increase in mandibular crowding has been observed in adolescents and young adults, typically between the ages of 13 and 26, coinciding with the eruption of third molars. However, some reports contend that this pressure is insufficient to cause anterior crowding.² Prompt identification of crowding in mandibular teeth is crucial for planning interceptive orthodontic treatment.¹ The purpose of this study was to evaluate the impact of mandibular third molars on lower anterior tooth crowding in patients with or without previous orthodontic treatment.



DENTAL CROWDING

Lower arch constriction and mandibular crowding might be caused by lower third molars.

METHODS

This systematic review incorporated thirteen observational studies. The study population encompassed patients of varying ages and genders, in permanent dentition, with or without prior orthodontic treatment, who had impacted, semi-impacted, or erupted mandibular third molars. These patients were compared to those without mandibular third molars (due to agenesis or extraction). The selected papers examined the impact of mandibular third molars on crowding of the mandibular anterior teeth in individuals of all ages and genders. The primary outcome was the impact of mapping the scientific data on mandibular third molars on late crowding of lower anterior teeth in patients receiving or not receiving orthodontic therapy. Changes in the length and width of the mandibular arch were secondary outcomes. Data were collected using predetermined forms, and the characteristics of the included studies were reviewed. The analysis utilized a random effects model, with forest plots used to visualize pooled estimates across studies. Statistical analysis was carried out with the R statistical package, and the level of significance was set at 0.05.

RESULTS

Eight studies had moderate risk of bias, while the other five had high risk. The quantitative analysis comprised seven studies, and three distinct meta-analyses were carried out. One for

patients without prior orthodontic treatment, one for patients with prior orthodontic treatment, and one combining both groups. In the first meta-analysis of patients without previous orthodontic treatment, those without third molars had less crowding, as indicated by

the random-effects model, showing a significant benefit for those without third molars ($P=0.01$). Also, individuals with third molars had higher Little's irregularity index scores compared to those without. In the second meta-analysis of patients with previous orthodontic treatment, there was no significant difference in crowding and arch width ($P=0.23$, $P=0.69$). However, those with third molars had shorter arch length, as indicated by the random-effects model ($P=0.07$). In the third meta-analysis involving patients with and without prior orthodontic treatment, crowding was found to be statistically significant with the random-effects model ($P=0.005$). The results indicated that individuals without third molars had fewer crowding issues compared to those with third molars, with higher little's irregularity index scores, as shown in Figure 1.

DISCUSSION

The study found that patients with mandibular third molars had more severe lower anterior dental crowding. In post-orthodontic patients with third molars, there was a noticeable reduction in mean arch length compared to those without third molars.² Cheng HC et al. revealed significant differences in the Little's irregularity index between the group that had their erupted third molars extracted and the group with agenesis of third molars. However, there were no differences in arch length and intermolar width between these patient groups. The study suggested that removing mandibular third molars may help prevent or alleviate long-term incisor irregularity.³

CONCLUSION

This systematic review suggests that lower third molars may play a role in mandibular crowding, particularly based on the included studies. Notably, patients with mandibular third molars tended to exhibit greater lower anterior dental crowding. Additionally, individuals who had undergone orthodontic treatment and retained their third molars had notably shorter mean arch length compared to those without third molars.

REFERENCE

- 1) Patano A, Malcangi G, Inchingolo AD, Garofoli G, De Leonardis N, Azzollini D, Latini G, Mancini A, Carpentiere V, Laudadio C, Inchingolo F, D'Agostino S, Di Venere D, Tartaglia GM, Dolci M, Dipalma G, Inchingolo AM. Mandibular Crowding: Diagnosis and Management-A Scoping Review. J Pers Med. 2023 Apr 29;13(5):774.

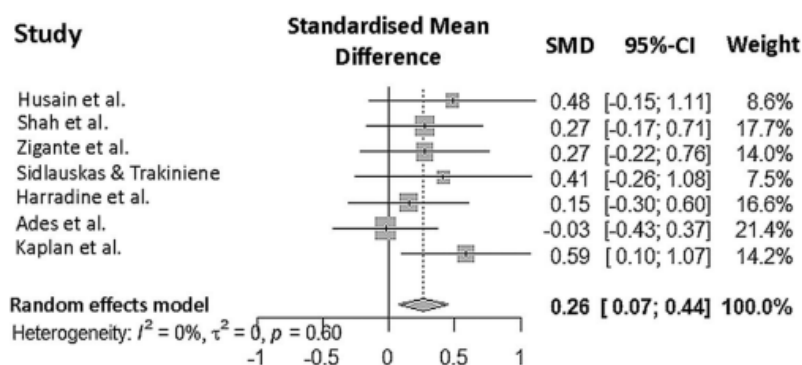


Figure 1. Forest plot for all the included studies (on patients with and without previous orthodontic treatment) for crowding



- 2) Palikaraki G, Mitsea A, Sifakakis I. Effect of mandibular third molars on crowding of mandibular teeth in patients with or without previous orthodontic treatment: a systematic review and meta-analysis. Angle Orthod. 2023 Oct 18. PMID: 37848193.
- 3) Cheng HC, Peng BY, Hsieh HY, Tam KW. Impact of third molars on mandibular relapse in post-orthodontic patients: A meta-analysis. J Dent Sci. 2018 Mar;13(1):1-7.

Relationship Between Salivary Properties and Tooth Wear: A Comprehensive Review and Meta-Analysis

INTRODUCTION

Tooth wear refers to the erosion of dental structure caused by mechanical and chemical factors, involving interactions between teeth, acids, and foreign substances. It is deemed pathological when the extent of dental erosion exceeds what is typical for an individual's age, resulting in discomfort or compromising function, appearance, or overall quality of life.¹ Multiple studies have verified the involvement of acids as one of the causative factors for tooth wear.² Saliva plays a crucial role in oral health, primarily safeguarding teeth against Erosive Tooth Wear (ETW) through various means, including: a) directly counteracting acid substances by diluting, clearing, neutralizing, and buffering acids; b) contributing to pellicle formation; c) supplying calcium, phosphate, and fluoride to facilitate the remineralization process.³ Saliva has various factors linked to tooth wear protection, but research results on their individual contributions are conflicting.¹ The purpose of this study was to identify salivary characteristics associated with the progression of tooth wear.

Tooth wear was negatively correlated, both quantitatively and qualitatively, with stimulated whole saliva pH, suggesting that pH monitoring could be beneficial for these patients.

METHODS

A systematic review and meta-analysis, comprising 111 studies, aimed to determine the connection between various salivary characteristics (such as pH, buffering capacity, and flow) and the presence or features of tooth wear. The secondary focus was on factors like gastroesophageal reflux, acidic food or beverage consumption, bruxism, or other elements that might influence the primary outcomes. The inclusion criteria covered articles examining the link between salivary traits, including xerostomia, and tooth wear in patients, as well as in-situ or in-vitro models. This review

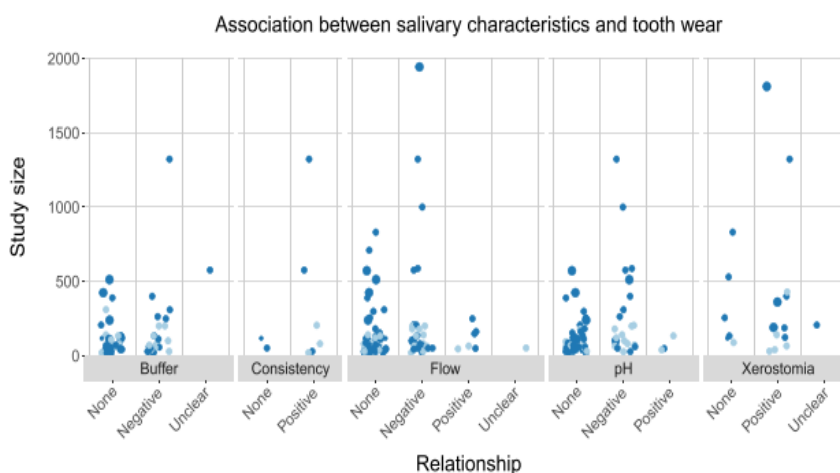


Figure 1. Xerostomia, pH, buffer capacity, consistency or viscosity, and salivary flow rate in relation to tooth wear



encompassed individuals of all ages and various study designs, including observational, cross-sectional, randomized controlled trials, in-situ, and in-vitro designs. Established systematic review methods were employed for screening, data extraction, and synthesis, while risk of bias and the certainty of evidence were evaluated using JBI tools and GRADE. The analysis assessed both direct and indirect associations between tooth wear and salivary components and characteristics.

RESULTS

While most studies indicated no significant relationship between physicochemical salivary traits and tooth wear (Figure 1), a substantial number did reveal connections. These findings showed negative associations between tooth wear and factors like pH, flow rate, and buffer capacity, with a positive correlation noted between tooth wear and saliva consistency/viscosity. Xerostomia was predominantly linked to tooth wear in most articles. Intriguingly, certain studies demonstrating these connections were notably larger than others that found no association or even an opposing relationship between variables. Notably, only the pH from stimulated whole saliva exhibited a negative relationship with tooth wear, with a pooled mean difference of 0.07. Among the longitudinal studies included, only one study suggested that the flow rate in stimulated whole saliva was associated with the progression of tooth wear, both at the baseline and during follow-up. The overall risk of bias remained unclear, and the certainty of evidence was assessed as low or very low.

DISCUSSION

The present study's quantitative and qualitative findings indicated that reduced pH levels were linked to increased tooth wear. In a study conducted by Abdelrahman HH and colleagues, it was observed that consistent consumption of acidic beverages heightened the likelihood of developing erosive tooth lesions.⁴ Studies have highlighted the crucial role of saliva in acid clearance.⁵

CONCLUSION

There was a negative correlation found in both quantitative and qualitative terms between the pH of stimulated whole saliva and tooth wear out of all the possible risk factors, suggesting that pH monitoring could be beneficial for these patients. Furthermore, there were qualitative correlations found between tooth wear and flow rate. However, there was minimal evidence certainty in both situations and a largely unclear risk of bias. Causal relationships could not be noted.

REFERENCE

- 1) Madariaga VI, Pereira-Cenci T, Walboomers XF, Loomans BAC. Association between salivary characteristics and tooth wear: A systematic review and meta-analysis. *J Dent*. 2023 Nov;138:104692.
- 2) Bartlett D, O'Toole S. Tooth Wear: Best Evidence Consensus Statement. *J Prosthodont*. 2020 Dec 17. PMID: 33350551.
- 3) Shitsuka C, Palma LF, Pedron IG, Polotow TGG, Barros MP, Leite MF, Corrêa MSNP. Salivary profile of children with erosive tooth wear: a transversal study. *Braz Oral Res*. 2020 Sep 4;34:e115.
- 4) Abdelrahman HH, Ammar N, Hassan MG, Essam W, Amer H. Erosive tooth wear and salivary parameters among competitive swimmers and non-swimmers in Egypt: a cross-sectional study. *Clin Oral Investig*. 2023 Nov 4. PMID: 37924355.



- 5) Kawano T, Shigeishi H, Fukada E, Yanagisawa T, Kuroda N, Takemoto T, Sugiyama M. Changes in bacterial number at different sites of oral cavity during perioperative oral care management in gastrointestinal cancer patients: preliminary study. *J Appl Oral Sci.* 2018 Jun 18;26:e20170516. PMID: 29898181.

Effectiveness of orthodontic tooth extrusion on regenerating missing papilla between existing maxillary anterior single implant and its adjacent tooth

INTRODUCTION

The presence of well-formed interdental papillae and ideal gingival contours is essential for achieving an aesthetically pleasing smile. Deficiencies in gingival papillae in the front upper jaw can result in the development of open spaces in the gums, commonly referred to as "black triangles," which are generally unwelcome, especially for individuals with highly visible smiles. To restore the missing gingival papillae, various techniques, including restorative procedures, orthodontic treatments, interdisciplinary approaches, and a range of surgical augmentation procedures, can be employed.¹ Regeneration of the missing papilla near single implants within the esthetic zone has remained a persistent challenge, despite progress in vertical hard and soft tissue regeneration. Notably, orthodontic tooth extrusion has proven effective in attaining alveolar bone and gingival tissue.² In this retrospective analysis, the efficacy of orthodontic tooth extrusion in regenerating the absent papilla between a pre-existing maxillary anterior single implant and its neighboring tooth was assessed.

In order to regenerate the papilla and mid-term stable proximal bone next to maxillary anterior single implants, orthodontic extrusion is a useful, non-invasive technique.

METHODS

A retrospective investigation involved 14 patients who had good periodontal health and underwent orthodontic tooth extrusion to restore the missing papilla adjacent to single implants in the esthetic zone. To be eligible, all teeth undergoing orthodontic extrusion needed to be in excellent periodontal condition, classified as Type 1 (mucogingival junction aligned with the underlying facial bone), as confirmed by bone sounding. These selected cases also required comprehensive data, including periapical radiographs, periodontal assessments, clinical photographs, study casts, at different time points: pre-orthodontic extrusion (T0), completion of orthodontic extrusion and retention (T1), and the most recent follow-up (T2). Parameters such as gingival characteristics, orthodontic extrusion movement, proximal bone levels, dentoimplant papilla levels, facial gingival levels, mucogingival junction levels, and keratinized tissue width were documented at these time points: pre-orthodontic extrusion (T0), post-orthodontic extrusion and retention (T1), and the latest follow-up (T2). Descriptive statistics were used to report the means and standard deviations of changes in both hard and soft tissues at different time points. The reliability of measurements was ensured through repeated assessments conducted at least 3 weeks apart and expressed as the Intraclass Correlation Coefficient (ICC).

RESULTS



A total of 17 maxillary single teeth were subjected to orthodontic tooth extrusion to regenerate the absent papilla, with 14 of them belonging to maxillary anterior single implants within 14 patients. Among the extruded teeth, 8 exhibited a thin gingival phenotype, while 9 displayed a thick gingival phenotype. The Intraclass Correlation Coefficient (ICC) exceeded 0.95 for all measurements, indicating a high degree of reliability and reproducibility in the measurement methods. At T2, following an average follow-up period of 49.3 months (ranging from 25 to 86 months), all 14 implants remained successfully osseointegrated, resulting in a 100% implant success rate. Changes in mean implant marginal bone levels were minimal, with values of -0.15 ± 0.17 mm on the mesial and -0.16 ± 0.15 mm on the distal aspect of the implant

at T1, and -0.18 ± 0.20 mm on the mesial and -0.23 ± 0.21 mm on the distal aspect at T2.

In terms of orthodontically extruded teeth,

radiographic hard tissue assessments revealed a mean orthodontic extrusion movement of 4.62 ± 0.78 mm at T1 and 4.63 ± 0.84 mm at T2. The mean gain in proximal bone level was 3.54 ± 0.61 mm (77.0% efficacy) at T1 and 3.47 ± 0.59 mm at T2. Clinical soft tissue evaluation at T1, after a mean orthodontic extrusion and retention duration of 14.3 months (ranging from 10 to 21 months), demonstrated a mean dento-implant papilla level gain of 3.98 ± 0.81 mm (86.8% efficacy) and a mean facial gingival level gain of 4.27 ± 0.55 mm (93.4% efficacy). Changes in the mucogingival junction level were minimal (0.10 ± 0.30 mm), and there was a gain of 4.17 ± 0.49 mm in keratinized tissue width (Table 1). Overall, the orthodontic extrusion movement was effective, with mean gains in proximal bone level, dento-implant papilla level, and facial gingival tissue of 77.0%, 86.8%, and 93.4%, respectively. The efficacy of orthodontic eruption movement on dento-implant papilla gain was slightly lower in the thin gingival phenotype group (80.5%) compared to the thick gingival phenotype group (91.5%). The orthodontically extruded tooth maintained good oral hygiene throughout the study, with a mean plaque score of 7.84% and a mean bleeding score of 5.89% at T0, and a mean plaque score of 13.7% and a mean bleeding score of 8.82% at T1.

Soft tissue change	Mean $\pm$ SD of tissue change (T ₀ -T ₁)
Dento-implant papilla level change	3.98 ± 0.81 mm
Facial gingival level change	4.27 ± 0.55 mm
Mucogingival junction level change	0.10 ± 0.30 mm
Keratinized tissue width change	4.17 ± 0.49 mm

Table 1. Changes in soft tissue after orthodontic extrusion

DISCUSSION

This study demonstrates that orthodontic extrusion of neighbouring teeth is a non-invasive and efficient approach for promoting the stable restoration of proximal bone and the adjacent proximal papilla near single implants in the maxillary anterior region. In Isola et al., it was found that both surgical and non-surgical methods are successful in regenerating hard tissue, but not all techniques can effectively increase soft tissue volume. However, the orthodontic approach demonstrated the ability to simultaneously enhance both hard and soft tissues.³

CONCLUSION In the context of this study, orthodontic extrusion of neighboring teeth has demonstrated its effectiveness as a non-invasive method for regenerating stable proximal bone and the proximal papilla in proximity to maxillary anterior single implants.

REFERENCE

1) Ni J, Zhong Z, Wu Y, Shu R, Wu Y, Li C. Hyaluronic acid vs. physiological saline for enlarging deficient gingival papillae: a randomized controlled clinical trial and an in vitro study. *Ann Transl Med.* 2021 May;9(9):759.

2) Kan JYK, Rungcharassaeng K, Yin S, Kang P, Celenza F, Spear F, Chung JY, Lozada JL. Orthodontic tooth extrusion to regenerate missing papilla adjacent to maxillary anterior single implants: A 2- to 7-year retrospective study. *J Esthet Restor Dent.* 2023 Oct 13. PMID: 37830507.

3) Isola G, Nucera R, Damonte S, Ugolini A, De Mari A, Migliorati M. Implant Site Changes in Three Different Clinical Approaches: Orthodontic Extrusion, Regenerative Surgery and Spontaneous Healing after Extraction: A Systematic Review. *J Clin Med.* 2022 Oct 27;11(21):6347.

Cleft Palate Repair Using Orbicularis Oris and Buccal Mucosal Flap: A New Dual-Layered Method

INTRODUCTION

Cleft lip and palate is a frequently encountered condition in the field of oral and maxillofacial surgery, often addressed in childhood. Nonetheless, there are cases where it may reoccur, particularly in the anterior palate region, leading to potential dentofacial deformities like skeletal Class III malocclusion.¹ Managing cleft patients involves a team of specialists, like plastic and maxillofacial surgeons, orthodontists, ENT doctors, speech therapists, and pediatricians. Common surgical techniques include Furlow double-opposing Z-plasty, von Langenbeck palatoplasty, V-Y Pushback, and Bardach palatoplasty. Repairing a cleft palate carries risks like velopharyngeal insufficiency (VPI), maxillary hypoplasia, and fistula formation.² This study highlights a chronic oronasal fistula case that had undergone multiple prior repairs and was treated using a new double-layered technique.

Surgeons performing repeat surgeries on patients may find that cleft palate repair using a buccal mucosal flap and the vascular orbicularis oris muscle is a beneficial option.



Figure 1. The patient's pre-treatment view includes the following: a) the patient's preoperative extra oral view; b) the patient's preoperative intraoral view displaying the oronasal fistula; c) the appearance of the partial orbicularis oris flap; d) the appearance of the flap's suturing to the nasal side of the fistula; e) the appearance of the cheek flap suturing to the oral side of the fistula; and f) a two-year view of the surgical area

CASE PRESENTATION



An 18-year-old male patient with an anterior palato-alveolar fistula and skeletal Class III malocclusion was sent to the Oral and Maxillofacial Surgery Clinic and Orthodontics. He had had several surgeries when he was a child and teenager. Both the Oral and Maxillofacial Surgery Clinic and the Orthodontics Clinic performed clinical and radiological evaluations before deciding to offer combined care. After completing initial basic orthodontic therapy, the Orthodontics and Oral and Maxillofacial Surgery Clinic decided on maxillomandibular double jaw surgery plus surgical closure of the fistula utilizing a chin bone transplant and primary suturation of the surrounding mucoperiosteal flap. The fistula was eventually reopened, but these plans were not executed.

Consequently, we employed a novel method using double-layered flaps after removing the unsuccessful bone graft from the surgical site. This involved closing the nasal cavity by employing the partial orbicularis oris muscle (Figure 1), which extended from the modiolus to the surgical site. Because there was not much debulking of the ineffective volume of the lip that started from the right cheek, a cheek mucosal flap was stretched to the surgical location and employed for oral side closure. Two years later, at his follow-up examination, the chronic oronasal fistula was seen to be healing successfully. The detachable prosthesis was made and fitted to the patient during this time and the follow-up period (Figure 2). The patient had undergone check-ups on a regular basis.

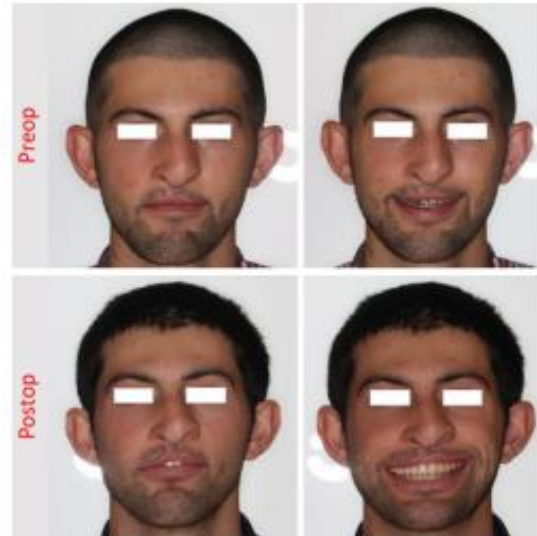


Figure 2. The patient received the application of the constructed removable prosthesis.

DISCUSSION

In the present investigation, an 18-year-old male patient was presented to the clinic with a skeletal Class III malocclusion and an anterior palato-alveolar fistula. Despite prior maxillomandibular double jaw surgery and surgical closure attempts, the fistula reopened, leading to the utilization of a novel double-layered flap technique.¹ Addressing a cleft palate in patient management is intricate. Repairing a cleft palate entails potential postoperative complications, with the most frequent ones being velopharyngeal insufficiency (VPI), maxillary hypoplasia, and the formation of fistulas.² Palatal clefts of significant width are susceptible to increased tension during closure, increasing their susceptibility to the development of postoperative fistulas. Repairing such fistulas is challenging due to inescapable scarring, changes in blood supply, and lingering tension following the initial palatoplasty. Moreover, the recurrence rate of fistulas remains notably high, ranging from 9% to 65% even after repair.³

CONCLUSION

In cleft palate patients, performing recurrent surgeries can pose significant challenges, primarily because the surgical site typically exhibits fibrosis and reduced vascularity. In such cases, cleft palate repair utilizing the vascular orbicularis oris muscle in combination with a buccal mucosal flap can be a favorable choice for surgeons.



REFERENCE

- 1) Akbulut N, Altan A, Sen E. Cleft Palate Repair with Orbicularis Oris Plus Buccal Mucosal Flap: A New Double Layered-Technique. J Dent (Shiraz). 2023 Sep;24(3):348-351.
- 2) Stein MJ, Zhang Z, Fell M, Mercer N, Malic C. Determining postoperative outcomes after cleft palate repair: A systematic review and meta-analysis. J Plast Reconstr Aesthet Surg. 2019 Jan;72(1):85-91.
- 3) Ha JH, Jeong Y, Koo YT, Jeon S, Chung J, Kim S. Effect of collagen matrix on postoperative palatal fistula in cleft palate repair. Sci Rep. 2020 Sep 17;10(1):15236.



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