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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:

1. **Impact of patient's age on perioperative complications in impacted third molar surgery**
2. **Impact of moderate and severe malocclusions on tooth loss over the course of 20 years**
3. **Effect of novel artificial aging protocol on the discoloration of both bracket-bonded and unbonded teeth**
4. **Case Report on Impacted Supernumerary Tooth in the Horizontal Plate of the Palatine Bone**

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Looking forward to your valuable feedback

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Medical Team, Micro Labs Limited

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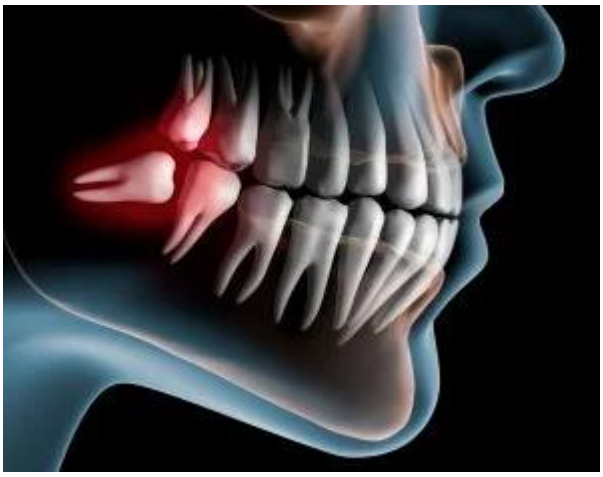
Impact of patient's age on perioperative complications in impacted third molar surgery

INTRODUCTION



Third Molar Surgery

The surgical removal of third molars (M3) is one of the most common dental procedures, particularly among individuals aged 19 to 21, accounting for 95% of extractions in this age group.[1] Indications for removal include pain, infection, and orthodontic reasons. Impacted third molars, which fail to erupt properly, are often removed by oral and maxillofacial surgeons. However, the prevalence and patterns of impaction vary, and these patterns significantly affect the risk of complications during extraction, including postoperative bleeding (0.3-1.5%) and infection (0.17-5.73%). The risk factors for these complications include angulation type, bone coverage, operation time, and the surgeon's expertise. While several risk factors have been identified, the influence of age on complication rates and its interaction with other risk factors, such as angulation and bone coverage, remains underexplored.[2] This study aims to investigate how patient age impacts perioperative complications in impacted third molar surgery and its effect on established risk factors.

METHODS

This retrospective study analysed 200 patients with impacted third molars who underwent surgical extraction between July 2023 and July 2024 in the Department of Oral and Maxillofacial Surgery. Extractions were performed under local anaesthesia by experienced surgeons, with postoperative antibiotics administered. A modified triangular flap through a marginal approach was used for incision and Vicryl 4-0 sutures for closure. Inclusion criteria were impacted third molars requiring surgical extraction, while exclusion criteria included erupted molars, incomplete records, poor-quality radiographs, and significant comorbidities. The sample was divided into two age groups: Group A (≥30 years, n=52) and Group B (<30 years, n=148). Radiographic analysis was performed using Visage 7 software, classifying the impactions based on Winter's, Pell and Gregory, and FDI notations. Bone coverage and distances to critical structures such as the maxillary sinus and inferior alveolar nerve were measured and classified. Surgical difficulty was assessed using the Gordon and Pederson scale. Descriptive statistics, Student's t-test for continuous variables, and chi-square test for binary variables were used.

RESULTS

This study included 200 patients with 554 impacted third molars, divided into two age groups: ≥30 years (Group A, n=52) and <30 years (Group B, n=148). Most patients (75%) were male. Pain was the most common indication for extraction, with no significant difference between groups. Significant differences were observed in angulation types, with older patients more likely to have mesio- and disto-angulated upper third molars, and younger patients showing more horizontal- and vertical-angulation. Upper third molars in younger patients had thicker bone coverage and larger distances to the maxillary sinus compared to older patients, who had deeper impacted lower third molars. The relationship with the ramus mandibulae also differed significantly, with older patients showing higher rates of Class I and III. Surgical difficulty scores according to the Gordon and Pederson scale indicated lower risk for upper third molars in older patients but higher risk for lower third molars. No significant differences were found in perioperative complications, including oral antral communication (OAC), inferior alveolar nerve (IAN) hypesthesia, postoperative bleeding, infection, or operation time between the two groups (Figure 1).

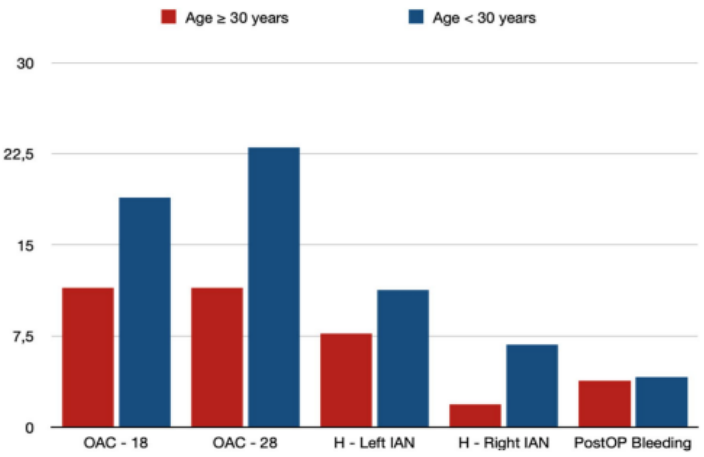


Figure 1. Perioperative complications (%) – OAC, Left IAN Hypesthesia, Right IAN Hypesthesia.

DISCUSSION

This study found that age (cut-off at 30 years) had no significant impact on perioperative complications such as OAC, IAN/LN hypesthesia, bleeding, or infection, despite older patients having deeper impactions. This contrasts with previous studies suggesting age as a key risk factor.[3] Additionally, no infections were observed in the upper third molars, consistent with the findings of Sukegawa et al. This suggests that upper third molars may be less prone to infection, possibly due to their anatomical position, warranting further investigation.[4]

CONCLUSION

The present study indicates that age (with a cutoff at 30 years) does not show a statistically significant association with an increased risk of postoperative complications following impacted third molar surgery.

Age (cutoff at 30 years) does not significantly affect the risk of postoperative complications after impacted third molar surgery.

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Impact of moderate and severe malocclusions on tooth loss over the course of 20 years

INTRODUCTION

Priority malocclusions raise tooth loss risk, while mild crowding and specific bite types may offer protective benefits.

Malocclusion refers to an abnormal craniofacial growth and development, which can arise from skeletal discrepancies (skeletal malocclusion), tooth misalignment (dental malocclusion), or a combination of both. It is classified into four categories: normal occlusion, Class I, Class II, and Class III, based on the relationship between the maxilla and mandible.[1,2] Malocclusions can be further categorized into sagittal, vertical, and transverse deviations, and are often associated with conditions like hyperdontia, hypodontia, impacted teeth, and space issues. The global prevalence of malocclusions in children and adolescents is 56%, with higher rates in Africa (81%) and Europe (72%). Despite its widespread occurrence, limited studies exist on the impact of malocclusion on tooth loss.[3] This study aims to investigate the potential long-term effects of moderate and severe malocclusions on tooth loss over a 20-year period.

METHODS

This population-based study involved participants aged 20–79 years, with data collected through medical exams, interviews, self-administered questionnaires, and dental assessments conducted by trained and calibrated dentists with excellent reliability (kappa >0.91). The focus was on participants under 50 years which reduce bias from age-related tooth loss. Orthodontic status was assessed using the German orthodontic index “Kieferorthopaedische Indikationsgruppen” (KIG), categorizing malocclusions from slight to severe, with treatment priority based on medical and financial criteria. Tooth loss was analyzed using multilevel survival analysis, adjusting for confounders such as age, gender, education, marital status, smoking, and orthodontic variables. Sensitivity analyses employed piecewise exponential and parametric survival models, and statistical comparisons of orthodontic exposures to smoking were made using semi-partial R^2. Periodontal disease and caries were considered mediators in the analysis.

RESULTS

This study analyzed the relationship between malocclusions and tooth loss in 1269 participants aged 25–49 years, with a median follow-up duration of 18.4 years. Results from the fully adjusted discrete-time survival model revealed that missing, unreplaced teeth (KIG U), increased overjet (>6 mm), deep bite with gingival contact (>3 mm), and cusp-to-cusp bite (KIG K2) were significant risk factors for tooth loss. In contrast, open bite (1–2 mm), deep bite without gingival contact, bilateral crossbite, and incisal crowding showed a protective effect against tooth loss (Table 1). The effect sizes of certain malocclusions, such as deep bite with gingival contact and increased overjet, were comparable to smoking as a known risk factor. The combination of deep bite with gingival contact and increased overjet further amplified the risk of tooth loss. Sensitivity analyses confirmed the robustness of these findings, with smoking, malocclusions, and missing, unreplaced teeth acting independently in influencing tooth loss.

Malocclusion Type	Risk Ratio	Risk Difference
Missing, unreplaced teeth (KIG U)	High	Increased risk
Increased overjet (>6 mm)	High	Increased risk
Deep bite (>3 mm) with gingival contact	High	Increased risk
Cusp-to-cusp bite (KIG K2)	High	Increased risk
Open bite (1–2 mm)	Low	Protective effect
Deep bite (>3 mm) without gingival contact	Low	Protective effect
Bilateral crossbite	Low	Protective effect
Incisal crowding	Low	Protective effect

Table 1. Risk Ratios and Risk Differences of Malocclusions on Tooth Loss according to the German Index of Orthodontic Treatment (KIG)

DISCUSSION

The current study shows that malocclusions contribute to tooth loss through periodontal disease, caries, and trauma, with the association between missing teeth and further loss remaining significant even after adjusting for sociodemographic factors. In contrast, previous studies primarily attributed this association to sociodemographic factors without accounting for the direct impact of malocclusions.[4] Additionally, while the current study focuses on the impact of malocclusions on tooth loss, it does not address other effects on oral health, such as temporomandibular joint function or speech, which were considered in previous studies.[3]

CONCLUSION

Malocclusions with treatment priority, such as missing teeth and increased overjet >6 mm, increase tooth loss risk, while non-priority malocclusions like moderate overjet also

contribute. Open bite, deep bite without gingival contact, and slight crowding may protect against tooth loss.

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Effect of novel artificial aging protocol on the discoloration of both bracket-bonded and unbonded teeth

INTRODUCTION

Orthodontic adhesive composition also significantly affects tooth discoloration under simulated oral aging conditions.

Manipulation of natural tooth surfaces can lead to color changes, with fixed orthodontic treatment (FOT) being a key factor that affects enamel during the procedure. While orthodontic treatment aims to align teeth and create functional occlusion, it also seeks to enhance aesthetic outcomes. However, patients may experience surface alterations, such as micro-cracks, fractures, abrasions, and white spots, during and after FOT.[1] With a growing number of adults seeking orthodontic care due to evolving beauty standards, increased awareness, and advances in treatment options, understanding the effects of orthodontic procedures on enamel is crucial. Artificial aging techniques are used to predict the long-term performance of dental materials. The bracket bonding process can lead to irreversible enamel alterations.[2] So, this study aimed to develop and apply a novel artificial aging protocol to assess its impact on enamel discoloration, and to compare the effects of four different orthodontic adhesives on the color and whiteness of both bracket-bonded and unbonded teeth.

METHODS

This experimental study included 100 human permanent lower incisors, extracted for orthodontic or periodontal reasons, ensuring no caries, discoloration, or surface abnormalities. The teeth were embedded in chemically cured acrylic resin and stored in distilled water. The sample was randomly divided into five groups, with metal brackets (Equilibrium 2, Dentaurum) bonded using four orthodontic adhesives: Transbond XT, Kurasper F, Bisco ORTHO, and Light Bond, while a control group received no bonding. Standard acid etching (37% phosphoric acid) was applied, followed by primer application and light curing. The samples underwent mechanical loading (50,000 cycles, 25-50 N), thermal cycling (10,000 cycles between 5–55°C), and immersion in five staining beverages (black tea, coffee, milk, cherry juice, cola) for 5 days. A colorimeter device (Vita Easyshade Compact) was used to measure the color of the teeth before and after testing. Color changes were assessed at baseline

and after aging using the (ΔE_{00}) and whiteness index (ΔWI_D) calculation. Shapiro-Wilk test and differences evaluated by one-way Analysis of Variance (ANOVA).

RESULTS

The mean ΔE_{00} and ΔWI_D values, along with intergroup comparisons, are illustrated in Figures 1 and 2. All groups, including the control group without bonding, showed significant colour and whiteness changes after artificial aging, with clinically visible discoloration. The ΔE00 values for bracket-bonded groups ranged from 8.02 to 16.36, while the unbonded control group showed an average of 4.69. ANOVA revealed significant differences between at least two bracket-bonded groups ($p<0.001$). The Light Bond and Bisco ORTHO groups showed the greatest colour changes, while Transbond XT was the least affected ($p<0.05$). No significant difference was found between Bisco ORTHO and Light Bond ($p>0.05$). ΔWI_D values also showed significant intergroup differences ($p<0.05$), with no significant difference between Transbond XT and the control or Kurasper F groups ($p>0.05$).

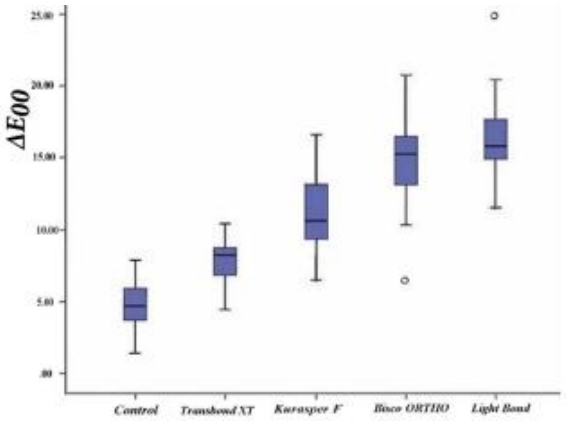

Figure 1. Color differences (ΔE00) among all the tested groups

DISCUSSION

This study found significant discoloration in both bracket-bonded and unbonded teeth exposed to a combined artificial aging protocol, with bracket-bonded teeth showing greater changes. This supports previous studies indicating orthodontic treatments cause enamel discoloration due to microcrack formation and stress.[3] However, the study's novel approach, combining mechanical and thermal stresses, reveals a more pronounced synergistic effect, which contrasts with earlier research that often examined these factors separately. Additionally, it confirmed that resin-based adhesives caused more discoloration, reinforcing findings from other studies but emphasizing the critical role of adhesive composition in tooth color change.[2]

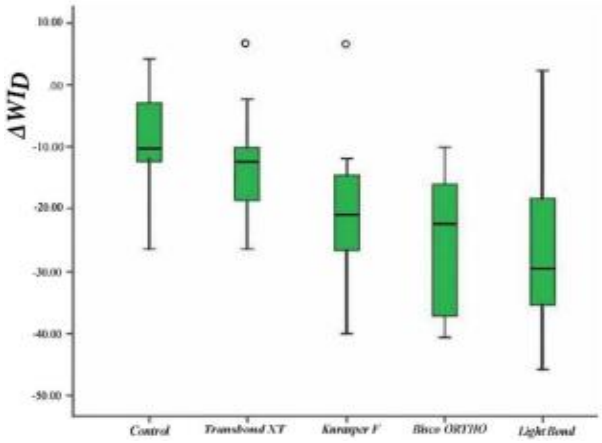

Figure 2. Differences in the whiteness indices of all the tested groups (ΔWID)

CONCLUSION

The combined artificial aging protocol effectively simulates oral cavity conditions, and the composition of the orthodontic adhesive influences tooth discoloration severity.

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Case Report on Impacted Supernumerary Tooth in the Horizontal Plate of the Palatine Bone

INTRODUCTION

Consider impacted supernumerary teeth in posterior hard palate swelling, with asymptomatic cases near vital structures requiring careful observation and radiographic monitoring.

An impacted tooth fails to emerge through the gum within the expected timeframe of development. Among impacted teeth, the maxillary canine is the most common, while impaction of the central incisor is rare, occurring in 0.06%–0.2% of cases.[1] Supernumerary teeth, or extra teeth beyond the normal series, are found in 1.5–3.5% of permanent dentition and 0.3–0.8% of deciduous dentition. They typically appear in the maxillary incisor, mandibular premolar, or near third molars regions but can also occur in unusual locations, such as the nasal cavity, maxillary sinus, and skull. Only two cases of supernumerary teeth in the horizontal plate of the palatine bone have been previously reported.[2] This case presents the third documented instance of an impacted supernumerary tooth in this rare location.

CASE PRESENTATION

A 10-year-old male presented with a painless, bony swelling on the posterior hard palate, present for three years. Clinical examination revealed an erupted supernumerary tooth palatal to the maxillary right central incisor and a non-tender bony swelling on the midline of the posterior palate. A non-contrast CT (NCCT) scan confirmed an impacted supernumerary tooth in the horizontal plate of the palatine bone, with the crown oriented posteriorly and the root anteriorly (Figure 1).

Figure 1. Axial, coronal, and sagittal NCCT sections of the face showing an impacted supernumerary tooth in the horizontal segment of the palatine bone (red arrow).

Pre-anesthetic evaluation, including medical history, physical examination, and laboratory tests, revealed no abnormalities. Potential surgical risks, such as bleeding, infection, and oroantral communication, were discussed, and informed consent was obtained.

Under general anesthesia, a palatal crevicular incision was made, and a full-thickness mucoperiosteal flap was raised. The impacted supernumerary tooth was exposed, and the surrounding bone was removed using a micromotor and round bur. Both impacted and erupted supernumerary teeth were extracted. No oroantral communication was observed, and hemostasis was achieved. The flap was sutured with 3-0 Vicryl.

Postoperative care included antibiotics (amoxicillin, ornidazole) and analgesics (paracetamol), along with chlorhexidine irrigation. The healing was uneventful, with no complications during one-year follow-up.

DISCUSSION

The current study identified two supernumerary teeth with conical morphology and well-developed roots, consistent with the most common type reported in the literature. One tooth was impacted, while the other erupted normally, reflecting the variable eruption patterns typically observed.[3,4] The treatment approach—surgical extraction of the impacted tooth and non-surgical extraction of the erupted tooth—aligns with standard clinical guidelines for symptomatic cases, although it contrasts with recommendations in some studies, which suggest extraction only in the presence of complications.[2]

CONCLUSION

In cases of posterior hard palate swelling, an impacted supernumerary tooth should be considered in the differential diagnosis. While extraction is the standard treatment, asymptomatic supernumerary teeth near vital structures can be managed with close observation and periodic radiographic monitoring.

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