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:

- **Evaluation of the clinical characteristics of patients with temporomandibular disorders**
- **Extent of malocclusion and parafunctional habits contribute to the development of signs and symptoms associated with temporomandibular disorders**
- **Investigation of the time interval needed for a tooth diagnosed with dentine hypersensitivity to recover from a first stimulus**
- **Partial tooth formation following extraction of the maxillary third molar germ in a complete crown formation stadium**

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Evaluation of the clinical characteristics of patients with temporomandibular disorders

INTRODUCTION

Temporomandibular disorders (TMD), which impact the temporomandibular joint (TMJ), masticatory muscles, and associated structures, rank as the second most common musculoskeletal condition following chronic lower back pain.[1] TMD is characterized by TMJ noises, pain in the joint or muscles, and limitations in mandibular movement, significantly affecting patients' quality of life. The reported prevalence of TMD varies widely from 7% to 84%. Epidemiological studies indicate a marked predilection for TMD among women, with female-to-male ratios ranging from 3:1 to 9:1. In contrast to other joint disorders that show increased prevalence post-menopause, TMD frequently affects women between the ages of 18 and 45. The onset of TMD pain typically occurs after puberty, peaks during the reproductive years, and fluctuates with the menstrual cycle. The highest prevalence was observed in women aged 20–40 years, while it was less common among children, adolescents, and the elderly. Despite these observations, the precise relationship between TMD clinical features and demographic factors such as gender and age remains unclear.[2] To address this gap, the present study aimed to retrospectively analyze this relationship to provide insights into the clinical diagnosis and treatment of TMD.

TEMPORO-MANDIBULAR DISORDERS

Proactive evaluation of the temporomandibular joint and masticatory muscles in children with mixed dentition, especially those with Class II malocclusion or parafunctional habits, is essential for early detection and prevention of temporomandibular disorders (TMD).

METHODS

This retrospective study included 3,362 patients diagnosed with TMD. Inclusion criteria included a confirmed TMD diagnosis, complete medical records, and consent to participate, while exclusion criteria comprised TMJ ankylosis, inflammatory TMJ diseases, and a history of maxillofacial trauma or TMJ surgery. Data were collected through interviews and clinical examinations following DC/TMD protocols. The clinical characteristics including symptoms and signs concerning age and gender were analyzed. Statistical analyses were conducted using IBM SPSS version 26.0, employing Chi-square and Fisher’s exact tests for categorical variables.

RESULTS

Among the 3,362 TMD patients, the majority (68.6%) were aged 16-35 years, with only 7.5% each in the ≤15 years and ≥56 years age groups. The female-to-male ratio was 2.2:1, with females comprising 68.8% of the cohort. Notably, male patients had a significantly lower average age (28.56 years) compared to female patients (30.49 years). The median duration of TMD before seeking care was 4 months, with younger patients (≤15 years and 16-35 years) seeking care sooner than older patients (36-55 years and ≥56 years). Female patients experienced a longer median duration of TMD (6 months) compared to males. Symptomatically, TMJ clicking was most prevalent in the ≤15 years age group (57%) and decreased with age, with no significant gender differences. Limited jaw movement, which was least common in the ≤15 years group, increased with age, and females exhibited a higher prevalence of both symptoms and signs compared to males. Pain was reported by 49% to 80.6% of patients as a symptom and 60.2% to 87% as a sign, with prevalence increasing with age (Table 1). There were no significant gender differences in pain symptoms or signs. The average Visual Analogue Scale (VAS) score for pain was 2.96 ± 1.23, with pain intensity rising with age. Acute TMD patients (≤3 months) reported significantly higher pain levels than chronic TMD patients (>3 months).

Parameters	≤15Y	16-35Y	36-55Y	36-55Y
TMD duration				
≤3 months	114 (45.4)	1003 (43.5)	307 (55.8)	150 (59.3)
>3 months	137 (54.6)	1305 (56.5)	243 (44.2)	103 (40.7)
Chief complaints				
Clicking	143 (57.0)	1186 (51.4)	199 (36.2)	72 (28.5)
Self-reported pain)	123 (49.0)	1278 (55.4)	379 (68.9)	204 (80.6)
Limitations in jaw movement	44 (17.5)	416 (18.0)	120 (21.8)	63 (24.9)
Clinical examination findings				
Clicking	165 (65.7)	1424 (61.7)	269 (48.9)	121 (47.8)
Pain	151 (60.2)	1456 (63.1	406 (73.8)	220 (87.0)
Restricted mouth opening (<40mm)	64 (25.5)	637 (27.6)	255 (46.4)	128 (50.6)

Table 1: Clinical characteristics of the patients in different age groups

DISCUSSION

This study confirmed that TMD primarily affected younger adults, with 68.6% of patients aged 16-35 years, aligning with peak occurrence between 20 and 40 years. This contrasts with findings by Marpaung et al. and Rentsch et al., which report higher prevalence in adolescents and children, possibly due to changing social pressures or lower healthcare-seeking behaviour among younger individuals.[3,4] It was found that a female-to-male ratio of 2.2:1 among TMD patients seeking care. This aligns with a meta-analysis that indicated the odds of presenting with TMD were 2.2 times higher in women compared to men. This consistency highlighted a significant gender disparity in TMD prevalence.[4]

CONCLUSION

Most TMD patients seeking care were aged 16–35 years, with females being about twice as common as males. Female patients not only had symptoms for a longer period before seeking treatment but also were older than males. Additionally, females were more likely to experience limitations in jaw movement compared to males.

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Extent of malocclusion and parafunctional habits contribute to the development of signs and symptoms associated with temporomandibular disorders

INTRODUCTION

Early evaluation of the temporomandibular joint and masticatory muscles in children with mixed dentition, especially those with Class II malocclusion or parafunctional habits, is vital for preventing temporomandibular disorders (TMD).

Temporomandibular disorders (TMDs) refer to a variety of clinical signs and symptoms that involve pain and dysfunction in the masticatory system, particularly affecting the temporomandibular joint (TMJ) and the masticatory muscles (MMs).[1] In children with primary dentition, functional disturbances in the orofacial system can occur but are often overlooked, leading to a potential progression into TMDs as they mature. The common clinical signs among children and adolescents include tenderness in the MMs and TMJ, joint noises, and headaches. Key symptoms such as TMJ sounds, pain, and restricted mouth opening are frequently evaluated, with TMJ clicking serving as an initial screening tool for intra-articular TMJ disorders. Additionally, parafunctional habits like bruxism have been significantly associated with TMDs in this age group. The prevalence of TMD signs and symptoms has risen, partly due to the underdiagnosis in children, with reported rates ranging from 20% to 60%. Although gender differences in the occurrence and presentation of TMDs are noted in adults, the relationship between malocclusion and TMDs in children remains unclear.[2] Therefore, this study seeked to explore how malocclusion and parafunctional habits contribute to the emergence of TMD signs and symptoms in school children with mixed dentition in Croatia.

METHODS

This cross-sectional study included 338 children (168 boys and 170 girls) aged 9 to 15 years, referred for orthodontic assessment. Examinations were conducted by a blinded orthodontist to minimize bias, and exclusion criteria included children with clefts, syndromes, systemic illnesses, or prior orthodontic treatment. Participants were divided into three age groups: 9-10, 11-13, and 14-15 years. Data collection assessed TMJ function, muscle tenderness, and mandibular range, with malocclusions classified by the Angle system. TMJ pain, muscle tenderness, and parafunctional habits were recorded via parent questionnaires, and tooth wear was evaluated using the Tooth Wear Evaluation System (TWES 2.0). The sample size was determined through a pilot study and power analysis, yielding a total of 339 participants. Statistical analysis was conducted using IBM SPSS Statistics software.

RESULTS

In a study of 338 children, the predominant age group was 11–12 years (67.8%). Malocclusion types were distributed as follows: normal occlusion (13.9%), Class I (33.1%), Class II (45.9%), and Class III (7.1%), with no significant differences by sex ($p = 0.398$) or age ($p = 0.133$). A minimum of one TMD symptoms were present in 42% of participants, with no significant differences between sexes ($p = 0.898$) or age groups ($p = 0.138$). However, headaches were more prevalent in girls (38.2% vs. 15.5%,) and the 11–13 age group compared to the 9–10 group. The most common parafunctional behaviour was pencil or nail biting (25.1%), with significant variations by age. Clenching and grinding showed a moderate to strong correlation with all observed symptoms. The most notable associations were found with wear facets, mandibular deflection, and muscle pain (Table 1). Logistic regression identified Class II malocclusion, pencil or nail-biting, and clenching/grinding as significant predictors of TMD symptoms.

Parafunctional Habits and TMD Symptoms	Pencil or Nail Biting		Chewing Hard Candies or Ice		Chewing Gum Every Day		Clenching/ Grinding Teeth	
Yes/No	Yes	No	Yes	No	Yes	No	Yes	No
Experienced Pain in TM Region	60.0%	23.0%	55.0%	14.5%	35.0%	19.2%	75.0%	5.0%
Muscle Pain	66.7%	21.1%	33.3%	15.3%	26.7%	19.5%	73.3%	2.9%
Mandibular deflexion	54.5%	20.7%	38.6%	13.6%	27.3%	19.0%	63.6%	1.0%
Locking	60.0%	24.6%	60.0%	16.2%	60.0%	19.5%	80.0%	8.1%

Table 1: Relationship Between Parafunctional Habits and TMD Signs and Symptoms

DISCUSSION

This study highlighted the significant role of parafunctional habits in TMD symptoms, with pencil or nail biting and clenching/grinding teeth increasing symptom likelihood by 2.43 and 8.9 times, respectively, consistent with previous research.[3,4] Additionally, Class II malocclusion was identified as a significant risk factor, increasing the likelihood of TMD symptoms by 2.6 times, although this contrasts with findings from Aboalnaga et al., who reported no significant association.[5]

CONCLUSION

Children with mixed dentition should receive a thorough evaluation of the temporomandibular joint, masticatory muscles, and associated tissues. This is particularly important for those with Class II malocclusion, as well as parafunctional habits like pencil or nail biting and teeth clenching or grinding, which significantly increase the risk of TMD symptoms. Proactive screening and assessment by healthcare providers are crucial to mitigate the risk and prevalence of TMDs in these children and to ensure timely diagnosis and intervention.

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Investigation of the time interval needed for a tooth diagnosed with dentine hypersensitivity to recover from a first stimulus

INTRODUCTION

Dentine hypersensitivity (DH) affects 50% of adults, causing transient pain from exposed dentine. More research is needed to establish optimal intervals for pain stimuli to improve assessment and patient care.

Recent data indicate a high global prevalence of dentine hypersensitivity (DH), with a study across seven European countries involving over 3,500 adults revealing that 50% experience this condition. DH is characterized by sharp, transient pain triggered by stimulation of exposed dentine on the crown and/or root of a tooth, subsiding quickly once the stimulus is removed. This pain often affects multiple teeth and can vary episodically due to changes in the occlusion status of the dentine tubules, ultimately impacting quality of life. Currently, there are no established studies on the optimal interval for repeating pain stimuli, with a common practice of employing a 5-minute gap between stimuli applied to the same tooth.[1] This prompted the authors to investigate the necessary recovery time for a tooth diagnosed with dentine hypersensitivity (DH) after an initial stimulus, whether from cold air-blast or tactile sources, to ensure a consistent pain response upon subsequent application of the same stimulus.

METHODS

A single-center, non-randomized clinical study was conducted to evaluate tooth sensitivity using two different stimuli. Healthy adults aged ≥18 years, with dentin hypersensitivity (DH) lasting more than 6 months and less than 10 years, were recruited. Exclusion criteria included untreated caries, periodontal disease, or any condition that could impact study validity. Participants were allocated to either the air-blast or tactile stimulus group. Baseline pain levels were recorded, and stimuli were applied at decreasing intervals. Pain responses were assessed using Schiff scores and a 100 mm visual analog scale (VAS). For the evaporative air stimulus, the air was applied at 60 psi, and the pain was scored from 0 to 3, with additional measurement using the VAS. For the tactile stimulus, a 20 g Yeaple probe was used, and the pain was recorded similarly using Schiff scores and VAS. Statistical analysis involved paired t-tests, 2-way ANOVA, and Spearman rank correlation to examine changes in pain scores.

RESULTS

About 80 participants were recruited, with 40 each in the cold air and tactile groups. Both groups had similar mean ages (around 43.5 years) and were predominantly White, with no adverse effects reported.

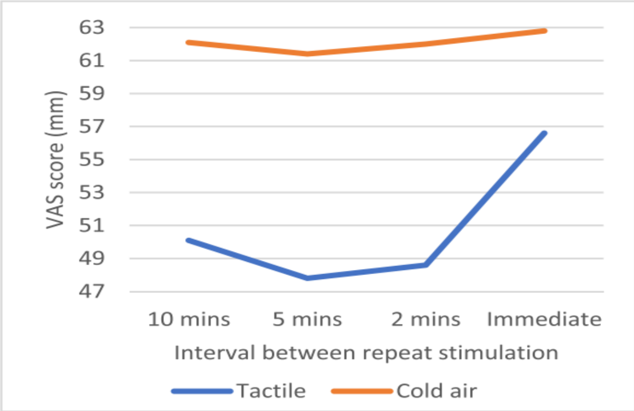

Figure 1. Participant VAS score by delay and stimulus

The cold air group had consistently higher (worse) VAS scores compared to the tactile group. Differences in VAS scores for cold air across delays were not significant, whereas tactile stimulation showed significant differences (Figure 1). Immediate re-stimulation was significantly worse than 2-minute stimulation for tactile (mean difference 8.0; $p < 0.001$), and the between-group difference was also significant (mean difference 7.19; $p = 0.011$).

For Schiff scores in the cold air group, there was a significant decrease from baseline to immediate re-stimulation (mean difference −0.225; $p = 0.018$). Moderate correlations between Schiff and VAS scores were found, but changes in these scores were weakly correlated. Re-stimulation times exceeded 120 seconds for 12.5% of the tactile group and 5% of the cold air group.

DISCUSSION

This study investigated the recovery times of teeth diagnosed with dentine hypersensitivity (DH) following two hydrodynamic stimuli: cold air-blast and tactile stimulation. This study's findings suggest that while cold air-blast elicits consistent pain responses even at short intervals, tactile stimulation requires approximately 2 minutes for reliable pain scores. This aligns with previous literature recommending the application of the least severe stimulus first but diverges from studies that indicate quicker recovery times for tactile stimuli.[2] In addition, this study highlights differing interpretations of pain, complicating the evaluation of treatment efficacy in DH. Notably, VAS scores were significantly higher for cold air-blast than for tactile stimuli, suggesting that the two stimuli produce unequal "pain doses," This variability was consistent with the previous study that highlighted the variability in pain perception among participants. While intra-participant consistency in Visual Analog Scale (VAS) responses was observed, there was significant inter-participant variability, reflecting the subjective nature of pain.[3]

CONCLUSION

This study suggested that a 2-minute recovery time was typical for DH stimulation, but a 3-minute interval was recommended for validity. Future studies should adopt this delay and consider if using one stimulus might be sufficient instead of two. Standardized global guidelines are needed to effectively evaluate and treat DH.

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Partial tooth formation following extraction of the maxillary third molar germ in a complete crown formation stadium

INTRODUCTION

Germectomy of the maxillary M3 at Demirjian stage D may result in partial tooth development; performing it at stage E was recommended to limit excessive root growth.

Germectomy, the early extraction of tooth germs, is advocated for various indications, notably in orthodontics and the management of pathologies associated with impacted teeth. The procedure is often employed to prevent anterior crowding, particularly in adolescents. The ideal candidates for germectomy are typically 13-14 years old, a period when the second molar (M2) has fully erupted, patient compliance is generally high, and there is sufficient dental space for minimally invasive intervention. This case report presents an unprecedented observation of a partial tooth formation, specifically a radix relict, as a complication following the germectomy of the third molar (M3) during its complete crown formation stage. This finding was diagnosed using cone-beam computed tomography (CBCT) and the unique case report adheres to the SCARE 2023 criteria.

CASE PRESENTATION

A 14-year-old patient was referred to the oral surgery department by an orthodontist for the surgical removal of the maxillary M3 germ. This referral was prompted by a lack of space and consequent eruption obstruction of the maxillary M2. After a thorough clinical and radiological evaluation, including orthopantomography and CT scan, it was determined that the maxillary M3 germ was in a developmental stage where root growth had not yet commenced (Figure 1).

Figure 1. Preoperative CT in horizontal view shows the tooth germ 18, which prevents the impacted tooth 17 from tooth eruption.

The patient's psychological, family, and medical histories were unremarkable, and he was a non-smoker. In October 2016, the right maxillary M3 germ was surgically removed without complications. This procedure involved a vestibular incision of the gingival margin and the preparation of a mucoperiosteal flap under local anaesthesia. The M3 germ was extracted in its entirety. Postoperatively, the patient had an uneventful recovery, and the sutures were removed 10 days later.

Figure 2. CBCT in axial view shows partial tooth formation eight years postoperatively after removal of the wisdom tooth germ in the maxilla at the stage of complete crown formation.

However, in March 2024, the patient returned with vague pain in the right upper jaw. Radiological findings from a CBCT scan revealed partial tooth formation, presenting as a radix relict, around the site of the previous germectomy. The patient opted against further surgery to remove the radix relict at that time and chose to manage the pain with analgesics (Figure 2).

DISCUSSION

It was found that performing germectomy of the maxillary M3 germ at stage D led to partial tooth formation, a complication not previously reported. This finding contrasts with the work of D'Angelo et al., which suggests that earlier removal stages were generally effective in minimizing complications.[3] While CT scans are crucial for surgical planning, the research highlights that, unlike the well-defined protocols for mandibular M3 germectomy, there is limited literature on the optimal approach for maxillary M3 cases. These observations underscore the need for further research to establish comprehensive guidelines for maxillary M3 germectomy, thereby complementing the existing protocols for mandibular cases.

CONCLUSION

This case demonstrated partial tooth development noted during a CBCT scan taken eight years after the germectomy of the maxillary M3 germ, which was at Demirjian stage D, indicating complete crown formation. To minimize excessive root development following germectomy, it was recommended that the procedure be performed at a more advanced stage, such as Demirjian stage E. Further research is needed to validate this approach.

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