

MEETING ABSTRACTS



Abstracts of the American Academy of Orofacial Pain (AAOP) 48th Scientific Meeting

AAOP 48th Scientific Meeting Organizing Committee^{1,*}

¹American Academy of Orofacial Pain 48th Scientific Meeting, Scottsdale, AZ, USA

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The American Academy of Orofacial Pain (AAOP) celebrated its 48th clinical & scientific meeting on 09–12 May 2024 at the Talking Stick Resort in Scottsdale, Arizona. As the official sponsoring organization of the dental specialty of Orofacial Pain, the AAOP is the premier professional academy dedicated to alleviating the suffering of patients afflicted with painful disorders of the jaw, mouth, face, head and neck. Our meeting in Scottsdale presented dentists and other healthcare professionals with a unique opportunity to tap into the interdisciplinary knowledge of dental specialists, physicians, physical therapists, and researchers whose expertise is dedicated to treating pain and promoting patient wellness.

The theme of the meeting—“Management of Orofacial Pain: Weighing the Evidence”—reflected AAOP’s commitment to provide attendees with information that is up to date, scientifically supported and clinically relevant. World-class speakers provided sessions on temporomandibular disorders, headache, dental sleep medicine, pain neuroscience education and more. The goal of the meeting was to empower attendees with knowledge and tools to better serve their patients and to bolster their practice. These and previous presentations are available virtually through the AAOP website at www.aaop.org.

01. Bell’s Palsy as the Major Neurological Manifestation of SARS-CoV-2 Infection: A Literature Review

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Aim of investigation: Various neurological complications have been reported in patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection; Bell's Palsy (BP), has been reported as one of the main neuropathies among those. This study reviewed the cases of Bell's Palsy as the only major neurological manifestation in patients with SARS-CoV-2 infection.

Methods: A PubMed and Scopus search was conducted between March 2020 and January 2024, using the keywords "COVID-19 OR SARS-Cov-2, AND Bell's Palsy". Studies entered the review, only if the SARS-CoV-2 infection was confirmed with a positive polymerase chain reaction (PCR) test result, and the exact onset of BP symptoms was documented. Publications reporting cases of COVID-19 infection with multiple neurological findings, as well as pediatric and pregnant patients were removed from the review.

Results: Our initial search resulted in finding 207 publications. 32 papers that reviewed 48 cases of BP in COVID-19 patients met the inclusion criteria. Our study showed that 40% of cases showed BP as the first manifestation; whereas 60% of cases developed BP symptoms following other symptoms related to SARS-CoV-2 infection (range of 2 days to one month). 70% of the cases showed complete recovery with BP symptoms, while 30% showed only partial improvement.

Conclusions: Although the number of studies in our review is limited, the development of BP symptoms in patients with SARS-CoV-2 infection indicates the necessity of further attention to SARS-CoV-2 infection as one of the possible causes of BP. More investigation is needed to establish the correlation between these two entities.

Acknowledgments and Funding Source: None.

02. A Cross-Sectional Study Examining the Impact of Obesity on Orofacial Pain

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Aim of investigation: Obesity is associated to several musculoskeletal pain conditions like low back pain and hip pain; as well as to increased odds of chronic migraine, fibromyalgia, neck pain and chronic widespread pain. Yet, few studies have investigated the relationship between pain intensity and obesity in orofacial pain patients. This study aimed to assess associations of obesity with pain intensity, insomnia symptoms, and orofacial pain diagnosis in a population of patients seeking treatment for orofacial pain.

Methods: A cross-sectional study was conducted in consecutive adults seen at Orofacial Pain Clinic (University of Kentucky). Demographics, pain diagnosis (International Classification of Orofacial Pain criteria), biometric data, insomnia symptoms, pain intensity and pain-related interference (Graded Chronic Pain Scale) were extracted. Independent *t*-tests were used to compare obese (defined as body mass index (BMI) ≥ 30) vs. non-obese patients (BMI < 30). Regression analysis was used to investigate significant predictors of pain-related interference.

Results: Of 440 patients (44.63 ± 15.98 y/o, 82.2% females), 31.14% present with obesity. Compared to non-obese patients, obese patients reported significantly higher pain-related interference (34.44 ± 29.57 vs. 27.62 ± 29.10 , $t = -2.247$, $p = 0.025$) and marginally higher pain intensity (53.44 ± 23.96 vs. 50.87 ± 22.29 , $t = -1.090$, $p = 0.276$). Even after controlling for pain intensity, obesity explained an additional 6% of the variance in pain interference.

There were no significant differences on pain intensity or insomnia symptoms. Also, there were no significant differences in BMI by primary orofacial pain diagnosis.

Conclusions: Obesity was associated with greater pain interference. Future research should explore the mechanisms underlying these relationships.

Acknowledgements and Funding Source: None.

03. Reliability of MRI-Based Structural Phenotypes in Temporomandibular Joint Osteoarthritis: Adaptation of Knee ROAMES

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Aim of investigation: To introduce and assess the reliability of a simplified Magnetic Resonance Imaging (MRI) tool, adapted from the knee Rapid OsteoArthritis MRI Eligibility Score (ROAMES), for defining eligibility of patients for inclusion in clinical trials using an anatomical approach that enables the stratification of temporomandibular joint (TMJ) degenerative disease into different structural phenotypes.

Methods: Eighty sequences of MRI scans from adult patients with TMJ degenerative disease and arthralgia were selected, addressing predefined phenotypes: inflammatory, hypertrophic, cartilage erosive, bone marrow and adaptive. A single-session calibration training involved two orofacial pain specialists experienced in diagnosing TMJ degenerative diseases from MRI, who assessed ten pre-selected images (two for each phenotype). Reliability was determined using weighted kappa statistics, while descriptive statistics determined concordance between a priori phenotypic definition and new classification for each evaluator.

Results: TMJ-ROAMES applied criteria identified 62 (77.5%) and 58 (72.5%) of the 80 pre-defined phenotypes correctly for each observer respectively and showed 65% agreement between them. Inter-rater reliability, as indicated by the weighted kappa values, was 0.50, with a standard error of 0.09 and a 95% confidence interval ranging from 0.31 to 0.70. The erosive phenotype had the highest level of agreement (88%), whereas the highest level of disagreement was noted in the inflammatory phenotype (80%).

Conclusions: After a single-session calibration, TMJ-ROAMES is suitable to screen and stratify potentially eligible TMJ into different structural phenotypes with a moderate level of agreement. Disagreement in the inflammatory phenotype underscores the need to refine diagnostic criteria, particularly in distinguishing between primary and secondary inflammatory effusions.

Acknowledgements and Funding Source: None.

04. Sleep Quality May Mediate the Relationship Between PTSD Symptoms and Pain Interference in Chronic Orofacial Pain: A Cross-Sectional Study

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Aim of investigation: Post-traumatic stress disorder (PTSD) symptomatology can lead to pain interference, which can then worsen PTSD symptomatology, creating a vicious cycle. Sleep quality may play a role on how PTSD and pain interference influence each other. This study aimed to test if sleep quality over one month mediated the relationship

between PTSD symptomatology and pain interference. We hypothesized that sleep quality would significantly mediate the relationship between PTSD symptomatology and pain interference.

Methods: At the initial visit to a university-affiliated orofacial pain clinic, treatment-seeking patients completed questionnaires assessing PTSD symptomatology, sleep and pain interference as part of standard care. Data were extracted from the medical records of 137 consecutive patients who reported experiencing a traumatic event. Mediation models in SPSS used the PROCESS macro.

Results: The mean age of the sample was 44.41 (SD = 15.72). The sample was primarily female (85.0%). Primary orofacial pain diagnoses for the sample were myofascial pain (59.3%), temporomandibular joint (TMJ) pain (17.9%), cranial nerve pain (14.3%), dental pain (4.3%), headache and/or idiopathic pain (4.2%). Results revealed a significant main effect of PTSD symptomatology on pain interference ($b = 0.014$, $p = 0.019$, 95% CI = 0.02–0.06). However, there was also a significant indirect effect *via* sleep quality, indicating potential mediation ($b = 0.08$, 95% CI = 0.01–0.18).

Conclusions: Our results suggest that sleep quality may play a role in the relationship between PTSD symptomatology and pain interference. Longitudinal data are needed to test this hypothesis, as such a link could have clinical implications for reducing pain interference in patients with a history of PTSD symptoms.

Acknowledgment and Funding Source: None.

05. Patient Satisfaction With a Telehealth Behavioral Intervention for Chronic Orofacial Pain: A Repeated Measures Study

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Aim of investigation: Physical self-regulation (PSR) is a three-session behavioral intervention designed to help people develop clenching awareness, learn relaxation strategies for muscles of the masticatory system and learn diaphragmatic breathing. Although previous work has established the efficacy of this intervention when delivered in person, little is known about how acceptable patients find the intervention when it is delivered *via* telehealth. The aim of this study was to describe treatment acceptability, expectancy, credibility and satisfaction for a telehealth version of PSR.

Methods: Twenty-six patients who completed a telehealth version of PSR as part of their care for chronic myofascial pain at a tertiary, university-affiliated orofacial pain clinic were asked to provide data on the acceptability (Treatment Acceptability and Adherence Scale, 0–56 scale), expectancy (Treatment Credibility-Expectancy Questionnaire, 0–27 scale), credibility (Treatment Credibility-Expectancy Questionnaire, 0–27 scale) and satisfaction (Client Satisfaction Questionnaire, 0–32 scale) immediately after completing the treatment.

Results: Patients reported PSR *via* telehealth to be moderately acceptable ($M = 44.81$, $SD = 3.19$). Although they found the intervention credible ($M = 21.46$, $SD = 4.63$), they only reported moderate expectancy that the intervention would make a change for their pain ($M = 16.96$, $SD = 5.53$). Yet, satisfaction following the intervention was relatively high ($M = 28.68$, $SD = 3.11$).

Conclusions: Results reveal promising acceptability, credibility, and satisfaction data for a brief behavioral clenching awareness intervention among patients with confirmed chronic myofascial pain in the face. Future work should test how to best implement such interventions into multidisciplinary orofacial pain treatment settings.

Acknowledgements and Funding Source: NIH National Center for Advancing Translational Sciences grant number UL1TR001998.

06. Improvement of Orofacial Pain and Clinical Sleep Outcomes With Mandibular Advancement Device Use for Obstructive Sleep Apnea: A Retrospective Analysis

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Aim of investigation: Mandibular advancement devices (MADs) have shown efficacy in treating mild to moderate obstructive sleep apnea (OSA). Many patients with OSA have chronic orofacial pain. This study explores the potential of a MAD to improve patient symptoms, including orofacial pain, and clinically relevant sleep parameters.

Methods: Patients who received a MAD for OSA from 2019 to 2023 were evaluated. Symptoms, like orofacial pain, and polysomnography (PSG) variables, like the Epworth Sleepiness Scale (ESS) and apnea-hypopnea index (AHI), were compared before and after MAD use. The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) were used to assess orofacial pain and diagnoses included myalgia of the muscles of mastication, temporomandibular joint arthralgia and disc displacement with reduction.^c

Results: A total of 176 patients received a MAD for treatment of OSA. The mean baseline ESS was 8 ± 4 (range 1–20). Initial PSG noted a mean AHI of 18 ± 15 /hour (range 4–110/hour; supine 22 ± 18 /hour, non-supine 14 ± 25 /hour), minimum oxygen saturation of 81 ± 7 , sleep efficiency of $74 \pm 16\%$ and an arousal index of 24 ± 19 /hour. 32% of patients had co-existing pain and OSA at their dental sleep consultation, and 3.2% continued to have pain once the OSA was treated with a MAD. There was also a significant improvement in AHI in follow-up polysomnography with the MAD ($p = 0.007$).

Conclusions: Treatment of OSA with a MAD can result in a considerable improvement of co-existing chronic orofacial pain.

Acknowledgements and Funding Source: American Academy of Dental Sleep Medicine, American Academy of Sleep Medicine Foundation, National Institutes of Health, The University of Arizona.

07. Translating N-of-1 (Single Subject) Research Design into Clinical Pain Practice: Feasible N-of-1 Trials

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Aim of investigation: N-of-1 trials use elements of group randomized trials to evaluate treatment effectiveness within single patients. These trials have not been feasible in clinical practice because of randomization and blinding. Our aim is to report a form of N-of-1 trials—N-of-1 chronic orofacial pain trials that were completed in clinical practice.

Methods: Study design was case series. Inclusion criteria were chronic continuous orofacial pain >1 year, >age 18, extensive clinical data available, with multiple trials and >12 month follow-up. We performed multiple N-of-1 clinical trials by first, meeting conditions for N-of-1; second, creating agreed upon goals of therapy between patient and clinician using Pain intensity, Pain interference with Enjoyment of life and General activities (PEG) 0–10 scale; third, deeply phenotyping with questionnaires, examinations and diagnostic tests such as PainTracker to personalize therapies; fourth, sequentially running therapeutic trials comparing each intervention with baseline; and fifth, analyzing simple change of outcome (PEG) after each trial. The N-of-1 trial would typically be—A--B--BC--A- whereby A is the baseline and B–C are separate therapeutic agents sequentially introduced.

Results: Patients were diagnosed with temporomandibular disorders, trigeminal neuropathic pain and burning mouth disorders plus differing levels of psychological distress (or not). Therapies included information, reassurance, medications, trigger point injections, topical clonazepam and neurosensory stents. Average PEG scores for five patients

were 23.4/30 at baseline and 4.0/30 after sequential therapies yielding 83.7% improvement.

Conclusions: The five cases of long-standing orofacial pain that were deeply phenotyped and treated *via* sequential feasible N-of-1 trials showed substantial improvement in pain intensity and interference.

Acknowledgements and Funding Source: UW Oral Medicine.

08. Dietary Supplementation of Grape Seed Extract in Pregnant/Nursing Females Inhibits Gut Microbiome Dysbiosis in Offspring and Increases Levels of Commensal *Bacteroides Acidifaciens*

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Aim of investigation: Chronic temporomandibular disorders (TMD) are associated with inflammatory bowel disorder and gut dysbiosis, which is characterized by inflammation and changes in the normal bacteria. We previously reported that dietary supplementation with grape seed extract inhibited pain signaling in a preclinical TMD model. The aim of this study was to determine if grape seed extract would inhibit gut microbiome changes in rat offspring caused by oxidative stress induced by prenatal and postnatal ingestion of copper oxide (CuO) nanoparticles.

Methods: Adult Sprague-Dawley female rats were exposed to CuO nanoparticles, the nutraceutical grape seed extract, neither or both *via* their drinking water during breeding, pregnancy and while nursing. Fecal samples were collected from offspring prior to weaning and bacterial DNA isolated and used for 16S next generation sequence analysis.

Results: Changes in the offspring's bacteria population, indicative of dysbiosis, were detected in male and female fecal samples whose mothers were exposed to CuO nanoparticles. Daily supplementation of grape seed extract to mothers prevented the CuO-induced microbiome changes in the offspring and increased abundance of *Bacteroides Acidifaciens*, a commensal species protective against diabetes, insulin sensitivity and obesity.

Conclusion: Exposure of adult female rats at the time of breeding, pregnancy and nursing to CuO nanoparticles induces mild dysbiosis in the offspring. Significantly, grape seed extract supplementation inhibited dysbiosis in the offspring and increased levels of the commensal, protective bacteria species *Bacteroides Acidifaciens*. Thus, grape seed extract functioning as a nutraceutical could be beneficial in managing TMD by inhibiting pain signaling and maintaining a healthy gut microbiome.

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09. Epigenetic Biomarkers for Chronic Painful Temporomandibular Disorder: A Pilot Study

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Aim of investigation: Diagnosing chronic painful temporomandibular disorders (TMD) often relies on subjective patient reports that are known to vary with many factors and thus, could benefit from having an objective pain biomarker. DNA methylation marks gene expression in response to environmental changes without altering the genomic sequence. DNA methylation signatures have been demonstrated in previous studies for migraine, low back pain and post-traumatic stress disorder (PTSD) using saliva samples and TMD using blood samples, suggesting that salivary DNA methylation might also be a biomarker for TMD. This pilot study assessed the feasibility of identifying putative diagnostic biomarkers for TMD using salivary DNA methylation signature.

Methods: We recruited participants with TMD and pain-free controls. Each participant underwent the Diagnostic Criteria for TMD (DC/TMD) evaluation, completed questionnaires and provided a saliva sample. Saliva samples underwent CpG site analysis using the Illumina EPIC arrays followed by bioinformatic analysis including principal component analysis, mostly differentially methylated CpG sites and Methylation Profile Score.

Results: A total of 13 TMD and 4 control participants were included. The principal component analysis, heat map and methylation profile score showed that salivary DNA methylation could differentiate between TMD and control participants. Subgroup analysis showed participants with high-impact TMD reported higher scores in anxiety, depression, catastrophizing or sleep disorders than low-impact TMD. The promoter-level analysis showed that the high- and low-impact TMD groups presented different epigenetic markers.

Conclusions: This study confirmed the feasibility of using DNA methylation as a putative biomarker for TMD.

Acknowledgments and Funding Source: This study is sponsored by Internal funding from the Medical School and School of Dentistry, University of Minnesota.

10. Headache Attributed to TMD: Impact of Different Diagnostic Criteria on Headache Characteristics

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Aim of investigation: Headache attributed to temporomandibular disorders (HA2TMD) is a secondary headache classified using two systems: Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), which requires examiner ascertainment of a painful primary TMD; and International Classification of Headache Disorders-3rd edition (ICHD3), which has no examination requirement. We investigated overlap of the classifications.

Methods: Data were from participants with headache from OPPERA-2, a community-based, cross-sectional sample of US adults (n = 505 aged 19–71 years; 73% female; 67% white). Presence or absence of HA2TMD was classified according to each diagnostic system, and four attributes of headache were assessed: frequency (days per month), duration (4-point ordinal scale), characteristic pain intensity (CPI, 0–100 scale) and headache-related disability (0–100 scale) in last 3 months. ANOVA and chi-square were used, with results reported at alpha = 0.05.

Results: One half of participants (n = 227) had ICHD3-HA2TMD and they had worse duration, frequency, CPI and disability than participants with only primary headache. However, only 54% (n = 123) of ICHD3-HA2TMD subjects had the more restrictive DC/TMD-HA2TMD and average levels of headache duration, disability and CPI did not differ significantly according to presence or absence of DC/TMD-HA2TMD; only average headache frequency was greater in those with DC/TMD-HA2TMD vs. ICHD3-HA2TMD alone.

Conclusions: Despite one half of ICHD3-HA2TMD cases failing to meet more stringent DC/TMD criteria for HA2TMD, levels of headache duration, disability or intensity were not affected. Yet, participants with either type of HA2TMD had more severe headache than participants with primary headache, suggesting that masticatory system

hyperalgesia amplifies headache symptoms.

Funding Source: National Institutes of Health U01DE017018 (NIDCR).

11. Low Dose Naltrexone as a Novel Therapeutic Agent for Post-Traumatic Trigeminal Neuropathic Pain: A Retrospective Case Series

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Background: Post-traumatic trigeminal neuropathic pain (PTNP) is an uncommon, painful neuropathic condition that affects a distribution of the trigeminal nerve that has been previously traumatized. Current pharmacological interventions are often ineffective for the management of neuropathic pain. Low Dose Naltrexone (LDN) is a relatively novel therapeutic agent that has been employed successfully in the treatment of other chronic pain conditions. To our knowledge, no prior report has been published on its use in the management of PTNP.

Case series: Four patients (2 males, 2 females; age range 43–73) were previously diagnosed with PTNP according to the International Classification of Orofacial Pain (ICOP) diagnostic criteria. Patients reported an average baseline pain of 6.25/10 managed with oxycodone, pregabalin, trazodone, duloxetine, gabapentin and/or nortriptyline. Patients were administered LDN increasing from 1.5 to 4.5 mg over the course of one week and maintained at 4.5 mg thereafter. Patient's existing medications were not altered. At follow up appointments ranging between 1–7 months, patient reported numeric pain scores and subjective improvement of symptoms on a 0–100% scale. Three out of four patients reported an improvement in symptoms, average pain score for treatment responders was 3/10, the average pain change score for treatment responders was -2.57 ± 0.65 , and average subjective percent of improvement was $63.33\% \pm 18.85\%$.

Conclusion: The outcomes of these cases support the use of LDN as a possible therapeutic agent in the management of PTNP. More rigorous investigation will be required to determine the extent of therapeutic benefit.

Acknowledgements and Funding Source: None.

12. Diagnosis and Management of Hypomobility of the Temporomandibular Joint: Two Case Reports

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Background: Temporomandibular joint (TMJ) hypomobility is a complex disorder with a range of clinical presentations and etiological factors. It requires a detailed clinical and radiographic examination, a diagnosis and a tailored management plan. The aim of this study is to present two cases with hypomobility, each illustrating two different diagnoses.

Case presentation: A 60-year-old woman reported with a chief complaint of limited jaw opening and bite changes that worsened over time. Clinical exam showed facial asymmetry and an uncorrected deviation to the left, upon opening.

The left joint capsule was tender to palpation. Panoramic radiographs revealed left condylar hyperplasia. The patient underwent left mandibular arthrotomy with tumor removal, repair of the joint and unilateral sagittal split. A 25-year-old woman presented with a chief complaint of limited jaw opening and bite changes. The clinical exam revealed facial asymmetry, chin deviation to the left and an uncorrected deviation to the right upon opening. Cone beam computed tomography (CBCT) revealed right condylar hyperplasia, ankylosis and degenerative joint disease. The patient is planned to receive a right TMJ total joint replacement, Maxillary LeFort 1 osteotomy, and a left sided sagittal split.

Conclusions: The differential diagnosis for disorders of the condyle includes conditions such as osteochondroma and TMJ ankylosis. The suspected diagnosis for the 60-year-old and 25-year-old patients are osteochondroma and TMJ ankylosis, respectively. Due to positioning, osteochondroma of the TMJ, as well as ankylosis of the joint can impair function and require surgical resection.

Acknowledgements and Funding Source: None.

13. An Exploratory Study Investigating the Potential Application of Coping Strategies for Pain Used by Athletes and Their Potential Application to Patients Dealing With Chronic Pain

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Aim of investigation: Research has shown that high-level athletes often demonstrate elevated tolerance for pain, including heat pain, cold pain, ischemic pain, pressure pain and exertion pain, however, little research has examined the specific mechanisms that underpin this ability to tolerate different kinds of pain. This phase of the study (Phase 1) was designed to assess the potential role of coping strategies in the elevated pain tolerance shown by high-level athletes, while the forthcoming Phase 2 will examine if these methods can be taught to chronic orofacial pain patients.

Methods: The first stage of this study involved modifications to the coping strategies questionnaire (Rosenstiel and Keefe, 1986), and administration to 50 athletes for factor analysis. These participants were asked to complete an online version of the questionnaire to attempt to assess the unique psychological and physiological methods that athletes employ in dealing with both exertion and injury pain.

Results: This study found that rather than ignoring or distracting themselves from the pain, most of the athletes reported that they chose to focus on and actively minimize the pain.

Conclusions: These strategies appear to be unique to high level athletes, and further research should be conducted to determine if they have validity in the pain management of patients dealing with chronic orofacial pain.

Acknowledgements and Funding Source: None.

14. The Development and Validation of an MRI-Compatible Bite Force Gauge for Standardizing Jaw Pain Provocation Tasks During MRI Sequencing

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Aim of investigation: There is a critical need for non-invasive methods for assessing and integrating local and central

factors in a heterogeneous chronic myofascial pain population. While magnetic resonance imaging (MRI) is a powerful tool for evaluating muscle (local) and brain activity (central), its safety considerations pose challenges to standardizing pain-provocation task during image acquisition. The study aim was to develop and validate an MRI-compatible bite force gauge to standardize jaw muscle provocation tasks during MRI sequencing.

Methods: The non-ferromagnetic bite force gauge was digitally designed and machined out of Delrin acetal homopolymer. The gauge, consisting of pistons and cylinders, transferred hydraulic pressure to a pressure transducer. A material testing system (MTS) machine was used to apply step-wise force increases, and the forces read by the pressure transducer were plotted.

Results: The resulting graph depicted a linear relationship between the forces applied by the MTS machine and those read by the hydraulic pressure transducer.

Conclusions: The results validated the MRI-compatible bite force gauge. The intended pilot study will utilize this gauge to conduct standardized jaw muscle pain provocation tasks during MRI. These sequences include functional MRI T2 relaxation time for identifying muscle edema, arterial spin labelling for assessing blood perfusion to muscles and proton spectroscopy for visualizing specific metabolites in central trigeminal pain pathways. By comparing brain and muscle metabolism in healthy and chronic temporomandibular disorder (TMD) patients, we aim to learn how local and central factors interact in a single individual to lead to the clinical presentation of persistent jaw muscle pain.

Acknowledgements: Peter Ness and Kate Beiler.

Funding Source: Internal funds from the UMN School of Dentistry made available to Dr. Moana-Filho.

15. Hemifacial Continuous Pain With Autonomic Symptoms: A Case Report

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Background: Hemifacial continuous pain with autonomic symptoms is a part of trigeminal autonomic orofacial pains. These have been described as pain attacks occurring in the orofacial region without concomitant headache but with characteristics and features of trigeminal autonomic cephalalgias. This condition presents as constant side-locked pain with associated autonomic features. The following is a case report of hemifacial continuous pain with autonomic symptoms.

Case presentation: 53-year-old male patient reported with continuous pain in the upper left dental quadrant for the last 4 years. The pain was described as aching and throbbing with an intensity of 5–6/10. Associated symptoms included conjunctival injection (especially on awakening), occasional rhinorrhea and awakening from sleep. He was unsuccessfully treated with root canal therapy/apicoectomy/extraction on teeth #14–15 along with antibiotics and nasal spray. A detailed examination of cranial nerves, cervical, masticatory muscles and intraoral structures was performed and found within normal limits. Brain magnetic resonance imaging (MRI) with and without contrast was unremarkable. Diagnosis of hemifacial continuous pain with autonomic symptoms was given with a trial of indomethacin. On 1-week follow-up, he reported complete pain relief at 25 mg tid. Pain returned upon stopping indomethacin. He reported occipital headache as adverse effect and ceased use. Sphenopalatine ganglion (SPG) block was performed, resulting in pain resolution for 8 hours. Patient is maintained on a combination of SPG blocks and gabapentin.

Conclusions: Trigeminal autonomic orofacial pain is rare and facial presentation of hemicrania continua not previously described. Knowledge of the condition is crucial for diagnosis and successful treatment.

Acknowledgements and Funding Source: None.

16. Characterizing Patients With Traumatic Brain Injuries in an Orofacial Pain Clinic: A Case Series

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Background: Traumatic brain injuries (TBI) and temporomandibular disorders (TMD) are often co-occurring. Little published research addresses the topic of how TMD patients with TBI may be different than those without TBI.

Case series: As an initial step to exploring the interrelationship, we performed a retrospective record review of patients seen at the University of Minnesota from 2018–2023. Inclusion criteria were patients 18 years or older, evaluated by an orofacial pain faculty member, and who reported a history of TBI. 45 patients met the criteria. Gender distribution was predominantly female (84%) with average age of 42 years old (range 18–74). Upon evaluation, mean pain intensity was 4.5 (range 1–10). The most common TMD diagnosis was myofascial pain of the masticatory muscles (89%) with 24% attributing their pain to the injury. Average age of first reported traumatic brain injury was 30 years old (range 8–51) and 42% of patients reported experiencing multiple TBIs. The most common source of injury was vehicular (42%). The most common comorbid health conditions were mental health related: anxiety (44%), depression (40%) and post-traumatic stress disorder (PTSD) (18%). 14 patients (31%) reported no improvement in symptoms at the first follow-up visit, and 3 (7%) patients reported worsening of the symptoms.

Conclusions: While patient demographics and diagnoses were subjectively similar to our “regular” patients, the report of no improvement in symptoms at their first follow-up visit in a substantial proportion of TMD-TBI patients suggests having a TBI can negatively impact prognosis. Prospective observational research designed to explore this topic is needed.

Acknowledgements and Funding Source: None.

17. Oropharyngeal Squamous Cell Carcinoma With Presenting Symptoms Mimicking TMD: A Case Report

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Background: Oropharyngeal cancer anatomically involves the areas of the tonsils, base of tongue, soft palate, or the posterior pharyngeal wall. In the US, 90% of oropharyngeal cancers are oropharyngeal squamous cell carcinoma (OPSCC). Men are more affected than women (4:1). Tobacco smoking, alcohol and infection with human papillomavirus (HPV) are recognized as risk factors for developing OPSCC. Signs and symptoms include difficulty or pain in swallowing, pain in the throat and ear, or tinnitus. The muscles of mastication can be affected causing trismus.

Case presentation: A 56-year-old male presented to our clinic with 12-month history of left ear pain, tightness of the left jaw muscles and mild sore throat with 6-month history of gradually worsening limited mouth opening. The patient tried physical therapy (PT) and multiple pharmacological treatments without improvement. On exam, the patient had a 4 mm maximum opening, with palpable non-tender anterior cervical lymph nodes. The patient provided a previous magnetic resonance imaging (MRI) without contrast of the temporomandibular joints (TMJs) originally ordered by an oral and maxillofacial surgeon (OMFS) with a radiology report focusing on the condyles and disc position. Upon review of preexisting MRI, a large mass was identified in the left tonsillar area, extending to the left pterygoid muscle area. Patient was urgently referred back to the OMFS for a biopsy which revealed squamous cell carcinoma.

Conclusions: Recognizing “red flags” within a patient’s history of present illness is essential for identifying potential serious conditions that might resemble a primary temporomandibular disorder (TMD). Correct diagnosis is critical

prior to initiating fundamental TMD treatments, which could potentially be lifesaving for the patient.

Acknowledgements and Funding Source: None.

18. Chronic Sinusitis of Actinomycosis as a Cause of Chronic Orofacial Pain: A Case Report

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Background: The goal of this report is to outline the diagnostic challenge in a case of chronic pain associated with actinomycosis sinus infection, emphasizing the need to consider this rare infection as a potential cause of persistent facial pain. Timely recognition is crucial to prevent unnecessary delays in diagnosis and pain management.

Case presentation: A 71-year-old woman, suffering severe left facial pain for two years despite multiple unsuccessful dental and surgical procedures, was referred to our center for further pain management. Previous multiple dental and acute left sinusitis related infections were confirmed in records. Oral-antral communication occurred after #15 extraction, followed by surgical closure. The original pain with sensitivity to palpation around the left edentulous alveolar ridge advanced to moderate with radiation to left ear and temple. Previous unsuccessful trials include tooth extraction, antiviral treatment and intermittent antibiotic treatments. Current low-grade fever with a history of dysgeusia and identification of hyperechoic signal in left frontal sinus in recent MRI led to the revisit of an endoscopic biopsy. Histological results confirmed the diagnosis of actinomycosis in the left paranasal sinus. Endoscopic surgery and a 6-month antibiotic course significantly improved her persistent pain.

Conclusions: Actinomycosis-induced sinusitis is a rare infectious disease caused by gram-positive anaerobes known as actinomyces. Its clinical characteristics, often presenting secondary facial pain, can be challenging to distinguish from sinusitis caused by other bacteria and fungi. Delayed clinical recognition may result in ineffective treatments, highlighting the importance of accurate diagnosis and evidence-based multidisciplinary management for better treatment outcomes.

Acknowledgements and Funding Source: None.

19. Eagle's Syndrome Mimicking Temporomandibular Joint Disorder Symptoms: A Case Report

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Background: Eagle's syndrome is commonly associated with anterolateral pain in the neck due to elongation of styloid process or stylohyoid ligament calcification. Because of its heterogeneous clinical presentations such as earache, tinnitus, difficulty swallowing, foreign-body sensation and pain, it is often misdiagnosed for several years and managed initially as other craniomandibular disorders including temporomandibular joint disorders.

Case presentation: We report the case of a 46-year-old male with a two-year history of left-sided dull, intermittent, ear pain with tinnitus. The patient also reported episodes of short-lasting sharp pain in the left ear while yawning, and progressive increase in tinnitus on swallowing. Turning the head in both directions and laying down significantly increased his pain and tinnitus. Previous consultations with multiple otolaryngologists led to a diagnostic magnetic resonance imaging (MRI) with attention to the internal auditory canal, however, no abnormalities were detected. On examination at our center, palpation of the cervical region behind angle of mandible on the left provoked similar ear

symptoms. Palpation of the left masseter muscle also resulted in familiar ear pain. Computed tomography (CT) imaging revealed elongated left styloid process with ossification of the left stylohyoid ligament. The patient had surgical correction of elongated styloid process on the left side and thereafter reported no pain on yawning, swallowing or during neck movements. His tinnitus reduced mildly in intensity, though did not subside completely.

Conclusions: Clinicians should consider Eagle's syndrome as a differential diagnosis in patients presenting with non-specific chronic orofacial symptoms for timely diagnosis and favorable clinical outcomes.

Acknowledgements and Funding Source: None.

20. Development of a Machine-Learning-Based Screening Model for Detecting TMJ MRI Abnormalities Using TMJ Tomographic Imaging

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Aim of investigation: Panoramic radiography devices generate tomographic temporomandibular joint (TMJ) images in open and closed positions, herein referred to as TMJ panoramic images, potentially revealing TMJ magnetic resonance imaging (MRI) abnormalities without MRI scans. Therefore, this study aims to evaluate the potential of TMJ panoramic images, using machine-learning-based detection, as a screening method for MRI-detected TMJ pathologies.

Methods: We acquired 1356 datasets (305 normal and 1051 with TMJ MRI abnormalities) by taking both TMJ panoramic images and MRI. The artificial intelligence (AI) models were developed using a ResNet18 backbone for multimodal learning, and their performance was evaluated based on accuracy, precision, recall, F1-score and area under the receiver operating characteristic curve.

Results: The TMJ panoramic images underwent processing through an image feature extractor, followed by information concatenation and classification with clinical features, including limited mouth opening and joint sound. The model achieved performance metrics of 0.772, 0.815, 0.836, 0.825 and 0.810, demonstrating a higher efficiency in detecting TMJ MRI abnormalities compared to ruling them out, thus confirming its potential as an effective screening tool for identifying possible abnormalities.

Conclusions: This study developed and validated a multidimensional screening model, combining TMJ panoramic images and clinical features, to improve screening for TMJ MRI abnormalities and inform the need for additional MRI in dental practice. For clinical applications, AI model require validation on multicenter data.

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21. Trigger Point Injection as an Adjunctive Therapy for the Management of Myofascial Pain in Patients Treated for Head and Neck Cancers: A Case Series

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Background: Head and neck cancer (HNC) treatments can cause myofascial pain (MFP) of the masticatory and cervical muscles, which reduces quality of life. Unfortunately, symptoms can be overlooked, and many patients do not receive appropriate pain management. Trigger point injection (TPI) is a safe, adjunctive, non-pharmacologic treatment that can reduce symptoms of MFP. TPIs help reduce pain, improve range of motion, and improve masticatory function.

Case series: Two patients, who were diagnosed with squamous cell carcinoma (SCC) of the oral mucosa, and one patient, who was diagnosed with right tonsillar SCC, developed MFP of the masticatory and cervical muscles post-cancer treatment, which included a combination of surgery, radiation therapy, chemotherapy and/or immunotherapy. TPIs were completed using 1% lidocaine plain and a maximum of 0.5 cc injected into each site. On occasion, greater and lesser occipital nerve blocks were also performed. Patients reported >50% pain in relief in their jaw and neck pain, with many visits showing almost complete pain relief. Pain relief lasted 1 week to 2.5 months. All patients were instructed to perform physical therapy exercises during their treatment. In addition, patients had an average improvement of 5.5 mm in their mouth opening after the injections.

Conclusions: TPIs are a safe, cost-effective adjunctive tool to help improve MFP in patients treated for HNC. TPIs improve masticatory range of motion in those with radiation-induced trismus.

Acknowledgements and Funding Source: None.

22. Post-traumatic Trigeminal Neuropathic Pain After Alveoloplasty: A Case Report

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Background: Post-traumatic trigeminal neuropathic pain (PTNP) after alveoloplasty is not uncommon, and often does not respond to conservative treatment. An oral pathologist and an orofacial pain expert simultaneously treated the patient.

Case presentation: A 60-year-old female presented with a chief complaint of pain in the left maxillary alveolar ridge with a visual analog scale (VAS) number of 8/10. The pain was aggravated by stimulation through talking, eating, and rubbing the area with finger. The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) was used to evaluate for TMD condition. The pain did not fulfill the criteria. Based on pain history, the patient had received several extractions and an alveoloplasty in the preceding 3 months. The patient was prescribed gabapentin 100 mg at night. A mouthguard was fabricated for protecting the area from touch/stimulus, and delivering benzocaine 4% as a topical anesthetic. At subsequent visit, the patient reported additional pain on the left side of her posterior tongue. Clinical exam findings in the tongue were within normal limits. Patient's compliance with mouthguard was low, and was educated to use the topical and mouthguard at least 2 times daily. The gabapentin dose was increased to 3 times daily, oral moisturizing gel was prescribed, and patient reported reduction of pain to 4/10. Patient is still being followed-up.

Conclusions: This case-report highlights the potential benefits of interprofessional collaboration in relieving neuropathic pain and discusses the therapeutic mechanism. The findings indicate that systemic medications should not be considered as the only option for patients with PTNP, and topical anesthetics can be beneficial.

Acknowledgements and Funding Source: None.

23. Sex Differences in Musculoskeletal Pain Among Dental Students: A Cross-Sectional Study

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Aim of investigation: Sex-dimorphism is suggested for musculoskeletal (MSK) conditions, such that females may have higher frequency/intensity of MSK disorders than males. Despite the acknowledged susceptibility of dental students to MSK disorders due to ergonomic challenges inherent in their profession, there is limited understanding of sex differences within this occupational group. This cross-sectional study assessed sex differences in MSK-pain among dental students.

Methods: Frequency/intensity of MSK-pain across different body areas was investigated among dental students (Midwestern University-Illinois and University of Kentucky) *via* Nordic MSK questionnaire. MSK symptoms frequency/intensity were compared across sex and self-reported ergonomics (chi-square, ANOVA).

Results: Of 156 participants (65.4% females, 27.2 ± 3.6 y.o.), 96% and 57% reported MSK-pain in >1 body-area in the previous 12 months and 7 days, respectively. Females experienced significantly greater number of painful sites in the past week ($p = 0.010$, 95% CI 0.155–1.120), and more pain-related interference in neck ($p = 0.020$, 95% CI 0.036–0.418) and knees ($p = 0.026$, 95% CI 0.023–0.352) than males. Males reported higher prevalence of neck (63% vs. 42%, $p = 0.013$) and lower-back pain (61% vs. 41%, $p = 0.018$) in the past 12 months than females, despite no statistical difference in ergonomics. Differences in ergonomics did not influence MSK-pain frequency, but were correlated with pain-intensity for neck ($p < 0.001$), shoulders ($p = 0.032$) and upper-back ($p = 0.021$).

Conclusions: Females seemed to experience more recent pain, males reported higher frequency of pain in the past. This emphasizes the need of specific interventions and ergonomic measures tailored to both male and female dental students, aiming to mitigate MSK-pain and improve the overall MSK well-being in this occupational group.

Acknowledgement/Funding Source: None.

24. Migraine and Headache Attributed to Temporomandibular Disorders: A Prospective Case-Control Study

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Aim of investigation: Migraines are highly comorbid with temporomandibular disorders (TMD). However, the association between Headache Attributed to TMD (TMDH), which is a secondary headache, and migraine, a primary headache, is unknown. This study investigates the presence of migraine in patients with chronic TMD with and without TMDH.

Methods: In the prospective case-control study, the cases had TMD and TMDH (TMD + TMDH), while the controls had TMD without TMDH (TMD – TMDH). All subjects completed questionnaires that screened for primary headaches, widespread pain, anxiety, depression, pain intensity and pain interference. Statistical analysis was conducted using the Chi-square test.

Results: A total of 15 cases and 15 controls were included in the study. 87% ($n = 13$) of cases and 93% ($n = 14$) of controls were females, with a mean age of 41 years (range:18–66 years) for the cases and a mean age of 48 years (range:18–69 years) for the controls. 93% ($n = 14$) of the cases and 87% ($n = 13$) of the controls had both myalgia and

arthralgia. The mean TMD pain duration for cases and controls was 9.75 (range of 3 months to 25 years) and 7.41 (range of 4 months to 31 years) years respectively. The mean TMD pain intensity for the cases and controls was 6 (range of 3 to 8) and 5 (range of 3 to 10) respectively. Self-reported migraine was not significantly different between cases (60% (n = 9)) and controls (40% (n = 6)) ($p = 0.273$).

Conclusions: This study suggests that high prevalence of migraine in patients with TMD is independent of the presence of TMDH.

Acknowledgements and Funding Source: American Academy of Orofacial Pain.

25. Secondary Trigeminal Neuralgia: Two Case Reports and a Literature Review

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Background: Trigeminal neuralgia (TN) is a chronic pain disorder characterized by sudden, recurring, unilateral electric shock-like pain. TN can be either idiopathic or secondary, with TN pain conditions being rare and often ambiguous. Secondary TN arises from underlying medical conditions that may inadvertently be overlooked.

Case presentation: Two cases were referred to an orofacial pain specialist due to persistent pain despite multiple dental treatments. Case 1 involved a 49-year-old male experiencing severe right-sided facial pain, diagnosed as secondary TN caused by an intracranial epidermoid cyst following comprehensive medical history, clinical examination, and diagnostic imaging. Case 2 featured a 40-year-old female with acute stabbing pain in the right eye and temporal area, determined to be atypical facial pain and right V1/2 atypical neuralgic pain secondary to multiple sclerosis after extensive evaluation, including fluoroscopic-guided lumbar puncture and diagnostic imaging.

Conclusions: TN, a debilitating chronic pain condition affecting the trigeminal nerve, often leads patients to seek initial evaluation from dentists. It is imperative for dentists to conduct a thorough intraoral examination to exclude other potential pathologies. In cases where no definitive odontogenic cause is found, referral to a physician, neurologist or orofacial pain specialist is advisable for further assessment and management.

Acknowledgements and Funding Source: None.

26. A Rare Case of Tensosynovial Giant Cell Tumor in the Temporomandibular Joint Area

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Background: In the head and neck region, the occurrence of tensosynovial giant cell tumor (TGCT) is extremely unusual, and it is particularly infrequent in the temporomandibular joint (TMJ) and the base of the skull compared to other areas. This report aims to describe a rare case of TGCT which presented atypical symptoms of pain and swelling.

Case presentation: A 65-year-old male presented with the chief complaint of left side TMJ pain with swelling since last 4 months. The clinical examination showed mild TMJ swelling with continuous moderate to severe pain on palpation, dull in nature, and was in the left preauricular region with referral to the temporal and masseter region. The patient had maximum mouth opening of 23 mm with pain with restricted lateral and protrusive movements. The panoramic radiograph showed flattening of the left condylar head and TMJ magnetic resonance imaging (MRI) was

ordered during to evaluate hard and soft tissues. The patient had tried home care measures, jaw exercises, pharmacotherapy and oral stabilization device. MRI showed a large low-signal intensity mass within the left TMJ with extension and involvement of the adjacent soft tissues and left masticator space. The final diagnosis was proved with the help of biopsy which confirmed the diagnosis of diffuse type TGCT with calcification and chondroid metaplasia.

Conclusions: All the cases require thorough history taking, careful examination and correct diagnostic studies to reach definitive diagnosis and provide proper management and save the patient from life-threatening conditions.

Acknowledgements and Funding Source: None.

27. Differentiating Between Symptomatic Irreversible Pulpitis and Trigeminal Neuropathic Pain: Assessment of a Novel Method for Collecting Data on the Temporal Patterns of Pain

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Aim of investigation: Evaluate a novel method for chairside collection of data on the temporal qualities of painful symptoms of symptomatic irreversible pulpitis (SIP) and trigeminal neuropathic pain (TNP) to determine: the ease with which subjects are able to depict temporal pain patterns using the method. What differences exist between the temporal patterns of TNP and SIP. Whether the temporal patterns recorded by the collection method can be differentiated.

Methods: TNP and SIP were diagnosed based on history and clinical exam (SIP and TNP), response to vitality testing and radiographs (SIP only), and treatment history (TNP only). Subjects were guided through a process that helped them produce time dependent pain plots. The ease with which these plots were made was compared against subjects' diagnosis, demographic and basic disease history data. Plots were sorted by blinded board certified specialists in oral medicine and endodontia to test whether they could be differentiated. Data was analyzed through a combination of unpaired *t*-test, Chi square test, or Fisher Exact test where appropriate.

Results: All 35 subjects were able to provide data with no or minimal assistance. Though not statistically significant, plots contained trends that may aid in differentiating between SIP and TNP. Clinical experts, using data collected from individual subjects' plots, are able to differentiate between SIP and TNP.

Conclusions: Subjects are able to plot the temporal pattern of their pain. Development of an easy to administer tool would serve as an aid in diagnosis of TNP, SIP, and possibly other pain conditions.

Acknowledgements and Funding Source: All funding provided by University of Washington.

28. Dental Conditions Influencing Tinnitus: A Scoping Review

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Aim of investigation: Dental conditions are frequently mentioned as influencing factors for tinnitus. Furthermore, tinnitus might develop after dental treatment or orthognathic surgery. Commonly prescribed medication by dentists can have tinnitus as a side effect. For clinical practice, dentists should know the current evidence of these possible relationships. This scoping review will provide an overview of the current literature investigating the relationship

between tinnitus and dental conditions to draw conclusions for clinical practice and identify gaps in the available evidence.

Methods: A search up to September 2023 was performed in Pubmed, Embase and Web of Science to identify all the articles dealing with the abovementioned relationship. The MeSH terms “tinnitus”, “stomatognathic diseases”, “anti-infective agents” and “oral surgery” were used. A total of 147 studies were selected.

Results: A higher prevalence of tinnitus in patients with temporomandibular disorder was found (between 35.8 and 60.7%) (n = 116), and several studies (n = 22) indicate an improvement in tinnitus symptoms after orofacial treatment. Only four case reports are published about the first-time occurrence of tinnitus after dental treatment or orthognathic surgery. For medication regularly prescribed by dentists, like aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) and the antibiotics amoxicillin and metronidazole, tinnitus has been reported as a side effect (n = 21).

Conclusions: When patients present with tinnitus, the dentist should investigate for signs of temporomandibular disorders (TMD) and check their medication, because both can influence the tinnitus complaints. The occurrence of tinnitus developed after dental treatment or orthognathic surgery should be further investigated.

Acknowledgments and Funding Source: None.

29. Temporal Tendonitis Misdiagnosed as Trigeminal Neuralgia: A Case Series

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Background: Temporal tendonitis (TT) is an orofacial pain condition characterized by inflammation of the temporalis tendon where it inserts into the coronoid process of the mandible. This condition often presents with a myriad of symptoms such as pain in teeth, eyes, sinus, *etc.* Patients often present with complaints of pain in these structures without any visible pathology, yet many healthcare providers are unfamiliar with TT because of the limited published data on this clinical entity. This may lead to diagnostic confusion often leading to iatrogenic harm and prolonged patient suffering.

Case series: This case series (45 y/o M, 47 y/o F, 54 y/o F) describes TT presenting as facial, sinus and orbital pain with symptoms of unilateral intermittent short-lasting pain at slight provocation during jaw function. Patients were previously evaluated in a neurological setting and diagnosed with intractable trigeminal neuralgia resistant to pharmacological management. Patient history and examination were consistent with TT. Diagnostic local anesthetic (LA) injection next to the temporalis tendon insertion alleviated all pain for short-term and was followed with injection with corticosteroid mixed with LA which eliminated all pain complaints and improved masticatory impairment. The patients were given self-care instructions and educated about their condition. At 2-, 4- and 6-week follow-up, patients reported resolution of their pain complaint.

Conclusions: The case series aims to contribute valuable insights into the nuanced aspects of TT often mimicking other facial pain conditions, offering healthcare professionals a deeper understanding of its clinical presentation and effective management strategies.

Acknowledgments and Funding Source: None.

30. Management of Burning Mouth Syndrome with Topical Capsaicin (Tobasco Sauce) Rinse: A Case Series

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Background: Burning Mouth Syndrome (BMS) is a chronic intractable orofacial pain condition characterized by the presence of near-constant burning sensation of the oral mucosa in the absence of a specific oral lesion. Besides burning sensation, patients with BMS also complain of oral mucosal pain, altered taste sensation, and dryness of mouth. This condition is of multifactorial origin, often idiopathic and its exact etiopathogenesis is still unclear.

Case series: This case series include four female patients with aged 45–74 years with a chief complaint of a burning sensation inside the mouth for over 1 year. Patient history and examination were consistent with BMS. Prior failed treatments included the use of antifungal agents, corticosteroid oral rinse and. All but one patient had tried clonazepam in the past but discontinued either due to intolerance or ineffectiveness. A 4-week trial of oral rinse with Tabasco sauce (diluted with water 1:1 to be used 3–4 times/day) was done. At 1-month follow-up at least 50% reduction in the pain was noted. At this time, they were started on 0.025% capsaicin oral rinse four times a day. At 3-month follow-up, patients reported 50–70% reduction in intraoral pain with improved quality of life. No side-effects were reported. Patients were educated on potential food and oral products which can potentially aggravate their pain symptoms.

Conclusions: BMS is a painful and often frustrating condition for patients affecting their quality of life. In patients who are resistant to traditional pharmacological treatments, topical capsaicin can be viable and effective treatment option.

Acknowledgments and Funding Source: None.

31. Artificial Intelligence-based Clinical Decision Support System for Orofacial Pain: Original Research

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Aim of investigation: Create a highly structured, machine learning-compatible, note-taking system with built-in clinical decision support (CDS) that will both improve the accuracy of the final diagnoses and the completeness of the encounter documentation.

Methods: This note taking system is a point-of-care data entry system. It uses Bayesian modeling based on a database of clinical encounters that currently has over 1020 records. There are two distinct interacting algorithms that suggest (1) possible diagnoses and (2) what data to collect next, during the encounter. Our outcomes include both concordance between the expert's choices versus the algorithm's choices. We are actively examining how many user entry steps (click burden) are required to produce an average note.

Results: Concordance between expert and our algorithm was found at the >70% level and we are now examining each prediction failure and categorizing them as: (1) missing critical data in encounter notes; (2) expert did not choose a diagnosis that the database supports; (3) no disease-defining features for a diagnosis have yet been identified or collected for the patient's diagnosis; and (4) too few case examples to create a valid set of critical data types and values for a diagnosis. We are also conducting detailed feature engineering on a diagnosis-by-diagnosis basis to improve the algorithm accuracy, after which we will cross-validate the results.

Conclusions: Our note-taking system provides valuable lists of suggested differential diagnoses and useful, interactive next-data-point guidance. As the database grows, its performance is expected to improve steadily.

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32. The Value of a Stepped Combination Rescue Therapy Approach for Medication-Resistant

Intractable Migraine Management: A Case Report

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Background: Medication-resistant intractable migraines leave healthcare providers and patients feeling frustrated and hopeless, while burdening our healthcare system and society with emergency room (ER) visits and workplace absenteeism. This case report aims to demonstrate the value of offering rescue therapies when conventional migraine treatments have failed.

Case presentation: A 26-year-old female patient was self-referred for a 2-week medication-resistant intractable migraine that was negatively affecting her quality of life and work attendance. Her neurologist had exhausted conventional migraine treatment options resulting in a recent ER visit for pain management. The patient had a 10-year history of chronic migraines, anxiety and temporomandibular joint (TMJ)-related disorders managed with medications and oral appliance therapy. Medical history and exam otherwise unremarkable. Patient instructed to continue existing medication protocols during rescue therapy trial. Week 1: intractable migraine aborted after 3 sphenopalatine ganglion (SPG) blocks using Tx360® (FDA-approved nasal applicator) to administer 0.3 cc 2% xylocaine per nostril. Week 8: patient resumed full-time work schedule and reported migraine improvement by following a stepped combination therapy plan consisting of patient education, SPG blocks, non-invasive vagal stimulation, complementary therapies, physical therapy, topical medications, trigger point injections, temporary medical leave, anxiolytic medication modifications under physician supervision, temporary oral appliance and psychotherapy. Week 12: sustained improvements reported. No ER visits or complications reported during the 8 weeks of therapy.

Conclusions: For medication-resistant intractable migraine patients, a custom stepped combination rescue therapy approach may be a valuable tool to reduce ER visits, workplace absenteeism and to restore quality of life.

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33. Difference in Musculoskeletal Pain Across Dental Training Years: A Cross-Sectional Study

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Aim of investigation: Musculoskeletal (MSK) disorders are among the most significant occupational health issues for dental professionals, starting as early as during dental school. This cross-sectional study investigated evolution of MSK among dental students.

Methods: Nordic MSK questionnaire was sent through REDCap to all dental students at Midwestern University-Illinois and University of Kentucky to assess location, frequency and intensity of MSK pain. MSK pain was compared between preclinical (1st–2nd year, on manikins) and clinical (3rd–4th years, on patients) training years with chi-square and *t*-test.

Results: 156 participants (65.4% females, 27.2 ± 3.6 y.o.) completed the study (73.8% preclinical, 26.3% clinical-students). Despite no statistical difference in self-reported ergonomics, age and sex, clinical-students reported significantly greater number of painful body sites ($p < 0.001$), frequency of MSK-pain, and pain-related interferences than preclinical-students. Specifically, clinical-students reported greater frequency of upper-back (96% vs. 15%, $p < 0.001$), shoulder (83% vs. 20%, $p < 0.001$), hip (73% vs. 44%, $p = 0.002$) and knee (78% vs. 31%, $p < 0.001$) pain in the past 12 months. No significant difference was found in jaw pain experience. Conversely, preclinical-students

reported more lower-back (54% vs. 32%, $p = 0.015$) and neck pain in the past 12 months (57% vs. 27%, $p < 0.001$). Clinical-students sought significantly greater treatment for their lower-back pain compared to preclinical students (46% vs. 17%, $p = 0.014$).

Conclusions: MSK-pain experience was more prevalent among clinical-students as they approach patient-based clinical care. MSK-related pain investigation and interventions should be offered through dental training to possibly address a higher frequency of MSK symptoms as clinical care progresses.

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34. Persistent Pain After Temporomandibular Joint Surgery: A Retrospective Cohort Study Documenting Clinical Characteristics, Comorbidities and Risk Factors

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Aim of investigation: Temporomandibular joint (TMJ) surgeries are generally beneficial in improving mandibular range of motion but are not universally helpful in reducing or eliminating pain. This study's aim is to document the characteristics of persistent postoperative pain (PPP) and to identify risk factors and comorbidities for developing persistent pain after TMJ total joint replacement (TJR).

Methods: This is a retrospective cohort study of patients who underwent TJR between 2000–2018 at Massachusetts General Hospital. Data on demographics, TMJ surgeries, pain, comorbidities and medication use was collected. Statistical comparisons were performed using the student *t*-test for continuous variables and the χ^2 test for categorical variables.

Results: 89 patients were included. The mean follow-up was 4.16 years. 76.4% of patients continued to have PPP after TJR; 32.4% of these patients had severe PPP. Pain characteristics varied between myofascial, neuropathic, and mixed, with a majority of myofascial pain characteristics. 63.2% of patients with PPP continued to take pain medications. Significant difference was noted between patients with and without PPP in terms of smoking behavior ($p = 0.0004$); and use of opioids ($p = 0.0002$), nonsteroidal anti-inflammatory drugs (NSAIDs) ($p = 0.00008$), muscle relaxants ($p = 0.001$) and neuropathic pain medications ($p = 0.018$).

Conclusions: This study's findings suggest that care should be taken in pursuing TMJ surgery in patients with high preoperative pain scores, other chronic pain conditions, opioid use and mood disorders. Early recognition of PPP can prevent further, unnecessary surgeries. Patients who develop PPP can benefit from close follow-up by an interdisciplinary team to provide the best outcome.

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