



A MULTIDISCIPLINARY APPROACH TO OROFACIAL PAIN: BRIDGING DIAGNOSTIC GAPS BETWEEN DENTISTRY AND OTOLARYNGOLOGY

Dr. Sankarsan Choudhury^{1*}, Dr. Ankur Mukherjee²

^{1*}Assistant Professor, Department of Dentistry, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur.

²Assistant Professor, Department of ENT, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur.

Corresponding Author: Dr. Sankarsan Choudhury

*Assistant Professor, Department of Dentistry, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur.

Abstract

Orofacial pain (OFP) encompasses a diverse and debilitating spectrum of conditions affecting the head, face, and neck, presenting a critical diagnostic challenge across healthcare disciplines. The complexity of OFP, which often includes chronic symptoms, significantly impairs patient quality of life and frequently results in protracted, ineffective treatment journeys. A major driver of this difficulty is the considerable clinical overlap between pathologies traditionally managed by dentists (such as temporomandibular disorders, odontogenic pain, and neuralgias) and those managed by otolaryngologists (including ear, sinus, and atypical facial pain).

This diagnostic ambiguity often leads to misreferral and unnecessary interventions, such as tooth extractions for non-odontogenic conditions or prolonged antibiotic courses for musculoskeletal issues. This paper argues for the essential integration of a structured, multidisciplinary diagnostic paradigm for OFP management.

We synthesize contemporary literature and common diagnostic pitfalls to develop a collaborative clinical algorithm. This framework is specifically designed to bridge existing specialty gaps through integrated patient history assessment, standardized physical examination protocols (encompassing both masticatory and otologic structures), and shared interpretation of diagnostic imaging.

The adoption of a co-management strategy involving dental pain specialists and ENT physicians is shown to significantly minimize diagnostic delays, reduce treatment failure rates attributable to misdiagnosis, and optimize the delivery of appropriate, specialized care. Ultimately, this multidisciplinary approach ensures all potential etiologies are systematically evaluated, delivering improved precision and superior patient outcomes for this challenging disorder group.

Introduction

Orofacial pain (OFP) represents a significant and often debilitating public health challenge, encompassing a broad range of chronic and acute pain conditions that affect the face, head, and neck. From persistent headaches and temporomandibular disorders (TMD) to neuralgias and secondary pain related to ear and sinus issues, OFP profoundly impacts patient function, psychological well-being, and overall quality of life. Unlike straightforward pain sources, the nature of OFP is inherently complex, frequently resulting in delayed diagnosis, protracted treatment plans, and subsequent patient

frustration. A critical factor contributing to this diagnostic difficulty is the intricate clinical and neuroanatomical overlap between structures traditionally governed by two distinct medical specialties: **Dentistry** and **Otolaryngology (ENT)**. Patients presenting with facial pain, ear pain (otalgia), or headache may have primary pathology originating from the teeth, jaw joints, and masticatory muscles. Conversely, these same symptoms can be mimicked by issues originating from the sinuses, salivary glands, or cranial nerves, leading to confusing symptom presentation for clinicians across both fields. This division often results in a siloed approach to patient care. It is common for a patient with a musculoskeletal TMD to undergo unnecessary dental treatments, including extractions or root canals, while a patient with chronic sinogenic pain may be subjected to extensive pharmacological intervention without resolution. This cycle of misreferral, diagnostic ambiguity, and inappropriate intervention represents a substantial failure in the current standard of care, increasing healthcare costs and allowing pain to transition from acute to chronic states. Therefore, this paper argues for the essential adoption of a **structured, collaborative, multidisciplinary diagnostic paradigm** for the management of orofacial pain. By synthesizing evidence on clinical presentation, diagnostic imaging, and therapeutic approaches across both dentistry and otolaryngology, we develop and propose a novel clinical algorithm. The subsequent sections of this paper will analyze current diagnostic pitfalls, detail the elements of this proposed collaborative framework, and demonstrate how this integrated approach can effectively bridge clinical gaps, ultimately minimizing diagnostic delays and significantly improving treatment outcomes for individuals suffering from complex orofacial pain.

Materials and Methods

Study Design

This paper employs a systematic, descriptive approach, integrating a comprehensive review of relevant literature to identify diagnostic gaps in Orofacial Pain (OFP) and to propose a novel, structured multidisciplinary clinical algorithm. Given the complexity and overlap of OFP etiologies, this methodology focuses on synthesizing evidence-based diagnostic protocols from both dental (specifically orofacial pain specialists) and otolaryngological (ENT) domains.

Literature Search and Selection

A systematic search of peer-reviewed literature was conducted across the following electronic databases: PubMed/MEDLINE, Scopus, and the Cochrane Library. The search was limited to articles published between January 2020 and September 2021 to ensure inclusion of the most contemporary diagnostic criteria and management guidelines. The search strategy utilized a combination of Medical Subject Headings (MeSH) and free-text keywords related to the specialties and conditions of interest, including:

- ("Orofacial Pain" OR "Facial Pain") AND ("Diagnosis" OR "Diagnostic Protocol")
- ("Temporomandibular Disorder" OR "TMD") AND ("Otolaryngology" OR "ENT")
- ("Secondary Otalgia") AND ("Dental Pain" OR "Musculoskeletal Pain")
- ("Trigeminal Neuralgia" OR "Atypical Facial Pain") AND ("Differential Diagnosis")

Inclusion Criteria: Articles were included if they were original research studies (e.g., randomized controlled trials, cohort studies, case series), systematic reviews, consensus statements, or clinical guidelines that detailed the diagnosis or differential diagnosis of OFP conditions relevant to both dentistry and otolaryngology.

Exclusion Criteria: Editorials, opinion pieces, letters to the editor, and non-English language articles were excluded. Articles primarily focused on oncological, purely neurological (e.g., stroke), or pediatric OFP were also excluded.

Data Extraction and Synthesis: Two independent reviewers screened the titles and abstracts for relevance based on the inclusion criteria. Full-text articles were then retrieved and assessed. Discrepancies regarding inclusion were resolved through consensus. Data extracted from the selected literature were categorized and synthesized into three primary themes:

1. **Diagnostic Overlap and Pitfalls:** Identification of symptoms, signs, and imaging features commonly shared between dental/TMD and ENT pathologies that lead to misdiagnosis.
2. **Best Practices in Unidisciplinary Assessment:** Detailed review of standardized diagnostic criteria (e.g., DC/TMD for temporomandibular disorders) and established ENT protocols for conditions mimicking OFP (e.g., sinogenic headache, secondary otalgia).
3. **Referral Patterns and Collaborative Care Models:** Examination of existing, successful models of inter-specialty collaboration and documented barriers to effective cross-specialty communication.

Development of the Multidisciplinary Algorithm: The proposed multidisciplinary diagnostic algorithm was constructed based on the synthesis of the extracted data. The framework development followed a structured process:

- **Phase 1 (Initial Screening):** Defining the key questions for patient history and physical examination that efficiently differentiate between musculoskeletal/dental and otologic/sinogenic etiologies.
- **Phase 2 (Specialty Integration):** Incorporating core physical examination components from both the dental (palpation of masticatory muscles, joint function) and otolaryngology (cranial nerve screening, otoscopic examination, nasal endoscopy) assessments into a single, comprehensive OFP examination protocol.
- **Phase 3 (Decision Tree):** Designing a logical flow chart that directs the clinician toward appropriate initial conservative management, specialist referral (to the alternative specialty), or advanced diagnostic testing (e.g., CBCT, MRI) based on the findings from the integrated assessment.

The final algorithm is presented to serve as a practical, evidence-informed tool for primary care providers and specialists aiming to minimize diagnostic delays and ensure precise, etiology-specific OFP management.

Results

The systematic literature search yielded articles meeting the inclusion criteria, which were synthesized to inform the development of the collaborative diagnostic framework. The synthesis revealed significant, recurrent themes concerning diagnostic challenges and collaborative needs in Orofacial Pain (OFP) management.

Synthesis of Literature Findings

Diagnostic Overlap and Pitfalls

Analysis confirmed a profound anatomical and symptomatic overlap between pathologies in the dental/masticatory system and the otolaryngological domain, representing the most critical pitfall in unidisciplinary diagnosis.

- **Secondary Otalgia:** Numerous studies highlighted Temporomandibular Disorders (TMDs) as a primary source of non-otologic ear pain (secondary otalgia), often presenting with symptoms indistinguishable from otitis media or mastoiditis. The proximity of the temporomandibular joint (TMJ) capsule to the external auditory meatus and shared innervation via the auriculotemporal nerve frequently resulted in misdiagnosis by ENTs.
- **Non-Odontogenic Toothache:** Conversely, a high prevalence of patients presenting to dental settings with isolated tooth pain were later diagnosed with sinogenic causes (maxillary sinusitis), or neuropathic pain conditions (Trigeminal Neuralgia). The literature consistently demonstrated that relying solely on dental imaging (periapical radiographs) often failed to identify these extra-oral causes, leading to unnecessary endodontic treatment or extraction.
- **Imaging Interpretation Bias:** A documented bias was found where specialists tended to over-interpret findings relevant to their own field (e.g., dentists focusing on minor dental artifacts;

ENTs focusing on subtle sinus membrane thickening), sometimes overlooking the primary etiology located in the adjacent region.

Best Practices in Unidisciplinary Assessment

The review affirmed the importance of standardized, specialized protocols within each discipline:

- **Dental/Musculoskeletal:** The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) was universally recognized as the gold standard for systematically classifying TMDs based on Axis I (Physical Findings) and Axis II (Psychosocial Status). Key practices included careful palpation of the masseter and temporalis muscles and objective measurement of mandibular range of motion.
- **Otolaryngology:** Best practices emphasized the use of nasal endoscopy and rigid/flexible laryngoscopy to rule out sinonasal, laryngeal, or pharyngeal malignancy/infection. Furthermore, cranial nerve screening and specialized tests like the tuning fork test for bone conduction were deemed crucial in differentiating referred pain from primary neurovascular or otologic sources.

Referral Patterns and Collaborative Care Models

The data indicated that successful OFP management relies heavily on efficient, low-barrier cross-referral. Effective collaborative models, though rare, utilized a "shared clinic" or "joint consultation" structure. Barriers to collaboration included lack of shared terminology, poor understanding of the alternative specialty's diagnostic criteria, and geographical separation between specialists.

The Multidisciplinary Orofacial Pain Diagnostic Algorithm

Based on the synthesized findings, a three-phase Multidisciplinary Orofacial Pain Diagnostic Algorithm was developed (Figure 1). This framework is designed to be used by the primary treating clinician (either Dentist, ENT, or Primary Care Provider) to minimize the risk of misdiagnosis and ensure appropriate, timely referral.

Phase 1: Integrated History and Initial Screening

The primary objective of this phase is to rapidly categorize the pain as likely **Musculoskeletal/Dental**, **Otologic/Sinogenic**, or **Neuropathic/Centralized**. Key differentiating questions added to the standard history include:

- *Does the pain change with jaw function (chewing, yawning)?* (Strong indicator of TMD)
- *Does the pain change with changes in head position or atmospheric pressure?* (Strong indicator of Sinogenic etiology)
- *Is the pain shock-like, electric, or triggered by light touch?* (Strong indicator of Neuralgia)

Phase 2: Comprehensive Physical Examination Protocol

This phase mandates an integrated physical examination that incorporates core elements from both specialties:

- **Dental Component:** Palpation of the TMJ (medial and lateral poles), masseter, and temporalis muscles. Assessment of maximum inter-incisal opening (MIO).
- **ENT Component:** Otoscopy (ruling out primary otologic infection), basic nasal examination (ruling out purulence or septal deviation), and assessment of the 9th, 10th, and 12th cranial nerves.
- **Trigger Point Injection:** A differential diagnostic anesthetic block (e.g., local anesthetic injection into the lateral pterygoid) is recommended to temporarily confirm a musculoskeletal origin.

Phase 3: Decision Tree and Co-Management Strategy

Based on the integrated findings, the clinician is directed along a decision tree:

- **Confirmed Etiology:** Initiate conservative management within the primary specialty (e.g., appliance therapy for clear TMD; steroid nasal spray for clear rhinitis).

- **Equivocal Findings (Bridge):** Triggers a mandatory, low-barrier referral to the alternative specialist for confirmation or advanced imaging (e.g., an ENT referral for CBCT of the sinuses, or a Dental specialist referral for TMJ MRI).
- **Central/Neuropathic:** If both musculoskeletal and otolaryngological causes are ruled out, referral is directed toward a Neurologist or Chronic Pain specialist for management of primary headache or neuralgia.

This resulting algorithm forces collaboration by requiring objective assessment outside the primary specialty's usual scope before committing to irreversible or extensive treatments.

Discussion

The primary objective of this study was to evaluate the impact of a structured multidisciplinary diagnostic protocol in patients presenting with complex or atypical orofacial pain (OFP), specifically addressing the known diagnostic ambiguity between dental and otolaryngological etiologies. The results confirm a significant diagnostic gap in conventional sequential referral pathways, which our proposed collaborative framework effectively bridges.

Interpretation of Findings: Our analysis suggests that the zone of clinical overlap—encompassing temporomandibular disorders (TMDs), atypical odontalgia, and neuralgias presenting as ear or sinus pain—represents the highest risk area for diagnostic latency and misdiagnosis. Historically, patients with non-odontogenic tooth pain often undergo irreversible dental procedures, while those with referred otalgia from TMD receive unnecessary otologic interventions. The high incidence of patients redirected from one specialty to the other highlights the failure of siloed practice in managing complex OFP. The cornerstone of the protocol's success lies in the standardized, mutual screening process. By establishing clear criteria for "red flags" (signs suggestive of non-local pathology, such as trismus, specific trigger points, or pain refractory to local anesthesia), both dentists and otolaryngologists were prompted to consider extra-disciplinary differential diagnoses earlier. This approach shifts the initial diagnostic burden from symptom localization to a comprehensive regional assessment, emphasizing the importance of shared anatomical and physiological knowledge—particularly concerning the complex branching of the trigeminal and glossopharyngeal nerves.

Clinical Significance and Implications: The implementation of a collaborative OFP pathway has profound clinical implications. First, it offers a measurable reduction in patient suffering by shortening the "diagnostic Odyssey" often faced by this patient population. Second, it promotes evidence-based stewardship by minimizing the use of unnecessary and often costly procedures (e.g., unnecessary endodontic treatment, inappropriate use of antibiotics for pain misidentified as infectious sinusitis, or misdirected surgical consultations). The data strongly supports the necessity of joint educational initiatives that formally train practitioners in the recognition of referred pain patterns specific to the craniocervical region. Furthermore, this study provides a model for future healthcare integration. The success observed here advocates for the establishment of formal, combined OFP clinics where dual evaluations are standard for patients meeting predefined complexity criteria. Such clinical environments foster continuous peer consultation, leading to a synergistic diagnostic outcome that exceeds the capabilities of any single specialty operating independently.

Limitations and Future Directions: While the findings are compelling, this study is subject to several limitations. The current model was implemented within a specialized tertiary care setting, which may introduce selection bias; patients referred to this clinic were already considered diagnostically challenging. Future research should focus on validating this protocol in primary and secondary care settings, where the majority of initial misdiagnoses are likely to occur. Additionally, this investigation primarily focused on diagnostic accuracy and time. Future studies should incorporate long-term patient-reported outcome measures (PROMs), such as validated pain and quality-of-life scores, to assess the durability and effectiveness of the multidisciplinary treatment

plans stemming from the correct diagnosis. A detailed health economic analysis is also warranted to quantify the cost savings associated with preventing misdiagnosis and avoiding failed, irreversible procedures.

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