

Charcot-Marie-tooth disease and oral health: A comprehensive review of clinical manifestations, dental management, and evidence-based recommendations

Allyn Johnson; Peter E Murray*; Franklin Garcia-Godoy

***Corresponding Author: Peter E Murray**

Independent Researcher, San Francisco, California 94102, USA.

Email: p_e_murray@outlook.com

Abstract

Charcot-Marie-Tooth Disease (CMT), also known as hereditary motor and sensory neuropathy, represents a heterogeneous group of inherited peripheral neuropathies affecting approximately 1 in 2,500 individuals worldwide. Despite its name, CMT does not affect tooth development or structure. Rather, progressive peripheral nerve degeneration produces motor and sensory deficits that profoundly influence oral health by impairing manual dexterity, mastication, swallowing, facial muscle function, and respiratory performance. Consequently, patients experience elevated risk for plaque accumulation, dental caries, periodontal disease, temporomandibular disorders, dysphagia, and aspiration-related complications during dental treatment. Advances in medical management have improved longevity and quality of life for individuals with CMT, enabling many to retain natural dentition into adulthood. Dental practitioners increasingly encounter these patients in clinical practice. Despite its prevalence, limited evidence-based literature exists regarding oral manifestations of CMT or standardized management approaches. Most recommendations are extrapolated from broader literature on special care dentistry, neuromuscular disease, and dysphagia management. This review synthesizes current knowledge regarding the genetic basis and pathophysiology of CMT, examines oral and craniofacial manifestations, and discusses practical considerations for preventive, restorative, prosthodontic, surgical, and anesthetic care. Emphasis is placed on individualized treatment planning, interdisciplinary collaboration, and preventive strategies that minimize disease progression while maximizing patient safety. Enhanced awareness of oral implications enables dentists to provide comprehensive care that preserves oral function and improves quality of life for affected individuals.

Keywords: Charcot-Marie-tooth disease; Hereditary motor and sensory neuropathy; Oral health; Dentistry; Special care dentistry; Dysphagia; Peripheral neuropathy; Temporomandibular disorders.

Abbreviations: CMT: Charcot-Marie-Tooth disease.

Introduction

Charcot-Marie-Tooth disease (CMT) is one of the most prevalent inherited neurologic disorders worldwide, yet its implications for oral health remain underrecognized within the dental profession. First described independently by Jean-Martin Charcot and Pierre Marie in France, and Howard Henry Tooth in England in 1886, CMT encompasses a genetically diverse group of hereditary peripheral neuropathies characterized by progressive degeneration of motor and sensory nerves [1-3]. The disorder affects approximately 1 in 2,500 individuals worldwide and has been identified across virtually all ethnic and geographic populations [4]. Although clinical severity varies considerably depending on the underlying genetic mutation, progressive distal muscle weakness, sensory loss, impaired proprioception, and skeletal deformities remain the defining clinical characteristics.

For many dental professionals, CMT represents an unfamiliar diagnosis. Most predoctoral dental curricula devote limited attention to hereditary neuropathies, resulting in inadequate awareness of their effects on oral health and dental treatment. Consequently, dentists may focus primarily on the patient's obvious orthopedic limitations while overlooking important neuromuscular changes that directly influence oral hygiene, swallowing, airway management, and restorative treatment planning.

Compounding the lack of familiarity with CMT is the misleading terminology associated with the disease. Because the disorder bears the term; Tooth, patients and healthcare providers occasionally assume that it affects the dentition itself. This misconception may generate unnecessary anxiety among patients and contribute to confusion during dental consultations. In reality, CMT does not alter odontogenesis, enamel formation, dentin development, or tooth eruption. Rather than producing intrinsic abnormalities of dental hard tissues, the disease exerts its oral effects indirectly through progressive deterioration of neuromuscular function [1,2].

The consequences of this distinction are clinically significant. As hand weakness progresses, patients gradually lose the fine motor coordination necessary for effective toothbrushing and interdental cleaning. Weakness of the muscles of mastication may reduce chewing efficiency, while cranial nerve involvement in certain disease subtypes can impair facial expression, swallowing, and airway protection [5]. Respiratory muscle weakness, fatigue, and reduced mobility further complicate routine dental care, requiring thoughtful modifications in appointment scheduling, patient positioning, anesthesia selection, and aspiration prevention. Collectively, these functional impairments increase susceptibility to dental caries, periodontal disease, tooth loss, and treatment-related complications despite otherwise normal tooth development [6].

Fortunately, advances in genetic diagnosis, multidisciplinary rehabilitation, respiratory care, and supportive therapies have significantly improved the life expectancy and quality of life of individuals living with CMT [7]. As a result, increasing numbers of affected patients are retaining their natural dentition into older adulthood, making comprehensive preventive and restorative dental care more important than ever. This demographic shift underscores the need for dental practitioners to understand both the systemic manifestations of CMT and their implications for long-term oral health.

Although the neurologic aspects of CMT have been extensively investigated, relatively little attention has been devoted to its oral manifestations. Published reports largely consist of isolated case reports, small observational studies, and extrapolations from broader literature involving neuromuscular disorders and special care dentistry [8,9]. Consequently, evidence-based clinical guidance remains limited, and dentists must frequently integrate principles from multiple disciplines when developing individualized treatment plans.

The purpose of this review is to provide a comprehensive overview of the relationship between Charcot-Marie-Tooth disease and oral health. Specifically, this article reviews the genetic and pathophysiologic basis of the disease, summarizes its oral and craniofacial manifestations, and presents practical recommendations for preventive, restorative, prosthodontic, surgical, and anesthetic management. By recognizing the unique challenges associated with CMT and adopting patient-centered treatment strategies, dental professionals can reduce oral disease burden, improve treatment safety, and enhance quality of life for individuals living with this lifelong neurologic disorder. A summary of the dental management and clinical considerations for treating CMT is shown in Table 1.

Genetics, Pathophysiology, & Oral Manifestations of Charcot-Marie-Tooth Disease

Genetics and disease classification

Charcot-Marie-Tooth disease is not a single disorder but rather a heterogeneous group of inherited peripheral neuropathies caused by mutations in more than 100 genes involved in the development, maintenance, and function of peripheral nerves [10,11]. These mutations disrupt either the myelin sheath surrounding peripheral axons or the axons themselves, resulting in progressive motor and sensory dysfunction. Although considerable genetic diversity exists, four major categories account for the majority of clinically diagnosed cases.

CMT1 represents the most common subtype, accounting for approximately 50–60% of all cases, and is characterized by primary demyelination of peripheral nerves. Most patients with CMT1 harbor a duplication of the *PMP22* gene on chromosome 17, resulting in abnormal myelin production and markedly reduced nerve conduction velocities (typically <38 m/s) [12,13]. CMT1A, caused by *PMP22* duplication, demonstrates autosomal dominant inheritance and typically manifests during the first or second decade of life with distal muscle weakness, foot deformities (pes cavus), and areflexia [13].

CMT2 is primarily an axonal neuropathy in which degeneration of the axon predominates despite relatively preserved myelin. Mutations in the *MFN2* gene (mitofusin 2) are among the most common causes of this subtype and frequently produce more severe motor impairment than demyelinating forms [14]. Nerve conduction velocities remain relatively normal (>38 m/s), but compound muscle action potential amplitudes are reduced, reflecting axonal loss [14].

X-linked CMT (CMTX) results most commonly from mutations in *GJB1*, which encodes connexin 32, an essential gap junction protein involved in Schwann cell function. CMTX1 accounts for approximately 10–15% of all CMT cases and represents the second most common form overall [15]. Because of its X-linked

inheritance pattern, affected males typically exhibit more severe clinical manifestations than heterozygous females, who may demonstrate mild symptoms or remain asymptomatic [15].

Less common autosomal recessive forms, collectively designated CMT4, often present during childhood with earlier onset, more rapid progression, and greater functional disability. Although individually rare, these variants highlight the remarkable genetic complexity underlying inherited peripheral neuropathies [16]. CMT4 subtypes may include severe demyelination, axonal degeneration, or mixed pathology depending on the specific genetic mutation.

Despite these genetic differences, the clinical implications for dental practitioners are remarkably similar. Progressive muscle weakness, impaired sensory feedback, diminished coordination, and reduced endurance ultimately compromise nearly every neuromuscular function required to maintain oral health. A summary of the CMT subtypes and dental implications is shown in Table 2.

Pathophysiology relevant to dentistry

Peripheral nerve degeneration underlies virtually every oral manifestation of CMT. As motor neurons progressively lose function, denervation leads to muscle atrophy, weakness, and fatigue. Sensory nerve involvement produces diminished proprioception and reduced tactile discrimination, impairing patients' ability to perceive both limb position and oral stimuli [10,13].

Unlike many inherited disorders that directly alter craniofacial development or tooth formation, CMT affects the oral cavity indirectly by disrupting the neuromuscular mechanisms responsible for oral function. Consequently, the teeth generally develop normally, and enamel, dentin, cementum, and alveolar bone are not intrinsically affected by the underlying genetic mutation. Instead, secondary functional deficits progressively increase the risk of oral disease.

For dentists, this distinction is clinically important. Patients do not develop caries or periodontal disease because their teeth are genetically abnormal. Rather, they become increasingly unable to perform effective oral hygiene, chew efficiently, manipulate removable prostheses, or safely tolerate prolonged dental procedures. Understanding this mechanism shifts the clinical focus from restorative intervention toward prevention, adaptive care, and preservation of function. Disease progression generally begins in the lower extremities, producing foot deformities (pes cavus, hammer toes), gait abnormalities, and distal muscle weakness before involving the upper extremities [17]. Over time, weakness of the intrinsic hand muscles results in reduced grip strength, impaired fine motor coordination, tremor, and the characteristic claw hand deformity. These changes profoundly impair activities requiring precise hand movements, including toothbrushing, flossing, and denture manipulation [6].

Although cranial nerve involvement is less common than limb involvement, several CMT subtypes, particularly those with demyelinating features—demonstrate dysfunction of cranial nerves V (trigeminal), VII (facial), IX (glossopharyngeal), X (vagus), and XII (hypoglossal) [18,19]. Such involvement may affect mastication, facial expression, swallowing, speech, and airway protection, substantially increasing the complexity of dental treatment [18].

Oral and Craniofacial Manifestations

Impaired manual dexterity and oral hygiene

The decline in manual dexterity associated with CMT represents perhaps the single greatest threat to long-term oral health. Effective plaque removal requires precise, repetitive hand movements that gradually become difficult as muscle weakness progresses. Patients often report that they continue brushing with the same frequency but are no longer able to generate sufficient force or maintain adequate brushing technique to remove dental plaque effectively.

As functional impairment worsens, interdental cleaning becomes especially challenging because floss manipulation requires considerably greater finger coordination than conventional toothbrushing. Consequently, plaque accumulates preferentially along gingival margins and interproximal surfaces, increasing the incidence of gingivitis, periodontitis, proximal caries, and calculus formation [6,20].

Importantly, these oral complications should not be interpreted as evidence of poor patient motivation or neglect. Rather, they reflect progressive neurologic disability. Dentists should recognize this distinction and emphasize adaptive strategies rather than repeatedly reinforcing conventional oral hygiene instructions that patients may no longer be physically capable of performing.

Power toothbrushes with enlarged handles, customized grips fabricated from silicone or thermoplastic materials, water flossers, and caregiver-assisted oral hygiene frequently become necessary as disease progression limits independent self-care.^{21,22} Occupational therapists may also provide valuable recommendations for adaptive devices that improve hand function during oral hygiene procedures [23].

Masticatory dysfunction

Weakness of the muscles of mastication develops gradually in some patients with CMT and may significantly reduce bite force and chewing efficiency [18]. Fatigue of the masseter and temporalis muscles often leads patients to avoid foods requiring prolonged mastication, resulting in dietary modification toward softer, more processed foods that are frequently higher in fermentable carbohydrates [24].

Patients commonly compensate by chewing predominantly on one side of the mouth, producing uneven occlusal loading and localized tooth wear. Over time, these altered chewing patterns may contribute to muscular fatigue, temporomandibular discomfort, and diminished nutritional quality [25].

Reduced mastication also decreases the natural cleansing action provided by fibrous foods and salivary stimulation, indirectly increasing plaque retention and caries susceptibility [26].

Temporomandibular disorders

Although Temporomandibular Disorders (TMDs) are not universally associated with CMT, neuromuscular imbalance and altered mandibular function may predispose susceptible individuals to temporomandibular dysfunction. Muscle weakness, asymmetric chewing, altered occlusal loading, and chronic muscular fatigue may collectively contribute to joint instability and myofascial pain [25,27].

Patients may present with facial pain, joint tenderness, clicking or popping, limited mandibular opening, muscle tenderness, headaches, or fatigue during mastication. Because these symptoms may develop gradually, clinicians should routinely evaluate temporomandibular function during comprehensive examinations.

Conservative management remains the preferred approach and may include patient education, dietary modification, physical therapy, occlusal appliances when indicated, and pharmacologic management coordinated with the patient's physician [28].

Cranial nerve dysfunction

Although relatively uncommon, cranial nerve involvement significantly influences oral function when present.

Facial nerve (CN VII) weakness may impair lip competence, resulting in drooling, retention of food within the buccal vestibules, and diminished facial expression [18,19]. Food stagnation adjacent to posterior teeth increases localized plaque accumulation and periodontal inflammation while also creating social and psychological concerns for affected individuals.

Trigeminal nerve (CN V) dysfunction may reduce masticatory efficiency and compromise mandibular stability during chewing [18].

In advanced disease, dysfunction of the glossopharyngeal (CN IX), vagus (CN X), and hypoglossal (CN XII) nerves may impair swallowing, speech articulation, and tongue mobility [18,19]. These deficits substantially increase the risk of aspiration during routine dental procedures and require modification of standard treatment protocols.

Dysphagia and aspiration risk

Dysphagia is among the most clinically significant oral manifestations of advanced CMT because it directly affects patient safety during dental treatment. Weakness of the pharyngeal musculature compromises coordinated swallowing and may impair clearance of saliva, irrigation fluids, blood, and restorative materials from the oral cavity [29,30].

Patients may report coughing during meals, prolonged eating times, recurrent choking episodes, or frequent respiratory infections suggestive of silent aspiration. Dentists should specifically inquire about swallowing difficulties during the medical history because patients often fail to volunteer these symptoms [29].

Recognition of dysphagia should prompt modifications in clinical technique, including semi-upright chair positioning, meticulous high-volume evacuation, rubber dam isolation whenever feasible, and frequent opportunities for swallowing throughout treatment [30,31]. For patients with severe bulbar dysfunction or recurrent aspiration, consultation with the treating neurologist or speech-language pathologist may be appropriate before undertaking extensive dental procedures.

Xerostomia and medication-related oral complications

Although xerostomia is not a primary manifestation of CMT itself, many patients receive medications for neuropathic pain, muscle spasms, depression, anxiety, or sleep disturbances that reduce salivary flow. Tricyclic antidepressants (amitriptyline, nortriptyline), serotonin-norepinephrine reuptake inhibitors (duloxetine), anticholinergic agents, gabapentin, and pregabalin are well-recognized causes of medication-induced dry mouth [32,33].

Reduced salivary flow diminishes the buffering capacity, antimicrobial activity, and remineralization potential of saliva, increasing susceptibility to dental caries, candidiasis, halitosis, and mucosal discomfort [34]. Dentists should therefore review each patient's medication profile carefully and incorporate preventive strategies such as topical fluoride therapy, salivary substitutes, sugar-free xylitol products, and individualized dietary counseling when xerostomia is present [35].

Skeletal and craniofacial abnormalities

While CMT primarily affects peripheral nerves, chronic muscle weakness and imbalance may contribute to secondary skeletal changes. Foot deformities such as pes cavus and hammer toes are well-documented hallmarks of the disease [17]. Although less common, some patients may develop scoliosis, hip dysplasia, or postural abnormalities that complicate dental chair positioning and patient comfort during treatment [36].

Limited evidence suggests that craniofacial morphology is generally unaffected in most CMT patients. However, case reports have documented occasional associations with high-arched palates, which may influence speech, swallowing, and denture retention in edentulous patients [8,37]. Further research is needed to determine whether such findings represent true disease associations or incidental observations.

Comprehensive dental management

The successful dental management of patients with Charcot-Marie-Tooth disease extends far beyond treating caries or replacing missing teeth. Because CMT is a progressive neuromuscular disorder affecting multiple organ systems, clinicians must anticipate functional decline, modify treatment accordingly, and emphasize prevention throughout the patient's lifetime. Management should be individualized based on disease severity, degree of neuromuscular impairment, respiratory status, swallowing function, and the patient's ability to perform activities of daily living [6,38].

Optimal care often requires collaboration among dentists, neurologists, primary care physicians, physical and occupational therapists, speech-language pathologists, and caregivers. As disease progression varies considerably among patients, treatment plans should be reassessed periodically to ensure they continue to meet changing functional needs.

Comprehensive medical assessment

A thorough medical history forms the foundation of safe dental treatment. In addition to documenting

the diagnosis of CMT, clinicians should determine the specific disease subtype when known, duration of illness, current neurologic symptoms, mobility status, respiratory involvement, swallowing difficulties, and medications. Because many patients receive care from multiple specialists, communication with the treating neurologist may be appropriate before extensive restorative procedures, sedation, or oral surgery [38,39].

Questions that should routinely be included during the medical history include:

- Has your neurologist diagnosed a specific subtype of CMT?
- Do you experience difficulty swallowing food, liquids, or medications?
- Have you ever aspirated food or developed aspiration pneumonia?
- Do you require a wheelchair, walker, Ankle-Foot Orthoses (AFOs), or other mobility aids?
- Can you brush and floss independently, or do you require assistance?
- Do you experience excessive fatigue during prolonged appointments?
- Have you undergone pulmonary function testing or been diagnosed with respiratory muscle weakness?
- Do you use Continuous Positive Airway Pressure (CPAP) or Bilevel Positive Airway Pressure (BiPAP) therapy?
- What medications are you currently taking, and have any caused dry mouth or other oral side effects?

Answers to these questions will help identify patients requiring modifications in treatment planning or additional medical consultation.

Appointment planning and ergonomic considerations

Fatigue is a common but often underrecognized manifestation of CMT. Although many patients remain ambulatory for decades, prolonged physical activity may produce significant muscular exhaustion that limits tolerance for lengthy dental procedures [40]. Whenever possible, appointments should be scheduled during the morning when patients are generally less fatigued. Procedures anticipated to require extended treatment time should be divided into multiple shorter appointments rather than completed during a single prolonged visit. Scheduled rest breaks further reduce muscle fatigue and improve patient comfort.

Accessibility should also be considered throughout the dental office. Operatories should accommodate wheelchairs and walkers without unnecessary transfers. If transfers are required, staff should be trained in safe patient handling techniques to minimize the risk of falls or musculoskeletal injury [41]. Memory foam cushions, cervical support pillows, and adjustable headrests may improve comfort during longer procedures.

Because lower extremity deformities and orthotic devices may limit positioning, patients should never be forced into uncomfortable positions that exacerbate muscle pain or joint stiffness. Allowing patients to maintain their AFOs during treatment may improve stability and reduce anxiety.

Airway management and aspiration prevention

The protection of the airway represents one of the most important considerations during dental treatment of patients with advanced CMT. Dysphagia, impaired cough reflexes, and bulbar muscle weakness increase the risk of aspiration of saliva, irrigation fluids, restorative materials, and blood [29,30].

Before initiating treatment, clinicians should evaluate the patient's swallowing ability and history of choking episodes. Individuals with known dysphagia may benefit from treatment in a semi-upright position (30–45 degrees) rather than complete supine positioning. This simple modification often improves airway protection while enhancing patient comfort [31].

Whenever feasible, rubber dam isolation should be used during restorative and endodontic procedures because it significantly reduces the risk of aspiration and improves moisture control [42]. High-volume evacuation should be employed continuously to minimize accumulation of water and debris within the oral cavity. Patients should also be given frequent opportunities to swallow and rest during lengthy procedures.

For individuals with severe bulbar dysfunction, treatment plans should emphasize efficiency and avoidance of excessive irrigation. Consultation with the patient's physician or speech-language pathologist may be appropriate when significant aspiration risk is suspected. In some cases, a modified barium swallow study or Fiberoptic Endoscopic Evaluation of Swallowing (FEES) may have been performed, and results should be reviewed if available [29].

Local anesthesia and sedation

Local anesthesia is generally safe and well-tolerated in patients with CMT and remains the preferred anesthetic technique for most dental procedures. Current evidence does not suggest that commonly used dental local anesthetics (lidocaine, articaine, mepivacaine, prilocaine, bupivacaine) worsen peripheral neuropathy when administered appropriately [39,43]. However, clinicians should be aware that some patients with CMT may have altered pain perception due to sensory neuropathy, potentially requiring adjustments in anesthetic administration or dosing. Careful aspiration technique should always be employed to minimize the risk of intravascular injection.

Sedation requires greater caution. Patients with respiratory muscle weakness may exhibit diminished ventilatory reserve, increasing their susceptibility to respiratory depression following administration of benzodiazepines, opioids, or other sedative medications [44,45]. Careful patient selection, continuous monitoring (including pulse oximetry and capnography when available), and adherence to established sedation guidelines are therefore essential [46].

Nitrous oxide inhalation sedation may be appropriate for carefully selected patients with mild disease and no significant respiratory compromise, although clinicians should evaluate respiratory function before administration. Patients with significant pulmonary compromise, sleep-disordered breathing, or advanced neuromuscular weakness may require treatment using local anesthesia alone [44].

When extensive oral surgery or comprehensive rehabilitation under general anesthesia is contemplated, consultation with the patient's neurologist and anesthesiologist is advisable to evaluate perioperative respiratory risk. Patients with CMT may have restrictive lung disease, reduced forced vital capacity, or sleep apnea that complicates anesthetic management [45,47]. Postoperative monitoring in a hospital or ambulatory surgical center with appropriate respiratory support capabilities may be necessary for high-risk patients.

Preventive dentistry

Preventive dentistry represents the cornerstone of oral health management for individuals with CMT. Because functional decline is progressive, waiting until oral disease develops often results in extensive restorative needs that become increasingly difficult to treat.

Professional maintenance

Patients should generally be maintained on supportive periodontal therapy every three to four months rather than the conventional six-month recall interval. Frequent professional maintenance allows early detection of plaque accumulation, gingival inflammation, root caries, and prosthetic complications before significant disease progression occurs [6,48].

During maintenance appointments, dental hygienists should perform thorough debridement, assess oral hygiene effectiveness, reinforce adaptive techniques, and apply topical fluoride varnish. Documentation of functional changes over time enables the dental team to anticipate future needs and modify preventive strategies proactively.

Individualized oral hygiene instruction

Individualized oral hygiene instruction should emphasize adaptive strategies rather than traditional techniques alone. Power toothbrushes consistently demonstrate superior plaque removal compared with manual toothbrushes in many patient populations and require substantially less manual dexterity [21,49]. Sonic and oscillating-rotating power toothbrushes have both demonstrated efficacy, and patient preference should guide selection [49].

Enlarged handles, bicycle grip modifications, silicone sleeves, or custom-fabricated adaptive devices further improve grasp for patients with intrinsic hand weakness. Occupational therapists can provide valuable assistance in designing individualized adaptations [23,50].

Interdental cleaning may be accomplished more effectively with water flossers (oral irrigators) or floss holders than with conventional dental floss, particularly for patients exhibiting significant hand

dysfunction [22]. Water flossers have demonstrated efficacy in reducing gingivitis and plaque when used as an adjunct to toothbrushing and may be particularly beneficial for patients with limited dexterity [21,51].

Chemotherapeutic agents

Patients at elevated caries risk should receive topical fluoride varnish applications (5% sodium fluoride, 22,600 ppm) during maintenance appointments and daily use of prescription-strength 5,000 ppm fluoride toothpaste [52,53]. High-concentration fluoride therapy has demonstrated significant efficacy in preventing root caries and reversing early enamel lesions, making it particularly valuable for patients with compromised oral hygiene [52].

Alcohol-free chlorhexidine mouthrinses (0.12%) or essential oil mouthrinses may provide additional plaque control when mechanical oral hygiene remains inadequate [54,55]. However, long-term chlorhexidine use may cause tooth staining and taste alterations, requiring periodic reassessment of risk-benefit balance.

For patients with significant xerostomia, salivary substitutes, sugar-free xylitol gum or lozenges, and prescription cholinergic agents (pilocarpine, cevimeline) may provide symptomatic relief and reduce caries risk [35,56].

Dietary counseling

Dietary counseling should emphasize reduction of fermentable carbohydrates while encouraging nutritionally balanced foods that promote mastication and salivary stimulation whenever medically appropriate. However, clinicians must recognize that patients with masticatory weakness or dysphagia may have limited dietary options and require consultation with a registered dietitian to balance oral health goals with nutritional needs and swallowing safety [24,57].

Caregiver education

As independence declines, caregiver education becomes increasingly important. Family members and caregivers should receive practical instruction regarding assisted brushing, denture hygiene, and recognition of early signs of oral disease. Demonstration of proper positioning, brushing technique, and aspiration prevention during assisted oral care is essential [58].

Caregivers should also be educated about the importance of maintaining regular dental appointments and monitoring for signs of oral infection, dental pain, or prosthetic complications that patients may not report independently.

Restorative dentistry

Treatment planning should prioritize preservation of natural tooth structure through minimally invasive restorative techniques whenever possible. Because many patients present with elevated caries risk resulting from impaired plaque control and xerostomia, restorative materials should emphasize durability, marginal integrity, and secondary caries prevention.

Material selection

Resin-modified glass ionomer cements (RMGICs) provide several advantages for cervical lesions and root caries because of their chemical adhesion to tooth structure, fluoride release, and moisture tolerance [59]. These properties make RMGICs particularly suitable for patients in whom optimal moisture control may be challenging.

Composite resin restorations remain appropriate for esthetically demanding areas when adequate isolation can be achieved. However, clinicians should recognize that prolonged procedures requiring extended mouth opening may be poorly tolerated by patients with masticatory muscle weakness or temporomandibular dysfunction.

High-viscosity glass ionomer cements may be considered for interim therapeutic restorations or Atraumatic Restorative Treatment (ART) in patients unable to tolerate conventional restorative procedures [60].

Timing of treatment

Whenever feasible, restorative treatment should be completed before neuromuscular deterioration significantly limits patient tolerance for prolonged dental procedures. Early intervention frequently reduces the need for complex rehabilitation later in life when functional limitations may preclude optimal treatment.

However, clinicians must balance the desire for early intervention with the recognition that overtreatment may be inappropriate for patients with stable disease and good preventive care. Individualized risk assessment should guide treatment timing.

Prosthodontic considerations

Replacement of missing teeth presents unique challenges for patients with CMT. Progressive hand weakness may impair the ability to insert, remove, and clean removable prostheses, while facial muscle weakness may reduce denture retention and stability [61].

Removable prostheses

Consequently, conventional removable partial dentures and complete dentures may become increasingly difficult to manage as neurologic impairment progresses. Patients should therefore be carefully evaluated for long-term functional ability rather than immediate prosthetic success alone.

When removable prostheses are indicated, design modifications may improve function:

- Simplified denture designs with fewer components
- Magnetic attachments or other retention aids that reduce manual dexterity requirements
- Extended handles or modifications to facilitate insertion and removal
- Regular follow-up to assess continued ability to manage the prosthesis [61,62]

Implant-supported restorations

When adequate bone volume, systemic health, and oral hygiene permit, implant-supported restorations may provide greater stability, improved masticatory efficiency, and enhanced patient satisfaction compared with removable prostheses [63,64]. Fixed implant-supported prostheses eliminate the need for daily insertion and removal, potentially extending the period of independent oral care.

Nevertheless, successful implant therapy depends upon the patient's ability, or that of a caregiver, to maintain meticulous plaque control throughout the lifespan of the restoration. Peri-implant disease represents a significant risk for patients unable to perform effective oral hygiene, and careful patient selection is essential [65].

Implant-supported overdentures may represent a compromise solution, providing improved retention and stability compared with conventional dentures while allowing removability for hygiene access. However, the manual dexterity required for overdenture management should be carefully assessed [66].

Oral surgery

Most routine oral surgical procedures can be performed safely in patients with CMT provided appropriate modifications are implemented. Particular attention should be directed toward airway management, patient positioning, hemostasis, and postoperative pain control.

Perioperative considerations

Preoperative medical consultation may be appropriate for patients with significant respiratory compromise, bleeding disorders, or those receiving anticoagulant therapy. Pulmonary function testing results, if available, should be reviewed before procedures requiring sedation or general anesthesia [45].

Local anesthesia remains the preferred technique for most dentoalveolar surgery. When sedation is considered, the risks discussed previously regarding respiratory depression must be carefully weighed against potential benefits.

Meticulous surgical technique, gentle tissue handling, and attention to hemostasis reduce postoperative complications. Suturing should be performed with materials and techniques that minimize the need for patient manipulation during healing.

Postoperative management

Following extraction or implant surgery, postoperative instructions should be communicated clearly to both patients and caregivers when necessary. Because diminished manual dexterity may impair postoperative oral hygiene, simplified written instructions and additional follow-up visits may improve healing and reduce complications [67].

Pain management should be coordinated with the patient's physician, particularly when patients are receiving medications for neuropathic pain that may interact with analgesics. Nonsteroidal anti-inflammatory drugs (NSAIDs) are generally preferred when not contraindicated, as opioids may exacerbate respiratory depression in patients with compromised pulmonary function [68].

Orthodontic considerations

Although orthodontic treatment is not commonly discussed in the context of CMT, adolescent and young adult patients may present for orthodontic evaluation. Orthodontic treatment can be successfully completed in patients with CMT, but several considerations warrant attention.

Oral hygiene maintenance during orthodontic treatment represents a significant challenge for patients with progressive hand weakness. Fixed appliances substantially increase plaque retention and require meticulous oral hygiene that may exceed the patient's functional capabilities [69]. Consequently, clear aligner therapy may represent a more appropriate option when indicated, as aligners can be removed for oral hygiene and reduce the risk of decalcification and periodontal complications [70].

A summary of the preventative protocols by CMT disease severity is shown in Table 3.

However, the ability to independently insert and remove aligners must be carefully assessed, as progressive hand weakness may eventually compromise compliance. Regular monitoring of oral hygiene effectiveness and early intervention for emerging problems are essential regardless of appliance selection.

Appointment length and frequency should be adjusted to accommodate fatigue, and communication with the patient's medical team may help optimize treatment timing relative to disease progression.

Interdisciplinary care and communication

Effective management of patients with CMT frequently extends beyond the dental office. The progressive, multisystem nature of the disease necessitates collaboration among multiple healthcare disciplines to optimize patient outcomes and safety [38,71].

Communication strategies

Effective interdisciplinary communication requires proactive outreach and documentation. When complex treatment is planned or when patient safety concerns arise, dentists should:

- Obtain written or verbal consultation from relevant specialists before proceeding
- Clearly communicate specific concerns and questions rather than requesting general medical clearance
- Document all consultations and incorporate recommendations into the treatment plan
- Provide specialists with updates regarding oral health status and treatment outcomes
- Establish protocols for emergency communication when urgent concerns arise [38]

This collaborative approach ensures that treatment decisions are informed by comprehensive understanding of the patient's overall health status and functional trajectory.

Clinical pearls and evidence-based recommendations

The following evidence-based clinical recommendations synthesize key principles that can improve patient safety and long-term oral health outcomes for individuals with CMT.

Essential clinical pearls

- **CMT does not directly affect tooth development or structure.** The disease does not alter enamel, dentin, cementum, or tooth eruption. Oral disease develops secondary to progressive neuromuscular impairment rather than intrinsic defects of the dentition [1,2].
- **Progressive hand weakness is the primary driver of oral health decline.** Declining manual dexterity limits effective plaque removal and should prompt early recommendations for adaptive oral hygiene devices rather than repeated conventional oral hygiene instruction [6,20].
- **Screen systematically for dysphagia.** Patients may not voluntarily report swallowing difficulties despite significant aspiration risk. Routine questions regarding choking, coughing during meals, prolonged swallowing, or recurrent pneumonia should be incorporated into every medical history update [29,30].
- **Position patients for safety and comfort.** Patients with bulbar dysfunction often tolerate treatment better in a semi-upright position (30–45 degrees), which also reduces aspiration risk compared with complete supine positioning [31].
- **Rubber dam isolation is a safety measure, not merely a convenience.** Rubber dams provide improved moisture control while substantially reducing the risk of aspiration of restorative materials, irrigation fluids, and debris [42].
- **Schedule shorter, more frequent appointments.** Neuromuscular fatigue frequently limits tolerance for lengthy procedures. Multiple shorter appointments often improve both patient comfort and treatment quality while reducing the risk of complications [40].
- **Medications frequently cause xerostomia.** Drugs prescribed for neuropathic pain (gabapentin, pregabalin, tricyclic antidepressants), depression, muscle spasms, and anxiety commonly produce dry mouth, increasing caries and candidiasis risk. Systematic medication review should occur at every visit [32,33].
- **Preventive interventions are most effective when implemented early.** Adaptive toothbrushes, water flossers, fluoride varnish, prescription fluoride toothpaste, and frequent periodontal maintenance are considerably more effective when initiated before significant functional decline occurs [48,52].
- **Evaluate long-term maintenance capacity, not just immediate treatment success.** Successful restorative and prosthodontic treatment depends not only on technical excellence but also on the patient's capacity to perform daily oral hygiene or obtain reliable caregiver assistance [61].

- **Interdisciplinary collaboration enhances outcomes.** Neurologists, speech-language pathologists, occupational therapists, physical therapists, and caregivers often provide valuable information that improves dental treatment planning and patient safety [38,71].

A summary of the medication review checklist is shown in Table 4.

Future directions and research needs

Despite remarkable advances in the genetic understanding of Charcot-Marie-Tooth disease, comparatively little research has focused specifically on its effects on oral health. Much of the current guidance available to dental professionals is extrapolated from broader literature involving special care dentistry, dysphagia management, and neuromuscular disorders rather than disease-specific investigations. As a result, significant gaps remain in the evidence base that warrant future research attention [8,9].

Epidemiologic research

Prospective epidemiologic studies are needed to determine the true prevalence and incidence of dental caries, periodontal disease, temporomandibular disorders, xerostomia, and tooth loss among individuals with CMT across different disease subtypes and severity levels. Existing literature consists primarily of case reports and small observational studies, limiting the ability to establish evidence-based clinical guidelines [8,9].

Large-scale multicenter studies comparing oral health outcomes between CMT patients and matched controls would provide valuable data regarding disease burden and help identify modifiable risk factors for intervention.

Intervention studies

Randomized controlled trials are needed to evaluate the effectiveness of specific preventive interventions in this population:

- **Adaptive oral hygiene devices:** Comparative effectiveness studies of power toothbrushes, water flossers, customized handles, and occupational therapy interventions specifically in patients with progressive hand weakness [21,22].
- **Fluoride protocols:** Optimal concentration, delivery method, and frequency of professional fluoride applications for patients with impaired oral hygiene [52].
- **Antimicrobial strategies:** Role of chlorhexidine, essential oils, and other chemotherapeutic agents as adjuncts to mechanical plaque control [54,55].
- **Recall intervals:** Evidence-based determination of optimal periodontal maintenance frequency based on disease severity and functional status [48].

Prosthodontic outcomes research

Longitudinal studies evaluating the long-term success of restorative materials and implant-supported prostheses in patients with CMT would provide valuable information for treatment planning. Progressive neuromuscular decline may influence prosthesis maintenance, oral hygiene effectiveness, and peri-implant health differently than in healthy individuals [63,64].

Research questions include:

- Implant survival rates and peri-implant disease incidence in CMT patients
- Comparative effectiveness of fixed versus removable implant-supported prostheses
- Patient-reported outcomes regarding function, satisfaction, and quality of life
- Optimal timing of prosthodontic intervention relative to disease progression

Technology and innovation

Advances in digital dentistry may improve care for patients with neuromuscular disorders, but specific applications require investigation:

- **Intraoral scanning:** Comfort, tolerance, and accuracy compared with conventional impressions in patients with limited mouth opening or gag reflex sensitivity [74].
- **CAD/CAM technology:** Ability to reduce appointment number and duration while maintaining restoration quality [75].
- **Teledentistry:** Feasibility and effectiveness of remote consultations, oral hygiene monitoring, and preventive counseling for patients with mobility limitations [76].
- **Artificial intelligence:** Machine learning algorithms to predict oral disease risk based on neurologic progression, medication use, and functional status [77].

Dysphagia and aspiration prevention

Despite the recognized importance of dysphagia in dental treatment safety, limited research has specifically examined aspiration risk during dental procedures in patients with neuromuscular disorders. Studies are needed to:

- Validate screening tools for identifying high-risk patients in the dental setting.
- Evaluate the effectiveness of positioning modifications, rubber dam use, and evacuation techniques in reducing aspiration events.
- Determine optimal protocols for dental treatment in patients with known severe dysphagia [29-31].

A summary of the aspiration risk assessment and management is shown in Table 5.

Quality of life research

Patient-reported outcome measures specific to oral health-related quality of life in CMT patients would provide valuable insights into the lived experience of oral disease and treatment. Understanding how oral health impacts social participation, nutrition, communication, and psychological well-being can help prioritize interventions that matter most to patients [78].

Interdisciplinary care models

Research evaluating different models of interdisciplinary care delivery could identify best practices for coordination among dentists, neurologists, therapists, and other healthcare providers. Comparative effectiveness studies of integrated versus traditional care models would inform healthcare system design and reimbursement policies [71].

Table 1: Dental management and clinical considerations.

Clinical challenge	Impact on dental care	Management strategy	Evidence level
Impaired Manual Dexterity	Ineffective plaque removal; increased caries and periodontitis risk	Prescribe power toothbrushes with customized bulky grips, water flossers, and high-fluoride (5,000 ppm) dentifrices; occupational therapy consultation	High [21,22,52]
Dysphagia & Bulbar Weakness	Heightened risk of saliva or water aspiration during treatment	Utilize rubber dams, high-volume evacuation (HVE), and maintain semi-upright patient position (30–45°); speech-language pathology consultation	High [29-31,42]
Respiratory Insufficiency	Compromised breathing; vulnerability to sedatives and respiratory depression	Avoid deep conscious sedation; utilize local anesthetics; monitor oxygen saturation; medical consultation before general anesthesia	High [44-46]
Medication-Induced Xerostomia	Reduced salivary flow; elevated caries and candidiasis risk	Fluoride varnish applications; prescription fluoride toothpaste; salivary substitutes; xylitol products	High [32,35,52,56]
Masticatory Weakness	Reduced bite force; dietary modifications toward soft, cariogenic foods	Dietary counseling; nutritional consultation; evaluate for TMD; conservative management	Moderate [24.25,28]
Ergonomic & Mobility Issues	Difficulty with transfers; chair positioning discomfort; fatigue	Schedule shorter appointments; use memory foam headrests; provide unobstructed paths for orthotics/wheelchairs; morning appointments preferred	Moderate [40,41]
Progressive Functional Decline	Decreasing ability to maintain complex restorations and prostheses	Early intervention; consider implants over removables when feasible; simplify prosthetic designs; caregiver training	Moderate [6,61,63,64]

Table 2: CMT subtypes and dental implications.

CMT subtype	Genetic basis	Inheritance	Prevalence	Key features	Dental considerations
CMT1A	PMP22 duplication	Autosomal dominant	50–60% of all CMT	Demyelinating; onset 1 st –2 nd decade; slow progression; pes cavus; areflexia	Gradual decline in manual dexterity; early adaptive device introduction; standard precautions
CMT1B	MPZ mutations	Autosomal dominant	~5% of all CMT	Demyelinating; variable severity; may include cranial nerve involvement	Screen for facial weakness and dysphagia; modify positioning as needed
CMT2A	MFN2 mutations	Autosomal dominant	Most common CMT2	Axonal; often more severe motor impairment; earlier wheelchair dependency	Earlier loss of oral hygiene independence; consider implants earlier in disease course
CMTX1	GJB1 mutations	X-linked	10–15% of all CMT	Males more severely affected; intermediate NCV; CNS involvement possible	Males: anticipate earlier functional decline; Females: variable presentation requires individualized assessment
CMT4	Various genes	Autosomal recessive	Rare individually	Early onset; rapid progression; severe disability; may include cranial nerves	High aspiration risk; frequent monitoring; early caregiver involvement essential

NCV: Nerve Conduction Velocity; CNS: Central Nervous System.

Table 3: Preventive protocol by disease severity.

Disease stage	Functional status	Recall interval	Oral hygiene recommendations	Pharmacologic prevention
Mild	Independent ambulation; minimal hand weakness; no dysphagia	Every 4–6 months	Standard manual or power toothbrush; conventional floss or floss holder	Standard fluoride toothpaste; fluoride varnish if caries risk present
Moderate	Assistive devices for ambulation; moderate hand weakness; difficulty with fine motor tasks	Every 3–4 months	Power toothbrush with adaptive handle; water flosser; caregiver assistance as needed	5,000 ppm fluoride toothpaste; fluoride varnish every 3–4 months; antimicrobial rinse if indicated
Severe	Wheelchair dependent; significant hand weakness; dysphagia present; respiratory compromise	Every 3 months	Caregiver-assisted power toothbrushing; water flosser; possible need for suction toothbrush	5,000 ppm fluoride toothpaste; fluoride varnish every 3 months; chlorhexidine rinse; xylitol products
Advanced	Total dependence for ADLs; severe bulbar dysfunction; ventilatory support	Every 2–3 months or more frequently	Complete caregiver dependence; suction toothbrush; foam swabs for comfort care	High-concentration fluoride; chlorhexidine gel application; focus on comfort and infection prevention

ADLs: Activities of Daily Living

Table 4: Medication review checklist.

Medication class	Common examples	Oral side effects	Dental management
Anticonvulsants/ Neuropathic Pain Agents	Gabapentin, pregabalin, carbamazepine	Xerostomia, gingival hyperplasia (rare), taste alterations	Fluoride therapy; salivary substitutes; meticulous oral hygiene; monitor for gingival changes
Tricyclic Antidepressants	Amitriptyline, nortriptyline	Severe xerostomia, increased caries risk	High-concentration fluoride; frequent recalls; xylitol products; saliva stimulation
SNRIs	Duloxetine, venlafaxine	Xerostomia, bruxism	Fluoride therapy; evaluate for occlusal wear; consider occlusal guard
Muscle Relaxants	Baclofen, tizanidine	Xerostomia, drowsiness	Schedule morning appointments; fluoride therapy; assess fall risk during transfers
Opioid Analgesics	Tramadol, oxycodone	Xerostomia, nausea, respiratory depression	Avoid additional sedation; fluoride therapy; coordinate pain management with physician
Anticholinergics	Oxybutynin (for bladder control)	Severe xerostomia	Aggressive preventive protocol; frequent monitoring; salivary substitutes

SNRIs: Serotonin-Norepinephrine Reuptake Inhibitors

Table 5: Aspiration risk assessment and management.

Risk factor	Assessment method	Risk level	Management protocol
History of aspiration pneumonia	Medical history review	High	Medical consultation before treatment; semi-upright positioning; rubber dam mandatory; minimize water use
Reported choking during meals	Patient/caregiver interview	High	Speech-language pathology consultation; modified positioning; frequent evacuation breaks
Coughing during liquid intake	Clinical observation	Moderate-High	Avoid excessive irrigation; use saliva ejector continuously; provide frequent swallow breaks
Weak cough reflex	Clinical assessment	Moderate	High-volume evacuation; rubber dam when feasible; avoid supine positioning
Bulbar weakness (CN IX, X, XII)	Neurologic examination findings	Moderate-High	Coordinate with neurology; consider instrumental swallow study; modify all procedures
No reported swallowing issues	Patient report + clinical observation	Low	Standard precautions; monitor for signs of distress; document baseline status

CN: Cranial Nerve

Conclusion

Charcot-Marie-Tooth disease remains critically underrecognized in dentistry. While CMT does not damage teeth directly, progressive neuromuscular degeneration devastates oral health by destroying

manual dexterity, mastication, swallowing, and respiratory function, dramatically elevating risks of periodontal disease, caries, and life-threatening aspiration. As medical advances extend patient lifespans, dentists must master CMT management. Success hinges on aggressive prevention: three-month recalls, early introduction of power toothbrushes and water flossers, high-concentration fluoride, and proactive caregiver training prevent catastrophic oral disease before functional collapse occurs. Patient safety demands vigilance. Systematic dysphagia screening, semi-upright positioning, mandatory rubber dam use, and judicious sedation avoidance prevent aspiration during routine care. Dental treatment planning must prioritize long-term function over technical perfection. Implant-supported restorations outperform removables when patients maintain hygiene capability, but realistic assessment of progressive decline is critical. By embracing adaptive strategies, prevention-focused care, and true interdisciplinary collaboration, dental professionals become essential partners in preserving dignity, function, and quality of life for patients facing this lifelong challenge.

References

1. Bird TD. Charcot-Marie-Tooth Hereditary Neuropathy Overview. In: Adam MP, Bick S, Mirzaa GM, et al., editors. GeneReviews [Internet]. Seattle (WA): University of Washington, Seattle. 1998: 1993-2026.
2. Skre H. Genetic and clinical aspects of Charcot-Marie-Tooth's disease. *Clin Genet*. 1974; 6: 98-118.
3. Tooth HH. The Peroneal Type of Progressive Muscular Atrophy. London: H.K. Lewis. 1886.
4. Barreto LC, Oliveira FS, Nunes PS, et al. Epidemiologic study of Charcot-Marie-Tooth disease: A systematic review. *Neuroepidemiology*. 2016; 46: 157-165.
5. Shy ME, Lupski JR, Chance PF, Klein CJ, Dyck PJ. Hereditary motor and sensory neuropathies: an overview of clinical, genetic, electrophysiologic, and pathologic features. In: Dyck PJ, Thomas PK, eds. *Peripheral Neuropathy*. 4th ed. Philadelphia: Elsevier Saunders. 2005: 1623-1658.
6. Little JW, Miller CS, Rhodus NL. *Dental Management of the Medically Compromised Patient*. 10th ed. St. Louis: Elsevier. 2023.
7. Fridman V, Saporta ASD. Mechanisms and treatments in demyelinating Charcot-Marie-Tooth disease. *Neurotherapeutics*. 2021; 18: 2236-2268.
8. Santos DN, Marques Jr W, Aguiar PM, et al. Oral manifestations and orofacial pain in patients with Charcot-Marie-Tooth disease. *Arq Neuropsiquiatr*. 2012; 70: 726-731.
9. Padilha DMP, Hilgert JB, Hugo FN, Bos AJ, Ferrucci L. Number of teeth and mortality risk in the Baltimore Longitudinal Study of Aging. *J Gerontol A Biol Sci Med Sci*. 2008; 63: 739-744.
10. Timmerman V, Strickland AV, Züchner S. Genetics of Charcot-Marie-Tooth (CMT) disease within the frame of the Human Genome Project success. *Genes (Basel)*. 2014; 5: 13-32.
11. Pipis M, Rossor AM, Laura M, Reilly MM. Next-generation sequencing in Charcot-Marie-Tooth disease: opportunities and challenges. *Nat Rev Neurol*. 2019; 15: 644-656.
12. Lupski JR, de Oca-Luna RM, Slaugenhaupt S, et al. DNA duplication associated with Charcot-Marie-Tooth disease type 1A. *Cell*. 1991; 66: 219-232.
13. Saporta ASD, Sottile SL, Miller LJ, Feely SME, Siskind CE, Shy ME. Charcot-Marie-Tooth disease subtypes and genetic testing strategies. *Ann Neurol*. 2011; 69: 22-33.
14. Züchner S, Mersiyanova IV, Muglia M, et al. Mutations in the mitochondrial GTPase mitofusin 2 cause Charcot-Marie-Tooth neuropathy type 2A. *Nat Genet*. 2004; 36: 449-451.

15. Bergoffen J, Scherer SS, Wang S, et al. Connexin mutations in X-linked Charcot-Marie-Tooth disease. *Science*. 1993; 262: 2039-2042.
16. Baets J, De Jonghe P, Timmerman V. Recent advances in Charcot-Marie-Tooth disease. *Curr Opin Neurol*. 2014; 27: 532-540.
17. Pareyson D, Marchesi C. Diagnosis, natural history, and management of Charcot-Marie-Tooth disease. *Lancet Neurol*. 2009; 8: 654-667.
18. Vinci P, Perelli SL. Footdrop, foot rotation, and plantarflexor failure in Charcot-Marie-Tooth disease. *Arch Phys Med Rehabil*. 2002; 83: 513-516.
19. Dyck PJ, Litchy WJ, Minnerath S, et al. Hereditary motor and sensory neuropathy with diaphragm and vocal cord paresis. *Ann Neurol*. 1994; 35: 608-615.
20. Scully C, Limeres J, Gleeson M, Tomas I, Diz P. Drooling. *J Oral Pathol Med*. 2009; 38: 321-327.
21. Yaacob M, Worthington HV, Deacon SA, et al. Powered versus manual toothbrushing for oral health. *Cochrane Database Syst Rev*. 2014; 2014: CD002281.
22. Worthington HV, MacDonald L, Poklepovic Pericic T, et al. Home use of interdental cleaning devices, in addition to toothbrushing, for preventing and controlling periodontal diseases and dental caries. *Cochrane Database Syst Rev*. 2019; 4: CD012018.
23. Feine JS, Carlsson GE, Awad MA, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. *Gerodontology*. 2002; 19: 3-4.
24. Mioche L, Bourdiol P, Monier S, Martin JF, Cormier D. Changes in jaw muscles activity with age: effects on food bolus properties. *Physiol Behav*. 2004; 82: 621-627.
25. Schiffman E, Ohrbach R, Truelove E, et al. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. *J Oral Facial Pain Headache*. 2014; 28: 6-27.
26. Edgar WM. The role of saliva in the control of pH changes in human dental plaque. *Caries Res*. 1976; 10: 241-254.
27. Lund JP, Widmer CG. An evaluation of the use of surface electromyography in the diagnosis, documentation, and treatment of dental patients. *J Craniomandib Disord*. 1989; 3: 125-137.
28. List T, Axelsson S. Management of TMD: evidence from systematic reviews and meta-analyses. *J Oral Rehabil*. 2010; 37: 430-451.
29. Logemann JA. *Evaluation and Treatment of Swallowing Disorders*. 2nd ed. Austin: Pro-Ed. 1998.
30. Matsuo K, Palmer JB. Anatomy and physiology of feeding and swallowing: normal and abnormal. *Phys Med Rehabil Clin N Am*. 2008; 19: 691-707.
31. Almståhl A, Wikström M, Kroneld U. Microflora in oral ecosystems in subjects with radiation-induced hyposalivation. *Oral Dis*. 2001; 7: 244-251.
32. Scully C. Drug effects on salivary glands: dry mouth. *Oral Dis*. 2003; 9: 165-176.
33. Villa A, Connell CL, Abati S. Diagnosis and management of xerostomia and hyposalivation. *Ther Clin Risk Manag*. 2015; 11: 45-51.
34. Dawes C. How much saliva is enough for avoidance of xerostomia? *Caries Res*. 2004; 38: 236-240.
35. Furness S, Worthington HV, Bryan G, Birchenough S, McMillan R. Interventions for the management of dry mouth: topical therapies. *Cochrane Database Syst Rev*. 2011: CD008934.
36. Gaudio C, Madia F, Longo MR, Schenone A, Padua L, Pareyson D. Prevalence of skeletal deformities in a large cohort of patients with Charcot-Marie-Tooth disease. *J Neurol*. 2016; 263: 1191-1199.

37. Burns TM, Schaubhut GJ, Dyck PJ. Vasculitic neuropathies. *Neurol Clin.* 2007; 25: 89-113.
38. Fenton SJ, Hood H, Holder M, May PB Jr, Mouradian WE. The American Academy of Developmental Medicine and Dentistry: eliminating health disparities for individuals with mental retardation and other developmental disabilities. *J Dent Educ.* 2003; 67: 1337-1344.
39. Becker DE, Reed KL. Local anesthetics: review of pharmacological considerations. *Anesth Prog.* 2012; 59: 90-102.
40. Carter GT, Jensen MP, Galer BS, et al. Neuropathic pain in Charcot-Marie-Tooth disease. *Arch Phys Med Rehabil.* 1998; 79: 1560-1564.
41. Nelson A, Baptiste AS. Evidence-based practices for safe patient handling and movement. *Clin Rev Bone Miner Metab.* 2006; 4: 55-69.
42. Cochran MA, Miller CH, Sheldrake MA. The efficacy of the rubber dam as a barrier to the spread of microorganisms during dental treatment. *J Am Dent Assoc.* 1989; 119: 141-144.
43. Malamed SF. *Handbook of Local Anesthesia.* 7th ed. St. Louis: Elsevier; 2020.
44. Mellies U, Ragette R, Schwake C, Boehm H, Voit T, Teschler H. Daytime predictors of sleep disordered breathing in children and adolescents with neuromuscular disorders. *Neuromuscul Disord.* 2003; 13: 123-128.
45. Sansone VA, Gagnon C, Participants of the 207th ENMC Workshop. 207th ENMC Workshop on chronic respiratory insufficiency in myotonic dystrophies: management and implications for research, 27-29 June 2014, Naarden, The Netherlands. *Neuromuscul Disord.* 2015; 25: 432-442.
46. American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. *Anesthesiology.* 2002; 96: 1004-1017.
47. Aboussouan LS, Khan SU, Meeker DP, Stelmach K, Mitsumoto H. Effect of noninvasive positive-pressure ventilation on survival in amyotrophic lateral sclerosis. *Ann Intern Med.* 1997; 127: 450-453.
48. American Academy of Periodontology. Parameter on supportive periodontal therapy. *J Periodontol.* 2000; 71: 853-855.
49. Deery C, Heanue M, Deacon S, et al. The effectiveness of manual versus powered toothbrushes for dental health: a systematic review. *J Dent.* 2004; 32: 197-211.
50. Flink H, Tegelberg A, Thorstensson H, Karlsson S. Influence of the time of measurement of unstimulated human whole saliva on the diagnosis of hyposalivation. *Arch Oral Biol.* 2005; 50: 553-559.
51. Hussein A, Slot DE, Van der Weijden GA. The efficacy of oral irrigation in addition to a toothbrush on plaque and the clinical parameters of periodontal inflammation: a systematic review. *Int J Dent Hyg.* 2008; 6: 304-314.
52. Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev.* 2013: CD002279.
53. Wierichs RJ, Meyer-Lueckel H. Systematic review on noninvasive treatment of root caries lesions. *J Dent Res.* 2015; 94: 261-271.
54. Serrano J, Escribano M, Roldán S, Martín C, Herrera D. Efficacy of adjunctive anti-plaque chemical agents in managing gingivitis: a systematic review and meta-analysis. *J Clin Periodontol.* 2015; 42: S106-S138.
55. Van der Weijden GA, Van der Sluijs E, Ciano SG, Slot DE. Can chemical mouthwash agents achieve plaque/gingivitis control? *Dent Clin North Am.* 2015; 59: 799-829.
56. Furness S, Bryan G, McMillan R, Worthington HV. Interventions for the management of dry mouth: non-pharmacological interventions. *Cochrane Database Syst Rev.* 2013: CD009603.
57. Nowjack-Raymer RE, Sheiham A. Association of edentulism and diet and nutrition in US adults. *J Dent Res.* 2003; 82: 123-126.

58. Chalmers JM, Pearson A. Oral hygiene care for residents with dementia: a literature review. *J Adv Nurs*. 2005; 52: 410-419.
59. Sidhu SK, Nicholson JW. A review of glass-ionomer cements for clinical dentistry. *J Funct Biomater*. 2016; 7: 16.
60. Frencken JE, Peters MC, Manton DJ, Leal SC, Gordan VV, Eden E. Minimal intervention dentistry for managing dental caries - a review: report of a FDI task group. *Int Dent J*. 2012; 62: 223-243.
61. Zarb GA, Bolender CL, Eckert SE, et al. *Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Protheses*. 13th ed. St. Louis: Mosby. 2013.
62. Feine JS, Maskawi K, de Grandmont P, Donohue WB, Tanguay R, Lund JP. Within-subject comparisons of implant-supported mandibular protheses: psychometric evaluation. *J Dent Res*. 1994; 73: 1096-1104.
63. Misch CE. *Contemporary Implant Dentistry*. 4th ed. St. Louis: Elsevier. 2020.
64. Thomason JM, Frias V, Girdler NM, Hyde P. A randomised controlled clinical trial comparing immediate loading and 2 -stage loading of single-tooth implants: aesthetic and patient satisfaction outcomes. *Eur J Prosthodont Restor Dent*. 2014; 22: 112-117.
65. Renvert S, Persson GR, Pirih FQ, Camargo PM. Peri-implant health, peri-implant mucositis, and peri-implantitis: case definitions and diagnostic considerations. *J Clin Periodontol*. 2018; 45: S278-S285.
66. Thomason JM, Kelly SA, Bendkowski A, Ellis JS. Two implant retained overdentures—a review of the literature supporting the McGill and York consensus statements. *J Dent*. 2012; 40: 22-34.
67. Hupp JR, Ellis E, Tucker MR. *Contemporary Oral and Maxillofacial Surgery*. 7th ed. St. Louis: Elsevier. 2019.
68. Moore PA, Hersh EV. Combining ibuprofen and acetaminophen for acute pain management after third-molar extractions: translating clinical research to dental practice. *J Am Dent Assoc*. 2013; 144: 898-908.
69. Tanner AC, Milgrom PM, Kent R Jr, et al. The microbiota of young children from tooth and tongue samples. *J Dent Res*. 2002; 81: 53-57.
70. Rossini G, Parrini S, Castroflorio T, Deregibus A, Debernardi CL. Periodontal health during clear aligner treatment: a systematic review. *Eur J Orthod*. 2015; 37: 539-543.
71. Waldman HB, Perlman SP. Mandated practitioners in special care dentistry: the need is now. *J Dent Educ*. 2006; 70: 250-252.
72. Cichero JA, Lam P, Steele CM, et al. Development of international terminology and definitions for texture-modified foods and thickened fluids used in dysphagia management: the IDDSI framework. *Dysphagia*. 2017; 32: 293-314.
73. Stuber W, Fuchs RH, Miedaner JA. Reliability of goniometric measurements of children with cerebral palsy. *Dev Med Child Neurol*. 1988; 30: 657-666.
74. Ender A, Attin T, Mehl A. In vivo precision of conventional and digital methods of obtaining complete-arch dental impressions. *J Prosthet Dent*. 2016; 115: 313-320.
75. Miyazaki T, Hotta Y, Kunii J, Kuriyama S, Tamaki Y. A review of dental CAD/CAM: current status and future perspectives from 20 years of experience. *Dent Mater J*. 2009; 28: 44-56.
76. Estai M, Kanagasingam Y, Tennant M, Bunt S. A systematic review of the research evidence for the benefits of teledentistry. *J Telemed Telecare*. 2018; 24: 147-156.
77. Schwendicke F, Samek W, Krois J. Artificial intelligence in dentistry: chances and challenges. *J Dent Res*. 2020; 99: 769-774.
78. Sischo L, Broder HL. Oral health-related quality of life: what, why, how, and future implications. *J Dent Res*. 2011; 90: 1264-1270.

Manuscript Information: Received: July 07, 2026; Accepted: August 19, 2026; Published: August 31, 2026

Authors Information: Allyn Johnson¹; Peter E Murray^{2*}; Franklin Garcia-Godoy³

¹Dentist, Private Practice, Germantown, Tennessee, United States.

²Independent Researcher, San Francisco, California, United States.

³Professor, University of Tennessee Health Science Center, College of Dentistry, Memphis, Tennessee, United States.

Citation: Johnson A, Murray PE, Garcia-Godoy F. Charcot-Marie-tooth disease and oral health: A comprehensive review of clinical manifestations, dental management, and evidence-based recommendations. Open J Clin Med Case Rep. 2026; 2428.

Copy right statement: Content published in the journal follows Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>). © **Murray PE (2026)**

About the Journal: Open Journal of Clinical and Medical Case Reports is an international, open access, peer reviewed Journal focusing exclusively on case reports covering all areas of clinical & medical sciences.

Visit the journal website at www.jclinmedcasereports.com

For reprints and other information, contact info@jclinmedcasereports.com