



The Importance of Lingual Function and Myofunctional Screening in Periodontal Disease Protocol- Literature Review

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Abstract

Purpose: The purpose of this paper is to review a sampling of the literature related to parafunctional habits, common orofacial myofunctional disorders, oral hygiene and periodontal disease from a tactical viewpoint.

Research Limitations: The scope of this review is by design limited to a cross-section of the literature in these areas. As such, it cannot, and does not, attempt to examine the full range of the literature, rather a sampling of related works.

Method: The PubMed database was searched for all free full text articles in English containing the terms bruxism, myofunctional disorder, temporomandibular disorder, malocclusion, and oral hygiene; with a direct inclusion of the term periodontal disease. A total of 1,428 articles resulted, of which exclusions were made for articles older than 10 years and unrelated themes. A period of research and review of the articles was made in 30 days with an adequate sampling of 16 texts selected for the purpose of this review.

Results: Selected articles were screened and discussed in the paper after a review of the full literature with inclusion discussed and relevant findings referenced within.

Keywords: *Lingual Function; Myofunctional Screening; Periodontal Disease*

Introduction

Periodontal disease is often poorly managed in many who suffer from it. Despite intentional increases in oral hygiene habits such as brushing with an electric toothbrush or performing daily flossing, stability in periodontal health maintenance can vary. Research has shown a correlation between malocclusion, tongue thrust and parafunctional habits in the biomechanical contribution towards periodontal disease progression. Many of the aforementioned contribute to orofacial myofunctional disorders which can be resolved or managed with myofunctional therapy; removing one or many factors in the chronic periodontal disease progression. Further exploration of the evolution of oral hygiene tools and information, bioinfectious contribution and biomechanical contributions exhibit the gap in the current standard periodontal treatment protocol in arresting disease advancement. The incorporation of myofunctional screening in the periodontal screening and management protocol is an encouraging new method of achieving optimal patient outcomes.

Evolution of oral hygiene

As far as history can accurately date back, humans have always had teeth and a desire and need to care for them. Failure to do so

would often result in tooth decay and loss. The earliest records of oral hygiene date back to Greek physician Hippocrates, who recommended tools and medicaments to clean the teeth and freshen the breath. Physical dental and interdental tools such as a siwak, toothpicks, toothbrushes, and floss have evolved over 6000 years to current standards [1].

In 1960 the American Dental Association stepped in to provide guidance to a confused and vulnerable public with their seal of approval for validated dental products. Current oral hygiene recommendations involve daily use of a soft toothbrush, mouthwash, and an interproximal aid such as dental floss string, floss stick, floss pick, or electric water flosser. While the overall retention of dentition has increased among the population with implementation of these habits, chronic periodontal disease persists and remains unstable in many.

Salivary content has been researched to provide an indication of periodontal disease progression as the bacterial load increases the anti-inflammatory response [2]. Other intraoral factors affecting the periodontium have been considered in research such as malocclusion and parafunctional habits [3-5]. However, lingual function lacks research to substantiate its role in periodontal hygiene.

A combination of lingual range of motion to cleanse the buccal vestibule and marginal gingival sulcus with pressure and suction serves as a promising investigation in future research. Inclusion of the role ankyloglossia plays in the limitation of lingual mobility and altered function furthering the progress as it is a feature commonly found in the periodontic patient population [6]. "In fact, the anomalous stress factors such as malocclusion, parafunctions, and lingual dysfunction have been described to be present in the vast majority of chronic gingival and periodontal inflammation cases" [7]. The role of orofacial muscle function is an under explored, yet auspicious, factor in oral hygiene maintenance and further managing periodontal disease progression.

Periodontal disease and oral health habits

Root scaling is the current standard of care and first choice of intervention methods in those with periodontal disease. This procedure, however, is highly reliant on many subjective factors such as clinician technique, adjunctive aids, and subsequent patient plaque control. While ideal to use as the most cost efficient and least invasive procedure, it is rarely effective at controlling chronic periodontal disease progression alone [8].

In periodontal pockets spaced at or greater than 5 mm, research has shown complete removal of calculus deposits to be achieved in less than 11% of cases studied [7]. Practitioner clinical skill and tools used in debridement of these areas naturally vary. Adherence of the patient to subsequent strict home regimens of new or modifies oral hygiene habits is also difficult to manage. Practitioners are not present with the patient daily to manage the latter factor and compliance has not been researched to improve due to increased office visits.

Awareness of dental hygiene practices and current standards has increased in public awareness. However, certain controllable factors such as tongue coating, tongue function, malocclusion and parafunctional habits have not been brought into the public eye. Chronic or uncontrolled periodontal disease that has been treated with scaling and root planning, oral hygiene modifications and adjunctive therapeutic methods like irrigation and doxycycline deposition, require a thorough look at researched areas of correlation.

Inclusion of tongue scraping with a metal "U" shaped tool to decrease bacterial load and improve the overall flora of the oral cavity has been shown to be a beneficial oral hygiene technique [3]. Orthodontic referral and, where appropriate, treatment also demonstrates a reasonable inclusion into the periodontal management protocol to decrease the undue stress the periodontium is subjected to due to dysfunctional mastication [9].

Periodontal disease and occlusion

The periodontium is impacted by the forces of mastication in a bidirectional relationship wherein negative forces of malocclusion influence the periodontal ligament fibers [10]. Ideal intercuspation has the ability to positively influence bone deposition and remodeling. Alternatively, malocclusion places undue stress on the fibers as the teeth occlude during mastication leading to dystrophy and widening of the spaces, inflammation of marginal gingiva, vertical bony defects and root resorption [7]. Chronic untreated malocclusion and dysfunctional use of the muscles of mastication perpetuates clinical signs of periodontal disease progression.

Periodontal disease and parafunctional habits

Often parafunctional habits begin in early childhood with prolonged non-nutritive sucking, commonly involving tongue or pacifier sucking habits. Subsequently leading to orofacial muscle dysfunction and compensatory patterning [11,12]. The continuous soft tissue pressures of the foreign object against the palate can alter the shape and influence crowding and malocclusion of the dentition [13]. Bruxism, tongue thrust and temporomandibular disorders frequently accompany the oral malocclusion and orofacial muscular dysfunction.

Periodontal disease bacterial profile consists of anaerobic bacterial colonies, with a prominence of spherical colonies [14]. Biomechanical stresses can irritate the gingival tissues and increase this bacterial profile within the periodontium. Opportunistic bacteria take advantage of the increased width of the periodontium and establish colonies within the developing pockets [10].

Stress has long been associated with parafunctional habits as a physiological response. Although research has not determined a standard acceptance of causation, many others have been theorized and examined. Physiological opening of the pharyngeal airway by mechanically shifting the mandible forward is an adopted theory by many orofacial myofunctional therapists. Neuromuscular therapeutic reeducation through myofunctional therapy decreases the parafunction in research and demonstrates potential for use in periodontal disease management [12].

Myofunctional therapy introduction

Myofunctional therapy was coined by B.E. Lisher in reference to the work and research of Dr. Alfred Rogers. Rogers studied under Dr. Edward Angle, the father of orthodontics and was a prominent figure of his time in the field. Rogers authored over 50 articles on muscle training in the early 20th century and believed that facial exercises and muscle training alone could alter malocclusion. Myo-

functional therapy has evolved since then to be inclusive of orthodontics and dental appliances as a collaborative treatment of malocclusion [8].

The consistent pressure of the soft tissues of the oral cavity impacts the dentition and craniofacial growth. Low, forward tongue posture, mouth breathing and tongue thrust swallowing has deleterious effects on the transverse growth of the palate and anterior growth of the mandible. Lingual palatal suction and seal during oral rest creates a consistent pressure against the palate to increase the width of the palate during growth pre-closure of the median palatine suture [11].

Orthodontic appliances are the first line of offense in remediation of tongue thrust and malocclusion. These appliances are often researched to result in relapse and poorly manage the contributory compensatory orofacial muscle function [13]. Myofunctional therapy uses exercises and neuromuscular retraining to rehabilitate proper oral resting posture and optimal orofacial muscle function. Resulting in habituation of a mature swallowing pattern and natural retention of orthodontic treatment outcomes [8]. Therapeutic rehabilitation of the oral function disengages the deleterious effects of tongue thrust and parafunctional habits without subjecting patients to more invasive methods of remediation.

Lingual function and myofunctional screening

Periodontal evaluation protocol commonly involves periodontal charting and assessment of gingival characteristics. Presence of gingival edema, vasodilation and periodontal pocketing among the key indicators of periodontal infection. Any positive changes in which would indicate an improvement in the periodontal condition and health. Oral hygiene instructions involving daily active homecare routine enhancement with brushing, flossing, mouthwash, and tongue scraping is the primary treatment criteria provided to patients.

Oral hygiene is an important consideration in the daily management of the bacteria plaque biofilm colonies. In addition to patient management through hygiene instruction, increased visits to the dental office for periodontal maintenance is incorporated. However, there is minimal stabilization provided as the biomechanical stresses maintain a negative influence on the periodontium [5,15]. Orofacial structure and function has been researched and presented in the literature to correlate with periodontitis signs such as gingival inflammation and recession [5,6,9,16]. Expecting stability and optimal management of periodontal disease progression without stabilization of the parafunctional habits, orofacial muscle function, and dental occlusion proves ineffective.

Incorporation of an oral musculature functional evaluation is an encouraging inclusion to the current periodontal screening protocol. Clinicians with appropriate training would be able to identify tethered oral tissues impacting lingual function and inhibiting lip seal as a physiological barrier. General practitioners would be able to identify scalloped tongue, malocclusion, open bite, narrow palate, proclination of anterior dentition, and tongue thrust as features of oral dysfunction. Many such features can be found during the routine intraoral and extraoral evaluation and noted in the patient's chart. Patients with clinical signs of periodontal disease who also present with signs of orofacial dysfunction should be referred to an orofacial myofunctional therapist for further evaluation and treatment. This interdisciplinary approach to tackling the biological irritants residing in the periodontium through scaling and root planing, education and modification of patient oral hygiene routines, orthodontic appliance intervention and rehabilitation of parafunctional habits through myofunctional therapy should be researched as an effective way to manage chronic periodontal disease. Further discussion would include potential barriers to treatment outcomes such as high financial responsibility and difficulty managing compliance with recommendations.

Conclusion

Periodontal disease has a biomechanical and functional component that is often overlooked for traditional biological infectious management. Achieving stability and prevention of further destruction of the periodontium requires practitioners to address all components of the disease. Thorough inclusion of the orofacial function, lingual mobility and parafunctional habits are essential for adequate diagnosis and referral. An interdisciplinary team of providers can expand current treatment of scaling and root planing, conservative surgery, and oral hygiene instructions to be inclusive of functional remediation and improve periodontal treatment outcomes.

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