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CLINICAL ARTICLE

Location of the Wear, Interdisciplinary Workflow and Therapeutic Approach for Tooth Wear: LIT Classification

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ABSTRACT

Objective: This article presents a guide for the rehabilitation of patients with dental wear using a minimally invasive approach. It provides a structured treatment sequence based on the location and extent of wear, the disciplines involved, and the therapeutic approach. The LIT classification establishes a relationship between the magnitude of the lesion and the appropriate type and material of restoration.

Overview: Tooth wear (TW) is a progressive, non-carious loss of dental structure caused by erosion, attrition, and abrasion, commonly affecting young patients. Its multifactorial origin and frequent association with other oral conditions demand complex, interdisciplinary management. Despite recent advances in diagnostic tools and treatment protocols, no existing classification integrates the extent and location of the wear and the specialties involved to treat the condition. This publication proposes a new system and structured approach to achieve predictable, conservative, and efficient oral rehabilitation.

Conclusions: Rehabilitating worn dentition requires precision, interdisciplinary planning, and tooth preservation. This LIT classification links TW magnitude to restoration type and extension, improving diagnosis, communication, and treatment predictability. It emphasizes minimal invasion, appropriate material choice, and a personalized approach, guided by wear extent, patient-specific factors, and the need for clear communication and biological preservation.

Clinical Significance: A structured treatment approach enhances predictability by aligning the clinician, team, and patient. Identifying pathology, integrating disciplines, and assessing TW are key to preserving dental structures and achieving long-term functional and esthetic success.

1 | Introduction

Tooth wear (TW) is a non-carious condition characterized by the progressive loss of dental structure due to erosion, attrition, and/or abrasion. According to recent prevalence studies, it has become one of the most common oral conditions, particularly among young patients [1, 2]. This irreversible loss of enamel and dentin results from a multifactorial etiology, including mechanical factors (attrition and abrasion), chemical factors (intrinsic or extrinsic erosion), or a combination of both [3].

The management of TW presents significant clinical and technical challenges for dental professionals. In many situations, it is associated with additional oral conditions such as malocclusions, periodontal disease, and partial edentulism, increasing the complexity of treatment [4]. The need

for an interdisciplinary approach, comprehensive treatment planning, and precise execution makes these situations particularly demanding. In recent years, several classification systems [5], therapeutic strategies [4, 6], and interdisciplinary treatment protocols [7–10] have been proposed for managing TW. Advances in digital technology have further enhanced communication, diagnosis, and treatment planning, offering new opportunities for efficient and minimally invasive restorative solutions [11, 12].

However, achieving optimal outcomes requires scientifically validated protocols that balance clinical success, patient satisfaction, and long-term stability [13].

To the best of authors knowledge, there is no classification that includes analysis, organized specialties, and treatment approach. This publication aims to propose a classification system based on the extent and location of TW, correlating it with the number of disciplines involved in managing associated conditions. Furthermore, it seeks to establish a structured therapeutic approach that enables predictable and conservative oral rehabilitation.

1.1 | Location of the Wear, Interdisciplinary Workflow and Therapeutic Approach

Patients presenting with TW, regardless of its etiology—whether mechanical, chemical, or multifactorial—display a range of clinical characteristics that require comprehensive evaluation [14]. Key aspects include the location of the wear, identification of the disciplines necessary for appropriate management, as well as the extension of the wear that would have an impact on the type of restoration and consequently, the preparation approach [15] (Table 1).

Treatment may involve restorative dentistry alone or in combination with other specialties such as orthodontics, maxillofacial surgery, periodontics, or implantology, depending on the complexity of the clinical situation [7–10]. In certain scenarios, an interdisciplinary approach involving two or more of these disciplines may be required to achieve optimal outcomes.

Furthermore, the type of tooth restoration must be carefully decided and designed based on the magnitude of the wear and the remaining dental structure [15]. Options range from no treatment and only monitoring two times a year to minimally invasive, often using additive composite restorations, or tooth preparation for partial or full coverage restorations when clinically necessary [16]. The choice of preparation technique should be guided by the principles of minimally invasive dentistry, long-term stability, and patient-specific functional and esthetic needs.

Considering the location of the wear, interdisciplinary workflow, and therapeutic approach led to creating the LIT Classification.

1.2 | Location of the Wear

These include the extent and distribution of the wear, the specific surfaces involved (occlusal, incisal, or cervical), the presence or absence of associated symptoms (such as sensitivity, functional limitations, or esthetic concerns), and above all, the potential loss of vertical dimension of occlusion (VDO) [17, 18].

Among these parameters, the need to alter the VDO is the most critical factor influencing the therapeutic approach, as it directly impacts occlusal function, esthetics, and long-term restorative stability [19, 20].

Therefore, the initial step in the proposed treatment protocol involves a comprehensive evaluation of the level and pattern of TW in order to confirm or rule out the need for VDO alteration. This phase is essential to determine the rehabilitation type and guides the selection of appropriate restorative strategies that aim to reestablish function, esthetics, and structural integrity in a predictable and biologically oriented treatment [21] (Figure 1A–O).

1.3 | Anterior Only

This situation could be associated with parafunctional habits, particularly bruxism, where a functionally adequate anterior guidance (AG) exhibits signs of attritional wear during posterior

TABLE 1 | Location, interdisciplinary and treatment concept for tooth wear: LIT classification.

disocclusion or intrinsic acidic due to dietary disorder such as bulimia. When the clinician identifies and intercepts this destructive process before the posterior teeth are affected, the patient presents as anterior wear without alteration of VDO if clinically possible [22] (Figure 2A).

In such cases—where the posterior dentition remains intact—maximum intercuspation or the patient's actual occlusion is preserved, and the vertical dimension could remain unaltered. Consequently, the treatment approach can be limited to the affected anterior region if there is enough restorative space [21].

However, the presence of compensatory eruption, dental malalignment, gingival or periodontal alterations, such as altered passive eruption or gingival recession or periodontal disease, or missing teeth may necessitate the incorporation of adjunctive disciplines into the comprehensive treatment plan. These include orthodontics with or without orthognathic surgery, periodontal treatment, and implantology [10, 19, 21].

1.4 | Posterior Only

In certain cases, wear is localized exclusively to the posterior dentition, often due to bruxism and/or erosion. This typically occurs when the AG is either absent or functionally inadequate—conditions that prevent effective posterior disocclusion during excursive movements. Contributing factors may include anterior open bites, dental misalignments, or skeletal Class II malocclusions [22].

Given that posterior teeth play a primary role in maintaining the VDO, anatomical restoration of these teeth is usually required to reestablish functional stability. However, in cases where there is no apparent loss of VDO—often due to compensatory extrusion or specific malocclusions such as open bites—restoring or increasing the VDO may not be necessary and could even be detrimental [23, 24] (Figure 2B,C).

In such scenarios, orthodontic treatment becomes a valuable, non-invasive tool to establish a functional AG through corrective

FIGURE 1 | Wear could be in anterior teeth only A–E, posterior teeth only F–J, or full mouth K–O.

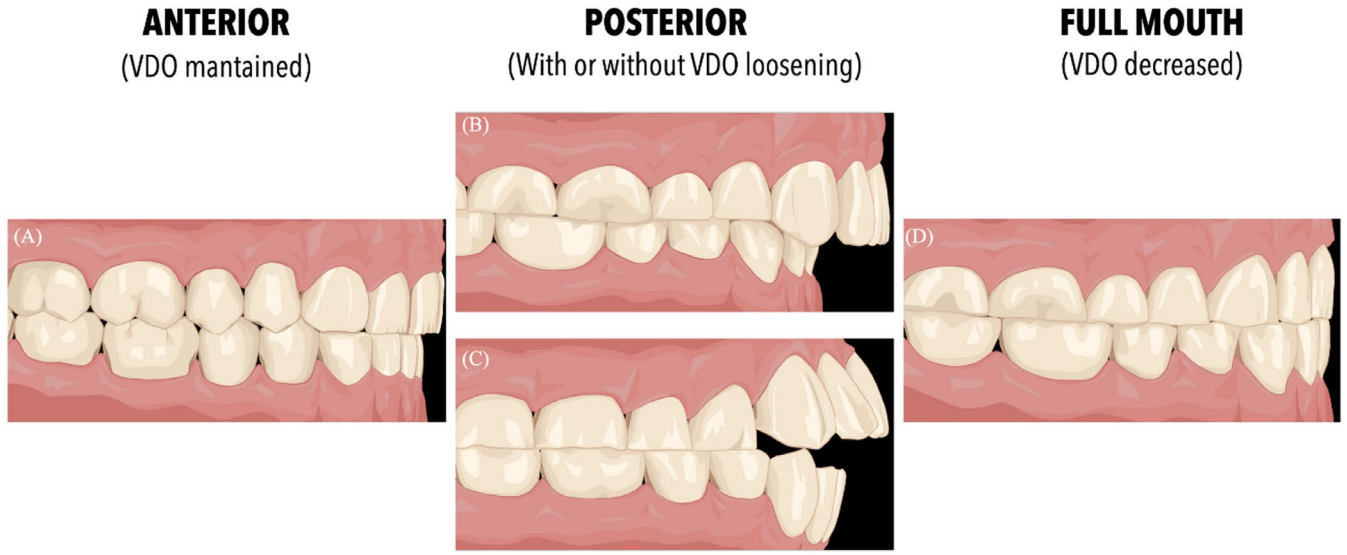


FIGURE 2 | Relationship between the location of tooth wear and changes in vertical dimension of occlusion (VDO). Wear on anterior teeth only A. Wear on posterior teeth only B. C. Wear on anterior and posterior teeth D.

alignment, supporting long-term occlusal balance and minimizing the risk of further posterior wear [7, 10].

1.5 | Full Mouth

In this group of patients, the combined effects of bruxism, erosion, and prolonged absence of dental intervention result in a destructive environment that significantly compromises oral health, esthetics, and function [25].

In individuals with bruxism, the progressive collapse of AG ultimately leads to a complete loss of disocclusion. This is accompanied by generalized loss of dental anatomy and a possible reduction in VDO [25] (Figure 2D).

In such cases, altering VDO through comprehensive rehabilitation treatment requires intervention on the functional surfaces of all teeth. The approach should prioritize tissue preservation and rely on additive restorative techniques whenever possible. Treatment planning must begin with facially driven esthetic parameters and proceed toward intraoral design [13].

These complex cases are often interdisciplinary, involving orthodontics, implant therapy, or periodontal surgery, among others. A structured treatment sequence—starting from biological and structural considerations and progressing to occlusal and esthetic goals—is essential [13, 19].

2 | Interdisciplinary Workflow

Before initiating any comprehensive rehabilitation, it is essential to address the presence of underlying pathology that may compromise the outcome of treatment. This includes periodontal disease that should be controlled through appropriate therapy, followed by enrollment in a tailored periodontal maintenance program at intervals of 4-6 months [26, 27].

Tooth structure diseases such as active caries, failing restorations, enamel defects, pulpal infections requiring endodontic therapy, and previously treated teeth requiring retreatment should also be addressed. Additionally, temporomandibular disorders (TMD)—including intra-articular disorders, muscular dysfunction, pathological lesions, or other joint pathologies—and airway health, particularly in the context of sleep-disordered breathing such as obstructive sleep apnea, should be properly diagnosed and managed [28, 29].

This critical preliminary stage, referred to as the Biological Foundation Phase before rehabilitation, ensures that the oral environment is stable, healthy, and capable of supporting long-term restorative and interdisciplinary treatments. It is crucial that any tooth restoration done during the Biological Foundation Phase in any tooth should not rebuild the full anatomy of the tooth, as this would be addressed later in the treatment; the only goal is to stabilize disease [30, 31].

TW is a common yet often complex condition that may initially appear to require solely restorative intervention. However, managing worn dentition frequently demands a broader interdisciplinary approach [32]. Depending on the extent and underlying causes, successful treatment may involve not only restorative dentistry, but also orthodontics to correct occlusal relationships, orthognathic or maxillofacial surgery to address skeletal discrepancies, periodontics for soft tissue management, and, in some cases, implant dentistry to replace lost teeth. The decision of which specialty gets involved and the order in the synergy between specialties is essential to restore function, esthetics, and long-term stability in patients with advanced TW [33] (Figure 3).

2.1 | Restorative Dentistry

Adhesive and conservative restorative dentistry will be an essential discipline in the presence of TW, whether combined with other specialties or not—it will always play a central role. This discipline must be grounded in several key principles: the preservation of tooth structure, adhesion to the remaining dental tissues, the use of digital tools, and the proper selection of materials [34, 35] (Figure 3A).

2.2 | Orthodontics-Orthognatic Surgery and Restorative

Orthodontics is a great discipline to combine with restorative dentistry, as its corrective nature allows for the minimization—or even complete avoidance—of tooth preparations. In many cases, it could enhance conditions to the extent that, when combined with minor additive interventions, complex problems could be resolved in a highly conservative approach. Well-organized workflow, rebuilding the tooth structure lost previous to orthodontics, and followed by the use of aligners and/or brackets, significantly improves preexisting conditions [36, 37].

As a result, the final restorative phase is often minimally invasive. Furthermore, orthodontics could contribute to improving esthetic parameters—such as gingival margins, dental absences, or agenesia—potentially avoiding the need for more complex treatments or implant surgeries. In more severe skeletal discrepancies, orthodontic treatment may need to be combined with maxillofacial surgery, including procedures such as maxillary impaction, mandibular advancement, or others, to achieve optimal functional and esthetic outcomes [38–40] (Figure 3B).

2.3 | Periodontal Plastic Surgery and Restorative

The perio-prosthetic synergy has become an indispensable component of any interdisciplinary approach in contemporary dentistry [41, 42].

Beyond its role in addressing biological, infectious, or general periodontal health concerns, periodontics offers a wide range of solutions that significantly impact periodontium health, esthetic and functional outcomes. These include periodontal plastic surgeries aimed at gingival margin leveling, the management of non-carious cervical lesions, the correction of altered passive

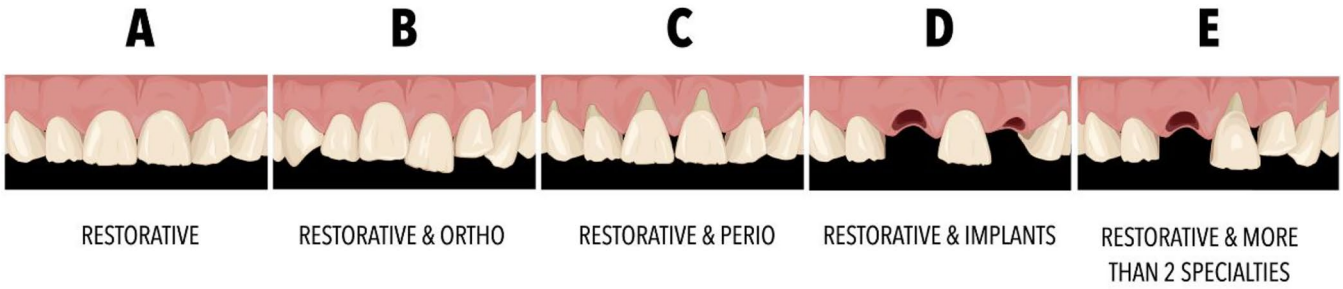


FIGURE 3 | Classification of tooth wear cases based on interdisciplinary treatment needs. (A) Restorative treatment only. (B) Restorative and orthodontic. (C) Restorative and periodontal plastic surgery. (D) Restorative and implant therapy. (E) Restorative requiring the involvement of more than two specialties.

eruption, and the treatment of soft tissue deficiencies around teeth, implants, or pontics [43].

In the context of patients with TW, this collaboration is particularly valuable. The periodontal component focuses on preserving teeth that are compromised not only by mechanical wear but also by underlying periodontal disease [44] (Figure 3C).

2.4 | Implants and Restorative

The absence of teeth—whether due to agenesis, premature tooth loss, trauma, or extensive caries—is a condition frequently observed in patients with TW. These edentulous areas are often accompanied by hard and/or soft tissue defects. Integrated planning between oral rehabilitation and implant therapy involves multiple critical aspects that must be carefully considered: the position of the implant platform relative to the occlusal plane, particularly in cases involving increased VDO; the size of the edentulous area and the number and position of implants; and the implant angulation relative to the final crown anatomy, among others [45].

As a general rule, the application of a clear protocol for treatment planning, validated through a functional mock-up, determines the ideal form and position of the definitive restoration, thereby guiding optimal implant placement. Digital tools and integrated guided surgery software significantly facilitate this process. While these pre-surgical decisions are relatively straightforward in single posterior implants, they become critically important in the esthetic zone and in cases involving extensive edentulous spans [46] (Figure 3D).

2.5 | Combination of Specialties and Restorative

When more than two disciplines are involved in the management of TW, the development of an interdisciplinary treatment plan becomes increasingly complex. In many patients with advanced wear, additional conditions such as dental malalignment, missing teeth, and gingival recession are commonly present [47–49].

Therefore, it is essential to assess case complexity through a structured risk evaluation, which should be conducted collaboratively by the interdisciplinary team in conjunction with the patient [8] (Figure 3E).

This shared decision-making process allows for a more accurate diagnosis, appropriate sequencing of interventions, and greater predictability in achieving functional and esthetic outcomes (Figure 4A–Y).

3 | Therapeutic Approach

Following the assessment of the location of the wear and the identification of the disciplines involved in the treatment, tooth preparation and material selection are guided by a combination of anatomical, esthetic, and functional factors. These criteria serve as the foundation for selecting the appropriate restorative approach and material [50–53].

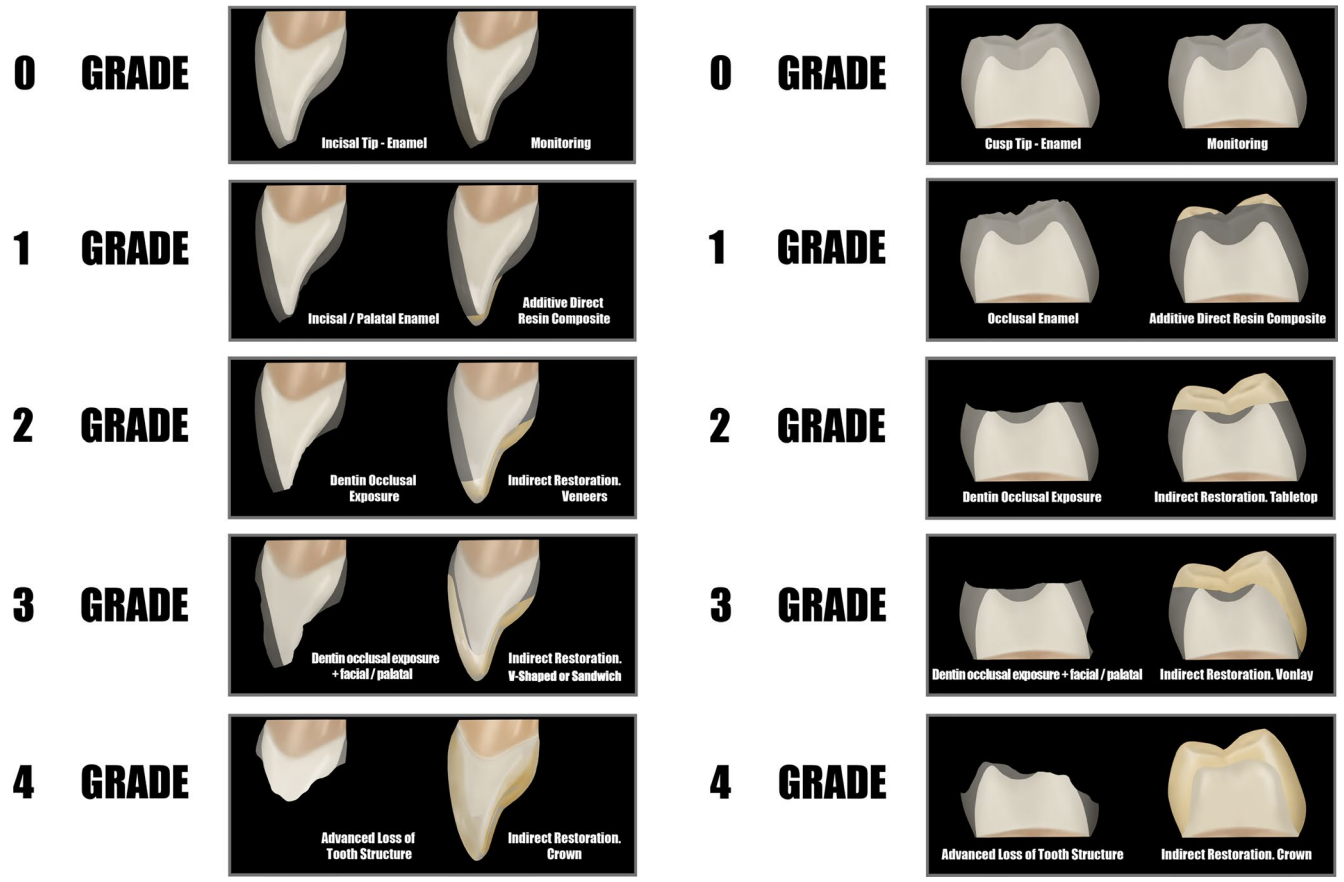
3.1 | Analysis of the Anatomical Extent of TW

The magnitude of TW is evaluated at the level of individual dental anatomy and categorized as follows [6, 54] (Table 2):

- *Grade 0*: Incipient wear in enamel. Wear at incisal edges of anterior teeth and cusp tips of posterior teeth. A conservative approach is recommended, consisting of no material addition and regular follow-up every 6 months to monitor the condition.
- *Grade 1*: Advanced enamel wear, no dentin exposed. Wear on the incisal edge and labial/palatal surfaces of anterior teeth, and on the occlusal surfaces of posterior teeth. Dentin is not exposed. An additive approach using direct composite resin is recommended for both anterior and posterior teeth in patients within this category.
- *Grade 2*: Wear involving minimal exposure of dentin. Incisal and palatal areas on anterior teeth and on the occlusal surfaces of posterior teeth. An indirect restorative approach is suggested, using buccal or palatal veneers for the anterior teeth and table-top overlay restorations for the posterior teeth.
- *Grade 3*: Advanced wear involving dentin. Wear at the incisal edge and both labial and palatal/lingual surfaces of anterior teeth, as well as occlusal and one additional

FIGURE 4 | Interdisciplinary treatment could vary from A to E: Restorative only. F–J: Restorative and orthodontics. K–O: Restorative and periodontics. P–T: Restorative and implants. U–Y: Restorative and a combination of orthodontics, periodontics, and implants.

TABLE 2 | Classification and treatment approach for anterior and posterior tooth wear, from initial enamel loss (Grade 0) to advanced structural damage (Level 4), with corresponding restorative strategies.



surface of posterior teeth. Patients in this category would benefit from indirect restorations, such as V-shaped ceramic restorations or a sandwich technique combining palatal and buccal restorations in anterior teeth. For posterior teeth, indirect restorations like overlays involving both the occlusal and buccal surfaces (vonlays) would be recommended.

- *Grade 4*: Extensive wear affecting the entire anatomical crown. Wear affecting the entire anatomical surface of both anterior and posterior teeth. It would be suggested to use full coverage crowns for anterior and posterior teeth.

3.2 | Selection of the Restoration Type and Material According to the Chosen Therapeutic Approach

After determining both the anatomical extent of wear and the appropriate therapeutic pathway based on the principle of preservation, the clinician could define the type of restoration and the most suitable material for rehabilitation. This enables effective communication with the patient and coordination with the clinical and laboratory team, thereby increasing the predictability of the treatment outcomes [53, 55].

As a general guideline, direct restorative materials are recommended due to the minimally invasive approach, while indirect restorations offer superior long-term survival rates [56, 57].

The selection of restorative materials and techniques should be guided by the level of wear and the specific treatment objectives. Minimally invasive rehabilitation options for patients with worn dentition include [51, 58–60]:

- *Direct*:
  - Material: Composite resins.
  - Techniques: free-hand, injection technique, stamp technique.
- *Indirect*:
  - Material: Microhybrid composite resins, feldspathic ceramics, and lithium disilicate ceramics.
  - Technique: analog, CAD/CAM, combination.

4 | Discussion

TW is a multifactorial condition whose diagnosis and management have evolved significantly over recent decades. Early classifications

by Eccles in 1979 and Smith & Knight in 1984 were foundational but limited by subjectivity and lack of validation [61, 62]. These indices were based on small sample sizes and clinical intuition, without structured guidance for interdisciplinary management or preparation protocols. As Ganss and Lussi in 2008 noted, the inconsistency among global indices has led to poor comparability across research and clinical outcomes [63]. While systems such as the Basic Erosive Wear Examination (BEWE) aimed to standardize erosion diagnosis, they fall short when applied to multifactorial cases involving attrition and abrasion [64]. The Tooth Wear Evaluation System (TWES) in 2015 and its update TWES 2.0 in 2020 expanded the scope by integrating etiology, magnitude, and risk-based treatment guidance [5, 54]. However, even TWES does not propose a comprehensive clinical framework linking wear location and extent to the number of disciplines involved, nor does it suggest a stepwise sequence for interdisciplinary collaboration or restorative preparation design.

This article seeks to fill that gap. By proposing a structured classification system based on anatomical location (anterior, posterior, full-mouth) and wear degree, and linking it to the appropriate involvement of specialties and type of restorative intervention, our approach offers a reproducible framework that builds on—but moves beyond—TWES and ACE [6, 54].

While those systems are focused on diagnosis and anterior cases, respectively, our model is both diagnostic and therapeutic, applicable to localized and generalized cases, and adaptable to a wide range of clinical contexts.

For instance, while TWES defines severity, it does not distinguish how anterior-only wear with preserved posterior dentition should be approached differently from posterior-only wear with inadequate AG [5]. In contrast, our system clearly outlines how the preservation or alteration of the VDO, compensatory eruption, or skeletal patterns influence the need for interdisciplinary input (e.g., orthodontics, periodontics, or surgery) and the sequence of interventions. These distinctions are crucial for predictable and conservative treatment, as reflected in current guidelines [15, 24, 65], yet have not previously been consolidated into a single protocol. Similarly, while other authors illustrate the value of interdisciplinary sequencing in complex conditions like amelogenesis imperfecta, the approach remains case-specific and lacks the scalability and generalizability offered by our model [66].

The EGOP protocol further advances the integration of esthetics and occlusal parameters through digital workflows in restorative planning for interdisciplinary treatments [13].

Within this interdisciplinary context, orthodontics plays a pivotal role, not only in repositioning teeth to reduce restorative invasiveness but also in re-establishing occlusal harmony and AG. The PGO concept: Prosthetically Guided Orthodontics exemplifies this integration [10]. It emphasizes a restorative-driven orthodontic strategy, where tooth movement is planned according to prosthetic goals, thereby minimizing preparation, optimizing esthetics, and ensuring functional stability. This aligns with our proposed system's sequencing philosophy, in which orthodontic intervention is coordinated with restorative and surgical phases to enhance predictability and biological respect. Advances in the integration of digital workflows in restorative planning in combination with dental implants, a growing trend underscored by other authors [67].

Another key area of alignment and divergence lies in VDO management [68]. Traditional assumptions about the need for test phases and the instability of increased VDO have been challenged in recent literature [17, 69]. Our protocol supports this evolving consensus by incorporating early VDO evaluation as a diagnostic pivot, guiding the full rehabilitation plan, without always requiring an extended trial phase—so long as the planning is biologically grounded and mock-up guided. Moreover, by specifying when VDO increases are necessary (full-mouth cases) or unadvised (posterior wear without functional deficiency), our approach adds clinical nuance often absent from general guidelines.

When it comes to material selection and restorative preparation, the literature emphasizes the importance of tissue preservation and minimal intervention [4, 33]. However, current classifications rarely connect the extent of wear at the tooth level to restoration design [6, 54]. Our grading system (Grades 0–4) directly informs the type of preparation and therapeutic approach—whether additive composite, CAD/CAM ceramics, or full-coverage restorations—thus aligning with and operationalizing the preservation principles described by other authors [70, 71].

While systematic reviews agree that no single material or technique is universally superior [71, 72], our system guides material selection based on functional load, esthetic need, and structural loss, rather than arbitrary preference or convenience. This bridges the gap between flexible decision-making and standardization—a balance that is often missing in case reports and larger consensus statements [15, 73, 74].

Ultimately, the model proposed in this article addresses key deficiencies in the existing literature:

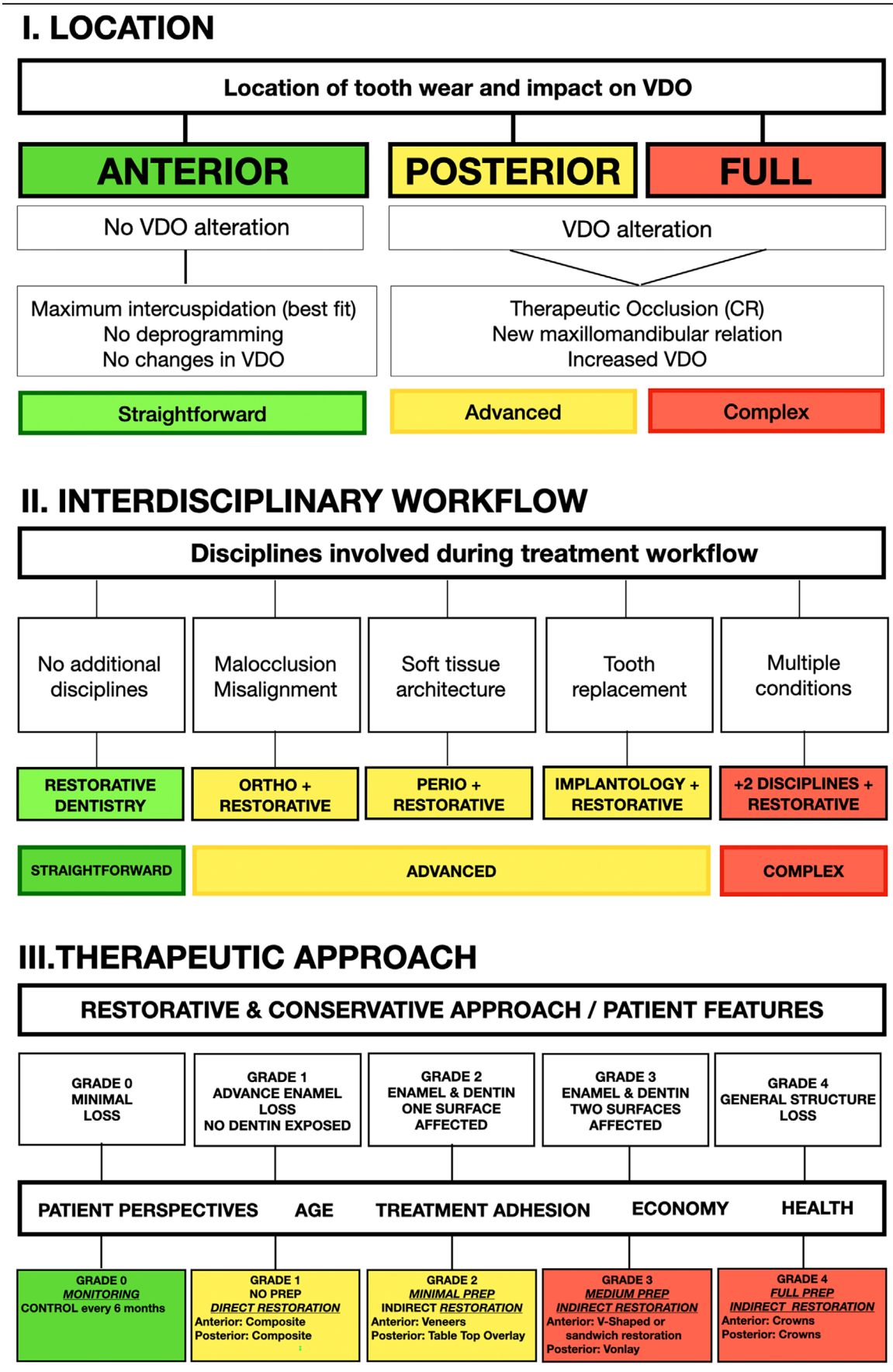
1. It standardizes diagnostic and treatment planning by correlating wear extent and location with interdisciplinary needs.
2. It defines a predictable sequence for combining specialties while respecting biological phases (e.g., the stabilization period prior to full reconstruction).
3. It aligns material and preparation choices with anatomical grading and clinical priorities, reinforcing minimally invasive principles with practical protocols.

Considering the above, this approach supports a shift from fragmented, reactive care to a proactive, reproducible, and biologically oriented rehabilitation model. It offers clinicians a decision-making framework that integrates the best of current evidence while adding much-needed clarity and structure to the management of patients with TW.

5 | Conclusion

Each step outlined in the LIT classification contributes to the management of patients with worn dentition, offering structured

TABLE 3 | LIT classification. Decision-making flowchart outlining location of the wear, interdisciplinary workflow, and therapeutic approach for tooth wear.



guidance for the treating clinician. By systematically assessing the Location of TW, identifying the Interdisciplinary involvement required, and determining the therapeutic approach such as preparation design and restorative material selection, the clinician could formulate a comprehensive and organized treatment plan. This approach enhances diagnosis, facilitates interdisciplinary coordination, and supports the development of conservative and individualized rehabilitation strategies for complex clinical scenarios (Table 3).

6 | Summary

TW is a progressive, non-carious loss of dental structure caused by erosion, attrition, and abrasion, commonly affecting young patients. Its multifactorial origin and frequent association with other oral conditions demand complex, interdisciplinary management. Despite recent advances in diagnostic tools and treatment protocols, no existing classification integrates wear extension and location, specialties involved, and therapeutic approach. This publication proposes a new system and structured approach to achieve predictable, conservative, and efficient oral rehabilitation.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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