

**Decoding Occlusal Facets: Selecting the Most Suitable Restorative Material for Every Patient**<sup>1</sup>Dr Tanvi Devan, BDS, Goregaon Dental Centre, India<sup>2</sup>Dr Jasdeep Kaur Cheema, BDS, DDS, FPFA, Alumini University of the Pacific Arthur A Dugoni School of Dentistry, San Francisco, USA<sup>3</sup>Dr Anuja Meenugu, BDS (OSM), MSHI, Wisconsin Milwaukee, USA<sup>4</sup>Dr Shumaela Ambreen, BDS, Sardar Patel Post Graduate Institute of Dental and Medical Sciences, Lucknow**Corresponding Author:** Dr Tanvi Devan, BDS, Goregaon Dental Centre, India**Citation of this Article:** Dr Tanvi Devan, Dr Jasdeep Kaur Cheema, Dr Anuja Meenugu, Dr Shumaela Ambreen, “Decoding Occlusal Facets: Selecting the Most Suitable Restorative Material for Every Patient”, IJDSIR- October – 2025, Volume – 8, Issue – 5, P. No. 14 – 23.**Copyright:** © 2025, Dr Tanvi Devan, et al. This is an open access journal and article distributed under the terms of the creative common’s attribution non-commercial License. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.**Type of Publication:** Review Article**Conflicts of Interest:** Nil**Abstract**

Tooth wear refers to irreversible loss of tooth structure due to mechanical or chemical wear that do not involve bacterial activity. Occlusal facets are hallmark features of attritional tooth wear. The choice of restorative materials plays a vital role in preserving both function and aesthetics, especially in posterior teeth where occlusal stress is significant. The aim of the study is to discuss commonly used materials such as glass ionomer cements, composites, and bonded amalgams for the early restoration of occlusal facets and prevention of further structural compromise.

Early detection of occlusal wear is essential, as it enables conservative intervention and improved long-term prognosis. The selection of restorative material should be based on several factor, including the patient’s age, esthetic expectations, presence of parafunctional habits, medical history, adhesive strategy and operator skill

level. Composite resin is one of the most widely used and accepted restorative materials in modern dentistry, appreciated for its esthetics, cost-effectiveness, physical properties, and versatility. Glass ionomer cement is widely used in both adult and paediatric dentistry and has versatile applications in both restorative and preventive dentistry. For generations, dental amalgam has been a reliable restorative material. It offers several advantages, including low cost, excellent wear resistance, minimal sensitivity to moisture, high tolerance to masticatory forces, and strong compressive strength. The use of bonding agents improves retention and reduces microleakage, especially in large cavity preparations. Given the increasing prevalence and multifactorial aetiology of tooth wear, it is important to understand not only the underlying cause but also the most effective approaches for managing and restoring the worn dentition.

**Keywords:** Cingula, Occlusal Facets, Tooth Grinding, Vinegar

## Introduction

Tooth wear refers to irreversible loss of tooth structure due to mechanical or chemical wear that do not involve bacterial activity. It is distinct from tooth loss caused by caries, trauma, or developmental disorders. Tooth wear occurs over time because of functional or para-functional habits. It is broadly categorized into abrasion, attrition, abfraction and erosion.

Attrition is a mechanical wear resulting from tooth-to-tooth contact, commonly seen in individuals with bruxism. Abrasion occurs due to external mechanical forces, such as aggressive tooth brushing, improper use of oral hygiene aids, habits such as nail biting. Another form of mechanical wear is abfraction – a type of non-carious cervical lesion caused by repeated flexural stress. It can occur due to tooth grinding, clenching, or chewing leading to wear of enamel and dentin at cervical region of tooth. These are wedge-shaped notches present near the gingiva and often co-exist with other types of wear. Erosion, on the other hand, is chemical wear resulting from exposure to acidic substances. This substance can either be carbonated beverages, citrus fruits, vinegar, or they can be intrinsic acids from conditions like gastroesophageal reflux or frequent vomiting.

Tooth surface loss is becoming more prevalent in younger population. According to the studies, approximately 3% of individuals in their early 20s shows signs of tooth wear, and this increases about 17% in older adults.<sup>1</sup> With lifestyle changes, dietary habits and rising stress levels contributing to parafunctional habits like bruxism, the number of affected individuals might grow.

Tooth wear if left untreated, can lead to multitude of complications. These include reduced vertical dimensions of occlusion, impaired aesthetics,

Temporomandibular Joint disorders, challenges in mastication and pain and discomfort. Psychologically, visible wear can lead to self-consciousness and reduced confidence, especially in young adults.

Counselling and educating people about existing tooth wear and identifying the etiology is crucial. Early diagnosis plays a crucial role in minimizing these complications. It allows for targeted preventive approach, proper risk management and appropriate care planning.<sup>2</sup> Mild cases of tooth wear can often be managed conservatively through preventive and behavioral therapy. However, pathological, or severe tooth wear often requires restorative treatment to re-establish function, esthetics, and occlusal harmony.<sup>2</sup> According to the study of Wetselar et.al, there are two criteria that can help the clinician to make decisions on when to start a restorative treatment. The primary criteria is the amount of loss of hard dental tissue and the secondary criteria are the factors influencing the speed of the loss of hard dental tissue, the age of the patient and other etiological factors that can be determined after thoroughly performed diagnostic procedures.<sup>3</sup>

The early changes seen on teeth can often be subtle and difficult to detect. Initial signs may include loss of surface characteristics, cingula, mamelons and smoothening of facial or incisal surfaces. As wear progresses, more pronounced features may become evident. In severe cases, this can include presence of cupped-out-lesions-particularly on the occlusal surfaces of lower first molars -and noticeable thinning of facial or buccal surfaces of upper incisors.<sup>4</sup>

Occlusal facets are hallmark features of attritional tooth wear. They appear as smooth, flattened and saucer shaped depressions on the occlusal surfaces of posterior teeth. The presence of well-defined occlusal facet indicates on going wear and may pose a clinical

challenge in restorative procedure, particularly in achieving adequate retention and stability of the material. In posterior teeth, where occlusal loads are highest, the smooth and shallow nature of the facets may compromise the mechanical interlocking and adhesive bonding. Furthermore, occlusal facets often lack natural contours and anatomy which can lead to mastication problems and TMJ dysfunction.<sup>5</sup>

The choice of restorative materials plays a vital role in preserving both function and aesthetics, especially in posterior teeth where occlusal stress is significant. Early intervention in treating occlusal facets is crucial to prevent progression to more severe tooth wear. Restorative materials must not only withstand functional loads but also offer durability against continuous wear. The aim of the study is to discuss commonly used materials such as glass ionomer cements, composites, and bonded amalgams for the early restoration of occlusal facets and prevention of further structural compromise.

### Methodology

To review the literature, Studies were selected from PubMed, Scopus, Web of Science, and Google Scholar without restrictions on publication year, to provide a comprehensive overview of current knowledge on restoration of tooth wear of posterior teeth with composite resins, glass ionomer cement and bonded amalgam. The review focused on comparing the efficacy of composite, GIC and bonded amalgam in tooth wear. The search terms included: "Tooth wear," "Occlusal wear," "Erosive tooth wear," "Attrition," "Composite Resin," "Glass ionomer cement," "Bonded Amalgam" "Dental Adhesives ," and "Posterior teeth." The research encompassed, Case reports, laboratory studies, clinical studies, and systematic reviews.

### Composite Resin

Composite resin is one of the most widely used and accepted restorative materials in modern dentistry, appreciated for its esthetics, cost-effectiveness, physical properties, and versatility. It is often regarded as a universal material suitable for both anterior and posterior restorations. Modern composite materials are designed to facilitate easy cross-linking, maintain low polymerization shrinkage, and exhibit favorable biological and mechanical properties.<sup>6</sup> As a tooth-colored material that closely mimics natural dentin and enamel, composite has emerged as a promising option in restorative dentistry.

### Advancements in Composite

When it comes to material type, studies have shown that conventional and nanofilled composites demonstrate similar wear behavior, while bulk-filled composites exhibit higher wear compared to nanohybrid varieties. Nanohybrid composites, which are widely used in clinical practice, have shown superior wear resistance and improved mechanical performance.<sup>7</sup> According to Magdalene et al., placing a thin layer of conventional composite over a bulk-filled restoration may help extend its longevity, although this approach should be carefully discussed with the patient.<sup>8</sup> Recent advancements have introduced self-healing composites as a novel alternative to overcome some of the limitations of traditional composites, such as secondary caries and restoration fractures. These materials incorporate microcapsule-based systems that can autonomously repair microcracks or damage within the restoration. To meet clinical demands, ongoing research is focused on optimizing the balance between mechanical strength and self-healing efficiency.<sup>9</sup>

### Adhesive System

Adhesives have undergone significant advancements and play a critical role in ensuring the longevity of

restorations. Adhesive systems are broadly categorized into Etch-and-Rinse (ER III & ER II) and Self-Etch (SE I & SE II) approaches. ER III is considered the gold standard<sup>10</sup> and involves a three-step process of etching, priming and bonding. Although time-consuming, it offers excellent bond strength. ER II combines primer and resin in a single bottle and uses 35–37% phosphoric acid for etching. It effectively prevents collagen collapse and reduces post-operative sensitivity.<sup>10</sup> SE II eliminates the rinsing step and keeps primer and adhesive in separate bottles. It provides good bonding to dentin and is less sensitive to the hydration state of the surface, though it bonds less effectively to enamel.<sup>11</sup> SE I, where primer and resin are combined, offers reduced technique sensitivity, but tends to have lowest bond strength.<sup>10</sup> Among these, ER III and SE II are noted for providing more stable and long-lasting outcomes. Regardless of the material used, adhesives have demonstrated a low risk of failure over a five-year period, supporting their continued use in well-selected cases.<sup>12</sup> Choosing the appropriate adhesive agent is crucial, as it can significantly influence the long-term strength and clinical success of the restorative material.

#### **Factors influencing bond strength and longevity**

The final step in restorative procedures is finishing and polishing, which is essential for achieving both esthetic appeal and long-term durability of composite restorations. According to a study of Sankar Vishwanath et al., 99.1% of participants agreed that finishing and polishing are vital for the clinical longevity of composite restorations. Ideally, this procedure should be performed 10–15 minutes after placement, as polymerization of photo-cured resins continues during this period.<sup>13</sup> Finishing should be done under a coolant to prevent heat generation, as the dry method can induce cracks within the material.<sup>14</sup> Finishing and polishing is a multi-step

process that requires following a proper sequence. Diamond burs are used initially for contouring and reduction of occlusal surfaces due to their high efficacy. However, they can leave rough surfaces. According to Prashanthi Sampath Madhyastha *et al.*, diamond burs like Astropol and Astroburs are preferred for achieving a better surface finish.<sup>15</sup> Tungsten carbide burs are used for minimal contouring or trimming.<sup>16,17</sup> For smoothening, carbide burs are recommended due to their lower cutting efficiency.<sup>15</sup> Polishing pastes and discs help to enhance the surface luster.<sup>18</sup> A surface sealant made of low-viscosity resin can be applied to reduce surface wear and extend the restoration's lifespan.<sup>13</sup>

#### **Future prospects of composite to restore occlusal facets**

Keeping all aspects in mind, in cases of tooth wear, composite can be a suitable restorative choice when wear is detected early or when the parafunctional habit is fully addressed. Restorations subjected to high occlusal stress, commonly seen in bruxism, show nearly three times higher failure rates compared to those under low occlusal load. Since tooth wear is predominantly seen in older individuals, restoration becomes more challenging due to complex occlusal rehabilitation needs and potential medical complications.<sup>19</sup> As the material is technique-sensitive and demands moisture control, it is generally better suited for young adults with good compliance and oral hygiene. ER III and SE II provide more stable and long-lasting outcomes; however, SE II may be preferable in clinical practice due to its good bonding performance combined with reduced application time.

#### **Glass Ionomer Cement**

Glass ionomer cement is widely used in both adult and paediatric dentistry and has versatile applications in both restorative and preventive dentistry. GICs naturally adhere to the tooth structure.<sup>20</sup> They bond effectively to

moist enamel and dentin, making them less susceptible to moisture contamination. Its key properties include biocompatibility, low technique sensitivity without the need for additional adhesive systems, it is a fluoride releasing material providing effective tooth surface protection against demineralization and supports tooth integrity, the coefficient of thermal expansion of GIC closely matches that of enamel and dentin, the modulus of elasticity is like dentin, and superior adhesion to calcified tissue compared to adhesive systems. GIC is also suitable for managing non-carious cervical lesions (NCCLs).<sup>21</sup> Additionally, when compared, both GIC and hybrid resin composites have shown comparable and successful clinical outcomes after six years of evaluation.<sup>22</sup>

#### **Advancements in GIC**

Based on chemical composition, GIC is divided into conventional, resin-modified, and metal-infiltrated glass ionomer cement. To overcome limitations related to mechanical strength and aesthetics of conventional GICs, resin modified GIC (RMGIC) was introduced. According to Sharanbir K. Sidhu's study, RMGIC performed well in terms of retention and post-operative sensitivity,<sup>23</sup> making it a restorative material of choice, especially in geriatric patients.<sup>24</sup> However, in patients with xerostomia or those at high caries risk, conventional GIC is recommended. Even though RMGIC performs better against abrasion and erosion, this advantage does not extend to xerostomia conditions. A newer conventional GIC, known as Fuji Bulk, has been introduced. It offers faster setting and increased resistance, making it suitable for elderly patients and those with xerostomia.<sup>25</sup> The powder-to-liquid ratio is an important factor for the long-term success of GIC restorations. High-viscosity GICs are superior to low-viscosity variants in terms of retention and is also considered a semi-permanent

restorative material for Class I and Class II restorations.<sup>22</sup>

The continuous advancements in GIC make it an adaptable restorative material.

#### **Factors influencing bonding and longevity**

The shape and size of the cavity significantly influence the retention of the material. The presence of sclerotic dentin can hinder bonding,<sup>26</sup> therefore removing or conditioning these surface areas is crucial. Tooth conditioning can be performed using 10% polyacrylic acid, which increases the wettability of the tooth surface, therefore increasing the bond strength.<sup>23</sup> Phosphoric acid has been shown to be a more effective conditioner for RMGIC.<sup>27</sup> The clinical success of GIC also depends on the surface texture of the material. To improve surface luster and prevent material wear, restorations should be coated with varnish or light-activated resin bonding agents. Both conventional GIC and RMGIC should be coated immediately after polishing. A restorative system such as EQUIA Fil (GIC) combined with EQUIA Coat (resin coating) has demonstrated improved mechanical properties and increased fracture resistance.<sup>28</sup> Appropriate cavity preparation, surface conditioning, and protective coating play a pivotal role in enhancing the durability, retention, and clinical success of GICs.

#### **Future prospects of GIC to restore occlusal facets**

Glass ionomer is also referred to as "man-made dentin".<sup>29</sup> Occlusal facets that extend deep into the dentin can be effectively restored using GIC, as it produces less post-operative sensitivity. Restorative treatment should ideally be completed in a short duration, when treating patients with serious medical conditions or those on long-term medications. Tooth wear is common among older individuals, and GIC can be the material of choice due to its minimal chairside time requirements. Although GIC has lower wear resistance, the loss of retention typically occurs as a cohesive failure, where the material fractures

but leaves an adhesive layer on the tooth surface, unlike composite, which often leaves the surface exposed and unprotected.<sup>30</sup> Glass ionomer cement does not effectively replicate natural tooth anatomy like composite does, but temporarily act as an interim restoration to stabilize the bite and improve function while definitive treatment is developed. In patients experiencing sensitivity due to tooth wear, till the time the parafunctional habits are resolved, GIC may be recommended. High-viscosity GIC or RMGIC with a protective coating would be suitable for restoring occlusal facets.

### **Bonded Amalgam**

For generations, dental amalgam has been a reliable restorative material. It offers several advantages, including low cost, excellent wear resistance, minimal sensitivity to moisture, high tolerance to masticatory forces, and strong compressive strength. In recent years, adhesive techniques have been introduced to enhance the performance of traditional amalgam. The use of bonding agents improves retention and reduces microleakage, especially in large cavity preparations, eliminating the need for pins. Bonding also enhances the inherent strength of the tooth structure, increases fracture resistance, and reduces post-operative sensitivity.<sup>31</sup> The main disadvantage of bonded amalgam is its metallic appearance, which is generally considered less appealing than tooth-coloured cements. Although the use of amalgam has declined, it continues to be the material of choice for many clinicians when restoring posterior teeth where aesthetics is not a primary concern.<sup>32</sup>

### **Adhesive system**

Among the various bonding agents used with amalgam, Amalgam-bond Plus with HPA has demonstrated the highest bond strength, while OptiBond has shown superior bond strength to dentin.<sup>33</sup>

For long-term outcomes, it is essential that the tooth surface is thoroughly wetted with the bonding agent, rather than simply increasing the volume of adhesive applied.<sup>34</sup> Light-cured adhesives exhibit higher bond strength compared to chemically cured ones, as they effectively initiate the setting reaction and allow the bottom layer of resin to bond more securely to dentin. According to one study, Amalgam-bond reported higher bond strength than resin-modified glass ionomer cement (RMGIC).<sup>33</sup> Additionally, Fuji II glass ionomer bond to amalgam demonstrated similar bond strength when compared with Amalgam-bond Plus. It has also been observed that spherical amalgam alloys achieve better bond strength than admixed alloys.<sup>35</sup> Thus, selecting the appropriate bonding agent and alloy type plays a critical role in enhancing the overall performance and longevity of amalgam restorations.

### **Future prospects of Bonded amalgam to restore occlusal facets**

More studies are needed to evaluate the long-term success of bonded amalgam in the restoration of tooth wear cases. Bonded amalgam remains a material of choice for posterior restorations due to its durability and strength.<sup>36</sup> It can be recommended in cases of large occlusal facets where cusp build-up is crucial. Since occlusal wear can lead to temporomandibular joint (TMJ) issues, preserving the occlusal anatomy becomes essential. Bonded amalgam may be considered in patients with ongoing parafunctional habits, where occlusion needs to be maintained despite the persistent wear factors. However, due to the complexity of placement and the need for precise technique, its use is generally not advised in elderly patients. It should also be avoided in pregnant women due to potential mercury exposure. Bonded amalgam is most suitable for young adults where



aesthetics is not a primary concern, and it offers excellent longevity, with clinical success reported up to 15 years.

Table 1: Criteria for selecting restorative material for early treatment of occlusal facet

	Composite Resins	Glass Ionomer Cement	Bonded Amalgam
Advancements in Materials	Nanohybrid Composites	High viscosity and Resin - modified glass ionomer cement.	Spherical Amalgam alloys.
Bonding Agents	Self-etching bond generation II	—	Amalgam-bond plus with HPA. Optibond for dentin bonding
Factors influencing bonding strength	Finishing and polishing. Restoration coated with low viscosity sealant.	Tooth conditioning with phosphoric acid for RMGICs. Restoration coated with varnish or light activated resin bonding agents.	—
Esthetics	Excellent	Moderate (Limited shades)	Poor
Technique sensitivity	High	Low	Moderate to High
Patient Group	Young adults with resolved parafunctional habit & aesthetics are the main concern.	Geriatric, paediatric and patients with medical conditions. As a temporary cement to avoid sensitivity due to tooth wear or stabilize bite till the next treatment plan.	Young adults with large occlusal facets to minimize the risk of TMJ disorders.

## Conclusion

Given the increasing prevalence and multifactorial etiology of tooth wear, it is important to understand not only the underlying cause but also the most effective approaches for managing and restoring the worn dentition. Among the key clinical manifestations, occlusal facets remain a common and often underdiagnosed issue, presenting in varying degrees of severity. Despite the availability of several restorative materials, current literature does not provide definitive evidence favouring the superiority of one material over another in achieving optimal clinical outcomes specifically for occlusal facet management.

Early detection of occlusal wear is essential, as it enables conservative intervention and improved long-term prognosis. The selection of restorative material should be based on several factor, including the patient's age, esthetic expectations, presence of parafunctional habits, medical history, adhesive strategy and operator skill level. Composite resin can be favourable choice for young adults, particularly in those with resolved parafunctional habits and aesthetic concern. Glass ionomer cements may be more suitable for geriatric patients or individuals with ongoing systemic conditions, given their ease of placement. GIC may also help in managing dentin hypersensitivity in patients with active wear till the further treatment plan. For patients

presenting with extensive occlusal facets or associated temporomandibular joint dysfunction, bonded amalgam restorations may offer superior resistance and structural support, particularly where preserving tooth anatomy is critical.

Patient education and counselling remain integral to treatment planning. Addressing the etiology, setting realistic expectations and ensuring compliance are just as important as restorative intervention itself. Considering the time-consuming and technique sensitive nature of tooth wear management, further clinical and comparative studies are needed to establish evidence-based decision making in the selection of materials for managing occlusal facets.

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