Innovative Dental Composite: Universal application and improved workflow for clinical practice

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Summary

Modern dental professionals encounter numerous challenges in their daily practice. This article presents an innovative dental composite from VOCO that promises to transform our clinical workflow. By addressing the complex demands of contemporary dental care, this new solution aims to enhance efficiency and patient outcomes.

Keywords

- VOCO GrandioSO Unlimited
- Class I, II, III, V and aesthetics cases
- Restorative
- Universal Nano-Hybrid Composite
- Resin Composite
- Cluster Shades

Introduction

Dental caries continues to be a widespread global health issue, ranking among the most prevalent chronic diseases worldwide [World Health Organization, 2017]. Fortunately, dental composites have transformed restorative dentistry by providing patients with both aesthetic and functional solutions. Among these advancements, the GrandioSO Unlimited composite (VOCO GmbH, Cuxhaven, Germany) stands out, marking a significant leap in dental restoration technology. This composite reflects the transition from traditional dental materials like silver and gold to modern, innovative tooth-coloured solutions [Bayne et al., 2019]. GrandioSO Unlimited allows for applications in dental cavities with increments up to 4 mm, making dental procedures more efficient while preserving exceptional aesthetic results. Its unique Visual Transformation Technology (VTT) provides high translucency in the non-polymerised state, enabling reliable depth polymerisation and adaptive colour integration.

Modern dental composites provide solutions for a wide range of clinical challenges across all cavity classes [Cho et al., 2022]. GrandioSO Unlimited features a simplified colour system covering the 16 classic VITA shades, with an enhanced chameleon effect for seamless integration with natural tooth colour. With a filler content of 91 % w/w, it sets new standards for high-performance dental materials, delivering excellent stability and strength.

Aesthetic remodelling has become increasingly sophisticated, with composite materials offering solutions that perfectly match natural tooth colour and translucency. By utilising these cutting-edge technologies, dental professionals can offer patients restorations that are structurally sound, durable, and virtually indistinguishable from natural teeth.

The following clinical cases have been selected as some of the first cases in the world to be treated with GrandioSO Unlimited, demonstrating its versatility and remarkable potential for general dental practice. Through a series of carefully documented treatments, this advanced composite material addresses a variety of dental challenges. Each case highlights the material's unique properties, showcasing its ability to deliver optimal function and aesthetic outcomes across different clinical scenarios.

Clinical cases

Class I

A 23-year-old patient presented with primary Class I caries on teeth 36 and 37, seeking an aesthetic and durable dental restoration. The lesions were asymptomatic and identified through clinical examination, with radiographic imaging showing no clear radiolucencies on the occlusal aspects. The patient desired a long-lasting, natural-looking solution, and the treatment plan involved direct composite restorations using GrandioSO Unlimited.

A comprehensive shade assessment was performed before tooth dehydration to ensure the best colour match. Treatment commenced with careful preparation of teeth 36 and 37 after successful anaesthesia and rubber dam isolation. Preparation involved using a speed-increasing handpiece with coarse grit diamond and tungsten carbide burs for precise caries removal. Air abrasion with 29 micron alumina at 3 bar pressure was applied at the amelodentinal junction (ADJ) for optimal surface preparation. Bonding was done with the universal adhesive Futurabond U (VOCO GmbH, Cuxhaven, Germany).

The restoration was completed using GrandioSO Unlimited in Cluster Shade A2, along with FinalTouch brown and white (VOCO GmbH, Cuxhaven, Germany), employing a fast modelling technique. This allowed the material to be placed in a single 4 mm increment, significantly streamlining the workflow without compromising handling or anatomical precision.

The material's 91 % w/w filler content was crucial for creating a restoration capable of withstanding occlusal forces in load-bearing areas. Intricate fissure anatomy was confidently carved, knowing the material would ensure both structural integrity and aesthetic integration.

The immediate post-operative result demonstrated a seamless, natural-looking restoration that met the patient's aesthetic and functional expectations. GrandioSO Unlimited's innovative characteristics were key in achieving this optimal clinical outcome.

Fig. 1a: Pre-operative clinical situation. Primary caries present on the occlusal surfaces of teeth 36 and 37.

Fig. 1b: Rubber dam isolation and Class I cavity preparation. Caries removal at the amelodentinal junction was performed with a combination of tungsten carbide burs and air abrasion (29 microns alumina, 3 bar pressure).

Fig. 1c: Immediate post-operative result: Class I composite restorations on teeth 36 and 37 with GrandioSO Unlimited (Cluster shade A2), finalised and characterised with FinalTouch brown and white tints.

Class II

A 26-year-old patient presented with a failing amalgam restoration on tooth 16, showing clinical signs of secondary caries. The tooth was asymptomatic, with deterioration identified through comprehensive clinical examination. Due to amalgam superimposition, radiographic assessment was limited, requiring a meticulous clinical approach. The patient sought an aesthetic and durable solution for the compromised restoration.

Treatment commenced with complete removal of the existing amalgam restoration on tooth 16, using a speed-increasing handpiece with coarse grit diamond and tungsten carbide burs for caries removal, following anaesthesia and rubber dam isolation. This was completed by 29 micron alumina air abrasion. Caries clearance at the amelodentinal junction ensured the complete removal of compromised tooth structure. A sectional matrix band was strategically placed to facilitate a tight anatomical contact and restoration morphology, minimising the risk of food trapping. After placement, Futurabond U was applied to ensure strong adhesion to the prepared surfaces.

The restoration was done with GrandioSO Unlimited in cluster shade A3, with FinalTouch brown and white tints for natural aesthetic integration. The material's key attributes, including 4 mm full depth of cure and chromo-adaptive properties, were utilised to ensure a comprehensive and seamless restoration.

The final restoration successfully met the patient's aesthetic and functional expectations, providing a durable solution to the secondary caries and failing amalgam restoration. This approach demonstrates the efficacy of modern composite restoration techniques in managing complex dental rehabilitation scenarios.

Fig. 2a: Displaying failing amalgam restorations on tooth 16 with clinical signs of possible secondary caries.

Fig. 2b: Rubber dam isolation and amalgam removal and caries clearance at the ADJ using a combination of tungsten carbide burs and air abrasion (29 microns alumina, 3 bar). Placement of a sectional matrix band to facilitate restoration of the ideal anatomical contact point.

Fig. 2c: Immediate post-operative result of composite restorations completed of tooth 16 using GrandioSO Unlimited cluster shade A3 and FinalTouch brown and white tints.

Class III

A 74-year-old patient presented with secondary caries surrounding an existing Class III restoration on the distal surface of tooth 21. The lesion was discovered following the loss of a post-crown on tooth 22, providing direct visibility and access. The patient understood that the asymptomatic tooth needed to be restored prior to planned implant treatment for replacing tooth 22.

Treatment commenced with the removal of the composite on tooth 21, following anaesthesia and rubber dam isolation. Caries removal, cavity preparation and bonding were accomplished analogue to the previous clinical case. The restoration was completed in a single increment using GrandioSO Unlimited Cluster Shade A3. Key benefits of the material in this Class III situation included its ability to be placed in a single increment, along with the use of a mylar-acetate strip for efficient and straightforward placement. The chromo-adaptive properties of GrandioSO Unlimited ensured excellent integration with the natural tooth structure (Fig. 3d).

Fig. 3a: Displaying clinical signs of secondary caries on tooth 21.

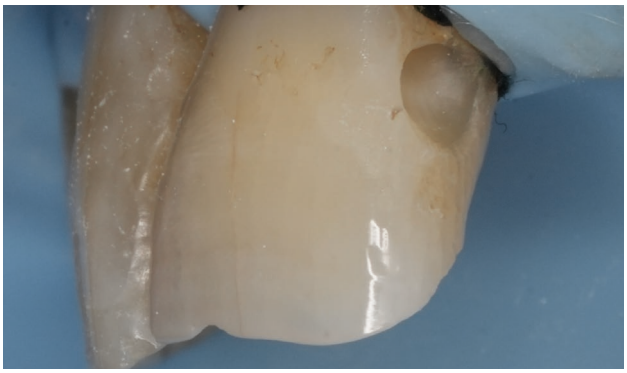

Fig. 3b: Rubber dam isolation of tooth 21 and caries removal at the ADJ using a combination of tungsten carbide burs and air abrasion (29 microns alumina, 3 bar). Placement of retraction cord soaked in astringent for achieving haemostasis and gingival retraction.

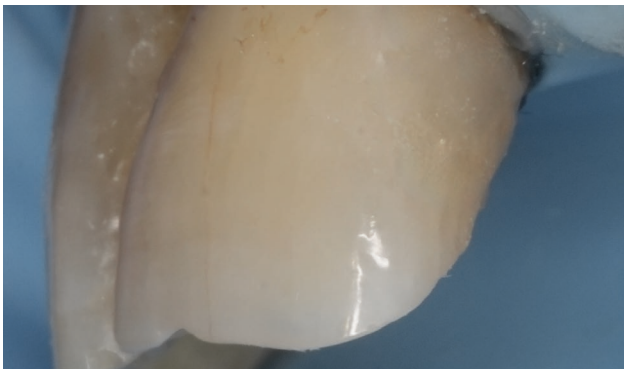

Fig. 3c: Immediate post-operative result of completed composite restoration on tooth 21 using GrandioSO Unlimited Cluster Shade A3.

Fig. 3d: Completed restoration on tooth 21 following the polishing protocol and rubber dam removal.

Class V

A 66-year-old male patient presented with multiple Class V buccal abrasion lesions in the upper arch, seeking an aesthetic and durable restoration. Clinical examination revealed failing buccal restorations on teeth 13 and 14, and significant buccal abrasion on tooth 26 requiring protective restorations. Tooth 12 showed early signs of wear, but the patient declined immediate intervention for it. Therefore, composite restorations were completed on teeth 13, 14 (Fig. 4a–e) as well as a novel restoration on tooth 26 (Fig. 5a–e).

Treatment began with the removal of composite on teeth 13 and 14 after successful anaesthesia and cheek retraction using an OptraGate (Ivoclar, Liechtenstein). Speed-increasing handpieces with a coarse grit diamond bur and alumina air abrasion (29 microns, 3 bar) were employed. Futurabond U was applied to the prepared surfaces to ensure strong adhesion. The restorations were done in a single increment using GrandioSO Unlimited Cluster Shade A3.5 for teeth 13 and 14, and Cluster Shade A3 for tooth 26.

The material offered exceptional handling for precise cervical placement, with VTT ensuring a full 4 mm depth of cure in 10 second increments (Fig. 4b and 4c). Its chromo-adaptive properties allowed for superb integration between the tooth and restorative interface with straightforward shade selection. Additionally, the material provides an outstanding polish compatible with various polishing protocols.

This comprehensive approach effectively addressed the patient's aesthetic and functional needs, delivering a natural-looking and wear-resistant solution for the buccal abrasion lesions.

Fig. 4b: Isolation completed with an OptraGate and pre-operative assessment of the shade of GrandioSO Unlimited A3.5 uncured.

Fig. 4c: Pre-operative assessment of GrandioSO Unlimited A3.5 mock-up cured for shade assessment.

Fig. 4d: Following local anaesthesia composite removal on 13 and 14 and placement of GrandioSO Unlimited Cluster shade A3.5 with final cure and initial polish.

Fig. 4a: Pre-operative clinical condition of restorations 13 and 14.

Fig. 4e: Immediate post-operative view and completed restorations on 13 and 14 following final polishing protocol.

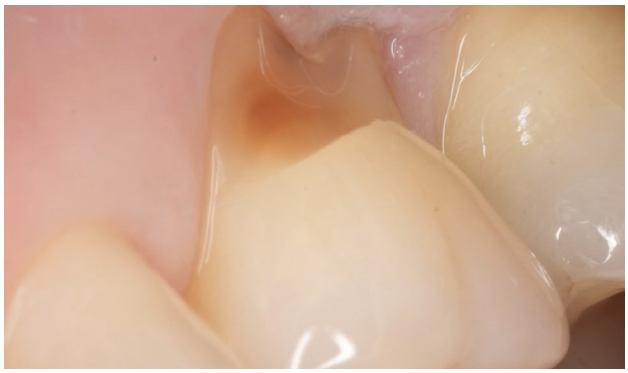

Fig. 5a: Displaying pre-operative clinical condition of 26 buccal abrasion (Frontal view).

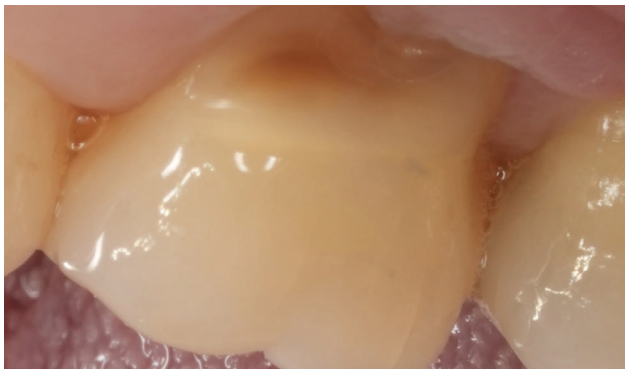

Fig. 5b: Displaying pre-operative clinical condition of 26 buccal abrasion (Buccal view).

Fig. 5c: Immediate post-op and completed restoration on 26 with GrandioSO Unlimited Cluster shade A3 (Frontal view).

Fig. 5d: Immediate post-op and completed restoration on 26 with GrandioSO Unlimited Cluster shade A3 (Buccal view).

Aesthetic case

A 37-year-old patient, having recently completed orthodontic treatment, sought to aesthetically enhance his 'social 6' anterior teeth. With high aesthetic demands, he desired a minimally invasive and durable method to improve the colour, shape, and texture of the teeth 13, 12, 11, 21, 22 and 23. Direct composite veneers were placed on teeth 12 and 22, and edge bonding completed on the other teeth using GrandioSO Unlimited Cluster shade A1.

The treatment commenced with two weeks of vital bleaching followed by three weeks of rehydration, ensuring a successful bonding protocol. It started with a freehand mock-up, which was cured to confirm shade selection and gain patient approval of the aesthetics. OptraGate isolation and air abrasion (29 microns alumina, 3 bar) were used to increase the bonding surface area. Futurabond U was then applied for optimal adhesion.
Restorations were completed in a single increment using GrandioSO Unlimited Cluster shade A1, sculpted freehand to the desired shape with various anterior instruments. The material's key benefits in anterior aesthetic cases include its translucency and chromo-adaptive properties, which help achieve a naturally aesthetic result. The easy handling allows for precise sculpting without material "springing back".

The outstanding polishability and high filler content (91 % w/w) ensure the longevity of the restorations, provided there is adequate maintenance and care [Dietschi et al., 2019].

Fig. 6a: Pre-operative smile view.

Fig. 6b: Pre-operative close-up view.

Fig. 6c: Pre-operative smile view (Split-dam anterior).

Fig. 6d: Smile view (Split-dam anterior). Immediately after composite placement (GrandioSO Unlimited A1).

Fig. 6e: Smile view (Polishing – marking primary and secondary anatomy).

Fig. 6f: Smile view (Immediate after initial polish).

Fig. 6g: Post-operative smile view (review visit).

Fig. 6h: Post-operative close-up view at review visit.

Final remarks

Modern universal composites like GrandioSO Unlimited offer incredible versatility and simplicity, making them ideal for various clinical scenarios. GrandioSO Unlimited, a next-generation universal nano-hybrid composite, performs remarkably in diverse settings (Fig. 1–6), from posterior areas with high strength demands to anterior aesthetic applications.

In Class I scenarios (Fig. 1), GrandioSO Unlimited's handling facilitates efficient workflows and accurate fast modelling techniques, ideal for posterior areas with high strength requirements. In Class II restorations (Fig. 2), its chromo-adaptive properties ensure seamless integration, even with intrinsic tooth discolouration. Furthermore, its predictable curing to a 4 mm depth refines the workflow, allowing for the placement of a bulk increment in deep boxes and the recreation of marginal ridges. Class III cases (Fig. 3) benefit from its excellent chromo-adaptive properties, ease of shade selection aided by its cluster shades, and outstanding surface polish. In Class V restorations (Fig. 4 and 5), GrandioSO Unlimited demonstrates ease of manipulation and memory during placement. The cluster shades aid in accurate shade selection, and, using a standard polishing protocol, the material achieves a high polish, resulting in outstanding, seamless restorations.

For the aesthetic case (Fig. 6), the high filler content (91 % w/w) of GrandioSO Unlimited was particularly beneficial for edge bonding and direct veneers. Similar to Class V scenarios, its chromo-adaptive properties provided versatility, allowing for seamless integration whether adding smaller volumes or applying a direct veneer.

Overall, GrandioSO Unlimited is an innovative solution that simplifies workflows with its universal applicability. It excels in both anterior and posterior restorations, demonstrated in various patient cases (Fig. 1–6). Its versatility, aesthetic quality, and strength make it ideal for diverse clinical scenarios.

The material allows for placement in increments up to 4 mm, handles deep margins effectively, and features a short curing time of 10 seconds. With a high filler content (91 % w/w), it offers excellent compressive strength for posterior use and outstanding polishability and aesthetics for anterior cases.

Practical tips include using a cured composite button for shade matching, and applying the material in thin increments for natural translucency in direct veneers or edge bonding. An opaquer may be used for underlying discolouration. In conclusion, GrandioSO Unlimited stands out as a versatile, universal aesthetic solution with five cluster shades, enhancing dental workflows and delivering exceptional results in various clinical scenarios requiring direct composite restorations.

Literature

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