海外精选 Overseas Cases

复杂而直接的ORMOCER

复合修复体在口腔后部区域的应用

Complex Direct ORMOCER

Composite Restorations in the Posterior Region

作者：Clarence Tam医生（新西兰）

出于成本的原因，患者和牙医经常会发现，他们不得不选择使用修复材料来改善牙齿结构、功能和外观方面的大型缺陷。而本病例报告则着力证明创新型有机改性陶瓷复合修复体能够凭借极低的收缩应力和体积收缩率，在应用于修复牙齿的同时，如何保护牙质。咬合功能是确保修复体使命寿命长的关键。

临床病例介绍

一名71岁的女性患者来到我们诊所，要求更换右下排第一和第二磨牙（#46和#47位置）中过大且效果不佳的复合树脂修复体。患者的天然牙冠仍然保留少量残留牙体组织，而且患者不希望再去除任何牙体组织（图1）。出于成本的原因，患者不得不选择避免进行修复治疗，包括运用烤瓷修复体的形式。我们向患者推荐了一种复杂而直接

For reasons of cost, patients and dentists today often find themselves obliged to use restorative materials for the treatment of large structural, functional and aesthetic defects. This case report demonstrates how an innovative, organically modified ceramic composite with extremely low shrinkage stress and volume contraction can be used to restore teeth while preserving tooth substance. Occlusal functionality is key to the longevity of the restoration.

Clinical case presentation

A 71-year-old female patient presented in my practice requiring replacement of insufficient, excessively large composite resin restorations of the lower right frst and second molars

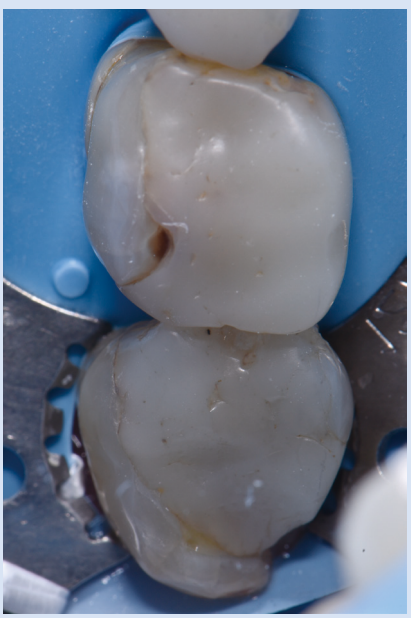

图1：术前状况显示现有修复体较大，残留牙体组织极少。

的树脂补牙体，该修复体只需对牙尖进行一些功能性和非功能性的修复即可。采用这种非传统方法时，其中很重要的一点是，咬合设计必须充分考虑修复材料和残留牙体组织的优缺点。

治疗过程

在取出现有的修复体之前，我们选择使用一盒含量为4%的阿替卡因（含1:100,000的肾上腺素），为患者进行了局部麻醉，并使用橡胶障对牙齿做隔离保护。为确保患者无龋齿，且牙质坚硬，我们使用龋齿检测器（龋齿标记器，VOCO）对患者的牙齿连续做了三次检查，同时还测量了残留牙尖的厚度。测量结果显示，底部厚度为3毫米。我们的治疗计划是，让修复体的边缘大幅度倾斜，方便以最大限度地增加计划修复材料的数量，并尽可能缩小牙尖区域，从而实现较大的接触表面（图2）。对于需要处理的龋洞区域，我们没有规

(46 and 47). The natural crown still retained a small amount of residual structure, and the patient did not wish for any further removal of the tooth substance (Figure 1). For cost reasons, the patient also chose to avoid prosthetic treatment, e.g. in the form of ceramic restorations. The patient was recommended a direct complex resin onlay requiring functional and non–functional cusp reduction. With this unconventional approach, it was important that the occlusal design should take into consideration the strengths and weaknesses of both the restorative material and the residual tooth structure.

Procedure

The patient was given a local anaesthetic with 1 cartridge of 4% articaine (with 1:100,000 adrenoline), and the teeth were isolated with a rubber dam prior to removal of the existing restorations. In order to ensure a caries–free, hard dentine base, three successive checks were performed with a caries detector (Caries Marker, VOCO). The thickness of the remaining cusps was measured, and found to be 3 mm at the base. The margins were strongly bevelled to maximise the amount of the planned restorative material with minimal reduction in the cusp region, and thus achieve a large contact surface (Figure 2). No centric contacts or other extensive functional contacts were planned for the cavity areas being treated.

The preparations were micro air abraded using 27 micron aluminium oxide; then a selective enamel etch

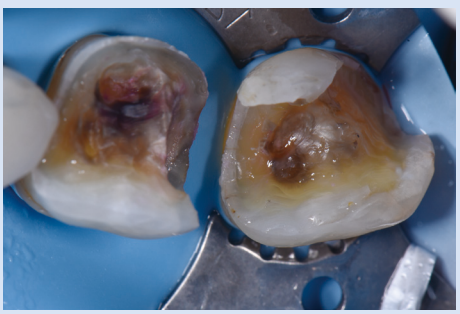

图2：准备好边缘倾斜幅度很大的修复体，作为减少牙尖直立高度的方案。牙尖底部厚度至少有3毫米。咬合形状的设计必须非常全面地考虑，以尽可能减少牙尖的侧向偏移负担。

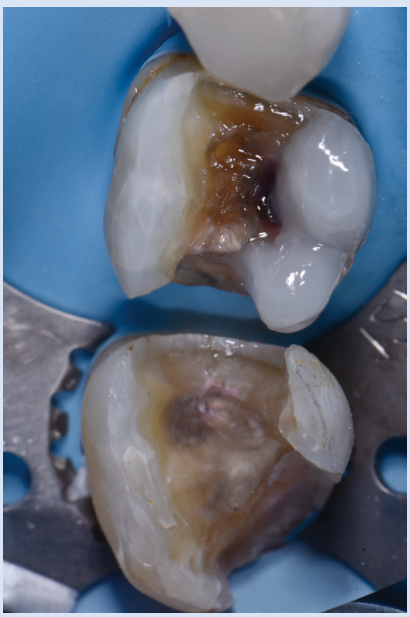

图3：使用27微米的氧化铝对牙齿进行空气微磨处理。然后，使用Futurabond U对牙齿进行选择性牙釉质酸蚀工艺处理。舌侧牙尖完全使用陶瓷填充材料ORMOCER（Admira Fusion X–tra，U色调，VOCO）进行构建。

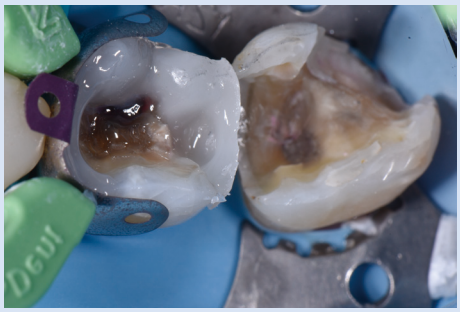

图4：边缘脊使用截面矩阵系统（V3，Triodent，Dentsply Sirona）进行构建。通过这种方式，我们将复杂的II类病例转化成为了更简单的I类病例。

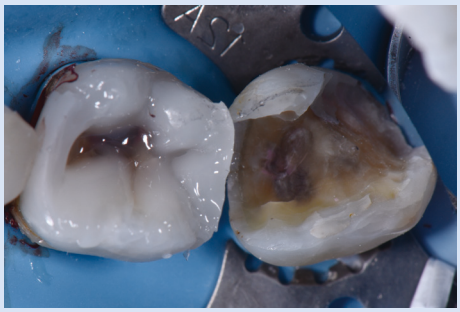

图5：从近中颊齿面开始，单独构建口腔齿面。

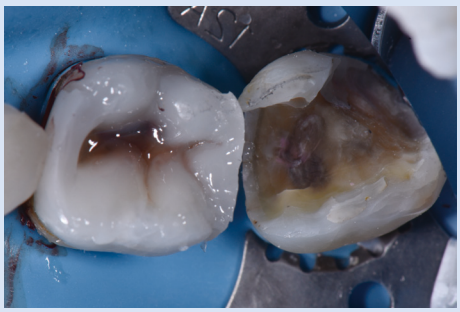

图6：在所有口腔齿面完全固化后，将棕色调FinalTouch（VOCO）添加到齿面底部，这是Tam齿面着色方法的一部分。

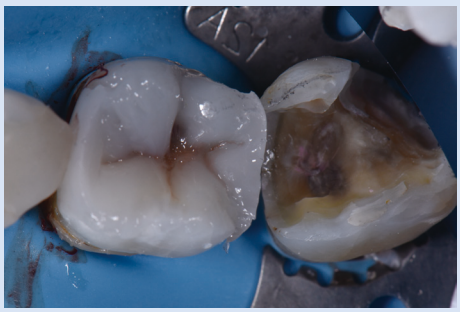

图7：对近中舌侧牙尖进行成形处理，并使用刷子进行整理，确保在近中舌侧和中舌侧齿面形成内褶。将棕色调部分覆盖，使其仅略微可见，从而产生自然的外观。

划中心接触面，也没有计划其他大范围的功能性接触面。

准备工作首先包括使用27微米的氧化铝对牙齿进行空气微磨处理；然后，使用33%的正磷酸溶液，对牙齿进行选择性牙釉质酸蚀工艺处理；接着，使用Futurabond U（VOCO）进行粘合（图3）。#46位置牙齿的舌侧牙尖使用通用色调的Admira Fusion x-tra自行构建，这是一种完全基于陶瓷材质的填充复合物。我们采用逐步增加2毫米的方式，使牙尖朝着中心咬合面加宽。在这里，关键因素在于，不要一次性大量使用这种填充材料，以达到确保固化深度最大化的目的。

Admira Fusion x-tra的优点在于增加了固化深度，这是该修复材料的固有特性。当舌侧牙尖底部固化后，使用截面矩阵系统（V3，Triodent）进行进一步处理（图4）。在近端框的底部牙龈区域，使用少量可流动的Admira Fusion Flow（A3色调，VOCO）材料进行填充，每次增加0.25mm（极薄），一共增加三次，以确保边缘能够最大限度地充分混合，同时保证良好的适应性。然后，使用Admira Fusion x-tra（U色调）材料逐步完成边缘脊的修复。在使用Tam齿面着色方法（棕色，FinalTouch，VOCO）

technique using 33% orthophosphoric acid was performed; followed by bonding with Futurabond U (VOCO) (Figure 3). The lingual cusps of tooth 46 were created free-hand using the universal shade Admira Fusion x-tra, a purely ceramic-based bulk-fll composite. The cusps were widened towards the centro-occlusal aspect progressively in 2 mm increments. The key factor here was not applying this bulk-fillmaterial in bulk, and thereby ensuring maximum depth of cure at all times.

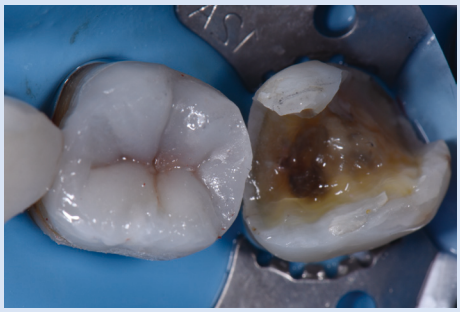

图8：对远中舌侧牙尖进行成形处理，并使用刷子进行整理，确保在周围其他齿面形成内褶，完成咬合表面的处理。色调看上去非常自然。在准备处理#47位置的牙齿之前，对边缘脊进行整理。以处理#46位置牙齿类似的方式，进行选择性牙釉质酸蚀、粘合和修复处理。

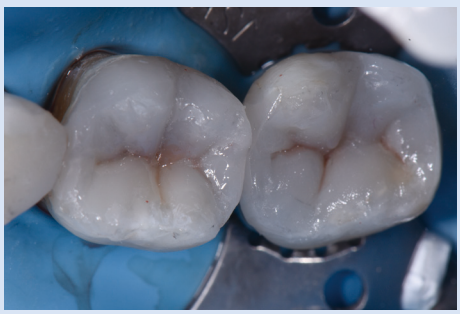

图9：在对三角脊进行牙釉质钙化不全细节处理之前的术后状况。

图10：使用FinalTouch白色调对三角脊进行牙釉质钙化不全细节处理之后的术后状况。

定制修复体色调之前，使用Admira Fusion x-tra对口腔齿面单独进行分层处理（图5和图6）。在下一步中，对舌侧牙尖单独进行成形处理，从而完成牙合面解剖学的设计（图7和图8）。完成#46位置牙齿的全面处理后，将矩阵系统放置在#47位置的牙齿上（Omnimatrix，Ultradent：远端边缘脊；V3

The beneft of Admira Fusion x-tra is the increased depth of cure which is inherent to this restorative. After curing of the base of the lingual cusps, a sectional matrix system (V3, Triodent) was used (Figure 4). In the gingival floo area of the proximal box, a small quantity of the flwable Admira Fusion Flow (shade A3, VOCO) was used in three 0.25 mm increments (extremely thin) to ensure complete and maximum marginal hybridisation and adaptation. The marginal ridges were then incrementally completed using Admira Fusion x-tra (shade U). The buccal lobes were layered individually with Admira Fusion x-tra before the Tam interlobe staining technique was utilised (brown, FinalTouch, VOCO) to customise the colour tone (Figures 5 and 6). In the next step, the lingual cusps were shaped individually, thus completing the design of the occlusal anatomy (Figures 7 and 8). Following complete finishing of tooth 46, the matrix system was placed on tooth 47 (Omnimatrix, Ultradent: distal marginal ridge; V3 Triodent: mesial marginal ridge). Tooth 47 was layered in a similar manner, again using a universal shade bulk-fill material (Admira Fusion x-tra)A small amount of white shade for customisation was applied to the triangular ridges of teeth 46 and 47 (FinalTouch, VOCO) to imitate the enamel hypocalcification (Figures 9 and 10). A glycerine layer was then applied, and the composite was polymerised fully through the glycerine in order to avoid the oxygen inhibition layer. Only minimal occlusal adjustments were necessary. Taking the material properties of the ORMOCER into consideration (high compressive strength and low flexibility), the occlusion was ground in to establish light centric point contacts without extensive lateral contacts or interferences. The restorations were fnished under water spray with a single-stage polisher (Dimanto, VOCO) to high lustre (Figure 11).

Rationale for material selection

Geriatric dentistry is becoming an increasingly prominent part of everyday general dental practice. The main objective of treatment for this section of the population is

Triodent：内侧边缘脊）。然后，同样使用通用色调的填充材料（Admira Fusion x-tra），以相似的方式，对#47位置的牙齿进行分层处理。将少量白色调定制材料应用到#46和#47位置牙齿的三角脊（FinalTouch，VOCO），以模仿牙釉质钙化不全效果（图9和图10）。之后，涂上甘油层，通过甘油使复合材料发生完全聚合作用，以避免氧气抑制层的产生。而这些过程都只需对咬合进行极小的调整即可。充分考虑到ORMOCER材料的特性（高抗压强度和低抗弯强度），对咬合面进行打磨时，即对于中心位置轻轻接触即可，确保不会产生大量侧面接触或干扰。使用单级抛光机（Dimanto，VOCO）和喷水对修复体进行整理，以实现高光泽效果（图11）。

材料选择理由

老年牙科学正成为牙科日常诊疗活动中日益突出的一个组成部分。这部分人群的主要治疗目标基本上是“在不产生高额费用的前提下，维持牙齿的基本功能”。大部分老年人都不愿意在牙齿上投入很多钱。考虑到这一点，我们必须了解各种直接和间接修复材料的物理特性，以设计出更合适的修复体。

> Admira Fusion的主要优点源于材料成分；它不含常规的甲基丙烯酸酯单体，因此能够实现更具生物相容性的修复效果（基本上是一种能够与所有粘合系统相容的纯陶瓷复合材料）。

复合树脂具有很高的抗压强度，但抗拉强度和抗弯强度都很低。牙釉质的抗压强度为384MPa，牙本质的抗压强度为297MPa。相比之下，牙本质的抗弯强度为165.6MPa。Admira Fusion x-tra的抗压强度为307MPa，抗弯强度为132MPa，与天然牙质相比，这些数值都是可接受的。同时，该材料的成分还具有极低的体积收缩率（1.25%），是当前市场上体积收缩率最低的产品。此外，在上面所示的II类修复中，能够维持最佳边缘密封性的能力也是至关重要的，特别是在牙本质粘合修复边缘位于釉质骨质界的情况下。

Arora等人研究了可流动复合材料在II类CEJ子分类修复的边缘完整性方面的作用。研究结果表明，当使用可流动复合防渗层替代仅具有可压性的复合树脂时，可显著减少微渗漏。[1]这项研究的前提是，II类修复的第一个失败点通常出现在近端框底部区域的修复边缘，特别是在位于龈下的位置。因此，体积收缩率和收缩应力是边缘保持较高精度和完整性方面的两个额外关键因素。

这种填充材料的极低收缩应力（3.71MPa），结合了较高的固化深度，确保了最大的边缘完整性，特别是跟常规复合材料一样以小增量方式使用的情况下。在避免牙龈刺激方面，生物相容性发挥了重要作用，相比树脂复合材料，陶瓷复合材料不太有利于生物膜的形成。

这种材料的显著效果，结合最佳加工特性，使其成为了我们诊疗工作中90%口腔后部修复病例的首要选择。结合FinalTouch系列中易于应用的定制色调，它使我们能够极大地提高效率、美观性、可预测性和边缘完整性，特别是在仅使用单一智能材料的情况下。DA

图11：最终术后情况显示中心位置仅发生轻轻接触，无功能性侧向偏移干扰，并且看上去很美观。

essentially “to preserve function without high cost”. The majority of older individuals are not willing to invest a lot of money in their teeth. In view of this, it is essential to understand the physical properties of direct and indirect restorative materials in order to design the appropriate restoration. Composite resins have high compressive strength, but only low tensile strength and flexibility. The compressive strength of enamel is 384 MPa and that of dentine is 297 MPa. In contrast, the flexuralstrength of dentine is 165.6 MPa. The compressive strength of Admira Fusion x-tra is 307 MPa, whilst its flexuralstrength is 132 MPa – acceptable values when compared to natural tooth substance.

The major advantage of Admira Fusion is derived from its material composition; it contains no conventional methacrylate monomers, and therefore allows for a more biocompatible restoration (essentially a purely ceramic–based composite compatible with all bonding systems).

At the same time, the composition gives an extremely low volumetric shrinkage (1.25%), the lowest of any product currently on the market. The ability to maintain an optimal marginal seal is also critical in the Class II restorations shown, especially in the case of dentine–bound restoration margins below the cementoenamel junction.

Arora et al investigated the role of flwable composites with regard to the marginal integrity of sub–CEJ Class II restorations and found a significant reduction in microleakage when a flowablecomposite liner was used instead of a purely packable composite resin.[1] The premise of this study is that the frst point of failure of Class II restorations is generally at the restoration margin, in the region of the proximal box floor,especially when located subgingivally. Thus, both volumetric shrinkage and shrinkage stress are two additional key factors with regard to high marginal precision and integrity.

The extremely low shrinkage stress (3.71 MPa) of this bulk–fll material, in combination with a high depth of cure, ensures maximum marginal integrity, especially if used in small increments like a conventional composite. In terms of avoiding gingival irritation, biocompatibility plays an important role, and ceramic–based composites are less conducive to the formation of biofilm than are resin composites.

The remarkable chameleon effectof this material, combined with optimal working properties, makes it the go–to choice for 90% of posterior restorations in my practice. When combined with the easy–to–apply customisation shades in the FinalTouch range, it enables me to increase enormously the efficicy, aesthetics, predictability and marginal integrity, essentially with just a single smart material.

作者简介

Clarence Tam医生是新西兰奥克兰市一家牙科诊所的负责人，专门从事美容和修复牙科领域。她出生于加拿大，毕业于西安大略大学（University of Western Ontario），并在多伦多大学（University of Toronto）/儿童医院（Hospital for Sick Children）完成了口腔综合科住院医生实习。她是新西兰美容牙科学会的会长和负责人，目前是澳大拉西亚（Australasia）地区拥有美国美容牙科学会认证会员资格的两名牙医之一。此外，她还拥有国际牙面美容学会会员资格。

Dr. Clarence Tam heads a practice in Auckland, New Zealand, which specialises in cosmetic and restorative dentistry. Born in Canada, she studied at the University of Western Ontario and completed her general dentistry residency at the University of Toronto/Hospital for Sick Children. She is the Chairperson and Director of the New Zealand Academy of Cosmetic Dentistry and is currently only one of two dentists in Australasia to hold Accredited Member Status with the American Academy of Cosmetic Dentistry. She holds Fellowship status with the International Academy for DentoFacial Esthetics.

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Admira® Fusion x–tra – The purely ceramic–based restorative materialAdmira Fusion x–tra is a purely ceramic–based restorative material, which allows for increments of up to 4 mm in thickness. The bulk–fillmaterial also has a convincing, low level of volume shrinkage, as well as outstanding biocompatibility. The universal shade U further simplifieshandling, as it provides aesthetic results in the posterior range by adapting, chameleon–like, to the surrounding dental substance. FinalTouch – Light–curing characterisation material FinalTouch is a light–curing composite for individual shade characterisation of direct and indirect composite restorations and masking of dental hard tissue discolourations. It is applied underneath/between the layers of composite/ORMOCER® restorative materials. FinalTouch, which is available in fie colours (white, blue, yellow, orange and brown), can be used to reproduce individual features such as fssures or white spots with a natural appearance and thus create perfect restorations down to the finest detail.