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Starting with the end in mind

The foundation of minimally-invasive dentistry



FIG /1 Pre-operative situation showing generalised presence of anterior diastemas secondary to an arch size-tooth size discrepancy.



FIG /2 Post-operative situation after guided placement of layered composite resin (Kuraray Noritake Majesty ES-2) with the use of intensives for creation of maverick effects.

Often, modern minimally-invasive techniques translate directly to minimal or no preparation of tooth substrate prior to placement of a prosthetic solution. We have heard of this trend reflecting 'Responsible Aesthetics' extending from restorative dentistry to fully-guided implant placement – techniques all based on digital metrics. Preservation of tooth structure is especially favourable in the case of young individuals where retention of tooth structure is key to maximising the prognosis of their teeth for a lifetime. To achieve this end, multidisciplinary dentistry is often necessary - teeth need to be moved to more ideal positions prior to preparations in order to maximise enamel volume for bonding, which is preferable to dentine as a substrate. However, there are situations where orthodontic perfection is not completely clinically achievable and restorative dentistry is required to define the ideal result.

This case describes a 36 year old male patient with a tooth size-arch size discrepancy characterised by large interdental spaces. The orthodontic option was rejected by the patient as he liked his current profile and only wished the "gaps" to be closed respecting ideal proportions of smile design. He was aware of and unhappy with the deficient length of his upper anterior teeth.

Pre-prosthetic bleaching was sought as the patient desired a lighter, brighter smile prior to shade mapping for the composite veneers and this was completed via custom bleaching trays worn overnight for 3 weeks using a 10% carbamide peroxide solution (Opalescence, Ultradent). Following completion of necessary minor restorative work, reference photos and intraoral measurements were taken which allowed calibration of the Digital Smile Design (DSD) software (Smile Designer Pro, Toronto, Canada). Using a myriad of tools such as vertical and horizontal reference lines to calibrate the facial landmarks, the smile

was evaluated with respect to tooth proportions, which were especially critical as sought to balance any addition in width with a corresponding addition in length without making the result look 'artificial'. Often, facially-directed smile design is key to predictable esthetics when the length of teeth are planned to be changed. If longer teeth are desired, should they be lengthened incisally or gingivally via crown lengthening?

Digital planning allows us to design treatment with the end result in mind and thus represents the new first step in esthetic treatment planning. In occlusal rehabilitation, the first step in esthetic treatment planning is to determine the length, width and position of the maxillary central incisors. From this compass point, the maxillary occlusal plane is planned, followed by the mandibular incisor three dimensional position and finally the mandibular posterior occlusal plane. The use



of software tools such as smile line arc, gingival arc and golden proportion rulers were utilised in the digital planning of tooth proportions.

Measurements relative to reality are possible as the software allows inclusion of a reference intraoral measurement, which then allows accurate communication of the needed dimensional changes to the laboratory for the diagnostic wax-up. In this way, the DSD drives the design of the diagnostic wax-up, which will then drive the trial smile, which will then allow us to test drive the result from both an esthetic and functional aspect before we have even committed to touch a bur to tooth.

In this case, the DSD-driven diagnostic wax-up allowed us to fabricate a putty stent, capturing the buccoincisor line angle. This process allows expedition of placement of the lingual shelf and readily transfers the design to the mouth during direct resin layering. If an indirect solution is sought, the putty stent can involve all the teeth to be treated, and the provisional restorations will be modelled after the new design. All-in-all, this process facilitates patient participation and motivation with the end result of increasing the predictability of success.

The Procedure

Shade selection was completed prior to dehydration of the teeth via the shade button technique (Kuraray Noritake Majesty ES-2). No anaesthesia was required prior to split dam isolation using a non-latex rubber dam

(Iso-Dam). Based on the putty stent, it was determined that a small volume of enamel required contouring to achieve the planned result without overcontouring the teeth.

Following preparation, the teeth were micro air abraded using 50 micron aluminium oxide (no dentine exposure) before a total etch technique using Kerr Optibond Solo Plus. The putty stent was scored and loaded before transferring the composite for the lingual shelf directly to the teeth. Proximal emergence profiles were refined using Garrison SlickBands used in a vertical end-down orientation extending into the gingival sulcus of the treated tooth. The join lines and hue of the teeth were determined using the WD (White Dentin) shade simultaneously establishing incisal dentin anatomy.

White intensives were placed in the mid-incisal edge region before placing a blue translucent composite increment on the proximoincisor corners of the buildup. A splash of amber translucent composite was placed over the middle dentine lobe for accentuated chroma in this region. Finally, the enamel layer (XWE) was placed in a single increment, respecting histoanatomical thicknesses of natural enamel before finishing and polishing.

This case truly demonstrates how one does appreciate the predictability of the restorative result when we start with the end in mind.



FIG /3 Putty stent generated from the digital smile design-guided diagnostic wax-up used to guide three-dimensional placement of the lingual shelf.



FIG /4 Pre-dehydration situation: shade selection using both the manufacturer shade tab and simultaneously using the direct shade button technique. Composite buttons in the latter are cured on the un-etched enamel surface for 5 seconds before evaluation to accommodate for any colour shift.

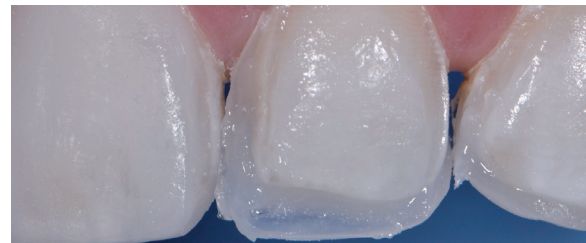


FIG /5 Guided placement of lingual shelf on tooth 22. Proximal contours can be idealised by using an anatomically-shaped sectional matrix (i.e. Garrison Slickband) turned vertically and placed within the sulcus to help guide the emergence profile.



FIG /6 Pencil line marking composite veneers defining position of proximal line angles as well as planned secondary anatomy.

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Clarence is the Chairperson of the New Zealand Academy of Cosmetic Dentistry. She is an Accreditation Candidate and Sustaining Member of the American Academy of Cosmetic Dentistry and seeks to be the first in New Zealand and Australia to gain Accredited Status with them. Clarence is an Opinion Leader for Henry Schein Shalfoon, 3M ESPE, Kuraray-Morita, GC Australasia, SDI, Coltene-Whaledent, Dentsply/Triodont/Rhodium and a Vocco Fellow in Australasia.

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