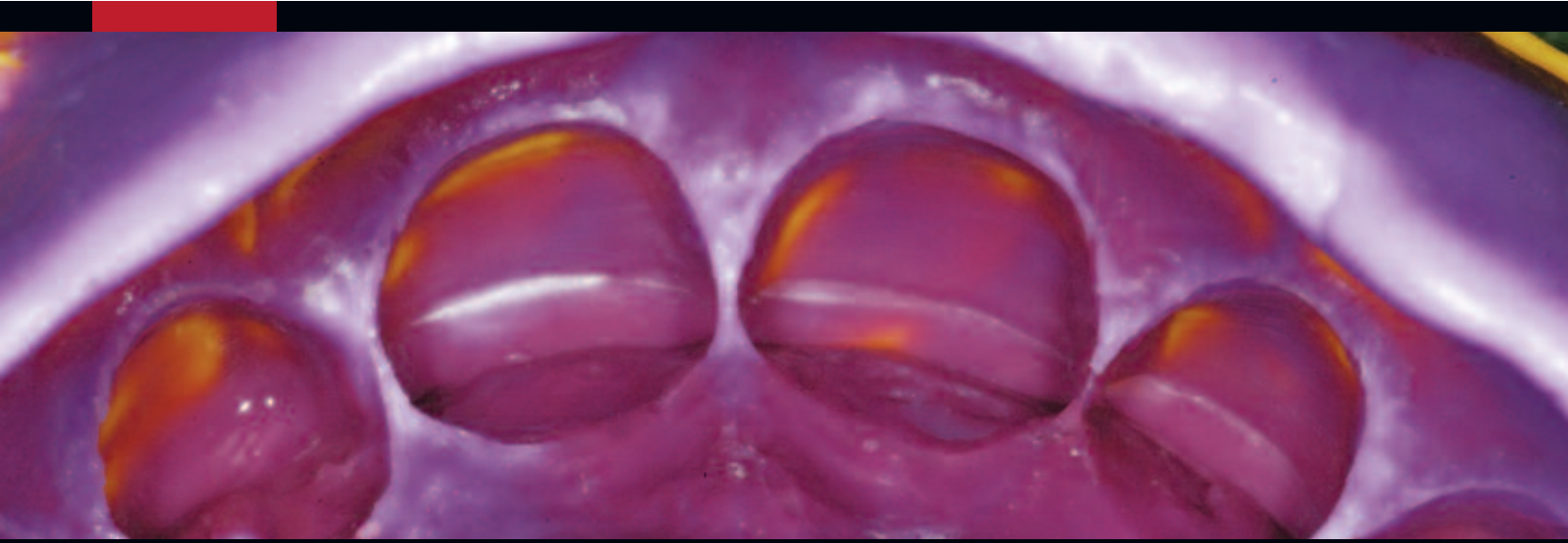


# Integrating function with conservative esthetic approaches:

## The restorative sequence



*Dr. Ali Tunkiwala*

**N**ature, with its hidden intricacies, produces an enthralling symphony of elements that has left human beings enamoured for eons. In his quest to recreate nature, man has embraced art in various forms. The artists, the sculptors, the poets and the writers over the years have humbly surrendered to the magnificence of nature's beauty. Dentists found their calling in the spectrum of art by the way in which they created and designed the minute aspects of natural teeth in the esthetic restorations they made for their patients. Emulating nature became the topmost goal for conscientious dentists. The exhaustive study of tooth morphology, the understanding of dental disease process and the gush of energy from the dental industry and material manufacturers have placed the dentists today on the peak of an artistic revolution that infuses beauty in the things that they create.

The case described here takes us through a journey of understanding the principle and pathophysiology of an unpleasing smile that requires a methodical approach to restore its lost glory in the most suitable manner conserving precious tooth structure.

### The Case Analysis:

The patient, aged 30 years, with history of orthodontics in her adolescence reported to the dental office with a complaint; that her smile does not do justice to the beauty of her face. On examination, the upper anterior teeth looked retroclined and over corrected as a result of orthodontics (Figures 1, 2, 3 & 4). Detailed analysis<sup>1</sup> was carried out using photographs and mounted study models; the relevant findings are tabulated in Table 1 (Figure 5).



Figure 1: Pre-operative Smile



Figure 2: Pre-operative Retracted View



Figure 3: Pre-operative Left Lateral Excursion



Figure 4: Pre-operative 1:1

## Risk Assessment:

The best way to understand the potential difficulties of the treatment and evaluating long term success of treatment outcome depends on thorough risk assessment strategies. A systematic approach to periodontal, bio-mechanical, functional and dentofacial risk is carried out<sup>2</sup>.

*Periodontally* the patient was 'low risk' as there was minimal or no bone loss and no bleeding on probing consistent with AAP classification.

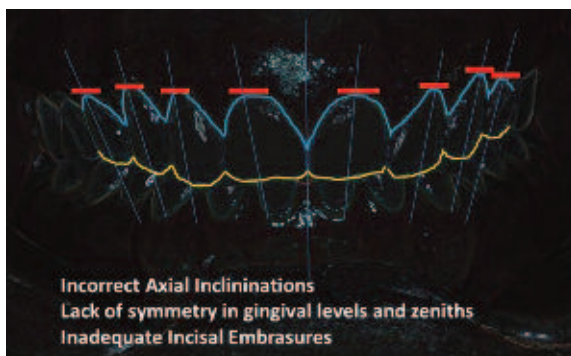


Figure 5: Analysing the problem list

	<i>Clinical Findings</i>
Facial Analysis	<ul style="list-style-type: none"> <li>■ Slight Canting of Maxillary plane</li> </ul>
Dento-labial Analysis	<ul style="list-style-type: none"> <li>■ Excessive display of Gingival tissue during smiling</li> <li>■ High Lip Line</li> </ul>
Phonetic Analysis	<ul style="list-style-type: none"> <li>■ E sound; Central Incisors occupy only 50% of length between lips</li> </ul>
Dental Analysis	<ul style="list-style-type: none"> <li>■ Midline Canted and shifted to left by 0.5mm</li> <li>■ Incorrect Axial Inclinations</li> <li>■ Uneven Gingival Zeniths</li> <li>■ Lack of Incisal Embrasures</li> <li>■ Lack of proportions in width to length ratio of Incisors</li> </ul>
Radiographic Analysis	<ul style="list-style-type: none"> <li>■ WNL</li> </ul>
Occlusal Analysis	<ul style="list-style-type: none"> <li>■ Discrepancy between MIP and CR</li> </ul>

Table 1

*Biomechanically* the patient was at 'low risk', as there was mild wear with sufficient enamel to bond to.

*Functionally* the patient was at 'moderate risk' although the patient had acceptable function, as the MIP was not coincident with CR and there was wear on all anterior teeth. Since the incisal edges of anterior teeth had to be reassigned their new positions, there is a need to alter the anterior guidance and thus CR would be the starting point for smile correction.

*Dentofacially* the patient had a 'High risk' rating as there was maximum tooth display and marginal gingival display due to the position of the lip line.



Figure 6: Study Casts Mounted in Centric Relation



Figure 7: Diagnostic Wax-up



Figure 8: Kois Deprogrammer

## The Treatment Philosophy:

There are two main considerations in arriving at a treatment concept in such cases. The first is the decision making regarding the joint position during treatment and the second is what treatment must be rendered on anterior teeth to get the desired esthetic result.

Considering the first dilemma, as to whether to treat the patient in MIP or in CR<sup>3</sup>, the answer depends on several factors. In cases with no joint symptoms or pathology and no signs of occlusal disease, with the treatment being restricted to a few teeth in an arch (Onlay, crown, bridge), the MIP position can be used as the joint position for treatment, especially if the anterior guidance is not being altered in anyway. In cases, where the signs of occlusal disease are present, the anterior guidance will be altered, the vertical dimension will be reassigned or the patient has clicking in the joints, the starting point of treatment has to be CR or an adapted centric posture. Needless to say, that a joint with a click (Pathology), needs a thorough analysis and treatment allowing the joint enough opportunity to heal and be in a stable, reproducible position without any symptoms lingering on during treatment.

The second consideration is more to do with the dental elements of the treatment. In cases such as these, the fact that there is anterior wear needs an investigation and in most such cases, the cause of this anterior wear is either anterior friction or posterior interferences or a combination of both. As this patient had an overcorrected anterior retroclined dentition, anterior friction due to constricted chewing envelope is a distinct possibility<sup>4</sup>. Lack of equilibration of posterior teeth after orthodontics can lead to posterior interferences that can cause such anterior wear. Thus the treatment approach must take both these into consideration.

The method of tooth preparation to create adequate room for the ceramic restoration has taken a huge refinement in the past decades. Deciding the volume of the final restoration with an intraoral mock-up not only allows

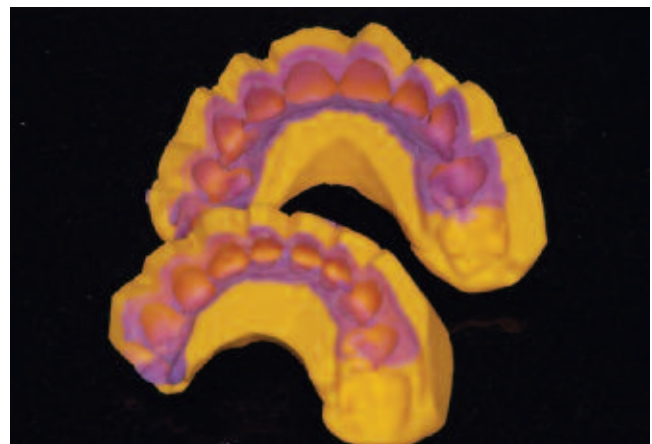


Figure 9: Putty Index generated from Wax-up

the patient to test drive the smile but also acts as a great barometer for the clinician to judge the amount of tooth structure to be removed<sup>5</sup>. In most cases such a volume based tooth preparation shifts the entire treatment in the predictable mineralized enamel of the tooth thus allowing lesser sensitivity post operatively and better bonding capabilities. The exceptional translucency of lithium disilicate allows life like esthetics to be achieved in thinner sections when the underlying tooth has normal coloured dentin and hence is the material of choice in such cases, compared to zirconia that requires more room on the tooth to produce equivalent esthetics and still fails to esthetically satisfy, due to increased opacity, when judged by a trained eye of a keen observer. The fact that lithium disilicate can be bonded to the underlying enamel to produce a long term result tips the scales more in its favour.

### The Initiation Process:

The first steps in such cases include the use of a deprogramming device such as a Kois Deprogrammer<sup>4</sup> to allow the established memory patterns in muscles to be erased so that the unstressed muscles can guide the mandible and obviously the joint to an optimum position of comfort that is not influenced by teeth. On the mounted study casts (Figure 6) of this relationship of jaws a wax up is generated to emulate the tentative position of the anterior teeth in three dimensions (Figure 7) based on the ideal proportions so well documented in literature<sup>6</sup>.

After 2-3 weeks of full time wear the patient is scheduled for an equilibration of the posterior interferences that is carried out methodically using the Kois deprogrammer as a guiding tool (Figure 8). As the anterior button of the deprogrammer is trimmed, the posterior teeth come in contact and using articulating papers of 200, followed by 40 microns the dentition is made to have simultaneous, uniform contacts of equal intensity on both sides. A shim stock confirms that each tooth backward of canines has a positive contact that affirms the establishment of good occlusion in static CR position<sup>7</sup>.

Using a putty silicone key, (Figure 9) generated from the wax up, a provisional restoration is made on unprepared teeth that have been totally etched and bonded to receive them (Figure 10, Figure 11). In this case, although, the patient had a very wide smile, we decided to treat #4 to #12 and #22 to #27 with ceramic veneers. #5 and #13 were extracted for orthodontic treatment at an earlier age.

The pathway adjustments<sup>7</sup> are then done on these provisionals with the patient in upright position using a 200 micron paper while the patient simulates the chewing cycle. In so doing all the surfaces on the lingual of upper incisors that are in the way of friction free anterior occlusion gets marked out. On removal of these anterior pathway interferences the patient will now have anterior guidance in harmony with the envelope of his chewing cycle. The canines (and sometimes the lateral incisors/premolars) are the only anterior teeth in this case that will bear the brunt of lateral excursive moments, touching first and guiding the mandible safely into its home position at the end of the chewing cycle.

On esthetically evaluating the provisionals the entire team concurred with the patient that the upper centrals could be made longer to provide a more pleasing proportion. It was decided to make that change in the final restorations.

### The Finalization:

The finalization of the restoration requires a methodical approach to tooth preparation and impression and transfer of data to the laboratory to aid the ceramist in fabricating life like restorations<sup>8</sup>. The need for 0.5 mm depth in the cervical zone for lithium disilicate has been pushed further and now it is possible to go to a depth that is as less as 0.3mm. The incisal edge preparation may be around 1.5mm in case an internal layering protocol for ceramics has to be followed. Using appropriate burs the incisal depth cuts are made and a depth cut of 0.3-.5mm made on cervical aspects of the provisionals (Figure 12). Using a pencil to mark the depth grooves on teeth, the remainder



Figure 10: Mock up bonded to teeth to test drive the smile and function



Figure 11: Smile View with Mock-up



Figure 12: Depth Cuts on Provisionals to initiate tooth preparations



Figure 13: Tissue Management with retraction cord in buffered Aluminum Chloride



Figure 14: Preparation of Lower Anteriors

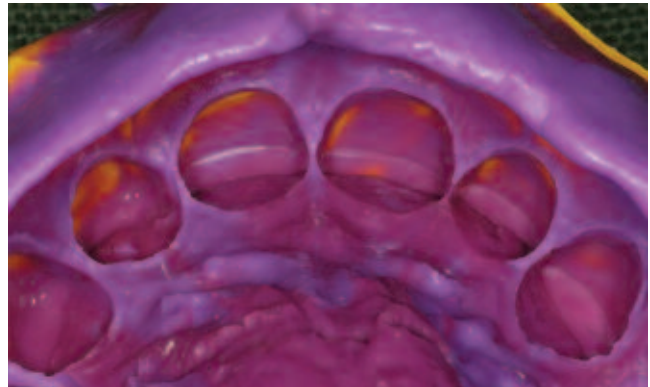


Figure 15: Final Impressions

of the material used for provisional is taken off. We realize in several such cases that hardly any tooth preparation is required thereby helping us leave all the enamel intact on the labial surfaces of these teeth. The margins are left supragingival too, in spite of the fact that the patient has a very high lip line, as the current ingots for lithium disilicate allow translucency to be used in the cervical one thirds that provides a chameleon effect and helps mask the crucial junction between the restoration and the uncut tooth. The added bonus of a supragingival margin being more conservative is an advantage in these cases.

Once the preparations are done, tissue management is carried out with a single cord (Figure 13, 14) dipped in buffered aluminium chloride and an impression made with addition silicone using a heavy and a light body consistency in two steps (Figure 15). New Provisionals (Figure 16) are made by spot bonding on the prepped teeth, using the previously made putty index.

The models are mounted in the lab using a stick bite that allows esthetically correct orientation of the upper plane. A full contour wax up of the final restorations (Figure 17) is made and attached to a sprue to be invested. The pressed lithium disilicate is



Figure 16: Smile with new Provisionals



Figure 17: Final Wax-ups duplicating the contours established from provisionals



Figure 18: Thin Veneers with immaculate texture, layering and form to mimic nature



Figure 19: Post-operative 1:1



Figure 20: Post-operative Left Lateral Excursion showing Anterior Group Function with Posterior Disclusion



Figure 21: Post-operative Retracted View



Figure 22: Post-operative Smile

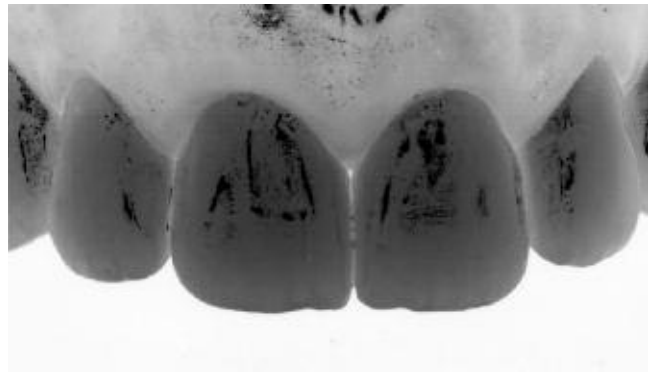


Figure 23: Image Photoshopped to highlight the textured areas



Figure 24: Post-Operative view showing an ideal emergence and impeccable soft tissue health around veneers.

then cut back in the incisal aspects to get a good play of translucency and opacity in the restoration. The line angles are well defined to make a robust and dominant central incisor and a marginally subdued lateral. The surface texture is worked upon to create natural light reflections (Figure 18).

The veneers are then bonded altogether with strict isolation protocols taking care to prepare the tooth as well as the intaglio of the ceramic veneers diligently<sup>9</sup>. Pathway adjustments are again carried out on these bonded restorations to keep the anterior teeth contours well within the envelope of chewing cycle<sup>7</sup>.

The final result is a pleasing blend of health and beauty (Figures 19 thru 24), achieved with extreme minimalism, a requisite while providing responsible esthetics<sup>10</sup> in the modern era. ■

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