



## Review and Case Report

## The Quest for Perpetual Smiles

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## ABSTRACT

Beauty in itself is a combination of reality and personal perception. As the mouth is the centre of communication in the face, the smile plays an important role in facial expression and appearance. Facial and smile attractiveness appear strongly connected to each other. Attractiveness is suggested to influence personality development and social interaction. Our ultimate goal, as clinicians is to achieve a pleasing composition in the smile-to create an arrangement of the various esthetic elements to proper proportion or relation according to known principles.

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## Background

In our modern competitive society, a pleasing appearance often means the difference between success and failure in both our personal and professional lives.<sup>1</sup> Scottish physiologist Charles Bell (1774-1842) was quoted as remarking that the thought is to the word that the feeling is to the facial expression. He pointed out in 1806 that a smile could convey a thousand different meanings, yet it is the most easily recognized expression.<sup>2</sup> And because the mouth is one of the focal points of the face, it should come as no surprise that the smile plays a major role in how we perceive ourselves, as well as in the impressions we make on the people around us.<sup>3</sup>

A charming smile can open doors and knock down barriers that stand between you and a fuller, richer life. An attractive or

pleasing smile clearly enhances the acceptance of the individual in the society where he belongs and the character of the smile influences to the great extent the attractiveness and the personality of the individual.<sup>4</sup>

Esthetic dentistry involves a certain attitude as well as artistic ability and technical competence.<sup>5</sup> Prosthodontist is probably the best person to identify the quality of smile. Further he is also able to change the quality of smile with the recently available innovative techniques and the state of art restorative materials and to plan restorations, to harmonize with the smile.<sup>6</sup>

The goal of an esthetic makeover is to develop a peaceful and stable masticatory system, where the teeth, tissues, muscles, skeletal structures and joints all function in



harmony (Peter Dawson). It is very important that when planning treatment for esthetics cases, smile design cannot be isolated from a comprehensive approach to patient care. Achieving a successful, healthy and functional result requires an understanding of the interrelationship among all the supporting oral structures, including the muscles, bones, joints, gingival tissues and occlusion.<sup>7,8</sup>

Factors related to patient tooth size, shape, position and color; the effect of occlusion; the overall facial and dental esthetics should be considered. The facial midline is a critical reference position for determining multiple design criteria. The amount and position of tooth reveal in various views and lip configurations also provide valuable guidelines in determining esthetic tooth positions and relationships. Thus, these macro-esthetic components of teeth and their relationship to each other can be influenced to produce more natural and esthetically pleasing restorative care.<sup>9</sup>

This article describes anterior rehabilitation of patients who met with an accident, fractured and lost their anterior teeth. Anterior guidance developed in the provisional restorations was accurately recorded in the customized incisal guide table and permanent restorations were fabricated accordingly.

## Case Presentations

### First case

A 30 year old youth counselor reported to department of Prosthodontics. His main concern was with his appearance as he felt shy smiling with his 'white tooth' (Fig 1). He also mentioned that it affect his job as he had to meet and interact with new people every day. He gave history of trauma 10 years ago, where he fractured his right central incisor, left central and lateral incisors. Following which endodontic treatment was done for all the three teeth,

followed by placement of an acrylic veneer on right central incisor. Patient presented in good general health with no chronic or systemic conditions and no allergy to food or drugs. The patient appeared alert, conscious, healthy, motivated for treatment, well orientated for time and space and normal gait. Lips were incompetent with the upper lip being shorter. Periodontal status was healthy. On occlusal examination, during lateral excursions canine guided occlusion was present on both the sides. Patient had reverse smile line which was also a major concern for the patient. Periapical radiograph showed endodontically treated 11, 21 and 22 with no bone loss and periapical lesions. Crown to root ratio was satisfactory.



**Figure 1:** Pre-operative view (Case 1)

## Treatment Planning

The aim for treatment was to improve esthetics and restore function. The following treatment options were given to the patient either to replace acrylic veneer with composite or ceramic veneer for right central incisor only or to fabricate all ceramic or Porcelain fused to metal (PFM) crowns for right central incisor, left central and lateral incisors.

The following clinical steps were followed: All the interferences that prevent a full range of anterior guidance functional pathways were eliminated. Diagnostic impressions were taken and cast were prepared and mounted on semi adjustable

articulator. A diagnostic wax-up was carried out on the maxillary anterior teeth to establish an anterior guidance that provided for disclusion of posterior teeth in all eccentric excursions and to correct the smile line (Fig 2).



**Figure 2:** Diagnostic wax-up

Putty indices were prepared from the diagnostic wax-up and the tooth contours from the diagnostic wax-up were replicated into the provisional restorations (Protemp IV, 3M ESPE). Tooth preparation was done with cautious consideration of the adjacent teeth following the principles of tooth preparation. The palatal reduction is carried out allowing sufficient space for the crown and to re-establish normal occlusal and protrusive relationships (Fig 3). Gingival retraction was done using retraction cord size 00 soaked in 25% Aluminium Chloride. 3M ESPE Express XT heavy body and light body consistency was used to make secondary impression.



**Figure 3:** Tooth preparations for crowns

The provisional restorations were prepared, finished, polished and cemented with non-eugenol temporary cement for easy removal at subsequent appointments. The patient was left with these provisionals for a period of 2 weeks to evaluate aesthetics, phonetics and function with respect to anterior guidance. A few days later patient was recalled to verify the patient's comfort and satisfaction with the aesthetics (Fig 4).



**Figure 4:** Patient smiling with the interim crowns

At the follow-up appointment, the accuracy of the occlusion was verified. Impressions of the provisional restorations were made, and a facebow recording was taken of the maxillary provisionals. Utilizing the facebow, the maxillary provisional model was mounted on the articulator; the mandibular model was then mounted using the occlusal bite record of the provisionals against each other. The ceramist was thus able to fabricate a custom incisal guide table. A custom incisal guide table, as described by Dawson, allows the ceramist to reproduce the anterior guidance established in the mouth with the provisional restorations (Fig 5).<sup>10</sup>



**Figure 5:** Customized incisal guidance

A new maxillary cast with prepared abutments, was attached to the upper member of the articulator. Master cast was prepared with die spacer in the laboratory for construction of porcelain fused to metal crowns. Three separate metal coping was prepared and evaluated intra orally for margin integrity, internal fit, stability and adequate space for ceramic material. Intra occlusal relationship record was needed. Vita classical shade guide was used for the shade selection.

Finally, fitting of the PFM crowns were checked and the patient was well satisfied with the appearance of the crowns. Since the ceramist followed the guidelines of the provisional restorations, minimal adjustments were necessary at this stage.<sup>11</sup> Crowns were cemented with Rely X U200 resin cement (Fig 6).



**Figure 6:** Post- operative view (Case 1)

### Second case

A 32 year old male patient reported to the dental clinic for replacement of his right central incisor which he had lost 2 years ago due to an accident. His prime concern was the unaesthetic appearance. It was planned to fabricate a bridge using adjacent teeth as abutments. Similar treatment methodology was used as in the first case (Fig 7, 8).



**Figure 7:** Pre- operative view (Case 2)



**Figure 8:** Post- operative view (Case 2)

### Follow-up and Evaluation

Follow-up appointments were carried out at regular intervals for both the patients. The soft-tissue response at 6 months was excellent with good papilla support and a natural emergence profile. After almost 2 years, there have been no clinical problems and the patients were very happy with the results. They felt very comfortable with “the fit” and were maintaining good oral hygiene.

Patient's consent was taken in order to use any photographs for records or publication.

## Discussion

Smile, a person's ability to express a range of emotions with the structure and movement of the teeth and lips, can often determine how well a person can function in society. Of course, the importance given to a beautiful smile is not new.<sup>12</sup> It is very important that when planning treatment for esthetics cases, smile design cannot be isolated from a comprehensive approach to patient care. Achieving a successful, healthy and functional result requires an understanding of the interrelationship among all the supporting oral structures, including the muscles, bones, joints, gingival tissues and occlusion.<sup>7</sup>

Smile line refers to an imaginary line along the incisal edges of the maxillary anterior teeth which should mimic the curvature of the superior border of the lower lip while smiling. Another frame of reference for the smile line suggests that the centrals should appear slightly longer or, at least, not any shorter than the canines along the incisal plane. This approach is particularly useful in cases of lip symmetry or extreme lip curvature during smile formation. Reverse smile line or inverse smile line occurs when the centrals appear shorter than the canines along the incisal plane.<sup>13</sup> The individual tooth morphology has to mimic nature.<sup>14</sup> Color, contour and the health of the gingival tissues provide the framework and back-drop for the esthetic smile.<sup>15</sup>

The metal ceramic restorations owe their popularity to the simplicity of bridge construction, durability, strength, marginal adaptation and versatility of use. Can be used successfully for various complex clinical situations like long span bridges, full mouth rehabilitation as also a number of

semi-fixed type of appliances.<sup>16,17</sup> The demand for metal-free restorations coupled with the desire for conservation of tooth structure has put new demands on our profession. There is a symbiotic synergy among the great skills of our ceramists, the commitment to successful chemistry of our researchers and manufacturers, and the unwavering desire for happy patients and long lasting restorations by clinicians.<sup>18</sup>

Shade selection is a complex procedure due to the variations and differences in the optical properties of the new generation of cosmetic restoration materials. It can be well accomplished by understanding the fundamentals of color and adopting a proper methodology of matching shades. The effective communication with the laboratory and precise fabrication and meticulous finishing of the restoration will affect the color of the final restoration.<sup>19, 20</sup> Also, the appropriate shade selection has to be done to bring out all the hard work of our smile design. Shade selection must be customized for each individual. It should be natural and polychromatic. The body of the tooth can be fairly uniform in color but the gingival third should be noticeably richer in chroma. The chroma should also increase from central to the canine, canine having a higher chroma.<sup>21</sup>

## Conclusion

Dentistry is an ever changing science. As new research and clinical experience broaden our knowledge, changes in treatment are required. This paradigm shift in the field of dentistry comes along just in time to meet the final needs and wants of patient who perceives an attractive smile no longer as a luxury but rather a necessary part of their life style. Aesthetic dentistry enables the dentist to change the appearance, size, color, shape, spacing and positioning of the teeth. The harmonious integration of modern smile design, material

selection, and interdisciplinary communication must be addressed in order to deliver optimal treatment as in the above mentioned cases.<sup>22</sup>

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