

Minimally invasive approach in aesthetic rehabilitation

Cementation protocol for totally additional veneers

S. Gellini; M. Barboni

ITALIAN DENTAL DESIGN®

Abstract

A gummy smile resolution passes through several procedures of variable invasiveness in relation to the causes by which it is determined. Some of these treatments provide the fracture of the maxilla, in case it presents excess vertical development, or a lip-repositioning technique with a consequent reduction of the upper lip mobility. The case described below presents the coexistence of different alterations, incomplete passive eruption, excessive vertical development of the maxilla, hypermobility of the upper lip and dental misalignment. These factors have been treated and largely resolved or mitigated through a minimally invasive approach.

In particular an additional technique, with feldspathic porcelain veneers has been applied, no preparation was done to the dental elements except for some too prominent corners.

Keywords: *aesthetic dentistry, gummy smile, minimally invasive, prep less, additional veneers.*

1. Introduction

The achievement of good aesthetic results for anterior teeth often requires the correction of size and inadequate anatomical proportions. Achieving a harmony between the teeth's shapes and the patient's face may depend on the ability to surgically modify the gingival architecture. The goal is developing an ideal relation between teeth and periodontal structures, which will lead to optimum esthetical and biological results. By integrating a periodontal plastic surgery procedure with the additional reconstructive therapy, keeping it in faith with the principles of minimally invasive surgery, is not only possible to develop a biologically stable tooth-gum interface, but is also possible to have very predictable results. Crown lengthening procedures

have become an important component of cosmetic dentistry and are increasingly used to improve the appearance of the restorations in anterior areas.¹

2. The minimally invasive philosophy

Modern medicine, and surgery in particular, is shifting its efforts towards a minimally invasive approach as treatment for numerous diseases. This objective is strictly related to an important concept, the so-called patient-centred approach², which puts the patient, and not the resolution of the disease, in the centre of the goal of treatment. Such an awareness in the medical field has made it possible to change a lot of believed ideal treatments which were instead highly expensive in terms of biological cost, physical and psychological stress, and could cause excessive suffering to the patients. Especially in dentistry, this philosophy is translating into less biologically invasive treatments for patients. Like in this article the loss of tooth tissue in conservative prosthetic rehabilitations can be dramatically reduced to reach zero value (prep less) in many situations.

3. Case report (description of the treatment sequence)

The patient came to our attention unhappy about the look of her smile.

By analysing the pictures of the face in rest position and in smiling position, it was possible to identify the disturbing elements on an otherwise pleasant appearance (images 1,2). After a thorough diagnostic examination, it was possible to identify the altering conditions such as: a multi-causal gummy smile due to the upper lip's hypermobility that manifests as an exaggerated > 3mm gum tissue exposure³, furthermore the upper lip results short (the average length of the upper lip in women falls in rank between 18 and 20mm, the patient has 17mm)⁴.

A slightly vertical overdevelopment of the maxilla was detected, witnessed by an excess of visibility of the incisors in the rest position. The lower third of the face is slightly increased. An incomplete passive eruption consisting in a partial exposure of the anatomical crowns of teeth was noticeable.

The first proposed solution was to perform an orthodontic therapy, followed by periodontal surgery and eventually lip repositioning surgery to reduce the motility of the lip while smiling.

The patient, however, refused orthodontic treatments and challenging surgical procedures, and also did not want healthy dental tissue to be removed by preparation of the teeth.

Then the aid of a mock-up (Picture 3) permitted to pre-visualize what would have been the final result with a minimally invasive approach. In agreement with the patient, the treatment proceeded with a second strategy which included the lengthening of the clinical crown with a mild bone resection to treat the altered passive eruption, followed by the application of 6 additional veneers to re-establish optimal aesthetic proportions.

In this case, it is opted for a direct technique of previewing to help assess the magnitude of elongation at cervical level through a wax-up that went on the soft tissues to allow the acrylic material to mimic the effects of periodontal plastic surgery.

3.1 Additional veneers adhesive cementation protocol.

Once the surgery has been successfully performed, and after a complete regeneration of the periodontal tissues has been accomplished (Pictures 4 to 8), the final working cast was made. Alveolar model technique has been used for the creation of the casts. This technique present several advantages, most of all it allows the technician to focus on the tooth-tissue relationship and design the veneers with a more adequate emergence profile in order to close dark spaces or move the papillae. (Picture 9)

The restoration of the front elements from 1.3 to 2.3 was chosen with the aim to restore aesthetic balance and proportions for the patient's face.

The cementation process was carried out in one single session for all the six elements. During this process it is very important to carefully respect the principles of modern adhesive techniques to achieve treatment success. It is only a meticulously performed adhesive procedure that can provide an optimum level of adhesion without preparing the tooth.

Absolute isolation of the interested teeth was performed through the use of a rubber dam, which will be maintained during all steps of cementation, and removed only in the closing stages of finishing and polishing.

Dental floss ligatures and appropriately adjusted clamps were placed in order to gain access to the cervical region of the elements. The apical displacing of the gingival margins was needed in order to see and then properly refine what is the most sensitive issue of this technique: the knife-edge end of the porcelain veneer. (Picture 10)

The composite material binds to ceramic through a double mechanism. The first micromechanical, obtained by etching with hydrofluoric acid gel at 9,6%; and a second chemical bond resulting from the use of a silanizing agent⁵. (Images 11 to 13)

The main difficulties of this technique are two: the considerable delicacy pre-cementing of the edge of the veneers (which in many cases do not reach the 0.2 mm thick), and the absence of a shoulder preparation, which does not provide references in regard to the correct placement of the element. A correct management of time and instrumentation during the bonding stage can overcome both these problems. Time needs to be longer than the traditional procedure, and instrumentation has to be extended to the use of magnification systems and bristle brushes.

Same bonding steps of a composite reconstruction were used for the teeth. Considering that these additional elements bond almost 100% of the times over enamel tissue which is the most ideal substrate for adhesion.

Total-etch , primer and bonding, filled adhesive and a highly filled composite were employed for cementation (Pictures 14,15). The reason why using filled adhesive and highly filled composite resin is recommended in this case, is because the more content of filler material is directly related to a better stability over time.⁶ Employing a sonic extruder technology to change the viscosity of the material makes possible to easily use highly filled resins even in those delicate tasks (Picture 16 to 21).

The veneer is then applied and pushed in place by the operator's fingers. One more advantage of using a light-curing composite resin to cement the veneers is that the operator has complete control on the time needed to refine margins before the material hardening.

Once the veneer reaches its final position one can proceed with the removal of excess resin using at first a probe and in a second moment the brush bristles to reach an optimal result in the marginal areas of the enamel-ceramic interface. Only when the operator is satisfied with the result can proceed light curing in multiple steps and from different angles. The last step will be the application of glycerine gel along the margins of the preparation to eliminate the layer of oxygen and complete the polymerization of the composite. Once the material has cured, it will be possible to make further adjustments using a scalpel blade 12 and interproximal abrasive strips. (Images 22 to 28).

Two years follow up (29,30).

4. Results and Conclusions.

The possibility of using veneers (which are progressively getting thinner, reaching the order of two tenth of a millimetre) associated with a reliable cementing technique opens a world of prospects in rehabilitation based on the concept of minimal invasiveness.

Now this *modus operandi*, far from being the panacea of treatments, appears to be the most acceptable solution for the patient, wherever the clinical indications permit it. In this case, for example, the result cannot be considered to be the best possible for the situation. However, the patient was pleased not only to have reached the benchmark seen in the mock-up, but also for respecting her request for minimum aggression. If one applies the appropriate cementation protocol with adequate means and tools, one can reduce, if not completely eliminate, what are considered to be the main limits of this technique: the fracture of the artefact during the phase of cementation and the failure in margins control.

5. Bibliography

1. Takei HH, Bevilacqua F, Cooney J.
Surgical crown lengthening of the maxillary anterior dentition: aesthetic considerations. Pract Periodontics Aesthet Dent. 1999 Jun-Jul;11(5):639-44; quiz 646.
2. Epstein RM, Street RL.
The Values and Value of Patient-Centered Care. Annals of Family Medicine. 2011;9(2):100-103.
doi:10.1370/afm.1239.
3. Jensen J, Joss A, Lang NP. *The smile line of different ethnic groups in relation to age and gender. Acta Med Dent Helv* 1999;4:38-46.
4. P. Roe, K. Runcharassaeng, J Y K Kan, R D Patel, W V Campagni, J. S Brudvik.
The influence of upper lip length and lip mobility on maxillary incisal exposure. American Journal of Esthetic Dentistry 01/2012; In Press.
5. D A. Terry, W. Geller.
Odontoiatria estetica e ricostruttiva: selezione dei materiali e delle tecniche. Quintessenza edizioni 2012, pag270.
6. Baroudi K, Mahmoud S.
Improving Composite Resin Performance Through Decreasing its Viscosity by Different Methods. Open Dent J. 2015 Jun 26;9:235-42.