... is it time to rethink Aesthetic Dentistry ?

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Introduction

What has *Aesthetic Dentistry* become today? It indeed depends from which perspective; if we judge it from Facebook publications or shows at large meetings, it is visually spectacular and undoubtedly artistic and inspiring. From a patient's perspective, medias and internet provide plentiful of images triggering their envy to get whiter, straighter teeth…. eventually giving them a truly more attractive smile. What can happen will depend on who they visit first; an orthodontist, a restorative dentist or prosthodontist? This patient's first step will probably define whether the treatment will be biological, conservative and reversible and how expensive it could be both on a short and long term perspective. From a technical standpoint, depending on the material selected and clinical protocol, it will be "simpler" if we go indirect with ceramics or CAD-CAM approach and certainly more demanding if we choose the direct way with composite…but we undoubtedly can achieve great results in both cases. There is however a great deal of controversy here as couple more elements shall enter the equation such as the patient's age, his psychological profile, his financial means (present and expected future one), his overall bio-functional status (caries, periodontal and functional risk factors) and his potential compliance with long-term follow-up and control of those specific risk factors. Finally, one shall measure the objective dental needs of the patient and correlate all factors without lead by commercial interests or "dental fashion". Is the present reality close to such virtue? Clearly not, it contrarily is far from this genuine image and time perhaps arrived to shape or reshape *Aesthetic Dentistry* toward a different future.

How can we impact such a future?… one can expect to follow just a few simple rules and concepts which we were taught during our dental studies…starting with the very basic concept "primum non nocere" and then treat our patients like they would be one of our closest family members. Add to this some well-known biological and biomechanical principle (Magne, 1999 and 2006) plus common-sense and we can fore-see the full picture of fair and truly modern *Aesthetic Dentistry*: "patient centred" (rather than "dental fashion" oriented), "specific, tooth-by-tooth" driven (rather than following a "mono-therapy" approach leading to 28 similar restorations) and aiming to "natural beauty" (rather than "stereotyped artificial aesthetics") (Dietschi, 2005). It is something new here?…maybe not, but it is important to work even harder to keep the profession in line with those simple principles and essentials.

The purpose of this article is, thanks to a comprehensive and original case report, to illustrate and motivate readers to revisit some current principles and clinical guidelines to answer more specifically the aesthetic needs of our patients using bio-mechanically safe and cost-effective procedures.

Case presentation

A middle-age women (46Y) presented herself to consultation with aesthetic complains related to her smile appearance and overall mouth condition (Figures 1A-F). She was increasingly concerned by her anterior teeth discoloration which she perceived as evolutive (both centrals would have become darker over the last 5years), while she also felt some functional and muscular tensions. Clinical evaluation revealed a generalised enamel dysplasia/hypoplasia which could be either from genetic origin (amelogenesis imperfecta) or, due to some clinical findings compatible with a moderate fluorosis, related to an abnormal intake or exposure to fluorides, although no clear element was revealed during medical history to suggest this pathological pathway. No one could exclude a combination of both aforementioned enamel abnormalities. Some wear facets on the lingual surface of upper incisors and cuspids were noted, together with fractured and worn lower incisors and cuspids (Figures 1B, E & F); some discrete wear facets were also present on the occlusal surfaces of nearly all posterior teeth, without significant dentin exposure (Figures 1C & D).

While the patient had obvious aesthetic expectations, she however did not anticipate any major, then costly restorative work to be done and was then hoping for a conservative solution of her dental problems. Having then excluded an extensive use of indirect ceramic restorations (i.e.: veneers and functional overlays) due to the limited "investment profile" of this patient and as well the lack of clear bio-mechanical rationale for such approach, the following treatment plan and sequence was proposed and then performed:

- Vital bleaching
- Slight correction of the VDO (using direct bonding)
- Restoration/protection of worn anterior teeth (upper on palatal side & lower incisal edges and cusps)

- No-prep restoration of facial upper & lower lesions (post-bleaching) using sandblasting and direct bonding
- Indirect porcelain veneers on #11 & #21(feldspathic porcelain)
- Permanent night-guard therapy

Vital Bleaching therapy was achieved following a "home bleaching" protocol with a 10% carbamide peroxide gel (Zoom NiteWhite, Philipps) over 3-4week period (minimum 20 applications per arch).

The next step according to the initial treatment sequence was to proceed with a slight augmentation of the VDO (vertical dimension of occlusion) (Abduo, 2012) to allow for a no-prep restoration of wear facets/lesions of both upper and lower front teeth (Figures 2A to G). Surfaces were cleaned with sandblasting (using 25-30μm Al_2O_3; Microetcher II, Danville), and fine diamonds (flame or ball shape burs 40μm) to prepare the surface for adhesion, especially in case some fluorosis is involved). Enamel was etched for 60s before thorough rinsing and application of an etch-and-rinse 3 step DBA system (Optibond FL; Kerr). Then, cusps of lower molars and premolars were restored with respectively, flowable composite or restorative composite enamel masses (Inspiro flow or restorative Skin White, EdelweissDR), until a proper occlusal space was created (about 2.5-3mm) (Figures 2C, D & F). The rationale for using flowable composite on molars is based on the fact that morphological and functional corrections do not have to be permanent and according to a rationale similar to Dahl's technique (Saha and Summerwill, 2004)), slightly faster wear of the added material shall have no impact on the treatment result and success. This space allowed to add about 1.5mm of restorative composite on either the palatal surfaces of upper incisors and cuspids as well as incisal edges and cusp tips of lower incisors and cuspids. After proper equilibration in latero-protusive movements, MI (maximal intercuspidation) and CR (centric relationship) positions, the patient was ready to start with the aesthetic treatment of facial lesions and discolorations.

Then, the remaining discolorations and as well the hyploplastic lesions could be restored as planned, following a 100% no-prep approach with exception of both upper central incisors (Figures 3A to K). Enamel defects were cleaned together with the most superficial white discolorations using the same combination of sandblasting (30μm Al_2O_3) and fine diamonds burs (40μm), plus rough finishing discs (Optidisc, Kerr) (Figures 3C to G); burs and discs were used only to smooth enamel where needed. Just after performing adhesive procedures such described above, a combination of flowable and restorative enamel composite masses (Inspiro) was used too, according to the defect size (flowable

composite in micro-defects and restorative consistency composite for "larger" lesions) (Figures 3H & I). The procedures were repeated for all facial lesions and remaining discolorations of the upper and lower teeth (from first molar to first molar in the upper arch and from second molar to second molar in the lower arch) (Figures 3J &K).

In order to obtain a satisfactory anatomy and uniform shade, a veneering approach was considered more suitable for both central incisors (Figures 4A to E). As both centrals represented the patient's most significant aesthetic concern, feldstpathic porcelain veneers were selected for optimal surface quality, shade integration and restoration "stability" (Magne et al, 2000; Albanesi et al, 2016; Morimoto et al, 2016) although composite could have also been an alternative solution. The tooth preparation was preceded by a diagnostic mockup (following a free-hand approach with flowable composite) to confirm the desired length and facial profile and thickness of the future restorations (Figure 4B). When confirmed by the patient, silicone indexes were produced as preparation guide and for the fabrication of temporary restorations as well (Figures 4C to E). The treatment was fulfilled by luting adhesively two indirect porcelain veneers using common cementation procedures (intrados etching with buffered hydrofluoric acid, silanization, wetting surface with hydrophobic bonding and placement with heated enamel composite (Skin White, Inspiro)) (Figures 5A to F).

For maintenance, a heat-formed night guard (1.5mm foil, Erkodur C, Erkodent) was fabricated to limit further tooth wear and possible restoration breakdown (composite build-ups on lower front teeth and palatal surfaces of upper front teeth); the patient was instructed to wear this protection every night.

Discussion

This 46Y old patient presented a moderate, potentially "progressive" disturbing aesthetic condition which brought her to consult for an aesthetic treatment, having however some financial limitations and being in principle in favour of a "non-invasive" solution. For such patients, the decision they will make will largely depend on the options they are being proposed, keeping in mind the bio-mechanical conditions of teeth to be treated and the expected longevity (aesthetic & functional behaviour) of the selected material(s) (Magne et al, 2000; Heintze et al, 2015; Demarco et al, 2015; Albanesi et al, 2016; Morimoto et al, 2016). In this particular case, despite the disgracious appearance of her front teeth and ongoing functional tooth wear, rational thinking suggested a limited use of indirect ceramic restoration (only teeth #11/21) following vital bleaching and a no-prep direct

approach for all other decays, using a combination of flowable and restorative composites (Dietschi, 2008). This treatment concept was based on the overall limited tissue loss, vital condition of all teeth and moderate tooth wear conditions; next to this, the patient appeared to be willing to cooperate with the night-guard therapy which was clearly indicated for the post- restorative maintenance phase. The only risk in case of insufficient compliance with the proposed protection strategy is the occurrence of partial restoration fractures (functional areas with "thin" composite coverage but ceramic possibly too) which are considered minor complications and can be easily repaired.

Conclusion

Such approach allowed to comprehensively fulfil both functional and aesthetic treatment demands of a discoloration/tooth wear case with a 100% no-prep approach for 26 out of the 28 teeth involved, having only two teeth minimally prepared for the placement two porcelain veneers. Such satisfactory global aesthetic result with nearly zero biomechanical involvement and cost-effective approach wouldn't be possible following the current trend to use immoderately extensive CAD-CAM full ceramic solutions to nearly all sort of aesthetic problems. Time have come to revisit and re-visit *Aesthetic Dentistry*, implementing more reasonable and biomechanically sound concepts and also following tooth-by-tooth treatment planning and execution. This attitude opens more doors to patients seeking for aesthetic and smile enhancements outside the limited academic environment or teaching purposes. We must actually face the fact that despite spectacular post-operative results, many case reports seen on internet, in journals and big dental shows often don't represent practical, feasible and affordable solutions to a significant proportion of our patients.

References

Abduo J. Safety of increasing vertical dimension of occlusion: a systematic review. Quintessence Int. 2012;43(5):369-380.

Albanesi RB, Pigozzo MN, Sesma N, Laganá DC, Morimoto S. Incisal coverage or not in ceramic laminate veneers: A systematic review and meta-analysis. J Dent 2016;52:1-7.

Demarco FF, Collares K, Coelho-de-Souza FH, Correa MB, Cenci MS, Moraes RR, Opdam NJ. Anterior composite restorations: A systematic review on long-term survival and reasons for failure. Dent Mater. 2015 31(10):1214-1224.

Dietschi D, Fahl N Jr. Shading concepts and layering techniques to master direct anterior composite restorations: an update. Br Dent J 2016;221(12):765-771.

Dietschi D. Bright and white: Is it always right? J Esthet Restor Dent. 2005;17(3):183-190

Dietschi D. Optimizing smile composition and esthetics with resin composites and other conservative esthetic procedures. Eur J Esthetic Dent 2008;3(1):274-289.

Heintze SD, Rousson V, Hickel R. Clinical effectiveness of direct anterior restorations–a meta-analysis. Dent Mater 2015;31(5):481-495.

Magne P, Douglas WH. Rationalization of esthetic restorative dentistry based on biomimetics. Esthet Dent. 1999;11(1):5-15.

Magne P, Perroud R, Hodges JS, Belser UC. Clinical performance of novel-design porcelain veneers for the recovery of coronal volume and length. Int J Periodontics Restorative Dent. 2000 Oct;20(5):440-457.

Magne P. Composite resins and bonded porcelain: the postamalgam era? Calif Dent Assoc 2006;34(2):135-47.

Morimoto S, Albanesi RB, Sesma N, Agra CM, Braga MM. Main Clinical Outcomes of Feldspathic Porcelain and Glass-Ceramic Laminate Veneers: A Systematic Review and Meta-Analysis of Survival and Complication Rates. Int J Prosthodont 2016;29(1):38-49.

Poyser NJ, Porter RWJ, Briggs PFA, Chana HS, Kelleher MGD. The Dahl Concept: past, present and future. British Dental Journal 2005;198(11):669-676.

Saha S1, Summerwill AJ. Reviewing the concept of Dahl. Dent Update. 2004;31(8):442-4, 446-7.


1A


1B


1C


1D


1E


1F


2A


2B


2C


2D


2E


2G


2F


3A


3B


3C


3D


3 E


3F

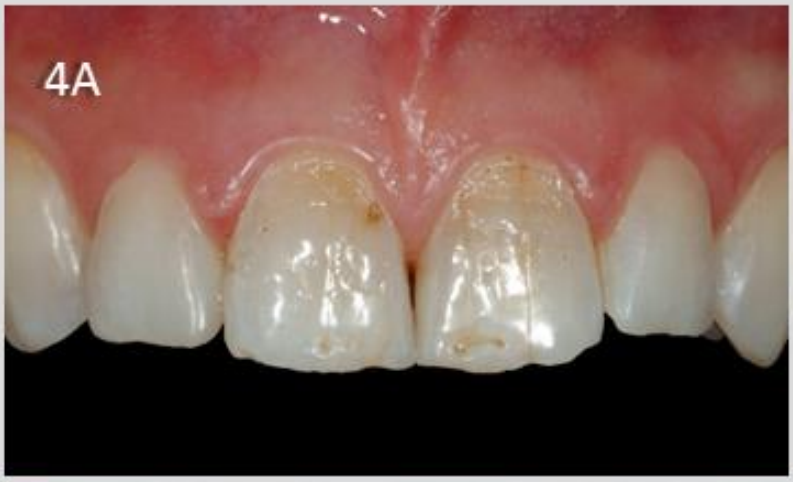

3G


3H


3I

3J

3K


4A


4B


4C


4D


4E


5A


5B


5C


5D


5E


5F


5G

Figure legends

1A to F: Preoperative intra-oral status of a 46Y old women consulting mainly for aesthetic concerns due to an overall discoloration (hypoplasia and dysplasia); a differential diagnosis of fluorosis was raised, although no objective element confirmed an abnormal exposure to fluorides. Significant wear lesions and fractures of lower incisor incisal edges are clearly visible and account for some parafunctional activities. The patient seeks for aesthetic (and secondarily functional) improvements but without considering any major and expensive restorative work.

2A: Posterior segments are being isolated to perform a moderate augmentation of the VDO (Vertical Dimension of Occlusion); this shall create4 about 1.5mm of interocclusal spaces in the anterior area to restore palatal surfaces of upper front teeth and incisal edges and cusp tips of lower front teeth

2B-D: After enamel surface treatment with sandblasting, surfaces to be modified were etched and prepared for direct composite applications using flowable and restorative enamel composite masses (Skin White, Inspiro, EdelweissDR), respectively on lower molars and premolars plus cuspid tip.

2E: The VDO correction of the lower right area (molars to cuspid) is completed.

2F-G: The exact same treatment was performed on the left side of the lower arch.

3A-B: The full lower and upper arches were isolated to perform the correction of facial remaining discolorations and enamel defects.

3B-F: The removal of surface whitish discolorations and preparation for adhesive procedures was performed with sandblasting (25-30μm $Al_2O_{3)}$) , fine diamonds (flame 40μm) and finishing discs (Optidisc, Kerr).

3H-I: Restorations were made with either restorative or flowable enamel composite masses (Inspiro skin white, EdelweissDR), depending on the defect size and/or functional strains.

3J-K: Completed treatment of facial lesions of upper and lower arches; both centrals are still to be treated.

4A: Upper central incisors prior to veneering.

4B: Length was corrected according to patient's desire and volume corrected free-hand with flowable composite, before recording the new configuration with silicone indexes as needed for control of preparation depth and for the fabrication of temporaries. The free-hand approach was considered appropriate here due the limited number of teeth involved.

4C-D: Preparation guide in place and post-preparation view.

4E: Temporaries in place, made of dual curing acrylic resin (Protemp Garant, 3M)

5A-B: Occlusal views and completed aesthetic and functional restorations

5C-F: Smile, anterior and lateral views of upper and lower front teeth following a 100% "no-prep" treatment using flowable and restorative direct composite restorations; only both upper centrals were indirectly restored following minimally-invasive preparation and using feldspathic veneers.