Minimally invasive cosmetic dentistry
A concept and treatment protocol for general practice

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Increased media coverage and the availability of free web-based information has led to heightened public awareness and thus to a dramatic increase in patients’ aesthetic expectations, desires and demands. Today, a glowing, healthy and vibrant smile is no longer the exclusive domain of the rich and famous and most general practitioners are forced to incorporate various aesthetic treatment modalities in their daily practices to meet this growing demand.

The treatment modalities of any health-care service are aimed at the establishment of health and the conservation of the human body with its natural function and aesthetics. The concept of minimally invasive (MI) treatment was initially introduced in the medical field and was adapted in dentistry in the early 1970s with the application of diamine silver fluoride. This was followed by the development of preventive resin restorations (PPR) in the 1980s and the atraumatic restorative treatment (ART) approach and Carisolv in the 1990s. The major components of MI dentistry are the risk assessment of the disease with a focus on early detection and prevention; external and internal remineralisation; use of a range of restorations, bio-compatible dental materials and equipment; and surgical intervention only when required and only after any existing disease has been controlled.

Current basic treatment protocols (TPs) and approaches in MI dentistry are the use of air abrasion, laser treatment or saline abrasion to gain cavity access and excavate infected carious tooth tissue through selective caries removal or laser treatment; cavity restoration by applying ART, PPR, or sandwich restoration; and the use of computer controlled local anaesthesia delivery systems with emphasis on the repair of a failed restoration rather than its replacement. Thus far, the focus of MI dentistry has been on caries-related topics and has not been comprehensively adopted in other fields of dentistry. Dr. Miles Markley, one of the great leaders of preventive dentistry, advocated that the loss of even a part of a human tooth should be considered a serious injury & that dentistry’s goal should be to preserve healthy and natural tooth structure. His words are much more relevant in today’s cosmetic dental practice, in which the demand for cosmetic procedures is rapidly increasing. With the treatment approach tendency towards the more invasive protocols, millions of healthy teeth are aggressively prepared each year in the name of smile makeovers and instant orthodontics, neglecting the long-term health, function and aesthetics of the oral tissues.

The need for a new concept
Contemporary aesthetic dentistry demands well-considered concepts and TPs that provide a simple, comprehensive, patient-friendly and MI approach with an emphasis on psychology, health, function and aesthetics (PPRA; Fig. 1). The need for a holistic concept and basic treatment guidelines was expressed by concerned practitioners, aesthetic dentistry associations and academicians around the world for the following basic reasons:

- Owing to an increased aesthetic demand, aesthetic dentistry is becoming an integral part of general dentistry. The aesthetic outcome of any dental treatment plays a vital role in the patient’s treatment satisfaction and the use of computer controlled local anaesthesia delivery systems with emphasis on the repair of a failed restoration rather than its replacement. This has led to the development of MI philosophy and its application into aesthetic dentistry.

Defining MICD
As the perception of aesthetics and beauty is extremely subjective and largely influenced by personal beliefs, trends, fashion and media, a universally applicable definition is not available. Hence, smile aesthetics is a multifactorial issue that needs...
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The main MICD benefits include:
1. promotion of health, function and aesthetics of the oral tissues and positive impact on the quality of life of the patient;
2. preservation of sound tooth structures (banking the tooth structure), while achieving the desired aesthetic result;
3. reduction of treatment fear and increased patient confidence;
4. promotion of trust and enhancement of professional image.

The MICD treatment protocol

In my experience, the TP’s that are currently in use in aesthetic dentistry are mostly based on more invasive techniques and procedures. With the use of such protocols, cosmetic dentists are knowingly, or unknowingly, heading towards the over-utilisation of invasive technologies in their practices, which is becoming a professional and ethical concern. The basic aim of the MICD TP is to guide practitioners in achieving optimum results with as little intervention as possible. The intervention level of the treatment in MICD depends on the type of smile defects and the aesthetic needs (objective measurement and subjective perception) of the patient.

The basic framework and pathway of the MICD TP are illustrated in Figures 2 and 3. It is to be noted that the TP in medical and dental sciences must be dynamic in nature and should be flexible to incorporate evidence-based facts. I have therefore outlined the MICD core principles that are required to achieve the optimum result in terms of health, function and aesthetics with minimum intervention and optimal patient satisfaction. However, it is the practitioner’s duty to incorporate all the necessary guidelines, protocols and regulations of the authority concerned (state or affiliated professional organisations) into the MICD TP.

Phase I: Understand

In the first step of Phase I, the perception, lifestyle, personality, and desires of the patient are explored. The primary goal of this first step is a better patient-dentist understanding. As the aesthetic perceptions of the dentist and the patient may differ, it is imperative to understand the subjective aesthetic perception of the patient. Various types of questions, personal interviews and visual aids can be used as supporting tools. In this step, the practitioner should ask the patient to complete the MICD self smile-evaluation form. The information obtained will help estimate the perceived smile aesthetic score (a-score) and will be used as the base-line data in the evaluation step.

Next, diseases, force elements and aesthetic defects of smile are explored. Information on the medical and dental history, general health and specific health (oral-facial) of the patient is collected and complete dental and periodontal charting is performed. In order to understand the force elements, the existing occlusion, comfort, muscular activity, speech and phonetics are thoroughly examined with the evaluation of para-functional and other oral habits, comfort during mastication and deglutition, and temporo-mandibular joints (TMJ) movements. The necessary diagnostic tests, photographic documentation and the diagnostic study models are prepared during this step for the further exploration of existing diseases, force elements and aesthetic defects.

In the following step, the data collected is analysed in relation to the accepted normal values of a patient’s sex, race and age (5BA) factors. The aesthetic components of the smile are analysed in detail grouped into macro-(facial and dental midline relation, facial profile, symmetry of the facial thirds and hemi-faces), mini-(visibility of upper anterior teeth, smile arc, smile symmetry, buccal corridor, display zone, smile index and lip line) and micro-aesthetics (dental: central dominance, teeth proportion, axial inclination, incisal embrasure, contact-point progression, smile line, tooth size and position; gingival: shape, contour, embrasure and zenith height). The practitioner can now grade the smile in terms of the patient’s health, function and aesthetics as follows:

- Grade A: The established parameters of oral health, function and aesthetics are within normal limits and aesthetic enhancement is required only to fulfil the patient’s cosmetic desires.
- Grade B: The established parameters of oral health and function are within normal limits; however, the aesthetic parameters are below the accepted level. Aesthetic enhancement can further improve the aesthetic parameters.
- Grade C: The established parameters of oral health or function or both are below the normal limits. An establishment treatment is mandatory prior to aesthetic enhancement.

From the above, the practitioner will obtain a smile aesthetic grading in terms of the patient’s health, function and aesthetics, as well as a complete overview over the smile aesthetic problems and the macro-, mini- and micro-smile defects.

The patient’s PHF factors are the four fundamental components of aesthetic dentistry and must be respected to achieve healthy, harmonious and beautiful smiles. The design step depends on the information obtained from exploration and analysis. The information on psychology is subjective in nature; however, health, function and aesthetic analysis provides the objective information that will guide the design with the various established and basic principles of smile aesthetics and also the feasible & practical extent of the aesthetic desires of the patient. The aesthetic mock-up, manual tracing, digital makeover and smile catalogues are some of the popular tools used in this step. A new smile, alternative designs, types of treatments involved, complexity, possible risk factors and complications, treatment limitation, and tentative costs should be established during this step.

For easy application, the aesthetic treatments in MICD are categorised as follows:
- Type I: Macro-aesthetic components;
- Type II: Mini-aesthetic components;
- Type III: Macro-aesthetic components: facial and dental midline relation, facial profile, symmetry of facial thirds and hemi-faces.

As the treatment modality depends on the professional capability and experience of the practitioner, simple and practical methods are used to categorise the MICD treatment complexity:

- Grade I: Treatment that may require consultation with a specialist (preventive, simple oral surgery/endodontics/periodontics/implants, short orthodontics);
- Grade II: Treatment that requires the procedural involvement of other dental specialists (complex endodontics/periodontics/orthodontics) but not oral and maxillofacial surgery or plastic surgery;
- Grade III: Treatment that requires the procedural involvement of oral and maxillofacial surgery or plastic surgery.

With the aid of this simple grading system, any practitioner can determine the complexity of the treatment involved for the accomplishment of a new smile design for an individual patient and can plan for the necessary multidisciplinary support.

The last step of this phase is the most important in MICD TP because in this step the patient is presented with an image of his or her future smile. Visual aids, such as a smile catalogue, aesthetic mock-ups, manual
The enhancement step of MICO is focused on the fulfillment of the patient’s aesthetic desires, which can be grouped into two categories based on the patient’s needs and wants. Even though it is sometimes difficult to draw a clear line between the two & their related treatment, in MICO they are categorised as follows:

- **needs**: objective restorative needs of the patient in harmony with the SRA factors and due emphasis on health and function of oral tissues (natural mimetic smile enhancement).
- **wants**: subjective desires of the patient, which may not be in harmony with the SRA factors (cosmetic smile enhancement).

Evaluation is the final step of MICO. The completed treatment without a proper consideration is incomplete in MICO protocol. The following components need to be evaluated:

- **Global patient satisfaction**: After receiving aesthetic dental treatment, the patient is requested to complete the MICO exit form, in which the patient evaluates his or her new smile, giving a second perceived smile aesthetic score (b-score), and indicates his or her global satisfaction score. The b-score is compared with the previous a-score.

This process helps determine the patient’s actual satisfaction status. In MICO, this is the main parameter for evaluating a patient’s aesthetic satisfaction.

- **Clinical success**: Clinical success is a multifactorial issue. Selection of proper cases (the patient), restorative materials, TPs and their correct and skilful application are the key factors for clinical success. Therefore, MICO TP suggests self-evaluation of the following four factors (4Ps) using the MICO clinical evaluation form:
  - **Patient factors**: regular maintenance-status, compliance issues and attitude of the patient towards aesthetic treatment;
  - **Product factors**: bio-compatibility, mechanical and aesthetic quality of the products used for the treatment;
  - **Protocol factors**: TP used in terms of its simplicity, predictability & its evidence-based nature;
  - **Professional factors**: existing knowledge and skills, and attitude towards developing these.

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**References available on request.**