Seven Keys to Optimize Interdisciplinary Orthodontics

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Orthodontics has always been the discipline that sets the stage for dento-facial esthetics. With the increasing demand for appeal and appearance, orthodontic treatment of adults has been the fastest growing area in the field of orthodontics. In addition to aesthetics, increased awareness of malocclusion, functional benefits of orthodontic treatment, advances in materials, aesthetically pleasing and biomechanically sound appliances, and interdisciplinary treatment philosophy have all played an important role in making orthodontic treatment popular in adult population. However, in recent years, increased focus on simplified and rapid intervention has created compromises in treatment outcomes. Lack of fundamental diagnosis and systematically sequenced treatment plans are being circumvented by technology and reliance on laboratory assistance. Diagnostic process, essence of treatment planning and biologic basis seem to be diminishing in importance. Often orthodontic treatment can be of significant assistance in periodontally and restoratively compromised patients. The primary goal of orthodontic therapy in such clinical situations is to reduce or prevent excessive periodontal surgery by establishing a physiologic alveolar crestal topography and to establish better occlusal relationships for predictable long-term prostheses by customized orthodontic tooth movements. This article explains the philosophy and treatment approach that brings together a diverse group of professionals into a cohesive interdisciplinary team to provide treatment strategies for adult patient. It explains existing and new orthodontic, periodontic, surgical and restorative techniques that provide the best possible solution to complex dento-facial problems.

In clinical practice, orthodontic treatment of adults may be somewhat different from that of most adolescents (1). Compared with adolescents, adults are more likely to have dental problems like missing teeth, restored teeth, periodontally compromised teeth, endodontically involved teeth etc. which demand some alterations in treatment strategy.

In patients with periodontally compromised dentition with significant bone and attachment loss, conventional approach to orthodontic tooth movement does not produce the desired results, as this may lead to increased tipping of teeth (2). Therefore, in such clinical situations, entirely different biomechanical strategies are required for efficient and desired tooth movement (3). Absence of growth potential in adults as opposed to growing patients is another factor that influences the orthodontic treatment strategy to resolve adult malocclusions.

1) Establish organized approach to diagnostic and treatment planning process

To formulate proper treatment plan, clarity in the final treatment and to prevent any complications and confusion, establishing accurate diagnosis is the most important step. The goal of the diagnostic process in an interdisciplinary treatment is to produce a comprehensive but concise list of patient’s problems and to incorporate various treatment options into a plan that gives maximum benefit to the patient (4). The orthodontist should:

- recognize the elements of malocclusion contributing to the development of a problem. This can be achieved by developing a comprehensive but concise database of useful information derived from patient’s history, clinical examination and analysis of diagnostic records (study models, full-mouth radiographs and facial and intraoral photographs).
- have comprehensive knowledge of different disciplines of dentistry to generate the pertinent data other than orthodontics.
- finally, define the nature of the problems to design a treatment strategy based on the specific needs and desires of the patient.

This database is then well organized in such a way that it gives a systematic description of the patient’s problem. The team involved can easily refer to this during the treatment planning process. While arranging the database of a complex dentofacial problem in a systematic manner, if the problem list becomes very extensive, it is advisable to classify the problem list into various areas like orthodontic problem list, restorative problem list and periodontal problem list (Fig. 1).

2) Define treatment goals

In the management of a patient with multiple dental problems, it is extremely important for a clinician to define finishing goals at the beginning of treatment and to focus on them till the finishing stage, in order to achieve them with a combination of appropriate orthodontic treatment mechanics, restorations and periodontal procedures. The treatment goals are mainly focused on establishing optimal oral health, aesthetics, good stomatognathic function and long-term stability. The clinician should be able to visualize the end result before implementing the definitive treatment plan. This requires clearly defined treatment goals that set the direction to the proposed treatment plan. Ideally, interdisciplinary treatment plan should be the one that addresses maximum number of highest priority problems including the chief complaint and optimizes the treatment results with maximum benefit to the patient with less risk involved. Since complex dento-facial abnormalities frequently present multifaceted problem list involving...
multiple disciplines of dentistry, it is important to address the patient’s main concern, whether the patient is seeking treatment for functional or aesthetic improvement or both. Finding a solution to each individual problem leads to the formulation of a definitive treatment plan. (1) A well-structured and organized list of problems makes sure that all areas have been evaluated in the diagnostic phase, and also serves as a valuable reference tool during the course of treatment. All specialists involved in formulating the treatment plan for the patient should provide possible solutions to individual problems based on their own areas of expertise, and no problem should be treated as less important. Provisional treatment plans are then compared with respect to their overall effects, and the plan that enhances the treatment and provides maximum benefit to the patient, considering the patient’s chief complaint, is then regarded as final and definitive treatment plan.

The treatment planning process almost always follows the same events, however, the treatment sequence varies significantly from patient to patient due to large variations in morphological configurations and treatment priority. Hence, it is critical to organize the sequence of various treatment procedures in such a way that each treatment procedure performed by one of the specialists from the interdisciplinary team facilitates the next in order (Fig.6). Figure 4 illustrates a 10-point treatment protocol for interdisciplinary cases.

3) Recognize ‘minor dental arch crowding’ as a ‘major’ periodontal concern

Dental arch crowding presents narrow interproximal spaces, which may result in a constriction of the interproximal bone due to reduced interradicular distance (Fig.5). This compromised bone as a result of dental constriction can be a challenge for both periodontists and prosthodontists. Decrowing of the dentition by orthodontic tooth alignment widens the interproximal bone, which can significantly enhance local host resistance and improve the prognosis of compromised or infected teeth (Fig.6).

Other than the aesthetic reasons, the resolution of interproximal tissue contact and faulty content and impressions are the predominant periodontal reason to eliminate dental arch crowding (6).

This integrated orthodontic and periodontal approach as an alveolar development exercise, should be considered as the most compelling periodontal rationale for orthodontic therapy. Hence, it is important to recognize orthodontics to be much more than simply an aesthetic domain.

4) Use orthodontic treatment in correction of ‘Biologic width’ violations

Restorative therapies essentially require a healthy and stable periodontium for long-term success. A denstographic unit exhibits a constant interplay of gingival tissues with crown contours, restorative material, its texture and its margins. Biologic width is defined as the dimension of space that the healthy gingival tissue occupies coronal to the alveolar bone (7).

It is further elaborated as a total of supra-gingival fibers, junctional epithelium and sulcus (8). This concept of existence of a specific width was first published by M. Asmussen in 1965 through cadaveric experiments, which revealed a mean measurement of a total of epithelial attachment plus connective tissue attachment to be 0.3 mm (Fig.7) (9).

D. Walter Cohen was credited to first coin the term ‘biologic width’. The significance of this width lies in the fact that it prevents penetration of microbes into periodontium. In 1977, higher recommended a distance of 0.5 mm minimum to be kept between restorative margins and alveolar crest for adequate gingival health maintenance (10). This 0.5 mm consists of 0.05 mm of supracrestal connective tissue, 0.1 mm of functional epithelium and 0.35 mm of sulcular depth. Violation of this natural seal disrupts dentogingival apparatus making it susceptible to invasion of red microorganisms and consequently causing gingival disturbances such as inflammation, recession and alveolar bone loss (11 and 12).

Thus it is imperative to maintain integrity in this zone. This measure of 0.5 mm allows for optimum function and maintenance of the papillae (13). If the space gained for the restoration is less than 0.5 mm, the crown margin should be placed subgingivally away from the papilla region. This leads to an adequate papilla development, adequate gingival closure. Clinical evaluation of the edentulous space and radiographic evaluation of the root position of the adjacent teeth should precede appliance removal.

The final implant restoration is significantly influenced by the position and angulation of implant placement. For proper placement of an implant, the minimum space between the adjacent teeth roots is usually 0.5 mm, providing enough room for small diameter implant placement, leaving about 0.75 mm of space for the bone between the implant and the adjacent roots (13).

Position adjacent teeth to facilitate restorative treatment

It is a common observation that when an orthodontist is opening up the space for placing lateral incisor, as the force is applied on the crowns of the central and canine teeth, the roots get tipped into the lateral incisor region. This leads to an inadequate crown space but the space between the adjacent roots gets reduced, making it impossible for the surgeon to place an implant (Fig.8).

Once the optimal space has been gained with appropriate treatment mechanics, acrylic teeth of proper size and color shade can be bracketed and attached to the archwires for esthetic purpose (Fig.5). If the space gained for the lateral incisor is in excess, the lateral incisor tooth can be used as a template, which will help determine the residual space clinically. Clinical evaluation of the edentulous space and radiographic evaluation of the root position of the adjacent teeth should precede appliance removal.

Establish optimal implant space

Adequate space gained for the restoration of the normal width of missing lateral incisor based on esthetics and occlusion will determine the appropriate size of the implant to be placed. When selecting the size of the implant, it is important to have 1.5–2.0 mm of space between the coronal line of the adjacent teeth for the development and maintenance of the papilla (14). After the elongation of the papilla and outline is obtained, it is important to radiographically evaluate the interradicular space. The roots of the adjacent tooth should be parallel to slightly divergent with adequate space between the roots for implant placement (Fig.9A and B).

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Size of the teeth play an important role in anterior dental esthetics, and the clinician are often often challenged with the disproportionate widths of anterior teeth in a day-to-day clinical practice.

This tooth size discrepancy is commonly observed in maxillary lateral incisors. In such situations, in spite of getting the teeth perfectly aligned and the size discrepancies completely resolved through orthodontics, the normal shape and smaller size of lateral incisor pose esthetic problems. This gingival augmentation of the site of implant placement can be accomplished in any clinical situation, by orthodontic tooth movement.

6) Optimize pre-restorative orthodontics

Orthodontic treatment is planned in any clinical situation, by orthodontic tooth movement. This can be accomplished in any clinical situation, by orthodontic tooth movement.

The author has, since the initial days of orthodontic practice, enjoyed the professional collaboration of specialists from other disciplines of dentistry in a fruitful career and continues to maintain professional enthusiasm with them.

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References


In a cosmetically concerned society, aesthetics forms an integral part of patient expectations. This directly mandates orthodontic professional who to systematically explore various factors that promote optimal aesthetics. Adhering to principles of balance and functional efficiency, treatment planning should diligently incorporate distinctly define orthodontic, restorative, surgical, and prosthodontic objectives. Various procedures from orthodontics, surgery, and restorations can be amalgamated with orthodontic treatment to refine aesthetic potential.

White and pink harmony

With this in mind, the author focuses on the gingival esthetics. Proper alignment of teeth constitutes perfection of white esthetics within a smile. However, when all the above is in place, the smile demands a harmonious balance of both, white and pink components of the face. The latter, according to clinical orthodontic principles, is the gingival architec which constitutes the pink component of the face. The gingival height of contour over the gingiva should extend halfway between the incisal edge and the labial surface of the tooth. This is true for every tooth in the dentition. It is apparent that the gingival margin should be at the level of the contact point between orthodontic and restorative treatment. This is the fundamental aspect for interdisciplinary treatment success.

Conclusion

An interdisciplinary orthodontic treatment presents the philosophy and treatment strategy that also involves a group of professions from other disciplines of dentistry as a cohesive team. This approach to manage complex clinical situations is highly sophisticated treatment modality and requires excellent communication and coordination among the team members. The goal is to simplify and simplify and simplify the treatment plan by providing solutions to a variety of clinical situations, which improves patient satisfaction and stability and ensures long-term treatment success.

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