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, which has created compromises in treatment outcomes. Lack of fundamental diagnosis and sequentially 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 damage by establishing a physiologic alveolar crestal topography and to establish better occlusal relationships for predictable long-term prognosis by customized orthodontic tooth movements. This article explains the philosophy and treatment approach that brings together a diverse group of professional 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 dentofacial problems.

In clinical practice, orthodontic treatment of adults may be somewhat different from that of most adolescents. Compared with adolescents, adults are more likely to have dentition that have undergone some degree of maturation over a period of time and they may have other 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. Therefore, in such clinical situations, entirely different biomechanical strategies are required for efficient and desired tooth movement. 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 provide 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 various 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 problem 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. 3).

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 dentofacial abnormalities frequently present multifaceted problem list involving
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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 (a). 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 configuration and treatment priority. Here, 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 r-point treatment protocol for interdisci- pinary cases.

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

Dental arch crowding presents a new 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 superficial crowding can be a problem for both periodontists and prosthodontists. Decoding 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 contours and embrasures is 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 orthodontic to be much more than simply an esthetic 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 dentogingival 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 supragingival fibers, junctional epithelium and sulcus (8). This concept of existence of a specific width was first published by Gargiulo et al. in 1961 through cadaveric experiments which revealed a mean measurement of a ‘total of epithelial attachment plus connective tissue attachment to be at .25 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 microorganisms into periodontium. In 1977, higher recommended a distance of .4 mm minimum to be kept between restorative margins and alveolar crest for adequate gingival health maintenance (10). This .4 mm consists of .3 mm of supragingival connective tissue, .1 mm of junctional epithelium and .2 mm of subepithelial connective tissue. The significance of this natural seal disrupts dentogingival apparatus making it susceptible to the growth of oral microorganisms and consequently causing gingival disturbances such as inflammation, recession and alveolar bone loss (11 and 12).

Thus it is imperative to minimize irritation to this zone. This measure of .4 mm allows for optimal esthetics and occlusion and consequently improving the soft tissue architecture of the oral cavity (13).

5) Improve implant site with orthodontics

There are several orthodontic procedures employed to improve implant site for predictable restorations.

Determine the timing of implant placement

Facial growth is the determinant of the age for implant placement in adolescent patients. The ossosintegrally integrated implant’s lack of eruptive potential makes it to behave like an anchored tooth, often causing a discrepancy in the occlusal plane due to continuous eruption of the adjacent teeth. Therefore, early implant placement poses a greater risk of compromised esthetics in the long term. Several studies on young adults who were treated with implant supported restorations to replace missing teeth have observed discrepancy between implant placement and adjacent teeth. In a study that followed the vertical changes of maxillary incisors adjacent to implants in a group of adolescent children between 15-30 years of age and adults between 40-55 years demonstrated infraocclusion of the implant-supported restorations, with a vertical step of 0.1-1.65 mm and 0.12–1.86 mm in adolescents and adults respectively (13).

Therefore, lack of proper occlusion and esthetic situations in the anterior region may be common observations due to jaw growth in patients with implant – supported restorations even if the implants are successfully integrated. The best method to determine the status of facial growth is to superimpose sequential lateral cephalometric radiographs taken at an interval of six months (Fig. 8). Generally, the implant should be placed after completion of facial growth (around 17 years in females and 21 years in males).

Establish optimal implant space

Adaptive 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 15 to 20 mm space between the convexity of the implant to the adjacent teeth for the development and maintenance of the papillae (14).

After the evaluation phase, 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.9 A and B).

Once the optimal space has been gained with appropriate treatment mechanics, acrylic tooth of proper size and color shade can be bracketed and attached to the archwire for esthetic purpose (Fig.10). If the space gained for the lateral incisor is in excess, the space gained can be used as a template, which will help determine the residual space 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 3 mm, providing enough room for small diameter implant placement, leaving about 0.75 mm space for the bone between the implant and the adjacent roots (15).

Position adjacent teeth to facili- tate restorative treatment

It is a common observation that when an orthodontist is opening up the space for missing 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 adequate crown space but the space between the adjacent roots gets reduced, making it impossible for the surgeon to place an implant (Fig.11).

It is equally important to take suffi- cient...
6) Optimize pre-restorative orthodontic treatment

Often management of adult patients typically exhibit compromised bone levels due to alveolar bone atrophy. Research studies have shown that in maxillary anterior teeth are extracted primarily in young adults and a narrow 30% over period of 5 years (6).

Orthodontic implant site development is a process involving the root movement that creates adequate alveolar ridge width through stretching the interdental papilla. However, in repositioning this may not require any intervention. Hence, in cases of deep-hi type disocclusion that is unilateral or quite significant, it is imperative to reduce the size of production of multiple interarchal Caries. Consequently, in absence of timely dental intervention, determinists such circumstances may significantly. Adjacent teeth drift into empty spaces to seal the broken interarchal contacts, thus producing papillary hyperplasia and/or gingival recession. This unique approach to manage complex clinical situations will certainly inspire readers to engage in their own interdisciplinary collaboration, approximation, and advance the practice of orthodontics and restorative dentistry. This approach to treat patients appreciate and benefit from. The author has, since the initial days of orthodontic practice, enjoyed the professional collaboration from other disciplines of dentistry in a fruitful career and continues to maintain professional enthusiasm with them. This unique interdisciplinary management of single tooth implants. Semen Orthod 1997; 3:45-72.

Karad A. Excellence in finishing current concepts, goals and mechanics. J Ind Soc Orthod 2006; 3:126-138. (10) Spreer J, Mathews D, Kokich VG. Immediate and Past-Chairman of the Indian Orthodontic Society. Dr. Ashok Karad is a Director of Smiles Care, Mumbai, Maharashtra and Past-Chairman of the Indian Orthodontic Society. Dr. Ashok Karad has been actively involved in clinical research, continuing education, and authorship. He has authored a book titled "Clinical Orthodontic Treatment: concepts, goals and mechanics."