

Adult Orthodontics, From Past to Present: A Review

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ABSTRACT

Background: In the recent era, more adults are seeking orthodontic treatment when compared with the past with varying degree of malocclusion. They are more conscious about their esthetics, so need for invisible orthodontics is increased. In this review we discuss important considerations and treatment modalities for treating adult patients.

Keywords: Dentistry, history, orthodontics.

INTRODUCTION

The frequency of malocclusion in adults is equal (or) more than that observed in children and adolescents. Since 1990's 15% of the orthodontic patients were adults. They fall into 2 different groups (1) **younger adults** (under 35, often in their 20's) who desired, but not received orthodontic treatment during adolescents. (2) **A mature group**, in their 40's or 50's who have other dental problems and require orthodontics as part of immense treatment plan.

DIFFERENCE BETWEEN THE ADOLESCENT AND THE ADULT

In the adolescent, tooth movement is pretentious by growth and symptoms are detected by practitioners or parents. While in adult there is tooth movement alone since the growth is completed and symptoms are noticed by the patient. Adult seeks orthodontic treatment more often for esthetic reasons. Adolescents are likely to show significantly more plaque accumulation and gingival inflammation during fixed orthodontic treatment than adults.¹ On a brighter note, adult patients are tidy, more careful more sincere, financially sound, less sensitive to pain and treatment time is either the same or less than that of younger patients.

LIMITATIONS OF TREATMENT IN ADULTS

There are two categories:

INTRINSIC-BIOLOGICAL

The intrinsic limitations are lack of growth in adults; skeletal discrepancies can therefore be corrected by Orthognathic surgery.

Other Intrinsic Factors

Periodontium- According to *Norton*, inadequate source of progenitor's cells may be due to vascularity with increasing age. Insufficient pre Osteoblast accounts for the delayed response to mechanical stimulus.

Alveolar bone- Orthodontic tooth movement depends greatly on age related changes of the skeleton. Cortical bone becomes denser while the spongy bone reduces with age.

Teeth - Adults are likely to have missing teeth, teeth reduced in dimension due to attrition as well as teeth with large restorations.

Extrinsic Limitations- BIOMECHANICAL SYSTEMS

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The force system used for treating adults differs in several respects from that used in young growing individual.

Deep bite: Extrusion of posterior teeth is not compensated by condylar growth.

Posterior cross bite: Arch expansion is not stable.

Barrer and **Chasens** et al suggested that it was advisable to stop orthodontic treatment when there is Uncontrolled/advanced local or systemic disease, excessive alveolar bone loss, severe skeletal discrepancy, inability to prevent excessive hard/soft tissue destruction, movement of teeth against occlusal opposition or into occlusal trauma, and no improvement in periodontal health, function or esthetics are possible.

DIAGNOSIS

Careful diagnosis and treatment planning on a **multidisciplinary basis** is essential to treat adult patients. The standard diagnostic aids such as case history, clinical examination and study casts, radiographs and photographs are mandatory.

I.O.P.A, occlusal and TMJ films should be obtained routinely in addition to the panoramic radiograph and cephalograms. The **problem oriented diagnostic approach** as described by **Proffit** and **Ackerman** is strongly recommended to ensure that no aspect of the patient need is neglected.

Additional diagnostic procedures in an adult patient includes - full series of TMJ x – rays, Muscle examination, Splint therapy, Diet evaluation, Conference with allied practitioner.

Factor in selection of treatment plan

- 1. Existing oral pathology:** Include recurrent decay, restorative failures, root decay involving pulp, periodontal bone loss, TMJ symptoms and retained roots. These conditions should be corrected first before proceedings to orthodontics with a multi-disciplinary approach.
- 2. Skeletal Relationships:** No growth with minimal skeletal adaptability. Therefore surgical procedures are frequently required to

correct moderate to severe skeletal disharmonies.

- 3. Biological Considerations:** Neuromuscular maturity – mechanical options for an adult are limited because of lack of neuromuscular adaptability.

4. Therapeutic approaches available

Tooth Movement: Most of them need tooth moving forces

Orthopedics: not effective

Orthognathic surgery: required in 10 to 20% of adult patients.

Restorative dentistry: frequently required.

- 5. Extraction (vs.) Non Extraction Therapy:** Atypical extractions are usually undertaken in adults. 4 premolars extraction are done to resolve crowding. Upper premolars extraction is done which is a common alternative.

6. Anchorage requirements: Anchorage control is important criteria in orthodontics. Adults have more anchorage potential because of completely erupted 1st and 2nd molars as well as accentuated mesial drift particularly in the mandibular arch. On the other hand 40% of the adult's patient is partially edentulous.

7. Missing teeth (Dental mutilations)

Adult requires a temporary tooth replacement during fixed appliance therapy or fixed prostheses later. Implants have become a reliable alternative. Therefore a multidisciplinary team approach is required for their comprehensive rehabilitations.

GOAL OF ORTHODONTIC TREATMENT

Since the adult vary in many respects from the adolescent and has limitations, the goal for adult orthodontics would be different from that of the adolescent.

Jackson's Triad based on objectives of esthetics, function and structural balance are neither realistic nor always necessary for all adult patients.

Orthodontist works on achieving the following objectives in adult patients:

1. Parallelism of abutment teeth
2. Most favorable distribution of teeth
3. Redistribution of occlusal and incisal forces
4. Adequate embrasure space and proper root position.
5. Adequate occlusal plane and potential for incisal guidance at satisfactory vertical dimension.
6. Adequate Occlusal Landmark Relationships
7. Better lip competency and support
8. Improved crown / root ratio
9. Improvement (or) correction of mucogingival and osseous defects.
10. Better self – maintenance of periodontal health.
11. Esthetic and Functional improvement

BIOMECHANICAL CONSIDERATIONS IN ADULT ORTHODONTICS

Sometimes it becomes necessary to change treatment strategy for adults from what would otherwise be used in adolescent patients to achieve similar goals.²

Selection of Mechanics

Exact biomechanical control of tooth movement is obligatory to rectify malocclusion in all 3 dimensions. The forces applied in adults should be at a lower level than those used for children. Force levels should be reduced but the magnitude of the couple applied to counteract the tendency to tip should not be declined proportionally.

Vertical control and facial profile

Maintaining vertical control and facial profile is very important in treating adult patients. A child tolerates extrusive tooth movement better due to condylar growth and vertical development of the alveolar process but in adult there will be opening of the bite by backward rotation of the mandible resulting in an increased facial height and over jet.

ACCORDING TO PROFFIT, ADULT ORTHODONTIC PROCEDURE IS CLASSIFIED INTO THREE CATEGORIES.

- ✧ Adjunctive treatment

- ✧ Comprehensive treatment
- ✧ Surgical-orthodontic treatment

Adjunctive treatment

Adjunctive orthodontic treatment is tooth movement carried out to facilitate other dental procedures mandatory to control disease and restore function. Some of them are Repositioning of teeth, Forced eruption of badly broken down teeth, Alignment of anterior teeth, and Correction of cross bites, etc.

Comprehensive treatment

Comprehensive orthodontic treatment aims at making the patient's occlusion as ideal as possible, by repositioning either all or nearly all the teeth in the process.

The **ideal time** for comprehensive orthodontic treatment is during **adolescence**, but Comprehensive treatment is also possible for adults. Adult's appliance should be **simple**, exert **light forces**, **long acting**, **invisible**, and **better retained** (fixed).

PERIODONTAL ASPECTS OF ADULT TREATMENT¹

The periodontal condition may be modified by a number of factors, prominent among which is age of patient, type of forces used, and individual variation in tissue morphology and response.³

There are no contraindications to treat adults with periodontal disease long as the disease is under control.

Attention if paid to 3 factors prior to orthodontic therapy can make the treatment easier and more predictable.

- ✧ Reduction of thick tissue either distal to the terminal tooth or in edentulous areas
- ✧ Inadequate bands of keratinized tissues.
- ✧ Frenal attachments

There are many options to treat adults rather than metal brackets keeping in view their esthetic concern. These are:-

CLEAR BRACKETS (plastic / ceramic bracket) along with tooth colored arch wire

LINGUAL ORTHODONTICS

The INVISALIGN SYSTEM

Invisalign® (Align Technology, Santa Clara, CA, USA) is a method for correcting orthodontic problems that uses the action of a series of transparent removable aligners.⁴ They also close spaces in mild crowding.

SURGICAL ORTHODONTICS

Correction of severe skeletal deformity in an adult is achieved by surgical means. 10 – 20% of adults fall into this category. Orthognathic surgery involves a plan of fracturing the facial skeletal parts and repositioning them as desired. Orthognathic surgery can be performed in both jaws and in all 3 planes of space.

Antero posterior plane-

Mandibular deficiency requires BSSO and mandibular advancement.

Mandibular excess requires BSSO and mandibular setback.

Severe dento alveolar proclination in bimaxillary protrusion cases – requires anterior segmental osteotomy.

In vertical plane

Vertical maxillary excess– Lefort Osteotomy with superior repositioning.

In Transverse plane

The skeletal problems–required SURGICALLY ASSISTED RAPID PALATAL EXPANSION⁵

Retention

Retention is a critical and challenging aspect of adult orthodontics. Rotated teeth should be over corrected to an extent of 5-10° before debonding. A supracrestal gingival fibrotomy will reduce the risk of relapse. Hawley's retainer remains the most commonly used retainer. Other retainer used is Bondable Lingual retainers, Invisible retainers, and Hawley's with tongue crib.

NEWER TECHNIQUES FOR ADULT ORTHODONTICS:

CORTICOTOMY ASSISTED ORTHODONTICS-

Alveolar corticotomy is an effective means of accelerating orthodontic treatment. Orthodontic treatment time is reduced with this technique to one-third of that in conventional orthodontics.⁶ Corticotomy has been used in difficult adult cases as an alternative to conventional orthodontic treatment or Orthognathic surgery. It was introduced by KOLE in 1959.

REGIONAL ACCELERATORY PHENOMENON (RAP) -

It was described by an Orthopedist **Harold frost**. It decreases the treatment duration especially in adults and mutilated cases where conventional orthodontics may not be possible.

ACCELERATED INVISALIGN TREATMENT ⁷ -

Technique developed by Wilckos, called **WILCKODONTICS** System (or) **ACCELERATED OSTEOGENIC ORTHODONTICS** (AOO) is similar to single tooth corticotomy. Here it involves all the teeth to be moved orthodontically. Owen amalgamates the **AOO procedure and Invisalign therapy** in his adult patients. After 10 days of uneventful healing, aligners were given. 3 to 4 times faster tooth movement occurred.

CONCLUSION

Biomechanical modifications made to accommodate orthodontic treatment of adult dentitions.² some adult patients necessitate changes in treatment strategy from what would otherwise be employed in adolescent patients to achieve similar goals. In other cases, objectives themselves may need to be modified because of lack of growth potential, constraints of treatment mandated by the patient or the presence of multiple missing or compromised teeth.

CONFLICT OF INTEREST

No potential academic conflict of interest relevant to the above article was reported.

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