

Aesthetic considerations in Orthodontic treatment modalities

Dr. Nikihil Vashi, Dr. Bhuma Vashi

Aesthetic dentistry has come to the fore over the past two-three decades and has been the prime mover and shaker of dental advancement in recent times. Interestingly, the science of Orthodontics, which has been around for almost a century has been primarily involved with correcting unaesthetic conditions as regards teeth. Let us review this basic science and its role in modern day Aesthetic Dentistry.

"In today's competitive world, the personality and style statement of an individual contributes significantly towards success. Without an attractive smile, however, the style statement is incomplete. A beautiful smile can spell the difference between success and failure.

What factors contribute towards a beautiful smile? The shape, size, colour and positions of the anterior teeth are primarily responsible for a beautiful smile. The positions, shape and colour of gingival tissues also contribute to it. The shape, size and position of the lips which determine the display of the teeth during smiling and talking, are also important.

A dental surgeon can change the positions, shape, size and colour of teeth and the level & shape of gingival margins, but does not have much control over the shape and size of the lips. Only the antero-posterior position of the lips can be influenced to some extent by changing the position of teeth.

The maxillary anterior teeth influence the smile of a person the most. Positioning of these teeth is very important. When the teeth are well aligned, leveled and their axial inclinations are proper, then the display of the teeth will be in Golden Proportions, thereby making the smile aesthetic.

If there is crowding or spacing in the upper anterior teeth, if one or more teeth are extruded or intrude, if the teeth are proclined or retroclined, if the anterior occlusal plane is inclined, then the smile gets adversely affected. All these conditions are due to improper positions of teeth. The dental midline is also dependent on the positions of teeth. The gingival margins too, are influenced by the same (Figs. 1, 2, 3).^{1,2,3,4,5}

Since the teeth are borne by the jaws, any discrepancy in the skeletal relationship affects the position of the teeth in antero-posterior, transverse and vertical planes, thereby affecting the smile. The skeletal relationship of the jaws with each other has to be taken into account to achieve the best possible aesthetic result that is functional as well as stable. It is important to understand the clinical



Fig 1: A typical Angles Class I Occlusion



Fig 2: A typical Angles Class I Occlusion

implications of the skeletal and dental positional relationships in all the three planes before embarking on



Fig 3: Improper positions of teeth affecting the smile adversely

excessive. The lips tend to be incompetent; the gingival display is greater on smiling, and there may be an anterior open bite (Figs.4,5). The occlusal forces are more angular and pointing anteriorly. Proffit et al⁶ have shown that the occlusal loads are smaller in these cases as compared to those with shorter skeletal facial types.

In Brachycephalic facial patterns, the lower facial height is reduced. The lips are competent, the gingiva is not visible on smiling, and the bite is deep (Figs. 6,7). The occlusal forces are more vertical and are heavier. Inaba⁷ has reported that maximum occlusal loads were observed in these facial types with loads reducing in Mesocephalic and Dolicocephalic facial patterns.



Fig 6: Brachycephalic facial pattern

any corrective therapy.

In Dolicocephalic facial patterns, the lower facial height is



Fig 4: Dolicocephalic facial pattern



Fig 7: Competent lips and gingiva not visible in the smile



Fig 5: Incompetent lips & Gummy Smile

The Mesocephalic pattern falls between the Dolicocephalic and the Brachycephalic facial patterns. The lips are competent, the gingival display is normal on smiling and the bite is normal. There is a wide spectrum between extreme Dolicocephalic and extreme Brachycephalic facial patterns.

In the transverse dimension, the width of the maxilla or maxillary arch affects the broadness of the smile. A person with a contracted upper arch will show a narrow



Fig 15: A Right retracted arch view with Class II Div II malocclusion



Fig 19: Right retracted arch view of a case with Class II Div II malocclusion



Fig 16: Left retracted arch view with Class II Div II malocclusion



Fig 20: Left retracted arch view of the case with Class II Div II malocclusion

When the upper anterior teeth are too short or too long; or



Fig 17: Frontal facial view of a case with a Class II Div II malocclusion



Fig 18: Retracted arch view of a case with Class II Div II malocclusion

they are too wide or too narrow, the smile of the person gets adversely affected. When the anterior teeth are too dark in colour or when they have stains/patches of demineralized enamel and surface irregularities, then too, the smile becomes unattractive. In short, whenever there is a problem with the shape, size and colour of the teeth, aesthetic procedures would help a patient get an attractive smile. In some cases both orthodontic correction and esthetic procedures may be necessary to get the best possible result. (Figs. 17, 18, 19, 20)

Due to the current social/professional atmosphere, many adults also seek treatment to improve their smiles. However, all are not open to wearing orthodontic fixed appliances because of the appearance of metal braces. For those people, other options like tooth coloured appliances, lingual appliances and in some countries "Invisalign" are available to choose from.



Fig 21: Frontal facial view of a case with Class III malocclusion



Fig 22: Retracted arch view of the Class III malocclusion



Fig 23: Right lateral view of the Class III malocclusion



Fig 24: Left lateral view of the Class III malocclusion

brackets. Ceramic brackets are the most popular. These brackets are made from polycrystalline or monocrystalline aluminum oxide. Ceramic brackets with metal inserts are more advantageous to use because the frictional resistance between the metal brackets and arch wires is less as compared to that between ceramic brackets and arch wires.^{8,9,10} Frictional resistance slows down tooth

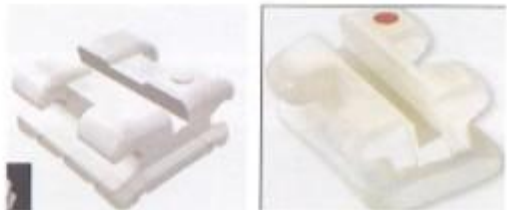


Fig 26: Plastic brackets and polyoxymethylene brackets

movements. (Figs. 25,26)

Ceramic brackets are strong, not very visible, inert and stable in the oral environment. Their disadvantages are that they are brittle, and tend to fracture particularly with full sized rectangular stainless steel wires. They also tend to wear out opposing teeth. Other materials used to



Fig 27: Preoperative view of a case to be treated with clear brackets

Tooth Coloured Appliances

Different materials are used to manufacture tooth coloured



Fig 25: Ceramic brackets with and without metal inserts



Fig 28: The patient with the clear brackets in place.



Fig 29: Clear brackets being used to correct the tooth position



Fig 30: Post op view of case treated with clear brackets



Fig 31: Pre of view of a case to be treated with a lingual appliance



Fig 32: Lingual appliance placed on the maxillary arch



Fig 33: Lingual appliance placed on the mandibular arch



Fig 34: Post op view of a case treated with a lingual appliance.

manufacture tooth coloured brackets are Urethane, Plastic, Polyethylene, etc. These materials are not as strong as ceramic and tend to wear out due to occlusal contacts. (Figs. 27,28,29,30)

Lingual Appliances

Lingual appliances have been used for many years. Their popularity is now growing as more adult patients are seeking orthodontic treatment that is "invisible". The latest lingual brackets are highly refined and low profile. Therefore, they are more comfortable for the patients.

Since the lingual contours of the anterior teeth vary considerably for every individual, it is not feasible to make preadjusted brackets that fit on everyone's teeth. Hence, the brackets have to be prepared for each case on casts at first and then are transferred with indirect bonding trays to the patient's mouth. There are different methods available to position the brackets precisely on the casts to accurately achieve the desired positions and angulations of the teeth. A few of the positioning methods are

- T.A.R.G. - Torque Angulation Reference Guide
- Fillion's lingual indirect bonding system
- CLASS - Customized Lingual Appliance Set-up Service
- Lingual bracket jigs

The advantages of lingual appliances are :-

1. They are not seen at all so even patients who are



conscious about wearing braces can get their teeth repositioned to get an aesthetic smile.

2. Moderate to severe malocclusions can also be treated with lingual appliances.

The disadvantages of lingual appliances are :-

1. Patients are uncomfortable for a few weeks due to confined tongue space and speech problems.
2. Laboratory work involved is much more as compared to labial appliances.
3. Chair-side time required per appointment is longer.
4. These appliances are much more expensive.

Invisalign

Invisalign is a method used for straightening teeth without the need for conventional fixed appliances. A series of custom made trays are prepared according to the corrections required for a patient, using 3-D imaging and precision machining. These trays bring about changes in the positions of teeth sequentially. The patient is supposed to wear the trays as instructed, in the proper order, and check ups are done every 6 weeks by the dentist or orthodontist to monitor the progress.

The advantages of Invisalign are:

1. They are not visible, so adult patients not wanting to "wear braces", can reposition their teeth to get an aesthetic smile without feeling conscious.
2. Mild to moderate tooth position corrections can be done with Invisalign.
3. They can be removed at meal times so the patients do not have restrictions on food.

The disadvantages of Invisalign are

1. As they are removable, the forces do not act on the teeth all the time.
2. Patient cooperation is very important.
3. Only mild to moderate malocclusions can be treated efficiently and effectively as the control needed for complex tooth movements cannot be exerted by Invisalign.
4. Patients experience speech problems for a few weeks.

Conclusion

In many patients it may not be possible to achieve the best aesthetic, functional and stable results without the use of orthodontic appliances to reposition teeth. These patients have the option of choosing orthodontic appliances which are not very visible, or not visible at all. With better understanding of bio-mechanics and biology of tooth movements the time taken for

orthodontic corrections has reduced. In most cases aesthetic improvements can be achieved in a few weeks to a few months. Today, orthodontics is not an isolated speciality dealing with only child/teenage malocclusions. It has a definite place along with other specialties in dealing with various aesthetic and functional requirements of adult patients as well. These patients should be made aware of the benefits of repositioning teeth to get better smiles and function and encouraged to undergo orthodontic corrections whenever required.

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