

Creating space for desired tooth movement

Creating space to facilitate tooth movement is one of the basic principles of orthodontics. Space creation in a dental arch may be required to correct certain features of a malocclusion such as crowding, overjet reduction, levelling of the curve of Spee or correction of incisor inclination and angulation. This space may be created by a number of means including the extraction of dental units, extra-oral traction, inter-dental stripping, and arch expansion.

The various methods of gaining space include:

1. Interproximal stripping
2. Arch expansion
3. Distalization of molars
4. Uprighting of tilted teeth
5. Derotation of posterior teeth
6. Proclination of anterior teeth
7. Extraction
8. Functional appliances
9. Combination of means

1. *Extractions*

Before planning the extraction of any permanent tooth it is important to ensure that all remaining teeth are present and developing in a satisfactory position. Extraction of teeth is required to provide space for either relief of crowding and / or to camouflage a class II or class III skeletal discrepancy. In general, to preserve symmetry, teeth are usually extracted on either side of the same arch. The decision to extract teeth is governed by:

- general factors
 - profile considerations
 - incisor relationship
 - appliance to be employed
 - anchorage requirements
- local factors
 - the condition of the teeth
 - the site of crowding
 - the degree of crowding
 - the position of individual teeth.



Extraction for relief of crowding



Extraction for camouflage of cl.II skeletal discrepancy

2. Interproximal stripping

Removal of 0.25 mm of enamel from each proximal surface of the incisors and canines creates 3 mm of space for relief of crowding, but should only be considered in the adult. There are general roles regarding stripping:

1. Do not create too much space.
2. Perform stripping procedures slowly.
3. removing only minimal amounts of enamel needed for the tooth movement

Contraindications for proximal stripping:

1. Patients who are susceptible to caries.
2. Proximal stripping is avoided in young individuals their teeth may possess large pulp chambers.

Advantages of proximal stripping

1. It may be possible to avoid extractions in borderline cases where space requirements are minimal.
2. Broad contacts may add to stability of results.
3. Localized malalignments can be corrected without involving too many teeth, especially in adult patients.

Disadvantages of proximal stripping

1. Sensitivity is most frequently seen following the procedure.
2. The roughened surface of enamel increases caries susceptibility.
3. Difficult to reproduce exact morphology of the tooth. This is especially true in case of maxillary anterior teeth. The shape created may not be as esthetic.
4. Loss of proximal contacts may result in food lodgment.



Diamond strip



Abrasive disc

3. Arch expansion

The expansion of the arch has been one of the oldest means of creating space in the dental arches. In the upper arch, treatment of a unilateral crossbite with displacement may provide up to 5 mm of space and obviate the need for extractions. In the absence of such a crossbite, arch expansion is unlikely to be stable. Correction of a lingual crossbite by lower arch expansion is possible in some cases but requires specialist skills. Expansion devices can be classified as:

- Rapid maxillary expansion devices (RME). e.g. Hyrax type
- Slow expansion devices. e.g. Screw appliance and Quad-helix appliance



Hyrax type appliance



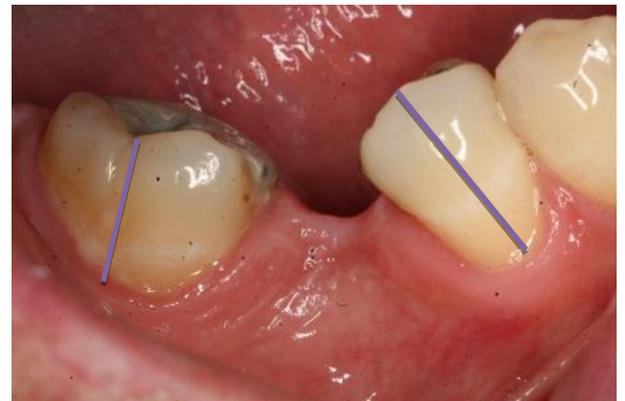
Screw appliance



Quad-helix appliance

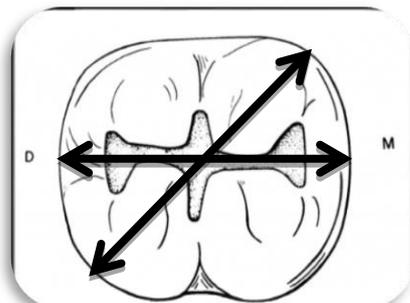
4. Uprighting of tilted teeth

Tilted posterior teeth always occupy more space. Uprighting of molars can lead to an arch lengthgain of 1-1.5 mm. Fixed appliances are ideally used for the purpose. Space regainers or the various screw appliances are also used frequently. The lip bumper and its modifications can also achieve good results.



5. Derotation of posterior teeth

Rotated posterior teeth occupy more space. Derotation of these teeth can help regain this space. The space regained varies upon the tooth concerned and the extent of rotation. For a similar degree of rotation, the molars occupy more space as compared to premolars: whereas rotated anterior teeth occupy less space. Derotation can be best achieved using a couple (forces equal in magnitude but opposite in direction) on the lingual and buccal surfaces of the tooth. Derotation springs are usually not effective for derotating posterior teeth. Any fixed appliance system with a two point contact has more efficient rotation control.



Proclination of anterior teeth

Proclination of anterior teeth can be undertaken in cases where these teeth are retroclined or their proclination will not affect the soft tissue profile of the patient adversely or the stability of the results achieved. Any of the proclining springs ('Z' spring, mattress spring, etc.) or screws (medium-, mini-, or micro-screws) or fixed appliances can be used for the purpose.



Proclining anterior teeth will give space to relieve crowding

7. Functional appliances

Some slight increase in arch dimensions may be possible in growing patients treated with a Frankel appliance, providing space to relieve mild potential crowding.



8. Distalization of molar teeth

Basically the procedures involved have one purpose, i.e. to push the maxillary and/or mandibular terminal molars posteriorly. This increases the arch length by the same length as the amount of distalization achieved. The distalization procedures are usually undertaken before the eruption of the second permanent molars. It is definitely much easier to move one molar distally as compared to two (i.e., first and second permanent molars). The appliances used for the purpose of distalization of molars can be classified as:

- Extra oral distalizing appliances. e.g. headgears with facebow or J-hook.

- Intraoral distalizing appliances. e.g. Lip bumper, Open coil springs and Jasper jumper.
- Orthodontic miniscrews (microimplants)



Open coil springs



headgear with facebow

9. *Combination of means*

In some circumstances, a combination of any or all of the methods listed may be appropriate to create space.