

# *The Orthogram*

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## Introduction

One of the most controversial and perhaps least understood procedures relating to orthodontics is the extraction of permanent teeth. The decision, whether or not to extract, should come from sound orthodontic diagnosis, but it is sometimes strongly influenced by various philosophies of treatment or even limitations of certain appliances. The fact that the procedure is irreversible and the great effect the extractions have on the final result make this decision one of great importance. I thought it might be helpful and interesting to you to discuss some of the ways an orthodontist decides whether to extract teeth and some factors that influence which teeth are selected and when they should be removed.

## Orthodontic Extractions

Before a decision can be made regarding extractions, a complete orthodontic work-up should be done. This ideally should include mounted casts, cephalometric x-rays, facial photographs, intraoral photographs, and a full mouth x-ray or panorex x-ray. This enables the orthodontist to determine the space needed to align crowded teeth and place them in their ideal positions and angulations over the basal bone to insure the greatest stability and best facial profile. This is a tall order and many factors must be considered.

The first step is to make a list of treatment corrections that will require more space:

- 1 - Arch length discrepancy - space needed to align the teeth properly.
- 2 - Excess curve of Spee - space required to flatten the occlusal plan to provide the correct overbite.
- 3 - Molar relation correction - space needed to move lower molars forward or upper molars back to achieve a Class I relationship.
- 4 - Posterior space shortage - space needed to allow eruption of second and third molars.
- 5 - Overjet correction - space needed to reduce maxillary incisor protrusion and to couple the incisors.

6 - Proper lower incisor angulation - space needed to place the lower incisors upright over lower jaw. Also determines antero-posterior position of denture in relation to the facial profile.

Items 3, 4 and 5 may be influenced by jaw growth so a method of growth prediction is helpful. Items 1, 2 and 5 can be measured from study casts. Item 6 is controversial because the lower incisor position is the key to orthodontic diagnosis so different philosophies disagree on what the proper position is.

Once the total space needs are known, several options are available:

1 - Expansion of the arches - only advisable in mixed dentition due to tendency to collapse. Maxilla may be expanded later if crossbite exists.

2 - First molar distalization - must have room in third molar area or may cause impactions of second or third molars. Procedures are technically difficult and require good patient cooperation.

3 - Tipping incisors forward - must consider effects on stability and profile as well as lip musculature and gingival attachment.

4 - Growth guidance with functional appliance - can achieve overjet and molar correction as well as some limited space by arch width development.

5 - Extractions - simple solution but can cause problems if not followed by comprehensive orthodontics.

If extraction seems the only workable solution after considering the other possibilities, then some thought should be given to selecting the appropriate teeth. Extracting four first bicuspid simply does not work out best for every case because of varying circumstances. It is good in Class I cases with extreme crowding or severe bimaxillary protrusion. Also patients with long narrow faces and open bites respond well to this extraction pattern. Some adults with less space requirements might also require first bicuspid extractions if they are not able to wear headgear to prevent loss of anchorage.

This brings up an important point. When extraction spaces are closed, there is some limit to the control of the direction the teeth move into the space by the orthodontist's technique as well as patient cooperation. This is an important

consideration in the extraction decision. With maximum crowding, an attempt must be made to prevent forward movement of molars or the teeth will become too procumbent. On the other hand, with minimal crowding and a good profile, the extraction of four first bicuspid could cause the teeth to retract too far and flatten the profile. For this reason, orthodontists often use other extraction patterns such as second bicuspid to obtain minimal retraction of the incisors in low discrepancy cases. This works well in many instances, but still may flatten the profile in certain cases with large chin buttons.

Extraction of second molars is another option that has many advantages. It provides room to distalize first molars just enough to get needed space without over retracting the incisors. The third molars later erupt to replace the second molars. This method is highly touted by some clinicians who recommend its use exclusively if extractions are needed. I prefer to use it only in carefully selected cases for which it seems to work best. Of course consideration should be given to the position and stage of development of the third molars when selecting cases to insure their proper eruption. Patients are told that occasionally some additional treatment might be necessary to upright the lower third molars after they erupt while this is hardly ever necessary in the uppers. I like this technique on patients around age 10 - 13 that have good profile and minimal crowding. These cases really turn out with a nice occlusion and look like a non-extraction case after the third molars erupt (which is usually about 3 years earlier than normal). One contraindication is a very deep overbite because the second molars are needed to open the bites with full banded appliances.

Older patients or adults that have minimal crowding and a good profile are better off having their third molars extracted, but they will need some headgear or sagittal appliance wear to distalize the molars. This decision can always be followed up with bicuspid extractions if the patient can't cooperate enough and the denture becomes too full.

Occasionally you will see extreme crowding in the lower arch due to a tooth size discrepancy (usually from small upper lateral incisors). Extraction of one lower incisor might be the answer, but should never be ordered before doing a set up on mounted casts to check out the functional occlusion. Too often, extraction of one lower incisor causes a loss of anterior coupling either with increase in overjet or mesial movement of the lower cuspids. This could result in posterior interferences and subsequent TMJ problems. I have had to retreat several of these transfer cases with surgical mandibular advancements to regain proper function, so a few minutes lab work can prevent a lot of future problems.

Correction of Class II molar relationships in non-growing patients may be accomplished with upper first and lower second bicuspid extractions in milder cases. More severe ones may be better off with upper bicuspid extractions to correct the cuspids to Class I while leaving the molars in Class II relationship. This method increases your chances of obtaining a good centric relation occlusion and the molars function as well in Class II as in Class I if the anteriors are discluding properly. Of course more extreme Class II cases with upper and lower crowding might require four first bicuspid extraction treatment and jaw surgery so it is necessary to decide before having extractions whether or not the patient needs and will accept surgery.

Uneven extraction patterns are sometimes necessary to help the non-surgical correction of jaw asymmetries. For instance, a patient with a deviation of the mandible to the left might have a Class II on the left and a Class I on the right side. You could decide between extraction of [#12 ] or [#5,#12,#20 and #28] or [#15] or [#5, #12 and #28], depending on the patient's other problems. An even extraction pattern will often cause a centric slide and subsequent TMJ problems because the Class II correction is incomplete and forces the jaw to shift back to the right to intercusate the teeth.

Sometimes situations such as ankylosed, transposed, badly decayed or missing teeth influence the extraction pattern; but each individual case must be evaluated to get the achievable optimum after considering all circumstances.

There are extreme philosophies on orthodontic extraction running from routine "four on the floor" for almost every case to the "non-extraction no matter what" school of thought. Fortunately, most orthodontists today base their extraction decision on individual patient needs after a careful study of all factors. Improved diagnostic techniques and earlier treatment in mixed dentition have greatly reduced the number of extractions, particularly first bicuspid. This has resulted in improved functional occlusions and nice full smiles for our patients.

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