Some Principles Involved In Orthodontic Treatment Of Operated Unilateral And Bilateral Complete Cleft Palate

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There are more orthodontists today interested in treating cleft palate patients than ever before. One of the reasons for the increased interest in this particular deformity has been the amount of research reported in the past few years. Researchers have attempted to analyze and classify[9], to study the morphology[3,8] and to point out specifically the areas involved[3,5] so that the influence of orthodontic treatment may be more effective.

How do the mandible and maxilla of the cleft palate patient differ from an individual without such deformity? The mandible is generally similar and indistinguishable in form, growing in a downward and forward direction. When teeth are present, the mandibular body height is significantly higher in the area opposite the cleft in unilateral cleft palates.[7] The anterior teeth related to the mandibular plane are inclined more lingually in individuals with cleft palates. It is in the maxilla that the main differences between cleft and non-cleft patients are to be found. In individuals without clefts the maxillary alveolar process and incisors develop and grow in a downward and forward direction; whereas in cleft patients, growth of the alveolar area and normal tooth eruption is greatly impeded. Individuals with unilateral clefts may exhibit a fairly normal deciduous tooth eruption pattern from one and a half to three years of age with a normal overbite. In a lateral headplate at this early stage the permanent incisors may be seen as erupting lingually (Fig. 1); the teeth are therefore very close together being almost the same distance apart as during the formation of the tooth buds.

In cleft palate patients the maxillary

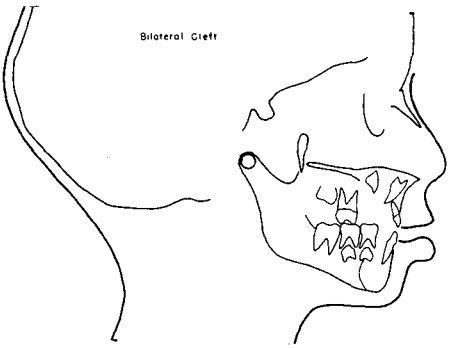

Fig. 1 Tracing of a five year old child, with bilateral cleft, showing lingual inclination of permanent central incisor.

part on the side of the cleft seems to be tilted inwardly resulting in the narrowing of the nasal cavity on the same side.[11] The effect of the cleft seems to be limited, affecting the nasal septum, premaxilla and lateral segments of the alveolar process.[5] Surgery of the lip and palate is generally performed at an early age. As a result of surgery, scar tissue is formed in lip and palate creating forces which detrimentally affect the eruption of the teeth and the development of the alveolar process. Therefore,

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the problem facing the orthodontist in treatment is one in which he attempts to overcome these abnormal forces, created by the presence of the cleft and subsequent surgery, in order that normal downward and forward growth of the maxilla may take place.[2,6,10]

When examining a large number of these cleft palate patients, there are certain characteristics which are obvious and which the orthodontist must consider.

1. The maxillary arch is constricted and the alveolar segments are tilted to the side of the cleft.
2. Due to this tilting a partial or total crossbite of the buccal teeth may result.
3. The maxillary anterior teeth generally erupt lingually to the mandibular incisors. This is especially true in bilateral clefts.
4. In bilateral clefts the anterior segment is quite mobile, its principal attachment being to the nasal septum.
5. There is a lack of vertical maxillary alveolar development resulting in a decrease in vertical facial height.
6. Due to the presence of the cleft the lateral incisors may be missing or may be peg shaped.
7. Supernumerary teeth may be present.
8. Where there has been lip surgery, the presence of scar tissue on the lip creates excessive posterior pressure against the anterior segment.

The constricted buccal segments present a problem unlike that of non-cleft individuals. In a non-cleft crossbite the correction is made by actively moving the teeth through the alveolar bone. In individuals with clefts, one strives to reposition the medially tilted segments in a lateral direction rather than to move individual teeth. This may be accomplished in a number of ways. Many orthodontists use the Arnold expander which has been adequately described in the literature.[1,12] In some parts of Europe an expansion plate using the Glen Ross expansion screw is used successfully. Personally, I have used successfully an appliance introduced to me by Dr. Egil Harvold which is used extensively in Norway. I have found it most satisfactory in repositioning the tilted maxillary segments with very little effect on the mobility of the teeth. This appliance consists of a palatal arch made of either .031″ or .035″ stainless steel round wire which fits into tubes soldered or welded on molar bands. Because of its positive force and ease of auxiliary spring attachment, it may also be used to move the anterior premaxillary segment labially (Fig. 2). However, for final, detailed individual tooth movement it is best to use the edgewise appliance.

I would like to mention at this point that the edgewise appliance as an instrument for expansion is positive and effective. Since its use requires the banding of all the teeth, it is difficult to use in cases where the lip pressure is great. The brackets and arch wire at times become embedded in the lip causing a great deal of injury. I, therefore, try to limit its use for final tooth positioning wherever possible.

According to Harvold, the optimum time for treatment of the lingually inclined incisors is in the deciduous dentition prior to the eruption of the permanent central incisors. In order to prevent crowding of the incisors, it is necessary to tilt the premaxilla forward, the objective being to neutralize the excessive posterior lip pressure. By banding all the deciduous teeth one might easily interfere with eruption which is essential to vertical growth. A great deal may be accomplished in this area by placing a palatal lingual archwire with gentle pressure near the incisors or by incorporating a very light auxiliary spring in the anterior region.

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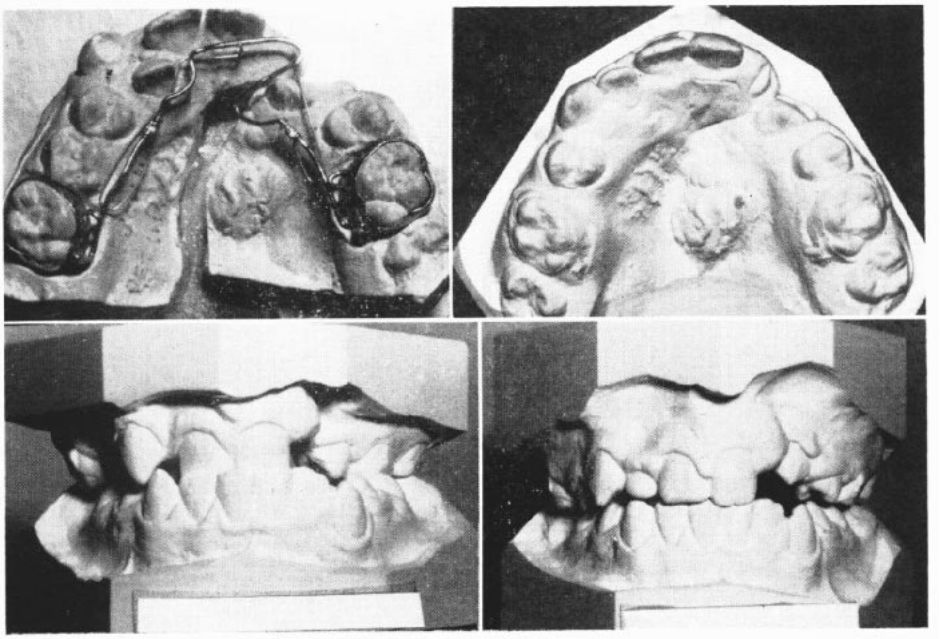

Fig. 2 Upper left, appliance, as used by Dr. E. Harvold, on split model indicating how action is applied. Upper right, the same cleft palate after expansion. Lower left, anterior view prior to expansion and vertical treatment. Lower right, anterior view after expansion and vertical treatment.

If the permanent teeth have already erupted before the patient is seen, some optimum treatment time has been lost. It is the erupting permanent teeth, properly controlled, which aid in the building of the alveolar process. Here again, a palatal bar with a special anterior auxiliary spring will aid in the correction of the anterior crossbite.

Vertical development is a most important aspect of treatment which many orthodontists fail to consider. Very often in borderline cases it is the difference between success or failure in repositioning the premaxillary area in bilateral cleft palates. After the maxillary buccal segments have been repositioned, vertical development of the alveolar process should be initiated. This may be accomplished in two ways. The entire mandibular arch may be banded and an edgewise archwire incorporating vertical spurs placed. Sectional arches are placed in the posterior segments of the maxilla with spurs for vertical elastics. Vertical alveolar development will take place by wearing light elastics and being controlled by the use of a bite plane, (the bite being opened one or two mms. at a time).

Another method, one which is used by Harvold, is to place bands on the maxillary molars and premolars with eyelets of .024″ wire soldered on the lingual of these bands just above the gingiva. A bite plate is constructed with .028″ wires fitted to engage these eyelets. The plate is stabilized and the buccal movement of the posteriors prevented by placing an .026″ wire as a clasp on the buccal surface of the molars and extended to the mesial of the first premolar. By activating the palatal wires away from the palate, the teeth tend to move occlusally, thus increasing alveolar vertical height (Fig. 3).

After the segments have been repositioned and vertical height has been

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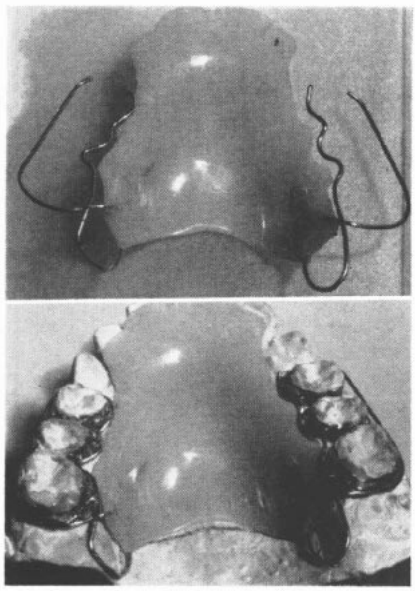

Fig. 3 Maxillary plate used in the treatment of vertical height. By activating lingual wires occlusally, vertical development is encouraged.

established, detailed tooth positioning is accomplished through the edgewise appliance. Missing teeth are replaced by incorporating artificial teeth on the retaining appliances. These retainers are used until the child is old enough to have them replaced with fixed restorations.

Often, supernumerary teeth may be present in the maxillary arch. Some may wish to extract these as soon as possible; however, Harvold has called attention to the fact that by retaining these and all deciduous teeth as long as possible, it may actually aid in the development of the alveolar process which is very important. The removal of the supernumerary teeth should not take place until final tooth positioning is to be accomplished.

In some bilateral clefts it is not always possible to retain the movable premaxillary area. This necessitates its removal surgically. A removable prosthetic appliance may be constructed replacing the surgically removed segment.

The problem of relating the maxilla to the mandible antero-posteriorly varies. It is greatly influenced by the amount of surgery performed on the maxilla and lip. In some individuals it is quite readily treated so that the anterior crossbite is soon corrected. In others, an end to end relationship is all that can be attained. In the latter types the surgical removal of two mandibular first premolars and subsequent tipping of the anterior teeth lingually is of great assistance. In more severe types, especially those involving bilateral cleft palates, a condition not unlike that of a severe Class III may be present. These are very difficult to treat orthodontically; often a prosthetic appliance or mandibular resection may be the only solution.

In conclusion, I would like to point out that the future for our cleft children is becoming brighter. A new era is dawning for them as a result of research that has been done and is still being done by some of our men in this very audience.

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