

Congenitally Absent Maxillary Lateral Incisors: Treatment Planning Considerations

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The congenital absence of one or more maxillary lateral incisors introduces an imbalance in potential maxillary and mandibular dental arch length in the permanent dentition. Elimination of this arch length imbalance after complete eruption of the permanent dentition necessitates formulation of a comprehensive treatment plan which considers the possibility of orthodontic space closure or a combination of orthodontic space opening and prosthetic replacement of the missing lateral incisors.

The choice between these two modes of treatment should not be made empirically. In most instances the presence or absence of major malocclusion symptoms serves as the primary criterion for either space opening or space closure. For a limited number of cases in which either treatment plan has the potential to provide an acceptable result, certain secondary criteria will determine the treatment approach.

SPACE CLOSURE

Lateral incisor spaces should be closed in cases with major malocclusion symptoms which require the extraction of permanent mandibular teeth. Mandibular extractions may be indicated to relieve anterior or posterior arch length deficiency, to reduce mandibular alveolodental protrusion or to compensate for a Class II molar relationship. The choice of teeth for ex-

traction will be determined by the location of the arch length deficiency, the amount of desired dental protrusion reduction and the anchorage requirements for molar relationship correction. Most commonly, mandibular first or second bicuspid extractions are indicated. Less frequently, in order to compensate for intermaxillary tooth size imbalance or to avoid mandibular intercuspid width expansion, mandibular incisor extraction is necessary (Figs. 1a, b, c). Treatment planning for all cases in which maxillary lateral incisor space closure is being considered should include a trial diagnostic setup to determine the mandibular extraction combination which will provide the optimum functional and esthetic result. In addition, the trial setup will allow identification of tooth surfaces which require functional and esthetic reduction so that equilibration may be initiated prior to appliance placement.

Figure 2a illustrates a case with major malocclusion symptoms requiring extraction of mandibular teeth. The patient was a 14 year 8 month old female presenting with anterior arch length deficiency, relative mandibular skeletal and dental protrusion, and Class I molar relationship. First premolar extraction was indicated in order to relieve the arch length deficiency and to reduce the dental protrusion. The favorable tooth size balance established by the combination of mandibular extractions and maxillary lateral incisor space closure is reflected in the occlusal relationship after treatment (Fig. 2b) and eight years postretention (Fig. 2c). Pretreatment skeletal and dental

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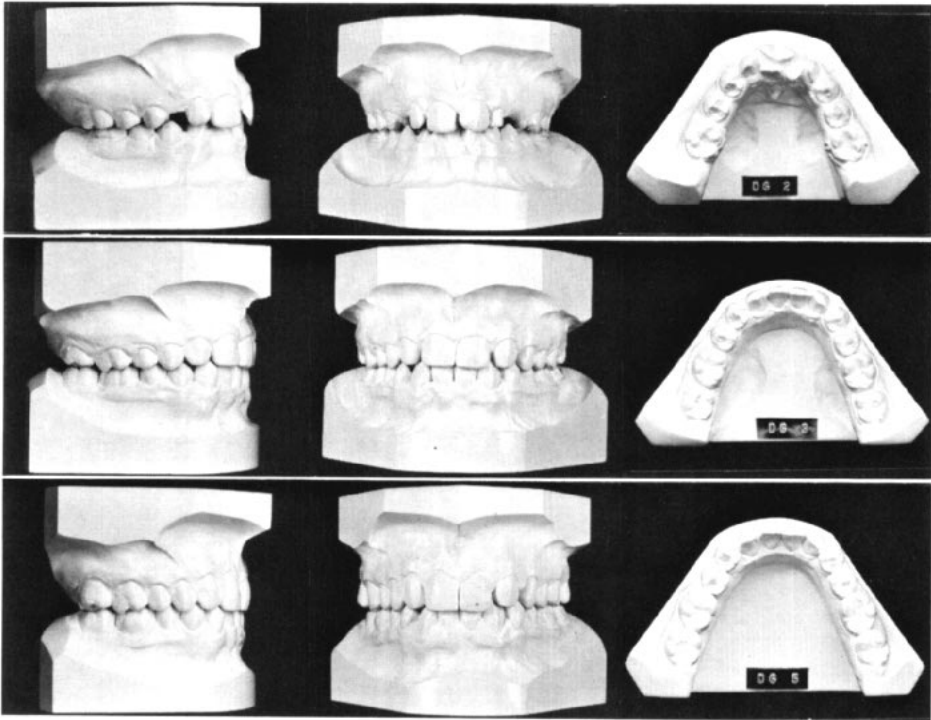


Fig. 1 Top, pretreatment casts of an 11 yr. 7 mo. old female presenting with a malformed maxillary left lateral incisor, Class I molar relationship and severe mandibular anterior crowding. To maintain mandibular arch form without expanding intercuspid width and to achieve interarch tooth size balance, the maxillary lateral incisors and mandibular central incisors were extracted.

Center, postorthodontic treatment casts at age 15 yrs. 1 mo. following mandibular central incisor and maxillary lateral incisor space closure.

Bottom, casts of same patient at age 26, 11 years after the removal of orthodontic appliances. Note the long term stability of the mandibular arch form and accompanying anterior tooth alignment and maintenance of the interarch tooth size balance.

relationships and treatment changes are depicted in the cephalometric composite.

Maxillary lateral incisor space closure is also indicated under certain circumstances not requiring mandibular tooth extraction. In cases presenting with an end-to-end or Class II molar relationship, it may be desirable to move the cuspids into the lateral incisor spaces and to establish or to maintain buccal distoclusion. Figure 3 shows the pretreatment casts of a 13 year 10 month old male with congenitally absent lateral incisors and full Class II molar relationship. Since the absence of man-

dibular arch length deficiency and alveolodental protrusion precluded mandibular tooth extraction, the treatment of choice was maxillary space closure and maintenance of the Class II molar relationship. This treatment plan is particularly expedient with postadolescent patients in whom minimal mandibular growth potential limits the possibility of orthodontic correction of skeletal Class II relationships.

SPACE OPENING

The absence of malocclusion symptoms requiring mandibular tooth extraction in combination with a Class I

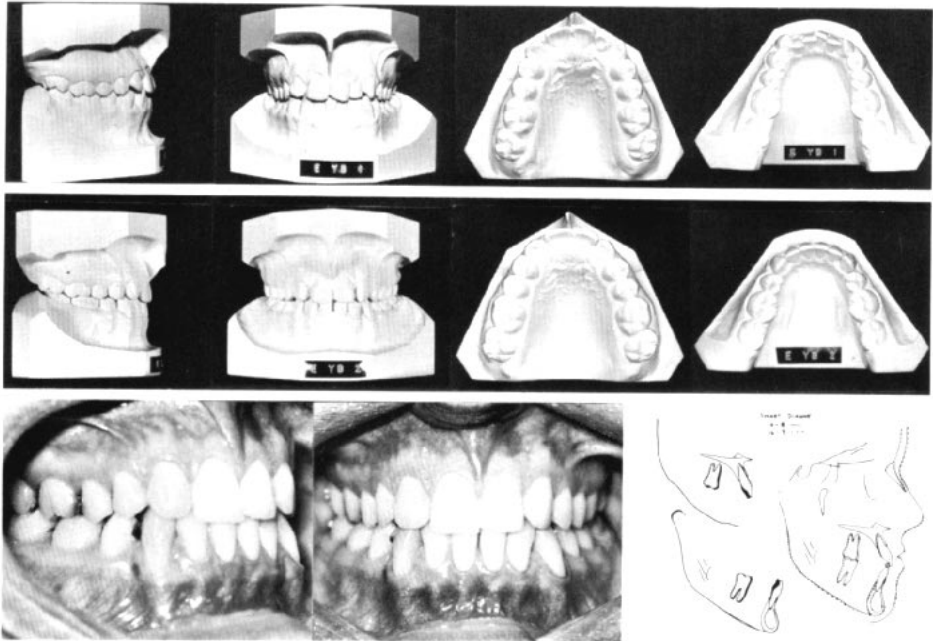


Fig. 2 Top, pretreatment casts of a 14 yr. 8 mo. old female presenting with congenitally absent maxillary lateral incisors. The maxillary left deciduous lateral was retained.

Center, posttreatment casts at age 16 yrs. 3 mo. following a combination of maxillary lateral incisor space closure and mandibular first premolar extraction.

Bottom, intraoral photographs of the same patient 8 years after the removal of retention appliances. The cephalometric composite illustrates reduction of the mandibular dental protrusion.

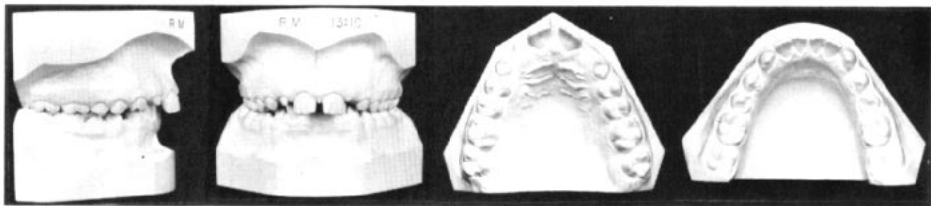


Fig. 3 Pretreatment casts of a 13 yr. 10 mo. old male with congenitally absent maxillary lateral incisors. Note the full Class II molar relationship and the absence of a mandibular arch length deficiency.

buccal occlusion generally favors treatment by orthodontic space opening and subsequent prosthetic lateral incisor replacement.

Figure 4a illustrates a case presenting with Class I buccal occlusion and neither a mandibular arch length deficiency nor alveolodental protrusion. Orthodontic treatment was planned to maintain the buccal relationship, re-

tract maxillary cuspids, and close the maxillary midline diastema (Fig. 4b). Thus mandibular extraction was not indicated. Favorable cuspid position and inclination allowed lateral incisor space opening with relatively uncomplicated mechanics over a short treatment period. Lateral incisor spaces were maintained with a cast partial denture in anticipation of placement of fixed

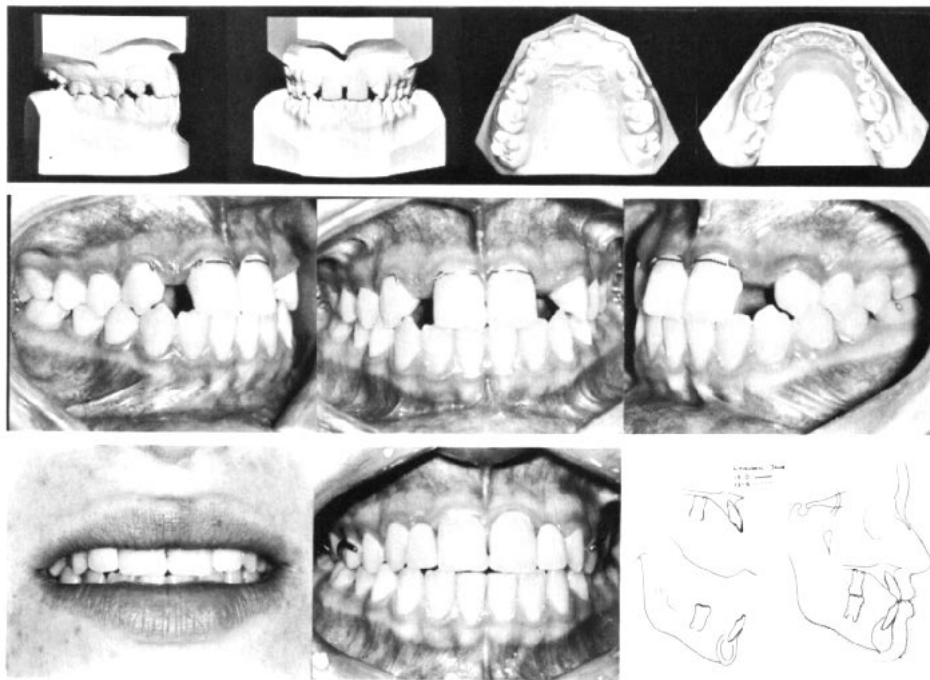


Fig. 4 Top, pretreatment casts of a 13 year old female presenting with congenitally absent maxillary lateral incisors. Note the Class I molar and cuspid relationship and the absence of a mandibular arch length deficiency.

Center, posttreatment intraoral photographs at age 13 yrs. 6 mo. following orthodontic space opening. Note placement of ligature wires to maintain tooth position during the transition from orthodontic appliances to prosthetic lateral incisor replacement.

Bottom, posttreatment photographs with a cast partial denture in place. The favorable lip posture limits the amount of tooth exposure during function. The cephalometric composite illustrates the pretreatment and posttreatment dental and skeletal relationships.

restorations (Fig. 4c). Pre and post-treatment cephalometric superimpositions demonstrate the minimal tooth movement accompanying such treatment.

SECONDARY CONSIDERATIONS IN TREATMENT PLANNING

In cases where the major malocclusion symptoms do not definitively dictate either space opening or space closure, one must rely on certain morphologic and functional criteria to determine the most favorable treatment approach.

Cuspid Color

Substitution of cuspids for maxillary

lateral incisors requires that cuspid color be compatible with the color of both adjacent and opposing teeth. Careful examination of color balance between cuspids and maxillary central incisors and cuspids and mandibular incisors may reveal a color incompatibility which would contraindicate lateral incisor space closure. In addition, when considering space closure one must account for the diminished translucency and darker cuspid color resulting from esthetic and functional recontouring of the cuspid incisal edge. If all other factors dictate lateral incisor space closure in spite of cuspid color incompatibility, incisal edge reduction should

be minimized. Similarly, reduction of labial enamel may alter the color gradation of the cuspid as well as accentuate color differences between the cuspid and adjacent and opposing teeth. Cuspid-central incisor color differences may be more acceptable in males than in females and less apparent in individuals with darker complexions.

Maxillary lip length

The esthetic impact of variations in tooth color and tooth shape is determined by the amount of tooth exposure during lip function. Thus, in patients with a relatively long upper lip, space closure may be acceptable in spite of major cuspid-central incisor color disparity. Conversely, in patients with a relatively short lip or with marked lip lifting during function, cuspid color incompatibility may contraindicate lateral incisor space closure.

Tooth size relationships

With closure of maxillary lateral incisor spaces, the most ideal esthetic balance will be achieved if cuspids are narrow mesiodistally relative to central incisors. However, if maxillary cuspids are relatively large, an acceptable esthetic result can be achieved through proximal cuspid reduction. Cuspids with convex surfaces and with thick proximal enamel lend themselves more readily to mesiodistal reduction than do cuspids with relatively flat contours and thin proximal enamel. Perhaps more important than the esthetic aspects of tooth size relationships are the functional considerations. The replacement of lateral incisors with cuspids usually creates a maxillary anterior tooth size excess. The extent of this interarch imbalance can be detected through a modified Bolton's analysis. Possible methods of treatment compensation for this excess should be evaluated by means of a trial diagnostic setup.

Cuspid position

The choice between lateral incisor

space opening or space closure will be influenced by the position the cuspids assume upon eruption. Cases in which cuspids erupt in close proximity to central incisors are best treated by space closure. The extensive distal bodily movement of such mesially positioned cuspids is not only mechanically difficult but is limited by the relative alveolar concavity between the cuspid and first premolar roots. This concavity is located in the area normally occupied by the cuspid root and accompanying canine eminence, and may limit the achievement of ideal labial root prominence of the cuspid.

The clinician must weigh these secondary criteria against each other and against the major malocclusion symptoms of arch length deficiency, alveolo-dental protrusion and molar relationship in order to arrive at the best possible treatment approach.

OCCLUSAL FUNCTION AND EQUILIBRATION WITH SPACE CLOSURE

The substitution of cuspids for lateral incisors drastically modifies the functional occlusion. Since maxillary and mandibular cuspids do not occlude with each other, there is no potential for a "cuspid rise" occlusion during mandibular working excursions. The maxillary first premolars, mandibular lateral incisors and upper and lower molars are most vulnerable to occlusal overloading under these circumstances. To preclude periodontal breakdown resulting from such overloading, proper occlusal equilibration is necessary. The objectives of occlusal equilibration should be:

1. To eliminate premature contact with the mandibular lateral incisors during working excursions by reduction of maxillary cuspid incisal edge and lingual contour.

2. To develop group function or modified group function in order to

more evenly distribute the occlusal loads during lateral excursions thus preventing maxillary first premolar overloading.

3. To eliminate cross-tooth balancing interferences through equilibration of the lingual cusp of maxillary first premolars. (Mesial rotation of maxillary first premolars for esthetic purposes will usually increase the potential for this type of interference).

4. To eliminate cross-arch balancing interferences, particularly by equilibration of maxillary first and second molar lingual cusps.

Occlusal equilibration is best handled in three stages:

1. Using the diagnostic setup as a guide, certain teeth can be reduced prior to band placement. Maxillary cuspids are best recontoured at this stage for establishment of proper tooth size relationship and centric occlusal contact with mandibular lateral incisors. In addition, maxillary first premolar equilibration at this stage will allow the desired amount of mesial rotation for esthetic purposes without introducing cross-tooth interferences. Gross posterior interferences in centric occlusion may also be eliminated at this time.

2. Immediately following band re-

moval, equilibration should be directed toward preliminary establishment of group function and elimination of major balancing interferences. Additional esthetic recontouring may be indicated at this stage.

3. After a period of retention and occlusal "settling," detailed functional equilibration should be accomplished.

By careful sequential occlusal equilibration it is thus possible to establish an acceptable functional relationship even in the absence of normal cuspid position. Lateral incisor space opening with prosthetic replacement to achieve a cuspid protected occlusion is seldom justifiable when most other treatment planning considerations indicate that space closure is preferable.

SUMMARY

In cases with congenitally absent maxillary lateral incisors, the presence of major malocclusion symptoms usually dictates the choice between space opening for prosthetic lateral incisor replacement and space closure with cuspid substitution for the lateral incisor. In situations in which either treatment approach is feasible, the choice should be based on evaluation of certain secondary criteria including acceptability of the resulting functional occlusion.

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