

The Maxillary Cuspid and Missing Lateral Incisors: Esthetics and Occlusion

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We are frequently confronted with diagnostic problems involving missing lateral incisors. Whether congenitally absent or lost because of accident or pathology, they complicate diagnosis and treatment.

More often than not patients and parents present seeking improvement in appearance. They are primarily interested in smiles rather than a Class I occlusion. As a consequence, our responsibility is to provide a functional, healthy, oral mechanism and, when possible, improve or maintain esthetics within the limitations of the material presented.

Opening or closing the lateral spaces is, of course, the diagnostic decision, the result of which is compromise. The question is simply: Which compromise is in the best interests of the patient both functionally and esthetically?

REVIEW OF THE LITERATURE

Angle¹ in his 7th edition (1907) stated:

"The evil effects arising from the extraction of upper lateral incisors to provide space in the crowded arch for the canines are so apparent that arguments against the practice seem out of place in a modern textbook. The abnormal appearance given the face in the region of the nose consequent upon the diminished size of the upper arch, together with the carnivorous appearance of the mouth by the resultant prominence of the canines is as repulsive as it is inexcusable."

Recognizing the importance of the cuspid and the eminence, Wheeler² states the "position and forms of the

canines and their anchorage in the bone will, with the boney ridge over the labial portions of the roots called the canine eminence, have a cosmetic value. With their roots they help to form a foundation that insures normal facial expression at the corners of the mouth."

In 1947 Dewel³ also emphasized the importance of the maxillary cuspid as being almost indispensable, and that "esthetically its strategic position in the angle of the arch is significant in the maintenance of harmony and symmetry of occlusal relationships and determining the contours of the mouth as a whole."

Strang⁴ states that, when faced with missing lateral incisors, the most ideal method of solving the problem is to open space for an artificial tooth. The procedure, from an esthetic standpoint, is the most satisfactory method of restoring beauty to the facial tissue. He places particular emphasis on the patient's sex, in that girls should have proper cosmetics, whereas males are better able to tolerate the canine in the lateral position. In addition, he notes that the disadvantages of space closure are loss of proper occlusion and "blemishes" to the facial lines.

In more recent works, emphasis has been placed on cuspid substitution for missing maxillary laterals. Carlson's⁵ paper in 1952 described a method of mesial cuspid positioning in conjunction with selective recontouring to improve the cosmetic appearance of the cuspids. A secondary objective was placement of the bicuspid in the area of the canine eminence to give needed contour to the face. He noted that, if the case cannot be treated without

Read before the Northern California Component of the Angle Society, 1975.

damaging the natural facial contours, space opening procedures should be considered.

In Henn's⁹ recent work published in 1974, he found that the canine eminence follows the cuspid as it is moved mesially and that there is a consequent narrowing of arch form. This narrowing effect did not exceed 1.5 mm on each side.

Carlson noted that if a tooth size discrepancy exists, it may result in spacing mesial to the bicuspid, and both he and Bisharn⁶ suggested that a diagnostic set-up would be valuable at the time of consultation so that the parent and patient could visualize the final result.

In 1972 Tuverson⁸ described a more detailed method of recontouring the cuspids on the mesial, distal, labial, and lingual surfaces as well as the incisal edge, the objective being to reform the cuspids to closely resemble lateral incisors.

In unilateral cases he contends that unless the cuspid can be sufficiently reshaped to closely match the opposing lateral, the lateral space should be opened for an artificial replacement, or the existing lateral should be extracted and both canines placed in lateral positions.

The occasional loss of occlusion was mentioned by Craig,⁷ Carlson, Bisharn, and Tuverson. Bisharn noted that when these cases relapse, either spacing occurs in the anterior segment or there is loss of interdigitation, the latter being the least desirable. When anterior spacing occurs, permanent retention following retreatment is the only way to insure stability.

The dilemma facing orthodontists in planning treatment for cases with undersized lateral incisors was noted by King.⁹ He stated the choice in treatment is usually one of compromise. We may close the upper denture and sacri-

fice interdigitation in the buccal segments, or we may produce adequate buccal occlusion and leave some spacing in the maxillary anterior segment, which in our esthetically-oriented society is objectionable to patient and parent.

METHODS AND MATERIALS

A total of fifty-six cases was used in the study. They were obtained from six independent practices including my own. Of the fifty-six cases, sixteen were males and forty were females ranging in age from fourteen to fifty-one. This may be an indication that lateral absence occurs more frequently in females.

One case had the right cuspid extracted and in another both cuspids were removed. Four cases were still undergoing treatment, two had posterior bridgework, one had four missing laterals and eight others were otherwise complicated with multiple extractions or by being cleft palate cases. Consequently, sixteen cases could not be considered in some or all aspects of the study.

Twenty-three cases had bilateral missing laterals, of these twenty-one had the spaces closed.

Seventeen cases were unilateral problems of which six were opened and eleven were closed.

Five photographs were taken of each patient: frontal, with a natural expression; frontal, with a broad smile; and three intraorals: frontal, and right and left lateral.

The photographs were subjectively evaluated and the following points considered: posterior and cuspid occlusion, dental esthetics and facial esthetics. The purpose of the investigation was to possibly provide some information on the following questions:

1. Is unilateral mesial positioning more or less acceptable functionally

and esthetically than bilateral positioning?

2. When spaces are closed, does the first premolar serve as an adequate cuspid substitute?

3. Is posterior occlusion more or less acceptable when lateral spaces are opened or closed?

4. Does transference of the canine eminence toward the midline area and its resultant loss at the corners of the mouth produce unpleasant dental esthetics and/or undesirable facial change?

RESULTS

Grading the quality of posterior occlusion was determined by the extent of equilibration that might be necessary to establish incline plane contact. Those cases that required little or no adjustment were considered excellent. When categorized as adequate, it was felt that a moderate amount of equilibration could effect satisfactory occlusion. An inadequate classification denotes that excessive equilibration would be required. When referring to *cuspid* occlusion in closure cases, it denotes the first *premolar*.

Two unilateral closed cases displayed excellent occlusion on the side of closure (Fig. 1). Seven cases were classified as adequate (Fig. 2), and three cases were judged inadequate (Fig. 3).

Of the unilateral opened cases, posterior and cuspid occlusion was found to be excellent in two and adequate in four.

With the exception of the two cases in which cuspid and posterior occlusion was excellent, the side of closure displayed consistently less adequate occlusal relationships than its counterpart.

Bilateral Posterior Occlusion

Of the twenty-four bilateral cases only two had spaces opened, both of



Fig. 1 Excellent occlusion on the side of closure.



Fig. 2 Adequate occlusion on the side of closure.



Fig. 3 Inadequate occlusion on the side of closure.

which had excellent posterior and cuspid occlusion.

Of the twenty-two closure cases, five were judged to have excellent occlusion. Twelve cases had adequate posterior occlusion and five cases were inadequate.

Of the five cases that had excellent posterior occlusion, three displayed spacing distal to the central incisor, or distal to the cuspids.

Dental Esthetics

Of the thirty-three unilateral and bilateral closure cases, twelve were felt to have good dental esthetics from an anatomical standpoint and four were judged unsatisfactory. Excellence seemed to be related to the degree of contouring performed to improve the shape and size of the cuspid. The more contouring, the less apparent was the size and shape discrepancy between it and the opposing lateral incisor.

Shade Differential

In six of forty cases the shade differential between the cuspid and the central incisor was judged to be objectionable. Twenty cases had good color balance. Three were felt to be excellent. Of the patients who had spaces opened and were wearing retainers or bridges, only two were judged to be esthetically adequate. Four cases were thought to be objectionable.

Facial Contour

At the beginning of the study we expected to find that mesial transference of the cuspid eminence, as described by Henns, would result in loss of soft tissue contour at the corners of the mouth. Evaluation of that type of change with the methods used was probably inadequate. The variables encountered, such as mandibular extractions and the resultant facial changes effected by treatment, clouded a subjective evaluation. To effectively evaluate contour changes in bilateral closure cases it would have been necessary to have a control group. This, of course, was not possible.

However, it seemed significant that the unilateral closure cases failed to exhibit facial asymmetry. If the presence of the eminence in its normal position is of such importance esthetically, one would expect to find a distinct lack of contour on the side of closure. This was not the case (Fig. 4). Only one case displayed a noticeable

lack of symmetry (Fig. 5).

Henns' observation that in no instance did eminence transfer result in loss of arch form of more than 1.5 mm would seem to indicate that a loss of that amount, or less, does not usually adversely affect lip or facial contour.

DISCUSSION

It seems evident from the results of this study that a compromise of some nature must be accepted. When relapse occurs in closure cases the results can be disturbing functionally and esthetically. The most disturbing result is lack of occlusion in the premolar and cuspid areas.

The comparatively small number of closure cases that exhibited both occlusal and esthetic excellence would seem to indicate that complete maintenance of space closure and occlusion is not usually possible. We may, therefore, be forced to choose between absence of spaces or lack of posterior interdigitation.

It would seem safe to say that the establishment and maintenance of the posterior occlusion is of primary importance and that spacing distal to the cuspid may be expected and accepted. However, anterior spacing is probably more objectionable to patient and parent. Obviously, there is a risk that spaces may open in the anterior segment if the canine drifts distally. In such instances we would tend to agree with Strang⁴ that it would be more acceptable in males than in females. If there is loss of vertical dimension this would appear to be a very likely consequence.

If such spaces become a cosmetic problem, reclosure of the space and placement of jacket crowns on the first premolars would seem to be preferable to the lingual onlays suggested by Bisharn,⁶ which are food traps and subject to frequent dislodgment. A prop-

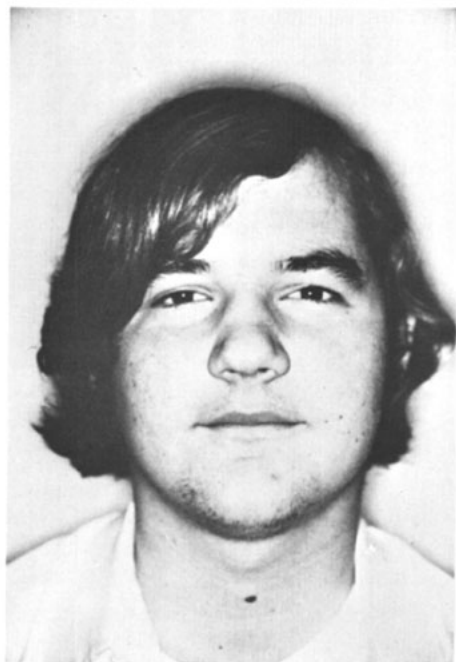


Fig. 4 Unilateral closure cases with no facial asymmetry.



Fig. 5 Facial tissue imbalance on the side of closure.

erly contoured jacket crown would not only maintain space closure, but could be constructed to resemble a cuspid and might be of particular value when the cuspid has been extensively recontoured. A jacket probably would add brilliance to the smile and tend to mask the narrowing effect of the maxillary arch that takes place when cuspids are moved mesially.

In eight cases cuspids were extensively contoured. The anatomical dental esthetics were thought to be more pleasing than in cases which had minimal contouring (Figs. 6 and 7). The cuspids are more compatible with the central incisors and seem to lessen the anatomical deficiencies of the first premolars. Reduction of the mesiodistal width probably accounts for the frequent inadequacy of posterior occlusion.

It should be noted that mesiodistal contouring may increase the likelihood of relapse and the resultant loss of posterior occlusion or spacing in the posterior segment, or both. A precontoured cuspid, or cuspids, could be included in the diagnostic set up to preview the occlusal and spacing difficulties that might be encountered.



Fig. 6 Extensively contoured cuspids displaying adequate dental esthetics.

A sometimes unpleasant accompaniment to space closing procedures is the color contrast between the cuspids and central incisors. One would suspect when the labial surface is recontoured the color contrast would be accentuated. This, however, did not seem to be. Of the eight patients treated in that fashion, each exhibited the same shade as the mandibular cuspid. An interesting observation was that in every instance, whether contoured or not, the shade of the maxillary cuspid seemed identical to its mandibular counterpart. If a color differential did exist, it was not discernible. Therefore, intraoral color photography would seem to be of value in treatment planning as well as during consultation. Shade discrepancies could be noticed and anticipated, minimizing patient or parental objection when treatment is completed.

Since unilateral closure cases displayed more frequent loss of occlusion on the side of closure, maxillary and mandibular tooth size discrepancies should be anticipated.

Although the first premolar is not the anatomical equal to the cuspid, it can serve as an adequate substitute both functionally and esthetically. Its lack of bulk may contribute to the narrowing effect of the maxillary arch which often seems to accompany closure procedures.



Fig. 7 Minimal cuspid contouring displaying unpleasant dental esthetics.

Since the unilateral closure cases did not exhibit an apparent lack of symmetry at the corners of the mouth, it seems evident that mesial transference of the cuspid and its eminence do not produce the unsightly results that might be expected. Evidently the first premolar and its eminence, if any, are sufficient to maintain soft-tissue symmetry. Therefore one might be more inclined to extract impacted maxillary canines in questionable situations, rather than undergo lengthy repositioning procedures. A philosophy of cuspid sanctity may be over-emphasized and their occasional removal might be in the best interests of patient, parent and orthodontist.

SUMMARY

When maxillary cuspids are moved mesially or if they are absent, it may be safe to assume:

1. There is no apparent change in facial contour.
2. The first premolar can serve as an adequate substitute for the cuspid, both functionally and esthetically.
3. If all spaces are closed, occlusal equilibration will usually be necessary to effect acceptable posterior occlusion. Mesiodistal contouring of the cuspids probably accentuates the problem since it seems to exaggerate any tooth size discrepancy which may exist between maxillary and mandibular teeth.

4. Unilateral space closure displays functional deficiencies more frequently on the side of closure.

5. Varying degrees of shade imbalance between the cuspid and central incisor can be expected, and the degree of contrast can be accurately predicted by using the mandibular cuspid as a guide. This is particularly important when the maxillary canines are impacted or unerupted.

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