

# Compendium

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with Ectodermal Dysplasia

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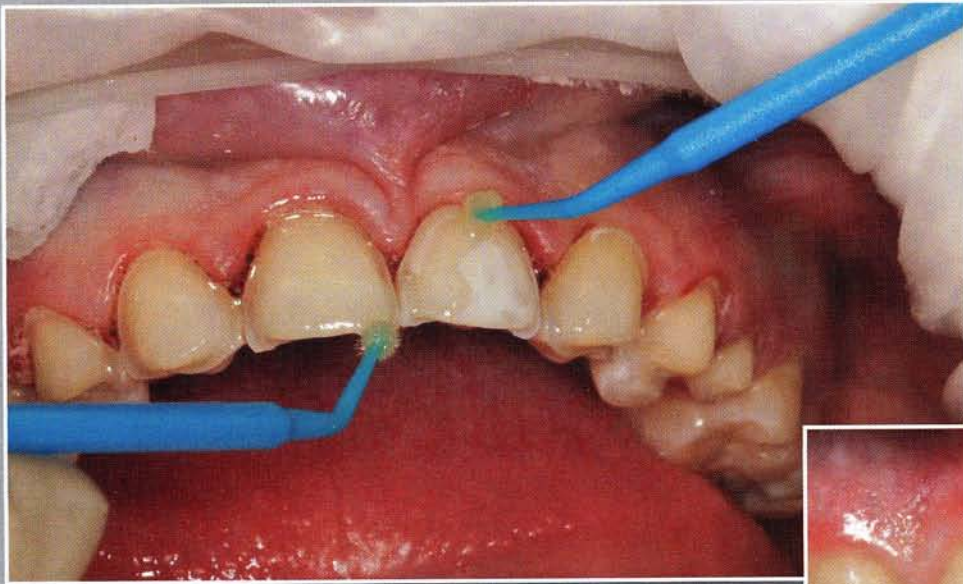
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CONFIDENCE



*Esthetics*



Function

## Interdisciplinary Treatment of an End-to-End Occlusion Due to Congenitally Missing Maxillary Lateral Incisors



Odontogenic aplasia, or the congenital absence of permanent teeth, is relatively common. When the missing teeth include the maxillary lateral incisors, treatment considerations must reconcile both esthetic and functional objectives. In developing dentition, erupting adjacent teeth can drift from their intended positions into the edentulous space created by the congenitally missing tooth. When this movement happens (eg, cuspids shifting more mesially than normal), esthetic and functional problems occur. A restorative solution for missing maxillary lateral incisors subsequent to the loss of the maxillary incisor spaces is presented while highlighting the use of a leucite-reinforced material. This approach allowed for a minimal preparation design and conservation of tooth structure, providing an optimal bond.

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**A**nalytic determination of the proper treatment is an important step in any dental therapy. One such condition, congenitally missing maxillary lateral incisors, requires practitioners to choose from an array of treatment options to obtain optimal results. Proper retainment of the missing tooth space with subsequent restorative treatment is considered possible in some cases.<sup>1</sup> This solution can be achieved conservatively using a bonded bridge or an implant and crown.<sup>1</sup>

When spaces between dentition are closed through orthodontics or natural forces following tooth loss, the resultant mesial drift of the maxillary dentition can create inappropriate esthetics.<sup>2</sup> This drift may also produce future functional occlusion issues.<sup>3,4</sup> The smile presentation can appear improper due to inconsistent tooth morphology.<sup>5</sup> For example, differences between a lateral incisor and cuspid include significantly different crown dimensions, contours, incisal embrasures, and periodontal relationships.<sup>5</sup>

When the maxillary cuspids migrate mesially, interaction with the mandibular cuspids for appropriate anterior guidance is lost.<sup>6</sup> Destructive wear of other anterior teeth occurs

as the teeth assume additional responsibility.<sup>6</sup> The shorter maxillary arch circumference, due to the missing teeth, can result in an interarch discrepancy, compromising the occlusal relationship.<sup>7,8</sup> A size mismatch between the maxillary and mandibular arches can place opposing dentition in functional paths, also causing destructive wear.<sup>7,8</sup> The clinician should treat the condition when the patient is a young adult because treatment options are time-sensitive.<sup>9</sup>

Sometimes an ideal resolution, such as re-establishing lost space with an implant or prosthodontic solution, is impossible.<sup>9</sup> Therefore, alternative restorative choices must be considered. In such cases, the restorative material must allow conservation of tooth structure.<sup>10</sup> One such option enables recapturing of the tooth's natural biomimetic characteristics, while still providing optimal bonding.<sup>10</sup>

### CASE REPORT

A 17-year-old female with a noncontributory medical history presented with congenitally missing maxillary lateral incisors (Figure 1 through Figure 3). The patient was starting college in a year and wanted an attractive smile. Previous



**Figure 1** Full facial image of a young adult female illustrating the esthetic problems associated with congenitally missing maxillary lateral incisors.



**Figure 2** Natural smile at 1:2 magnification showing the interproximal spaces and large incisal embrasures.



**Figure 3** Retracted 1:2 magnification image reveals significant functional wear of the upper incisors not protected by properly positioned maxillary cuspids.



**Figure 4** Retracted 1:1 view reveals incisor wear from chipping.



**Figure 5** Retracted 1:2 right lateral image shows how the anterior teeth directly oppose each other in maximum intercuspation.



**Figure 6** After a second round of orthodontics, the patient's anterior overjet has been increased to establish space for lengthening the upper anterior teeth.

orthodontic care had aligned the remaining maxillary dentition mesially, in an attempt to eliminate the space created by the missing incisors. The resultant constriction of the maxillary arch circumference and end-to-end occlusal relationship left the patient disappointed with the esthetics.

A clinical examination revealed that the end-to-end occlusal relationship was causing significant enamel loss from insufficient anterior guidance in lateral functional movements (Figure 4 and Figure 5).<sup>7,8</sup> This loss was caused by mesial migration of the maxillary cuspids.<sup>6</sup> The risk of incurring further wear to these teeth over time was great, and the oral health ramifications of nontreatment were unacceptable.<sup>7,9</sup>

## CLINICAL DISCUSSION AND TREATMENT PLAN

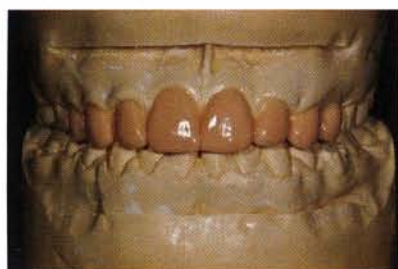
Because the patient's root morphology was compromised and exhibited foreshortening, any extensive orthodontic plan was quickly eliminated from consideration.<sup>5</sup> After discussing the case, the orthodontist and dentist determined that a risk-free, limited orthodontic protocol was the best option.<sup>11,12</sup>

This plan entailed the creation of a more natural horizontal relationship between the maxillary and mandibular arches by bringing the mandibular incisors back and flaring the maxillary anteriors facially.<sup>13</sup> Then, the interproximal spaces would be filled by conservatively prepared porcelain veneers.<sup>13</sup>

The increased circumference of the upper arch, with decreased circumference of the mandibular arch, would also provide room for natural height and width ratios, a proportionate balance of the maxillary incisors, and elimination of the crossbite of teeth Nos. 6 to 27. The orthodontic treatment would be 12 months (Figure 6).<sup>11,12</sup> The procedure would then be completed to an esthetic and functional finish using indirect porcelain restorations (Figure 7).<sup>13</sup>

## LABORATORY DISCUSSION

When considering a restorative material, the technician should think from the "outside in." Whether dentine, porcelain, or composite, any optically dense material must be covered by a minimum of 0.5 mm of translucent enamel material and provide a color depth.<sup>14</sup> If little-to-no enamel reduction has occurred, a technician needs only to replace



**Figure 7** Proposed morphologic changes of the patient's anterior teeth are predetermined in the diagnostic wax-up.



**Figure 8** The alveolar crests of the anterior teeth are sounded to determine whether a gingivoplasty or crown lengthening is needed to construct proper gingival architecture.



**Figure 9** OptraGate® (Ivoclar Vivadent) retraction was used after soft-tissue diode-laser gingival recontouring.



**Figure 10** Micrometer measuring the thickness of the veneer.



**Figure 11** Etched enamel throughout the prepared surface of the tooth verifies the minimal preparation that was performed.



**Figure 12** A two-step bonding agent (Excite®, Ivoclar Vivadent) was applied following acid etching.

the missing enamel, allowing the colors and effects of the natural tooth to be expressed.<sup>14</sup> Feldspathic veneers are the obvious choice in these cases because the ceramist has the greatest ability to vary the amount of filtering, or expression, of the underlying color and character.<sup>15</sup>

However, the greater the tooth reduction, the more difficult it is to make a restoration appear natural.<sup>15</sup> If teeth are overprepared, all internal structures and characteristics must be layered in ceramic, prior to layering the enamel.<sup>14</sup> This requires greater skill and knowledge but allows for the utmost number of options when choosing restorative materials.<sup>15</sup> Any system with dentine and enamel materials, such as IPS e.max<sup>®</sup> (Ivoclar Vivadent, www.ivoclarvivadent.com), porcelain fused to metal, or high-strength ceramics (LAVA<sup>®</sup>, 3M ESPE, www.3mespe.com), will suffice.<sup>15</sup>

### PRODUCT DESCRIPTION

Conservative preparation of teeth for restorations should be the goal of all dentistry. Three-quarter crowns and veneers, with finishing lines in enamel, are functionally equal to crowns but allow for conservation of tooth structure.<sup>14,15</sup> In cases that require greater than 0.5 mm of restorative material, a hybrid material that combines the optics of dentine and enamel is the obvious choice.<sup>14,15</sup> Leucite-reinforced

glass-ceramic restorations show a low clinical failure rate and excellent esthetics, even beyond 11 years.<sup>15</sup>

IPS Empress<sup>®</sup> Esthetic (Ivoclar Vivadent) is a leucite-reinforced, pressable ceramic that fits the functional and esthetic requirements of restorative cases.<sup>15</sup> While a feldspathic option was considered in this case, the functional changes to the patient's occlusal scheme necessitated the use of a high-strength material.<sup>14,15</sup> The color, clarity, strength, and leucite distribution of IPS Empress Esthetic contributed to improved strength and superior optical properties compared with other materials used for metal-free restorations.<sup>15</sup> Leucite-reinforced restorative materials, such as IPS Empress Esthetic, allow practitioners to create pressed and layered restorations that mimic the beauty of natural dentition, while still enabling conservation of the tooth structure.<sup>14,15</sup>

Pressable ceramics also have the advantage of being the most predictable material for managing interdental spaces—when tissue is blunted or tissue and tooth morphologies are dissimilar.<sup>14,15</sup> In this case, the IPS Empress Esthetic ingot ETC-0 provided a natural blend of translucency and color filtering, creating a slightly brighter esthetic result.<sup>14,15</sup>

The challenge presented by pressable ceramics, however, is in disguising the interface between the more optically dense ingot material and the translucent enamel veneering



**Figure 13** Full-face image of young adult with her definitive restorations.



**Figure 14** Postoperative image of the patient's smile.



**Figure 15** Alternate postoperative image of the patient's smile.



**Figure 16** Retracted view showing the different morphology that the minimally prepared restorations provide.



**Figure 17** Side view of new restorations, illustrating the anterior occlusal relationship.



**Figure 18** A 1:1 magnification view showing the characterization of the IPS Empress Esthetic veneers.

materials.<sup>14,15</sup> The typical approach has been to “cut in” internal incisal structures by shaping the pressed restoration during cutback for veneering enamel. Layering this area with transparent material alone can result in a manufactured-looking incisal zone.<sup>14,15</sup> IPS Empress Esthetic was chosen for its combination of enhanced strength and complementary veneering ceramics, which allowed management of the transitional incisal zone.<sup>14,15</sup>

## RESTORATIVE TREATMENT

The treatment plan involved minimally prepared, additive leucite-reinforced porcelain restorations. This restoration would apply to eight teeth, ranging from a veneer for tooth No. 4 to a full crown for the microdontic tooth No. 13.

The need for a stronger material to fill the incisal embrasures was the main reason IPS Empress Esthetic was chosen.<sup>15</sup> Due to the morphologic changes with increased crown length (Figure 8 and Figure 9) and additional bulk in the incisal embrasures, the leucite-reinforced material provided increased strength compared to feldspathic glass.<sup>14,15</sup>

Another benefit of the leucite material was the ability to keep the restoration thickness minimal (Figure 10).<sup>14,15</sup> This prevented preparing the tooth past the dentoenamel junction, leaving nearly 100% of the enamel surface to bond the restoration (Figure 11 and Figure 12).<sup>14,15</sup>

## CONCLUSION

The authors advocate the use of leucite-reinforced porcelain when adding facial contours because it allows for sufficient restoration thickness without the need to prepare through the enamel.<sup>15</sup> This “additive technique” takes advantage of the increased tensile strength of the leucite-reinforced hybrid.<sup>15</sup> In the case presented here, because the shapes of the teeth were changing from cuspids to laterals and first bicuspid to a larger cuspid, a thicker layer of porcelain was needed to fill the incisal embrasures (Figure 13 through Figure 15).<sup>14</sup> Therefore, a stronger and more translucent material was employed.

As mentioned, dental teams are presented with myriad choices of restorative materials and CAD/CAM options have complicated the landscape further. While material decisions are always important, proposed changes to a patient’s habitual occlusion make these choices even more crucial. Esthetics, while still the driving force behind cases involving restorations in the anterior segment, must be considered in combination with

resistance to impact because patients may not be accustomed to their new functional movements (Figure 16 through Figure 18).

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