

# Use of Bonded Power Arms in Cases with Missing Upper Lateral Incisors

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**T**here are two basic options for treating patients with missing maxillary lateral incisors. The first is to close the spaces and substitute the canines for the lateral incisors; the second is to redistribute and maintain the spaces for placement of osseointegrated implants or crown-and-bridge prosthetics. Several factors must be considered when deciding which strategy to use.<sup>1-6</sup>

With the first treatment option, there should be enough overjet for retraction of the upper anterior teeth, assuming the overbite is carefully controlled. If the patient has normal overbite and overjet, the arch perimeter must be maintained during space closure.<sup>7</sup> Substitution of a canine for a lateral incisor involves considerations of not only the size, shape, and color of the crown, but also the gingival contours and gingival display in smiling. Recontouring, bleaching, composite bonding, and periodontal surgery are usually necessary for optimal results.

The second treatment option may require derotation of the central incisors and canines, space closure, and root paralleling to create enough space for esthetic restorations. Because implants cannot be placed until facial growth is complete, it is important to monitor tooth erup-

tion and implant site development. In an adult, the height of the papilla on the distal of the central incisors will be affected as the teeth are moved toward each other.

This article shows how bonded power arms<sup>7</sup> (BPAs) can be used to treat cases of missing maxillary lateral incisors using the second method.

## Case Report

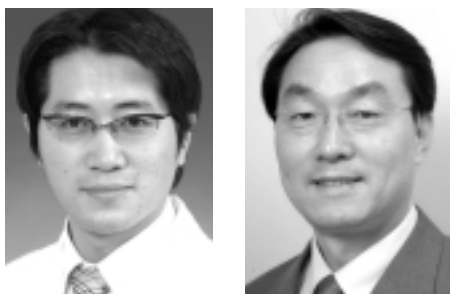
A 15-year-old female in the early permanent dentition presented with a Class I molar and Class II canine relationship (Fig. 1). She had slightly retrusive lips, deficient lower anterior facial height, and a deep overbite, with anterior diastemas and generalized interdental spacing in both arches. The panoramic x-ray revealed the absence of both maxillary lateral incisors and the maxillary right second molar; the tooth germ of the maxillary left second molar was developing. The axes of the maxillary central incisors were slightly divergent, indicating that more root movement than crown movement would be needed to close the wide diastema.

Treatment objectives were to:

1. Open space for the missing maxillary lateral incisors.
2. Close the space between the maxillary central incisors.
3. Maintain the space for the maxillary lateral incisors until implants could be placed.

The lower right first molar was treated endodontically because of severe caries, but eventually had to be extracted. An anterior bite plate was then prescribed to help correct the deep overbite.

Seven months later, the upper arch was fully bracketed\* and aligned with an .016" nickel titanium archwire, and open-coil springs were



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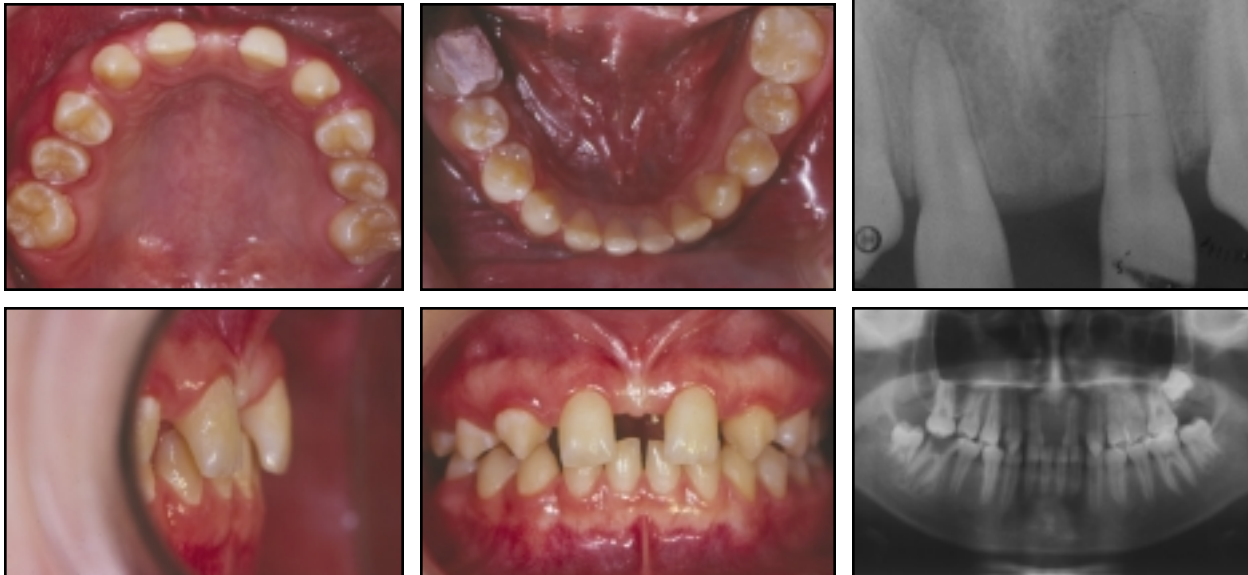


Fig. 1 15-year-old female patient with wide maxillary diastema, generalized interdental spacing, and missing maxillary lateral incisors and right second molar before treatment.

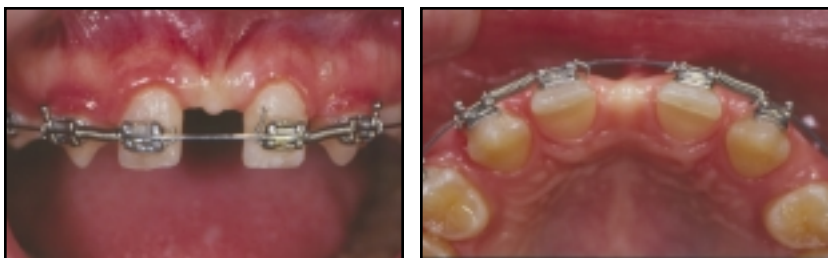


Fig. 2 Open-coil springs used to gain space for maxillary lateral incisors.



Fig. 3 Space gained after seven months of fixed appliance treatment.

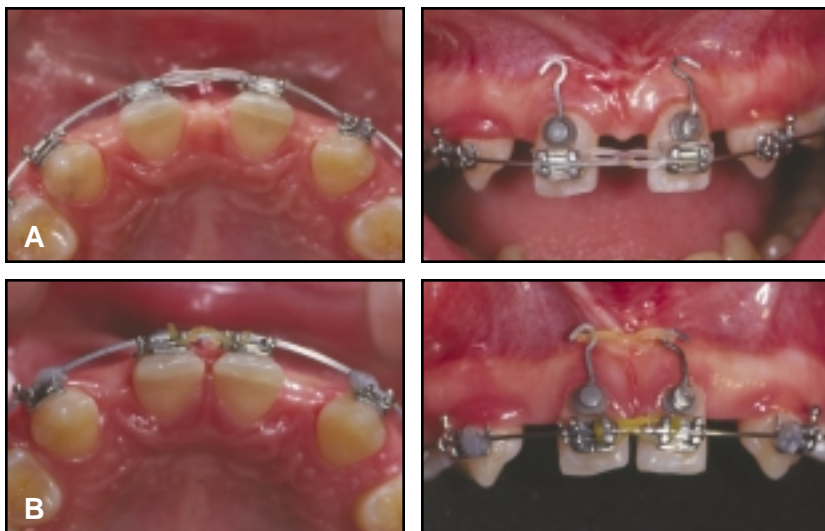
used to gain space for the maxillary lateral incisors (Fig. 2). After another seven months, a frenectomy was performed to release the labial frenum attached to the incisor papilla and thus prevent impingement from the BPAs during space closure (Fig. 3).

BPAs were bonded to the maxillary central incisors, gingival to the brackets, and engaged with power chain to produce bodily translation of these teeth (Fig. 4). After 19 months of total

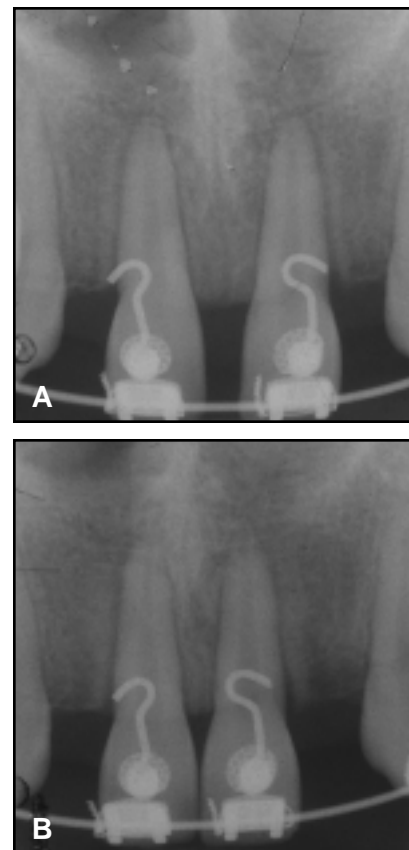
treatment, the wide diastema between the maxillary central incisors was completely closed (Fig. 5). The space was maintained with temporary pontics in place of the lateral incisors.

### Discussion

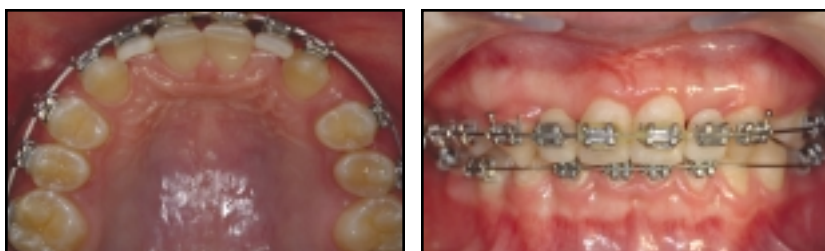
Robertsson and Mohlin found that patients treated with orthodontic space closure were more satisfied with their appearance than those who



**Fig. 4** Progressive space closure without loss of arch length using BPAs and power chain. A. One month after bonding of BPAs. B. Three months after bonding of BPAs.



**Fig. 5** BPAs removed after 19 months of treatment, with temporary pontics in maxillary lateral incisor spaces.



had prosthetic replacements.<sup>8</sup> The patients treated prosthetically also showed worse periodontal health. In a case such as the one shown here, however, retraction of the upper anterior teeth would have made the lips even more retrusive and deepened the overbite. The only way to avoid worsening the patient's appearance would have been to maintain the arch perimeter during anterior space closure. Furthermore, because of the missing maxillary lateral incisors, a canine-guided functional occlusion could not have been achieved.<sup>9-11</sup> The maxillary premolars could have been substituted for the canines and the canines for the lateral incisors, but the esthetic results and long-term stability would have been questionable. Therefore, space opening and prosthetic restoration of the missing maxillary lateral incisors was the only viable treatment option. Skeletal anchorage could not be considered for this case because reciprocal movement was needed to close the space between the maxillary central incisors.

The BPA is a simple, comfortable appliance consisting of a button and attached power arm that is bonded to the labial or lingual surface of the tooth.<sup>7</sup> Because the moment applied by the BPA is determined by the length of the power arm, it is important to measure the tooth's root length. Determining a three-dimensional center of resistance from a two-dimensional periapical x-ray or even a dental cast is difficult. If the BPA is not placed accurately, pure translation will not occur, and an incisal step will develop. Therefore, it is important to monitor tooth movement carefully during space closure.

When periodontal disease is involved, the alveolar bone level between the maxillary central incisors will be lower than normal, and the BPA hooks should be placed more gingivally on the crowns.<sup>7</sup> If black triangular spaces develop during or after tooth movement, they can be reduced by interproximal recontouring.

Shashua and Artun found no association between relapse and the presence of an abnormal frenum or an osseous intermaxillary cleft, although patients with an abnormal frenum had a wider pretreatment diastema than those with a normal frenum.<sup>12</sup> If relapse of the diastema is the primary concern, however, the frenectomy should be performed after the space closure.

### REFERENCES

1. Argyropoulos, E. and Payne, G.: Techniques for improving orthodontic results in the treatment of missing maxillary lateral incisors: A case report with literature review, *Am. J. Orthod.* 94:150-165, 1988.
2. Millar, B.J. and Taylor, N.G.: Lateral thinking: The management of missing upper lateral incisors, *Br. Dent. J.* 179:99-106, 1995.
3. Richardson, G. and Russell, K.A.: Congenitally missing maxillary lateral incisors and orthodontic treatment considerations for the single-tooth implant, *J. Can. Dent. Assoc.* 67:25-28, 2001.
4. Kokich, V.O. Jr.: Congenitally missing teeth: Orthodontic management in the adolescent patient, *Am. J. Orthod.* 121:594-595, 2002.
5. Asher, C. and Lewis, D.H.: The integration of orthodontic and restorative procedures in cases with missing maxillary incisors, *Br. Dent. J.* 160:241-245, 1986.
6. Garg, A.K.: Treatment of congenitally missing maxillary lateral incisors: Orthodontics, bone grafts, and osseointegrated implants, *Dent. Implantol. Update* 13:9-14, 2002.
7. Chun, Y.S.; Woo, Y.J.; and Row, J.: Use of bonded power arms for interdental space closure, *J. Clin. Orthod.* 35:539-543, 2001.
8. Robertsson, S. and Mohlin, B.: The congenitally missing upper lateral incisor: A retrospective study of orthodontic space closure versus restorative treatment, *Eur. J. Orthod.* 22:697-710, 2000.
9. Hobo, S. and Takayama, H.: Effect of canine guidance on the working condylar path, *Int. J. Prosthodont.* 2:73-79, 1989.
10. Thornton, L.J.: Anterior guidance: Group function/canine guidance. A literature review, *J. Prosth. Dent.* 64:479-482, 1990.
11. Siebert, G.: Recent results concerning physiological tooth movement and anterior guidance, *J. Oral Rehabil.* 8:479-493, 1981.
12. Shashua, D. and Artun, J.: Relapse after orthodontic correction of maxillary median diastema: A follow-up evaluation of consecutive cases, *Angle Orthod.* 69:257-263, 1999.