INTRODUCTION
Have you ever walked into a hygiene exam check to find your orthodontically banded patient anxiously waiting for an answer? “When?” the patient demands; “How many more minutes?” A letter from the orthodontist asks if spacing is appropriate between the canines and the centrals. The letter requests explicit direction on tooth movement or permission to deband.

Your immediate reaction is, “I don’t know!” The patient’s teeth do not fill the existing space, they are contralaterally dissimilar, and you are responsible for setting up the case so the restorative phase is both functionally and aesthetically predictable. The patient wants the brackets off yesterday. What do you do?

Many restorative dentists have worked on patients who were debanded but whose existing dentition had not been orthodontically structured to allow for contralateral symmetry in the final reconstruction. Usually the restoring dentist does not recognize this until he or she bonds the spaces closed, filling in whatever space remains after orthodontic treatment. It then becomes clear that the spaces were not equalized, leading to asymmetry of the contralateral teeth, an unattractive and unequalized smile, and a dissatisfied dentist and patient.

Today, however, we have the ability to preplan these complex situations and better satisfy our patients. The composite bonding technique I describe in the following article will serve as a predictable, functional, and aesthetic solution to these complex situations. The article will review the parameters for anterior tooth positioning, proportions, contours, and techniques to predictably manage space management dilemmas.

CASE REPORT
Diagnosis and Treatment Planning
A 14.5-year-old female patient presented with fully banded upper and lower arches as part of orthodontic treatment to align and straighten her teeth and bite (Figures 1a to 1c). Her gingival zenith and tissue appeared healthy and symmetrical. Her dentition was caries free with no wear. She was healthy and had no significant medical history.

Transitional orthodontic bonding was prescribed as part of a multidisciplinary approach to improve aesthetics. She demonstrated diastemas in the smile zone, with teeth Nos. 6 to 8 and 9 to 11 being separated by gaps. The lateral incisors were irregularly shaped, asymmetrical, and narrow (Figure 2). The patient presented to the orthodontist as a 13-year-old female 18 months prior with a Class II division II malocclusion and a significant tooth size discrepancy, primarily between the upper lateral incisors. The orthodontist, in the past 18 months, had reduced the overbite and overjet and had obtained an ideal posterior occlusion. The central incisors were aligned so the roots were parallel, and the centrals were at the midline of the face and perpendicular to the interpupillary line.

The dental midline runs vertically from the nasion subnasal point, interincisal point, to the pogonion. Ideally the papilla between the maxillary central incisors coincides with the midline of the face. In research conducted by Miller et al, it was shown that 70% of the time, the maxillary midline coincided with the facial midline when the lip’s philtrum was used as a reference point. It is more important to have the dental midline perpendicular to the interpupillary line and straight; this allows for symmetry. The occlusal line should conform to the commissural line. In this case, the orthodontist placed the centrals’ incisal edges in close relationship following the curvature of the lower lip, which has also been called the smile-line.

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continued on page 130
at a distance of 0.5 to 1.5 mm from the lower lip. A space was created mesial and distal to the lateral incisors, ensuring that adequate spacing was provided to allow for functionally strong and visually appealing composite placement.

With the above parameters accomplished, the brackets were removed from Nos. 6 to 11, and we were ready to restore.

In consultation with the patient and her parents, we developed a treatment plan that would utilize transitional bonding and attempt to close the diastemas and correct the contralateral asymmetry found in the upper arch. The goal was to create 2 lateral incisors with ideal size and shape following the golden rule of proportion. Once this was accomplished, the brackets would be replaced; any residual spaces would be closed orthodontically.

The most influential factors in a harmonious, balanced anterior dentition are the size, shape, and position of the maxillary incisors; it is therefore paramount that they are contralaterally identical to each other. The width of a central incisor should measure approximately 70% to 80% of its length. Evaluation of the central incisors’ mesiodistal widths, incisal architecture, and embrasures revealed asymmetry.

Measurements with a Dentagauge digital caliper (Erskine Dental International) revealed that the right central (8.5 mm wide) was thinner by 0.5 mm than the left central incisor (9.0 mm wide) (Figure 3). The distal incisal corner was also curvier and its embrasure more open, with the incisal edge slanted apically toward the distal. The right central incisor would require composite bonding on the distal to equalize the width and provide symmetry.

Preparation and Composite Placement
A universal nanocomposite resin (Filtek Supreme Ultra [3M ESPE]) composite resin was selected for the transitional bonding due to its strength, sculptability, and shade-matching capabilities. A microfilled composite resin (Durafl [Heraeus Kulzer]) was chosen as the thinnest final facial layer; its silicate particles are .04 µm in size, with the filler being 35% of the weight. This microfilled composite is translucent and provides excellent polishability and long-term color retention to the final restoration.4 The treatment plan was to deband, perform transitional bonding, and rebond within 3 days. Fortunately, the patient was satisfied with the present color of her dentition, as time did not allow for whitening procedures.

Extrinsic stain was removed from debanded tooth surfaces using plain pumice on a soft prophylaxis cup. Shade selection should be performed immediately, as the tooth will have otherwise desiccated and lightened after the bonding protocol, leading to an incorrect match. The center body portion of the tooth was examined and matched to the VITA Vitapan (Vident) tooth shade guide, and a composite body shade was selected that matches this portion.

It is important to discuss the level of aesthetics the patient requires in the final restoration. If the patient has low expectations and a monochromatic tooth, the case can be completed using one body shade.5 In this case, the depth of color and vitality needed to mimic the adjacent tooth was simple and required Filtek Supreme Ultra shade A1B on the body of the tooth and WE on the incisal corner. When applied as a thin, final facial layer, Durafl V5 in shade A1 will modulate the color and allow color depth to come from within the restoration.

Experiencing with these different shades and thickness of composite by placing them in the planned area of the tooth and curing them allows the dentist a preview. This is a technique that provides predictability in color mapping and can aid in designing an imperceptible restoration.

The patient was fully retracted when visual symmetry was attained, the brackets were removed from Nos. 6 to 11, and we were ready to restore.

Figure 2. Preoperative frontal view of teeth Nos. 6 to 11. Note irregularly shaped and narrow lateral incisors.

Figure 3. The right central was thinner by 0.5 mm than the left central incisor.

Figure 4. Composite bonding on the distal of the right central to equalize the width and provide symmetry.

Figure 5. Measuring the mesiodistal widths of teeth Nos. 7 and 10; note that they are different.

Figure 6. Etching of tooth No. 7 showing where composite will be applied.

Figure 7. A diamond bur (No. 8889-009 [Brasseler USA]) was used to contour the mesial facial embrasure of No. 7.

Figure 8. Removing the aprismatic enamel on the mesial of tooth No. 10 (left lateral) with the 8889-009 bur.

Figure 9. Microetching (Micro Etcher II [Danville Materials]) the mesial of tooth No. 10 using a 60°-rounded 0.032-µm nozzle aluminum oxide 27-µm white.

Figure 10. Finalizing width and verifying contralateral symmetry.

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Figure 10. Finalizing width and verifying contralateral symmetry.
When treating space management situations, parameters for anterior tooth positioning, proportions, contours, and techniques must be applied. Rule of Proportion as a guide, the laterals should be 5.4 mm wide (5.4 x 1.68 = 9 mm), the widths of teeth Nos. 8 and 9. Magne et al has shown the widest crowns were those of central (9.0 mm) and lateral incisors (7.0 mm). The central incisors in this case were 9 mm wide. If we use the Golden Rule of Proportion to create 5.4 mm wide lateral incisors, they would appear thin and disproportionate. The relative dimensions of teeth seem to be the most objective dental criteria within the aesthetic checklist; they can be controlled using line angles and special effects of tooth form to influence perceptions of symmetry, dominance, and proportion.

The anatomy of a lateral incisor shows a distinct contrast between facial-palatal surfaces. The perceived space during laughter and mouth opening. Rounded incisal edges will compensate for teeth that are too large, and straight edges are indicated for incisors that are too narrow. These parameters are very subjective.

The identical bonding protocol that was described earlier on tooth No. 8 was performed on No. 7. The mesial and distal incisal spaces of No. 7 were etched (Figure 6) and adhesive was applied. A1B was positioned on both sides of the tooth in order to equalize the space, and a thin facial layer of Duraﬁl was placed as a ﬁnal facial layer over the A1B. After light-curing for 15 seconds, the Brasseler USA diamond was used to contour the facial and incisal embrasures (Figure 7). The width that was aesthetically pleasing was 7.0 mm; the incisal embrasures are a youthful V shape.

The bonding protocol that was described on teeth Nos. 7 and 8 was again performed on No. 10. Apsirmatic enamel was removed using the Brasseler USA diamond (Figure 8), and the mesiodistal incisal surface of No. 10 was microetched (Figure 9) and rinsed for 5 seconds. The tooth was acid-etched for 15 seconds with agitation, rinsed for 5 seconds, and blotted dry. The adhesive bonding agent was applied in 2 to 3 coats, lightly air-dried, and light-cured for 10 seconds. Composite A1B was sculpted mesially and distally to equalize the tooth width and ensure symmetry to No. 7 by using the aforementioned composite placement instrument and contouring gold instrument. Duraﬁl A1 was placed as the thinnest ﬁnal facial layer over 7 and 10. Measurements of Nos. 7 and 10 veriﬁed that our composite placement had balanced the widths of these 2 teeth, brought them into proportion, and ensured contralateral symmetry (Figure 10).

Finishing and contouring was performed to ensure that proper anatomical contour and imperceptibility between the composite and the tooth interface was attained. Primary anatomy, which consists of the facial proﬁle, outline form, and incisal embrasures, was reﬁned by using a Sof-Lex Finishing and Polishing disc (3M ESPE) to give a ﬁnal polish to bring about a lustrous, lifelike ﬁnish.

Postoperative Check

The patient and her parents returned for a postoperative visit one day after placement of her composite restorations. The size and contour of each tooth was veriﬁed for contralateral symmetry using a digital caliper (Denstague [Erskine Dental]). Reﬁnement, ﬁnalization, and margination of the composite was performed; followed by a ﬁnal polish with Enamelize (Cosmedent) aluminum oxide polishing paste on a FlexiBuff (Cosmedent) (Figure 11). Our clinical check conﬁrmed contralateral symmetry, shade matching, and ﬂawless margins between the patient’s natural tooth and composite reconstruction. The teeth gave off a luminescent, lifelike appearance, and demonstrated indistinguishable restorations.

The transitional bonding, accomplished with a combination of a universal nanocomposite resin and a microﬁlled composite resin, will provide this patient a fully functional, aesthetically pleasing smile for years to come. With the patient’s and her parents’ ﬁnal approval, she returned to the orthodontist’s ofﬁce for banding and closing of the remaining spaces distal to the lateral incisors by moving the canines mesially.

CONCLUSION

When treating space management situations, parameters for anterior tooth positioning, proportions, contours, and techniques must be applied. The ﬁnal restorative result (Figure 12) demonstrated symmetry, balance, and harmony, as well as seamless, undetectable restorations. The advantages of using this technique are predictability in shape and form of the ﬁnal results. Immediate fabrication of an Essex retainer can be accomplished at debanding, and the patient is happy with the ﬁnal results.

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References


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