Anterior tooth spacing (diastemas) is one of the many problems that patients routinely attend at our offices for correction. Orthodontics is the usual route forward in such cases - but often the patient is unwilling to go through lengthy orthodontic surgical procedures. In such instances, more practical and simple solutions may be indicated. One example is the use of porcelain veneers. This article will consider this option in further depth. This is the third part of a series where the author will closely examine the theory and practice of aesthetic treatment. Part one looked at anterior proportions and the golden proportion, part two looked at traditional bonding procedures in the anterior region. In this part, the author looks closely at an alternative approach, namely the use of porcelain veneers. The advantages and disadvantages of this technique will be considered.

Figure 1: Diastemas present after orthodontic treatment. Teeth not in the golden proportion.

Figure 2: Minimal tooth preparation involving slice preparation.

Figure 3: Veneers cemented in place using golden proportion calipers.

Figure 4: Veneers now showing the correct golden proportion.
treatment and opts for the shorter restorative phase instead. Closing of the spaces will often mean that several teeth need to be made wider in order to fill the necessary spaces. Usually between four and eight teeth are sufficient to complete the process with the necessary aesthetic outcome. Case One shows an example of a patient who was referred by her orthodontist for closure of residual spacing after initial orthodontic treatment where six porcelain veneers were used to close anterior spacing between the upper incisors and canines (Figures 1 to 3). However, gap closure by increasing the width also means that the ideal length to width ratio (75-80%) and the golden proportion (1:618:1) may be affected (Figure 4). If the length cannot also be changed then the technician needs to create the illusion of narrower teeth.

**Shapes and contours**

When tooth lengthening cannot be accomplished as an adjunct to widening of the teeth because of aesthetic or occlusal factors, then the technician needs to use subtle contouring and shading in order to give the illusion of a thinner tooth where, in fact, a fatter tooth is actually visible. These models’ faces (Figures 5 to 8) show how the combination of shadow and colour give the appearance of a thinner face. A similar effect can be produced by subtle changes in the porcelain restorations, including:

- Minimal incisal translucency
- Minimal gingival shading
- Bringing in the line angles (mesially and distally) towards the centre of the tooth
- Moving the contact areas more palatally
- Introducing vertical crack lines and texture (stripes makes one look thinner)

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**Narrow teeth**

On occasions the original tooth width is inadequate and by simply closing the spaces by widening the teeth the golden

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CASE TWO

The GDC Lifelong Learning Scheme. In October 2000, the GDC launched the preparatory scheme for its lifelong learning initiative. The scheme requires that dentists will have to accumulate 250 hours of CPD credits over five years. 75 of these hours must be verifiable. The GDC also suggests that these hours be spread evenly over the five years. In other words, therefore, dentists can be expected to perform approximately 15 hours of CPD per year. The R&AP CPD Programme will enable practitioners to guarantee hitting this annual level of CPD in one go.

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The addresses to send answers to appear on page 14.
The patient had one tooth removed and replaced with a Steri-Oss Replace implant (Nobel Biocare) and Procera abutment and crown and three adjacent dentine-bonded restorations to recreate adequate aesthetics.

Incisal length

Diastema cases may, however, need anterior tooth lengthening to go with the widening, either from the gingival area by periodontal crown lengthening or by increasing the length of the tooth at the incisal edge. This second scenario is acceptable as long as the anterior guidance is tried out first on prototypes and then copied in the definitive restorations or if the anterior guidance is copied from the patient's existing teeth via a custom-made incisal guidance table - and then the guidance is simply lengthened. Case Three (Figures 15 to 19) shows a case where anterior crowns have been made previously in a diastema case but the end result was square-shaped teeth that appeared too wide. By increasing the correct width-to-length ratio (Figures 9 to 14), the patient had one tooth removed and replaced with a Steri-Oss Replace implant (Nobel Biocare) and Procera abutment and crown and three adjacent dentine-bonded restorations to recreate adequate aesthetics.

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Implant surgery
A similar effect to crown lengthening can also be produced by using dental implants if teeth are missing as the surgical approach allows soft tissue repositioning and pontic site development prior to the restorative phase of treatment. In Case Five, two Steri-Oss implants (Nobel Biocare) were placed to replace a denture that had spaces between the denture teeth and a three unit bridge used to restore the space, also replacing an old porcelain-fused-to-metal crown on the upper left lateral incisor (Figures 25 to 30). Surgical repositioning of the soft tissues (with either connective tissue grafting from the palate or use of the ‘palatal roll technique’) during implant surgery (and abutment connection at second stage) allows for the creation of the correct width-

length of the crowns and copying the anterior guidance, the correct proportion of width to length is again achieved, this time by eight Procera crowns (Nobel Biocare).

Increasing the length of the teeth from the incisal edge in order to gain the correct proportion may, however cause these longer anterior teeth to impact on the lower lip when the patient smiles, which may in turn affect speech and phonetics. Determination as to whether lengthening in these cases is possible can only be achieved by the correct use of prototype plastic restorations.

CASE FOUR

Gingival contouring
Creating the correct proportion of the upper anterior teeth may also be achieved by crown lengthening and gaining the additional length at the expense of the gingival soft tissues and bone. A high lip line, causing a gummy smile, may be improved in this way and the opinion of a periodontist experienced in these procedures should be sought. Case Four (Figures 20 to 24) again shows a previous diastema case in which composite labial veneers have been built up to close the diastemas but at the expense of creating square shaped bulbous veneers. Periodontal crown lengthening re-establishes the correct width-to-length ratio, this time by bone and soft tissue removal, allowing the provision of six ‘Procera’ crowns (Nobel Biocare) to create a beautiful smile.

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Figure 20: Pre-operative smile showing square shaped crowns and excessive gingivae

Figure 21: Crown lengthening procedures

Figure 22: New Procera and ceramic crowns - close-up

Figure 23: Final new smile showing correct length-to-width ratio of the teeth

Figure 24: Final facial appearance with new smile
to-length ratio of the anterior restorations, keeping the incisal edge position the same as prior to treatment so that the patient's anterior guidance was not altered. An ovate pontic site was also developed during the connective tissue graft procedure to improve the appearance of the pontic area.

**Interdental papilla**

One final further difficulty in overcoming diastema closure is that of producing a thin pointed interdental papilla - where once there was a blunted, wide papilla present. This is done by precise measurement of the position of the underlying interdental bone and then transferring this information to the technician. This can be accomplished by using a periodontal probe to measure the level of bone interdentally adjacent to each tooth surface by probing until the bone is sounded (heavy pressure) and measuring from this point to the incisal edge of the finished tooth preparation and relaying this information to the dental technician. The technician can then measure the distance from the incisal edge to a point on the preparation that is 5mm from the interdental bone and that is where the coronal aspect of the contact area between adjacent teeth (restorations) should finish. In this way, black triangle disease can be eliminated and the papilla fills the gap. Case Six shows a patient who presents with two old crowns on his central incisors with spacing and missing interdental papilla (blunted). One tooth was removed due to root resorption and failed endo/post and was replaced by a Steri-
Oss Replace Select implant (Nobel Biocare) together with an all-ceramic Procera abutment and crown (Nobel Biocare) and a further Procera crown and Procera veneers on adjacent teeth, maintaining the same length of the teeth as previously (Figures 31 to 36).

Conclusions
While orthodontic treatment is usually the optimal treatment to close diastema, restorative options are available when patients decline such therapy (in particular due to time constraints). The patient should always receive a consultation from an orthodontic specialist, be fully informed of the more invasive nature of non-orthodontic treatment, and provide written consent to this type of procedure before preparation is initiated. When orthodontic therapy is not performed, the aesthetic correction of maxillary spacing relies upon the combination of tooth preparation techniques, knowledge of tooth anatomy and dentine adhesion, technical support, and determination of bone levels in conjunction with correct contact area placement and expert surgical knowledge, training and protocol. The clinician’s understanding of these principals allows aesthetic results to be achieved with success and predictability, using an interdisciplinary team approach.

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References