Esthetic Correction of Anterior Dental Malalignment: Conventional versus Instant (Restorative) Orthodontics

ABSTRACT
Over the past 20 years since its introduction, adhesive dentistry has suffered, at times, from overuse, particularly in patients with problems of malalignment for which conventional orthodontics would once have been used. The purpose of this article is to create a “flow sheet” to aid decision making regarding whether conventional orthodontics should be used, and what the limitations of treating a patient are if treatment is performed without any orthodontics.

CLINICAL SIGNIFICANCE
A suitable framework will help separate the patients who would benefit from orthodontic intervention from those who can be managed with purely restorative care. (J Esthet Restor Dent 16:149–164, 2004)

Frank Spear, DDS, MSD*
*Founder and director of the Seattle Institute for Advanced Dental Education; Private Practice, Seattle, WA, USA

Reprint requests:
Frank Spear, DDS, MSD
600 Broadway, Suite 490,
Seattle, WA 98122.
©2004 BC Decker

Over the past two decades, nothing has changed the way dentistry is practiced as much as endosseus root form implants and adhesive dentistry.1–6 When introduced to the profession, both technologies provided the ability to restore patients in more conservative ways, leaving natural teeth minimally altered. Over the 20 years that have followed their introduction, both technologies have suffered, at times, from overuse. Some therapists decided that implants were so successful, it would be beneficial to remove more teeth and use more implants. To that extent, many implant publications have shown patients who would routinely have been treated with periodontics and restorative dentistry in the past, now being treated with full-mouth extractions and implant reconstructions.

This same phenomenon has also been applied to adhesive dentistry, particularly bonded porcelain, particularly in patients with problems of malalignment for which conventional orthodontics would once have been used. Now “instant orthodontics” is being performed routinely with bonded porcelain. In fact, in every major city in the country, one can look in the Yellow Pages and find a dentist offering “two-appointment orthodontics.” It is now commonplace to have at least one publication per month arrive at our office showing a patient with unrestored teeth receiving 10 or 20 bonded porcelain restorations correcting a problem of alignment.

The purpose of this article is not to judge whether all of these treatment plans are right or wrong—I spend the majority of my practice time performing bonded porcelain restorations to alter patients’ appearance—but to create a “flow sheet” to aid decision making regarding whether conventional orthodontics should be used, and what the limitations of treating a patient are if treatment is performed without any orthodontics.

The decision process can be viewed as a series of questions, and depending upon the answer to the questions, the practitioner and patient can decide whether to involve orthodontics.

QUESTION 1
Will the teeth need to be restored to satisfy the patient’s esthetic desires regardless of whether orthodontics is performed?

This is a critical question to answer. If the teeth will need to be restored because of existing restorations, poor tooth size or shape, or color problems that cannot be corrected with bleaching, then orthodontics will have to provide some other significant benefits to be chosen to correct malalignment. On the other hand, if the teeth do not require restorative treatment other than perhaps bleaching and recontouring...
**QUESTION 2**
*Can the occlusion be managed without orthodontics but with restorative dentistry?*

Often restorative dentistry can solve the esthetic problems of maxillary and mandibular anterior teeth but cannot correct the occlusal relationship of the anterior teeth (Figures 3 and 4). This is especially true of patients with inadequate or excessive overbite or overjet, or single-tooth anterior crossbites.

For the restorative dentist, the most common occlusal problems encountered when desiring to restore the maxillary anterior teeth to a new length are a lack of room owing to inadequate overjet, particularly in cases of excessive wear, or a concern that the new, longer restorations will create an excessively deep overbite that may result in fracture of the porcelain.

The restorative dentist's thought process to solve these spatial problems typically involves a desire to increase the vertical dimension of the occlusion. Often a measurement is made from the cementoenamel junctions or gingival margins of the maxillary central incisors to the mandibular central incisors to determine whether this distance is below the average of 18 to 20 mm and then to decide whether a vertical opening is required to regain lost vertical dimension.7,8 Unfortunately, all these measurements help evaluate is the state of eruption of the maxillary and mandibular anterior teeth, not the vertical dimension of occlusion. Unless the posterior teeth, particularly the molars, show significant wear or are lost, it is highly unlikely that the patient has lost vertical dimension. So, why not increase the vertical dimension restoratively? Primarily because there is the cost to the patient and the need to restore posterior teeth that otherwise would require no treatment.

How can orthodontics overcome the problem? If the problem is one of excessive overbite due to wear and anterior eruption, orthodontics can level the arches intruding the anterior teeth, allowing the dentist to restore the anterior teeth and leave the patient’s posterior teeth unrestored (Figures 5–8). If the problem is one of
inadequate overjet, as in an end-to-end occlusion, the orthodontist can strip or extract mandibular teeth, creating room for the mandibular anterior teeth to be retracted. A normal overjet is created to properly position or restore the anterior teeth, leaving vertical dimension unchanged.

Another occlusal problem commonly associated with cases of severe crowding is the inability to create a normal canine relationship in the occlusion, even with full-coverage restorations. Again, orthodontics can resolve the canine relationship, and only a conservative veneer, or even no restoration at all, is needed, rather than very aggressive restoration.

Can the occlusion be managed without orthodontics but with restorative dentistry? If so, go to Question 3. If not, orthodontics is preferable.

**Question 3**

Is the most apical free gingival margin level esthetically acceptable?

With the emphasis on esthetics that has occurred over the past 25 years, the relationship of gingival levels to appearance is now well accepted.12 What does not seem to be as well understood, however, is why aberrations in gingival margin levels occur. That is, why are the free gingival margins at different levels on two central incisors in the same patient? What we know biologically is that, in most patients, the biologic width is constant for that patient around all teeth.13,14 Therefore, variations in gingival margin height must be due to differences in bone level or sulcus depth between teeth in the same patient. If recession of facial bone on one central incisor has occurred, so that its bone level is 3 mm apical to the adjacent central incisors, it would not be surprising to see the gingival margin on the central incisor with the bony recession also recede. What also can happen, however, is that the bone levels vary not because of bony recession, but because of differences in tooth eruption. An example would be two overlapped central incisors, one to the lingual and one to the facial aspect. The tooth to the lingual aspect will always exhibit more wear than the one to the facial aspect. As it does, it will erupt, bringing the bone coronally with it and resulting in a coronally placed gingival margin.

Another possible cause of aberrations in gingival margin heights is variations in sulcus depth between the central incisors, despite correct bone levels. The tooth with the shallower sulcus will have a more apically positioned gingival margin than the one with a deeper sulcus. This variation in sulcus depth is common in cases of anterior tooth malposition. The more labially inclined teeth have a thinner gingiva and a shallow sulcus, and the more lingually placed teeth have a thicker gingiva and a deeper sulcus (Figures 9–15).

So what does all this have to do with whether I use orthodontics? We all know periodontal surgery can alter gingival margins, and we also know it is much easier to remove tissue or bone than to create it.15–17 So, one must consider whether the most apical free gingival margin level is an acceptable one. If it is, then it is possible to use either gingivectomy or osseous surgery to apically position the gingival margin heights on all the other teeth relative to the most apical tissue. However, if this process would create excessively long and thin-appearing teeth, then a new problem exists. Although connective tissue grafting is predictable and effective for covering...
exposed root surfaces, it is far less predictable for moving tissue coronally to cover enamel or ceramic on labially positioned teeth. Therefore, if the patient has a high smile line and the most apically positioned free gingival margin is unacceptable owing to a labially positioned tooth, orthodontics to reposition the teeth and tissue is the most predictable solution.

Orthodontics can also be used to correct the other situations described above. When a coronally positioned gingival margin owing to a lingually positioned tooth and a deep sulcus are present, one can correctly position the tooth, and the gingiva will thin to a normal thickness sulcus depth and level. Last, a tooth in labial version with slightly apical thin tissue and a shallow sulcus can be correctly positioned, and the gingiva will thicken to a normal sulcus depth and level.

As an aside, it currently is popular to use a laser or electrosurgery to sculpt the free gingival margins to ideal levels during cosmetic restorative procedures. This results in a far more pleasing final result esthetically. However, the practitioner must identify the cause of the gingival aberration prior to selecting the mode of treatment for the gingival levels. If the problem is one of bony levels, then flap surgery and osseous contouring are necessary to provide biologic health and tissue stability. If the problem is excessive sulcus depth owing to a lingually positioned tooth, then sculpting the tissue is biologically acceptable. But since the tooth is in lingual version, a significant amount of tissue regrowth may occur, and it may be necessary to periodically retrim the tissue to maintain the ideal appearance. Orthodontic repositioning of the tooth can also alleviate the problem (see Figures 9–15).

Is the most apical free gingival margin level esthetically acceptable? If so, perform surgery to correct the tissue and go to Question 4. If not, consider whether grafting can provide the necessary coverage. If still not, orthodontics is preferable.

**QUESTION 4**

*Are the papilla levels harmonious?*

As with free gingival margin levels, the papilla levels are critical to the overall esthetics of anterior teeth. Papillae that are positioned too far apically result in either an open gingival embrasure (black space) or the development of an excessively long contact and subsequent rectangular-looking teeth. Three factors come into play in establishing papilla levels: underlying bone level, the patient’s biologic width, which is a combination of the connective tissue and epithelial attachment heights, and the gingival embrasure form and size. Of these, the patient’s biologic width is relatively constant, but bone level and embrasure form can vary dramatically with tooth eruption. This variance can create a significant esthetic challenge for the restorative dentist. In general, unless a patient has had wear or excessive overjet and secondary eruption, the interproximal bone is rarely positioned too far coronally. And, unless the patient has had periodontal disease, the interproximal bone is rarely too far apical. This means that in most patients who present for cosmetic procedures, variations in papilla level are related to embrasure form. Interestingly, excessively large embrasures, as in the presence of diastemata, can result in papillae that are positioned apically. Excessively small embrasures, as can happen in overlapped or rotated teeth, can also result in papillae that are positioned apically. The key question, then, is whether the most apically positioned papilla is acceptable; that is, does its position result in an excessively long contact and disharmony of coronal form that is esthetically displeasing? If so, orthodontics is the only option to correct it. Currently there are no periodontal surgery procedures that can increase the height of interproximal bone or grow predictable interproximal soft tissue. However, orthodontics can erupt teeth to move interproximal bone coronally, close diastemata to move soft tissue papilla height coronally, or align overlapped teeth, allowing the papillae to move to the normal coronal position above the bone. Of these examples, significantly malaligned overlapped teeth is the situation that most often benefits from orthodontics to correct papilla levels.

Typically, patients with multiple diastemata do not have normal papilla heights, but the heights of all the papillae are even. Therefore, the appearance is harmonious, just with slightly larger contacts than if the diastemata were closed. Malaligned
teeth, however, are a significantly different problem. Some embrasures are normal and have normal papilla height; others are very small because of the overlap and have significantly apically positioned papillae. In these patients, if orthodontics is not performed, there is often a significant disharmony of contact length and final coronal form (Figures 16–18).

Are the papilla levels harmonious? If so, go to Question 5. If not, orthodontics is preferable.

**Figure 16.** This patient presented after reading about cosmetic dentistry and desired the restoration of all her maxillary teeth to change their appearance. She also made it clear she desired a near-perfect final result. Her left central incisor was the only anterior tooth that would require restoration (other than some incisal bonding on the right lateral and central incisors) if she underwent orthodontic treatment. A review of her papilla levels quickly changed her mind. Because of the rotated left lateral incisor, the papilla between the lateral and central incisor was apically positioned owing to the small gingival embrasure. Restoring the teeth would not have moved the papilla coronally and would have resulted in a very long contact.

**Figure 17.** From the incisal edge, the rotation of the lateral incisor and the narrowing of the embrasure were obvious.

**Figure 18.** Because the bone level was correct, when orthodontics corrected the rotation following placement of a correctly shaped temporary on the left central incisor, the papilla returned to its normal level. Following orthodontics, the only restoration placed was the replacement crown on the left central incisor and direct bonding on the incisal edges of the right lateral and central incisors.

**QUESTION 5**

**Can an acceptable contour and arrangement be created?**

This is really a question of coronal width and length. In my role as an educator, this is the question I am most often asked concerning instant orthodontics. Students approach me carrying a photograph or model showing large diastemata or severe crowding and say, “Do you think I need to send the patient to an orthodontist?” What they are really asking is, Can I make these teeth look good given their existing position and alignment? My response to the question is always the same: without drawing my desired tooth form on the photograph or doing a diagnostic wax-up on the model, I do not know. Having said that, I believe a few comments are appropriate concerning contour and arrangement.

First, let us consider patients with multiple diastemata. This condition occurs for two reasons: inappropriately small natural anterior teeth or normal teeth with an excessively large arch form. The two conditions can be very different to treat. The patient with diastemata owing to small teeth is usually best treated with restorative dentistry, regardless of whether orthodontics is performed. Patients with normal-sized teeth but a long arch form can often be treated with either restorative dentistry alone or orthodontics alone. The key to determining appropriate treatment is to perform a diagnostic wax-up or set-up on mounted models.

At the other extreme are patients with severely overlapped and crowded teeth. These patients commonly present with biologic and structural problems as well, which we address in Question 6. The esthetic concern for both patients with diastemata and those with crowding is how the teeth will look if they are restored in their current position. There are several articles discussing the use of the “golden proportion” in planning treatment for patients with malalignment.19,20 Although this may be a useful tool for doing a wax-up or set-up, it can fall short of creating ideal esthetics in patients with diastemata or crowding. The reason for this shortfall is simple: the golden proportion creates a proportionate relationship of the teeth relative to their widths. This seems logical, but the evidence is clear that some anterior teeth, particularly the maxillary central incisors, carry more weight in patients’ assessment of esthetics. Conversely, the maxillary lateral incisors can have large variations in their width and still be judged esthetic as long as they are symmetric. This concept must be considered when developing a plan for patients with an extreme amount of excessive space or crowding. In either case, the golden proportion will apportion the space to a percentage, which may create very large or very small central incisors. It is more pleasing esthetically to create the ideal proportion to the central incisors and to allow the laterals to be wider or narrower than ideal. Proportionate central incisors create the illusion of a pleasing smile, whereas misproportioned lateral incisors are rarely noticed as long as they are symmetric to each other.12

Can an acceptable contour and arrangement be created? If so, go to Question 6. If not, orthodontics is preferable.

**QUESTION 6**

**Are structural compromises necessary to correct the alignment?**

One of the great strengths of bonded porcelain is its conservative nature compared with conventional full-coverage restorations.4 When malalignment is being corrected, the tooth preparation must be significantly more aggressive. A labially positioned tooth that needs a significant amount of labial reduction to bring it into line sometimes requires near amputation of the existing coronal form. A lingually positioned tooth that needs significant lingual tooth preparation to avoid an excessively thick incisal edge and rotated teeth may require a combination of significant labial and lingual reduction on mesial and distal aspects to accomplish the desired alignment. It is an interesting challenge to determine how...
much tooth preparation is acceptable in a treatment plan. Historically, dentistry has espoused the most conservative treatment possible for any tooth; however, there are no clear-cut guidelines that a particular degree of reduction will result in a certain percentage of success. It does seem prudent, however, to consider the patient’s age and current dental condition when determining appropriate reduction. The younger the patient and the fewer current restorations, the more desirable it is to perform tooth preparations conservatively. Are structural compromises necessary to correct the alignment acceptably? If so, go to Question 7. If not, orthodontics is preferable.

QUESTION 7
Are the biologic consequences of correcting the alignment restoratively acceptable?

The answer must take into consideration two components: the pulpal and periodontal issues. If the desired contour requires a tooth preparation that exposes the pulp or amputates the pulp and coronal tooth structure, strong consideration must be given to the treatment with orthodontics. As good as our pulp caps and endodontics procedures are, they definitely are not 100% successful. In a young individual, choosing between elective endodontic therapy and a foundation restoration may impact whether the tooth lasts for the patient’s lifetime (Figures 19–22).

The risk of adversely affecting the periodontium biologically must also be taken into account when considering a restorative-only correction. Anytime a rotated or lingually positioned tooth is corrected restoratively, there is the potential for significant alterations in emergence profile, which may have an impact on gingival health. Restorative alignment of severely overlapped teeth certainly has the potential to negatively impact the periodontium. As the teeth overlap, the contact moves apically, and the risks of violating the biologic width during tooth preparation and of subsequent inflammation increase. Simply separating the contact with a bur creates a high likelihood that the margin will be placed in the attachment. Note the apical position of the contact between the left central and lateral incisors in Figures 16 and 17.

Are the biologic consequences of correcting the alignment restoratively acceptable? If so, perform instant orthodontics using restorative dentistry. If not, orthodontics is preferable.

SUMMARY

The ideal patient for instant orthodontics would meet the following requirements:

- Have a need for tooth restoration regardless of whether orthodontic treatment is done
- Have an ideal occlusion without any orthodontic treatment
- Have a free gingival margin and papilla levels that are manageable without orthodontic treatment
- Have a pleasing and esthetically acceptable contour and arrangement without orthodontic treatment

Figure 19. This patient, a dentist, desired restorative correction of his tooth malalignment rather than orthodontics. The teeth needed restoration to achieve his esthetic goals regardless of whether orthodontics was completed. The occlusion was able to be managed without orthodontics. His high lip line did not show the discrepancies in free gingival margin levels, and the papilla levels, which did show, were acceptable. However, to bring the left lateral incisor into alignment would have virtually guaranteed pulpal involvement during tooth preparation, and subsequent endodontics.

Figure 20. The occlusal view showed the labial positioning of the left lateral incisor. When presented with the option of endodontics versus short-term orthodontics, the patient chose orthodontics.
treatment options and to present it to your patients. Essentially this list is an informed consent sheet for the purpose of treatment. An example is presented in Table 1. I grant you, this example looks biased toward orthodontics, but it is realistic. After having the pros and cons outlined for them, patients who did not want orthodontic treatment may suddenly decide it will not be so bad. In addition, patients will recognize that you have presented to them an honest assessment of what is possible, regardless of whether it will result in you performing the treatment. That level of commitment to their well-being creates a high level of respect toward you; they will likely refer you to their friends and family who may be considering esthetic care. Patients will trust what you tell them because of your integrity and reputation for putting patients’ health above monetary gain. Although you essentially send some patients away, the ultimate gain is that you get the patients who did not want or orthodontic intervention from those who can be managed with purely restorative care.

**DISCLOSURE AND ACKNOWLEDGMENTS**

This article has been reprinted in large part, with permission, from Spear FM. The esthetic correction of anterior dental mal-alignment conventional vs. instant (restorative) orthodontics. *J Calif Dent Assoc*, 2004 Feb;32(2):133–41.

The author has no financial interest in the companies whose products are mentioned in this article.

**REFERENCES**


### Table 1. PROS AND CONS OF TREATMENT OPTIONS.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthodontics</td>
<td>Costs less</td>
<td>More time involved</td>
</tr>
<tr>
<td></td>
<td>Fewer restorations</td>
<td>Retainer needed after treatment</td>
</tr>
<tr>
<td></td>
<td>No root canals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No periodontal surgery</td>
<td></td>
</tr>
<tr>
<td>Nonorthodontic</td>
<td>Less time involved</td>
<td>Costs more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More restorations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aggressive tooth preparation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Periodontal surgery</td>
</tr>
</tbody>
</table>
I would like to offer an additional perspective to the restorative dentist, that is, the view of an orthodontist. Yes, Dr. Spear has illustrated the steps necessary to identify the patient who would benefit from orthodontics, but upon referring this patient, will the orthodontist know what you want done? Will the orthodontist be able to interpret the correct positioning of the teeth in the patient who will require some future restorative dentistry? My point is this: when referring the patient, send along the vital information that will permit the orthodontist to know what specific treatment is necessary, or you may not be satisfied with the results of the orthodontic intervention. Let me illustrate what I mean for each of Dr. Spear’s guidelines.

**Question 1:** Will the teeth need to be restored to satisfy the patient’s esthetic desires regardless of whether orthodontics is performed? If the answer is no, refer the patient to an orthodontist. In some cases, existing restorations may be replaced after orthodontics. If the final restorations are crowns, the orthodontist may position the teeth differently than for a patient who requires porcelain veneers. The orthodontist needs to know your specific restorative plan to place the individual teeth in their appropriate relative positions.

**Question 2:** Can the occlusion be managed without orthodontics but with restorative dentistry? Dr. Spear refers to the common problem of anterior dental wear, which results in overeruption of the abraded teeth relative to adjacent nonworn teeth. If you conclude that orthodontics is necessary to reposition the worn teeth, the orthodontist must be aware of your intentions with regard to the final vertical tooth position. Should the teeth be intruded? If so, by how much? Will gingival surgery be planned to crown lengthen the teeth to achieve adequate resistance and retention for the restoration? The orthodontist needs to know.

**Question 3:** Is the most apical free gingival margin level esthetically acceptable? If not, orthodontics is recommended. But what do you want the orthodontist to accomplish? Do not expect the orthodontist to know your intentions. Do you want the orthodontist to intrude the coronally positioned gingival margins? Do the apically positioned gingival margins require tooth extrusion?

**Question 4:** Are the papilla levels harmonious? If not, refer the patient to the orthodontist. However, simple orthodontic movement does not guarantee even papilla levels in all patients. As Dr. Spear alludes, the height of the papilla depends on the
level of the bone, the size of the embrasure, the shape of the adjacent teeth, and the health of the tissue. In fact, the orthodontist must align the bone levels between adjacent teeth to initially establish commensurate papilla levels. Then, the interproximal distance between adjacent teeth must be similar, as well as the mesial and distal shapes of the teeth, to provide the appropriate shape to the embrasure to eventually establish harmonious papilla levels.

**Question 5:** Can an acceptable contour and arrangement be created? As Dr. Spear describes, this is really a question of coronal width proportional to length. Orthodontists can accomplish these modifications for the restorative dentist in several ways. The correct treatment often requires the construction of a diagnostic wax-up to determine the correct contour and arrangement in concert with the restorative dentist.

**Steps 6 and 7:** Are the structural compromises and biologic consequences of correcting the alignment restoratively acceptable? Although these principles typically apply to the nonrestored dentition, occasionally the restorative dentist may refer a patient to the orthodontist who already has had a previous restoration placed inappropriately on a malposed tooth or who already has a biologic width violation that needs to be corrected. If the patient will have orthodontic treatment as a part of the plan, the timing of correcting these existing problems prior to, during, or after the orthodontic treatment must be determined. The timing differs in various situations, and the team must select one that is appropriate for each specific situation.

In summary, Dr. Spear provides an excellent method for the restorative dentist to determine when to restore or refer a patient to an orthodontist to correct malaligned anterior teeth. However, when orthodontics is selected as the appropriate solution, the restorative dentist and orthodontist must plan the treatment together in an interdisciplinary manner to provide the optimum result for the patient. My congratulations to Dr. Spear, who has made an outstanding contribution to the literature on esthetic dentistry.

**REFERENCES**


