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C L I N I C A L C A S E S

Esthetics and pre-prosthetic orthodontic treatment. Three clinical cases.

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We have long considered pre-prosthetic treatment plans an integral part of our therapeutic arsenal. In fact, orthodontics offers many possible types of prostheses to improve treatment and to help ensure long-term results.

Esthetically speaking, the appearance of the gingiva plays an absolutely critical role in overall esthetic perception, *a fortiori* for patients whose smile line is average or high. In these cases, having healthy gingiva does not in and of itself guarantee that orthodontic rehabilitation will be successful.

Ideally, when someone smiles, the line of the necks of the teeth is parallel to both the plane of occlusion and the horizontal reference lines: the bi-commissural line and the bi-pupillary line (fig. 1 and 2).

There should be a regular contour to the marginal gingiva that is perfectly symmetric, with scalloped mucosal margins, connecting the zenith gingival to the interdental papillae (fig. 3)

Unfortunately, the ''idyllic'' smile lines described above are not always present when we perform an intra-oral exam. For

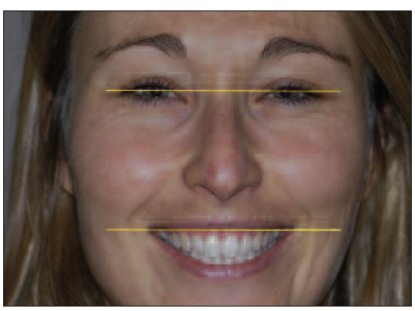

Figure 1
The bi-pupillary line is the horizontal reference line.

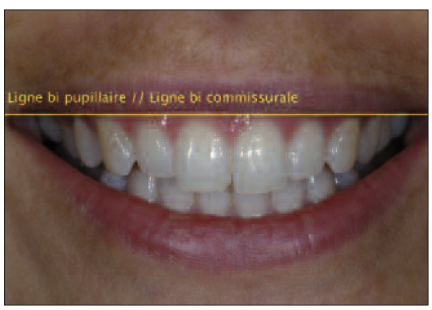

Figure 2
Ideally, the bi-commissural line is parallel to the bi-pupillary line and is therefore horizontal.

Figure 3
The smile is harmonious when the line of the necks of the teeth is parallel to the bi-pupillary line and the bi-commissural line.

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patients with an average or high ''gummy'' smile, any irregularity in the alignment of the gingival margins and/or the absence of interdental papillae may present a noticeable cosmetic imperfection.

When the above gingival defects present, we can often improve the esthetics of these patients in a minimally invasive and ''elegant'' manner by performing a few judiciously chosen vertical movements of the misaligned teeth.

Patients can present several simple situations:

- the line of the necks of the teeth is not harmonious because of the excessively apical position of one or two teeth, and, in this case, mucogingival surgery cannot correct it or is insufficient to correct it;
- one of the incisive-canine group occasionally presents an absence of papillae;
- the line of the necks of the teeth has an ideal gingival architecture, but one of the teeth (strategic) is severely decayed and requires a crown lengthening, that in the long term, would modify the architecture.

In these three situations, a general practitioner, with some fairly simple orthodontic traction, can for the most part find a solution to these esthetic problems that affect the gingiva.

In this article, we are going to illustrate treatment for these gingival defects by presenting three clinical cases.

Orthodontic materials have evolved and have simplified orthodontic practice because of technical features such as the Ni-Ti® orthodontic wire with shape memory.

We can now avoid the drudgery of wire bending that the general practitioner is not even trained to do because it takes just a single procedure to reposition a tooth by using shape memory wire that contains all the pre-programmed prescription for the individual patient.

1 – METHOD

For these ''mini orthodontic treatments'', we use NiTi wire (16 mm diameter), pre-programmed to be adapted to the shape of the arch. We generally only use a part of the arch, i.e. about two to three teeth on either side of the misaligned tooth.

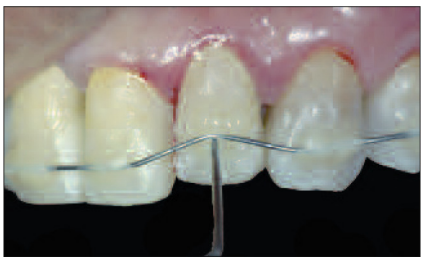
''Homemade'' attachments are bent and bonded to the labial faces of the placeholder teeth with a flowable orthodontic composite.

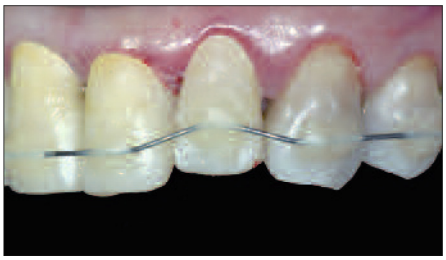
The NiTi arch-fitted wire is placed straight across the teeth and bonded with a composite to the placeholder teeth but not to the misaligned tooth (fig. 4).

Once the arch wire is properly bonded, the dentist bends it toward the root apex of the affected tooth with a probe and bonds it in this position with a drop of flowable composite (fig. 5 and 6).

This type of activation is repeated every three weeks if necessary, depending upon the amplitude to the desired movement.

Figure 4
The NiTi arch wire is placed straight across the teeth adjacent to the misaligned tooth and bonded with a flowable composite.





Figures 5 and 6
The orthodontist then bends the arch wire toward the root apex of the affected tooth, holds it in place with a probe and bonds it with a flowable composite.

These dental movements effect a re-shaping of the osseous structure and therefore of the periodontal line, modifying the height and alignment of the critical gingival scallops.

In the particular case of restoring severely decayed strategic teeth, we do not always wish to modify the gingival structure.

In this situation, each activation is accompanied by an intrasulcular incision into the supracrestal fibers in order to extrude the tooth without displacing the periodontal margin.

2 – CLINICAL CASES

2 – 1 – First clinical situation

The upper left canine is severely decayed, presenting sub-gingival caries, with a healthy gingival margin, slightly inflamed, in contact with the residual root but in perfect harmony with the gingival architecture of the incisive and canine dentition (fig. 7 and 8).

Figure 7
Palatal view of the severely decayed canine, whose caries extends sub-gingivally. The tooth is nevertheless strategically important.

Figure 8
A buccal view of the same canine shows the correct position of the periodontal margin.

Figure 9
After the installation of the temporary crown, the technique remains the same, with an additional intrasulcular incision for each activation.

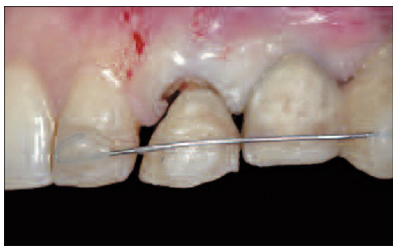


Figure 10
With each exertion of pressure on the archwire, local anesthesia precedes the intrasulcular incision.

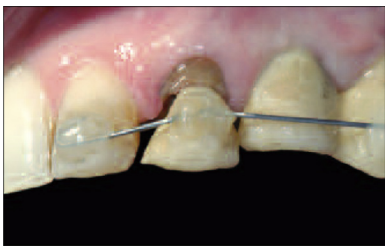


Figure 11
After completion of the orthodontic tilting, the gingival margin will show little or no displacement.

Saving this canine is crucial, and fortunately, the relationship of the crown to the root is very favorable. A surgical elongation of the tooth crown might save this vulnerable canine.

Unfortunately, it would entail an unsightly modification to the gingival architecture. The surgical elongation technique could be applied to the entire anterior dentition to minimize the negative impact on the canine but once again the surgery is not appropriate since it is aggressive and esthetically risky.

The dentist could also decide to intrude this tooth using orthodontic pressure: the periodontium will move with the tooth. Then, the increase in periodontal height that results from the movement will be reduced by using surgical elongation that should restore the initial harmony of the smile line.

The use of orthodontic pressure, a longtime part of our practice, can be modified to avoid surgical intervention.

The strategy is specific to this condition: move the tooth not the periodontium, thus creating a true coronary elongation that is non-surgical. To do this, we made a temporary crown attached with an intra-radicular post embedded in the residual root and temporary crowns on the posterior implants. We placed a NiTi wire passively between the crowns on the implants and the incisors.

Then with each activation of the wire on the provisional canine, we anesthetize the area and make an intrasulcular incision of the supracrestal fibers (fig. 9). We perform these procedures approximately every three weeks (fig. 10), until we have extruded the healthy part of the root enough without displacing the gingival margin (fig. 11).

The practitioner can then endodontically retract the tooth (fig. 12) and reconstruct it (fig. 13 and 14), before making a restraint that must be worn for 16 to 20 weeks in order to ensure that the repositioning of the tooth lasts. This restraint is easily made by cementing a temporary crown to the adjacent teeth.

The permanent ceramic crown (ceramica emax Ivoclar), is made in a completely conventional manner; no

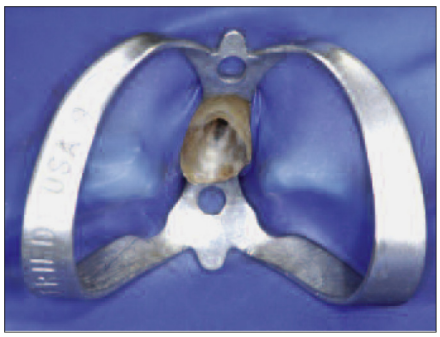
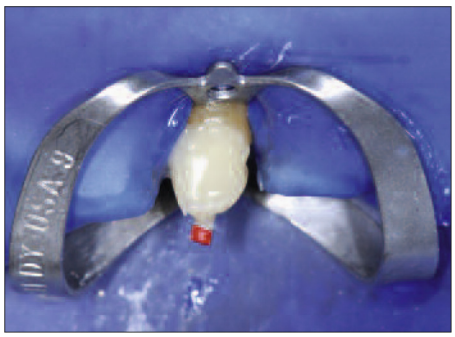
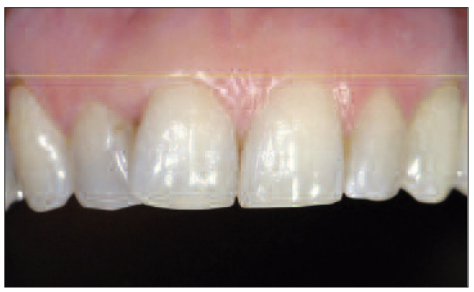


Figure 12
After orthodontic extrusion has been achieved, a dental dam is used to facilitate endodontic treatment.



Figures 13 and 14
The tooth is reconstructed at the treatment site with fiberglass screw and an angled abutment made of composites before passing on to the retention phase with a temporary crown.



Figures 15 and 16
After 20 weeks of retention, an emax ceramic crown is installed without any periodontal retouching.

periodontal adjustment will be necessary because the line of necks of the teeth has not been affected (fig. 15 and 16).

2 – 2 - Second clinical situation

This second situation involves the loss of a papilla that may be periodontal or iatrogenic in origin, in a sector that is very visible esthetically (fig. 17).

Whatever the case may be, this papilla is almost impossible to recreate and is absent because the underlying bony septum is missing.

Our inability to reconstruct the interdental osseous volume makes it impossible to reconstruct this papilla.

This young female patient is troubled by this unsightly ''black hole'' and is dissatisfied with the esthetic appearance of her prosthesis (fig. 18 and 19). Her request that we make a new crown is an opportunity to begin a more global esthetic treatment plan that includes: a whitening procedure,

Figure 17
Unsightly appearance of the gap 11/12 due to the loss of the papilla.

Figure 18
How the patient's smile looks before treatment.

Figure 19
Tooth 11 has a crown, tooth 21 has a large composite and the adjacent teeth are of various hues.

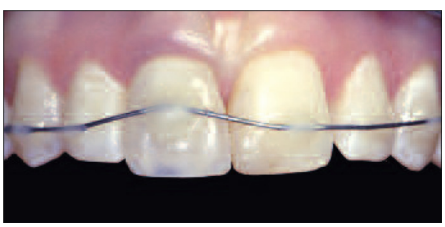
replacing the composite on the adjacent tooth and especially eliminating the black hole that resulted from the papilla loss.

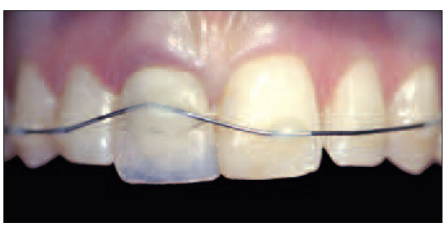
We do not have a lot of options for solving this esthetic dilemma.

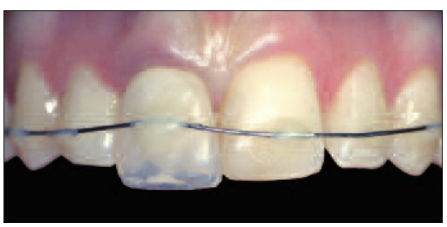
One solution would be to make a wider crown to fill in the papilla loss but then we would also have to make one for the contralateral tooth in order to symmetrically compensate for the increased volume. Besides, the esthetic result of this solution will not necessarily be ideal.

The other solution, that we opted for with the consent of our patient, consists in beginning orthodontic traction of the prosthetic tooth (n°11) while at the same time displacing the entire periodontium. In this way, we hope to recreate the osseous septum between 11 and 12. In fact, we are going to modify the alignment of the gingival collars; we will plan a coronary elongation procedure at the end of the orthodontic traction that will solely involve the labial zone in order to preserve the line of the newly obtained papilla.

After removing the old crown, performing endodontic adjustments and installing a temporary crown, we will begin orthodontic treatment by traction. The activation will be performed 4 to 5 more times but without any periodontal retraction during this subsequent treatment (fig. 20 to 22).







Figures 20 to 22
After installing the temporary crown, the extrusion treatment is started, thus causing the coronary displacement of the periodontium.

Figures 23 and 24
Stop the activations once the periodontium has reached the same level as the contralateral tooth, retention is achieved by bonding to the adjacent teeth.

Figures 25 and 26
During the retention phase, a labial coronary elongation is performed on 11 in order to realign the gingival margin without touching the ''neopapilla''.

Figures 27 and 28
After the whitening treatment, the composite of 21 is redone using a stratification technique of colored and translucent materials.

We stop the tractions as soon as the inter-proximal gingiva have reached the desired level (fig. 23). Once again, the temporary crown is bonded to the adjacent teeth for the whole retention period (fig. 24).

We can use this ''latency'' period to our advantage by doing the whitening treatment and the periodontal procedure to align the collars while preserving the new papilla (fig. 25 and 26) and, by cementing the proximal tooth (fig. 27 and 28).

In total, given the time needed for healing and maturation of the tissues, we will wait six months before making

Figure 29
A lateral view of the embrasure 11/12, the day the all-ceramic crown was placed on 11.

Figures 30 and 31
A two-year check-up on the esthetic result of our ''ortho-perio-prosthetic'' rehabilitation.

and installing the all-ceramic crown (fig. 29).

Nearly two years later, we see the perfect integration of our prosthesis into the smile of our patient, due in large part to the ''resurrection'' of the papilla that would not have occurred without orthodontic therapy (fig. 30 and 31).

2 – 3 – Third and last clinical situation

It is surely the most common scenario, the occasional appearance of extremely unsightly recession along one or two gingival collars at the level of iatrogenic prostheses that were installed years ago (fig. 32 and 33). In this case, using periodontal therapy, by epithelial conjunctive tissue graft, will not solve our problem, nor does coronary elongation of the healthier adjacent teeth.

Once again, after installing individual temporary crowns, treatment by orthodontic traction is the only way to improve the situation.

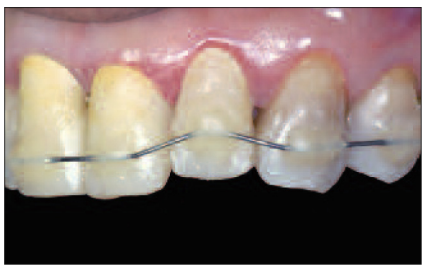
We begin with the most affected tooth (22).

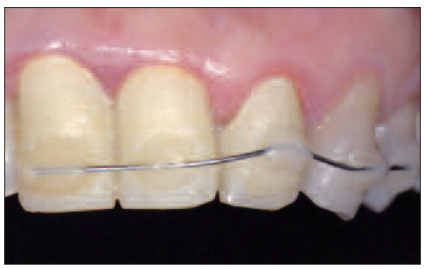
After three activations spaced over two to three weeks, the gingival collar is perfectly positioned (fig. 34 and 35).

Next, we treat the tooth alignment: it will be done quickly with just one activation (fig. 36).

After making an esthetic mask (intraoral duplication in composite

Figures 32 and 33
The initial state: esthetic restoration of this smile presents a significant challenge.





Figures 34 and 35
Following orthodontic traction, the periodontium of 12 is gradually realigned.

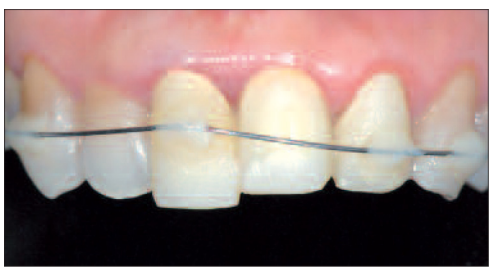


Figure 36
After treating 12, we begin the extrusion of 21, always in hope of improving the gingival defect.

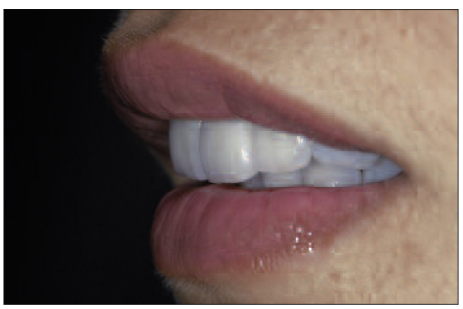
made of esthetic or diagnostic wax-up, we can now appreciate the new gingival architecture of the patient, created by our traction (fig. 37).

New bonded temporary crowns (also called second generation), originating from this mask, mark the beginning of the mandatory 4-month

Figure 37
Starting with an intraoral cast model made by using the diagnostic wax-up method, the facial esthetic mask allows us to validate our prosthetic plan.

Figure 38
Four next generation temporary crowns are bonded, originating from the mask and the wax-ups mark the beginning of the retention phase.

Figures 39 and 40
Comparison of before and after ortho-prosthetic treatment.



Figures 41 and 42
The esthetic integration of our prosthetic appliances, using minimally invasive orthodontic techniques, is very satisfactory.

retention period, that allows us to validate in consultation with the patient the new alignment of her teeth (fig. 38).

After attempting to whiten the adjacent teeth that improves only the occlusal first half, the defect will be rehabilitated by installing three all-

ceramic individual crowns (IPS-Emax Ivoclar), and by one bonded veneer on 12.

A comparison of the before and after photos clearly shows the improvement achieved by this minimally invasive technique (fig. 39 to 42).

3 – CONCLUSION

Too often neglected or forgotten, these small pre-prosthetic orthodontic ''manipulations'' can play a role in a many different clinical situations.

Moreover, these minimally invasive techniques can be implemented effectively and simply.

In certain clinical cases, the above techniques are absolutely necessary since they are the only way to provide an effective and lasting solution for particular situations.

Therefore, it is imperative that we integrate these techniques into our therapeutic arsenal, when we are performing esthetic-enhancing procedures.