# *smooth emergence profile with the friction retention system*

A smart and safe solution based on Xive

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## INTRODUCTION

With recent implant restorations, it is essential to achieve a good esthetic result by reconstructing the continuity of the cervical line and interdental papillae from the proximal natural conditions (Figs. 1 and 2). By doing so, the emergence profile of the superstructure affects the induction and preservation of the cervical line. When creating the emergence profile on the final restoration, an individual abutment is created and the superstructure is placed with cement in most cases (Fig. 9). However, this is precisely where problems arise, particularly with patients with thin gingiva. To enable the removal of excess cement, the margin between the abutment and the final restoration is located slightly subgingival – i.e. in the middle of the emergence profile. Adapted to the peri-implant mucosa conditions, it is important to avoid this kind of margins when creating the emergence profile. The Friction Retention System negates the use of cement and conveniently allows the use of pre-fabricated abutments (straight Friadent EstheticBase abutment). In the final restoration the clinical crown and the emergence profile are in one piece (Figs. 6, 9, 11, 12). I have used this technique for over 10 years and found a number of considerable benefits.

*1_Three years after placing the superstructure (Resin Friction Retention System)*

*2_Five years after placing the superstructure (Metal Friction Retention System). In the posterior region too, an esthetic result is important.*

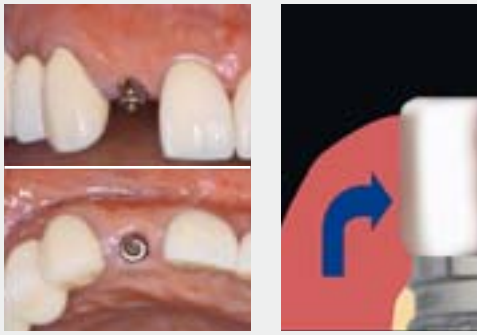
## EMERGENCE PROFILE AND CERVICAL LINE

The key to successfully inducing the cervical line is pressure. The peri-implant mucosa needs to be adapted in order to exert sufficient force when covering the implant (Fig. 3). The emergence profile of the superstructure adds pressure on the mucosa and the cervical line appears at the point where these opposing forces meet (Fig. 4).

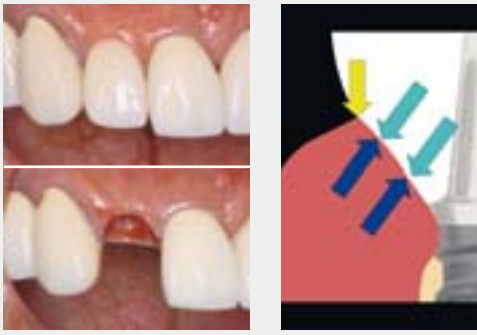
Position and shape of the cervical line can be influenced by adjusting the contour of the emergence profile thereby changing the pressure (Figs. 5 and 6). If the contour is enhanced, the pressure increases and the gingival line will move to the apical side. If, on the other hand, the contour is reduced, the pressure decreases and the gingival line will move along the emergence profile of the superstructure. In each case, to adapt the condition of the mucosa individually and control the position of the cervical line that we want to induce, the appropriate emergence profile needs to be determined. In this case, I have focused on a buccal supra-implant mucosa. With insufficient tissue volume, when considering the shape of the emergence profile, we must ensure that the height of the buccal supra-implant mucosa is maintained (Fig. 7). If there is sufficient tissue, volume pressure can be increased in order to induce the cervical line (Fig. 8). If this is not the case, tissue management techniques can help to ensure sufficient tissue volume around the implant. At this stage, in order to build the appropriate height, it is essential to ensure sufficient width of the buccal supra-implant mucosa. Some delicate adjustments of the emergence profile of the provisional crown in the patient's mouth may be necessary in order to find the correct shape for the induction of the cervical line, especially in patients with a thin biotype. The information taken

*6_Adjusting the emergence profile can influence the position and shape of the cervical line.*

*3_Situation after half a day. The peri-implant mucosa needs to exert sufficient pressure when covering the implant.*

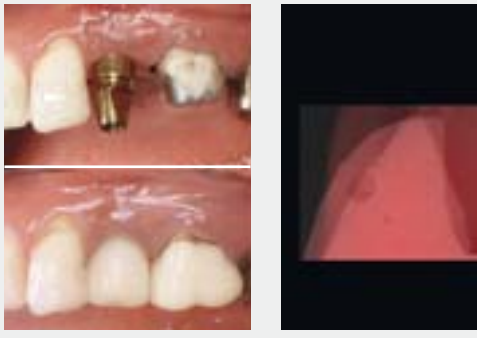


*4_The emergence profile of the superstructure exerts pressure on the mucosa. The cervical line emerges at the point of coincidence of these opposing forces.*



*5_Shape of the buccal supra-implant mucosa before and after inducing the cervical line as an effect of the provisional crown.*

*7_There is little tissue volume, so when planning the shape of the emergence profile, we must ensure that the height of the buccal supra-implant mucosa is maintained.*



*8_If there is sufficient tissue volume, greater pressure should be applied in order to induce the cervical line.*

from the provisional crowns must be accurately transferred to the final superstructures in order to sustain the position and shape of the cervical line.

**THE PROBLEM OF INDIVIDUAL ABUTMENTS**

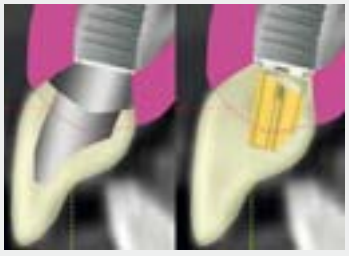
When the final superstructure is manufactured, it is common to use individual abutments. The margin between the abutment and the superstructure should extend between 0.5 to 1.0 mm subgingivally from the cervical line (Fig. 9) in order to remove the flow-out cement when placing the superstructure. Not removing the flow-out cement would be harmful for the mucosa. However, this margin aggravates the creation of a smooth emergence profile. In addition, particularly with thin gingiva, metal abutments may cause a dark discoloration of the mucosa.

**THE FRICTION RETENTION SYSTEM**

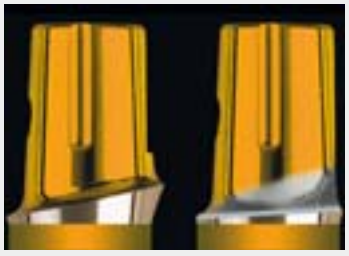
The Friction Retention System – a technique that I applied rather frequently – allows for the placement of the superstructure between abutment and substructure without using cement by relying on friction retention alone. Since removing flow-out cement is no longer necessary, the margin between the abutment and the superstructure can be placed closer to the implant platform (Fig. 9). For this procedure, I use fabricated straight Friadent EstheticBase abutments with a gingiva height of 1 mm. The dental technician bevels the edge of the collar circularly and reduces its height as much as possible (Fig. 10), for positioning the superstructure close to the implant platform. This allows for the easy creation of a smooth emergence profile (Figs. 11 and 12). Crown and emergence profile form one unit, both being fabricated from tooth-colored material. This also eliminates the problem of metal visible through the mucosa.

One key benefit of this method is the possibility to remove the superstructure easily whenever necessary (Fig. 19). This has a number of advantages: If the superstructure is damaged, it can be easily removed for repair. A possibly loosened abutment screw can be easily tightened. The peri-implant mucosa and the general hygiene can be monitored more easily. I usually remove the superstructures once or twice a year, allowing me to monitor the peri-implant tissue visually and by x-ray (Figs. 13 to 16).

There are two types of Friction Retention Systems: the Metal Friction Retention System and the Resin Friction Retention System. In the beginning, I used to apply the former exclusively to cast metal substructures (Fig. 17).



*9_Comparing the method of using the individual abutment (left side) and the Friction Retention System (right side)*



*10_Straight Friadent EstheticBase abutment with a gingiva height of 1 mm. A bevel at the edge of the collar further reduces the height.*

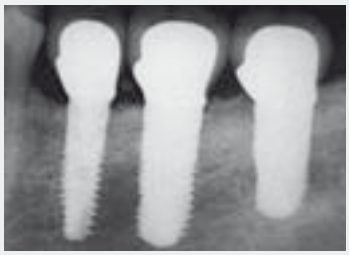
*11_The smooth emergence of the superstructure of the case seen on Fig. 1*

*12_The smooth emergence of the superstructure of the case seen on Fig. 2*

*13_The superstructure is removed three years after placement (case seen on Fig 1).*

*14_The superstructure is removed three years after placement (case seen on Fig 2).*

*15_The three years follow-up radiograph of case seen on Fig. 1*



*16_The five years follow-up radiograph of case seen on Fig. 1*

Today, the frameworks are made of metal or zirconium dioxide by CAD/CAM systems (DeguDent Cercon System). However, it is difficult to achieve sufficient retention force with zirconium dioxide. Therefore, I have developed the Resin Friction Retention System. For this method, a groove is made on the abutment wall and filled with resin material (Fig. 18). Subsequently, the retention force is adjusted.

## HANDLING

When the superstructure is placed, a white Vaseline-based antibiotic ointment is applied to the abutment. The ointment fills the microgap between abutment and superstructure.
At first, the superstructure is placed manually. Subsequently, an automatic mallet is used; a method that, in my experience, does not risk the loss of osseointegration.
A crown remover with a hook at both ends is used for removing the superstructure. At the bottom of the palatal side of the superstructure, there is a removal notch for placing the hook of the remover. By pulling the cylinder upwards against the stopper a few times, the superstructure can be removed easily (Fig. 19).
As it is difficult to prepare the removal notch when applying the Zirconium substructure, an alternative method of removal is needed: The superstructure has an undercut area. A length of dental floss is tied there and the superstructure is simply pulled out.

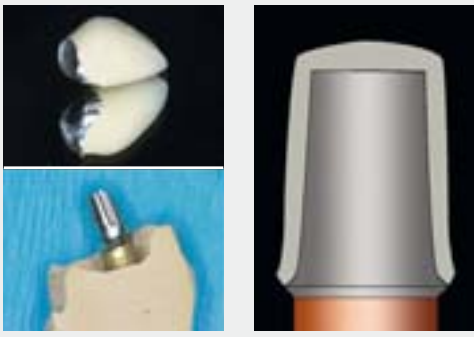
## EXPERIENCES

The Metal Friction Retention System has been applied since 1999 and the Resin Friction Retention System since 2006. There is a low incidence of superstructures falling out: only three cases (Table 1). These problems, however, occurred some time after placement. One of the causes is a change in occlusion.
I investigated the retention force of 23 superstructures that used the Metal Friction Retention System and there were no problems during placement. The average retention force was 1.6 kg when a static force of 5 kg was added. These conditions are the criteria upon which adjustments to the retention force of the superstructure are made.

## CONCLUSION

The Friction Retention System has many considerable advantages and plays an important role in achieving perfect treatment results. The indication is restricted to single tooth replacement and that the limit is a three unit bridge.
In addition, implant placement conditions and securing sufficient tissue volume surrounding the implant are fundamental to its success. ■

*17_The Metal Friction Retention System*



*18_The Resin Friction Retention System*

*19_Removing the superstructure of the Metal Friction Retention System*

*Table 1_Frequency of complications of the Friction Retention System*

| | MFRS Since 1999 | RFRS Since 2006 |
|---|---|---|
| Falls out | 3 | 0 |
| Loosening | 4 | 4 |
| Number of implants | 296 | 14 |

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