

# Aesthetic rehabilitation and tissue preservation in the anterior region

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While there are often several adequate prosthetic treatment options to choose from for one single case, there are some cases where none of the proven solutions seems to be perfectly suitable. The prosthodontist and his team have to balance the pros and cons for each available option – they have to decide which treatment is best suited to fulfil the needs of the specific patient. This was the case with a 16-year-old female patient who presented at the Department of Prosthodontics of the Ludwig Maximilians University of Munich, Germany, in 2015. An orthodontic treatment had just been completed and a further prosthetic rehabilitation was required.

## Background

At the age of 10, the patient had suffered an anterior tooth trauma with avulsion and replantation of the maxillary central incisors (teeth 11 and 21, FDI notation). Despite all efforts, it had not been possible to preserve tooth 21. The former dentist had replaced it with a four-unit metal-ceramic adhesive bridge (Maryland bridge) (Figs. 1 & 2).

Unfortunately, the dismal prognosis for tooth 11 was confirmed in the course of treatment: it had to be extracted during orthodontic therapy. In order to replace both central incisors for the duration of this therapy, a provisional bridge with artificial gingiva was manufactured and attached to the fixed orthodontic appliances (Fig. 3).



*Fig. 1: Situation prior to the orthodontic treatment with an adhesive bridge used to replace tooth 21.*

*Fig. 2: The adhesive bridge shows a compromised fit after repeated removal and placement.*

*Fig. 3: Snapshot during orthodontic treatment with temporarily replaced central incisors. (Image 1–3 courtesy of Prof. A. Wichelhaus)*

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Fig. 4: Situation at the first visit of the young female patient at the LMU Munich private dental office.



Fig. 5: Patient with interim prosthesis after removal of the orthodontic appliances, replacement of the fillings and palatal tooth preparation.

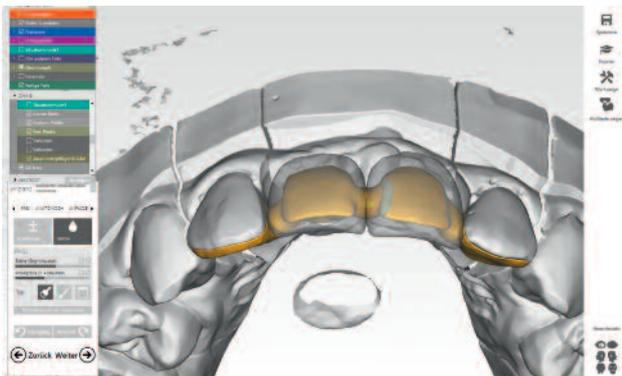


Fig. 6: Computer-aided framework design starting from the anatomical tooth shapes using the Zfx CAD Software.

### Prosthetic treatment plant

At the patient's first visit in the private dental office of the LMU Munich, the lateral incisors had large composite restorations not only on the vestibular surfaces, but – due to the previous rehabilitation with an adhesive bridge – also on the palatal surfaces (Fig. 4).

Tooth 22 had received an endodontic treatment. This fact significantly limited the prosthetic options and had a negative effect on the prognosis of this tooth. The developmental stage of the cervical vertebrae assessed by the orthodontist using lateral cephalometric radiographs revealed that only minimal transversal and horizontal growth was still to be expected for this patient. Due to this fact and the unfavourable prosthetic value of the abutment teeth, the prosthodontic team – in consultation with the patient—decided to place an all-ceramic adhesive bridge with two wings bonded to teeth 12 and 22. The aim of this treatment was to postpone the placement of implants as long as possible in order to ensure that the patient was fully grown when this intervention was carried out. By use of a fixed restoration, the team strived for the best possible support and preservation of the surrounding soft and hard tissues.

### First steps

After removal of the fixed orthodontic appliances, the direct restorations of the maxillary lateral incisors were replaced by new composite restorations. Tooth preparation had already been carried out on these teeth to place the former metal-ceramic bridge. Hence, it was not necessary to remove large amounts of additional tooth structure, however, the existing palatal preparations required refinement. Subsequently, gingiva management was carried out with retraction paste. An impression was taken with the 3M True Definition Scanner and uploaded to the 3M Connection Center. The patient received a removable interim prosthesis (Fig. 5).

### Laboratory procedure

In the dental laboratory, the digital impression file was downloaded, a physical model ordered and the data set imported into the Zfx CAD Software for the design of the adhesive bridge framework. The bridge was designed in full contour. The recommended parameters (minimum wall thickness, connector strength etc.) for the selected material – 3M Lava Plus High-Translucency Zirconia – were entered into the software. Then, the bridge was automatically reduced to the framework (Fig. 6).

This procedure is beneficial in that it provides for a uniform strength and optimal support of the veneering porcelain. The framework was milled, thinned out at the margins using a fine diamond rubber polisher, individualised with dyeing liquids, and sintered. The precise fit of the wings to the palatal tooth surfaces was confirmed on the model before the porcelain layering was performed (Fig. 7). Figure 8 shows the situation at the biscuit-bake try-in.

Finally, the adhesive bridge was finished and glazed. On the model, a highly accurate fit was obtained (Fig. 9), and the restoration showed a natural appearance (Fig. 10). This is in part due to the high translucency of the framework material (Fig. 11).



Fig. 7: Precise fit of the sintered framework.



Fig. 8: Try-in of the restoration in its fired, unglazed state.



Fig. 9: Precise fit of the wings in the palatal area.



Fig. 10: Final restoration on the model: A natural colour gradient is obtained.

### Clinical procedure

With the use of a GC Fit Checker Advanced Blue (GC Europe), the precise fit observed on the model was confirmed intraorally (Fig. 12).

As the patient was also satisfied with the aesthetic result, the adhesive bridge could be placed immediately. For this purpose, the working field was isolated with rubber dam and a 37 % phosphoric acid etching gel applied to the palatal enamel surfaces of both lateral incisors for 30 seconds and to the dentine surfaces for 15 seconds before being rinsed off.

The inner surfaces of the wings were conditioned to

increase the surface roughness. After thorough cleaning of the surfaces, an adhesive (3M Scotchbond Universal Adhesive) was applied, rubbed in, air-dried and light-cured according to the manufacturer's instructions.

Then, 3M RelyX Ultimate Adhesive Resin Cement was applied and the bridge placed. The excess cement was removed immediately with a sponge pellet. To prevent a reaction of the uncured cement with oxygen and lay the foundation for a good marginal integrity, the exposed margins were covered with glycerine gel (Fig. 13) and polymerised. Figure 14 shows the situation immediately after curing.



Fig. 11: Light transmission through the translucent framework material.

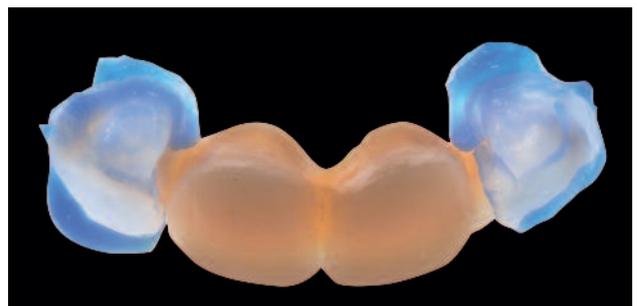


Fig. 12: Use of fit checker to verify the precise fit of the restoration.



Fig. 13: Interfaces between tooth and restoration covered with glycerine gel.



Fig. 14: Margins immediately after curing of the cement.



Fig. 15: Aesthetically satisfying situation after eight weeks. Further recovery of the gingival tissues needs more time.



Fig. 16: A natural look is obtained.

## Result

The aesthetic appearance was already satisfactory, although the harmony was impaired by black triangles between the teeth. Due to the favourable characteristics of the ceramic, however, the soft tissue recovered quickly and closed the gaps. Figures 15 and 16 show the results eight weeks after the restorative procedure.

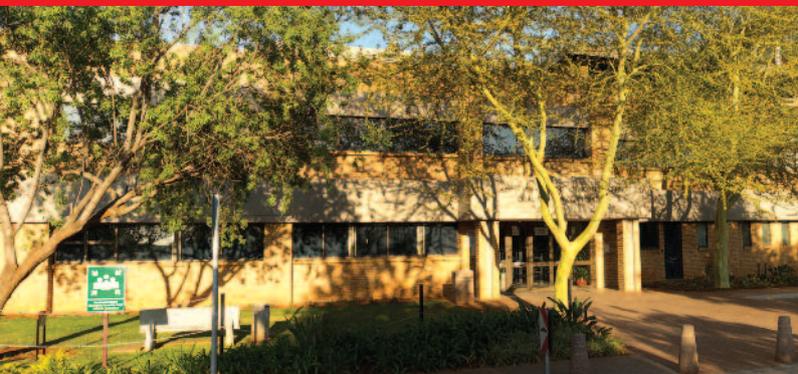
## Discussion

As an alternative to the selected treatment option, it would have been possible to place a removable partial denture or two two-unit adhesive bridges with one wing each. The former, however, is regarded as functionally less effective and not capable of supporting the preservation of soft and hard tissues. The two-unit adhesive bridges would have required stabilisation with a retainer. The main reason to opt against this alternative was the compromised value of the abutment tooth 22. As the root surfaces of the maxillary lateral incisors are small, it also seems questionable if this design would have offered sufficient stability to ensure the desired result.

With regard to the restoration that was produced, the invasive preparation is surely a matter of debate. However, the existing preparation for the metal-ceramic bridge and the large composite restorations limited the amount of sound tooth structure that needed to be sacrificed at this point of the treatment to a minimum, so that the plan became acceptable. In general, the maximum preservation of tooth structure should always be given highest priority when a dental restoration is planned. Important criteria guiding the amount of hard tissue removal are the available intermaxillary space and the minimum wall thickness of the selected material.

Due to the material selection in the present case, it is not necessary to remove the restoration as long as it serves its purpose. Thus, the planned long-term temporary might even become a definitive restoration over time. This, of course, is only possible with continuous monitoring and good compliance of the patient

*Reprinted with permission by CAD/CAM 01/2017  
First publication: 3M™ Health Care Academy Expertise™  
Magazine nr.29, edition November 2016 p.28-31.*



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Date/time: Saturday 23rd September 2017, 08h30 - 13h30 - followed by lunch

### Programme

TIME	ACTIVITY	PRESENTER
8:30 - 9:00	Register / Coffee	
9:00 - 10:00	Applied anatomy and Radiology of the maxilla	Prof Andre van Zyl
10:00 - 10:30	Bone regeneration material for sinus floor elevation	
10:30 - 11:00	Healing of augmented sinus	
11:00 - 11:15	Coffee / Tea	
11:15 - 11:30	Trans-crestal sinus floor elevation	
11:30 - 12:00	Lateral window technique- sinus floor elevation	
12:00 - 13:30	Hands on session	
	Lateral window sinus floor elevation with implant placement	Prof Andre van Zyl & Dr Billy Lombard
13:30 - 15:00	Lunch	

For more information regarding registration, please contact: Ms Rene Catchpole  
Tel: +27 (0) 12 319 2312 | Email: recatchy@gmail.com

### Entry Requirements

Completion of Postgraduate Course in Implantology - University of Pretoria

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