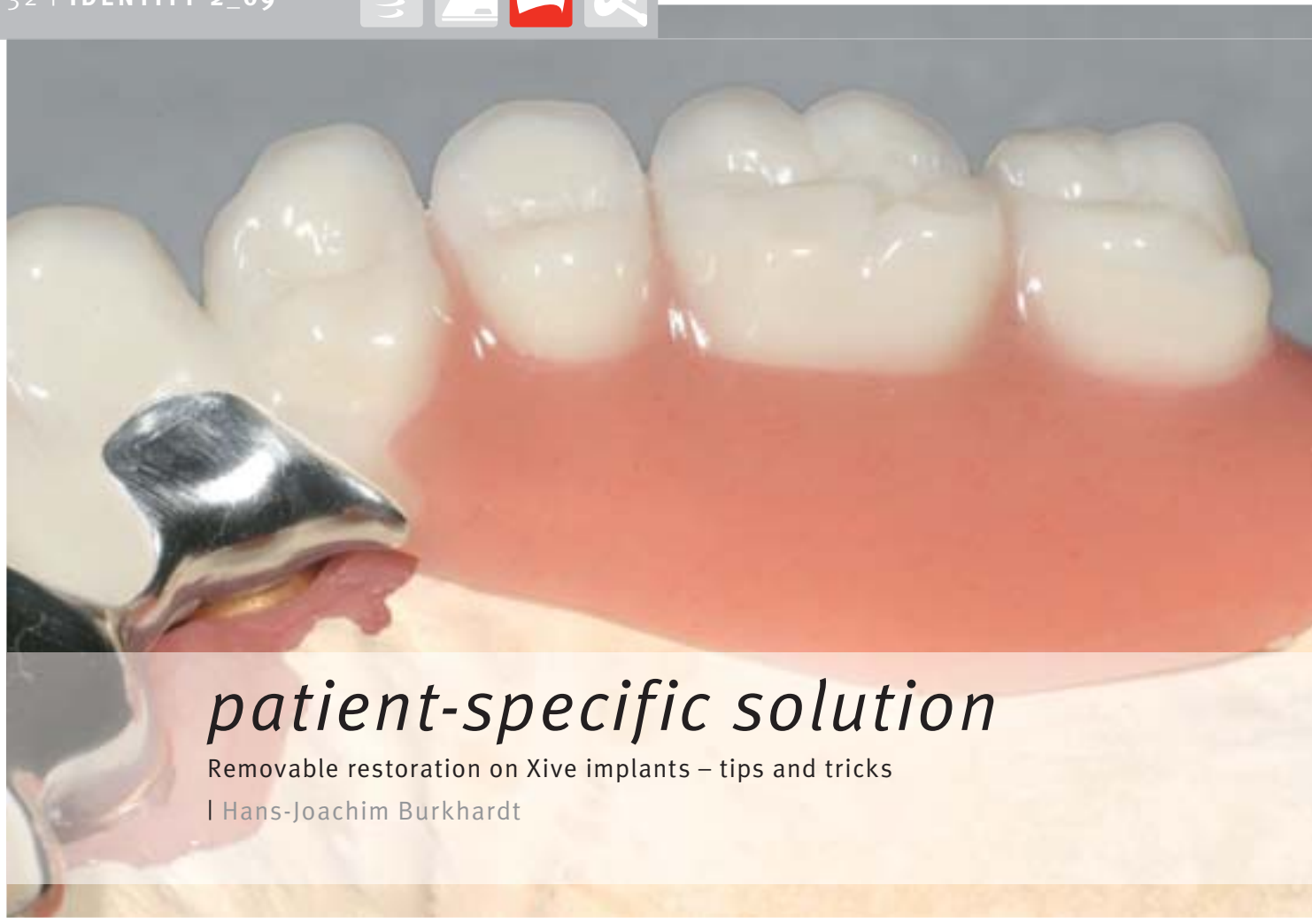

patient-specific solution

Removable restoration on Xive implants – tips and tricks

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INTRODUCTION

There is a whole series of therapeutic solutions at hand for restoring an edentulous maxilla. The dental technician should definitely be involved as early as the planning phase. The technician can produce the wax-up or the mock-up based on the situation models, photos, the old prostheses, etc. It has proven worthwhile in our experience for the patient to come into the lab to determine the tooth shade. This visit presents a good opportunity to gain an impression of the personality and to find out more about the patient's wishes and ideas. This small investment in time pays off in our view in several ways: The patient gets to know the entire treatment team and therefore has a better idea of how many persons are looking to fulfill their wish of having esthetically and functionally restored teeth. This instills trust in the entire team. The advantage for the dental technician is that they have far more additional information than would ever have been obtained from the mute plaster model.

THE WAX-UP

The patient presenting was missing all teeth in the maxilla. The restoration was to be with an implant-supported, removable prosthesis. The prosthesis was coupled to the four Xive implants (region 14, 12, 22, 24) with double crowns.

The wax-up was easy to achieve, as the dentition in the mandible provided very good orientation for the form, size and position for the teeth in the maxilla (Fig.1). The patient's esthetic requirements were well satisfied. High quality polymethyl methacrylate (PMMA) artificial teeth were selected. This makes the subsequent procedure much easier for the technician.

TIP Plastic teeth can be ground out much thinner than ceramic teeth or multilayer composite teeth. This is especially advantageous given space restrictions, so more space is available for the tertiary structure.

The nature of the wax for setting up the teeth is such that it allows the function of the prosthesis to be "tested". The wax prosthesis is not damaged in the process and teeth do not fall out either. The classical "summer wax" is completely unsuitable.

TIP Switching to higher quality waxes means greater expense in the first instance, but ultimately pays off.

After trying out the wax-up, the dentist carries out his/her planning and inserts the implants. The dental technician's main task begins with taking an impression of the implant position.

PRODUCING THE FRAMEWORK

The wax-up accepted by the dentist and patient is an important basis for the subsequent work. For example, it provides essential information on the space available for the substructure.

A matrix is fabricated in order that the situation can be transferred from the wax-up to the working model.

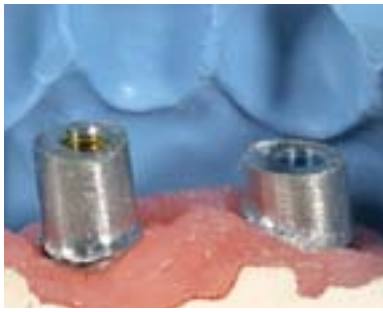
When fabricating the master model, the subsequent work to be performed on it has to be taken into consideration. In the case presented, the Friadent implant analogs made of aluminum cannot be used, as very high stresses arise during milling. The implant analog, the abutment and the screw could be damaged during rough machining or undesirable changes in position could arise. For this reason, Friadent milling implants made of special steel should be used for this kind of work.

Friadent telescopic abutments are individualized to the master model for producing the taper connection with a 1° taper angle (Figs. 2 and 3). This is a reliable and established solution that promises a secure fixation, is easy to handle and also allows corrections if necessary. The preparation margins are all paragingival (Figs. 2 and 4). As mentioned, stresses arise during milling that can be minimized however. TIP For example, for rough removal of metal we use a turbine with water cooling. This technique has hardly taken off so far, but it has essential advantages. As a result of the high speed, less oscillation is transmitted to the junction between the analog and abutment. Turbines come to a halt if the contact pressure is too high. The water cooling means the abutment does not heat up. The screw or the analog has not been observed to shake loose from the model using this technique. In the case presented, the thickness of the gingiva is over 4 mm at the distal implants. In such cases, the Friadent telescopic abutments prove to be too short. As the strength of the prosthesis fixation not only comes from the taper angle, but also from the vertical dimension, the height of the abutments must be adapted.

1_The wax-up coordinated between the physician and the patient as the basis for all further work

2_The Friadent telescopic abutments are milled on the model with a turbine and water cooling

3_The finished preparation with a 1° taper angle



4_The circular hollow channel at the height of the gingival margin

5_The distal construction is too short for a reliable taper connection and has to be elongated

6_The surface is smoothened with finer cutters and the hollow channel refined. The welding seam cannot be recognized

7_The finished and bevelled abutments are shaped to match the set-up

8_The electroplated secondary parts

TIP

Here we use discs, for example cut off from longer abutments in previous jobs. These discs are positioned over the screw channel of the roughly pre-milled abutment and are initially only attached with a phaser welder. After checking the orientation and accessibility of screw channel, both parts are welded circumferentially from the outside and inside (Fig. 5).

They are then remilled once again (Fig. 6). With these extensions, it should be considered that there may be a change in loading on the implant. In our experience, it is completely irrelevant whether the change in height is in the abutment or in the prosthesis. Leverage is leverage!

Fabrication of the tapered abutment takes place as usual with progressively fine cutters through to polishing (Fig. 7). The next step is electroplating to produce the secondary parts. The abutments are screwed to the analog on which the electrodes are attached. We favor electroplating over a period of 12 to 14 hours as this achieves a homogenous result (Figs. 8 and 9).

Caps made of high quality foil material are produced over the electroplated secondary parts. They serve as molded parts to produce the tertiary structure and should have as uniform a wall thickness as possible of at least 0.3 mm. The caps extend to the gingival margin (Fig. 10). The carrier foil used as a retainer generates a circular gap of 0.1 mm. This is sufficient as an adhesive joint.

The impression of the framework is produced from light-curing wax and plastic. The matrix with the teeth fixed in provides information on where back protection plates, closure margins, etc. are to be positioned, for example (Fig. 11). All areas can be checked, thus eliminating retrospective corrections. In the hardened state, this framework of plastic and wax is dimensionally stable and it allows the finished impression to be lifted from the model. The transfer to a CoCr alloy then takes place with a casting procedure (Fig. 12). Hence the tertiary framework is stable and the large connecting bar to cover the gum is not required. The metal framework is finished and polished in the usual way.

COMPLETION

The framework is salinized and coated with opaquer for the permanent bond between metal and plastic. All plastic materials are matched with one another, such that the final product results in the most homogeneous block possible.

9_The finished electroplated caps

10_Deep drawn caps serve as modelling aids for the tertiary structure. A carrier foil serves as a retainer for the adhesive joint

11_The framework is modelled to match the dental set-up

12_The finished framework has been cast from a CoCr alloy



13, 14, 15_The finished job viewed orally.
As a result of the framework design and the alloy used, the large connecting bar is not required.
This significantly enhances the patient's comfort.

Both the teeth, as well as the white and pink prosthesis material, are made of pure PMMA plastic. The prerequisite for a perfect bond between the individual plastic components is that the layers already hardened, such as the artificial teeth, for example, are roughened on all contact surfaces with a coarse diamond grinder.

TIP The quality of the cast plastic components can be considerably enhanced if they are polymerized under increased pressure. We therefore use a polymerization device with a pressure of 6 Bar. The plastics treated in this way are more homogeneous, better for polishing and more resistant against soiling and aging. Irritations and allergies are eliminated.

In the finishing process, we find it very important to finish the static and dynamic occlusion as precisely as the options available in the lab allow. All margins and edges are smoothed to avoid pressure points as far as possible.

TIP All transitions between metal and plastic, as well as between the individual plastic components, are smooth and merge seamlessly (Figs. 13 to 18). This enhances wearing comfort and makes care easier.

CONCLUSION

Removable, implant-supported dental prostheses are just as acceptable as fixed restorations. An advantage of the solution presented here is that, after removal of the prosthesis, every post is very easily accessible for cleaning. It may be the case that the patient would have been in a position to adequately care for fixed implant-supported bridges at the time of incorporation. But the perspectives of implants have to be calculated in decades. Planning must therefore also consider how the capability of the patient to perform the necessary care will develop. The solution presented here takes this factor into account. Further advantages are the modest financial costs and that the prosthesis can be modified if necessary. ■



16, 17, 18_The finished job viewed vestibular.
The gingiva modelling already defined in the wax-up has been adopted completely.