> Hybrid bridges - Combinations between onlay / crown / inlay / implant and retainer bridges with extensions

**Choice of retainer**

Recommended operational areas

- **of Metal retainers:**
  - Metal reconstructions of the upper-/lower- posterior region
  - Bridge frameworks with vestibular glaze ceramic crowns
  - Inlay-, onlay-, overlay-, combicrown-reconstructions
  - Working in combination with implants
  - suitable for larger bridges

- **of zirconium retainers:**
  - for completely metal-free bridges
  - for aesthetically demanding solutions, especially in upper-/lower- anterior region, upper-lateral area
  - Working in conjunction with a combination of ceramic inlays, ceramic crowns
  - applicable for smaller gaps (max. 1 pontic).

**IMPORTANT:**

Due to the precision, metal bridges can only produced be with copying milling equipment. DENTAL BIOMECHANICS or our licensed laboratories offer that possibility.

**Marking the retainer position on the model**

In the laboratory slicing templates are being made for optimal positioning of the retainer.
After placing the prepared slicing cap, the abutment is sliced using a large fine-diamond drill in a high speed handpiece. Finish the surface with a Soflex disc to obtain a sufficiently smooth and large enough surface. This also aids in guaranteeing a parallel insertion direction of the construction.

**Marking the central drilling point**

The ideal position on the proximal surface is slightly lingual/palatal from the middle. The top of the retainers edge should be 1 mm from the top of the marginal ridge. This means that the central point is 2.2 mm away from the occlusal ridge, in general as close as possible to the gingiva.

**IMPORTANT:**
While preparing the bridge parts, the dental technician should make sure that there is palatinal or lingual access to clean the retainer.

**Predrilling the enamel**

An important step of the procedure is predrilling the enamel with a small round diamond drill; this makes it possible to 'guide' drilling using the micro-drill handpiece. You should take care that the enamel is perforated deep enough, to ensure quick and efficient final preparation with the micro-drill handpiece.

**Preparing the retainer channel**

Before drilling the retainer canal, apply a drop of oil on contra angle and micro-drill.

When applying a metal retainer, the 1.0 mm drill is placed in the corresponding position (mesially or distally, depending on the preparation) in the micro-drill handpiece. When using a zirconium or glass fiber retainer (both retainer pins have a 1.2 mm diameter), the retainer canal is prepared with a 1.2 mm drill, as described before.

The drilling angle should be at 90° of the approximal contact surface. The retainer channel is drilled in three steps under water cooling (handspray!). After each step, drill and retainer channel has to be cleansed with water. That way, obstruction of the retainer channel through dentin particles is avoided. Prepare the channel until the flange of the drill lies in the enamel.

**Attention:**
the preparation is perfect, if the enamel shows a full round ring.

**Fitting and adhesive placement of the retainer**

Use the special fitting device or a retainer without holder to fit the retainer in the prepared channel. The retainer has to be slightly recessed and completely level against the abutment tooth. If the fitting is not exact, the channel should be deepened carefully and the fitting procedure should be repeated. When you are sure of the exact fit the retainer can be cemented.

Apply rubberdam! Clean the abutment with sodiumhypochloride. Place the retainer in ethyl alcohol for some time. IMPORTANT: Never remove a retainer from the retainer holder during the process! Remove discoloration of the abutment teeth with a brush or rubber.....

Etch the preparation for 30-40 sec with 37% phosphoric acid, rinse 30 sec. with water spray and dry carefully. Apply primer/bonding according to the instructions of the manufacturer. Apply little cement on the retainer pin and in to the channel with a small brush.

Position the retainer holder in a 90 degree angle to the occlusal/incisal surface firmly into the channel. Beware of the proper positing of the retainer holder!!

**IMPORTANT:**

**Axis parallelism**

During the fixation process, the retainer holder should be kept in place under pressure using a Heidemann spatula.

When the cement has fully dried (takes about 6 min.), the retainer holder is removed from the retainer in occlusal/incisal direction. Remove excess cement with a brush paying extra attention to the space between retainer and gingiva.

**Preparation of further abutments**

According to the guidelines for the inlay- or crown-preparation, slice the other abutment tooth.
Impression

Place the impression cap on the retainer and take the impression using any known procedure. All modern impression materials are suitable with the exception of alginate and hydrocolloid.

**ATTENTION:**

If the impression is sent to the laboratory, don't forget to include the two metal torsion matrices, the corresponding plastic modelling caps and two analogues.

Making a temporary provision

As with all conventional constructions, the dentist can decide if he wants to use a temporary provision to close the gap, although protecting the sliced tooth is number one priority of course. The advantage of using the provision is letting the patient adjust to the final construction.

A dental technician can provide the provision, or it can be made using prefabrications.

In the front area one can use e.g. Frasaco prefabricated crowns. Grind such a crown up proximally to the incisal edge and fill the crown with a toothcoloured artificial resin and place it over the retainer. After hardening the cap is removed and the provision is finished. A partial denture can also be modified by grinding at the sides.

**IMPORTANT!**

Before placing the bridge one should check, using an instrument or plastic analogue, if the rotating part of the torsionattachment indeed rotates. Also check the exact positioning of the torsion attachment in place in the bridge, so it can be fitted tension-free. If the rotating part of the torsion attachment does NOT move, you should have the dental technician take care of it!

The dental technician should place some silicon paste or vaseline between the torsion retainer patrix (primary part) and the bridge matrix (secondary part), before placing the torsion attachment. This to prevent cement from getting in between primary- and secondary part of the bridge. Furthermore the paste keeps the torsionretainer-patrix in place, helps in keeping the retainer rotatable and prevents the rotating torsion part from dropping out prematurely.

**IMPORTANT:**

Only put little cement on the retainer - NOT in the torsion attachment!
Modelling of a conventional bridge with torsionattachment

**Case:**
Molar 34 = crownpreparation
Molar 35 = is missing
Molar 36 = is missing
Molar 37 = crownpreparation

**a) Apply plaster hardeningmaterial and a substitute symbol laquer**
The plaster model should be hardened and the surfaces should be sealed.
This is especially important around the preparation to prevent breaking of the plaster material.
In order to create space for the cement when placing the bridge later, a substitute symbol laquer is applied on the crownpreparations in the usual way.

**b) Determine insertdirection and ideal location of the torsionattachment**
Retainer

Place the retainerholder with the retainer in the parallelogram and bring in position. Connect to the cap with wax and remove the retainerholder!

Preparation technician - connect the waxmodel with the torsionattachment and modeling the pontic

Using a wax wire or wire of burn-out plastic, the wax model is connected to the torsionretainer-matrix! Please ensure that waxmodel and torsionattachment remain at their designated places!
The kind of modeling depends on whether and how the bridge is to be shaped! One should, however, make sure that the plastic parts (torsionretainer-matrix) is well covered with wax!
Finally, the fitting of the waxmodel is checked on the working model.

Attention:
Metal free TDB conventional zirconium bridges can only be produced with copying milling equipment because of precision.

Attention,
IMPORTANT: Before placing porcelain on the metal torsionmatrix remove the secondary part of the torsionattachment from the cast bridge section so that the metal torsion matrix does not oxidize in the bridge section while placing the porcelain. Afterwards the metal torsionmatrix is put back into the bridge section; the technician should lubricate between the torsionretainer-patrix (primary) and the bridge matrix (secondary) with silicone paste.

This stops the cement of flowing between primary and secondary part during the cementation of the
Furthermore, the torsionretainer-patrix is fixed in the bridge structure by the paste, which facilitates the placement of the bridge during the cementation.

Attention:
Apply a little bit of cement on the retainer only (NOT in torsionattachment)

**Dentist: Placement of a biomechanical combined bridge with TDB torsionattachment**

The conventional mechanical bridge consists of two parts: first the single crown is cemented in the mouth. Before placing the second part (crown with interlock) one should check using an instrument, if the metal- or zirconium-matrix of the torsion attachment is able to rotate in the bridgepart (if not - the dental technician should solve the problem).

Then a little cement is placed on the crown patrix, which is already in place, after which the second part of the bridge with interlock can slide in to position tension free.
General 1

The option of combining two retainers (where a connector is placed in each pillar tooth), should, if possible, only be used in the frontal area and when replacing premolars.

Further:
During the 'settling' phase of an implant insertion

in the transition time after root treatment or root tip removal
in the regeneration stage after (a.o.) treatment of Parodontitis (etc.)

Based on high axis- and plane-parallelism-requirements and occlusion disturbances, this combination should be avoided in upper- and lower side dental area.

Specifying the retainer position on the model

Slice caps, to be used as transfer templates, are made at the lab for optimal placement of the retainer.

Placing the slice cap, made at the lab,
By using the open cap side, the clinical pillar tooth is sliced using a large fine-diamond drill in a red corner piece and leveled with for instance a Soflex-disc, to obtain a flat and large enough retainer-surface.
Marking the central drilling point

The ideal position on the proximal surface is slightly lingual/palatal from the middle. The top of the retainers edge should be 1 mm from the top of the marginal ridge. This means that the central point is 2.2 mm away from the occlusal ridge, in general as close as possible to the gingiva.

IMPORTANT:
While preparing the bridge parts, the dental technician should make sure that there is palatinal or lingual access to clean the retainer.

Predrilling the enamel

An important step of the procedure is predrilling the enamel with a small round diamond drill; this makes it possible to 'guide' drilling using the micro-drill handpiece. You should take care that the enamel is perforated deep enough, to ensure quick and efficient final preparation with the micro-drill handpiece.

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When using a zirconium or glass fiber retainer (both retainer pins have a 1.2 mm diameter), the retainer canal is prepared with a 1.2 mm drill, as described before.

The drilling angle should be at 90° of the approximal contact surface. The retainer channel is drilled in three steps under water cooling (handspray!). After each step, drill and retainer channel has to be cleansed with water. That way, obstruction of the retainer channel through dentin particles is avoided. Prepare the channel until the flange of the drill lies in the enamel. Attention: the preparation is perfect, if the enamel shows a full round ring.

ATTENTION:
When applying a crownless bridge, where a retainer is placed on both abutment teeth, one of the abutments teeth should be prepared with a small 'wing' or retention, to make sure it can not rotate!

ATTENTION:
When preparing a wing-bridge with two TDB retainers, a small retention should be prepared in one of the abutments, to avoid rotation of the constructed bridge.
**Fitting and adhesive placement of the retainer**

Use the special fitting device or a retainer without holder to fit the retainer in the prepared channel. The retainer has to be slightly recessed and completely level against the abutment tooth. If the fitting is not exact, the channel should be deepened carefully and the fitting procedure should be repeated. When you are sure of the exact fit the retainer can be cemented.

Apply rubberdam! Clean the abutment with sodiumhypochloride. Place the retainer in ethyl alcohol for some time. IMPORTANT: Never remove a retainer from the retainer holder during the process! Remove discoloration of the abutment teeth with a brush or rubber.....

Etch the preparation for 30-40 sec with 37% phosphoric acid, rinse 30 sec. with water spray and dry carefully. Apply primer/bonding according to the instructions of the manufacturer.

Apply little cement on the retainer pin and in to the channel with a small brush.

Position the retainer holder in a 90 degree angle to the occlusal/incisal surface firmly into the channel. Beware of the proper positioning of the retainer holder!!

**IMPORTANT:**

**Axis parallelism**

During the fixation process, the retainer holder should be kept in place under pressure using a Heidemann spatula.

When the cement has fully dried (takes about 6 min.), the retainer holder is removed from the retainer in occlusal/incisal direction. Remove excess cement with a brush paying extra attention to the space between retainer and gingiva. Apply glycerine gel.

**Impression**

Place the impression cap on the retainer and take the impression using any known procedure. All modern impression materials are suitable with the exception of alginate and hydrocolloid.

**ATTENTION:**

If the impression is sent to the laboratory, don't forget to include the two metal torsion matrices, the corresponding plastic modelling caps and two analogues.

**Making a temporary provision**
As with all conventional constructions, the dentist can decide if he wants to use a temporary provision to close the gap, although protecting the sliced tooth is number one priority of course. The advantage of using the provision is letting the patient adjust to the final construction.

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**IMPORTANT!**
Before placing the bridge one should check, using an instrument or plastic analogue, if the rotating part of the torsion attachment indeed rotates. Also check the exact positioning of the torsion attachment in place in the bridge, so it can be fitted tension-free. If the rotating part of the torsion attachment does NOT move, you should have the dental technician take care of it!

The dental technician should place some silicon paste or vaseline between the torsion retainer patrix (primary part) and the bridge matrix (secondary part), before placing the torsion attachment. This to prevent cement from getting in between primary- and secundary part of the bridge. Furthermore the paste keeps the torsionretainer-patrix in place, helps in keeping the retainer rotatable and prevents the rotating torsion part from dropping out prematurely.

**IMPORTANT:**
Only put little cement on the retainer - NOT in the torsion attachment!
IMPORTANT
Before each use, next to using oil, also sterilize the micro contra angle and drill!!

The micro contra-angle should be used only for drilling

Oilcleaning
retainer channels on the approximal surfaces of the abutments in mesial or distal directions.

Changing the micro drill
Open the clip and insert the micro drill as straight as possible. The round part of the bearing is faced to the front. Close the clip. The drill is developed for both mesial and distal preparations

For mesial drilling place the bearing with the micro drill facing up.

For distal drilling place the bearing with the micro drill facing down.
The 1,0 mm diameter drill is ONLY to be used for 1,6 mm TDB retainers.

The 1,2 mm diameter drill is to be used for 1,8 mm glass fibre- and zirconium-retainer.

**Cleaning, disinfection, sterilization**

**Preparation of the transfer instruments (contra angle)**

- Manual treatment
  - **Disinfection**
    - Use external disinfectant spray or wipe with biologically tested surface disinfectants (pH between 2.5 - 9; e.g. Minute Spray-classic and Minute Wipes from Alpro Medical Ltd.) or 80% ethanol
    - Wear protective gloves

- **Cleaning**
  - After use clean from the outside with cleaning cloth soaked in alcohol or a brush
  - from the inside with a cleaning and disinfectant spray (eg WL-clean/WL-dry from Alpro Medical GmbH)
  - Wear protective gloves
  
  or clean in a thermal disinfector:

  - Wear protective gloves
  - Put the Transferring instrument standing up, head upwards, in the thermal disinfector. Do NOT lay it down.
  - Only clean with mild detergent in washing water (pH between 2.5 - 9; e.g. TR-2 from Alpro Medical Ltd.)
  - Follow drying procedure
  - Dry any water residue with air gun

- **Oil treatment of the contra angle**
  - Use W & H Service Oil F1, MD-400
  - Place head on box
  - Shake box, hold vertically and spray into the coupling tube for about 1 sec
  - do this before each sterilization

  Subsequent sterilization preferably in an autoclave

- **Automated treatment**
  Carefully disinfect the outer and inner surfaces preferably using mechanical equipment for cleaning, disinfecting and maintenance (automated instrument maintenance e.g. Assistina 301 plus from W & H)

  Subsequent sterilization preferably in an autoclave
Sterilization (reliable way of sterilizing)

Steam-vacuum sterilization - Class B devices (for example, Lisa 300 and 500 from W & H) up to 135 ° C with a clean sterilization time of at least 3 minutes - use only distilled water Chemoklavierung with alcohol vapor to 135 ° C

- only put cleaned and oiled transfer instruments in the sterilizer
- sterilization after each patient is strongly recommended

Preparation of rotary instruments (drills), and used fine instruments
with instrument disinfectants listed in the VAH

machine-thermal processes are preferred (eg in a thermal disinfector from Miele)

- use washing water with a mild pH of 2.5-9 (eg TR-2 from Alpro Medical Ltd.)

If this is not available, use the immersion procedure.

- Wear protective gloves
- Don't let foreign matter dry
- Remove large organic pollution with pulp
- Follow the concentration prescriptions from the disinfectant manufacturer
- full coverage with disinfectant (eg BIB forte of Alpro Medical GmbH) is mandatory
- Stay with advised application time
- Rinse under running water
- Dry and sterilize instruments

To reinforce the cleaning action it is recommended (and mandatory in case of manual preparation) to use an ultrasound machine with special disinfectants. When using an ultrasonic bath to enhance the cleaning action, please pay attention to possible protein fixation by unsuitable disinfectants or by too high operating temperatures.

Sterilization (zuverlässige Sterilisationsverfahren)
Steam-vacuum sterilization - a Class B (for example, Lisa 300 and 500 of the company, W & H) Use up to 135 ° C with a pure Sterilisationshaltezeit of at least 3 minutes - only distilled water Chemoklavierung with alcohol vapor to 135 ° C

- sterilization after each patient is highly recommended

We refer to the joint recommendation of the Commission for Hospital Hygiene and Infection Prevention at the RKI and BfArM "Anforderungen an die Hygiene bei der Aufbereitung von Medizin produkten" 2001 and the evidence based note of the commission for hospital hygiene and infection prevention at RKI "Infektionsprävention in der Zahnheilkunde - Anforderungen an die Hygiene" 2006.