Preparation of adhesive inlays and onlays.

• Precise preparation of various bevel angles, around margins
• Prevention of undesired undercutting
• Precise preparation result
• Reproducible results
• Improved preparation margins for dental technicians
• No damage to adjacent teeth
For these complex repair techniques, the preparations and in particular the forming of the tooth margins, are outlined in the literature with precise geometrical specifications. The attempt to implement the required basic forms and margin geometries with an exclusive reliance on rotary instruments, often results in less than optimum results.

The SONICflex® prep sonoabrasive preparation tips, facilitate the complete avoidance of iatrogenic damage to adjacent teeth, whilst preparing the desired cavity geometry.

With clinically-proven, rotary instruments, old fillings and restorations may be efficiently removed and "basic preparation" performed. For "fine preparation" of bevelled proximal margins, diamond-coated instruments with oscillating motion are especially suitable. The newly-developed handpiece consists of the KaVo SONICflex® LUX 2003 L or 2008 L airancer, that oscillates within the audible range, in conjunction with various, specialised tips. These are specifically-formed, diamond-coated tips, with "non-continuous", non-diamond coated circumferential edges and "safe-sided", smooth backs. The non-diamond coated back faces the adjacent tooth surface during preparation work and indeed can be rested against it.

The enamel of the tooth is abraded by conical or ceramic inlays. There is a risk of damaging adjacent teeth, when proximal margins are prepared with rotary instruments. A common proximal margin line and bevel angles with unstable occlusal extension. In addition, irregular enamel structures are noted, when box cavities are prepared with rotary instruments.

Principles of the proximal adhesive inlay cavity
In the adhesive inlay technique, a divergence of approx. 6° degrees and a common insertion axis are required, for the occlusal cavity and the respective proximal boxes. The layer thickness of the proximal wall should be at least 1 mm. In the literature, similar bevel angles as for amalgam fillings (60° to 90°) are recommended, to achieve stable restoration margins, on the composite or ceramic inlays.

Design of tips for "adhesive inlay preparations": SONICflex® prep ceram.
For improved control during the achievement of the desired cavity geometries, a sonoabrasive preparation tip has been developed for the adhesive inlay cavity: the SONICflex® prep ceram. Its basic form is trapezoidal and the preparation surface is coated with a 46µm-diamond layer. The occlusally divergent tip has a bevel angle of 75° cervically and a bevel angle of 60° laterally. The lateral and cervical surfaces are mutually linked through a pronounced, rounded profile.

To stabilise the guidance of the tip, its rear, non-diamond coated face, is rested against the adjacent tooth. For finishing the cavity edges, these should be briefly reworked with the same attachment, powered with low drive air-pressure. In the process, the tip edge is always guided somewhat proud of the cavity edge. As the instrument is prevented from completely filling the cavity, with their different extensions, individual corrections of the lateral and cervical bevel angles are possible, by rotation about the longitudinal and transverse axes.

Sequence of fine preparation work
After initial preparation with rotary instruments, the SONICflex® prep ceram tip, making allowance for the planned insertion direction, is applied with a gentle pressure, against the lateral box wall and cervical curvature and held in position after activation of the drive. In a short time, the form of the areas of the tip that are in contact with the tooth material is transferred. Without torquing the instrument, move away from the preparation area. The cervical region and the two lateral surfaces are thus prepared.

Left: The preparation tip rests against the surface of an adjacent tooth, during fine preparation work.
Right: The desired bevel angles are achieved cervically and laterally.

Reworking with the oscillating SONICflex® prep ceram tip, produces an ideally-formed cavity in the proximal area.

There is a risk of damaging adjacent teeth, when proximal margins are prepared with rotary instruments.
General information on the application

SONICflex prep ceramic tips for preparation of laboratory-created prosthetics, are covered with a fine diamond-coating (grain size 46 µm). In the oscillation-based process, the shaping and finishing is performed with the same diamond-coating. To this end, spray cooling at a flow rate of 15 to 30 ml/min is essential, both to avoid thermal damage to the pulp and for the removal of abraded tooth material.

Optimum abrasion performance may be achieved at a maximum drive air-pressure of 3.5 bar (output pressure at the MULTItex coupling). The tips should be applied with a pressure of approx. 1.5 N. If too much pressure is applied, the abrasion power is reduced by attenuation of the oscillation.

When the ideal application pressure is used during preparation, a specific sound-level is generated that can serve as an acoustic check. For finishing and edge finishing, the drive air-pressure that can normally be adjusted with the foot pedal, should be reduced according to individual requirements, to 2 bar pressure. At the same time, the oscillation amplitude can be reduced by increasing the application pressure and hence the control of the instrument can be improved. The SONICflex 2003 L or 2008 L should be set to power level i for finishing work.

Clinical case studies

1.1 The gold inlay on tooth 17 is loose.

1.2 After removal of the inlay, the real extent of secondary caries is clearly visible.

1.7 Empress® inlay for tooth 17. The rounded, proximal-cervical transitions, may be clearly seen.

1.8 Situation with adhesively-fixed Empress® ceramic inlay, on tooth 17.

Evaluation

The desired geometry, or that predetermined by the tip, can be transferred to the initial cavity with the fine preparation described above, while conserving healthy tooth tissue. Only enough tooth material is removed, as is required to reproduce the form predefined by the instrument, in the marginal extremities of the cavity. Proximal cavities, minimal occlusal divergence, margins formed to the nearest degree and evenly rounded proximo-cervical curvatures, may be easily created.
Clinical case studies

2.1 Initial situation with several inadequate composite inlays, in teeth 25 to 27.

2.2 Precise tip-guidance during proximal preparatory work on the box, is significantly simplified with the oscillating tip, even with steeply lying cavity edges.

2.3 The proximal sections of the inlay exhibit even layer thicknesses and proximal-cervical transitions.

2.4 Teeth 25 to 27 with rubber dam, for adhesive fixing of the ceramic inlay.

2.5 Teeth 25 to 27, seen in the follow-up check one year later.

3.1 Initial situation, with amalgam fillings in need of replacement.

3.2 Prostheses for teeth 24 to 27 - adhesive inlay and onlay restorations from Empress®.

3.3 Situation after removal of the failed amalgam fillings and caries excavation with rotary instruments.

3.4 After application of a dental adhesive, partial, structural fillings with light-cured composite (Tetric Flow® and Tetric® Ceram, VIVADENT, Schaan) are produced.

3.5 SONICflex® prep ceram tips were exclusively used for proximal box preparations.

3.6 Final result with integrated Empress® restorations.

Advantages of using SONICflex® prep

- No damage to adjacent teeth
- Precise transmission of the tip’s geometry to the marginal cavity angles
  - no underrun undercutting
  - specific achievement of the bevel angles
  - harmonious transitions between cervical and lateral edge areas
- Marginal areas and preparation surfaces are smooth and free from defects
- Improve dental restoration by optimisation of cavity form
- Suitable for all fully ceramic, or fine-grain, hybrid composites (e.g. CEREC®, EMPRESS®, TARGIS VECTRIS®,...)
- Reproducibility of treatment results
- Reduction of treatment stress in critical processes
- Reduction of the “skill-dependency” of complex preparatory work, due to ease of operation
- Reduction of duration of preparatory work
- Conservation of healthy tooth tissue

Literature


Hugo, B.: Entwicklung und Anwendungsmöglichkeiten oszillierender Verfahren in der Präparations-technik (Teil II) [Development and applicati-on possibilities of oscillatory processes in preparation techniques (Part II)]. DZZ 52, 11/97, S. 718-727

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Deliverable forms

<table>
<thead>
<tr>
<th>Tip set with 2 tips, distal and mesial</th>
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<tbody>
<tr>
<td>SONICflex® prep ceram</td>
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<td>SONICflex prep gold</td>
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<td>SONICflex® prep CAD/CAM</td>
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<td>Torque wrench</td>
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<td>Case for tips</td>
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