In this first of two articles we will discuss the technical side of the telescopic dentures before presenting the clinical side in the second part. Telescope prosthesis or double crowns are a proven option for the prosthetic treatment of dramatically reduced dentition (fewer teeth might serve in some cases as an alternative to implants). However, the production of such a prosthesis demands high technical skills on the side of the dentist and the dental technician. Of equal importance is a good communication between dentist and technician. These are the main keys to a successful case.

The telescopic attachment consists of two parts:
1. The primary (inner) crown, or coping, which is permanently fixed to the anchor teeth, and is preferably made out of a precious metal, a high gold alloy. 2. The secondary (outer) crown implemented in to the prosthesis, made out of the same alloy.

The usual type of double crown system next to the conus type is the parallel telescopic crown. They are named due to the fact that all surfaces from the primary (inner) and the secondary (outer) telescopic are not only parallel to each other but also parallel to the axis of each incorporated tooth. However in the case of a conus telescopic system a 4 degree angle of both telescopes to the axis of the tooth is aimed for, provided by the exact preparation of the dentist.

Indications
Double crowns can be used in the following situations: where there is a strongly depleted dentition uncertain prognosis of individual teeth in a periodontally damaged jaw (existing bone depletion, increased loosening of the anchor teeth) with a suboptimal distribution of the remaining teeth for the retention of removable bridges

The almost universal applicability is characteristic for this anchoring system. Telescopic crowns can be applied as clasp-free connecting elements with purely periodontally and periodontally-gingivally supported partial prostheses.

The pros and cons of double crowns

Advantages of the telescopic system:
• a predominantly axial loading of the pillars leading to a favourable distribution of force protection of the anchor teeth from decay
• the option of primary splinting for the securing and fixing of loose teeth
• integrated tilt-avoidance
• a straightforward ability to extend the prosthesis even up to a full denture the aesthetic advantage as no clasps are used the beneficial and straightforward treatment and control of the parodontium and the internal coping can be used as a cost effective alternative to implants

Disadvantages of the telescopic system:
• requires a high technical effort
• correspondingly higher costs
• over sizing of the secondary crowns if the pile has not been efficiently reduced
• in comparison to a PMF crown higher tooth substance loss in preparation can only be coated/veneeried with composites

How double crowns work

Physical principles

The patient expects the prosthesis to be easily inserted and removed. At the same time, the prosthesis has to be sufficiently attached so that it cannot be leveraged off by motion during speech and eating. In order for these conditions to be met, you need certain physical preconditions. These are explained below.

In order to achieve a hold between the primary and secondary telescopic, these have to fit in a particular manner. There are three different types of fit:

1. a clearance fit, in which there is still a small bit of give/play
2. the medium fit, in which there is a large tolerance or oversizing before the joining of the components (which gives totally useless telescopic crowns)
3. the pressure fit, where the components are tight and interact such that friction is created during fitting

On the principle that both crown pieces have to join exactly and without obstruction, parallel telescopic crowns are always pressure fittings; this is why telescopic crowns are preferably made from precious alloys, because of their high elasticity.

The importance of friction

The inner and outer telescopes are joined together by friction. Stated simply, the friction is due to the interaction between the surface layers of the inner and outer telescope. The binding forces of the telescopic crowns are therefore a consequence of this friction.

Friction in telescopic crowns is a value that is difficult to measure. It is principally dependent on the technical construction of the crown, which is influenced by the following factors:

• the number of the planned telescopic crowns
• the length of the friction surfaces of the individual tooth and also the sum of all available telescopes
• the placement of the friction surfaces relative to one another. Only oppositely facing parallel surfaces can provide the required friction with the elasticity of the materials, which is why gold alloys are generally used
• the quality of the work

A prosthesis has to be prepared in such a way that the patient can insert it without difficulty. Additionally, it must provide the feeling of fitting firmly.

The denture should also be removable without difficulty whilst not loosening at the wrong moment or due to sticky foods. The criteria must remain valid over a longer period of wear.

Note: The force required for removal of the prosthesis:

250–500 P is regarded as acceptable to patients. The maximal force required for removal should not exceed 650 P, as with higher levels the patient can often not remove the prosthesis.

Achieving the correct friction of the individual telescopic components is only possible with considerable experience and skill by both parties technically involved: the dentist and the dental technician, and their interdisciplinary communication. The success also depends on the precision of each step.

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and each detail.

Conclusion to Part 1
We have given you an overview of the technical aspects of telescopic prostheses or double crowns and their almost universal applicability. The basic principles of how they work and the importance of achieving the right level of friction are described. Success is dependent on good communication and technical skill on both the dentists and the technical laboratory's part.

In the next article of “Part 2 of precision dental prosthetics with highly engineered connections” we will illustrate the clinical side to the telescopes or double crowns, i.e. the planning and preparation required.

References