PSN-EAO
09PS1-407

The “Conical Bridge”

a fully CAD-CAM based, implant supported telescopic system:

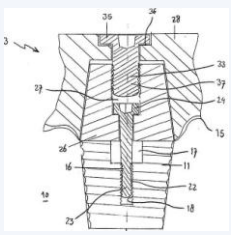
Bettens R.[1], van Werkhoven T.[2], Bogaert F.[3] , Vanderbeken G.[4], De Vleeschouwer K.[4], Hanssen S.[5]

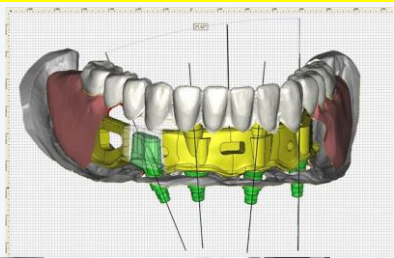
1. Maxillofacial surgeon, Drs. Bettens-De Pooter, H.-Hartziekenhuis Roeselare-Menen, Wilgenstraat 2, 8800 Roeselare, Belgium (rbettens@hhr.be)
2. Denturist, TPP van Werkhoven, Moergestelseweg 18, 5062 JW Oisterwijk, the Netherlands
3. Dentist, Dental Clinic Bogaert, Aalterstraat 82, 9880 Aalter, Belgium
4. Dental Technicians, Dental Labo Vanderbeken, Zandvoordeschorredijkstraat 42, 8400 Oostende, Belgium
5. CAD supervisor, ES Healthcare NV, Researchcampus 10, 3500 Hasselt, Belgium

Topic: Technical and biological complications

Introduction

Traditionally the choice between a fixed or removable implant borne restoration is crucial in the treatment of the edentulous jaw and this decision should be made prior to implant placement. Both treatment options have their drawbacks. While fixed suprastructures offer more comfort and a psychological advantage, cleaning issues and problems with speech or esthetics may negatively affect the outcome. The concept of a “removable bridge” supported by telescopic abutments on implants is not new. Although this treatment option eliminates most problems associated with a conventional fixed or removable prosthesis on implants, the high costs and labor-intensive laboratory procedures required for telescopic abutments have minimized the application of this concept.



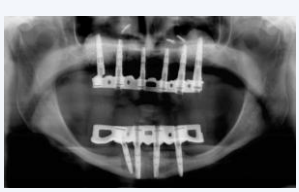


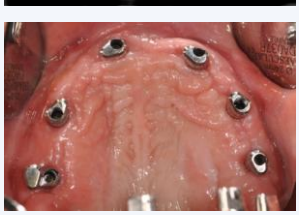
The “Conical Bridge”: concept, design and manufacturing, clinical phase

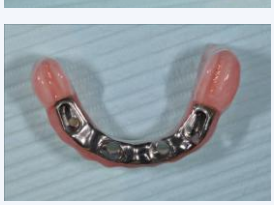
The second author (vWT) has updated the old telescopic technique to a fully CAD-CAM driven procedure, suitable for all contemporary implant brands. The patented “Conical Bridge” has the same clinical advantages as the traditional conical systems, but the application of CAD-CAM technology (E.S. Healthcare N.V., Hasselt, Belgium) greatly simplifies the procedure for the dental technician and restorative dentist, thereby reducing costs.

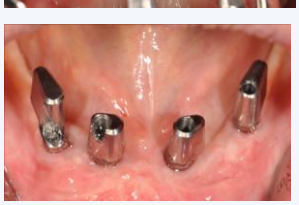
The **Computer Assisted Design** has only 2 components: the conical abutments and the metal framework, which both are designed and manufactured at the same time. The conical abutments are completely custom-made and can correct for large discrepancies between ideal and actual implant position and angulation. Hence implants can be placed with a bone oriented approach in difficult cases (e.g. skeletal malocclusions, severe atrophies). By altering the height and width of the abutments, frictional retentive forces can be regulated at lib. The metal framework is also completely tailor-made and obviates the need for separate female and reinforcing components. Less interarch space is needed when compared to classical telescopic systems. The conical bridge can be used as a removable or a fixed bridge. In the latter situation 2 abutments are provided with screw retention. As a fixed Conical Bridge can easily be converted into a removable bridge (and vice versa), the patient has a permanent choice between fixed and removable.The **Computer Assisted Manufacturing** process through milling of titanium or chrome-cobalt guarantees the highest standard of precision.

Not only the laboratory phase, but also the **clinical phase** is greatly simplified. The framework is used to insert the abutments in the patients mouth, so a separate positioning jig is not needed . The metal framework and its telescopic connection with the abutments rigidly connects the implants, which makes this suprastructure suited for early loading. The use of the framework to seat the abutments prevents rotational forces on the early loaded implants by its precise fit. Due to the fact that all the data needed for production of the abutments and framework are fully digitalized, the reproducability is excellent, which greatly facilitates renewal or repair.









Case Study

This 60 year old female patient has been edentulous for 37 years wearing complete upper and lower dentures. This has resulted in severe vertical atrophy of the mandible and marked horizontal resorption of the maxilla. She suffered from pain and instability of both dentures. Cranial bone onlay grafting was performed to reconstruct mandibular height and maxillary width. Bilateral sinusfloor elevation was executed using the window technique. Temporary implants were used to protect the onlay grafts and to stabilize the dentures during the healing phase of the bone grafts. Six months after the first surgery 6 Xive implants (Dentsply-Friadent, Mannheim, Germany) were placed in the upper jaw and 4 Xive implants were placed in the lower jaw. Three weeks later final impressions on implant level were taken. The most distal implants in both right lower and right upper jaw (regions 1.6 and 4.4) were in a prosthetically less favourable position. The conical abutments on these implants were designed in an off-centered position. Six weeks after implant placement two removable “Conical Bridges” were delivered (Dental Labo Vanderbeken, Oostende, Belgium).

Conclusion

The Conical Bridge combines the clinical advantages of a telescopic implant supported bridge with the ease of production through CAD-CAM technology. It is a viable alternative to a conventional fixed or removable prosthesis. It is suitable for all contemporary implant brands.

Legend of Figures

1. Top row, left: Cross-section of Implant Neck, Conical Abutment with optional screw retention for a fixed bridge and Metal Frame;
   Top row, right: CAD of lower Conical Bridge (see case study)
2. Second row, left: Pre-op lateral headfilm of case study;
   Second row, right: After cranial bone grafting (notice difference in hard and soft tissue profile)
3. Third row, left: Cranial maxillary grafts and temporary implants (peroperative view);
   Third row, right: Panoramic X-ray of the final result with Conical Bridges in upper and lower jaw
4. Fourth row, left: Maxillary Conical Bridge (notice off-centered access hole for the screw of abutment 1.6);
   Fourth row, right: Maxillary abutments in the mouth (notice abutment design for correction of the palatal position of implant 1.6)
5. Fifth row, left: Mandibular Conical Bridge;
   Fifth row, right: Mandibular abutments (notice increased height of the abutments and distal extensions of the abutments)

Presented at the 18th Annual Scientific Meeting of the European Association of Osseointegration – 30 September-3 October 2009, Monaco, France