Successful full mouth fixed rehabilitation of a mutilated dentition is always a prosthetic and surgical challenge. Accurate diagnosis, proper treatment planning, prudent choice of prosthetic materials and meticulous treatment execution are essential for a successful treatment outcome over a long period. The treatment of a partially edentulous oral cavity using a combination of immediate-loading and delayed-loading implant-supported porcelain-fused-to-metal and full-ceramic restorations is presented in this report.

Introduction
Prudent clinical judgement and careful balancing of the risks and benefits of various treatment options are essential for a predictable long-term treatment outcome for prosthetic treatment. It is known that loss of the vertical dimension of occlusion (VDO) may pose significant clinical difficulties in prosthetic treatment. The clinical procedures for the re-establishment of a new therapeutic vertical dimension of occlusion is seldom taught in undergraduate dental curricula. VDO is defined as the superior-inferior measurement between two points when the occluding elements are in contact. Various methods have been proposed for the clinical assessment of the VDO. Loss of the tooth structure does not necessarily equate to loss of the VDO, as the VDO may be maintained as a result of compensatory dental eruption. When the clinical loss of the VDO is small, accurate diagnosis can be difficult. In this case study, the management objective was to determine whether there was any need for the re-establishment of the VDO in the case of small loss and whether the proposed change in the VDO was clinically acceptable. When the loss of the VDO is small, any change in the VDO should be based on the amount of interocclusal space required to restore the dentition to proper form and function. A significant alteration of the VDO should be approached with care, and unnecessary, excessive changes of the VDO should be avoided. In general, a significant change of the VDO should be monitored over an extended period.

Improvements in macroscopic implant morphology and surface treatments have led to the reduction of healing time and the concept of immediate loading of implants. Early implant loading is a successful protocol in selected cases. Providing that sufficient bone volume is available, flapless surgical implant placement is predictable and patients experience minimal post-surgical discomfort.

The posterior maxilla presents a unique challenge to implant placement when minimal bone height remains inferior to the sinus floor. Pneumatisation of the maxillary sinus occurs after extraction of molars. In addition, the posterior maxilla has poorer bone quality, mainly Type IV bone.

Placement of implants in grafted bone sites has a high success rate of osseointegration. Several authors have reported an approximate 92 per cent success rate of implants after sinus augmentation. However, immediate implant loading under such conditions is generally avoided. The low failure rate may be attributed to the placement of implants of greater lengths in grafted bone sites.

This case study describes the team approach management of a mutilated dentition, using different types of combinations.
Influence of surface properties on osseo-integration

A biomechanical and histological study in the rabbit

Jan Gottlow, Sargun Barkarno & Lars Sørensen

Sweden

The first objective of the present study was to compare shear strengths at the bone-implant interface between the SLActive implants and the TiUnite implants. The second objective was to compare the bone-to-implant contact between the two different surfaces. The hypothesis of the study was that SLActive implants would promote a superior osseointegration to the TiUnite implants, as evaluated by biomechanical and histological means.

Thirty rabbits with a minimum age of four months were chosen for the study. Two test implants (Standard Plus, Ø 4.1 mm, RN, SLActive, 8 mm) and two control implants (Re-place Select Taper, Ø 4.3 mm, TiUnite, 10 mm, corresponding to 8.5 mm TiUnite) were inserted in the tibia, and one test and one control implant were inserted in the femur. The left and right side were randomised for test and control implants. Ten rabbits per time point were evaluated after ten days, three weeks, and six weeks of healing. Ten test and control implants per time point placed in the tibia were subject to shear-strength testing. Thereby, the removal torque values were measured and the shear-strength values subsequently calculated.

Histomorphometrical investigation was performed on all implants.

At ten days of healing, the SLActive implants yielded higher mean shear-strength values than the TiUnite implants without statistical significance. At three weeks and six weeks of healing, the SLActive implants yielded higher mean shear-strength values than the TiUnite implants (Fig. 1) with statistical significance.

The histomorphometrical investigation for the second objective of the study is still in progress. Thus far, this study strongly suggests that the interface shear strength of titanium implants is significantly influenced by their surface characteristics. The SLActive surface demonstrated higher shear strength with statistical significance in the tibia of rabbits compared with the TiUnite surface at three and six weeks after implant placement.

* p = 0.001 after three weeks; p = 0.002 after six weeks

Fig. 1. Shear strength (N/cm²) after ten days, three weeks, and six weeks after implant placement.

Jan Gottlow is a licensed specialist in Periodontics from Gothenburg in Sweden. He can be contacted at info@gottlowdental.com.
Margins of the tooth preparations were kept supra-gingival, and no gingival displacement procedures on the prepared teeth were necessary.

Upon completion of the crown preparations, six endosseous implants (Nobel-Replace, Nobel Biocare) were placed by the periodontist in the posterior mandible using a flapless surgical protocol. All implants were placed with 45 Ncm insertion torque (Fig. 5). No surgical template was used during the surgical phase; the prosthodontist was present during the implant surgery to ensure implant placement was prosthetically acceptable.

Pick-up type implant impression copings (NobelReplace, Nobel Biocare) were attached to the newly placed mandibular implants. High-viscosity vinyl polysiloxane material (Aquasil Ultra Heavy, DENTSPLY DeTrey) was carefully injected onto all tooth preparations and the implant impression copings. A stock polystyrene tray loaded with putty material (Aquasil Putty, DENTSPLY DeTrey) was seated over the entire dental arch to make the definitive mandibular impression. The definitive mandibular impression was made in the usual manner. A centric relation record was made with a vinyl polysiloxane material (Regisil PR, DENTSPLY DeTrey).

The development of the definitive crown restorations was carried out as usual on the definitive casts. Except for the maxillary right molars, all maxillary and mandibular crowns supported by natural teeth were restored with Cercon (DeguDent) full ceramic crowns. Prefabricated abutments (NobelReplace, Nobel Biocare) were custom milled with a six-degree taper in the dental laboratory to facilitate the development of the restorations. Splinted, cement retained, implant-supported mandibular restorations with porcelain occlusal surfaces were made of porcelain fused to metal material.

On the day of restoration delivery, the mandibular implant abutments were torqued down to 52 Ncm. The abutment screw holes were sealed with guttapercha (Mynol, Block Drug Company). All the definitive crowns were cemented in resin-modified glass-ionomer luting agent (RelyX Unicem, ESPE). The insertion of crowns was followed by implant placement in the maxillary arch.

In the presence of the prosthodontist, three endosseous implants (NobelReplace, Nobel Biocare) were placed by the periodontist in the right maxillary posterior area.

Panoramic radiograph after insertion of the crowns. Additional implants were placed in the maxillary posterior areas.

The treatment required a small increase in the VDO. It was therefore necessary to make impressions that registered all tooth preparations simultaneously.

The patient desired a high level of aesthetics; full ceramic restorations were chosen for the anterior teeth. As the minimum core thickness for this full ceramic system is 0.4 mm, this enabled conservation of tooth structure while achieving excellent aesthetics.

Traditional porcelain-fused-to-metal anterior crown restorations require the placement of labial crown margins within the gingival sulcus, in order to mask the transition between the root surface and the porcelain-fused-to-metal restoration. By prescribing full-ceramic restorations, intra-sulcular placement of crown margins on the labial surface becomes less important from an aesthetic standpoint.

In this report, cervical crown tooth structure of the anterior teeth was free of caries, teeth preparation margins were made at the gingival level and gingival retraction procedures were eliminated. As gingival retraction cord packing was not required, mechanical trauma to the gingival tissues was reduced and significantly less clinical time was required. This is particularly beneficial for individuals with thin gingival biotypes.

Porcelain-fused-to-metal restorations were used in the posterior teeth because of the well-documented long-term clinical track record of this restoration. In order to maximise the aesthetic outcome, porcelain occlusal surfaces were prescribed.

Conclusion

The clinical management of an aesthetically demanding, complex functional prosthodontic rehabilitation is a clinical challenge. Various restorative materials were used for this treatment. A combination of full ceramic restorations and porcelain-fused-to-metal restorations with porcelain occlusal surfaces enhances the overall aesthetic outcome, as well as functional predictability. Various surgical and implant-loading protocols were used, to ensure optimal results.

About the authors

Dr Angsar Cheng obtained his dental training from the University of Hong Kong, his prosthodontics specialty training from Northwestern University, USA, and his Certificate in Maxillofacial Prosthodontics from UCLA, USA. He is a Consultant Prosthodontist with Specialist Dental Group in Singapore. Dr Cheng can be contacted at drcheng@specialistdentalgroup.com.

Dr Helena Lee obtained her dental training at the National University of Singapore and her periodontics specialty training from the University of London-Eastman Dental Institute, UK. She is a consultant periodontist with Specialist Dental Group™ in Singapore. Dr Lee can be contacted at drlee@specialistdentalgroup.com.

Specialist Dental Group: www.specialistdentalgroup.com