Treatment options for the edentulous arch

The implant-retained overdenture
The implant-retained overdenture is described as a prosthesis that is supported, and is supported by, the natural tissues retained by the dental implant; the prosthesis is not attached to the mandible as is the case with a conventional hybrid overdenture, but is supported by the patient's natural dentition. It is a removable prosthesis that is supported by the dental implant. The patient is responsible for the care and maintenance of the prosthesis, and it is designed to simulate the natural dentition as closely as possible. The prosthesis is supported by the dental implant, and the patient is responsible for the care and maintenance of the prosthesis. The prosthesis is designed to simulate the natural dentition as closely as possible. The patient is responsible for the care and maintenance of the prosthesis.

The hybrid prosthesis
The hybrid prosthesis is a combination of a fixed bridge and a removable overdenture. It is used when there are two or more implants placed in the anterior region. The prosthesis is supported by the dental implant, and the patient is responsible for the care and maintenance of the prosthesis. The prosthesis is designed to simulate the natural dentition as closely as possible. The patient is responsible for the care and maintenance of the prosthesis. The prosthesis is supported by the dental implant, and the patient is responsible for the care and maintenance of the prosthesis. The prosthesis is designed to simulate the natural dentition as closely as possible. The patient is responsible for the care and maintenance of the prosthesis.

ATLANTIS Conus concept: the removable implant-support ed bridge
As described above, the tissue-supported overdenture performs best with only two implants placed in the anterior region. When more than two implants are placed, the goal should be to provide a completely implant-supported result. The ATLANTIS Conus concept (DENTSPLY Implants) provides the optimal functioning convenience of a fixed hybrid but also allows patient retrievability for uninstrumented oral hygiene practice, regardless of the degree of ridge lap. It is in effect, a prosthesis that can be removed by the patient, with the stability of a fixed bridge.

Case Report
A 73-year-old woman with a history of 11 years of complete edentulism of the maxilla and mandible, and five endosseous implants in the anterior mandible, presented with a chief complaint of a non-retainable and unstable lower denture. The implants were standard diameter, externally hexed, Branemark fixtures. She had a moderate resorption of both the maxillary and mandibular residual ridges (Fig 1). The patient had bone loss involving the implant bodies but comparing the radiographic evidence available, documenting her condition through the years, it appears the bone loss occurred soon after implant placement and no appreciable change was seen thereafter. During those 11 years, her treatment history included initial retention of the implants with a complete denture retained by the locator at-tachment system (Zest Anchors), and the maxilla was restored with a complete denture. She advised that the result was unsatisfactory as the lower denture displaced during function.

The concept centers around patient-specific attachments, each milled to 3 degree convergence, and parallel to each other in the dental arch. The goal is for at least four implants in the mandible and four to five implants in the maxilla. These uniquely designed, conical attachments are designed to correspond with a friction fit (IDENTIFY) which are incorporated into the prosthesis. The result is a friction fit, stable, retrievable and fully implant-supported bridge that remains removable by the patient.
ments used to retain the lower prosthesis. The attachment male components were secured intra-orally using autopolymerizing acrylic resins to minimize the possibility of laboratory error. The patient continued to experience problems with the lower denture coming loose during function and consequently frequent replacements of the nylon male inserts, replace- ment with Extended Range Inserts did not improve the performance. The metal abutments demonstrated considerable wear as well (Fig. 6). Releasing the locking mechanism did not improve the analogy to an acceptable degree to completely cover the coping-analog interface. The impres- sions were boxed with wax and poured in vacuum-mixed die stone to prevent cracking. The impression coping screws were removed and the impressions were separated from the cast. Standard laboratory procedures were followed in clean- ing and trimming the working casts. After casting, the cast abutments were again removed to confirm the seating of the abutments in the patient. The working cast was then duplicated and the duplicate cast was used to retain the lower prosthesis. A one-in refractory material for fabri- cation of the lower prosthesis. The attachment male compo- nents of the lower prosthesis were torqued to 20 Ncm, appropriate for the implants involved. The SynCone caps were placed and viewed with magnification to assure that they were not sub- stantially over the gingival tissues (Fig. 13). The prosthesis was placed over the caps to verify there was no abstraction of complete seating. The prosthesis was removed and worn holes were drilled through the bucc- pal aspects of the acrylic resin to relieve hydraulic pressure during capture of the caps. The SynCone caps were placed and the retention was checked for hardness and after an additional minute the mould copy of clear acrylic resin was made. The patient was scheduled for com- pletion of treatment. The Locator abutments were again removed and Teflon tape was placed in the implant excluded from the design. The abutments were secured onto the cast metal frame (Fig. 12), and the clear cast matrix was perfectly oriented. The locking design as dots on the ma- trix superimposed with those on the abutments. Once verified, the abutments were torqued to 20 Ncm and the prosthesis was seated. The patient was satisfied she would experience no difficulties performing this. The clear, duplicate copy of the bridge was seated onto the abutments us- ing a chair-side soft lining material (Fig. 19). This copy serves as a temporary de- vice for the patient to wear when cleaning the finished bridge or when sleeping to protect the tongue from scraping against the abutments. A panoramic radiograph was taken at completion of treatment (Fig. 19). The patient returned after one week and again after six weeks, and report- ed that the lower bridge did not move at all during function and stayed seated until she removed it. She commented on the ease of cleaning the dental abutments, and she reported no discomfort and no food entrapment. Overall, the pa- tient was very pleased with the result (Fig. 20).

Clinical and laboratory procedures

Because the existing dentures were made within the last five years and were acceptable with regard to tooth position and vertical dimension, it was decided that clear, acrylic resin duplicates of each denture would be made to serve as custom trays. Double-sided impressions of each denture were made and delivered to the dental laboratory for fabrication of the duplicates. Once processed, the cast abutments were shortened by 2 mm to allow border mold- ing. The duplicate of the mandibular denture were made and delivered to the patient for final im- pression copings were prepared and placed in the patient’s mouth over the abutments. The completed mandibular bridge was superimposed with those on the abutments. Once verified, the abutments were torqued to 20 Ncm, appropriate for the implants involved. The SynCone caps were placed and viewed with magnification to assure that they were not sub- stantially over the gingival tissues (Fig. 13). The prosthesis was placed over the caps to verify there was no abstraction of complete seating. The prosthesis was removed and worn holes were drilled through the bucc- pal aspects of the acrylic resin to relieve hydraulic pressure during capture of the caps. The SynCone caps were placed and the retention was checked for hardness and after an additional minute the mould copy of clear acrylic resin was made. The patient was scheduled for com- pletion of treatment. The Locator abutments were again removed and Teflon tape was placed in the implant excluded from the design. The abutments were secured onto the cast metal frame (Fig. 12), and the clear cast matrix was perfectly oriented. The locking design as dots on the ma- trix superimposed with those on the abutments. Once verified, the abutments were torqued to 20 Ncm and the prosthesis was seated. The patient was satisfied she would experience no difficulties performing this. The clear, duplicate copy of the bridge was seated onto the abutments us- ing a chair-side soft lining material (Fig. 19). This copy serves as a temporary de-vice for the patient to wear when cleaning the finished bridge or when sleeping to protect the tongue from scraping against the abutments. A panoramic radiograph was taken at completion of treatment (Fig. 19). The patient returned after one week and again after six weeks, and report- ed that the lower bridge did not move at all during function and stayed seated until she removed it. She commented on the ease of cleaning the dental abutments, and she reported no discomfort and no food entrapment. Overall, the pa- tient was very pleased with the result (Fig. 20).

Figure 7. Design images showing thecourtooth and bite position of the duplicate abutment and proposed design of the ATLANTIS Conus Abutments

Figure 8. ATLANTIS Conus Abutments on the working cast. Each abutment has the tooth number location scored on the buccal- surface facing

Figure 9. SynCone caps are seated on the abutments on the working cast. An impression of this arrangement is made to fabricate a cast metal frame to reinforce the final restoration

Figure 10. Completed laboratory restoration, note the termi- nation at the first molar to avoid excessive cantilever length. The chrome frame is snapped on the functional side to preventgray show-through.

Figure 11. Completed laboratory restoration showing the metal frame and acrylated area to receive the SynCone caps

Figure 12. ATLANTIS Conus Abutments seated. Note the “mar- gins” of the abutment, and the area where the parallel prepara- tion begins, is supra-gingivally positioned

Figure 13. SynCone caps are fitted to the abutments to verify un-abstracted and complete seating

Figure 14. Rubber dam is placed over the abutments to prevent pick-up material from licking into undercuts areas below the pre- pared margin. SynCone caps are seated and ready to be captured into the prosthesis

Figure 15. ATLANTIS Conus Abutments seated. The patient continued to experi-ence problems with the lower denture coming loose during function and consequently frequent replacements of the nylon male inserts, replace-ment with Extended Range Inserts did not improve the performance. The metal abutments demonstrated considerable wear as well (Fig. 6). Releasing the locking mechanism did not improve the analogy to an acceptable degree to completely cover the copping-analog interface. The impres- sions were boxed with wax and poured in vacuum-mixed die stone to prevent cracking. The impression coping screws were removed and the impressions were separated from the cast. Standard laboratory procedures were followed in clean- ing and trimming the working casts. After casting, the cast abutments were again removed to confirm the seating of the abutments in the patient. The working cast was then duplicated and the duplicate cast was used to retain the lower prosthesis. A one-in refractory material for fabri- cation of the lower prosthesis. The attachment male compo- nents of the lower prosthesis were torqued to 20 Ncm, appropriate for the implants involved. The SynCone caps were placed and viewed with magnification to assure that they were not sub- stantially over the gingival tissues (Fig. 13). The prosthesis was placed over the caps to verify there was no abstraction of complete seating. The prosthesis was removed and worn holes were drilled through the bucc- pal aspects of the acrylic resin to relieve hydraulic pressure during capture of the caps. The SynCone caps were placed and the retention was checked for hardness and after an additional minute the mould copy of clear acrylic resin was made. The patient was scheduled for com- pletion of treatment. The Locator abutments were again removed and Teflon tape was placed in the implant excluded from the design. The abutments were secured onto the cast metal frame (Fig. 12), and the clear cast matrix was perfectly oriented. The locking design as dots on the ma- trix superimposed with those on the abutments. Once verified, the abutments were torqued to 20 Ncm and the prosthesis was seated. The patient was satisfied she would experience no difficulties performing this. The clear, duplicate copy of the bridge was seated onto the abutments us- ing a chair-side soft lining material (Fig. 19). This copy serves as a temporary de-vice for the patient to wear when cleaning the finished bridge or when sleeping to protect the tongue from scraping against the abutments. A panoramic radiograph was taken at completion of treatment (Fig. 19). The patient returned after one week and again after six weeks, and report- ed that the lower bridge did not move at all during function and stayed seated until she removed it. She commented on the ease of cleaning the dental abutments, and she reported no discomfort and no food entrapment. Overall, the pa-tient was very pleased with the result (Fig. 20).
Intraoral welding and lingualized (lingual contact) occlusion: a case report

By Dr. Luca Dal Carlo, Dr. Franco Rossi, Dr. Marco E. Pasqualini, Dr. Mike Shulman, Dr. Michele Nardone, MD, Tomasz Grotowski, Dr. and Sheldon Winkler

Intraoral welding was developed by Pierluigi Mondani of Genoa, Italy, in the 1970s to permanently connect submerged implants and abutments to a titanium wire or bar by means of an electric current (Fig. 1). The current is used to permanently fuse the titanium to the abutments in milliseconds, so the heat generated does not cause any pathology or patient discomfort.

If possible the implants are placed without flaps. The titanium wire or bar is bent and aligned passively to the contour of the labial and lingual surfaces of the implants before applying the electric current to permanently connect titanium implants.

The technique follows a strict surgical and prosthodontic protocol, which includes using a number of implants close as possible to the number of teeth to be replaced, achieving primary stability by engaging both cortical plates (bicorticalism), immediate splinting of the implants utilizing intraoral welding and immediate insertion of a fixed provisional prosthesis with satisfactory occlusion. The technique provides for immediate loading and does not jeopardize the integration process.

Although intraoral welding has been used successfully in Europe, especially Italy, for many years, it has yet to achieve everyday use in the United States.

Members of the Italian affiliate of the American Academy of Implant Prosthodontics, NaavoOSI, have long and successful experiences with immediate loading of maxillary implants connected together by intraoral welding.

By inserting the prosthesis with adequate retention and stability the same day as the surgery, patient complaints and discomfort can be avoided or substantially reduced. The instantaneous stability that results from the splinting can reduce the risk of failure during the healing period. Intraoral welding can also eliminate errors and distortions caused by unsatisfactory impression making, as the procedure is performed directly in the mouth.

Intraoral welding can fulfill a great need for business and socially active patients who desire to return to work immediately after dental surgery. It requires a minimum amount of time and does not jeopardize the integration of the implants.

Pierluigi Mondani1 of Genoa, Italy, and Dr. Luca Dal Carlo have successfully used the Mondani intraoral welding unit to fix maxillary and mandibular teeth. In the United States, the introduction of this technique has been slow. There are long and successful experiences with intraoral welding.

Although intraoral welding has been used successfully in Europe, especially Italy, for many years, it has yet to achieve everyday use in the United States.

Winkler, Tomasz Grotowski, Dr. and Sheldon Winkler

Fig. 1. Schematic drawing of Mondani intraoral solder unit

Fig. 2. Preoperative panoramic radiograph of 50-year-old caucasian woman

Fig. 3. Nonrestorable teeth visible after removal of the patient’s prosthesis

Fig. 4. Eight titanium one-piece implants are inserted.

Fig. 5. Immediate stabilization of the eight implants and two additional implants previously inserted in the posterior regions by welding each implant to a 2.5 mm supporting titanium bar

Fig. 6. Panoramic radiograph after 90 days suggests complete integration

Fig. 7. Healthy gingiva was observed after 90 days

Fig. 8. Lower implants welded together intraorally

Fig. 9. Three-tooth mandibular fixed prosthesis

Fig. 10. Seven-year follow-up radiograph shows satisfactory preservation of bone surrounding all of the implants

Fig. 11. Intraoral photograph of the definitive prosthesis shows healthy gingiva
Discussion
The number of implants placed for an edentulous patient should be based upon whether the design is to be implant-assisted or implant-supported. If the goal is a minimalistic design utilizing the soft tissue for support, two implants using locator attachments are appropriate to retain a mandibular denture and will provide a predictable outcome. However, when more than two implants are used, resilient overdenture retainers are employed, they are not a corresponding linear increase in retention of the denture and the result may suffer. Therefore, when at least four implants are planned, the restoration should be designed as implant-supported to maximize the value of the patient’s greatest investment.

This article discusses just such a situation where a patient had experienced a greatly decreased lower jaw due to the use of the ATLANTIS Conus concept, a successful result was achieved without the greater expense of a fixed hybrid. The final result was functionally effective enough to be a fixed restoration while providing lip and cheek support of a removable prosthesis without compromising or obstructing oral hygiene.

The clinical design of the ATLANTIS Conus concept provides outstanding retention of the prosthesis due to the use of the four selected implants that were previously inserted in the posterior regions was achieved by welding juxta levering techniques. The implant-supported gradual dimensional change and the subsequent occlusal adjustments

Figure 15. Completed bridge with SynCone caps processed in position. Because they have been precisely fabricated, there is no error in fit, these caps are extremely retentive allowing only vertical displacement of the prosthesis.

Figure 16. Completed restoration. Note the absence of screw access holes for a prosthesis that looks like a denture yet fits like a bridge.

Figure 17. ATLANTIS Conus abutments torqued to specified level, obturated with Teflon tape and composite resin.

Figure 18. Laboratory processed, clear duplicate prosthesis with silicized wire material to improve retention; to be used as a guide to protect the tongue from the sharp edges of the abutments.

Figure 19. Panoramic radiograph of the abutments seated on the four selected implants. Because the restoration is implant-supported, gradual dimensional reduction of the residual ridge will present no consequence to the patient.

Figure 20. Completed bridge in place showing flange length suitable to prevent food.

Clinical report
A healthy 50-year-old Caucasian woman presented for treatment at the office of one of the co-authors (LOC) with a mobile, painful, 12-tooth eminiporous alloy-ceramic fixed prosthesis (Fig. 2). The prosthesis was removed and all of the remaining abutment teeth were found to be nonrestorable with extraction indicated (Fig. 3). After removal of the retained teeth right, one implant pieces were inserted in one session (Fig. 4).

Immediate stabilization of the eight implants and 2 additional implants that were previously inserted in the posterior regions was achieved by welding juxta levering Implant Welding (IWG, Nordent, Italy) each implant to a 1.5 mm supporting titanium bar (Acroni, Casargo, Italy), which previously had been bent to fit passively on the palatal mucosa (Fig. 5). A provisional resin prosthesis was inserted, which provided an acceptably vertical dimension and lingual contact occlusion. Oral hygiene procedures were demonstrated to the patient and reviewed at all future appointments.

After 90 days, a panoramic radiograph showed complete integra-

Oral implantation (in press)

Dr. Luca Del Carlo is in private practice in Veneto, Italy. Dr. Fransco Rosso is in private practice in Venice, Italy. Dr. Marco E. Pasquali is in private practice in Milan, Italy. Dr. Shlomi Shulman is in private practice in Cilfan, N.S., and adjunct associate professor at the School of Oral Health Sciences, Kingston, Jamaica. Dr. Michele Nandone is with the Ministry of Public Health, Iran, Italy. Dr. Shlomi Winkler is adjunct pro-
of the School of Oral Health Sciences, Kingston, Jamaica. Dr. Tomasz Czodrowski is in private practice and professor at the School of Oral Health Sciences, Bres-zen, Poland.

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