Intraoral welding and lingualized (lingual contact) occlusion: a case report

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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 Mondani1 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 as 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.[2]

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, NuovoGISI, have long and successful experiences with immediate loading of maxillary implants connected together by intraoral welding.[2]

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 fulfil a great need for business and socially active

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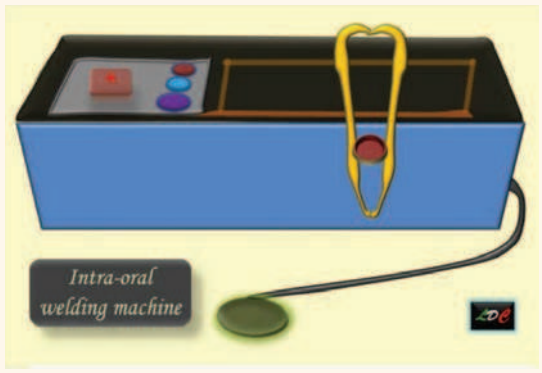

Fig. 1. Schematic drawing of Mondani intraoral solder unit

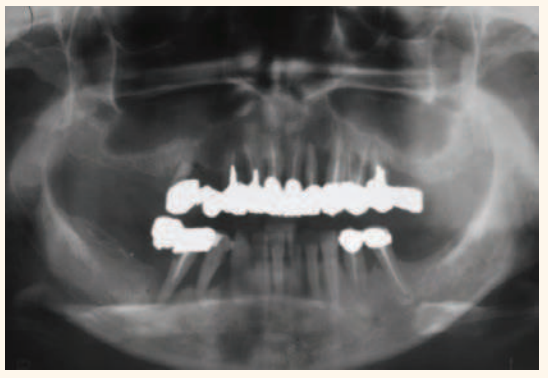
Fig. 2. Preoperative panoramic radiograph of 50-year-old caucasian woman


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


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

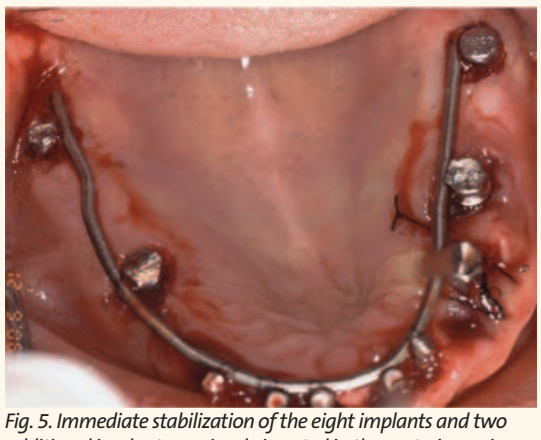
Fig. 5. Immediate stabilization of the eight implants and two additional implants previously inserted in the posterior regions, by welding each implant to a 1.5 mm supporting titanium bar

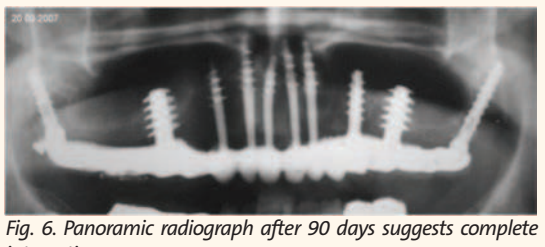
Fig. 6. Panoramic radiograph after 90 days suggests complete integration


Fig. 8. Lower implants welded together intraorally

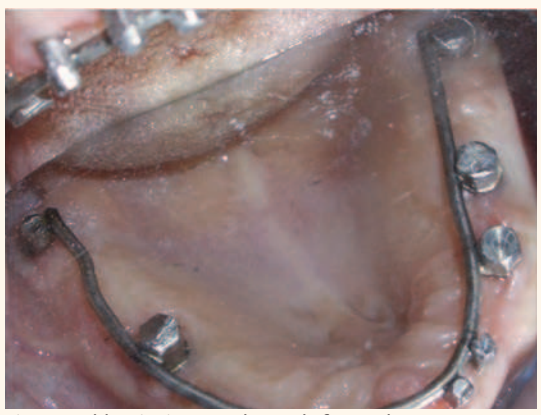
Fig. 7. Healthy gingiva was observed after 90 days


Fig. 9. Three-tooth mandibular fixed prosthesis

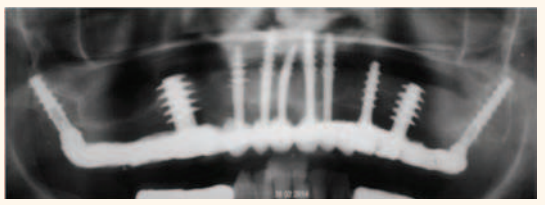
Fig. 10. Seven-year follow-up radiograph shows satisfactory preservation of bone surrounding all of the implants


Fig. 11. Intraoral photograph of the definitive prosthesis shows healthy gingiva

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persons, as the surgical and prosthodontic procedures are accomplished on the same day. Patients can leave the dental office with a stable, esthetic and retentive prosthesis.

The flapless technique, first proposed by Tramonte[3], can be performed when the bony crest is wide and an adequate amount of attached gingiva is present. The technique allows for uneventful healing, a reduction of postsurgical inflammation and only moderate inconvenience for the patient, who can eat efficiently the same day.

Provisional prosthesis and tooth arrangement

During the surgical session a temporary resin prosthesis is inserted. Occlusal plane height must be correct. A lingualized (lingual contact) scheme of occlusion is recommended. The upper anterior teeth are best arranged without any vertical overlap. The amount of horizontal overlap is determined by the jaw relationship. A vertical overlap for appearance can be used, provided that an adequate horizontal overlap is included to guard against interference within the functional range.[4]

Lingualized (lingual contact) occlusion

Lingualized (lingual contact) occlusion maintains the esthetic and food penetration advantages of anatomic teeth while maintaining the mechanical freedom of nonanatomic teeth. Among the advantages of a lingualized occlusion are occlusal forces centered over the ridge crest in centric occlusion, masticatory force is effectively transferred more "lingual" to the ridges during working side excursions, the "mortar and pestle" type of occlusion minimizes the occlusal contact area providing for more efficient food bolus penetration and elimination of the precise intercuspation that can complicate the arrangement of anatomic denture teeth.

Lingualized occlusion also prevents cheek biting by holding the buccal mucosa off the food table by eliminating occlusal contacts on the maxillary buccal cusps, minimizes occlusal disharmonies created from errors in jaw relationships, denture processing changes and settling of the denture base, and simplifies setting of denture teeth, balancing the occlusion and any subsequent occlusal adjustment procedures.[5]

Clinical report

A healthy 50-year-old caucasian woman presented for treatment at the office of one of the co-authors (LDC) with a mobile, painful, 12-tooth semiprecious 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, eight titanium one-piece implants 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 (Acerboni Intraoral Welding Unit, Casargo, Italy) each implant to a 1.5 mm supporting titanium bar (Acerboni, 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 acceptable 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 suggested complete integration (Fig. 6) and a healthy mucosa was observed. (Fig. 7). The definitive full-arch gold-ceramic maxillary prosthesis was inserted, which greatly pleased the patient and her family.

In the lower arch, the right first and second bicuspids were extracted and implants placed in the first bicuspid and first molar regions. The implants were welded together intraorally (Fig. 8), followed by the fabrication and cementation of a three-tooth fixed prosthesis (Fig. 9).

A 7-year follow-up radiograph (Fig. 10) shows satisfactory preservation of bone surrounding all of the implants. An intraoral photograph of the definitive prosthesis shows healthy gingival tissue (Fig. 11).

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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 minimalist 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 using resilient overdenture retainers are employed, there is 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 greater investment.

This article discusses just such a situation where a patient had experienced repeatedly low value from her investment of five implants. By redesigning her treatment to become implant-supported through 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 comparable to a fixed restoration while providing lip and cheek support of a removable prosthesis without complicating or obstructing oral hygiene.

The telescopic design of the ATLANTIS Conus concept provides outstanding retention of the prosthesis during function as edentulous patients chew in a relatively flat elliptical pattern and the bridge can only be removed vertically. The abutments themselves are patient-specific and can be made for all major implant systems, allowing rescue of many frustrating results with overdentures.

As long as there is sufficient interarch space (at least 12 mm), existing finished dentures can be retro-fit with ATLANTIS Conus abutments, reducing patient cost while providing a stable result. Cast chrome frame reinforcement is advised for all new ATLANTIS Conus prostheses as the tremendous increase in strength of the bridge by the frame more than offsets the slight increase in cost and may actually reduce required inter-arch space.

The clinical procedure is relatively simple and comparable to implant overdentures; however, because the abutments are patient-specific, tooth position must be established before the design of the abutments is begun.

Conclusion

A patient with an 11-year history of frustration with her dental implant investment was treated successfully with the ATLANTIS Conus concept using patient-specific abutments and SynCone caps, providing an implant-supported, removable bridge with all the benefits of a fixed design and none of the limitations.

Figure 15. Completed bridge with SynCone caps processed in position. Because they have been processed intra-orally, 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

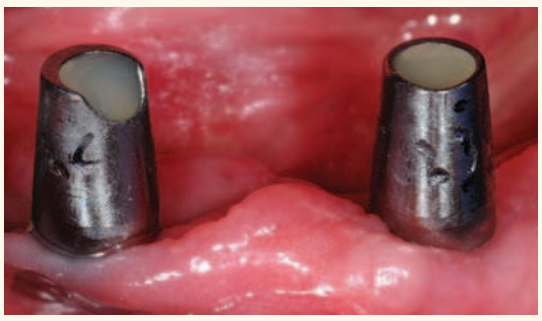

Figure 17. ATLANTIS Conus abutments torqued to specified level, obturated with Teflon tape and composite resin

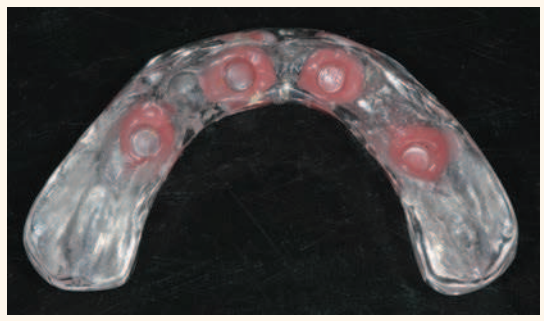

Figure 18. Laboratory processed, clear duplicate prosthesis with siliconized reline material to improve retention; to be used as a nighttime appliance to protect the tongue from the sharper edges of the abutments

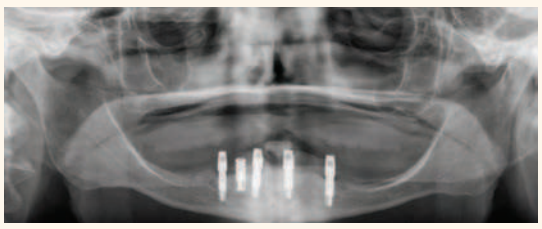

Figure 19. Panoramic radiograph of the abutments seated on the four selected implants. Because the restoration is fully implant-supported, gradual diminution of the residual ridge will present no consequence to the patient

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

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