result of dehissed inferior alveolar canal and mental foramen by the mandibular denture and resulting Trigeminal neuralgia.

In these cases the subperiosteal implant can be of tremendous help. By definition, a subperiosteal implant is a framework specifically fabricated to fit the supporting areas of the mandible or maxilla with permucosal extensions for support and attachment of a prosthesis. The framework consists of permucosal extensions with or without connecting bars and struts. Struts are classified as peripheral, primary and secondary. The subperiosteal implant can be constructed as a complete arch, unilateral or universal, and is loaded immediately.

Prior to the tremendous success of the root form implants since Dr. Brånemark introduced the concept of osseointegration in 1981, the subperiosteal implant along with blade and plate implants were routinely used to support either a fixed, or removable, complete or partial prosthesis. The subperiosteal implant is custom made and designed to fit and sit on top and around the bone, but under the gums. There are two methods for its fabrication and installation.

The first and original technique is the "dual surgery" method. Usually under sedation, the jawbone is exposed and an impression of the bone is made using a custom impression tray and the impression material of choice (not alginate). Whenever possible, vertical dimension in centric relation to the alveolar ridge with the opposing arch to provide inter-maxillary distance for determination of abutment height of the subperiosteal framework and the height of the prosthesis is recorded while the bone was still exposed. The gums are sutured closed and the patient is dismissed with a facemask-type compression bandage.

This impression is poured with plaster to fabricate a replica (model) of the jawbone and the model is used by the dental laboratory to custom cast the implant with the suprastructure to fit the jaw along with the final prosthesis that was prescribed. Six to eight weeks after the first-stage "impression acquisition" surgery, a second procedure is then carried out where the jawbone is re-exposed and the implant placed and secured into place. The gums are closed with stitches over the subperiosteal and around the suprastructures and the prosthesis is placed into place.

This type of protocol was very common and predictable as it used very familiar and commonly practiced prosthodontic techniques for workup and fabrication of the implant and the final prosthesis, but was very unsatisfactory to the patient and a big deterrent for undergoing the therapy.

In the late 1980s and early 1990s with CT and within the past decade cone beam volumetric tomographic (CBVT) scans becoming more common in dental/oral surgical diag-

**Fig. 1:** Panoramic view of a severely resorbed mandible.

**Fig. 2a:** Mandibular complete arch subperiosteal implant with locator attachments and countersunk screw holes for bone screws.

**Fig. 2b:** Maxillary subperiosteal implant with recepticles with thread pattern for locator abutments and countersunk screw holes for rigid fixation using bone screws.
NEW ORLEANS
April 22-24, 2010

Implants and all that ♫ JAZZ! ♫

ICOI Spring Symposium and 13th IPS Symposium
New Orleans Marriott on Canal Street

For more information please contact the ICOI Central Office
at (973) 783-6300 or visit our website at www.icoi.org

Sponsored by:

ICOI

ADA CERP® Continuing Education Recognition Program
AGD - Accepted Program Provider
FAGD/MAGD Credit, 5/1/09 - 6/30/12

Photo Credit: Richard Nowitz

ICOI is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. ICOI designates this activity for 23 continuing education credits.
nosis and treatment planning, and medical modeling companies getting better and more accurate in computer modeling of anatomic structures, the first stage surgery for the fabrication of an accurate impression of the jaw was bypassed.

For the “single surgery” method, a special CT/CBVT scan of the arch being considered for rehabilitation is ordered. A replica (radiographic template) of the final prosthesis is fabricated with the denture base made with acrylic with 25 percent barium sulfate, a radiopaque marker that shows in the 3-D radiograph outlining the soft tissue (gum) architecture (Fig. 5).

The radiographic template is worn during the scan, and using the scan data and advanced computer modeling techniques, a model of the jawbone and overlaying soft tissue is constructed.

This stereolithographic model (Fig. 4) of the alveolus and the overlying gum (Fig. 5) is used by the dental laboratory to fabricate the custom subperiosteal implant and process and finish the prosthesis for immediate function.

A surgical procedure is then carried out where the alveolus is exposed and the implant placed and secured to the jaw (with bone screws) and any gaps between the implant and the underlying bone is filled with hard tissue graft of the dentist’s liking and guided bone regeneration technique is applied. The gums are closed with stitches and the prosthetic is put into place for immediate function.

The patient is instructed in the usual manner for postoperative wound and prosthesis care and a stretchable compression bandage is applied.

This modern one-stage protocol is more palatable for the patient who is more likely to consider this form of implant therapy versus undergoing multiple augmentation procedures to build the ridge to the appropriate dimensions (height and width) in the certain areas for implantation of appropriately sized rootform implants. Depending on the location and type of materials used for augmentation, it could be six months to up to two years or more before the patient is rehabilitated with a final prosthesis.

At times, the patient is not a good candidate to undergo such significant augmentative procedures either due to health or financial considerations.
Case report No. 1
A 61-year-old caucasian female presents with the chief complaint that her lower denture doesn’t fit well and every time she wore it, it caused great pain and a burning sensation in the lower jaw. She only wore it for cosmetic reasons and never chewed with them in and made excuses for not eating in company of others.

She has been to several dentists, including prosthodontists, who fail to fabricate complete removable mandibular dentures she can wear comfortably.

She also has sought consultations with several oral surgeons who would only recommend multiple autogenous onlay grafts in the intermental region for an implant-supported soft-tissue borne overdenture with the possibility of still experiencing pain due to the free end saddles pressing into the exposed mental foramen and inferior alveolar nerve when chewing.

Her past medical history was significant for post-menopausal osteoporosis for which she takes Boniva (ibandronate sodium) once a month. She also suffers from hypertension, which is under control, and for which she takes a combination of thiazide diuretic and beta blocker. She also suffers from panic disorder for which she takes Zanax (alprazolam) on a regular basis.

Her past dental history is significant for periodontal disease, which was the reason for her losing all of her teeth by the time she was in her 30s and now having severe atrophy of both jaws.

Twenty years ago, she began implant therapy for supporting her complete mandibular dentures. During the years, the implants failed for one reason or another and the last one remaining is fractured with a piece still integrated but not usable. Both mental foramen and parts of the mandibular canal are exposed on the crest of the alveolus with the nerves enveloped in the soft tissue over the crest.

Treatment plans were developed after an initial panoramic view was extracted from a CBVT.

Treatment plan No. 1
• Total treatment time: eight to 12 months.
• Anterior iliac crest to be used as a donor site for block grafts to augment the intermental region and posterior mandible with bilateral relocation of the mental foramen and mandibular canal more apically and laterally.
• Surgery under general anesthesia.
• Insertion of a full maxillary removable denture and immediate insertion complete mandibular denture using four locator abutments.
• Permanent relining of the lower prosthesis in two months.

Case report No. 2
A 48-year-old caucasian female presents with the chief complaint that her lower implant bar-retained overdenture is extremely uncomfortable, doesn’t fit well and is cosmetically unacceptable. She is also unhappy with the way her maxillary denture fits and feels.

She has sought consultation from several dentists including prosthodontists, periodontists and oral surgeons who recommended various options, including removal of the existing implants and placing new ones in a more favorable angulation and even changing the retention mechanism from bar to individual implant retention (o-rings, locators and type).

For the maxillary denture, all recommended a new denture.

Her past medical history was insignificant for post-menopausal osteoporosis for which she takes Boniva (ibandronate sodium) once a month. She also suffers from hypertension, which is under control, and for which she takes a combination of thiazide diuretic and beta blocker. She also suffers from panic disorder for which she takes Zanax (alprazolam) on a regular basis.

Her past dental history is significant for periodontal disease, which was the reason for her losing all of her teeth by the time she was in her 30s and now having severe atrophy of both jaws.

Twenty years ago, she began implant therapy for supporting her complete mandibular dentures. During the years, the implants failed for one reason or another and the last one remaining is fractured with a piece still integrated but not usable. Both mental foramen and parts of the mandibular canal are exposed on the crest of the alveolus with the nerves enveloped in the soft tissue over the crest.

Treatment plans were developed after an initial panoramic view was extracted from a CBVT.

Treatment plan No. 1
• Total treatment time: eight to 12 months.
• Anterior iliac crest to be used as a donor site for block grafts to augment the intermental region and posterior mandible with bilateral relocation of the mental foramen and mandibular canal more apically and laterally.
• Surgery under general anesthesia.
• Insertion of a full maxillary removable denture and immediate insertion complete mandibular denture using four locator abutments.
• Permanent relining of the lower prosthesis in two months.

Case report No. 2
A 48-year-old caucasian female presents with the chief complaint that her lower implant bar-retained overdenture is extremely uncomfortable, doesn’t fit well and is cosmetically unacceptable. She is also unhappy with the way her maxillary denture fits and feels.

She has sought consultation from several dentists including prosthodontists, periodontists and oral surgeons who recommended various options, including removal of the existing implants and placing new ones in a more favorable angulation and even changing the retention mechanism from bar to individual implant retention (o-rings, locators and type).

For the maxillary denture, all recommended a new denture.

Her past medical history was insignificant for post-menopausal osteoporosis for which she takes Boniva (ibandronate sodium) once a month. She also suffers from hypertension, which is under control, and for which she takes a combination of thiazide diuretic and beta blocker. She also suffers from panic disorder for which she takes Zanax (alprazolam) on a regular basis.

Her past dental history is significant for periodontal disease, which was the reason for her losing all of her teeth by the time she was in her 30s and now having severe atrophy of both jaws.

Twenty years ago, she began implant therapy for supporting her complete mandibular dentures. During the years, the implants failed for one reason or another and the last one remaining is fractured with a piece still integrated but not usable. Both mental foramen and parts of the mandibular canal are exposed on the crest of the alveolus with the nerves enveloped in the soft tissue over the crest.

Treatment plans were developed after an initial panoramic view was extracted from a CBVT.

Treatment plan No. 1
• Total treatment time: eight to 12 months.
• Anterior iliac crest to be used as a donor site for block grafts to augment the intermental region and posterior mandible with bilateral relocation of the mental foramen and mandibular canal more apically and laterally.
• Surgery under general anesthesia.
• Insertion of a full maxillary removable denture and immediate insertion complete mandibular denture using four locator abutments.
• Permanent relining of the lower prosthesis in two months.
significant and was categorized as an ASA1 patient. Social history is significant for divorce five years ago, and she is planning on remarrying in the near future. Her past dental history is significant for becoming completely edentulous at age 18 upon recommendation of her dentist. Ten years ago, she had four implants placed in the anterior mandibular symphysis out of which one failed. Her bar was preserved and made usable with three implants.

Two years ago, she had new mandibular and maxillary dentures fabricated by a prosthodontist that was recommended by the periodontist who removed the failed implant. Treatment plans were developed after evaluation of the panoramic view extracted from the initial CBVT. Treatment plan the patient elected to undergo: Total treatment time of eight to 12 weeks.

Conclusion
Both patients and others like them have undergone this type of rehabilitation using subperiosteal implants without any untoward complications and have reported satisfactory results upon visits with the hygienist.

The author would like to acknowledge Dr. Jerome Kaufman, DDS, (prosthodontist) of Arch Dental at Le Visage Center for Cosmetic and Implant Dentistry for performing the prosthetic workup and completion of such challenging reconstructions, and Ryan Dutton, CDT of Dutton Dental Laboratory, Ohio, for his exemplary fabrication of such difficult and precise frameworks.


References

About the author
Dr. Pankaj Singh has authored the third edition of the best-selling textbook on dental implants, “The Atlas of Oral Implantology,” which will be released in December. Singh is an attending faculty at the Department of Dental Medicine and Oral Surgery at LIJ-North Shore University Hospital Medical Center in New York and is a clinical instructor of advanced dentistry at New York University College of Dentistry (subiatical). He is the founder and CEO of Arch Dental Associates and Le Visage Cosmetic & Implant Dentistry with offices in Manhattan, Huntington and Garden City, NY. Singh has been in private practice for more than 15 years, specializing in implant, sedation, reconstructive dentistry and dental sleep medicine. He is a graduate of New York University College of Dentistry. He completed his advanced training in dental implants at Brookdale Hospital and NYU.