CONCORD LEXINGTON PERIODONTICS

NEWSLETTER

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At **Concord Lexington Periodontics,** our mission is to provide exceptional periodontal care while fostering collaborative partnerships with dentists to enhance patient outcomes. We are committed to delivering advanced, evidence-based solutions for gum health and dental implant placement, ensuring every patient receives care tailored to their unique needs. By working together, we aim to support dentists in addressing complex cases, restoring function and aesthetics, and improving the overall health and confidence of their patients. Through shared expertise, trust, and communication, we strive to be a valuable resource and partner in achieving excellence in dental care.

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GUIDED IMPLANT PLACEMENT FOR THE EDENTULOUS ARCH

DUAL SCAN TECHNIQUE

Years ago, when we started placing implants to help retain and support dentures, we would develop a surgical guide. It was a time-consuming process that involved the duplication of the current denture, and it could take multiple appointments. There was usually an extra lab expense, and the duplicate denture was often made from a radiopaque material or with radiopaque markers to help "plan" implant placement with a panoramic x-ray. We would then use a "clear" surgical denture guide during the surgery, where implant placement was free-handed, and the use of guide pins helped direct the implants into the intaglio surface of the surgical guide.

Fast forward to today and dentistry continues to evolve and change in a multitude of ways. With the continual flow of technology, it seems that we are only starting to hit the "technology" stride in dentistry. We are seeing dental procedures become more digitally-based, which can make the overall outcome quicker, easier and more predictable. But, like with almost all technology, there is a learning curve that comes along with it, and it can be challenging and frustrating in the beginning. But with some help, it can streamline this process! Technology and implant placement go hand-in-hand in today's dental world and are quickly becoming the standard of care with 3D CBCT scans, digital treatment planning and fully-guided implant surgeries and placement. So, where do we start with the edentulous patient today?

First and foremost, we must determine the final goal or outcome that is desired by the patient and the restoring doctor. Are we developing a treatment plan that will simply convert their current denture to an implant-retained denture with the use of a few implants that is more secure, or are we attempting to create an implant-supported and screw-retained fixed final restoration with multiple implants? This article will focus on how to take an edentulous patient and create a surgical guide for implant placement that will incorporate and support an implant-retained final overdenture prosthesis. (With some modifications, we could also use the same process to place multiple implants for either a fixed removable or fixed hybrid final prosthesis.)

When it comes to developing a surgical guide for the edentulous patient, the patient usually presents to our office in a few ways - either with old and worn out dentures needing new dentures and interested in implants; or with a relatively new set of dentures, having discovered that dentures are not exactly what they signed up for, and looking for a solution to their problem. If the patient hopes to use their current denture, we must determine whether the current denture is acceptable or if we will be making a new one? One of the very first steps in denture fabrication is determining whether or not the current denture has acceptable esthetics. When we were in dental school, we all learned that esthetics was one of the first steps in the denture process and it was determined by the position of the maxillary central incisors (also the first part of Facially Generated Treatment Planning). We also have to determine if the overall occlusion is acceptable as well as evaluate the current denture's overall fit and finish and determine the stability on the tissue.

Many times, patients may have an older, worn denture that may "fit well" to the patient but the overall esthetics is poor, and/or the tooth position and occlusion is incorrect, or it does not fit well or even look good! With patients who have a current denture that has acceptable esthetics, we have to make sure that the current denture has an intimate fit and finish to the soft tissue and is stable. Why? It is very simple: the final surgical guide will replicate the intaglio surface of the current or new denture, and it will only fit as well as it does.

Fig. 1

A poor-fitting denture that is scanned equals a poor-fitting surgical guide that equals even more error introduced into the final placement of the implants, increasing surgical risks and complications and ultimately leading to a final outcome that is less than desirable for everyone involved.

If the current denture does not fit well, then we have to complete a hard reline of the current prosthesis to ensure an intimate, stable fit. If it is stable, fits well, and looks great, then we can focus on moving forward in this process and developing the number and placement of the implants to support the final overdenture design and the surgical guide required. If the current denture esthetics and/or fit is poor, it may be best to start by developing a new denture, where we have full control over the esthetics as well as the fit and finish of the final prosthesis. We would want to have the new denture to a point that it is ready to process and delivered.

Once we have a denture that has acceptable esthetics, fit and finish, we can now proceed with the digital part of treatment planning for the implant placement and surgical guide (unless you developed your denture digitally, which is now a possibility!). Nowadays, we can take the denture and apply radiopaque markers to it and scan the patient and prosthesis quickly, easily, and without extra visits, costs or doing a lot of extra work. To proceed, we have to place radiopaque markers on the denture in a manner that allows software programs like Simplant (Dentsply Sirona Implants) to be able to merge the scans together accurately.

There are a variety of ways to add these markers to the denture, but the one I have found to be quick, easy, non-damaging, inexpensive, and very accurate is the use of radiographic markers by Suremark™.

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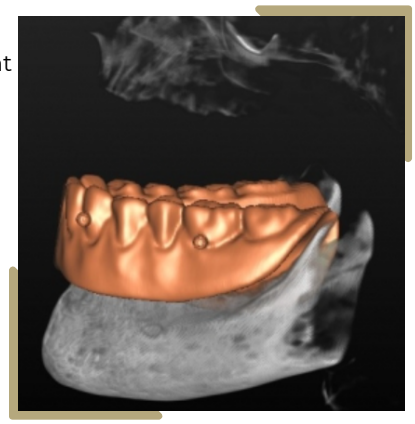
"Technology and implant placement go hand-in-hand in today's dental world "

These are markers that have a radiopaque ball on a removable sticker that you can place on the patient's dentures.

Before scanning, we want to place a minimum of six to eight radiographic markers on each denture, ideally on facial and lingual surfaces, and you want to keep them below the occlusal plane so they do not interfere with the occlusion and any bite registration material used does not adhere to them (Fig. 1). Once we have them in place, we are now ready to proceed with the dual scans needed to develop and finalize the surgical guide. The first scan can be completed by placing the dentures in the patient's mouth and then placing a radiolucent bite registration in a manner that keeps the teeth slightly apart.



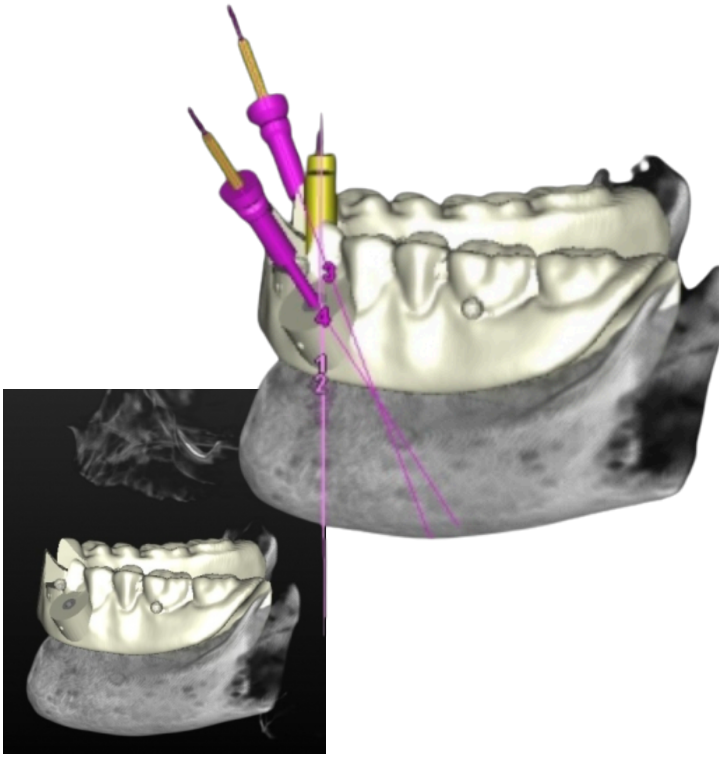
Why?

A radiopaque bite registration blocks out the denture anatomy and tooth position present. It is important to keep the teeth apart so that when the scans are complete, there are no data points or denture anatomy overlapping in the scans and we can see the incisal edges as well as cusp/fossa positions clearly. Once the dentures are clearly seated, you are now ready to complete a full CBCT scan, making sure that all anatomy is clearly incorporated into the scan.

Afterwards, without removing any of the radiopaque markers present, we are now ready for the second scan in the CBCT. This is done by placing the denture onto a holder that allows for the denture to be parallel to the floor and in a relative close proximity to the first scan. (Note: some manufactures have stands that are designed just for doing this).

In my own experience, I have found that due to the nature of the material in dentures, I will reduce the overall exposure setting to allow for minimizing any data lost that can occur at higher settings. This scan will allow for a clear, digital replica of the denture with the markers in place.

Now that both scans are complete, you can either use your software or software programs like SimPlant (Dentsply Sirona Implants) which has free online services like DentalPlanit, that will merge the data points between the scans. This allows for clinicians to clearly see the patient's anatomy as well as look at implant restorative space, implant position, angulation, etc. during the implant planning process with and without the denture prosthesis in place. Now that all of the data has been collected and merged, the practitioner can choose to either design and construct the final surgical guide or send it to a dental lab or service to do the initial design and digital placement of the implants.



Ultimately, when it comes to the final placement of the implants, and the surgical guide design, both the surgeon placing the implants and the restorative dentist should collaborate, finalize and approve the surgical guide prior to it being fabricated. Ideally, the final designed surgical guide showing implant placement should be shared with the restoring dental laboratory for input toward the final design of the prosthesis desired. This should allow for an optimum outcome for the surgeon, restorative dentist, lab technician and ultimately, for the patient!

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COMPREHENSIVE ALVEOLAR RIDGE AUGMENTATION AND IMPLANT PLACEMENT

Alveolar ridge changes after tooth extraction pose a significant challenge in implant dentistry. The natural resorption process results in a reduction of both horizontal and vertical dimensions of the alveolar ridge, complicating implant placement and necessitating advanced surgical techniques. These changes not only affect hard tissues but also induce significant alterations in soft tissues.

The reduction in alveolar ridge height and width leads to a decrease in vestibular depth, which can compromise the hygiene of the future implant. The *reduced* depth makes it difficult for patients to clean around the implant effectively, potentially leading to plaque accumulation and increased risk of peri-implant disease. The *diminished* depth can also affect the fit and stability of dentures or other prosthetic devices, compromising their functionality and comfort.

Additionally, the position and quantity of keratinized mucosa are often adversely affected. The keratinized tissue, which is essential for maintaining a healthy and stable soft tissue barrier around implants, becomes displaced or reduced.

This change can result in less stable soft tissue around the implant site, potentially increasing the risk of peri-implantitis and other complications. Inadequate keratinized mucosa can lead to mucosal recession, exposing the implant surfaces to the oral environment and making them more susceptible to bacterial colonization.

Maintaining adequate keratinized mucosa around dental implants is critical for peri-implant health. Keratinized mucosa provides a stable, resistant soft tissue barrier, protecting against mechanical stress and microbial invasion, which is essential for the long-term success of dental implants. Sufficient keratinized tissue also enhances the implant's esthetic outcome by ensuring a natural appearance of the gingival contour and supporting the soft tissue structure.

The importance of soft tissue management in implant dentistry cannot be overstated. Achieving and maintaining optimal soft tissue conditions around implants is vital for preventing peri-implant diseases and ensuring the longevity of the restoration. This involves not only the preservation of existing keratinized mucosa but also the augmentation of deficient areas through grafting procedures when necessary.

This case report describes the comprehensive surgical management of a 55-year-old patient with a significant horizontal ridge defect and minimal keratinized mucosa. The patient required a complex approach to ensure successful implant placement and long-term peri-implant health. The treatment plan involved ridge augmentation, soft tissue grafting, and meticulous surgical techniques to address both hard and soft tissue deficiencies, ensuring a stable and esthetic implant restoration.

Patient history and initial presentation

Figures 1a and 1b: Lateral (1a) and occlusal (1b) views of the edentulous site at area #19.

The patient, a 55-year-old woman with no significant medical history, presented with an edentulous site in the mandibular first molar region (area #19). The tooth had been extracted more than three years ago because of caries. Initial clinical examination (Figs. 1a and 1b) revealed a horizontal ridge defect and minimal keratinized mucosa at the site, posing challenges for implant placement and long-term stability.

Diagnostic evaluation

A CBCT scan was performed to evaluate the extent of the ridge defect and the anatomical position of the inferior alveolar nerve. The scan (Fig. 2) confirmed a significant defect and showed that the inferior alveolar nerve was positioned less than 10 mm from the alveolar crest, indicating a high-risk site for implant placement. This necessitated careful planning to avoid nerve damage during the surgical procedure.

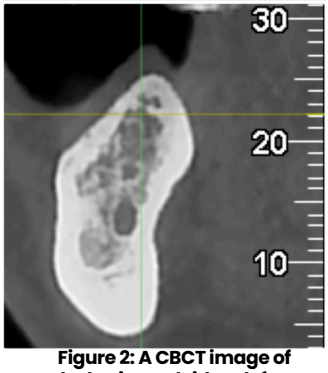

Figure 2: A CBCT image of the horizontal ridge defect and the proximity of the inferior alveolar nerve.

Surgical procedure

Flap design and elevation

The surgical intervention began with a crestal incision at the edentulous site, extending to sulcular incisions on teeth #18, #20, and #21 (Fig. 3). A full-thickness flap was elevated beyond the mucogingival line to expose the bone while preserving flap thickness.

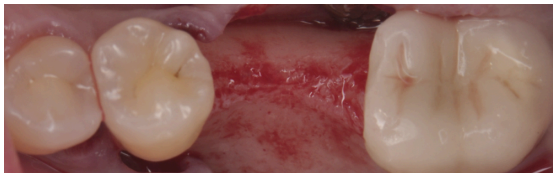

Figure 3: Crestal and sulcular incisions with full-thickness flap elevation.

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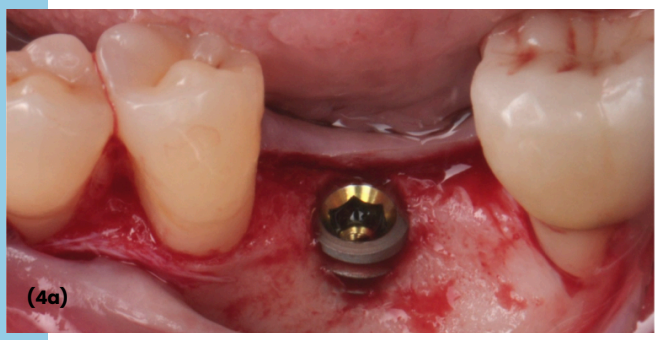
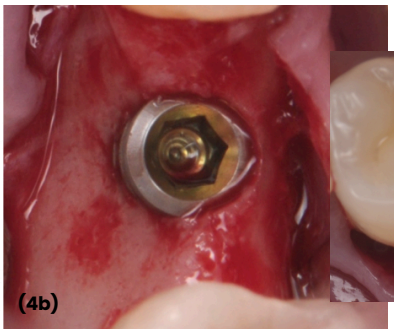
This approach ensured adequate visibility and access for the bone grafting and implant placement procedures. A partial-thickness dissection was performed to facilitate flap mobilization and ensure primary wound closure. This technique allowed for sufficient tissue manipulation and coronal repositioning, which is critical for achieving optimal primary wound closure and healing outcomes.

Implant placement and ridge augmentation

The implant (4.6 by 7.5 mm) was placed in an ideal 3D position with an equal distance to the adjacent teeth, 1 mm subcrestal and centered buccolingual (Figs. 4a and 4b). However, because of the significant ridge resorption, approximately 4 mm of the buccal rough surface of the implant was exposed, resulting in a bone dehiscence.

To address this, a cross-linked collagen membrane was used to cover the exposed implant, and a particulate bone graft using freeze-dried bone allograft (FDBA) was applied (Fig. 5). The collagen membrane was secured with resorbable 5-0 sutures anchored to the periosteum, ensuring stability of the graft material and facilitating bone regeneration. This suture stabilized the graft and relieved any extensive flap tension that could have compromised primary wound healing.





Figures 4a and 4b: Lateral (4a) and occlusal (4b) views of implant placement.

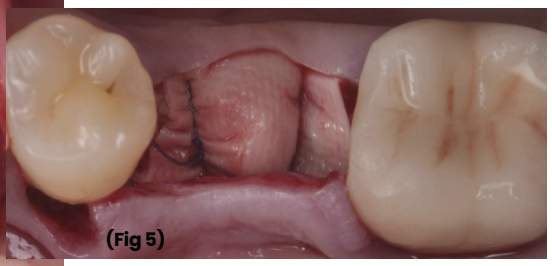
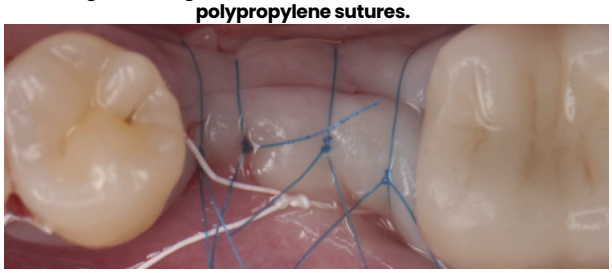


Figure 5: Cross-linked collagen membrane and FDBA particulate bone graft.

Surgical site closure

The surgical site was meticulously closed using 4-0 PTFE sutures in a horizontal mattress technique, complemented by 6-0 polypropylene simple interrupted sutures in the middle of the ridge to achieve primary closure (Fig. 6). This combination of suturing techniques ensured a stable, secure closure, promoting optimal healing and minimizing the risk of wound dehiscence. Additionally, simple interrupted 4-0 PTFE sutures were used in the interproximal sites.

Figure 6: Surgical site closed with 4-0 PTFE and 6-0 polypropylene sutures.

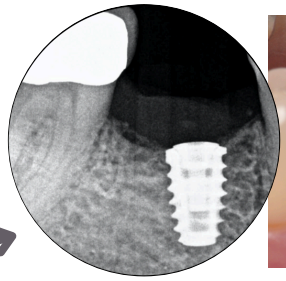


Postoperative care and evaluation

Postoperative care instructions were provided to the patient, including the use of chlorhexidine rinses, analgesics, antibiotics, and a soft diet to facilitate healing. Regular follow-up appointments were scheduled to monitor the healing process and assess the integration of the bone graft and implant.

A radiograph taken six months after the procedure (Fig. 7) showed satisfactory healing and bone integration around the implant, indicating successful osseointegration and stability of the grafted site. Clinically, a lateral view of the ridge (Fig. 8) revealed minimal keratinized tissue at the site, highlighting the need for further soft tissue management.

Figure 7: Six months postoperative radiograph.



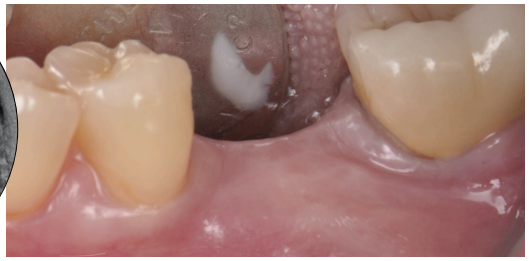


Figure 8: Lateral view of the ridge, six months after implant placement.

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Soft tissue management at second-stage surgery

To address the deficiency in keratinized mucosa, a second-stage surgery was planned. A crestal incision was made at the edentulous site, not touching the adjacent teeth. A partial-thickness flap dissection was performed at the implant site, displacing the minimal keratinized tissue present at the lingual site (Fig. 9). Two divergent vertical incisions were made at the buccal area, leaving the connective tissue and periosteum attached to create a vascular surface for a free epithelialized graft. The cover screw was then removed, and a 5 mm healing abutment was placed.

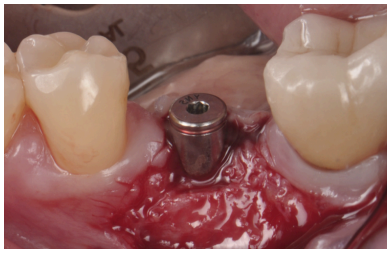


Figure 9: Partial-thickness flap dissection for keratinized tissue management.

Graft harvesting and placement

A free epithelialized graft was harvested from the anterior palate and fixed in place with 6-0 polypropylene simple interrupted sutures at the edges and a periosteal suture around the healing abutment. Additional 5-0 simple interrupted sutures were used to secure the flap in an apical position, ensuring optimal adaptation and stability of the graft (Fig. 10). The donor site was treated by means of collagen sponges and crisscross 4-0 PTFE sutures anchored to the teeth, achieving hemostasis.

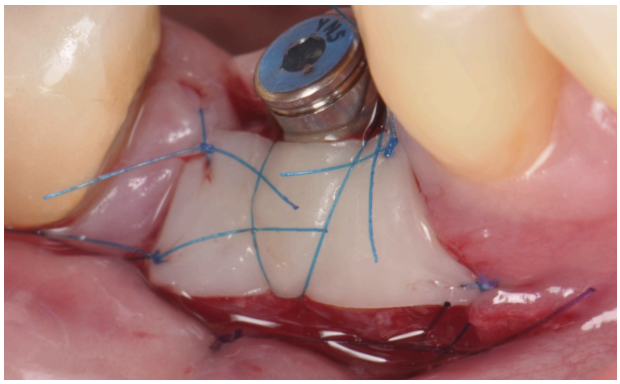
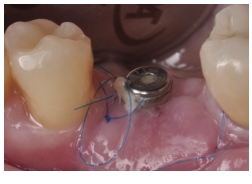


Figure 10: Free epithelialized graft fixed in place.

Healing and final restoration

Two weeks after the procedure, the site exhibited uneventful healing and sutures were removed (Fig. 11). The patient demonstrated good compliance with postoperative care instructions, contributing to the favorable healing outcome.

Figure 11: A photo taken two weeks after the procedure shows uneventful healing.



Crown delivery

Six months after graft placement, the clinical pictures showed a well-integrated, screw-retained crown with more than 4 mm of keratinized tissue in both occlusal (Fig. 12a) and lateral (Fig. 12b) views. The presence of adequate keratinized mucosa provided a stable and healthy peri-implant environment, which is critical for the long-term success of the implant restoration.

Figures 12a and 12b: Occlusal (12a) and lateral (12b) views six months after crown delivery.

Follow-up visit

A radiograph taken one year after crown delivery (Fig. 13) demonstrated stable marginal bone levels around the implant, confirming the success of the comprehensive surgical approach and the stability of the peri-implant tissues. This radiographic evidence was corroborated by clinical observations, which showed no signs of inflammation or mucosal dehiscence around the implant site. The stability of the bone levels indicated successful osseointegration, a critical factor for the long-term durability and functionality of the implant. Furthermore, the clinical examination revealed a healthy mucosal contour with an adequate band of keratinized mucosa surrounding the implant. The presence of this keratinized tissue contributed to the overall health of the peri-implant tissues by providing a robust barrier against bacterial invasion and mechanical stress. The patient reported high satisfaction with the esthetic and functional results, noting an improvement in her ability to chew and a significant boost in confidence because of the enhanced appearance of her smile.

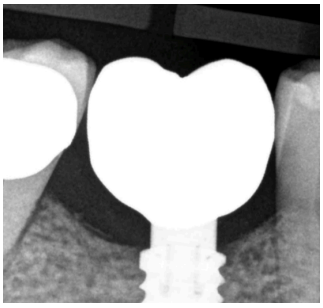


Figure 13: A radiograph taken one year after crown delivery shows stable marginal bone levels.

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Integrated approach, predictable outcomes

This case highlights the importance of a multidisciplinary approach in managing significant alveolar ridge defects and ensuring the presence of keratinized mucosa for long-term peri-implant health. The combination of advanced bone grafting techniques, meticulous soft tissue management, and precise implant placement facilitated the successful rehabilitation of this high-risk site. Using a cross-linked collagen membrane and FDBA particulate bone graft was instrumental in regenerating the lost bone structure, while the soft tissue grafting procedures ensured an adequate amount of keratinized mucosa, contributing to the implant's long-term stability and health.

The favorable outcome in this patient underscores the efficacy of combining bone regeneration and soft tissue augmentation techniques to overcome anatomical challenges and achieve optimal functional and esthetic results in implant dentistry. Future cases with similar complexities can benefit from this integrated approach, ensuring predictable and sustainable outcomes. By addressing both hard and soft tissue deficiencies, clinicians can enhance the success rates of dental implants and provide patients with restorations that look natural and function effectively over the long term.

Moreover, this case reinforces the necessity of thorough presurgical planning, including the use of advanced imaging techniques such as CBCT scans to accurately assess the anatomical landscape and identify potential risks. The careful planning and execution of surgical procedures and the selection of appropriate grafting materials and techniques are paramount to achieving successful outcomes in complex cases.

In conclusion, managing significant alveolar ridge defects requires a comprehensive and multidisciplinary approach. Integrating bone grafting and soft tissue augmentation techniques is crucial for ensuring dental implants' long-term success and health. This case exemplifies how a well-coordinated treatment plan, tailored to address the patient's specific needs, can result in excellent functional and esthetic outcomes, ultimately enhancing their quality of life. As implant dentistry continues to evolve, such integrated approaches will remain pivotal in overcoming the challenges posed by complex anatomical scenarios and delivering predictable, high-quality care to patients.

By Gonzalo Blasi Spear Digsest

Pause & Reflect with

CONCORD LEXINGTON
PERIODONTICS

Reflecting on patient procedures: What Would You Have Done Differently?

In the ever-evolving field of implant dentistry, every case presents unique challenges. As we review the outcomes and methodologies used, we invite you to reflect on your approach to similar scenarios.

As we evaluate the results and techniques applied, we encourage you to take a moment to consider how you might approach comparable situations with your patient.

By reflecting on these scenarios, dental professionals can uncover valuable insights to enhance future practices and elevate the standard of patient care.

We truly appreciate you taking the time to read our newsletter. We value the opportunity to connect with our community and share insights about dental health and care.
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