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Dental Implant Site Evaluation

Proper dental implant treatment planning includes a careful assessment of the hard and soft tissue available. Ideally, the site is healed with adequate vertical and horizontal bony dimensions and a thick gingival biotype. Common pathologic processes such as caries, periodontal disease, fracture and also bony atrophy can introduce challenges to a treatment plan. When possible, the process of site development ought to begin when the tooth is still present, as the best path to avoiding extensive reconstructive procedures is to prevent their necessity.

The aim of this newsletter is to review the steps taken to evaluate and prepare sites for dental implant treatment. We will also review some of the techniques available to improve inadequate sites and the indications for those techniques. We will approach this from the ideal treatment planning mindset, understanding that alternatives exist when the ideal plan cannot be carried out. Thank you for taking a moment to read the material we have put together.

Special points of interest:

- *What benefits are gained from grafting an extraction socket?*
- *Where does planning start for a congenitally missing tooth site?*
- *What techniques are used to gain alveolar height and width?*
- *What are indications and contraindications for immediate implant and provisional treatment plans?*

Beginning the Process

A dental implant should provide adequate support for its planned prosthesis. Implant lengths of 10 mm and greater are preferred and the implant diameter should be adequate for the expected occlusal load.

Clinical evaluation begins with measurement of the alveolus using a periodontal probe, followed by assessment of the type and quantity of keratinized tissue and also the mesiodistal and interarch restorative space.

A standard panorex film provides a 'straight-on' view of the vertical dimension and digital calibration controls for errors caused by magnification. Periapical films are a good adjunct for anterior sites and cone beam CT scan can provide 3-dimensional information when plain films are inadequate or when a guided surgery is planned.

After assessment we must ask: Is there adequate vertical and mesiodistal restorative space for a prosthesis? Does the opposing arch need to be altered? Can we place implants without grafting? Are those implants suitable for the planned prosthesis? If not, what procedures will allow for proper sized implants? What provisional will be used? Is immediate implant placement an option (and is it advisable)? How about immediate loading?

Inside this issue:

Images: Buccal defect grafted to restore buccal bony wall with Bio-Oss.

IMPROVING SITE PREDICTABILITY WITH SOCKET GRAFTS

When immediate implant placement is not advisable, socket grafting provides the opportunity to set up the site for an ideal, delayed placement.

There are benefits to hard and soft tissue healing with a socket graft. Tooth extraction begins an unavoidable atrophy of edentulous alveolar bone. Minimizing atrophy by grafting the socket decreases the need for more invasive block grafts and makes the eventual hard and soft tissue architecture more predictable.

Many non-restorable teeth have periodontal defects and/or fractures that causes loss of alveolar bone, particularly on the facial aspect. When the diseased tooth is removed, there is often an intact envelope of soft tissue covering the void left by the extracted root. Grafting the site prevents retraction of the soft tissue into the empty space and restores the dimensions of the alveolus.

Some patients are unsure about an implant vs bridge restoration at the time of extraction. Grafting the socket in this undecided patient lays the foundation for the implant but can also make for better site contour beneath the pontic in a bridge restoration.

As a safe and effective set-up procedure, the socket graft is recommended for planned dental implant sites. We are happy to discuss the procedure further if you and your patients have questions. Our doctors prefer to establish an understanding of the reasons for the technique in order to illustrate its value as an adjunct to an implant treatment.

Image: Congenitally absent #7 treated with 3 mm platform Nobel Active Implant after orthodontics increased space from 3 mm to 5 mm.

CONGENITALLY MISSING TOOTH SITES

Planning these sites involves cessation of skeletal growth and orthodontic treatment to idealize the spaces. Prior to removal of braces, PA films should be taken to ensure parallelism of adjacent roots and a minimum of 6 mm of space mesio-distally.

Bone quality is often poor in the congenitally missing site and can often be managed with implants more suited for soft bone, such as Nobel Active. Planning for the provisional in these cases can involve immediate temporization, but if bone quality does not allow for ideal primary stability, a non-implant-borne provisional should be available (a flipper).

The labial bony dimension is often deficient when growth is complete, and many of these cases require block bone grafting to provide suitable dimensions for implants. This graft is performed 6 months before implant placement.

Image: Implant #19 referred for removal after immediate placement by local provider.

IMMEDIATE DENTAL IMPLANTS: FACT AND FICTION

Placing a dental implant at the time of extraction is like any other procedure in dentistry, there are indications and contraindications. The placement criteria for an immediate implant are like any other implant: 1. primary stability, 2. proper location, 3. adequate bony dimensions and 4. absence of pathology. Failure to adhere to these criteria increases the likelihood of short and long term failure. Some very common reasons to stage implant treatment would be loss of the buccal plate, local anatomy such as the inferior alveolar nerve and obviously, an active infection. Some local experts have advocated that the infected site is ideal because of the presence of immune cells to facilitate healing. This claim is anecdotal and is not supported by any scientific literature.

The literature indicates that no long term data is available on the topic and that current studies are underpowered and at high risk for bias.

The image at left illustrates the point. This failure was likely avoidable with staged treatment and the implant required removal and re-treatment. One has to question, what was gained by the immediate placement?

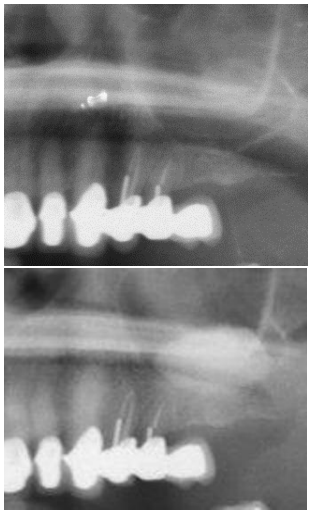
Vertical Dimension

Evaluation of the restorative space and alveolus are equally important to the vertical evaluation of an implant site.

Limited restorative space from supraeruption of an opposing tooth can often be managed with a screw-retained prosthesis and/or alteration of the opposing dentition.

Alveolar height can be affected by atrophy, the lingual contour of the mandible and the anatomy of the inferior alveolar nerve and maxillary sinus. Our evaluation seeks to identify or create at minimum, a 10 mm alveolar height because of the proven, superior outcomes of 10 mm length implants.

Related to health, preference, or treatment duration, some patients may only opt for a shorter implant. But if less than 10 mm are available, the expected occlusal load on the final prosthesis must be considered and the risks and benefits of short vs long implants and the associated graft procedures should be presented to the patient. Most sinus lifts can be performed at the time of implant placement with local anesthesia. Often block grafts are taken from the ramus under IV sedation. These grafts heal for 6 months prior to either implant placement, or implant restoration, in the case of a sinus lift/ implant procedure.



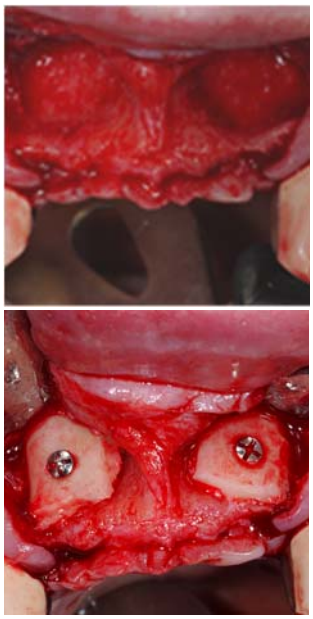
Images: Sinus lift allowing for 13 mm implants at sites #14, 15.

Limited Horizontal Dimension

Earlier we discussed the prevention of a narrow ridge subsequent to tooth extraction with socket grafting. Long-standing edentulous sites and sites that had tooth removal for periodontal disease are often too narrow for implant placement. The narrowest implants with FDA approval for permanent restoration are 3.0 mm for maxillary lateral and lower incisor teeth and 3.5 mm for other sites. Along the lines of the discussion about implant length, the implant diameter must take into account the planned prosthesis and expected occlusal load.

The gold-standard for bone graft augmentation of the narrow ridge is an autogenous graft. The mandibular ramus provides adequate graft size for most treatment plans. Patients are treated with local anesthesia or their desired level of sedation. The graft is secured with titanium screws that are removed after 6 months of healing, when the implant is placed.

For reconstruction of large defects, grafts from the iliac crest are performed by our doctors in a hospital setting.



Images: Ramus graft allowing for implant at sites #7, 10.

Sites Considered For An Implant-Borne Provisional

An immediate implant and provisional produces a superior gingival esthetic outcome as the papillae and gingival margin positions are predictably maintained. With proper primary stability, a patient is a candidate for this plan.

Important features of the provisional crown are: no occlusion in centric and excursive movements, reduced facial contour in the cervical region and judicious use of cement.

Emphasis for post-op care with an immediate provisional revolves around strict adherence to avoiding occlusal forces by the patient. This plan has a great reward but carries the risk of failure in a non-compliant patient. Patients are counseled on the role their compliance plays in the final outcome.

A backup plan for a flipper is an important part of preparing for this case. Inadequate primary stability can contraindicate an immediate provisional and the patient prepared for this fares much better if they are aware of the possibility!

Single and multi-unit cases are candidates for this treatment and we hope you will consider this for cases with high esthetic demand.

Gingival architecture with immediate implant/crown.

CONNECTICUT MAXILLOFACIAL SURGEONS, LLC

291Farmington Ave
Farmington,CT 06032
860-678-7528
860-678-7933 fax

1080 Day Hill Road
Windsor, CT 06095
860-285-0889
860-298-9030 fax

507 Hopmeadow St
Simsbury, CT 06070
860-658-0446
860-651-1034 fax

663 East Main St
Torrington, CT 06790
860-496-6036
860-496-6039 fax

415 Silas Deane Hwy
Wethersfield, CT 06109
860-529-5394
860-721-1033 fax

WWW.CMSLLC.COM

Our Mission Statement

All of us at **Connecticut Maxillofacial Surgeons, LLC**, are dedicated to the highest quality of care in the specialty of Oral and Maxillofacial Surgery. We take pride in providing contemporary clinical care in a full scope of the specialty as well as serving in a leadership capacity for the future of our specialty on both a local and national level. CMS,LLC can truly be described as a unique group of service-oriented professionals whose aim is to provide the highest level of patient care in combination with a maximum of comfort, sensitivity, and compassion for each and every individual.

Through our presence on the Internet we hope to move beyond the realm of merely providing clinical care in the classic sense. First and foremost, we would like to further close the information gap between us and our patients. A more ambitious intent would be to not only fulfill a regional endeavor but also provide a broader understanding of our specialty on a global level. Through a depth of experience and resources that we possess as a group, we hope to provide an ever increasing knowledge base accessible by all of those with any interest.

Definition of Oral & Maxillofacial Surgery:

Oral and Maxillofacial Surgery *is a medical and dental specialty of surgery which involves the diagnosis, surgery and adjunctive treatment of diseases and defects involving both the functional and aesthetic aspects of the hard and soft tissues of the oral and maxillofacial region.* (American Dental Association) More simply put in layman's terms, the oral and maxillofacial surgeon is the orthopedic surgeon of the facial region. He or she is an individual who addresses problems ranging from the removal of impacted teeth to the repair of facial trauma. He or she may be a doctor you would visit to:

- Have a **tooth extraction**.
- Have teeth replaced by having **dental implants** inserted.
- Have oral surgical procedures performed in the office under outpatient **ambulatory anesthesia**.
- Have a **jaw cyst or tumor** diagnosed, removed and reconstructed.
- Have your jaw aligned with **orthognathic surgery**.
- Have you jaw joint repaired with **TMJ surgery**.
- Have **jaw reconstruction** following cancer surgery.
- Have your facial bones realigned after **facial trauma**.

PROMOTING A CONSERVATIVE APPROACH

Product development and improved treatment protocols have greatly accelerated the pace of dental implant treatment since its introduction. Immediate dental implant and implant-borne provisional treatment plans provide short and long term esthetic benefits and the single surgical procedure minimizes patient pain. Fortunately, in most anterior and premolar sites, immediate treatment can observe the principles of primary stability and axial loading.

Immediate molar implants have become a trend that takes treatment back to the days of "the implant was placed where the bone was." In some cases, with lower molars, the implant can be placed in the ideal inclination with good primary stability. In the adult patient with age-appropriate pneumatization of the sinuses, the immediate molar implant typically results in placement in one of the root sockets, at an angle, often the palatal root. While angled and custom abutments can accommodate for an off-axis implant, we would ask what was gained by the immediate placement?

All dental practitioners strive to provide ideal care while recognizing that sometimes the health, preference or anatomy of a patient may result in a satisfactory result that 'could have been just a little better.' If the patient has been informed of the options for ideal and satisfactory treatment plans and decides to cut the corner for a faster result, they are at least making an informed decision. Until it is shown that the immediately-placed maxillary molar implant prosthesis has the same prognosis and ease of restorability as the current standard of care, we will continue to recommend the proven, conservative approach in the treatment of your patients.