

1 **Essentials of Implantology and CBCT-Guided Implant Surgery: Level I**

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-
- Tarzana. CA

2 **Understanding**

- The technician understands “the how”
-
- The Doctor also understands...
- “the why ... the why not...”
- and the what if...”

3 **Thought for the Day...**

- “Familiarity is the Key to Success”
- - Gerry Rodrigues

4 **To Do Surgery?**

- What is your experience/ comfort level
- “Hassle factor”
- 30 - 60 minute time limit
- Dealing with complications
 - Backup
- to the same standard of care as a specialist

5 **To Do Surgery?**

- doesn't mean you should not refer the patient.
- In your office should be a “practice builder”
- Specialist makes you look great to the patient
- Your training, experience and comfort zone!

6 **Strategy “Think like a surgeon”**

- visualize the procedure from start to finish
- ded. and have them ready/ readily available
- Anticipate complications
- Headlight, loupes
- “Measure twice, cut once”

7 **Basic Implant Treatment Planning**

- of bone type/soft tissue type/ biologic width
 - considerations for the implant surgical patient
 - extraction and ridge preservation grafting
 - treatment planning – why CBCT is standard of care
 - design/ principles/rules of ideal implant planning
 - Concepts of implant length
 - consultation appointment, incl. informed consent
-

- Introduction to the Astra Tech EV system
- Prepping the patient for surgery
- Surgical suite set-up: draping/ handpiece
- Principles of freehand implant surgery

8 **Basic Implant Treatment Planning**

- ITV vs ISQ
- Astra Tech EV-S surgical kit and drilling sequence
- Healing abutment vs. cover screw
- Post-op care
- Recognizing and managing complications
- Peri-implant disease
- Technical troubleshooting
- Implant maintenance protocols
- Hands-on with the Astra Tech EV (freehand) kit
- Astra Tech EV conical and profile implants
- Work-up, planning / work flow/ finalizing plan
 - EV 5.4 implant placement
 - Hands-on with the EV Guided kit
 - Guided surgery trouble shooting
 - Case planning exercises
 - Closing thoughts

9 **Implantology Fundamentals**

- Bone
- Soft Tissue

10 **Ridge Classification**

- Ridge shape based on amount of resorption
- Line-- demarcates alveolar/ basal bone

11 **Bone Quality Classification**

- Cortical and cancellous bone and medullary density

12

13 **In addition to good quality bone, we also need**

- Sufficient bone volume

14 **Insufficient Bone Volume**

- Inadequate bone width

15 **Insufficient Bone Volume**

- Inadequate bone height
- Inadequate bone width

16 **What do we need surrounding an implant fixture?**

- Blood supply to alveolar bone comes from:
- Periosteum

- Periodontal ligament

17 **What are the requirements for bone surrounding an implant fixture?**

- Absorption due to compromised blood supply
- 2 mm buccal (facial)
- 2 mm lingual (palatal)

18 **Tissue Considerations**

- Tissue Biotype
- Biologic Width

19 **Soft Tissue Biotypes**

- THICK
 - Flat bone architecture
 - Dense, fibrotic soft tissue
 - Large amount of attached gingiva
 - Prone to pocket formation
- THIN
 - Scalloped bone architecture
 - Delicate, friable soft tissue
 - Thin attached gingiva
 - Prone to gingival recession

20 **Soft Tissue Biotypes**

- THICK
 - Minimal ridge atrophy
 - Bone/gingival contours more predictable
- THIN
 - Apical/lingual ridge resorption
 - Bone/gingival healing less predictable

21 **Soft Tissue Biotypes - So What?**

- THICK
 - Immediate implants may not need preservation graft
 - Immediate implants more predictable
- THIN
 - Ridge preservation essential
 - Immediate implants less predictable

22 **Biologic Width**

- The restorative margin and the alveolar crest.
- Connective tissue and epithelial attachment
- Adequate biologic width results in inflammation

23 **Violation of Biologic Width**

24 **Biologic Width**

25 **Keratinized Gingiva (KG)**

- oral epithelium (0.5 - 1.5mm) + Sulcus depth

-

26 **Violation of Biologic Width**

27 **Keratinized Gingiva Requirements**

- Significance for Dental Implants:
- Less of keratinized tissue around an implant.

- 10mm, but about 2mm is a good rule of thumb.

28 **Question**

- Can I place the implant without a flap (tissue punch)?

29 **If you have enough...**

- Bone
- Attached gingiva

30 **Spacing/ Position Issues**

- Ideally-
 - Parallel to adjacent teeth
 - Equally spaced between adjacent teeth
 - Aligned with occlusal tables of adjacent teeth

31

32 **Are complete fill of the interdental papilla?**

- Tarnow DP, Magner AW, Fletcher P: The effect of distance from the contact point to the papilla. J Periodontology 1992; 63: 995-996

33 **Tarnow 1992**

- Acceptable, but tooth form will look more square

34 **Salama 1998**

- Not based on "platform-switched" implants

35 **Maintenance of Interdental Papillae**

- The maximum distance between the crestal bone and the contact point should be 4-5 embrasure space.

36 **Distance between implants**

- Tarnow 2003 Clinical Periodontology. 11 Ed.

37 **Implant Spacing Guidelines**

- Height of inter-implant bone crest. J Periodontology 2000; 71:546-54

38 **Platform Switching**

- tal implants, especially with smooth necks.
- el usually resorbs to level of rough surface.
- 5mm JE, 1.5-2.0mm CT). Canullo et al. 2011

- placed at crest will establish biologic width.

39 Platform Switching

- nt that is narrower than the implant fixture.
- outment-implant interface and forms a seal.

40 Platform Switching

- Platform-matched

41 ve as a "mechanical retention factor" for periodontal fiber orientation

- witching on Collagen Fiber Orientation and Bone Resorption Around Dental Implants: A
ial Implants . 2012, Vol. 27 (5), p1116-1122.

42 Platform Switching

- onical seal connection seems to significantly reduce crestal bone loss.

43 Implant Consultation

- Review medical history
- Review clinical data
- discuss treatment options
- plan for procedure

44 Pre-Surgical Considerations

- Get a thorough medical history
- Get a complete list of medications
- Prior surgery
- Allergies

45 Pre-Surgical Evaluation

- betes - impaired wound healing, infections
- Heart conditions - anticoagulants
- Cancer treatment - bisphosphonates
- Osteoporosis - bisphosphonates
- sthma - inhalers (impaired wound healing)
- king - impaired wound healing, infections
- onic steroid use - impaired wound healing

46 Medications

- How do they affect treatment?
- Which ones to stop

- Which ones not to stop
- Modifications of routine meds

47 **e Risk of Osseointegrated implant Failure**

- antidepressant- Prozac. Zoloft. Celexa. Paxil
- bone formation and increase risk of fracture
- patients (94 implants in 51 patients on SSRIs)
- risk of dental implant failure (10.6% vs. 4.6%)
- and further increased the risk in both groups

48 **JADA November 2003**

- or minor procedures if at risk of thrombosis

49 **Coumadin Therapy**

- For most dental implant procedures
- can usually be maintained, if INR is 3.5 or less

50 **Antibiotic Prophylaxis Guidelines- Joints**

- American Academy of Orthopaedic Surgeons/American Dental Association. Prevention Procedures: Evidence-based Guideline and Evidence Report. American Academy of Orthopaedic Surgeons. http://www.aaos.org/education/continuing_education/guidelines/PUDE/PUDE_guideline.pdf

51 **Antibiotic Prophylaxis Guidelines- IE**

- Patient Selection
- Preventive antibiotics before certain dental procedures is reasonable for patients with:
 - prosthetic material used for cardiac valve repair
 - a history of infective endocarditis
 - a transplant that develops cardiac valvulopathy

52 **Antibiotic Prophylaxis Guidelines- IE**

- is no longer recommended for any other form of congenital heart disease.
 - congenital (present from birth) heart disease:
 - including palliative shunts and conduits
 - completely repaired congenital heart defect with prosthetic material or device, within the first six months after the procedure
 - any repaired congenital heart defect with residual defect at the site or adjacent to it (which inhibits endothelialization)
 - prosthetic material occurs within six months after the procedure.

53 Antibiotic Prophylaxis Guidelines- IE

- Dental Procedures
- Indicated for the patients identified in the previous section for all dental procedures that involve the teeth, or perforation of the oral mucosa.
-

54 Antibiotic Prophylaxis (when indicated)

- Patients. The recommendation is that the antibiotic be given before the procedure. This is to maintain blood levels. However, the guidelines to prevent infective endocarditis state, "If the antibiotic is given after the procedure, the dosage may be administered up to 2 hours after the procedure."

55 Antibiotic Prophylaxis (when indicated)

- Patients who require prophylaxis but are already taking antibiotics for another condition. In these cases, it is recommended that the dentist select an antibiotic from a different class than the one the patient is currently taking. The dentist should select clindamycin, azithromycin or clarithromycin for prophylaxis.

56 Herbal Supplements

- Medications, foods, or affect normal physiology

57 Common Herbals

- Coenzyme Q10
 - Decreases warfarin effectiveness
- Cranberry
 - Enhances anticoagulants
- Valerian
 - Interacts with sedatives. muscle relaxants. antidepressants
- St. John's Wort
 - Interacts with SSRIs. TCAs. warfarin. OCPs
- Saw Palmetto
 - Interacts with warfarin to prolong bleeding
- Melatonin
 - Interacts with sedatives. muscle relaxants. raise blood sugar
- Fish Oil
 - Interacts with bleeding with Plavix. Lovenox. warfarin. ASA

58 Common Herbals

- Ginseng

- warfarin. affects insulin and hypoglycemics
- Ginkgo Biloba
 - anticoagulants, decreases antiviral drugs efficacy
- Garlic
 - Affects ASA. warfarin. Plavix
- Green Tea
 - May contain Vit. K. interfere with warfarin
- Ginger
 - along ASA. warfarin. other blood thinners
- Grapefruit
 - amiodarone, carbamazepine, benzodiazepines, ED drugs, warfarin.

59 **Medication-Induced Osteonecrosis of the Jaws (MRONJ)**

- Formerly BRONJ
- Seen with:
 - Antiresorptive medications
 - IV Bisphosphonates
 - Oral Bisphosphonates
 - RANK Ligand Inhibitors (denosumab)
 - anti-angiogenic medications (Bevacizumab/Avastin)

60 **Bisphosphonates**

- inhibit bone resorption by osteoclasts.
- used in prostate, lung and breast CA, and multiple myeloma.
- indications of osteoporosis, and for Paget Dz.

61 **IV Bisphosphonates**

- Aredia (pamidronate) - 2001
- Zometa (zoledronic acid) - 2002
- hypercalcemia in metastatic bone disease.
- Very potent. Zometa > Aredia
- Administered monthly

62 **Oral Bisphosphonates**

- Fosamax (alendronate) - 1995
- Actonel (risedronate)
- Boniva (ibandronate)
- Skelid (tiludronate)
- Didronel (etidronate)
- Given daily - weekly
- About 1/5 - 1/10 as potent as IV

63  **Rank ligand inhibitor**

- Denosumab
- RANK ligand- inhibits osteoclastic function
 - Prolia- SQ α 6 mo for osteoporosis
 - for metastatic bone disease (except MM)
- Bone - effects minimal 6 mo after cessation

64 

65  **Mechanism**

- Inhibit bone resorption by osteoclasts
- Not metabolized
- maintained over a prolonged period of time
- especially at the site of dentoalveolar "trauma"

66 

67  **AAOMS Case Definition of MRONJ**

- with antiresorptive or antiangiogenic agents
- I or extraoral fistula(e) in the maxillofacial region that has persisted for > 8 weeks
- ; or obvious metastatic diseases to the jaws

68  **Risk of BRONJ depends on:**

- IV vs oral drug
- Dose
- Duration of drug exposure
- Time since last used
- History of "trauma"

69  **Relative Risk after dentoalveolar surgery**

- IV Bisphosphonates
 - 14.8 - 16.4%
 - If > 1 year
- Oral Bisphosphonates
 - 0.1 - 0.5%
 - If > 3 years
- Antiresorptive agents
 - ??
- Mandible- 73%
- Maxilla- 22.5%
- Both - 4.5%

70  **Patient Management**

- patient must be aware of and accept risk
- For oral bisphosphonate patients
 - controversial- no evidence of effectiveness

- Maybe if taking > 4 years
- For IV bisphosphonate patients
 - AVOID elective procedures
- RANK L Inhibitors
 - 3 mo. No data to support/refute cessation
- drugs - No data to support/refute cessation

71 **Prevention of BRONJ**

- Patients Taking Oral Bisphosphonates
 - Maintain good oral/dental health
 - Patient education
 - Assess risk based on dose/ duration
 - Thorough Informed Consent
 - Consider modification/ discontinuation of drug
 - 3 months before
 - 3 months after

72 **Risk Assessment – Oral Bisphosphonates**

- Serum CTx (Collagen Type I C-Telopeptide)
- 2006 Quest Diagnostics
- Type I collagen due to osteoclastic activity
- Marker of bone remodeling
- bisphosphonate use -- Risk of BRONJ

73

74 **Serum CTx**

- mentioned in most current AAOMS guidelines.

75 **Atraumatic Tooth Extraction**

- -Proximators
 - "Turbo periostomes"
- -Apical Retention Forceps
 - Thin beaks
 - Tapered profile
 - Movement to pass deeper onto root surface

76 **Ridge Preservation Grafting**

- The amount of bone present at extraction site
- (at 6 months) ridge resorption by about 75%
- Irrigated. graft material is packed into socket
- Barrier membrane is placed over graft
- Sutured in place

77 **Changes to extraction site occur in first 12 months after extraction.
Resorption occurs within the few months**

- Bone healing and soft tissue contour changes following single-tooth extraction: a clinical study. *Journal of Prosthetic Dentistry* 23(4); 313-23, 2003

78  **Ridge Preservation Grafting**

- Review of all English language dental literature
- 8 abstracts → 104 full text article analysis
- 6 months after extraction
 - 3.79mm (29-63%) horizontal
 - 3.4mm (L) vertical avd. bone loss (11-22%)

79  **Symbios™ regenerative products**

80  **My Ridge Preservation Technique**

- OS mineralized corticocancellous granules
- SYMBIOS OsteoShield PTFE membrane
- Cytoplast suture

81  **Symbios™ Cortical/Cancellous Granules**

- 80% cortical and cancellous human bone (20%)
- Large particle range
 - Mineralized: 1.0 mm – 2.0 mm
 - Demineralized: 0.5 mm – 3.0 mm
- Integrates in approximately 4-5 months
- 3-year shelf life

82  **OsteoGraf®/N**

- matrix (ABM) – microporous hydroxylapatite
- Dense, high-heat sterilized bovine particles
- Available in 2 particle ranges:
 - 250 – 420µ (OsteoGraf N-300)
 - 420 – 1000µ (OsteoGraf N-700)
- Resorbs in approximately 9 – 12 months
- 5-year shelf life

83  **OsteoGraf®/N**

84  **OsteoGraf®/N**

85  **Symbios™ OsteoShield™ PTFE Non-Resorbable**

- Proprietary 100% polytetrafluoroethylene sheet
- Biologically inert and tissue compatible
- Mesh appearance is dimples, not holes – makes membrane virtually impervious to bacteria (bone)
- 4-year shelf life

86  **Symbios™ OsteoShield™ PTFE Non-Resorbable**

87 **Symbios™ Osteosnield® PTFE
Non-Resorbable**

88 **Symbios™ Osteosnield® PTFE
Non-Resorbable**

89 **Ridge Preservation Technique**

90 **Mixing Bone with Saline versus Blood**

- Saline and blood are both isotonic
- Blood contains fibrin, proteins, stem cells
- cohesive when mixed with blood versus saline
- requires drawing blood (approx. equal volumes)
- Clinical advantage??

91 **Symbios™ regenerative products**

92 **Symbios™ Osteosnield® Collagen
Resorbable**

- suture Achilles tendon for safety and predictability

- GBR barrier function
- Integrates in approximately 6-9 months
- 3-year shelf life

93 **Symbios™ Osteosnield® Collagen
Resorbable**

94 **Symbios™ Osteosnield® Collagen
Resorbable**

95 **Ridge Preservation**

- 88 v.o. female
- HTN, hypothyroid
- Synthroid, Losartan (Cozaar)
- NKDA
- Lost crown, saw endo --> not restorable

96 **Ridge Preservation**

97 **PeriAcryl**

- Collaplug
- Gut Fig-8 suture
- PeriAcryl

98 **Panoramic radiographs**

- time, ...but it still left out the third dimension

99 **The Birth of Computed Tomography**

100 **Back Projection Image Reconstruction**

101 **How Cone Beam CT Works**

102 **How Cone Beam CT Works**

- X-rays are used more efficiently
- hundreds of slices per one rotation

103 **Hounsfield Units**

104 **μ - Attenuation Coefficient**

- In CT, we are most interested in bone density
- Machines are different. Geometries can vary
- X-ray beams are not monochromatic
- Beam depends on the x-ray photon energy
- Staining and metal artifacts affect attenuation

105 **Bottom line...**

- Areas of the same patient in the same scan.
- Comparisons between scans can be unreliable.

106 **3D Imaging- CBCT**

- And the patient's anatomy in 3D is critical to:
 - Accurate implant planning
 - Avoidance of complications
 - Long term implant success

107 **Anatomical Considerations**

- Mandibular Nerve
- Lingual nerve
- Maxillary Sinuses
- Mucohoid Fossa

108 **Nerve Injury**

- Nerve (IAN) injury
 - Drilling injury
 - Tends 0.1 - 1.0 mm beyond fixture depth
 - Fixture injury
 - Pressure on IAN
 - Impingement on IAN

109 **Anatomical Considerations**

- Mandibular Nerve
 - Stay at least 2mm above canal
 - Watch anterior loop of mental nerve

110 **Preventing IAN Injury - 2mm safety margin**

- 2mm Safety Margin

111 **Beware the Anterior Loop**

112 **Anterior Loop of Mandibular Nerve**

- Greenstein G and Tarnow D.

- The Mental Foramen and Nerve: Clinical and Anatomical Factors Related to Dental Implants 1933-1943, 2006

113 Results/ Conclusions

- Location can vary from canine —1st molar
- More accurate than conventional radiographs
- Incidence ranges between 0 - 88%
- Bone should be kept from mandibular nerve

114 Lingual Nerve

- Very variable location
- Can be above or below the mylohyoid muscle
- Avoid lingual retraction and instrumentation

115 Mylohyoid Fossa

116

117

118 Soft Tissue Bleeding

119 Anatomical Considerations

- Maxillary Sinuses
 - Lighten skull
 - Warm, moisten air
 - Pneumatize after extractions

120 Anatomical Considerations

- Maxillary Sinuses:
 - "Normal" vs. "pathological" pathology
 - Penetrating the sinus floor

121 Sinus Floor Violation

122

123 Sinus Floor Violation

124 This is a problem...

- Solid bone at floor of sinus to stabilize fixture
- Sinus lift FIRST

125 Maxillary Bone Requirement

- Solid bone at floor of sinus to stabilize fixture
- Sinus lift FIRST

126 Nasopalatine Duct

127

128 Planning your first implant case

- My first guided surgery case

129 Key to Success

- We don't want you to have complications
- We don't want you to stop placing implants

- Complexity is based on training and experience

130 **Your first (25) cases should be:**

- Very straightforward
- Minimal risk of complications
- Adequate bone volume - no bone grafting needed
- Good anatomy - flapless surgery (tissue punch)
- 1st Premolar to 1st Molar
 - Easy access
 - Not in the anterior esthetic zone

131 **Rules of Engagement - Implant Planning**

- Implant fixture should be placed:
 - Parallel to occlusal forces
 - Parallel to adjacent teeth (if not tilted)
 - Parallel to central sulcus/ axis of restoration
 - Parallel to lingual & buccal cortical walls
 - Parallel to adjacent implants and teeth

132 **Implants are not Teeth**

- Implants are non-vital
- There is no PDL
- Implants don't move
 - Do not place implant until ortho is finished

133 **Tooth Movement**

- Use a space maintainer
 - Essix bridge
 - Bonded bridge
 - Staple/ flipper
- Orthodontic Evaluation if significant
- May result in removal of tooth

134 **Tooth Movement**

- Use a space maintainer
 - Essix bridge
 - Bonded bridge
 - Staple/ flipper
- Orthodontic Evaluation if significant
- May result in removal of tooth

135

136 **Radiograph of atrophic ridge**

- Short fixtures

137 **6 mm implant length option**

- Implant also helps reduce the need for bone augmentation

138 

139  **Success rate of a short implant vs. longer?**

- success rate at 3 years. Mean bone loss was 1.46mm.
- Mialo P. 7mm long dental implants in posterior jaws: 3-year report of an ongoing pro
2017
- implants. More complications were seen in augmented patients
- short implants versus longer implants in vertically augmented posterior mandibles: a ra
Eur J Oral Implantol 7(4): 359-369, 2014
- shorter implants placed in augmented bone, with fewer complications.
- cases supported by 6mm long 4mm wide implants or by longer implants in
domized controlled trial. Eur J Oral Implant 6(4): 359-373, 2013

140  **Crown-Implant Ratio**

- Peri-implant bone loss was not influenced by C/I ratio.
- RJ. To what extent does the crown-implant ratio affect survival and complications of
Clin Oral Implants Res 20(4): 67-72, 2009
- equal rate and do not result in more bone loss.
- even to implant ratios. Dentistry Today CE Course 25, 2011.
- significantly improve implant success rates
- Weber HP. Sukotjo C. Does the type of implant prosthesis affect outcomes in the pe
22(suppl):140-172, 2007

141  **Implant Consultation**

- Review medical history
- Review clinical data
- discuss treatment options
- plan for procedure

142  **Case Presentation**

- overall implant long-term success is about 95%.
- About 1 out of 20 implants fail
- once will pay to replace a bridge after 5 years
- once has a 90- 95% failure rate after 15 years

- Just like a "permanent" tooth (93% success)

143 **'Doctor, are dental implants permanent?'**

- are as permanent as your permanent teeth"

144 **Informed Consent**

- with the patient of the potential/expected-
 - Risks
 - Benefits
 - Complications
 - Alternatives, including no treatment
 - Option of going to a Specialist

145

146 **This is a long-term commitment**

- "Implants are like a car"
 - Not a one-time event/expense
 - It requires "Regular routine maintenance"
- Patient must be committed to success
- Partnership

147 **Success Strategy**

- Biofilm reduction
 - Daily maintenance by patient
 - Water flosser (Water-Pik) daily
 - 1% hypochlorite solution - 6 drops per tank
- 6 month recall- Implant protocol
 - Glycine air abrasion
 - Er,Cr:YSSG laser (2780 nm)
 - Piezoscaler (Ti tips)

148 **Astra Tech Implant System EV**

- A site-specific, crown-down approach
- of "Prosthetically-Driven" implant planning

149 **Implant System BioManagement Complex™**

- long-term bone level maintenance and esthetics

150 **Astra Tech Implant System EV**

- EV Straight vs. Conical fixtures
- Conical Connection
- Implant/ component packaging
- Standard (non-guided) surgical kit

151 **Implant size / tooth position**

- Implant sizes in relation to the natural dentition

- 3.0mm and 5.4mm implants are non-guided EV implants:

Characterization of the newly introduced system

- Clinical part
- Maximal bone maintenance for OsseoSpeed EV

-
-

- 19 patients/49 OsseoSpeed EV implants
- VAS score
- Clinical and radiographical examination

152 System overview – key points surgical

- Surgical simplicity and flexibility

153 Versatile implant designs

- One system for all indications
- Suitable for both one-stage and two-stage surgery
- Designed for immediate and early restoration

154 Implant assortment

Implant design

155 - OsseoSpeed™ EV

156 Ø 3.0 mm implant

- Maximal space in lower anteriors or upper laterals

157 Ø 5.4 mm implant

- Better option for treatment of the molar region

158 6 mm implant length option

- Implant also helps reduce the need for bone augmentation

159 One interface – three indexing solutions

160 Preparing the Patient for Surgery

- Medical Considerations
- Medications
- Chlorhexidine Oral Rinse
- Systemic Antibiotics

161 Perioperative Protocols

- Antibiotic Use
 - Systemic
 - Chlorhexidine 0.12% (16 oz)
- Pain Medications

.....

-
- Mv Reaimen:
 - Axin 750 ma (Amoxicillin 875 ma) BID x 6d
 - CHX Rinse 0.5 oz BID x 16d

162 Peridex / ABX Regimen

- 2 prescriptions
- 2 x per dav
- Started 2d before suraerv

163 Allergic to Penicillins and Cephalosporins?

- Define "Alleraic"
-
- Biaxin 500ma BID x 6 Davs
- Cipro 500ma BID x 6 Davs

164 Pre-Op Patient Instructions

165 PreOperative Protocol

- nination should be prior to implant planning
- nv sources of infection should be managed
- Periodontal issues should be under control
- should be no sources of periapical infection
- rophylaxis 2 weeks before implant suraerv

166 clinical Pearl

- Once you have done the work-up for the surgery and planned the surgical guide, any re guide to not fit.
- l. or wait until after implant suraerv is done.

167 Another pearl

- Following that same logic-
- ing ortho treatment, do not plan implants until after ortho case is finished.
 - the surgical guide may not fit
 - e teeth are moving. The implant does not!

168 Implant Case Checklist

- Implant Svstem
- Fixture sizes
- Grafting materials
- 2nd Stage info

169 Basic Implant Surgery Techniques

- Preparing the patient for suraerv
- Suraical draping
 - "sterile technique"
- Suraical techniques
 - Drilling sequence

- Pearls and pitfalls
- Post-op management
- Avoiding and managing complications

170 Principles of Surgery

- Wound Classification
- Clean vs. Sterile technique
- Protocol of Oral Surgery/ Implant Surgery

171 SURGICAL WOUND CLASSIFICATIONS

- I. Clean:
 - - Uninfected, no inflammation
 - - Resp. GI. GU tracts not entered
 - - Closed primarily
 - - Neck, thyroid, vascular, hernia, splenectomy
- II. Clean-contaminated:
 - - Resp. GI. GU tracts entered, controlled
 - - No unusual contamination
 - - Oral surgery, bronch. colon surgery, Oral or ENT

172 SURGICAL WOUND CLASSIFICATIONS

- III: Contaminated:
 - - Open, fresh, accidental wounds
 - - Major break in sterile technique
 - - Gross Spillage from GI tract
 - - Acute nonpurulent inflammation
 - - Dental surgery, penetrating wounds, tooth extraction

173 SURGICAL WOUND CLASSIFICATIONS

- IV: Dirty:
 - - Old traumatic wounds, devitalized tissue
 - - Existing infection or perforation
 - - Organisms present BEFORE procedure
 - - Wound, positive cultures pre-op, Abscessed Tooth

174 Clean Technique

- Hand washing, hand drying and use of non-sterile gloves
- Avoid contact with mucous membranes or dirty (contaminated) items
- Clean tech is appropriate for:
 - Taking blood pressures
 - Examining patients
 - Removing sutures from oral cavity

175 Invasive Procedures

- od stream, the inside of the body, or normally sterile parts of the body

176 In Summary...

177 Aseptic Technique

- d for short invasive procedures. It involves:
- Antiseptic (alcohol, betadine or chlorhexidine)
- sterile gloves
- Antiseptic on patient's skin (if extraoral)
- Use of clean, dedicated area

178 Aseptic Technique

- Bare skin or mucous membranes, or normally sterile parts of the body
- V, penetration through mucous membranes

179 Sterile Technique

- Invasive procedures with high rates of infection
- Examples:
 - Any long invasive procedure
 - Placement of central lines and thoracic lines
 - Surgery of sterile parts of the body

180 Sterile Technique

- The technique is used for surgery. It involves:
- Surgical hand rub with long acting antiseptic
- Hands dried with sterile towels
- Sterile field
- Sterile gown, mask, gloves
- Sterile supplies
- Skin prep
- A dedicated room

181 Surgical Draping for Implants

- Cavity is classified as "clean-contaminated"
- "Sterile" doesn't exist for the mouth
- Operating room sterile draping is a waste
- Modified draping for dental implant surgery

182 Success rates of osseointegration for implants placed under sterile versus clean conditions *J Periodontol 1993 Oct;64(10)954-6*

- Retrospective study
 - / 273 implants - OR/ strict sterile protocol
 - 1" - 31 cases/ 113 implants - Clinic setting

- Evaluated at Stage 2
 - .9% implant success/ 95.1% case success
 - 8.2% implant success/ 93.5 case success
- statistical difference between study groups
- can be performed under "clean" conditions

183 **ess you touch outside of the aseptic field**

- "clean" environment is a good insurance policy

184 **Draping for Implant Surgery**

- over patient's hair. chest with sterile towels
- light handles, trays, handpieces and tubing
- Clean Cover over hair
- Clean Cover downs
- Eye protection

185 **Oral Surgery Aseptic Technique**

- r Face that is not Already Packaged Sterile:

- Instruments/ Implant surgical Kit
- Gauze
- Needles
- Irrigation
-

- You can touch:
 - Patient
 - Sterile /Clean Covered surfaces
 - Sterile Instruments/ Implants

186 **Oral Surgery Aseptic Technique**

- You can't touch:
 - Everything Else
 -
- gloves if they touch outside of aseptic field
- Do not place implant if it gets contaminated

187 **What About the Surgical Stent?**

- solution for 10 - 15 minutes before surgery

188 **Sterile Field Setup**

- www.salvin.com

189 **Hand Asepsis**

- Avaaard
- hexidine/Alcohol surgical hand disinfectant
- Equivalent to a traditional surgical scrub
- Let hands dry before donning gloves

190 **Oral Cavity Asepsis**

- Chlorhexidine 0.12% Rinse prior to draping

•

191 **Airway Protection**

- Bite Block and Throat Pack
- Isolite

192 **Basic Surgical Tray Setup for Implants**

- Bite Block / Mouth Prop
- 4 x 4 and 2 x 2 Gauze
- Local Anesthetic/ Syringe/ Needle
- Minnesota Retractor
- Wieder Retractor
- Surgical Suction Tip
- #15 Scalpel Blade
- Periosteal Elevator
- Mosquito Hemostat
- Straight Curette
- Adson Tissue Forceps
- Tissue Scissors
- Needle Holder
- Suture Scissors
- Sterile Saline for Irrigation
- Sterile container for mixing bone graft

193

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197 **Implant packaging**

198 **Implant packaging**

199 **Drill packaging**

200 **Torque Wrench EV**

- Driver Handle. Surgical
-
- Driver Handles. Prosthetic

201 **EV Kit Important Tips and Tricks**

- debris out of flutes. then clean in ultrasonic
- components after washing. before autoclaving
 - Washtray EV: SKU 31071000
- Autoclave EV Guided kit by itself

- h gauge and stabilization abutments in kit

- grouped by length, and implant color code
- dull them, even if they have not been used!
 - \$4800 - 6000 per full set

202 **Local Anesthesia for Dental Implant Surgery**

- Innervation of teeth
- Innervation of edentulous site

203 **Drilling for Success**

- Dig the implant osteotomy sites. This means:

- Light pressure on the drill
- Slowest drilling speed for the job
- Feed decreases as drill diameter increases

204 **Intermittent versus Continuous Drilling** **Intermittent drilling actually causes less heat generation.**

- Finding: The significance of motor speed. JOMS 60 (10), 1160-1169, 2002.
- Temperature during the drilling of implant sites. Int J OMF Implants 11(1), 35 - 37, 1996.
- Temperature. Int J Oral Maxillofac Surg 1996; 25:394-399.

205 **Intermittent versus Continuous Drilling**

- Results in higher temperatures in bone due to:
 - Cloaking effect of bone debris
 - Inability of irrigation to reach site
- Cutting efficiency and increases time required
- In vitro and in vivo investigations. Int J Oral Maxillofac Surg 1991; 20: 245-249.

206 **Implant Drilling Speeds**

- Tissue Punch:
- Osteotomies:
- Thread Tapping:
- Implant Delivery:
- Cover Screw/Abutment:

207 **Bony Heat Necrosis**

- Held at temperatures 44°C to 47°C for 1 minute
- Due to denaturation of alkaline phosphatase
- ERIKSSON RA, ANDREKSSON T. Temperature threshold levels for heat-induced bone tissue necrosis. Int J Oral Maxillofac Surg 1983;50:101-107.

- Eriksson RA, Albrektsson T. The effect of heat on bone regeneration: An experimental study. *Maxillofac Surg* 1984;42:705–711.

208 Drill Sharpness

- Thermal bone when drilling. *J Bone Joint Surg* 1972;54:297–308.
- End bur diameter. *Int J Oral Maxillofac Implants* 1996;11:634–638.
- Andrianihine T, Wagenknecht M, Donkerwoicke M, Zurbruggen C, Burny F. External fixation. *Int J Oral Maxillofac Surg* 1987;10:1507–1516.
- Surgical technique and implant bed preparation. *Quintessence Int* 1992;23:811–816

209 Guided Implant Surgery

- Clinical Question:
- Why preparations as compared to non-guided?
-
- Clinical Bottom Line:
- This is supported by three in vitro studies in which a statistically significant increase of bone density was observed compared to conventional drilling without a guide.

210 Bottom line...

- It does not reach critical levels for bone necrosis.
- Temperature rise using surgical guides in-vivo is clinically relevant.

211 Saline vs. Water for Irrigation

- (0.9%) saline is the recommended irrigant.
- Theoretically, irrigation with water creates an osmotic gradient which causes fluid movement and cell rupture.

212 Saline vs. Water for Irrigation

- However...
- It really does make a difference in clinical practice?
- Probably not.

213 Irrigation versus room temperature saline?

- Sener BC et al. Effects of irrigation temperature in heat control in vitro at different drill diameters. *J Oral Maxillofac Surg* 2004;62:294–298
- 7, 12 mm depths; saline at 25°C and 10°C
- Superficially versus bottom of osteotomy
- Ice provides sufficient cooling for drilling

- irrigation of the osteotomy after each drill

214 **Implant Drill Controller**

- Maximum speed= 1500 rpm
- Copious irrigation

215 **ImplaNT Motor Foot Control**

- 4 Pedals

216 **Implant Drill Controller**

- Tissue Punch- 800 rpm
- Drilling- 1500 rpm
- Implant placement- 50 rpm (35 Ncm)
- Cover screw/ healing abutment - 10 Ncm
- Copious irrigation

217 **Osteotomy and placing the implant fixture**

218 **Drill direction needs to be kept true**

- Very critical on pilot drill (first drill)
- as it gets deeper due to flexion at the wrist
- your wrist stiff and keep drill going straight.
- excessive osteotomy- let the drill find its way

219 **Intra-Operative Radiographs**

- Freehand drilling
- To verify osteotomy position and angulation

220 **Primary Stability - Mechanical**

- decrease 24 hours after implant placement
- due to bone bone remodeling around implant
- least stable about 3-4 weeks after insertion

221 **Primary Stability**

- rises by about 8 weeks - secondary stability
- due to biological integration (osseointegration)

222 **Implant initial Primary Stability**

- measured by "Insertion torque value" - ITV
- Resonance Frequency Analysis (RFA)

223 **Osstell- Implant Stability Quotient**

- <http://www.osstell.com/scientific-database/>

224 **ISQ**

- Measures bending load
- affected by
 - Implant stiffness
 - Interface with surrounding bone
 - Transducer design

- Implant length above bone

225 ISQ Values

- ISQ <50 has higher non-integration rate
- Will change after implant placement
 - ↓ to improve during osseointegration
 - Weeks, then returned to initial ISQ values
- ↓ stability 1st 4 weeks, then stabilized

226 Insertion Torque Value (ITV)

- Mechanical friction between implant and bone
- ITV measures resistance to rotation
- Resisting torque depends on
 - Surface area of implant contacting bone
 - Implant length and diameter
 - Critical pressure on the bone
 - Coefficient of friction
- Static value at implant insertion

227 Insertion Torque Value (ITV) - is higher better?

- ↓ soft tissue recession that those inserted with "regular torque"
 - "Regular torque" = <50 N cm
 - High torque = ≥ 50 N cm
- 20 N cm had higher risk of non-integration

228 Higher ITV (>50 Ncm)

- necrosis of both cortical and medullary bone.

229 ITV vs ISQ

- Akça K et al. Torque-fitting and resonance frequency analyses of implants in conventional Maxillofac Surg 2010 39(2): 169-73, 2010.
 - Concluded by "Torque-fitting vs. RFA compared"
 - Observed between torque-fitting and RFA.
- Monje A et al. Sensitivity of resonance frequency analysis for detecting early implant failure. J Oral Maxillofac Surg 2014; 72(4): 456-61, 2014
 - 36 implants (June 2007 - January 2013)
 - Measures- ISQ at placement and at 4 months
 - Reliable in predicting early implant failure

230 Levin B P. The Correlation Between Immediate Implant Insertion Torque and Implant Failure. J Oral Maxillofac Surg 2016 Nov/Dec; 74(11): 833-840.

- Purpose of this retrospective study was to investigate whether a correlation exists between insertion torque (ITV) and implant stability quotient (ISQ) in nonmolar sites.
- Sites were placed into extraction sockets. ITV was recorded at surgery, and ISQ was recorded and/or ISQ were evaluated at 6 to 8 weeks.
- For implants with lower initial stability values.

231  **Levin B P. The Correlation Between Immediate Implant Insertion Torque and Implant Stability Quotient (ISQ) in Nonmolar Sites. 2016 Nov/Dec;36(6):833-840.**

- Sites were integrated and were definitively restored
- Between the measurements at either time point.
- Mean ITV and ISQ in the measured population.
- The findings of this study question the requirement of excessively high ITV and ISQ for osseointegration.

232  **Primary Stability**

- > 30 Ncm ⇒ OK to Provisionalize
- 20 - 30 Ncm ⇒ Healing Abutment
- ≤20 Ncm ⇒ Cover Screw/ Bury

233  **Poor Primary Stability**

- May be due to decreased bone density
- May be due to over-preparation of osteotomy
- "Visibly mobile"- remove implant and graft
- "somewhat stable" (≤20 Ncm)- bury fixture

234  **Poor primary stability - "Spinner"**

- Vanderov - #7

235 

236  **Current Concepts**

- Sites immediately provisionalized have been shown to osseointegrate
- Sites are thought to decrease osseointegration
- Aim for ITV in 20 - 35 Ncm range

237  **High (>35 Ncm) Insertion Torque**

- Reverse out implant
- Prepare site with 'X' drill
- Replace implant

238 **Instruments needed –
Surgical Tray EV**

239 **Why Concept
One tray for all OsseoSpeed™ EV implants**

- Is recommended for OsseoSpeed Profile EV
- Organized to support the user
- Color coded and simple layout
- Overlay snapped onto the tray base
- No rubber grommets

240 **Overlay 1**

241 **Overlay 2**

242 **Overlay 3**

243

244 **Drilling protocol
- OsseoSpeed™ EV - conical**

245 **Guide Drill EV / Precision Drill EV**

246 **Drill logics**

247 **Bone classification**

- Protocol for preparation of the spongy bone

248 **Drills**

- Excellent cutting properties
- Twist drills and step drills
- Sterile packaging
- Multiple-use with option for single-use
- Marked with diameters and drill letter/number
- Additional tip depth is maximum 1.0 mm

249 **Drill logics**

250 **Drill logics
- optional osteotomy preparation**

251 **Osteotomy preparation options**

- Widens the apical portion of the osteotomy
- The body portion and widens apical portion

252 **Drilling protocol
- OsseoSpeed™ EV straight**

253 **Drilling protocol
- OsseoSpeed™ EV straight**

254 **Drilling protocol
- OsseoSpeed™ EV - conical**

255 **Drilling protocol
- OsseoSpeed™ EV - conical**

256 **Expanded drilling protocol**
- OsseoSpeed™ EV straight and conical

257 **Flexible drilling protocol**
- providing the preferred primary stability

- The stepped osteotomy design ensures proper preparation of the marginal bone for implant stability

258 **Direction Indicator EV**

- Narrow end is used after drill
- Wider end is used after drill
- A laser marking indicates the 6 mm depth

259 **Implant Depth Gauge EV**

260 **Implant Driver EV**

261 **Torque Wrench EV**

- Torque Wrench EV
-
-
-
- Driver Handle. Surgical
-
-
-
- Driver Handles. Prosthetic

262 **Implant packaging**

263 **Implant packaging**

264 **Implant pick-up**

265 **Drill packaging**

266 **Drilling**

267

268 **What if the implant falls off the driver?**

- How do you pick it up and replace it?
- Im implant holding forceps #304 (IHF0304)

269 **Healing options**

- One-stage surgical protocol
 - HealDesian EV. round or triangular
 - Healing Uni EV

-
- Two-stage surgical protocol
 - Cover Screw EV, one height

270 EV Healing abutments

271 Cover screw vs. healing abutment

- How do you decide?

272 Cover Screw

- Suboptimal initial stability (<20 Ncm)
- Grafting around implant
- Flipper/ stavplate resting on ridge

273 Healing Abutment

- Good initial stability (>20 Ncm)
- Temporary prosthesis can be seated
- Minimal or no grafting around fixture

274 Cover Screw vs. Healing Abutment

- Subcrestal Implant placement
- or healing abutment won't seat completely?

275 Post-Op Radiographs

- Periapical is usually adequate
- the seating of cover screw/ healing abutment
- Panoramic in certain situations

276 screw/ healing abutment won't seat fully

- Bone is in the way!
- Implant placed too deeply
- profiling necessary (if implant depth good)

277 EV Bone Reamer Kit

278 Post-Op INstructions

- Ice
- Soft Diet
- Rest
- Analgesia
 - 1000mg APAP + 400 mg Ibuprofen
 - Tramadol 50 mg

279 Post-Implant Surgery Instructions

280 My Post-op Appointment Routine

- 2 weeks - remove sutures
- 4 weeks later (6 weeks)
- 8 weeks later (14 weeks) - evaluate for restoration

281 Implant Integration Time

- Immediate load

- 8 weeks
- 4 months

282 **2nd Stage - Uncovering the Fixture**

- Preserve the keratinized mucosa
- Expose the implant fixture:
 - Place healing abutment
 - Place final abutment
 - Take fixture-level impression
 - Suture tissue back in place around fixture

283 **2nd stage surgery**

284

285 **2 weeks post-op**

286

287 **Common Complications**

- "Implants are easy!"
- "Everyone should be placing them!"

288 **Damage to Adjacent Teeth**

289 **Damage to Adjacent Teeth**

- If minor - watch
- Endodontic treatment
- Implant removal

290 **Damage to Adjacent Teeth**

291 **Bleeding during site preparation**

Bleeding from Bone

- Place implant
- If during crafting
 - Apply pressure

Local Measures to Control Bleeding

- Gauze pressure
- elfoam), absorbable oxycellulose (Suracel)
- Topical thrombin
- Bone wax
- Local anesthetic

292

293

294

295 **Sinusitis**

- Augmentin 875mg BID x 14 days
- OTC antihistamines- Claritin. Allegra
- OTC Nasal steroids- Flonase. Nasacort

296 Sinusitis

- If allergic to Augmentin (PCN)
 - Cipro (ciprofloxacin) 500 mg BID
 - Cleocin (clindamycin) 300 mg QID
 - Biaxin (clarithromycin) 500 mg BID

297 Sinusitis

- If sinusitis fails to resolve:
 - Remove implant
 - Debride graft (Calwell-Luc)
- Medical evaluation (ENT or OMFS) if persistent

298 Preventing IAN Injury

- 2mm Safety Margin

299 Nerve Injury

- IAN injury most common
 - Drilling injury
 - Avoids 0.1 - 1.0 mm beyond fixture depth
 - Fixture injury
 - Pressure on IAN
 - Impingement on IAN

300 Seddon Classification

- Neuropraxia
 - Blunt trauma or stretching
 - Minor deficit
 - No loss of continuity

301 Seddon Classification

- Axonotmesis
 - Nerve damaged but not severed
 - Partial deficit

302 Seddon Classification

- Neurotmesis
 - Nerve is severed
 - Axonal degeneration
 - Neuroma formation
 - May be painful - dysesthesia
 - Poor prognosis for resolution

303 Nerve Injury Protocol

- Document
- Document
- Document
- Follow clinical progress
- If unsure, refer

304  **Nerve Injury Protocol**

- Neuropraxia
 - Remove implant
 - Corticosteroids/ NSAIDs
 - May resolve in days to weeks
- Axonotmesis
 - Remove implant
 - Corticosteroids/ NSAIDs
 - nsation returns in 2 - 6 months (0.1mm/d)

305  **Nerve Injury Protocol**

- Neurotmesis
 - Complete anesthesia >3 months
 - v for continued anesthesia or dysesthesia

306  **Without CT Guidance**

- 64 year old woman
- Multiple implants placed
- Right lower lip numb. painful (burning)
- al: #30 implant "close" to mandibular nerve

307  **CT Scan**

- Implant fixture was removed
- Gabapentin 300mg TID
- Pain improved over 6 months
- Gabapentin tapered off
- Nerve sensation improved 80%

308 

309  **Broken Abutment Screw**

310  **Astra Tech Screw Removal Instruments**

311  **Astra Tech Screw Removal Instruments**

312  **Broken Abutment Screw**

- Salvin Implant Rescue Kit

313 



314  **Other Options**

- Ultrasonic
 - vibrate and loosen screw
 - back out with tip
- Cotton applicator
 - break stick and engage screw
 - rotate counter-clockwise

315  **Broken Implant**

316 **Fixture Removal**

- Salvin Implant Rescue Kit

317

318 **Implant Removal Trepine**

319 **Astra Tech EV Implant Removal**

320

321

322 **ical findings with healthy dental implants**

- Firm pink peri-implant mucosa
- Shallow probing depths (≤ 3 mm)
- Absence of bleeding on probing
- Absence of purulence or suppuration
- Non-responsive to percussion
- High-pitched resonance with percussion
- Maintenance of bone level to 1st thread of fixture

323 **Peri-implant mucositis and Peri-Implantitis**

- Dental implants are not susceptible to caries
- Inflammatory problems, just like natural dentition
- Can result in loss of implants

324 **Peri-Implant Mucositis**

- 32 - 80% incidence
- Inflammation during healing
- Biofilm harboring bacteria (Gram -)
- Reversible inflammatory changes
- No bone loss

325 **Peri-Implant Mucositis and Peri-Implantitis**

- Previous periodontal disease
- Poor plaque control/ inability to clean
- Smoking
- Genetic factors
- Diabetes
- Occlusal overload
- Residual cement

326 **Management**

- Do not fixture for the first 6 weeks of integration
 - Light debridement
 - Chlorhexidine irrigation/ rinse
- Infected- antibiotics
 - amoxicillin

- cephalosporin
- clindamycin

327 Management

- Film from the implant surface is primary goal
 - Irrigation device
 - Chlorhexidine irrigation/ rinse
- Infected- antibiotics
 - amoxicillin
 - cephalosporin
 - clindamycin

328 Sodium Hypochlorite Irrigation

- led to reductions in supragingival biofilm accumulation and gingival inflammation
 - De Nardo R, et al. Effects of 0.05% sodium hypochlorite oral rinse on supragingival 2012
- led to a significant reduction in bleeding on probing, even in deep unscaled pockets
 - Gonzales S, et al. Gingival bleeding on probing: a relationship to change in periodontal Periodontol Res 50(3): 387-402, 2015
- Chlorine showed a significant bactericidal effect against adhering bacteria
 - 3 methods on in vivo human oral biofilm. Clin Oral Impl Res 21(8): 866-872, 2010

329 Peri-Implantitis

- 10 - 40% incidence
- Inflammatory process
- Biofilm harboring pathologic bacteria
 - zirconium abutments similarly colonized
- Implant in function
- Bone loss

330 Peri-Implantitis

- associated with implant-supported overdentures
- Incidence 11-32% (fixed 7-20%)
- Management of dental implants; Oral Maxillofacial Clinics N Am 15 (2003) 243-249

331 Implant failure and peri-implant bone loss

- of implant failure and peri-implant bone loss
 -
- 76 patients with 1320 OsseoSpeed implants
- At least 2 years follow-up (24-65 months)

- Analyses. at a level of significance of 0.05
- Analysis (Cox proportional hazards regression)

332 Implant failure and peri-implant bone loss

- Survival Bone loss
- Treatment protocol ns ns
- Smoking status $p = 0.001$ $p < 0.001$
- Implant design ns ns
- Reconstruction ns ns
- Treated jaw ns $p < 0.001$
- Opposing jaw status ns ns
- Recall compliance $p = 0.010$ ns

333 Implant failure and peri-implant bone loss

334 Peri-Implantitis

- Minor
 - Scale with titanium curette
 - Intra-sulcular antibiotics
 - Home irrigator/ HClO

335 Cement Sepsis

- to be debrided; managed like peri-implantitis
- to avoid- keep margins ≤ 1 mm subgingival

336 Exposed Fixture

- further exposure as inflammation reduces
- Pocket depth improves
- May be maintainable for long term

337 Moderate Implantitis

- Mild radiographic bone loss/ pocketing
- Increased probing depths
- Bleeding on probing
- Gingival erythema
- Purulent drainage
- Gram - anaerobes
- No mobility

338 Peri-Implantitis

- Surgical debridement
- Citrate. CHX
- Bone graft
- Infuse (rBMP)
- Barrier membrane - PerioDerm
- Primary closure

339  **Technologies to treat Peri-Implant Disease**

- Er:CR:YSGG laser
 - Removes biofilm and Ti Oxide
 - Removes granulation tissue
 - Sterilizes sulcus/pocket
 - May promote bone regrowth

340  **Technologies to treat Peri-Implant Disease**

- Er:CR:YSGG laser
 - Removes biofilm and Ti Oxide
 - Removes granulation tissue
 - Sterilizes sulcus/pocket
 - May promote bone regrowth
- Glycine polishing
 - Peri-implant mucositis
 - Adjunct to laser

341  **Ultrasonic Implant Debridement**

- showing lack of damage to implant surface

342  **Can an implant have a periapical Lesion?**

- al scar from osteotomy longer than implant
- Infected
 - not placed in proximity to focus of infection
 - Contaminated implant was placed
 - Bone necrosis due to overheating

343  **Implant periapical lesion**

- If infected, requires surgical intervention
 - mobile: apical resection and debridement
 - If mobile: removal and grafting

344  **Implant PeriApical Lesion**

345  **Implant PeriApical Lesion**

346  **Implant PeriApical Lesion**

347  **Implant PeriApical Lesion**

348  **Failing Implant**

- Refractory to treatment
- Continues to get worse
 - Bone loss progresses
 - Continued suppuration
 - Continued pain
 - Mobility

349  **Implant Failure**

350  **Protocol**

.....

- Chlorhexidine rinse- BID
- Amoxicillin 875mg BID
- Start 2 days prior
- Continue 5 days post-op

351 Risk factors for Implant Failure

- Clinical and the outcome of implant treatment.
 - Dental implants: a systematic review and meta-analysis. J Dent 43(5): 487-498, 2015.
- Clinically significant predictors of implant failure
 - Failures. J Dent Res 95(9): 995-1002, 2016

352 Salvage of an ailing implant

- Require replacement unless the implant is removed
- Esthetics is not a factor
- Access for peri-implantitis treatment is available
- Usually treated by surgical and/or prosthetic means (excludes poor implant placement)
- Saving the fixture (would require trephine or drill)
- Psychological or emotional attachment to the implant
- Financial considerations are an issue

353 Removal of an ailing implant

- Removal by the ailing implant requires replacement
- Usually treated by surgical or prosthetic means (includes poor implant placement)
- Bone loss in combination with poor position
- Surrounding periodontium and adjacent teeth
- Designed for the specific existing implant system

354 J Periodontal Communications 8:264, Aug 15, 2017

- MMP-8 in sulcular fluid in peri-implant pockets
- Proposed a chewing gum test for peri-implantitis
 - Embed denatonium fragment to chewing gum
 - Release of denatonium. resulting in a bitter taste
 - Intensity of bitterness related to level of MMP-8
- Chewing gum test and chair side sulcular fluid assay

355 Hands-On Exercise

356 Overlay 3

357 **Drilling protocol**
- OsseoSpeed™ EV - conical

358 **Drilling**

359 **Implant installation**

360 **Drill direction needs to be kept true**

- Very critical on pilot drill (first drill)
- as it gets deeper due to flexion at the wrist
- your wrist stiff and keep drill going straight.
- excessive osteotomy- let the drill find its way

361 **Implant design**
- OsseoSpeed™ EV

362 **Basic Implant Treatment Planning**

- width at crest with adjacent convergent roots
 - Congenitally missing tooth
- Sinus lift with 6-8 mm of bone

363 **OsseoSpeed™ EV Conical - Clinical Indications**

- wide space between roots - maxillary anterior
- Posterior maxilla - ridge height \approx 6 mm

364 **Drilling protocol**
- OsseoSpeed™ EV - conical

365 **Drilling protocol**
- OsseoSpeed™ EV - conical

366 **Drilling protocol**
- OsseoSpeed™ EV - conical

367 **Expanded drilling protocol**
- OsseoSpeed™ EV straight and conical

368 **OsseoSpeed™ Profile EV**

- A uniquely shaped, patented implant, specifically designed for sloped ridge situations around the implant.

369 **Implant design and assortment**
- OsseoSpeed™ Profile EV

370 **Overview**

- sloped ridges are a common clinical situation
- that preserves the marginal bone and supports the soft tissue all around the implant
 - Efficient use of available bone
 - Reduced need for augmentation

- Soft tissue esthetics

370 **1 alveolar ridge with a sloped configuration**

- evaluate the soft and hard tissue alterations
- und OsseoSpeed™ Profile implants placed
- in sloped ridges
-
- 65 single tooth implants in 65 patients
- Healed sloped ridges
- Loading after 21 weeks
- placed in mandible and first molar position
- el (ie. the lingual rim was situated at or below the bone crest)

371 **1 alveolar ridge with a sloped configuration**

- OsseoSpeed™ Profile implant placement and
 - Healing Abutment 4.0/5.0 connection
- weeks Re-entry and clinical measurements
- al abutment and crown installation (loading)
- 1 year Last follow-up
-
- gingival pocket depth at the 21-week follow-up
- probing pocket depth at the 1-year follow-up
- week and 1-year follow-up (-0.1 to +0,1 mm)

372 **1 alveolar ridge with a sloped configuration**

- No implant failures
- Stable marginal bone levels
 - Buccal bone alterations (16 w): - 0.3 mm
 - lingual bone alterations (16 w): - 0.02 mm
 - proximal bone alteration (1 year): - 0.54 mm
-
- Stable hard and soft tissues
- differences between buccal and lingual bone levels

373 **configured shoulder in the posterior mandible-a prospective multi center study**

- n= 184 patients/ 238 Profile OS TX implants
- Assessment times
 - Before placement
 - After placement
 - Prosthetic delivery

- 6. 12. 24 months after placement

374  **configured shoulder in the posterior mandible-a prospective multi center study**

- Avg 2.4 (±0.4) years - 99.2% survival
- Increased peri-implant keratinized mucosa
- Greatest difference in ≤ 2 mm KG at post-op
- Mean inter proximal bone loss 0.30 ± 0.6 mm
- Shoulder configuration supports regain of KG

375  **Implant slope height**

376  **Optimal positioning**

- EV, the positioning of the implant is crucial
- The objectives are to:
 - t level with the buccal marginal bone level
 - riginal bone all the way around the implant

377  **instruments needed -
Implant Driver Profile EV**

-

378  **Implant-abutment interface connection**

379  **Cover Screw Profile EV**

-
- The cover screw has a self-guiding feature
- ead to engage and seat in one-position-only
- Two-piece
-
-
-

- ent. keep the sleeve and screw assembled.

380  **instruments needed -
Implant Driver Profile EV**

-

381  **instruments needed -
Surgical Tray EV**

- is recommended for OsseoSpeed Profile EV

382  **IMPLANT WITH
ASTRA TECH Implant System™ EV**

383  **ed Surgery with OsseoSpeed™ Profile EV**

- Instruments needed:
- Implant Driver Profile EV
- Proline Overlay

384  **Osteotomy preparation**

385 **Drilling protocol, straight**

386 **Drilling protocol, conical**

387 **Drilling protocol**

388 **considerations OsseoSpeed™ Profile EV**

389 **Implant slope height**

390 **Measuring – considerations**

- Verify drilling depth after cortical drill
- Follow the osteotomy to verify the drilling depth

391 **Measuring – considerations, cont.**

392 **Optimal positioning**

- EV, the positioning of the implant is crucial
- The objectives are to:
 - Level with the buccal marginal bone level
 - Marginal bone all the way around the implant

393 **Why do we place implants?**

- TO REPLACE
- MISSING TEETH!

394 **“Prosthetically-Driven”**

- Start with the ideal prosthetic restoration
- Work backwards from there

395 **CBCT-Guided Implant Surgery**

- Custom surgical guide for implant placement.
- Controls implant location, angulation and depth.
- Sleeve system controls each osteotomy drill.
- Guided by computer-designed treatment plan

396 **Implant Planning - GALILEOS Implant**

397 **Key to Success**

- Any other restorative procedure in dentistry.
- As if there is attention to detail at every step.
- Accurately represent the desired final prosthesis.
- Must be identical or implant placement will be inaccurate.

398 **GALILEOS Classic Guide Workflow**

- This is the one that you need to know first!
 - Scanning template
 - Radiopaque pontic

- 399 **GALILEOS Workflow**
 - "Classic" Guide vs. Optiguide
- 400 **What is the Difference?**
- 401 **Study Model**
- 402 **Duplicate Model/ Wax-up**
- 403 **Create Vacuform Shell**
- 404 **"Classic" Workflow- scanning with a template**
- 405 **Scan patient with Template**
- 406 **Plan with Astra EV/ video**
- 407
- 408
- 409
- 410
- 411
- 412 **Without Vacuform Shell**
- 413 **"Direct Scan Template"- Futar Scan**
CLASSIC GUIDE
- 414 **Direct Scan Template- Futar Scan**
- 415 **Approved Bite Registration Materials**
 - Futar Scan (Kettenbach) *
 - Futar D (Kettenbach)
 - Flexitime bite (Heraeus)
 - Metalbite (R-Dental)
 - Virtual CADbite (Ivoclar)
- 416 **Direct Scan Template (CGI)**
- 417 **Surgical Guide Workflow**
- 418 **Recommended Stone for Study Model**
 - Scannable Stone
- 419 **GALILEOS Scan**
- 420
- 421
- 422
- 423 **CEREC-GALILEOS Integrated Workflow**
 - OptiGuide from SICAT
 - CEREC data is imported in to GALILEOS
 - .SSI file
- 424 **OptiGuide Workflow- SICAT milled guide**
- 425 **CEREC-GALILEOS Integration**
 - .ssi file can go on a memory stick

426 

427 

428 

429  **Craig Boone Planning video**

430 

431  **Postop**

432  **Astra Tech System EV Protocol**

- Surgery report- guided/ video

433  **Astra Tech System EV Guided Tray**

 **supported) with mental navigation or the use of a pilot-drill template**

434  **supported) with mental navigation or the use of a pilot-drill template**

- were randomized into 6 groups as follows:
- 1) Universal bone, 2) Universal mucosa, 3) Facilitate bone, 4) Facilitate mucosa
- 5) Template pilot drill 6) Mental navigation

- IPLANT software using imported CT scans

- Surgical guides were done by DENTSPLY Implants

- Placed (4 - 6 implants in mandible or maxilla)

-

- Compared in Mimics software (Materialise)

- Primary point, b) angular deviation, c) apex point

435  **supported) with mental navigation or the use of a pilot-drill template**

436  **Comparison: Guided vs Freehand Approach in a Simulated Plastic Model**

- Both freehand and guided implant placement

- Performed by experienced surgeons

437  **Comparison: Guided vs Freehand Approach in a Simulated Plastic Model**

438  **Integrated system for dental implant planning**

- Evaluated accuracy of SICAT surgical guides

- 10 partially-edentulous models

- 54 implants placed

- 2mm pilot sleeves versus NobelGuide

- Planned versus placed implant positions compared

- Mean angulation variance: 1.18 degrees

- Mean apical position variance: <500 microns

439 

440 Patient Card

- Item number 32670687-US-1705
- Comes in packs of 25

441 Surgical components and procedures

- "Standard" EV surgical kit
- EV Guided Surgical kit

442 Guided surgery components and instruments

- GALILEUS computer guided implant treatment with the ASTRA TECH Implant System™ EV

443 Tray with ASTRA TECH Implant System™ EV

444 Guided Surgery with OsseoSpeed™ Profile EV

- Instruments needed:
- Implant Driver Profile EV
- Proline Overlay

445 Guided surgery components – highlights

446 Tube configuration

- Where mouth opening capacity is not an issue

447 Implant size / tooth position

- Implant sizes in relation to the natural dentition

448 SIMPLANT SAFE GUIDE – with lateral access

449 Sleeve-on-Drill™ concept

- Precise and safe
- Shortest possible drill used
- Easy handling
- No "third" hand necessary

450 The Sleeve-on-drill™ concept

451 Supported implants and connections

- Are not fully supported with all drilling steps.

452 Drill logics

453 Drill logics- Standard vs. Guided Drills

454 Surgical treatment and drill logics

Surgical treatment and drill logics

455 Tray Concept

One tray for all OsseoSpeed™ EV implants

- Organized to support the user
- Color coded and simple layout

- Overlay snapped onto the tray base

- Grommet-free tray design

Streamline Overlay

Streamline Overlay

456 Proline Overlay

457 Proline Overlay

458

459

460

461

462 Small Tray EV Storage

- SKU 25984

463

464

465 System logic

466 Soft tissue preparation – Punch

- The punch, marked with a P is used to make a minimally invasive circular incision in the of the guide.

- Responds to the implant length and diameter

- Color: corresponds to the implant diameter

- Single use only

- Optional use

467 Dynamic tube position – spongy bone preparation

468 Cortical bone preparation – Initial Drill

- Drill is used to remove the soft and hard tissue and to prepare the shape of the bone for d is directly guided in the tube of the guide.

- Responds to the implant length and diameter

- Color: corresponds to the implant diameter

- Used for multiple use. approximately ten cases

469 Bone classification

- Protocol for preparation of the spongy bone

470 Depth control principles

- Drills for spongy bone preparation

- Physical depth stop

471 Drilling protocol – OsseoSpeed™ EV Straight

472 Drilling protocol – OsseoSpeed™ EV Conical

473 **Spongy bone preparation**

- Physical depth stop
- Sleeve-on-drill concept
- Color and number, implant length and diameter
- Implant length: 6–8 mm, 9–11 mm, 13–15 mm
- Indicated for multiple use, approximately ten cases
- Sleeve: sterile and single use only
- Delivered together with guides

474 **Cortical bone preparation**

- **Straight Implants**

- Directly guided – no sleeve needed
- Color: corresponds to implant size
- Markings: diameter and drill letter
 - A – thin cortical bone < 2 mm
 - B – thick cortical bone \geq 2 mm
- Two drills available based on implant length: 9–13 mm and 8–11–15 mm
- Indicated for multiple use, approximately 10 cases
- Note: There is a separate depth marking for the 6 mm implant.

475 **Cortical bone preparation - Conical Implants**

- Directly guided – no sleeve needed
- Color: corresponds to implant diameter
- Markings: drill letter, implant diameter and length
- Two drills available based on implant length: 9–13 mm and 8–11–15 mm
- Indicated for multiple use, approximately 10 cases

476 **Dynamic tube position**

- **cortical drills**

477 **Osteotomy preparation options**

- widens the apical portion of the osteotomy
- the body portion and widens apical portion

478 **Implant Driver EV**

479 **Implant Driver EV-GS**

- Color: corresponds to implant
- Implant depth in relation to the tube in the guide
- Indicated for post-surgical manufactured abutments
- Guide - reverse implant and widen osteotomy

480

481

482 Profile EV - what's different

483 Implant-abutment interface connection

484 Cover Screw Profile EV

-
- The cover screw has a self-guiding feature
- Designed to engage and seat in one-position-only
- Two-piece
-
- Important: keep the sleeve and screw assembled.

485 Assortment overview

486 EV-Stabilization Abutment

- The stabilization abutment secures the SIMPLANT SAFE Guide against lateral and non-axial movements. The abutment and sleeve are prepared.
- Color: corresponds to implant
- Two lengths available: 6-9-13 mm and 8-11-15 mm
- Handle and Screwdriver interface
- Physical depth stop – no movement of the template in any direction

487 Astra Tech Implant System EV 5.4 Diameter

488 Ø 5.4 mm implant

- Alternative option for treatment of the molar region

489 Implant size / tooth position

- Implant sizes in relation to the natural dentition
-
- 3.0mm and 5.4mm implants are non-guided

490 Astra Tech Implant System EV

- Hands-On
- 4.2 x 11 EV-S fixtures



491 Drilling protocol – OsseoSpeed™ EV Straight

492 Cortical bone preparation – Straight Implants

- Directly guided – no sleeve needed
- Color: corresponds to implant size
- Markings: diameter and drill letter
- A – thin cortical bone < 2 mm
- B – thick cortical bone ≥ 2 mm
- Two drills available based on implant length: 9-13 mm and 8-11-15 mm

- nd for multiple use. approximately 10 cases
- note: there is a separate depth marking for the 6 mm implant.

493 **Osteotomy preparation options**

- widens the apical portion of the osteotomy
- the body portion and widens apical portion

494 **Speed™ EV Conical - Clinical Indications**

- ed space between roots - maxillary anterior
- Posterior maxilla - ridge height \approx 6 mm

495 **Drilling protocol – OsseoSpeed™ EV Conical**

496 **Optical bone preparation - Conical Implants**

- Directly guided – no sleeve needed
- Color: corresponds to implant diameter
- Coding: drill letter, implant diameter and length
- Two drills available based on implant length:
9-13 mm and 8-11-15 mm
- nd for multiple use. approximately 10 cases

497

498 **Guided Implant Surgery**

- Problem Solving

499 **What if the surgical guide doesn't fit?**

- Increase profile if probably less than ideal. so...
 - Trim the guide
 - Trim the adjacent teeth

500

501 **What if the patient has limited opening?**

- Strategies
- Sleeve on drill- move down
- Drill short. then lengthen
- Drill freehand with standard kit

502

503 **Another Clinical Pearl**

- Go with the longer implant

504 **What if... the guide should break?**

- Don't panic!

505 **What if... the guide should break?**

- Fundamentals before you do Guided Surgery
- a standard implant surgery kit (i.e.: have it)
- to know to complete the case successfully

506 **Drill direction needs to be kept true**

- Very critical on pilot drill (first drill)
- as it gets deeper due to flexion at the wrist
- your wrist stiff and keep drill going straight.
- excessive osteotomy- let the drill find its way

507 **Implant Maintenance**

- success and minimize peri-implant disease

508 **This is a long-term commitment**

- "Implants are like a car"
 - Not a one-time event/expense
 - requires "Regular routine maintenance"
- Patient must be committed to success
- Partnership

509

510 **Success Strategy**

- Biofilm reduction
 - Daily maintenance by patient
 - Water flosser (Water-Pik) daily
 - 1% hypochlorite solution - 7 drops per tank
- 6 month recall- Implant protocol
 - Glycine air abrasion
 - Piezoscaler (Ti tips)
 - Er:Cr:YSSG laser (2780 nm)

511 **Standard 6 month Recall**

- Remove the titanium oxide layer and biofilm
- Hand scaling- titanium curette
- Piezotome(?)
 - Titanium tip
- Air abrasion
 - Glycine powder

512 **Early bone loss**

- Er:Cr:YSSG laser
- REPAIR Protocol

513 **Pitfalls- Procedural**

- "I think I can do it"
- "It looks easy"
- Not having the correct instruments
- Not having a flap/ big enough flap
- Not planning/ being prepared
- referring the patient to the OS to begin with!
 - Offer patient options: GP or OS

514 **Pitfalls- MedicoLegal**

- Inadequate informed consent
- Inadequate radiographs
- Poor records
- Failure to call for help/ refer to specialist
- Failure to inform patient of complication
- Finding a patient's complaint of a complication
- to give patient option of seeing a specialist

515 **Beginning Implant Surgery**

- Where do I start??

516 **What we strongly recommend...**

- Implant surgery is a journey, not a race
- Start very basic and slowly advance from there
- Your first 20 cases should be:
 - Flapless, 1st Premolar to 1st Molar sites
- Then, you can move on to:
 - i.e. open flap/ limited bone augmentation

517 **Have a Mentor**

- Find Maxillofacial Surgeon and/or Periodontist
- You need him/her
- He/She needs you!
- How do you deliver the best care to your patients

518 **How to Develop That relationship**

- "start doing straightforward implant cases."
- "I appreciate the relationship we have."
- "at I always do what is best for my patients."
- "watch you do some simple implant cases?"
- "watch me do some simple implant cases?"

519 **How to Develop That relationship**

- "only do cases that I am comfortable with."
- "standing of what is possible with implants."
- "I was previously recommended for a bridge or partial."
- "Thank you" gift?

520 **Cases- Working with a Surgical Specialist**

- "We discuss..."
- "the best treatment options for the patient"

 **Thank You!**

521 **Thank You!**

 **Thank You!**