SIMPLANT DIAGNOSIS for SURGICAL PLACEMENT AND RESTORATION OF SINGLE SYBRON IMPLANTS

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Dental implants have undergone many positive advances over the recent years. Our successes have dramatically increased to the point where implant dentistry is become a constructive and simple alternative to conventional dental procedures. When missing one or several teeth, single dental implants are both functional and the final restorations esthetic. Our newest materials can predictably match the structure, contour and lifelike qualities of natural dentition.

Partial dentures and bridges have been the treatment of choice in dentistry for generations. The results may indeed be acceptable, but the newest implant alternatives are better and less traumatic to the patient. We no longer have to grind down healthy tooth structure to replace single missing teeth, and patients no longer have to bear the restraints of a removable appliance. Today, dental implants are a viable and important part of tooth replacement in our practices.

The use of dental implants to support, retain and stabilize single crowns greatly improves the quality of life in patients who may have been deemed removable partial denture candidates. These partial appliances can be difficult to wear and make chewing difficult. Sore spots can make wearing them

miserable and they can move around the mouth while eating or speaking. Kissing can be an embarrassment. It is intuitive today that replacing missing teeth with a treatment that has proven to have an outstanding prognosis , is functionally strong and esthetically pleasing is a better option. Eating healthy foods is a part of life that should not be dismissed. Dental implants can help patients enjoy life again. The design of our modern dental implants that follow basic engineering principles have allowed the implant dentist to create beautiful, long lasting solutions for their patients' dental problems.

However, there are still concerns with any surgical procedure, especially in the sinus areas or in bone which nerves are located. These concerns have popularized the newest concepts in implant dentistry. We are now able to utilize our CAD/CAM computer software to virtually place our implants using CT scanning software and visualize the patient's entire oral anatomy in three dimensions, which takes all of a few minutes. The reluctance to place implants in certain anatomic areas is eliminated with the virtual evaluation of anatomy and placement of the implants in question. We are now certain for ideal placement or have the ability to abort the case or consider more invasive procedures prior to ever touching the patient.

After having a dental CT scan done, the information can be used by several scanning software programs, such as Simplant. This system allows us to use the computer to choose the implant of choice and position around vital anatomy. This technique is proving to be a cost effective solution to assist the implant dentist in planning an esthetic final result and minimizing any surgical challenges they may face. Patient acceptance is improved because concerns the individual may have can be addressed in a precise manner.

CT technology is based on planning algorithms used clinically for many years. CT scans and 3D planning software can really improve our predictability and safety. This technique can be used for single tooth edentulous spaces, like in this clinical case, partially edentulous spaces , fully edentulous maxillary and mandibular overdenture cases or fully edentulous maxillary and mandibular full arch permanent restorations. **The surgical cases are, therefore, driven by the final esthetic and functional result.** It is critical to make sure that the final tooth contours are established prior to any surgical intervention. Placing the dental implants in the jaw before understanding tooth position and the final result is a big mistake.

CT planning are placement systems, like Simplant, provide a high level of comfort and safety for the patient by reducing surgical and restorative time. This is done by utilizing an accurate three dimensional plan prior to implant placement. There are obvious advantages including; easy visual understanding for clear case presentations to the patient, reduced surgical chair time, reduced restorative chair time in certain cases, reduced stress for the clinician and the patient, **the avoidance of surprises during surgery,** implants that are placed optimally for long term implant and prosthetic success and most importantly an improved esthetic result.

In a single implant case, a CT scan alone can be used to diagnose and virtually place the implant of choice. A radiographic guide may be fabricate by the dentist to aid in the visualization of the optimal prosthetic outcome. The teeth are positioned ideally in wax and then a hard model to illustrate what the case will look like finished before ever starting. All appropriate dental anatomy in included. The #D image from the CT is analyzed and the implant planning and simulation of implant placement completed using the computer.

The surgical placement of the dental implants can be done in a conventional manner using the information gathered in diagnosis using the CT image or a surgical guide created to help direct the implants in the ideal position. In this case, surgery is often completed without any incisional flap. The implants are placed in the desired depth using the computer software from Simplant and the precisely created surgical guide.

Our patient is a 44 year old female with several dental problems. The right and left maxillary first molars had been extracted years previously. The mandiubular arch will be restored with grafting and implants in the future. Our main objective was to establish a correct occlusal plane relationship and improve the esthetics. Our choice of implants in this case was Sybron –Pro XRT dental implants (Sybron International). This implant has some dramatic advantages in placement and restoration. The implant has a self threading design. An internal octa or hex pattern allows for great stability of the platform switching abutments. Here, a 4.8mm crestal width X 4.1mm body and 9mm tall implant was used in the #3 area. The determining factor in shape and size of the implant choses was the CT diagnosis done prior to surgery and the position of the maxillary sinus floor. The edentulous #14 area was an ideal place for a 4.1mm X 9mm internal hex implant. Two different types of implants were used in contralateral positions to describe the surgical technique and final implant restorations of each design.

Figures:

1. CT radiograph illustrates a no distortion panoramic view and cross sectional views of the edentulous areas where implants are planned. Note the position of the sinus. Simple panoramic radiographs or periapicals do not give the three dimension image achieved with CT scanning.
2. Periapical of edentulous maxillary right first molar area. How much vertical and height of bone do we really have?
3. Retracted smile. Our patient missed her maxillary first molars and made her feel less than ideal.
4. Occlusal view of # 3 area. It appears clinically that we have adequate width of bone, but the CT gives us an exact interpretation of the amount of bone we really have.
5. The Sybron implant system is simple and precise. The first drill used to initially determine angulation is the Lindemann Guide. This is a very sharp drill with a point. It also allows for lateral positions as it also cuts on it's side.
6. The Lindemann Guide penetrates the soft tissue and bone several millimeters.
7. A digital radiograph is taken to determine angulation of the primary drill
8. A sharp tissue punch blade removes soft tissue at the surgical site and eliminates the need for a full thickness flap. Sutures will not be required following implant placement.
9. Firm pressure is used with the tissue punch to make a clean incision.
10. Occlusal view of incision made with the tissue punch
11. The soft tissue is simply removed with a curette
12. The Tissue plug determines depth of soft tissue at the site.
13. Occlusal view of the incision and intial osteotomy site made with the Lindemann Guide drill.
14. A perioprobe is used to determine tissue depth or height.

15,16,17 A 2.2mm diameter Twist drill is used to establish depth. The black lines are clearly delineated 7mm, 9mm, 11mm, 13mm and 15mm.

18. Radiograph illustrating angulation that implant will be placed in center of the ridge. The drill was placed about 10mm into the bone.

19,20,21 A 3.3 Twist drill (actual diameter is only 2.8mm) is positioned so that an osteotomy 9mm into bone is made. Note the soft tissue was approximately 3mm in height, so in determining a visual of how deep to place the implant, the 9mm we want the implant to go into bone is added to the

3mm of tissue height. Therefore the line markings on the twist drill is visualized to 12mm. Thus the visual is in between the second large black line, which is about 12mm.
22. Radiograph of 3.3mm Twist drill in site. Note the notches of the drill itself. The first break is at 7mm, the second is 9mm. This is intended to be our final depth, just at the floor of the sinus.
23,24,25 A 4.1mm Twist drill (actual diameter is 3.5mm) is positioned. We are drilling at about 1200 RPM.
26. Radiograph of 4.1mm Twist drill in ideal postion at 9mm of depth.
27,28 External packaging of the Sybron implant system
29. Internal packaging of the Sybron implant system XRT-PRO Octa implant
30. The cover screw for the implant is included in the packaging
31. An Octo implant driver is placed into the handpiece and then into the internal design of the implant.
32. The implant is retained on the implant driver.
33,34,35,36. The motor is turned down to record 25Ncm of torque. The implant is driven into the osteotomy site and stops when 25Ncm of torque is achieved.
37. A radiograph of the implant in position.
38. The tightness of the Implant in bone is checked using a torque rachet. These record torque of 15, 25 and 35Ncm. We easily achieved 25Ncm of torque on this implant in the maxillary right first molar area. Once this level of torque is achieved either a cover screw or a taller healing abutment can be safely placed into the implant to allow for tissue healing.
39,40. Here a taller healing abutment is chosen to allow for tissue healing around the abutment. This eliminates the need for any secondary surgical intervention. The taller healing abutment will allow direct access to the internal design f the implant after integration has progressed.
41. Occlusal view of implant in position immediately after placement though the tissue.
42,43 The healing abutment is placed into the internal design of the Sybron implant
44. The healing abutment is torque to 15Ncm which will prevent any loosening during the healing phase.
45,46. The healing abutment in position. Note there is no bleeding, no sutures were required. This is a very non evasive therapy.
47. Radiograph of Sybron Octo implant in position immediately after surgical placement. Note the plateform switching design of the healing abutment.

48. Tissue healed around the healing abutment after 4 months of integration. The patient had no symptoms and only took a Tylenol for discomfort the day of surgery.
49, 50 The healing abutment is torqued out of the implant
51. Note healthy gingival cuff created by the healing abutment
52,53 A direct impression is planned. The impression system is a two piece system with an octagon base which engages the internal design of the Sybron implant and a screw which threads it into position.
54. A hex tool is used to place the impression coping.
55,56 The two piece impression coping is inserted into the implant.
57. A radiograph is taken to insure a complete seat of the impression coping. This is a mandatory protocol procedure to insure that the impression coping engages the implant completely.
58. A polysiloxane impression is made with light and heavy body material. Note the clean contours of the impression. The impression coping must be retained properly in the impression to insure a proper abutment and crown fabrication.
59,60,61 The impression coping is removed and placed into a laboratory analogue which simulates the design of the implant.

62. The impression coping/analogue is carefully placed into the implant impression.
63, 64,65 The healing abutment is replaced in the mouth while the dental laboratory makes a master cast using the implant analogue to fabricate the proper abutment and crown.
66 ,67,68,69 Again the healing abutment is removed prior to placement of the prepared abutment.
70,71,72,73,74 The prepared abutment is torqued into position at 25Ncm and a radiograph is taken to insure a complete seating of the abutment into the body of the implant. A piece of cotton or silicone is placed into the screw hole after torquing to place and a little cavit is used to cover the screw hole prior to crown cementation.
75,76,77 Different designs and types of crowns can be fabricated by the dental laboratory including esthetic and durable zirconia crowns, conventional porcelain fused to metal or crowns intended to be used for bruxers. It was determined that the zirconia crown was the most esthetic and would be durable. The translucency is best of the three choices.
78. The zirconia crown creates a warm essence.
79. the PFM was more opaque.
80,81 The zirconia crown cemented into place.
82. Final radiograph of implant retained maxillary first molar cemented into place.

83,84,85 Radiograph of contralateral maxillary left first molar; edentulous space, implant ideally positioned and healing abutment placed immediately after flapless surgical procedure.
86,87 The healing abutment in position and removed using a hex tool.
88. Tissue cuff around the integrated Sybron implant. This is a internal hex design 4.1mm X 9mm XRT-PRO Sybron implant.
89,90,91 A hex design direct impression coping is also a two piece system that engages the internal design of the hex implant.
92,93,94 The impression coping in position and checked for complete seating with a radiograph
95,96 A polysiloxane impression is made using light and heavy body materials. A nice clean impression of the impression coping is made.
97,98 The impression coping is placed into the hex designed implant analogue used by the dental laboratory to simulate the actual implant position in the mouth.
99. The impression coping and analogue is placed into the final impression.
100,101,102 The healing abutment is replaced and torque into position while the dental lab fabricates the prepared abutment and crown.
103,104,105 The healing abutment is again removed from the mouth prior to the prepared abutments seating.
106,107,108,109 The hex abutment is torqued into position at 25Ncm.
110,111 The abutment screw opening is covered with silicone or cotton and cavit prior to crown cementation.
112. Radiograph of abutment in proper position.
113, 114 Again choices can be made for crown design; zirconia, PFM or material used for bruxers
115,116 A zirconia crown was chosen for it's esthetics
117 Porcelain fused to metal crown try in
118. Bruxer material is opaque and not very esthetic
117 Final radiograph of zirconia crown in place in the maxillary left first molar