Surgiguide used for a minimally Invasive Flapless Surgery and Precise Placement of Eight Nobel Biocare (Select) Implants

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ABSTRACT

Implant dentistry has always the final prosthesis in mind. The prosthetically driven implant prosthesis will assure good esthetics, function, and also hygiene. This will give long-time success. The use of medical imaging and software planning has resulted in a marked improvement in treatment planning. The virtual software helps in accuracy in treatment planning. Surgical guides can be fabricated from a computed tomography scan. A surgical guide is used to assist in proper surgical placement and angulation of the implants. A guide also increases the esthetic and functional aspect of prosthetically driven implant treatment.

Keywords: Atraumatic extraction, CAD-CAM prosthesis, Flapless implant placement with nobel surgiguide, Periotome, Provisionalization.

How to cite this article: Rai SA, Jeevan C, Jeevan V. Surgiguide used for a minimally Invasive Flapless Surgery and Precise Placement of Eight Nobel Biocare (Select) Implants. Int J Clin Implant Dent 2015;1(3):107-112.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Implant treatment as the first option when planning an oral rehabilitation is increasing as well as becoming more available and affordable. The goal of an implant-supported full arch prosthesis is to restore esthetics and function as well as to preserve the integrity of the intraoral tissues.

There are many factors that may influence patient satisfaction, such as age, bone quality, quantity, the patient and surgeon relationships, pretreatment expectations and the psychological profile of the patient.

Uses of a surgical guide:

• It guides the osteotomy drills at correct position an angulations.
• It guides the implant fixture placement at the correct position, angulation, and depth.
• Also, it guides the surgeon on the amount of bone reduction or bone harvesting if that is required.2-4
• It minimizes errors.
• The surgery is minimally invasive, precise, and safe.

This case presented is of a 53-year-old male patient who desired a fixed prosthesis. He complained of a functional problem with a major difficulty in chewing due to the mobility of bridges and pain on chewing. He was a nonsmoker and his systemic condition was good. The preliminary clinical and radiographic examination revealed generalized horizontal bone loss in both the maxilla and the mandible. Considering the chief complaint of the patient, the following treatment plan was established.

– Extraction and socket preservation. This was followed by fabrication of a transitional complete denture. The teeth were extracted atraumatically with the use of a periotome.
– Following careful debridement socket preservation was done using Cerasorb. Cerasorb was used for socket preservation because it has been proven to be equivalent to autogenous bone. It is a new generation of pure-phase tricalcium phosphate. As it has a unique interconnecting porosity, it allows it be completely resorbed while it simultaneously forms new bone. Cerasorb will quickly turn over to quality vital bone within 4 to 12 months depending on the location and size of the defect and the patients characteristics. It is an osteoconductive material and is cost-effective.5
– The lower jaw was treated with a flap surgery to treat the periodontal condition. Hygiene and brushing techniques were advised.
– A few months later, a radiographic stent and a computed tomography (CT) scan were used to fabricate a surgiguide.
– The surgiguide was used to perform a flapless surgery for placement of eight Noble Biocare implants. The implants were allowed to integrate, and the final complete fixed implant prosthesis was delivered.
CASE REPORT

A 53-year-old man was presented with upper mobile teeth.

Medical History

- Bleeding in the gums and several mobile teeth in the upper jaw.
- Inability to chew well
- Gaps between upper teeth which affected appearance.

Clinical Examination

The patient was a 53-year-old well-built Indian male. The upper teeth were mobile, and gums were swollen and tender. The temperomandibular joint function was normal, showed normal range of movement, and there were no clicks or sound on opening or closing. He had no parafunctional habit.

Radiographic Evaluation

An orthopantomogram panoramic radiograph showed upper and lower arch with horizontal bone resorption (Fig. 1). There was a bridge present in the maxillary right central incisor, lateral incisor, canine and first premolar region. The upper left teeth had considerable bone loss. The lower right posterior teeth were missing.

Preoperative Diagnosis

The patient had generalized horizontal bone loss and mobility in the upper anterior and posterior teeth.

Development of Treatment Plan

The patient desired a fixed prosthesis which would aid in better mastication and would have good retention. He had no systemic complications and the maxilla had adequate bone. In addition, the patient was compliant. Hence, the prognosis seemed good and it was decided to go ahead with implants.

Evaluation of Existing Natural Dentition

All upper teeth had grades 2 to 3 mobility and required extraction.

Interarch Relationships

The patient had a normal overbite with existing prosthesis and occlusal plane. He had a normal temperomandibular joint function on clinical examination. The vertical-dimension-centric occlusion in the existing prosthesis was acceptable.

Evaluation of Edentulous Ridge

There were edentulous areas in the posterior maxilla and mandible. The alveolar mucosa appeared thin and mildly inflamed.

Prosthetic Restoration Selection

The patient wished to have a fixed bridge with better esthetics and function. It was planned to extract all the upper mobile teeth and provide an immediate maxillary denture. This was followed 3 months later by a new maxillary denture with full extension for comfort. Occlusion was planned with minimal overbite. The denture was made to satisfy esthetics, phonetics, and function.

Hard- and Soft-tissue Modifications

The hard tissues could be prevented from further resorption after extraction of teeth by socket grafting. The soft tissues would be improved following extraction and grafting. Mandibular teeth were treated with a flap surgery prior to treating the upper jaw (Fig 2).

Implant Selection Rationale

Eight Nobel Biocare implants were selected to be placed in the maxilla. A CT scan was done using the upper denture. A surgical stent was obtained from Sweden to be able to fabricate a final CAD-CAM prosthesis for the patient. There are several types of surgical guides available such as self/light cure acrylic resin, metal reinforced acrylic, vacuum formed polymers, milling, CAD-CAM prosthesis, Stereo lithographic models. Amongst these Milling, CAD-CAM prosthesis and stereo lithographic models have provided good results.
**Surgical and Prosthetic Report**

The patient was informed and instructions were given. The treatment plan stages were explained to the patient. An informed consent for the surgical procedure was obtained.

The patient was advised extraction of all upper teeth followed by socket grafting with collaplug and Cerasorb. The patient rinsed his mouth with chlorhexidine solution. Local anesthesia was administered in the buccal and palatal maxilla. The teeth were extracted and the extraction socket curetted. Collaplug and Cerasorb were placed in every socket followed by socket preservation sutures (Fig. 3).

The patient was advised antibiotics and anti-inflammatory medication for 5 days. He was seen a week later, and his upper denture was relined. He was advised not to wear his denture and to give time for healing. A new denture was delivered that satisfies the patient’s esthetics and function.

**Implant Surgery (June 6, 2009)**

Standard preoperative instruction were given to the patient regarding the surgical procedure, pre medications (2 gm Augmentin 1 hour prior to the surgical procedure) and diet. An informed consent for the surgical procedure was obtained on the day for surgery.

The patient rinsed his mouth with chlorhexidine solution (clohex 0.2% chlorhexidine gluconate oral rinse, Dr. Reddy Lab, Navi Mumbai, India). The extraoral surfaces were painted with Betadine. The patient was then draped with sterile drapes and intraorally with Betadine solution (10% povidine/iodine topical solution) was applied with particular attention to the surgical sites. Local anesthesia was administered with labial and palatal infiltration using four carpules of 1.8 cc, 2% L. The surgiguide was placed and a pilot drill was done in the positions set in the surgical guide.

**INSTRUMENTS AND MATERIALS**

Standard surgical tray consisted of the following instruments:

- Bard Parker handle no. 3
- Bard Parker blade no. 15
- Bard Parker blade no. 11
- Glickman’s periosteal elevator
- Austin’s retractor
- Gingival tissue retractor
- Reduction gear 1/16 contra-angle handpiece
- Implant motor with physiodispenser
- Mayo Hegar needle holder
- Goldman Fox curved scissors
- Goldman Fox straight scissors
- Castroreijo needle holder
- Tissue forceps

Implant surgical tray consisted of:

- Pilot drill – 2.0 mm
- Twist drills – 3.5, 4.3 mm
- Ratchet
- Implant drivers – long/short
- Radiographic stent surgical guide
- Implant hex screw drives long/short
- Paralleling pins
- Depth gauge
- Drill extender

Suture type and material used:

- 4.0 silk suture swaged, 3/8 circle round needle.

**Prosthetic**

- Materials used
  - Impression – (Impress)
  - Model – Type II dental stone
  - Die – Type IV dental stone
  - Transfer – Open tray impression transfer posts
  - Abutments: Nonhexed preformed abutments
  - Restoration screw retained.

- Techniques
  - Preparation
  - Impression – Open tray technique
  - Bite registration
  - Temporization
  - Articulation

- Prosthetic delivery
  - Evaluation of fit
  - Occlusal adjustment
  - Placement

- Follow-up
  The patient was advised follow-up visits every 3 to 6 months for the 1st year and thereafter every 6 months to 1 year.

**Surgical Stent Fabrication**

The radiographic markers were placed in the upper removable denture of the patient. The patient was sent for a dental CT scan. The CT scans were then sent to...
Sweden for fabrication of the surgical stent. The surgical stent was received a month later. A new esthetic and functionally acceptable denture was made to help in the fabrication of the final Procera implant bridge.

**SURGICAL PROCEDURE: IMPLANT PLACEMENT**

The surgiguide was placed in Betadine solution. Once anesthesia was administered, the surgiguide was placed on the maxilla and fixed with stabilizing screws (Nobel Biocare).

Since the surgiguide had been made to indicate the ideal position of the implants, a flap less surgery could be done. The first pilot drill hole was made at the following positions (Fig. 4).

**Maxilla:**

16 14 13 11 21 22 23 24 25 26

Right side upper first molar, first premolar, canine, and the upper central incisor positions.

On the left side in upper left central incisor, canine, first premolar, second premolar, and first molar positions.

The positions being (1) mesial of 16, (2) buccal of 14, (3) cingulum area of 13, (4) at cingulum of 21, (5) between 21 and 22, (6) mesial of 23, (7) position of 24, and (8) between 25 and 26.

The number of implants used was eight and sizes were 4.3 by 13 mm.

Each twist drill 2.3, 3.5:4:3 to a depth of 13 mm the implants more than placed. The cover screws were placed followed by interrupted sutures with Vicryl sutures (Figs 5 and 6).

The patient was advised not to wear the denture for 2 days. The denture was relined with GC Reline (GC corporation Tokyo, Japan) and was advised to wear only when required.

The patient was advised to return after 6 to 8 months for the second stage.

**PROSTHETIC STAGE**

Stage 2: December 17, 2009

The eight cover screws were removed and the gingival formers 8 number were placed. The patient was asked to report in a month’s time. A week later a flap was performed in the lower jaw.

Stage 3: January, 28, 2010

**Impression:** Open tray impression

The healing or gingival formers were removed.

An impression at implant level was taken by placing impression posts. The impression posts were connected to each other with a pattern resin. This was to have a successful transfer of the implant positions.

The impression posts which were unscrewed as they protrude through the wax in the tray used. The impression was then removed. The healing screws were replaced and then the impression was sent to the lab.

A model was made with the implant analogs (Fig. 7), and a framework was milled from titanium. Next appointment:

- The framework was tried in for fit.
- A wax base was made on the model containing analogs. The lab was instructed to leave a space...
between analogs and the base to accommodate for the presence of healing abutments.

- Removed healing abutments that correspond to the temporary cylinders and the place was based with screws.
- Wax try-in was performed following the technique for a denture fabrication.

The 5th appointment:
A try-in with denture teeth in place to verify esthetics and function was done as it was for a porcelain-fused to metal bridge.

Delivery on March 25, 2010 (Figs 8 and 9A).
The porcelain implant bridge was received. The abutments were seated on the implants. X-rays were taken to confirm proper seating of the abutments.

This was followed by placing the porcelain implant bridge. Once it was confirmed that it had a passive fit it was then screwed onto the 8 implants. The patient once satisfied the screw holes were closed with a composite (fremit) (Figs 9B to E).

The lower jaw was treated with three implants elsewhere.

**Fig. 7:** Implant analogs on cast

**Fig. 8:** Postprosthetic panograph

**Figs 9A to E:** (A) The completed CAD-CAM prosthesis, (B) frontal view in occlusion, (C) lateral view in occlusion – Right, (D) lateral view in occlusion – Left, and (E) occlusal view – Maxillary. Implant-supported bridge
CLINICAL RESUME

Replacing the upper teeth with a porcelain fused to metal implant bridge was better than a removable complete denture. It made a big difference to the patient’s function and comfort.

Types of patient instructions:
Postoperative instructions included plaque maintenance and use of a chlorhexidine 0.2% mouthwash.

The patient was instructed to apply a cold pack for 2 hours externally and was instructed to avoid consumption of any foods, and liquids for the duration of the effect of the anesthetic. In the day following surgery he was asked to have semisolid or liquid diet for 2 days postoperatively. He was also asked not to use a brush on the surgical site for 10 days and to use chlorhexidine 0.2% mouthwash after each meal for 15 days postoperatively. In addition, he was asked not to bite on very hard food substances.

He was given plaque maintenance instructions with toothbrush, dentifrice, and interdental brushes for tissue surfaces if the bar and the inter implant spaces. He was recalled at 15 days, 1, 3, 6 months, and a year. He was asked to report immediately if the prosthesis or the bar felt loose for tightening of the abutment screws.

COMPLICATIONS

Except for transient ecchymosis intraorally and extraorally after the surgical insertion of the implants. The treatment concluded without any complications. Postdelivery of the prosthesis and the bar at 15 days and 1 month follow-up of the plaque maintenance was done. This was adequate and the patient was advised to continue this maintenance.

PATIENT ACCEPTANCE AND PROGNOSIS

The porcelain fused to metal bridge was very comfortable for the patient. He felt extremely secure, can function very well, and feels very confident about himself. The lower jaw was treated with scaling and a flap. The prognosis of the maxillary prosthesis for this patient is good provided the maintenance of plaque is well monitored.

REFERENCES