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STEREOLITHOGRAPHIC IMPLANT SURGICAL GUIDE FOR ACCURATE IMPLANT PLACEMENT-A CASE REPORT

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ABSTRACT:

The placement of dental implants is a challenge for clinicians because of existing anatomy and high esthetic and functional demands1,2. This article presents a case for implant placement for complete oral rehabilitation with implants.

Guided surgery is accepted as the most accurate way to place an implant and predictably relate the implant to its definitive prosthesis, although few clinicians use it.3Virtual Implant placement was planned using CBCT scan, casts with trial denture bases, Implant planning software and prosthetic designing software were used fabricate a stereolithographic surgical guide..

The article describes the successful application of digital technology in the production of the surgical template for accurate placement of Osseo integrated implants.

Keywords: Computer-aided design, computer-assisted manufacture, surgical template, guided implant surgery.

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CASE REPORT:

A 65 year old male reported in clinic for restoration of his failing dentition. Full mouth rehabilitation was planned due to vertical dimension loss and mobility and deterioration of his existing teeth and prostheses.

Vertical dimension was corrected and his anterior dentition was rehabilitated with re established vertical dimension. Right maxillary premolars and molars were already extracted with the failed prostheses. Left maxillary posterior restorations were removed and teeth extracted.

Maxillary posterior implant restorations were planned. Diagnostic casts were prepared and diagnostic wax up at the established vertical height was done and try in completed for adequate occlusal relation and functional verification.

The CBCT (cone beam coaxial tomography) was done to adequately get a 3D volumetric data of the alveolar bone in the maxillary implant site. The cbct was analysed with Nobel Clinician software.

The maxillary cast and trial denture base was surface scanned with Nobel Procera 2G scanner and the surface scan exported to the Nobel clinician software for fusing the model scan and the cbct generated data for prosthetic planning and accurate three dimensional implant placement .

Fig 1. a. Pre operative image as the patient presented,
b. Vertical dimension re established

Figure 2. CBCT generated 3D image of maxilla

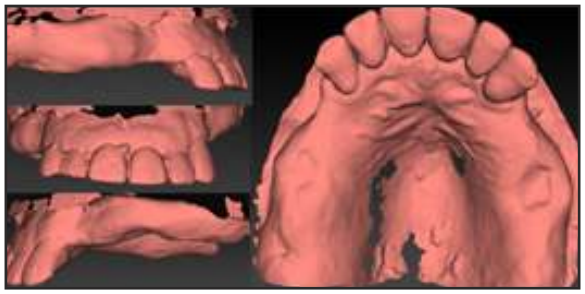

Figure 3. Surface scan STL file from Nobel Procera 2G Scanner

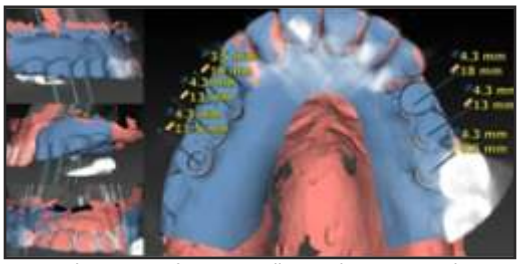

Figure 4. Surface scan, diagnostic wax-up and CBCT data fused for implant simulation

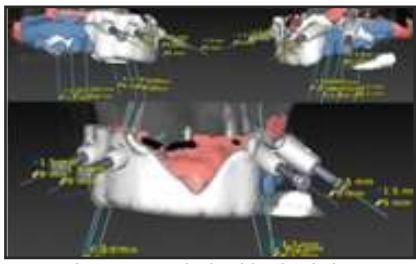

Figure 5. Surgical guide simulation on the Software

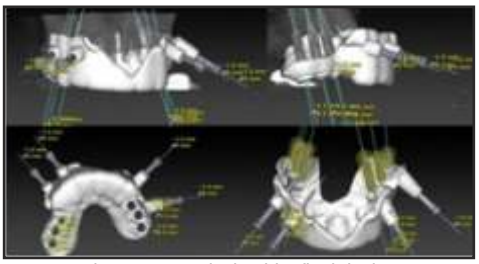

Figure 6 . Surgical guide final design

Figure 7. Stereolithographic surgical guide

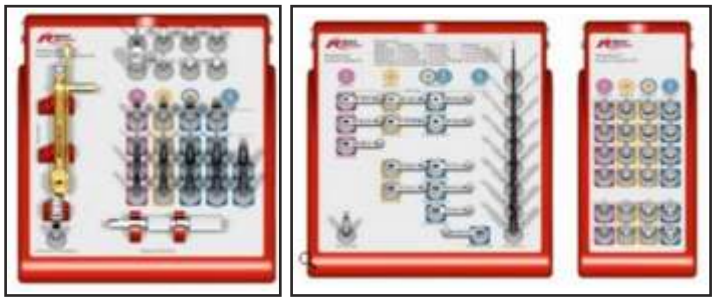

Figure 8. Guided Surgical Kit

Figure 9. Surgical guide in position for implant insertion

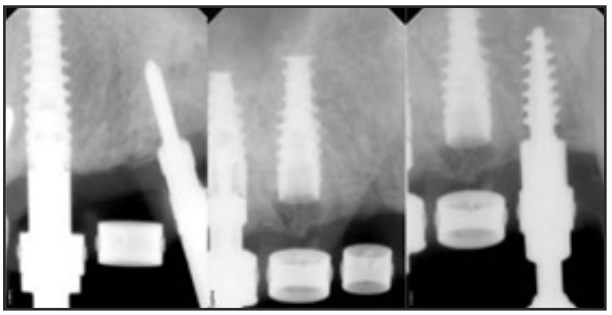

Figure 10. Periapical radiographs for verification of implant insertion and position

The implant location and type were finalised after fusing the cbct and Procera scanner generated surface scan. The Nobel Active Implants were selected and surgical guide template was generated within the software planning in Nobel Clinician.

The software generated surgical guide STL (Stereo Lithography file format) file was exported and stereolithographic 3D printed surgical guide was fabricated for Nobel Active Implant.

The surgical guide was checked for fit and seating. The guided surgical kit for Nobel active implants was used in the surgical protocol and implant insertion achieved using the prescribed drill sets for the selected implants .

The implant insertion was achieved in a flapless environment and immediate transmucosal healing abutments were placed. The immediate post operative intraoral periapical

xray views were taken to verify the implant placement. The patient was recalled for check up and next phase of prosthetic rehabilitation

Discussion

Digital technology has proved an invaluable tool in the way we diagnose the condition and plan the treatment.[1,3,6] However, even the best of plans seems worthless if not properly executed. Anatomical limitation and better prosthetics demands the clinician to gain more precision in surgical positioning of dental implants.[5,6] During oral implant placement, the drill (position, depth and angulation) must be guided by the clinician according to the final form of the prosthetics. Ideal placement facilitates the establishment of favourable forces on the implants and the prosthetic component. In this regard, surgical guides have shown better predictability of placement improving better prosthetic results. Several guides have been reported in the literature such as self/light cure acrylic resin, metal reinforced acrylic templates, vacuum formed polymers, milling, CAD-CAM prosthesis, stereo lithographic models. Out of these; Milling, CAD-CAM prosthesis or stereo lithographic models have provided good results.

CONCLUSION:

Prosthetically driven implant restorations insures good esthetics, function and hygiene maintenance enabling long time success. Accuracy in treatment planning and execution of planned treatment is vital for this success. Continious advancements that have occurred in planning treatment (virtual software) for implant prosthesis have generated an equal rise in transferring the planned therapy to surgical realization. In this regard, surgical templates have enabled clinician to deliver predictable surgical & prosthetic results. Surgical guides have not only decreased the chances of operator driven damage of critical anatomic structures; they also increase the aesthetic and functional advantages of restoration-driven implant therapy. If clinician is considered a pilot, then surgical guide is his navigator.

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