



RESEARCH ARTICLE

THE QUICKLY USABLE EFFICIENT SURGICAL TEMPLATE (QUEST) FOR DETERMINING THE ANGLULATION AND ALIGNMENT OF DENTAL IMPLANTS

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ABSTRACT

Surgical templates guide the proper and precise placement of dental implants. Conventional templates may lack stability and thus be less predictable than those fabricated using modern computer programs. But the computer generated surgical templates are expensive, and require specialized gadgets with trained personnel. Therefore a faster, economical and equally efficient technique is needed. This article illustrates a technique of fabricating a surgical template using easily available dental materials and simple instruments. This template will guide the operator to place and position the dental implant more precisely as well as it help him to determine the implant angulation accurately.

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INTRODUCTION

The success of dental implants depends on proper treatment planning and uneventful placement during surgery (Shotwell, 2005). The use of guides for surgical placement of dental implants certifies a safe and minimally invasive surgery, thus improving the final outcome of treatment for the patients. This in turn offers the best combination of support for repetitive forces of occlusion, esthetics, and hygiene requirements, with a little decision making at the time of surgery (Misch, 2005). Angulation of teeth and implants has always been a determining factor for replacing missing anterior teeth. After diagnostic wax up two reference points are selected for each implant, one at the occlusal (central fossa or incisal edge) surface and the other on the crest of the ridge (Misch, 2005). If a third reference point could be made available at the most apical area of the implant, then perhaps the implant will be

perfectly and accurately seated both labio-lingually and mesio-distally. In modern times such detailed information is provided to us by cross-sectional radiography, namely the computed tomography (CT) (Schwarz, 1987; Schwarz, 1987 and Schwarz, 1989), and the cone-beam computed tomography (CBCT) (Benavides, 2012; Pedroso, 2014). These information allow us to evaluate the available bone, the near anatomic structures, and proposed tooth positioning for near accurate placement of dental implant. But these investigations are not only time consuming but also need costly armamentarium and trained personnel to operate them. Alternative to these were the conventional radiographic guides with radiopaque markers (Israelson, 1992 and Basten, 1995), which can be converted to a surgical template (Verde, 1993 and Pesun, 1995). But the conventional templates were neither that stable nor predictable as the computer generated templates (Al-Harbi, 2005). Therefore a faster, economical and equally efficient technique is the need of the hour. This case report illustrates the fabrication of a surgical template which will guide the operator to place an implant more precisely and accurately.

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Case report

A 24 year old male reported with a chief complaint of missing anterior teeth (Figure 1). He gave a history of trauma to his anterior teeth six years back following which his right maxillary lateral incisor was extracted.

Zhermack) and cast was poured using type III gypsum (Kalstone, dentsply). (Figure 2)

- The area of implant surgery was anesthetized using local anesthesia. Bone mapping was done using a sharp endodontic instruments (15# K-files, Mani). The thickness of mucosa was measured at five different



Fig. 1. Pre Operative view



Fig. 2. Diagnostic Cast



Fig. 3. Bone Mapping



Fig. 4. Trough creation



Fig 5 & 6. Implant analogue with transfer coping



Fig. 7. Reassembled cast



Fig 8 & 9. Surgical template being fabricated



Fig. 10. Try in of Template



Fig. 11. Osseotomy using template



Fig. 12. Post Operative view

An implant supported fixed dental prosthesis was planned to restore the edentulous space. But it was the angulation and the residual alveolar bone that made it necessary to fabricate a surgical template for proper alignment of the implant and the crown to follow.

TECHNIQUE

- Preliminary impressions were made using irreversible hydrocolloid impression material (Tropicalgin,

areas, one at the crest and two on the buccal and lingual each at a distance of two to three millimeter.

- The diagnostic cast was sectioned using a saw at the site of implant placement with adequate mesiodistal width on either halves. The measurements of bone mapping were marked on this sectioned cast and the available bone was drawn. The angulation was also determined according to adjacent tooth on the sectioned cast. (Figure 3)
- Maintaining this angulation a trough was made on either halves of the cast using a laboratory straight

handpiece (Marathon, universal engineering company) with a straight fissure stainless steel bur (SS White, Lakewood, New Jersey) (Figure 4). The implant analogue was seated into this trough and the final angulation was rechecked. (Figure 5)

- The sectioned casts were reassembled using cyanoacrylate (FeviKwik, Pidilite, India) with the implant analogue inside, resembling a mock implant surgery. (Figure 6 and 7)
- A template was fabricated using auto polymerized clear acrylic (Lucitone clear, Dentsply). The template was retrieved from the cast. It was then finished and polished (Figure 8 and 9)
- The template was disinfected using glutaraldehyde and tried in patient's mouth before the surgery. (Figure 10)
- Initially the template was used to attain proper depth using the guide drill and initial drill. Once the pilot holes have been prepared, the template is hollowed out according to the diameter of all future drills to guide them for the placement of the implant. (Figure 11)
- The implant is then placed and mucoperiosteal flap is then closed using interrupted sutures. The final prosthesis was delivered after a period of 6 months (Figure 12).

DISCUSSION

Poorly aligned dental implants often complicate the clinical and laboratory procedures employed for the fabrication of superstructures. Therefore the key to the success of an implant lies in its proper placement. From the traditional radiographic templates (Israelson, 1992 and Basten, 1995) and surgical templates (Verde, 1993 and Pesun, 1995) to the modern day CT (Schwarz, 1987; 1987 and 1989) and CBCT (Benavides, 2012 and Pedroso, 2014) all techniques are aimed towards accomplishing this goal. But each had their own advantages and shortcomings. The technique that has been put forward in this case report has three advantages. Firstly it requires the popularly used and easily available dental materials like autopolymerizing clear acrylic, dental stone etc. and armamentarium like saw and implant analogue. Second, it patronizes the science of tomography by sectioning the cast and utilizes the innovation of CBCT to place the implant analogue at a desired alignment. Thus it simulates a mock surgical implant placement inside the bone. This mock implant placement allowed us to obtain the desired angulation along with the labio-lingual and mesio-distal orientation that was maintained throughout the surgical procedure. Thirdly the process of fabrication is quick and economical. This surgical

template has few drawbacks. It is unable to determine the proper alignment in a completely edentulous arch with moderate to severe resorption. In the presence of any nearby vital structure like the maxillary sinus or inferior alveolar canal, this template cannot specify the labio lingual safe distance from those structures. Even with few limitations this case report provides an innovative surgical template that is quick to fabricate and equally efficient in determining the final placement and alignment of dental implants.

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