ABSTRACT

PURPOSE: The aim of study is to evaluate the accuracy of dental implant positioning placed using digitally planned 3D printed surgical guide.

MATERIALS AND METHOD: The study was conducted in the department of Oral and Maxillofacial Surgery, Ragas Dental college, Chennai, Tamilnadu. 15 implant sites in 4 patients irrespective of gender (two males and two females) were selected based on the inclusion criteria. These patients, who presented to the department of Oral and maxillofacial surgery Ragas Dental College and hospital with a complaint of partial or complete edentulism with a desire of fixed prosthesis, were included in the study. Pre-operative CBCTs were taken. Virtual planning was performed through blue sky bio software and surgical guide was prepared. Guides were fabricated through Stratasys Eden 260vs computer 3D printer by polyjet printing technology. SS316 cylindrical drill sleeves were prepared. Drilling was done by placing the surgical guides through the information gained from virtual planning. Depth control system was used. A drill was inserted in the drill sleeve of master sleeve upto the physical stop of drill shaft and the next size sleeve was placed where the drill was completely inserted into the master sleeve for achieving the implant depth. This was done in a sequential order and the final drill was placed directly into the master sleeve. After six months, postoperative CBCT were taken. A Virtual planning was performed in preoperative CBCT and postoperative CBCT were converted into virtual 3D models using DICOM to Print
(D2P) software. These 3D models were superimposed using Geomagic Freedom software and accuracy of the angulation of the implant had been evaluated.

RESULTS: The results from the study revealed that the mean value for deviation of the angulation at crest was 6.9885 degrees and the standard deviation was 11.38088 degrees. The mean value for deviation of the angulation at apex was 6.8292 and the standard deviation was 11.09377. The mean value for the deviation at crest was 0.6623mm and the standard deviation was 1.15892mm. The mean value for the deviation at apex was 0.6131mm and the standard deviation was 0.8831mm.

CONCLUSION: From the results of the study we would like to conclude that the placement of dental implants using digitally planned surgical guides is within clinically acceptable limits. It further ensures minimal or virtually nil damage to the relevant anatomical structures and makes implant placement less difficult for beginners.

Key words: Surgical guides, Virtual planning, DICOM, CBCT.