Accuracy of a Dynamic Dental Implant Navigation System in a Private Practice

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Purpose: *To evaluate the in vivo accuracy of dental implants placed using a dynamic computer-aided dental implant (CAI) navigation system. The impact of various factors on accuracy was also analyzed.* ***Materials and Methods:*** *A retrospective in vivo study was performed during the period of October 2015 to December 2017. Data were obtained on all implants placed during this time frame. A chart review was conducted to identify the type of flap, number of implants placed, number of patients treated, and factors related to the description of edentulism (partial or complete). To evaluate accuracy outcomes, the preoperative cone beam computed tomography (CBCT) plan was volumetrically registered to a post-implant placement CBCT scan. Deviations between the planned and placed implant positions were analyzed. Data were statistically analyzed for factors that may affect the accuracy during usage.* ***Results:*** *Data were obtained on 231 implants placed in healed ridges using a flapless or minimal flap approach under dynamic guidance by a single surgeon. In the 89 arches operated on, 28 (125 implants) were fully edentulous. For all implants, the mean (SD) discrepancies were: 0.71 (0.40) mm for entry point (lateral) and 1.00 (0.49) mm at the apex (3D). The mean angle discrepancy was 2.26 degrees (1.62 degrees) from actual vs planned implant positions. The accuracy measurements for partially edentulous patients using a thermoplastic stent attachment and for fully edentulous patients using a mini-implant–based attachment were nearly identical. No significant accuracy differences were found between implant positions within the different sextants. Guided insertion of the implant itself reduced angular and apex location deviations. The accuracy of implant placement improved during the study period, with the mean entry point and apex deviation as well as overall angle discrepancy measured for the last 50 implants being better (0.59 mm, 0.85 mm, and 1.98 degrees, respectively) compared with the first 50 implants (0.94 mm, 1.19 mm, and 3.48 degrees, respectively).* ***Conclusion:*** *Dynamic surgical navigation is an accurate method for executing CBCT-based computer-aided implant surgery. In addition, an increased experience level of the surgeon with dynamic navigation appears to improve accuracy outcomes.* Int J Oral Maxillofac Implants 2019;34:205–213. doi: 10.11607/jomi.6966

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Computer-aided implantology (CAI) refers to the use of computerized technology to plan and guide the placement of dental implants based on a three-dimensional (3D) cone beam computed tomography (CBCT) image of the jaw. This approach has many benefits.[1–8] These benefits include:

- The ability to transfer a prosthetically driven implantation plan to the jaw
- Enabling flapless/minimal flap surgery, potentially leading to reduced patient discomfort, reduced chair time, reduced morbidity (infection, bleeding), and faster recovery
- Reduced risk of iatrogenic damage to nearby anatomical structures
- Increased efficiency such as reduced chair time; elimination of the need for plaster models, wax-ups,