

Computer Aided Surgical Guides More Accurate than Conventional Freehand Implant Placement

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“The incorporation of treatment planning modified by CAD/CAM offers significant advantages, including the evaluation of three-dimensional anatomy and the fabrication of anatomic site models and bone-supported surgical templates. Other advantages are shorter treatment times, minimization of intraoperative radiography during implant placement, less invasive surgical techniques (eg, flapless surgery with less swelling and pain and faster initial healing times), prefabrication of a definitive prosthesis, and immediate use of a fixed prosthesis. (5,17)”

“Based on the results of the present study, it was noted that the differences between planned and actual implant positions and angulations with the CAD/CAM method were smaller than those placed using a conventional planning method.

Table 1 summarizes the results obtained in this study and compares them to previous studies.”

“The average differences between the planned and actual entry points in the mesiodistal and buccolingual directions, lengths, and angles of the implants and the osteotomy showed a considerable reduction in the CAD/CAM group versus the conventional group (P<.005).”

Table 1 Transfer Error During the Use of CT Scan Analysis, CAD/CAM Templates, and an Optical Tracking System Between Planned and Actual Implant Positions and Angulations

Study	CT scan analysis	CAD/CAM templates	Optical tracking system
Sarment et al ⁴	1.5 ± 0.7 mm 8 ± 4.5 deg	0.9 ± 0.5 mm 4.5 ± 2 deg	
Naitoh et al ¹⁵	0.3 ± 0.6 mm 5 ± 3.5 deg		
Besimo et al ¹⁴	0.6 ± 0.4 mm in max 0.3 ± 0.4 mm in mand		
Van Steenberghe et al ¹⁰		0.8 ± 0.3 mm 1.8 ± 1 deg	
Di Giacomo et al ⁹		1.45 ± 1.42 mm 7.25 ± 2.67 deg	
Fortin et al ⁷			0.2 mm 1.1 deg
Birkfellner et al ¹⁶			1.23 ± 0.28 mm
Present study	2.4 ± 0.68 mm mesiodistal 0.39 ± 0.27 mm buccolingual 0.7 ± 0.46 mm (length) 5.9 ± 4.5 deg	0.88 ± 0.38 mm mesiodistal 0.22 ± 0.17 mm buccolingual 0.11 ± 0.05 mm (length) 1.2 ± 0.08 deg	