a.i and dynamic navigation v/s free-hand implant placement .. what's ideal and precise in maxillary edentulous with deficit bone.

Dr. Sanjay Jain, MDS

Periodontist & Implantologist sjjain76@hotmail.com Prof.Dr Katalin Nagy, DDS,phD,DSc,

Abstract

AI and dynamic navigation are transforming dentistry, especially implantology. They enhance accuracy and efficiency with minimal patient visits for comfort and precise outcomes. Al helped in analyzing patient data, such as dental scans and medical histories, to create highly accurate preoperative plans. It simulates and real time dynamic navigation then guides the placement of dental implants and the indirect sinus lift procedure based on the patient's unique anatomy. The aim of the present study was to compare and evaluate the efficacy of indirect sinus lift with immediate implant placement using Dynamic Navigation versus freehand placement.

Materials & Methods

In 24 cases of bilateral partially edentulous posterior maxilla, Indirect sinus lift and implant placement procedures were performed under NAVIDENT in **Group A** and free hand implant placement was done in **Group B**

1. CBCT scans and IOS (Intraoral Scanning) data were obtained and processed using AI-based Navident software.

2. Implant selection for length and diameter was based on software planning.

3. Sinus floor - Crestal elevation was achieved using densah osseodensification burs.

 Real-time dynamic navigation was used to guide the implant placement in Group A .
Free hand implant placement was done in

Source hand implant placement was done in



Results

A total of 66 implants were placed using the predecided protocol.

Post-operative CBCT scans were procured, and implant placements were evaluated using evalvnav software for both the groups.

Results The mean entry deviation in **Group A(with dns and a.i)** was 1.5 mm as compared with Group

B (freehand) which was 3.6 mm The angulation error mean in Group A was 1.8 degree as compared with Group 4 which was 14.2 degree.

The mean apex deviation was 3.5 mm (Group A) as compared with 7.1 mm (Group B)



Conclusion

Dynamic navigation in dental implant surgery utilizes real-time tracking with dicom data from CBCT. Al-driven software processes this data, offering real-time guidance for precise placement, reducing the risk of sinus membrane damage. It also adapts to unexpected anatomical variations, improving accuracy in both implant placement and sinus floor elevation when compared with freehand group. A.i with DNS group achieved statistically significant accuracy, precision and prosthetic placement of implants with indirect sinuslift compared with the freehand placement.



1)Stefanelli LV, DeGroot BS, Lipton DI, Mandelaris GA. Accuracy of a dynamic dental implant navigation system in a private practice. Int J Oral Maxillofac Implants 2019;34:205-13 2)Block MS, Emery RW, Cullum DR, Sheikh A. Implant placement is more accurate using dynamic navigation. J Oral Maxillofac Surg 2017;75:1377-86 3)Huwais S, Meyer E. Osseodensification: A novel approach in implant osteotomy preparation to increase primary stability, bone mineral density and bone to implant contact. Int J Oral Maxillofac Implants 2016;32:27-36.

References