Objectives:
Simultaneous implant placement in conjunction with lateral or transcrestal maxillary sinus floor augmentation gives the benefit of reduction in healing times and surgical interventions. Primary implant stability, however, may be significantly reduced in resorbed residual ridges. Aim of the present study was to investigate the impact of residual bone height, bone density and implant diameter on primary stability of implants in the atrophic sinus floor.

Material and Methods:
A total of 66 NobelActive™ implants were inserted in the sinus floor of fresh human cadaver maxillae: 22 narrow (3.5 mm), 22 regular (4.3 mm) and 22 wide (5.0 mm) diameter implants in residual ridges of 2 to 6 mm height. Presurgical computed tomographic scans were acquired to assess bone height and density. Primary implant stability was evaluated by insertion torque values (ITV), Periotest values (PTV) and Osstell implant stability quotients (ISQ).

Results:
Correlations within outcomes (ITV, PTV, ISQ) were highly significant (p<0.001). Radiographic bone density was found to significantly impact all 3 outcome measures (p<0.001), while no influence of residual bone height and implant diameter could be revealed by multifactorial analysis. Consistent results were seen in all subgroups (including residual ridges of 5 to 6 mm height).

Conclusions
Bone density seems to represent the major determinant of primary stability in maxillary sinus augmentation with simultaneous implant placement (as well as 5 to 6 mm short implants in the maxillary sinus floor). Preoperative bone density assessment may help to avoid stability-related complications in one-stage implant treatment of the atrophic posterior maxilla.

Suggested Reading

Bone density seems to represent the major determinant of primary stability in maxillary sinus augmentation with simultaneous implant placement. Increasing insertion torque (ITV, blue curve) and decreasing insertion speed (green curve) recorded during implant placement using a KaVo INTRAsurg 1000 surgical unit.

Significant (*) impact of bone density on primary implant stability (ITV) was consistently observed in residual alveolar bone of 2 to 6 mm height, while no correlation (rs) regarding implant diameter could be found.