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Using a Soft, Moldable Biomaterial for Internal Maxillary Sinus Elevation: A Case Report

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2- The Perio Studio, Boston, MA.

BACKGROUND & AIM

Restoring bone in the posterior maxilla is frequently required due to sinus pneumatization, but traditional augmentation methods present significant limitations. The lateral sinus lift is highly technique-sensitive, carries higher patient morbidity, and necessitates strict post-operative restrictions. Conversely, the traditional crestal approach using osteotome can induce benign paroxysmal positional vertigo in patients. While piezoelectric technology utilizes advanced tips to simultaneously remove bone and elevate the membrane, the internal approach still carries an inherent risk of Schneiderian membrane perforation that can be exacerbated by the granule size and sharp edges of particulate bone grafts.

The aim of this presentation is to highlight the use of novel piezo technology that can assist with the procedure combined with a soft, moldable biomaterial that can gently elevate the Schneiderian membrane.

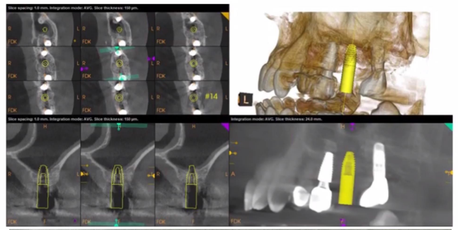
CASE PRESENTATION & TECHNIQUE

Patient introduction:
A 73 year old male presented to the practice as a referral from a prosthodontist to restore the maxillary left quadrant. The patient had a history of multiple external sinus lift procedures and was concerned about the morbidity of the treatment. Furthermore, he recently retired and would like to move to Florida as soon as the treatment is complete.

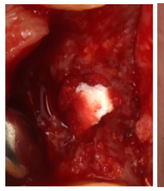
Technique overview:
Following osteotomy preparation piezoelectric technology, was used to safely removes bone while simultaneously elevating the Schneiderian membrane. A moldable bovine collagen/calcium phosphate plug was trimmed and carefully inserted to elevate the membrane. This material acts as a soft hydraulic cushion, gently lifting the Schneiderian membrane. Periapical radiographs were taken at multiple stages to evaluate the grafting.

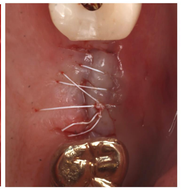
SURGICAL PROCEDURE PLANNING

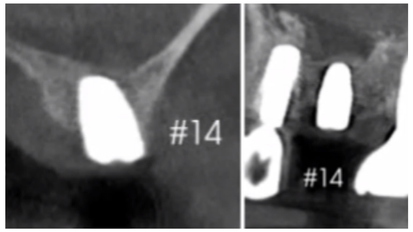
To overcome the limitations of traditional approaches, a digitally planned internal sinus lift was utilized. Digital design allowed for exact volumetric planning of the graft required, preventing the overgrafting often seen in lateral approaches. An implant was simultaneously placed. The pliable nature of the plug allowed for atraumatic vertical augmentation, completely avoiding the sharp edges and perforation risks associated with particulate grafts. Post-operative CBCT imaging reveals a distinct, smooth radiopaque dome apical to the implant fixture at site #14. Soft tissue healing was uneventful. At the restorative phase, the implant demonstrated osseointegration and was successfully loaded with a final restoration maintaining stable bone levels at follow-up.

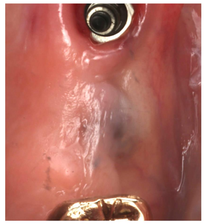


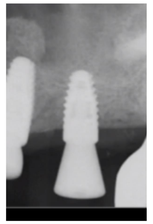
STEP-BY-STEP PROCEDURE & FOLLOW-UP

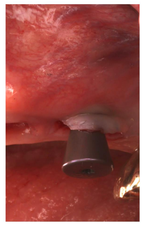


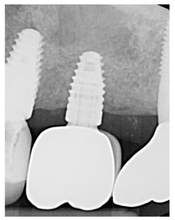












DISCUSSION

Traditional internal sinus elevation introduces an inherent risk of Schneiderian membrane micro-perforation due to the sharp edges of particulate grafts, the condensation forces required, and limited access. The post-operative CBCT from this case illustrates that combining digital planning, piezoelectric surgery, and a moldable biomaterial (bovine collagen/calcium phosphate) provides a highly controlled alternative. The biomaterial functions as a dynamic hydraulic cushion. Its pliability allows for uniform, atraumatic tenting of the membrane without point-loading stress, creating an isolated, stable space for osteoconduction while circumventing the complications of osteotome. This technique minimizes patient morbidity, prevents osteotome-induced vertigo, and eliminates the micro-perforation risks inherent to particulate graft packing.

CONCLUSION

The use of a soft, moldable biomaterial combined with digital planning and piezoelectric technology during internal maxillary sinus elevation serves as a protective apical cushion for the Schneiderian membrane. Further controlled clinical trials are recommended to validate these findings.

ACKNOWLEDGEMENTS

The Perio Studio Team for the support: Rose McKenna & Dr. Estar R. Vallapu.

We want to thank our prosthodontics collaborator: Dr. Chad Hanna.

Contact: nika_mehrnia@hsdm.harvard.edu

References

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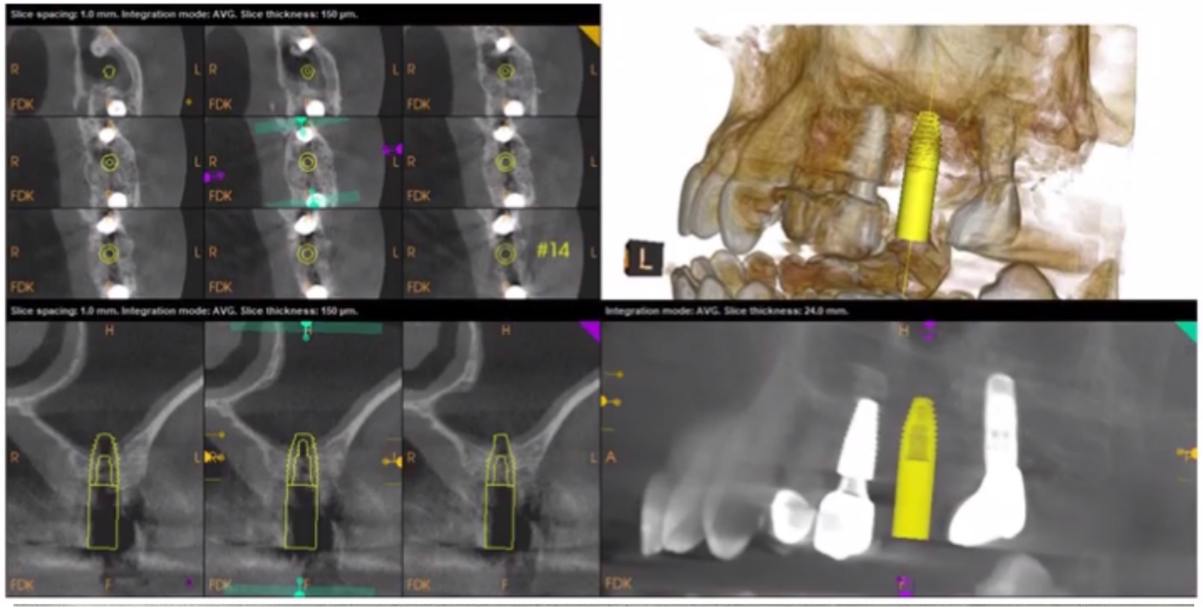

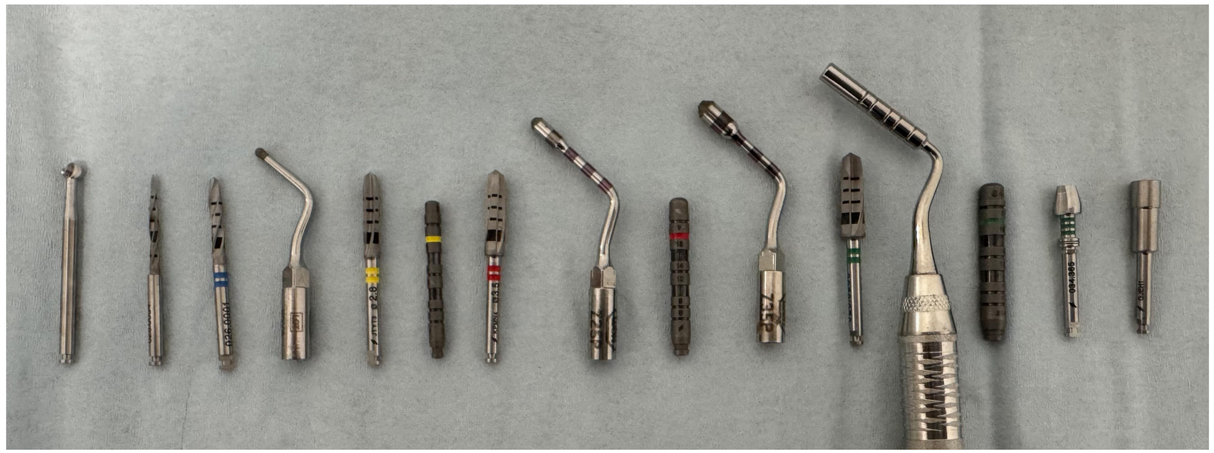

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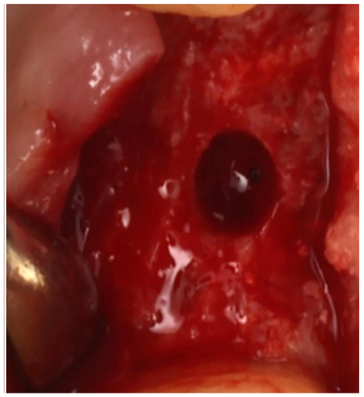

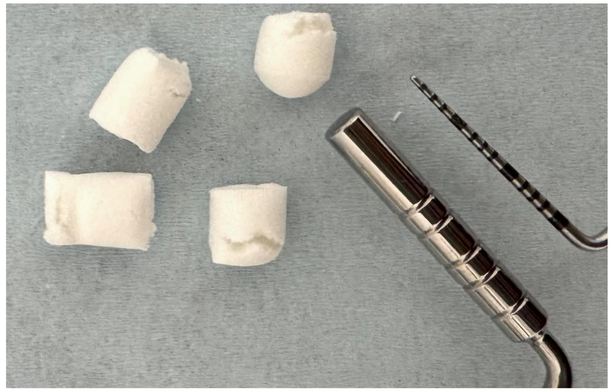

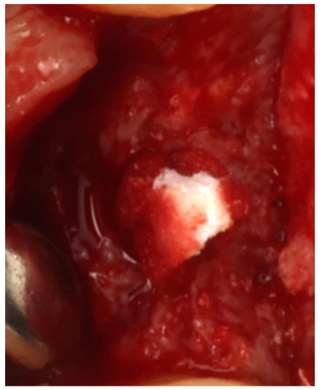

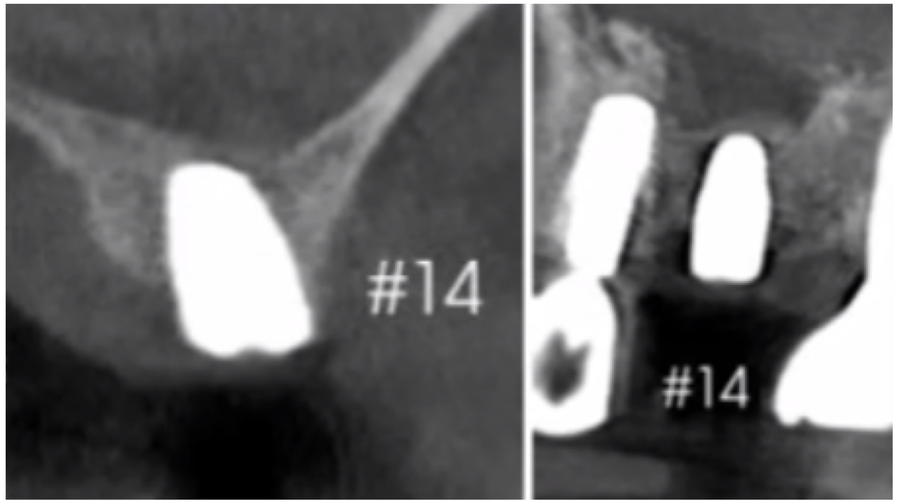

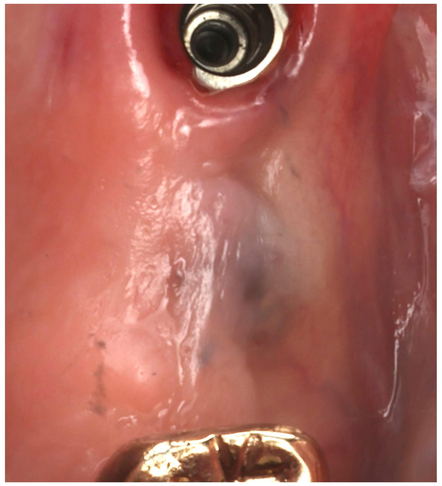

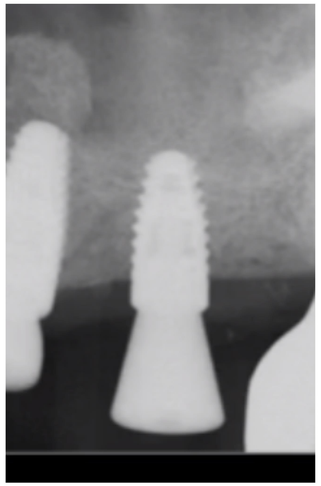

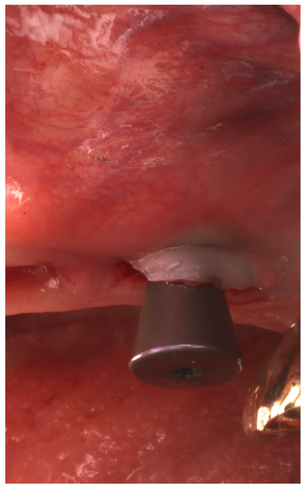

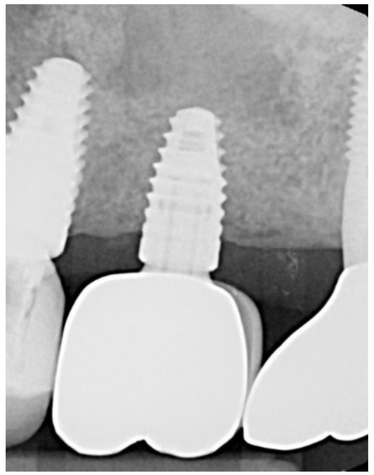

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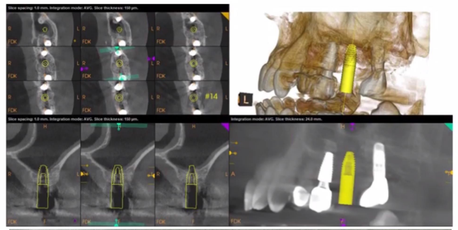

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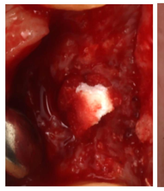

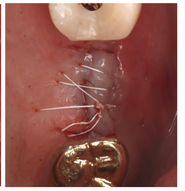

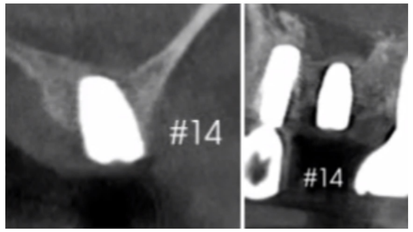

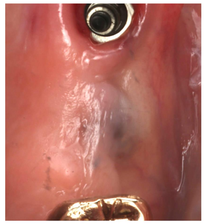

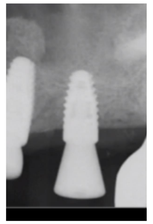

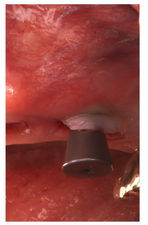

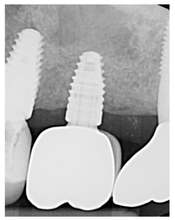

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