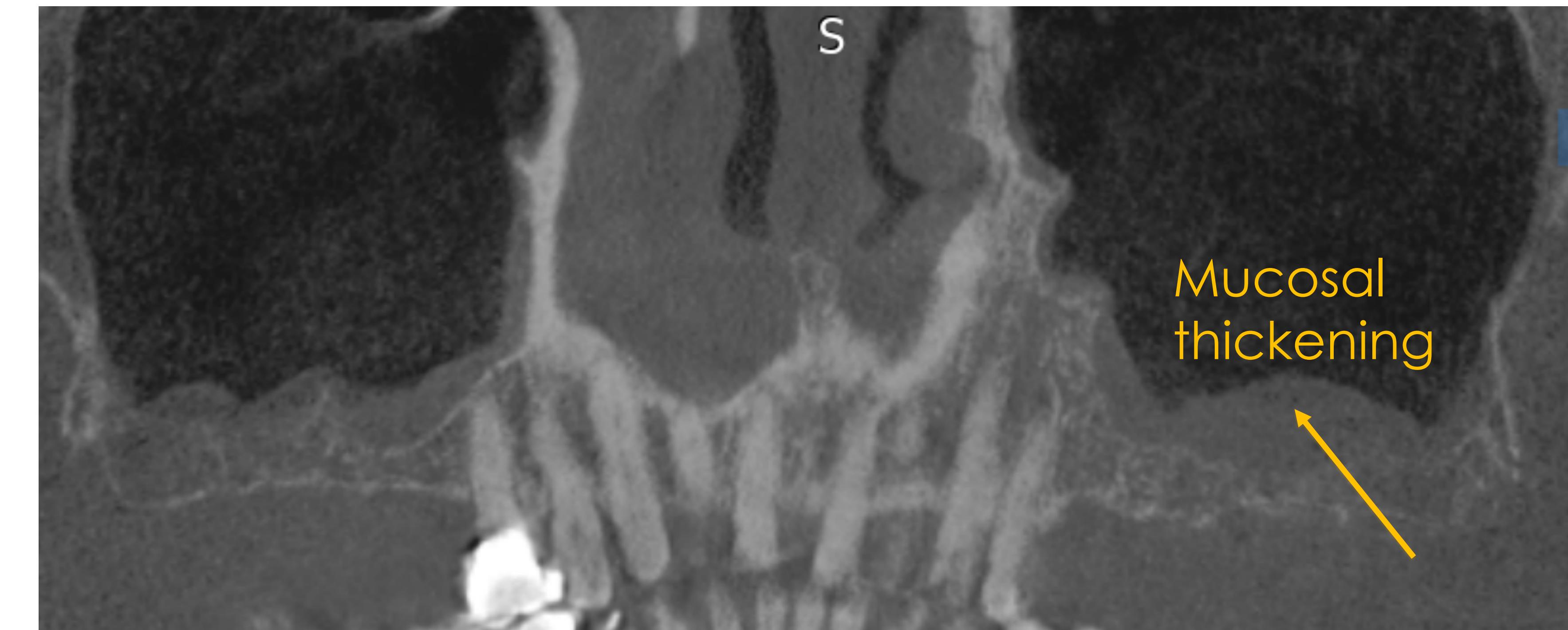
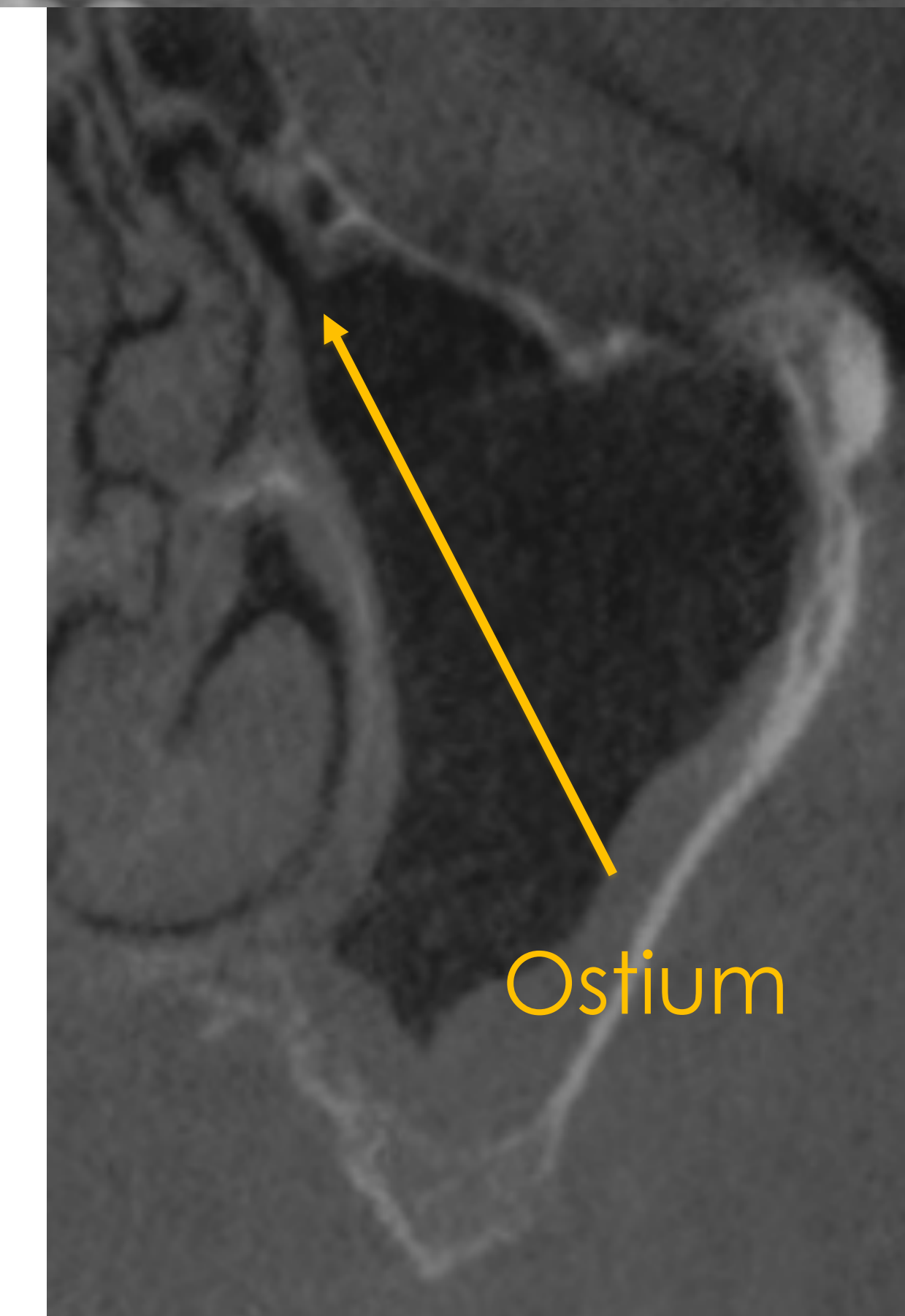


Post-maxillary Sinus Surgery Opacification in Asymptomatic Patients: Transient Swelling of the Sinus Mucosa or Graft Dispersed Into the Maxillary Sinus. A Radiographic Report of 3 Cases After At Least 5-year Follow-up



Giachi Carù F.¹ DDS MSc; Scaini R.² DDS MSc; Testori Tiziano¹⁻²⁻³ MD DDS MSc FICD

INTRODUCTION: Maxillary sinus grafting (MSG) is a predictable regenerative technique to facilitate maxillary posterior implant placement when there is inadequate vertical bone height inferior to the maxillary sinuses to allow placement of implants of adequate dimensions.



MATERIALS AND METHODS: MSG allows for an increase in vertical bone height which allows dental implant placement. Maxillary sinus mucosal membrane perforation is one of the most common intra-operative complications during MSG and may allow for graft material extrusion into the sinus. When this occurs, the maxillary sinus's muco-ciliary function may expel the extruded graft material through the sinus's natural ostium, though graft particles could remain in the sinus proper or possibly occlude the natural ostium.

¹ Lecturer Lake Como Institute (Scientific Director: Tiziano Testori MD, DDS), Academy of Osseointegration (AO) Approved Training Provider, Como, Italy

² Department of Biomedical, Surgical, and Dental Sciences, Università degli Studi di Milano, Milan, Italy.
IRCCS, Galeazzi Orthopedic Hospital, Milan, Italy.

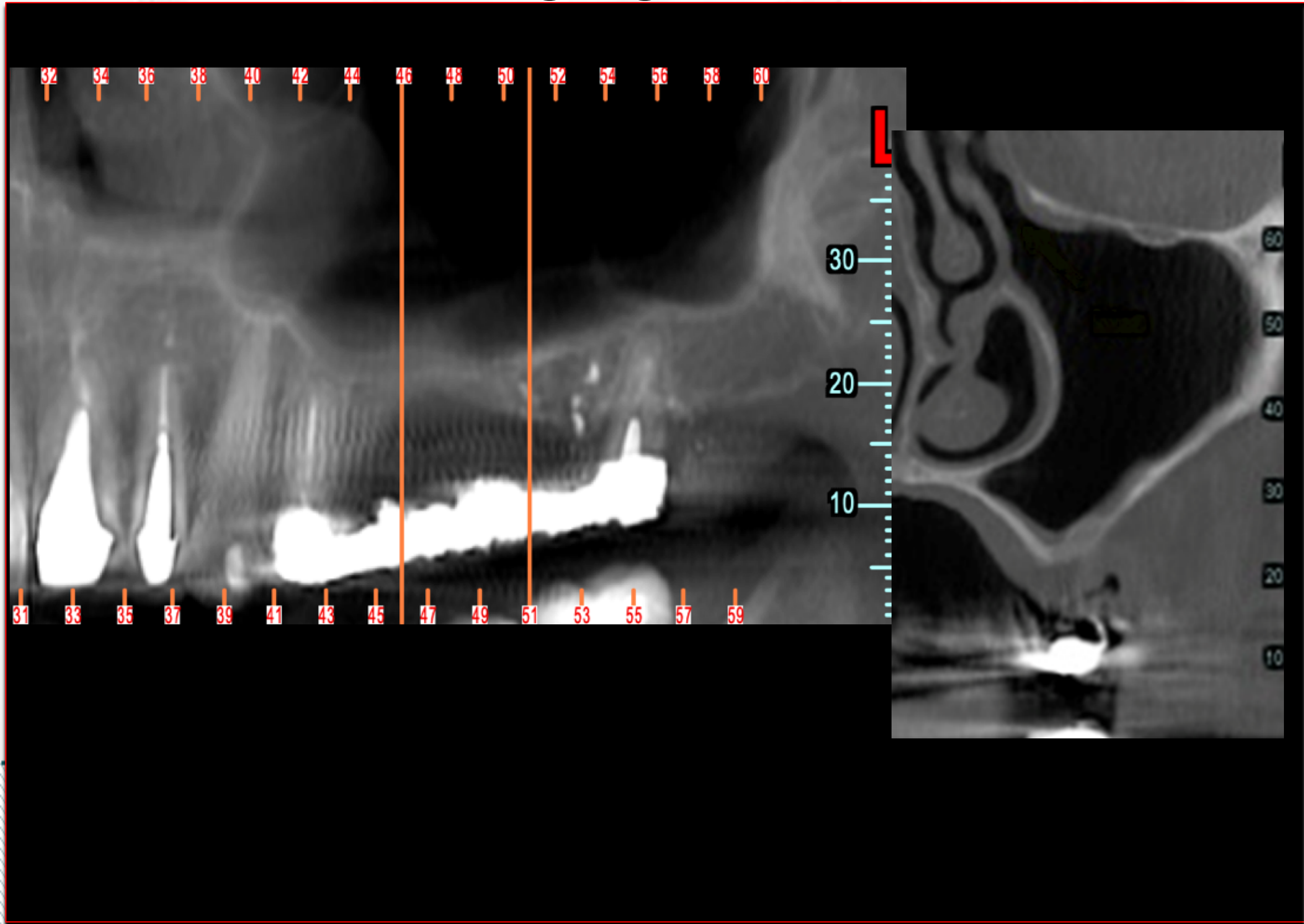
³ Adjunct Clinical Associate Professor, Department of Periodontics and Oral Medicine, University of Michigan, School of Dentistry, Ann Arbor, Michigan

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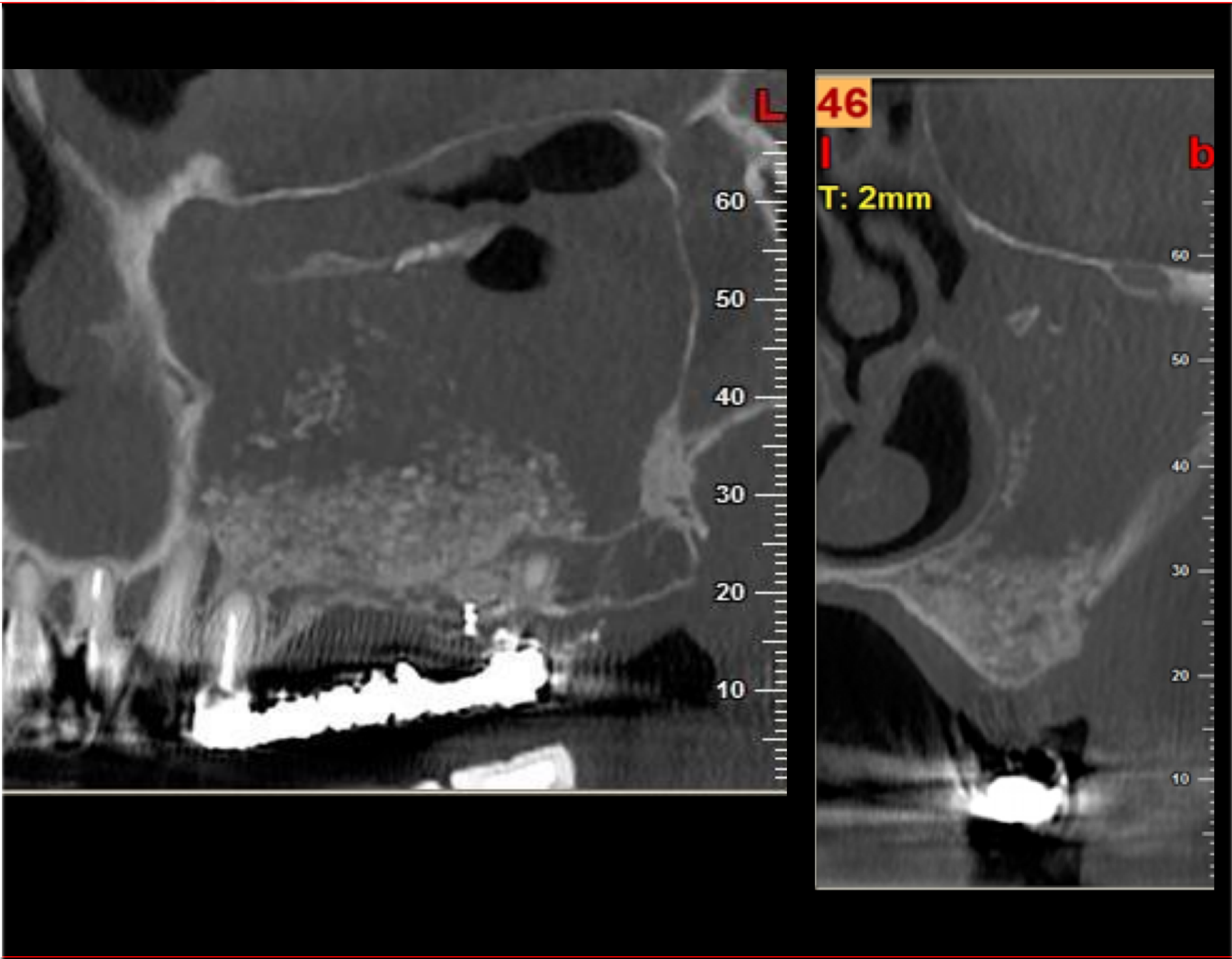
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RESULTS: Transient maxillary sinus mucosal edema could normally occur and a post-op CBCT could show different degrees of partial, subtotal or total sinus opacification that it is difficult be differentiated from graft particles dispersed into the sinus and embedded in the sinus mucous accumulation that could have the same radiographic density of transient mucosal swelling.

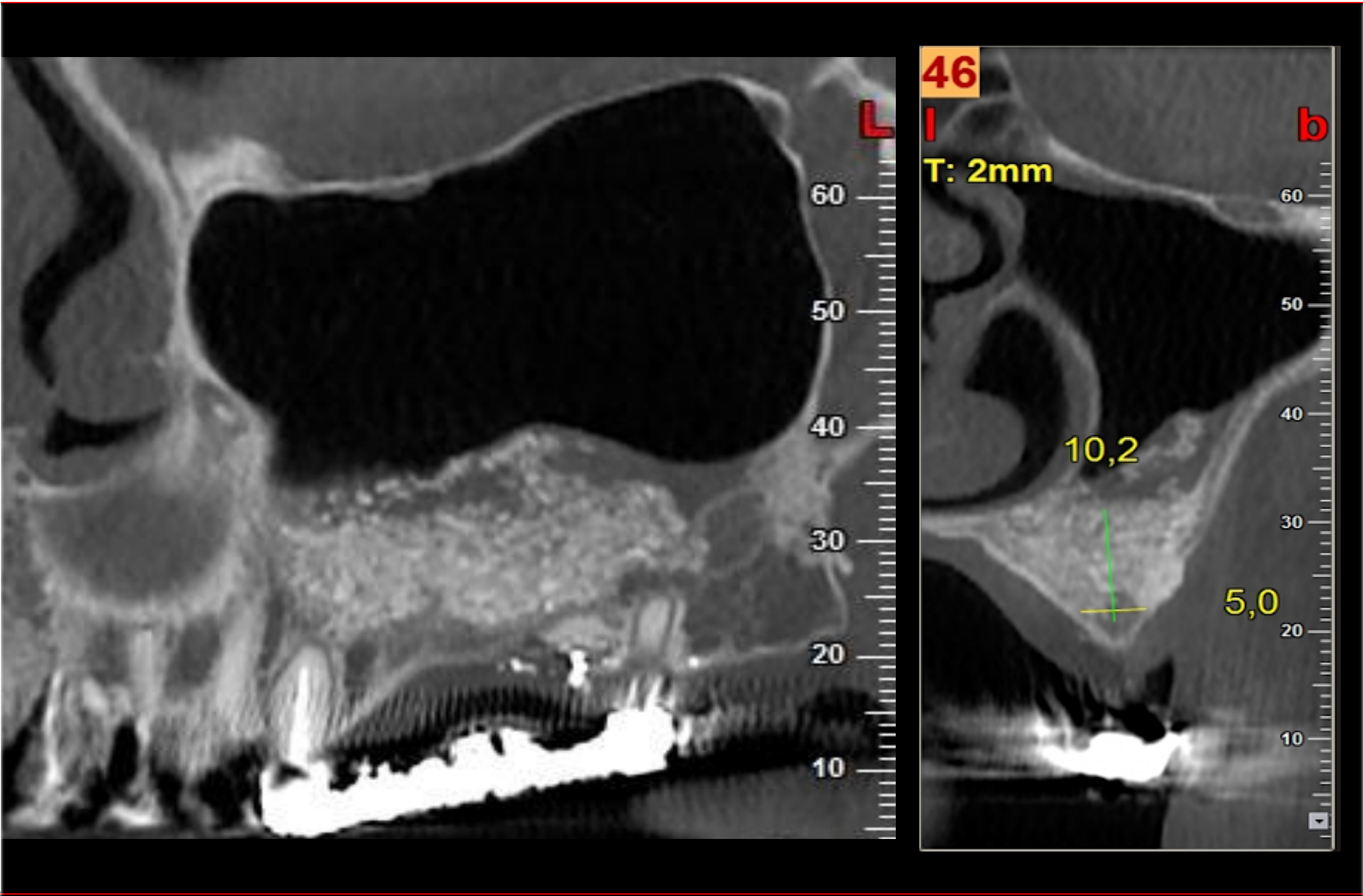
Preoperative cone-beam CT panoramic reconstruction: mucosal thickening on the floor of each maxillary sinus (Type II according to Rappani et. al. 2016). Such mild thickening is of no clinical significance and both sinuses are considered to be healthy. In the cross section image the patent ostium is highlighted



Cone-beam CT follow-up 4 weeks after surgery. Xenograft particles seems dispersed in the sinus with extended radiopacity and some radiolucent areas in the most superior portion of the sinus. Panoramic reconstruction and cross section



Cone-beam CT follow-up 10 months after surgery. The resolution of inflammation is shown. Panoramic reconstruction and cross section.



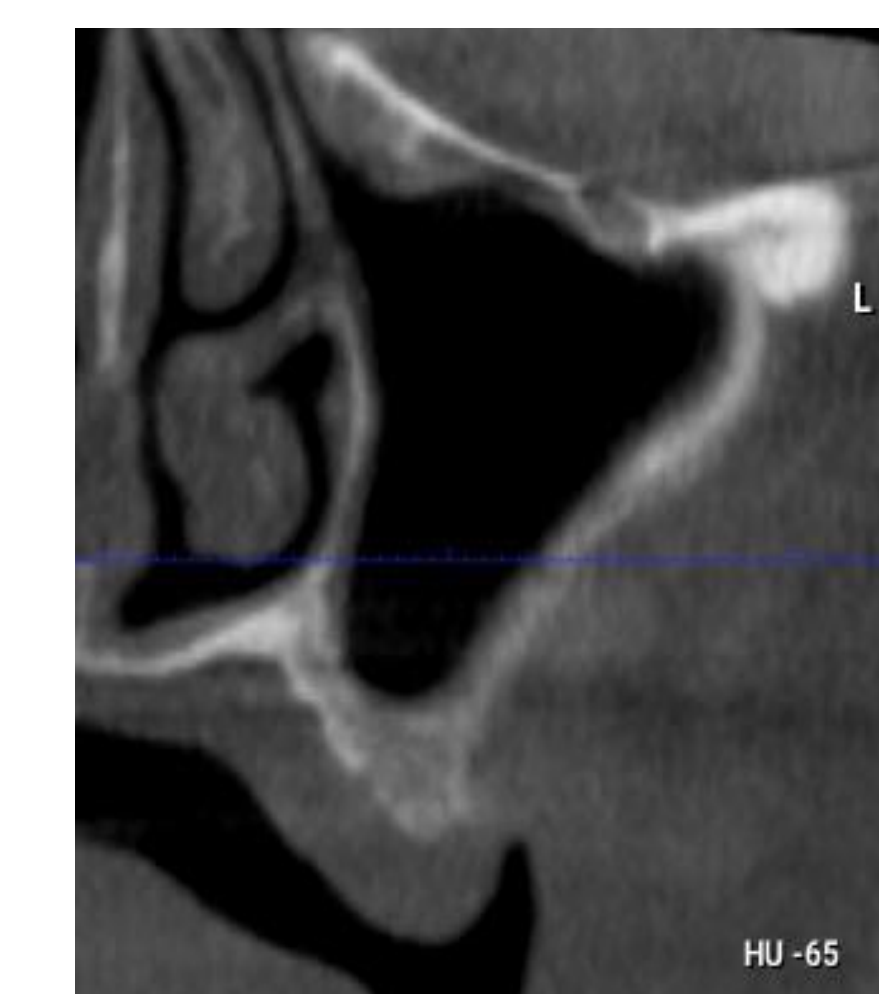
CBCT 6-year follow-up CBCT scan showing a healthy sinus



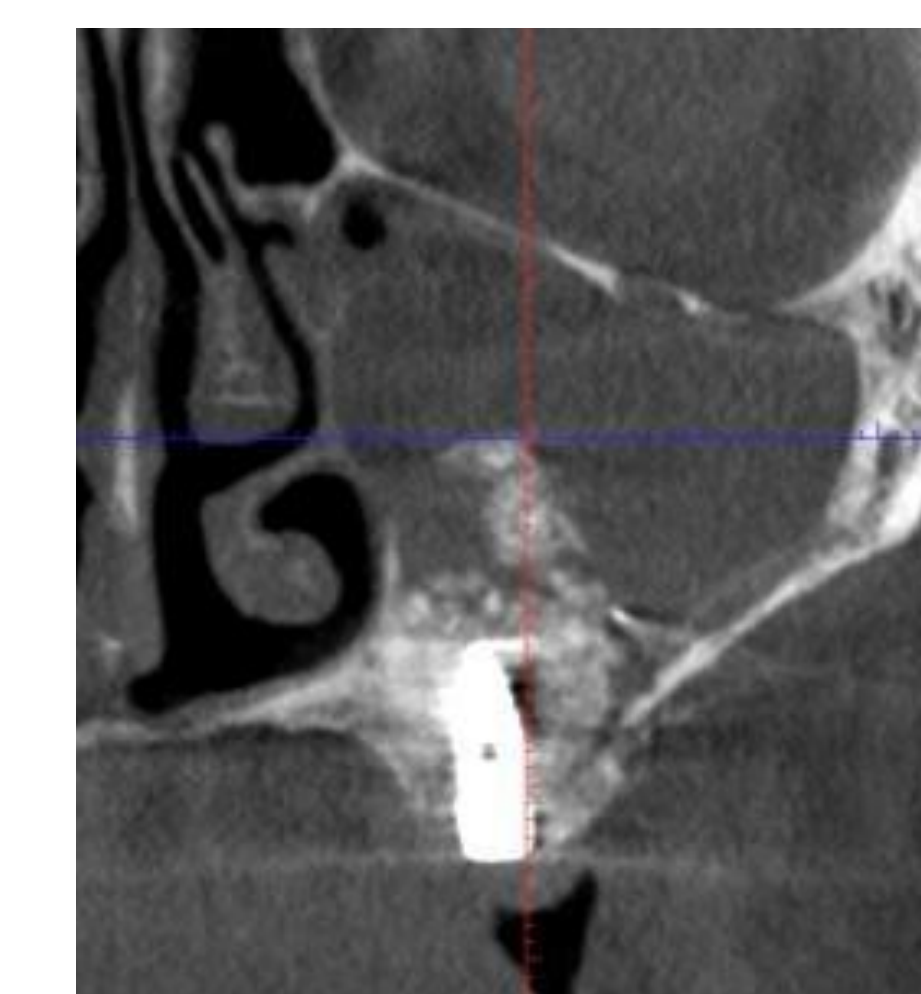
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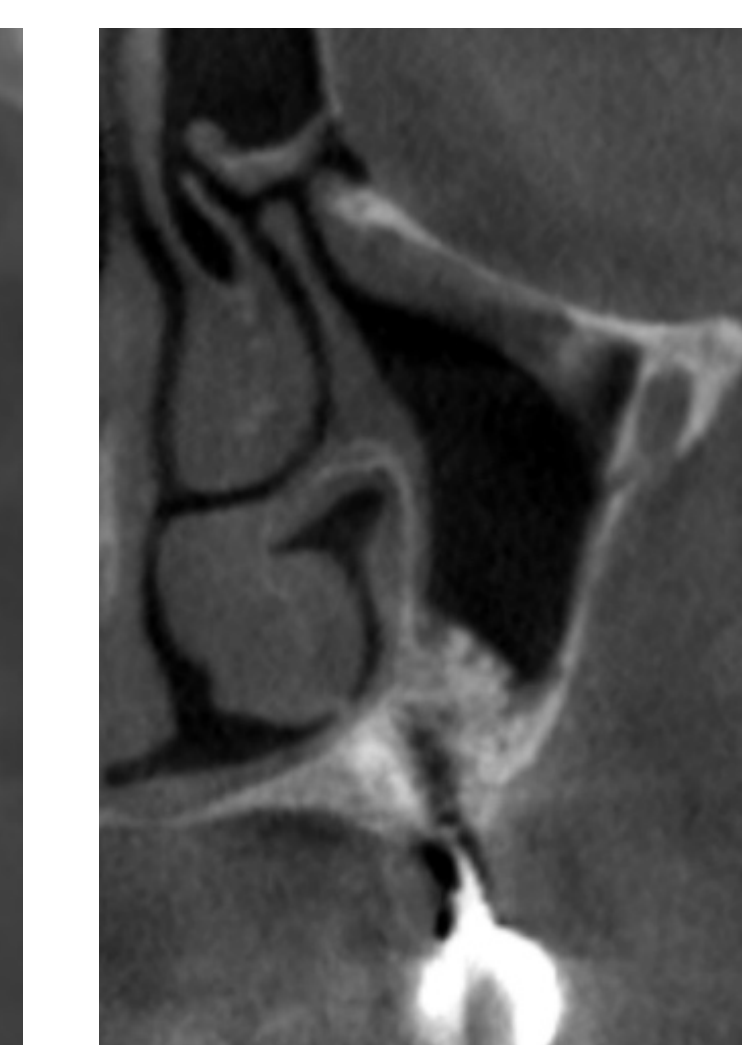
CONCLUSIONS: After MSG, patients may develop maxillary sinus opacification on postoperative CBCT, and bone graft particles may appear extruded into the sinus. However, one cannot conclude definitively the location of graft particles on CBCT alone, as some particles could be contained below / inside the thickness of an inflamed sinus or dispersed, through undetected perforations, in the sinus cavity full of mucus. In completely asymptomatic patients who had a healthy sinus with an open ostium at the time of the MSG, a conservative management with close follow-up examinations could be considered a pragmatic approach. Patients with sinusitis symptoms should be referred to an otolaryngologist for nasal endoscopic evaluation and discussion of medical and possibly surgical options. As far as we know, this is an innovative approach; therefore, the conclusions drawn in this paper have to be considered as preliminary, and must be confirmed by future studies. More research is necessary to understand the mechanisms of asymptomatic sinus opacification following MSG, and its optimal management.



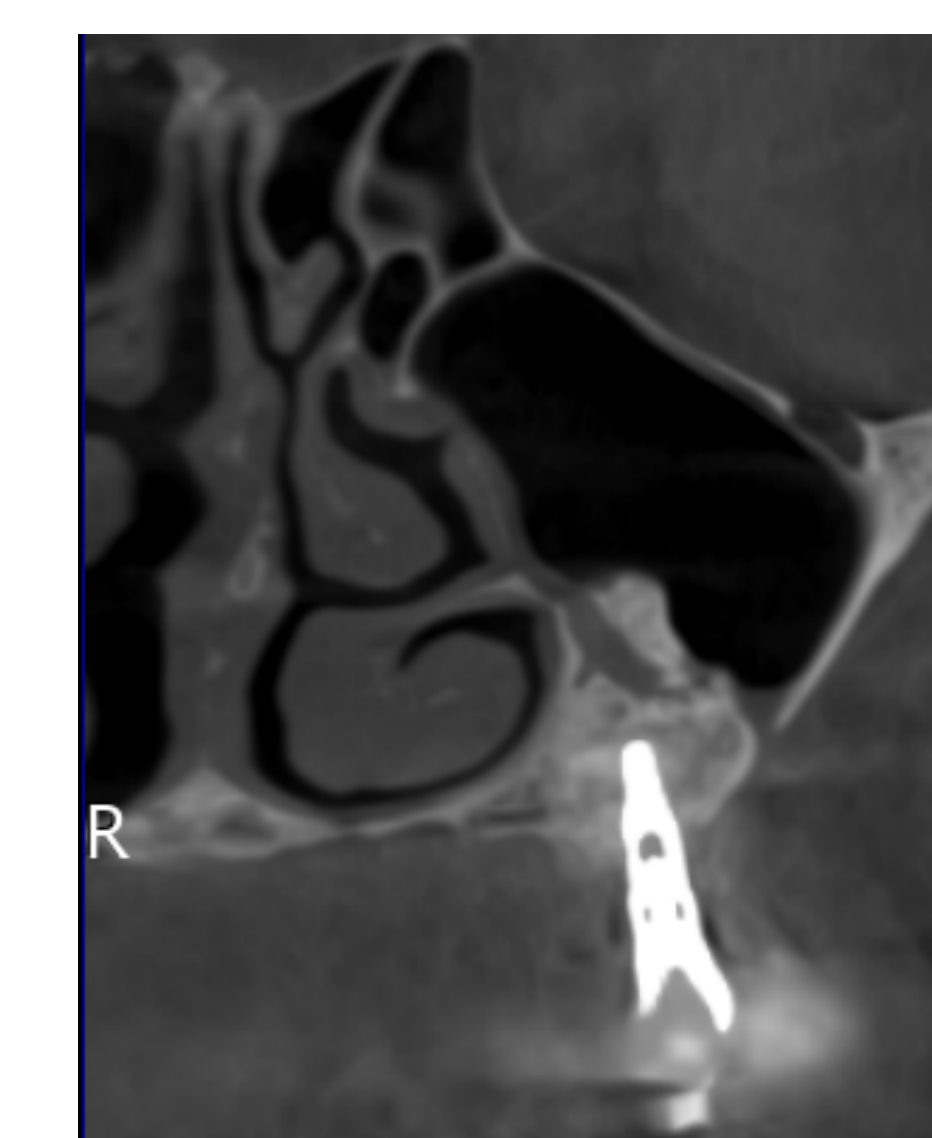
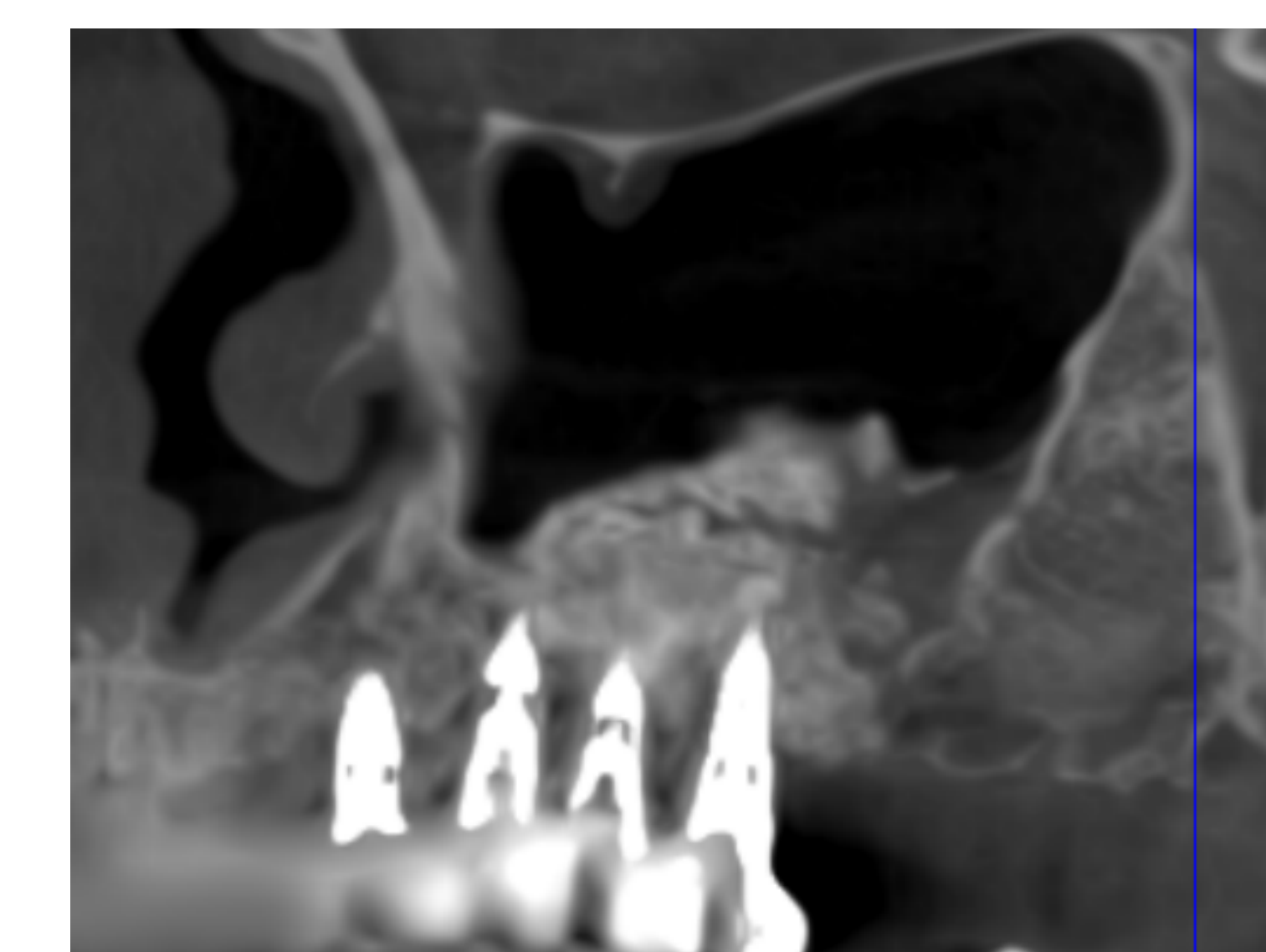
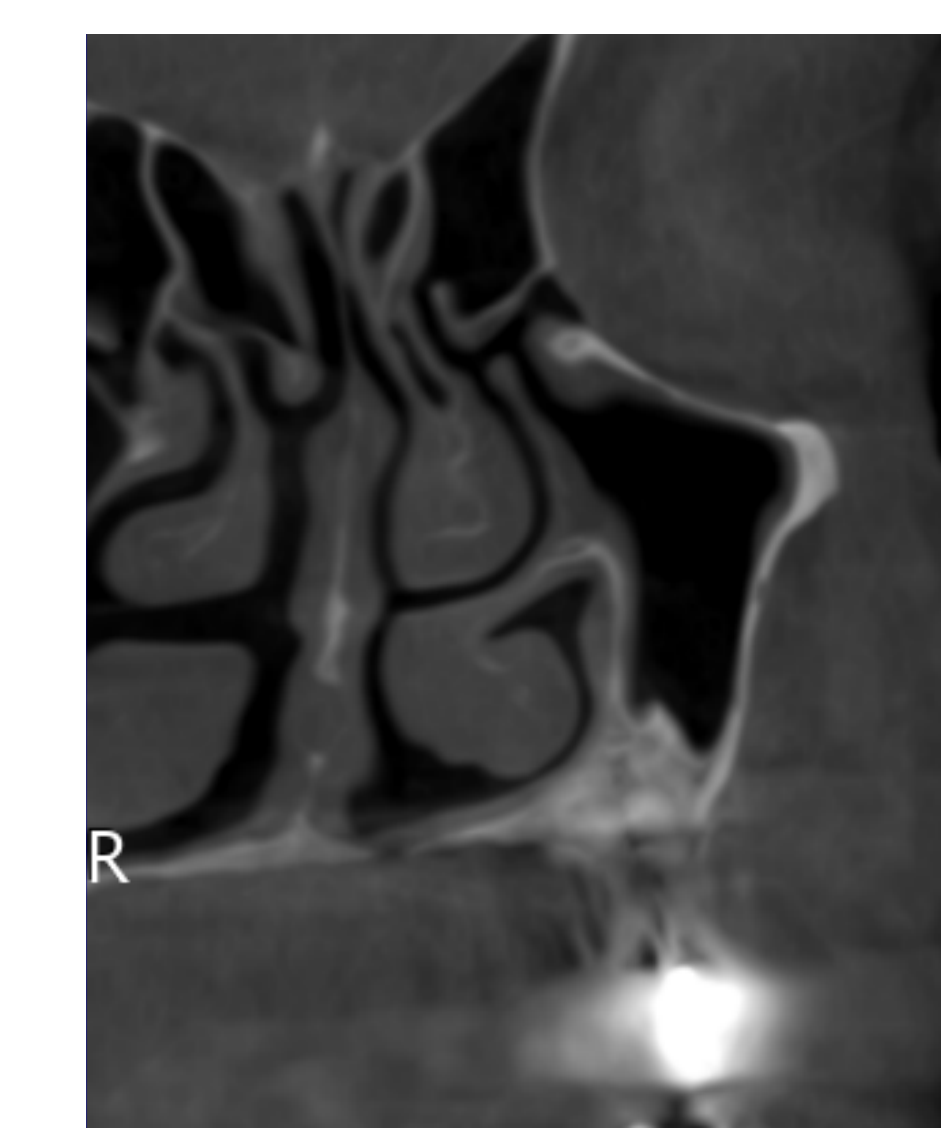
Coronal view of a preoperative CBCT showing an healthy sinus. A sinus lift and simultaneous implant placement were planned.



Coronal view taken at the 6 months follow up CBCT shows extensive sinus radiopacity/mucosal thickening with some graft particles that seem dispersed in the sinus



Panoramic reconstruction and coronal views of a CBCT taken at 13-month after the first surgery shows almost complete resolution of the radiopacity but it is still present (arrow) an area of radiopacity on the distal part of the graft.



8 years follow- up: A in the cross section and in panoramic view are visible an area of radiolucency inside the graft (arrow) and an area of radiopacity in the distal part of the graft that has not changed since the previous exam. B The ostium is patent, and the patient has no symptoms.