Oroantral fistulas: CT evaluation with Dentascan software.

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Purpose

Oroantral fistulas can be defined as a pathological communication between the maxillary sinus and the oral cavity through the hard palate floor[1,2]. They usually occur after avulsion of posterior superior teeth (most commonly the first molar) sequent to traumas, disruption of the maxillary sinus floor by periapical lesions, or after excision of cystic or neoplastic lesions involving the sinus floor[3,4,5].

An oroantral fistula can occur as the consequence of a postoperative acute sinusitis or of a sinusal mucosa perforation sequent to implants placement[6,7,8]. Fistula forms because of oral epithelial migration into the fistulous communication. This happens when perforation lasts at least 48-72 hours[9]. In the subsequent days, the tissue organization does not allow the spontaneous closure of the perforation.

The formation of the fistula causes an alteration of the oral cavity equilibrium because of recurrent sinusitis, erosion of the surrounding bone tissue and infections (mostly mycotic infections)[10,11,12]. This condition can become chronic and antral or nasal polyps may form, causing mechanical obstruction of the ostium and of the air flow[13].

Sometimes it is necessary to remove the fluids accumulated in the sinus, using Caldwell-Luc procedure: this technique consists of the surgical toilet of the sinus through the lateral wall, removing the infectious material, and the creation of a sinus drainage through the nose. This allows also to make sinus washes in the postoperative period[14,15,16].

Plain radiography and CT with Dentascan software allow to locate the fistula, evaluate its diameter, its extension and the possible complications.

Methods and Materials

28 patients (11 F; 17 M), 35 of median age, came to our observation with a suspect of oroantral and/or oronasal fistulas, between 2006 and 2009. The examined patients clinically presented dental crisis, purulent material leak from the oral cavity, sequent to avulsion of premolar or molar teeth and/or to disruption of the maxillary sinus floor by periapical lesions (Fig.1,2,3).

In our institute, all patients underwent CT examination with Dentascan and Volume Rendering (VR) reconstruction softwares. All the exams have been performed using a Light Speed Plus (GE) multislice CT scanner, provided with Dentascan spiral reconstruction programme.

The study technique comprised preliminary antero-posterior an lateral scanograms performed with the following acquisition parameters: 120 Kv and 200 mA. The subsequent axial scans were acquired using the sequent scan protocol: thickness 1,25 mm; increment 0,6 mm; feed 3,75 mm/s, rotation time 600 ms; Pitch 0,75:1; SFOV 25 cm; matrix 512x512; reconstruction algorithm with high spatial resolution (for the bone), WW 400, WL 40, gantry inclination of 0°.

CT scans were obtained with the patients in the supine position, using a head holder and modifying the head position according to the considered teeth arc, because of the different angulation of the two arcs in relation to the axial plane, to not modify the FOV angulation during the scan.

The acquired data were transferred to a work-station dedicated to Dentascan spiral reconstructions.

We used the following reconstruction parameters: SFOV 12,7 cm; oblique reconstructions thickness 1:0mm; panoramic reconstructions thickness 1:0mm; WL 800; WW 3200.

Parasagittal images and VR reconstructions allow to detect the fistulous canal and to evaluate its extension, the alterations of the surrounding alveolar bone, the presence of abscessual collections in the involved maxillary sinus, the inflammatory thickening of the mucosa covering the middle and inferior turbinates.

Images for this section:

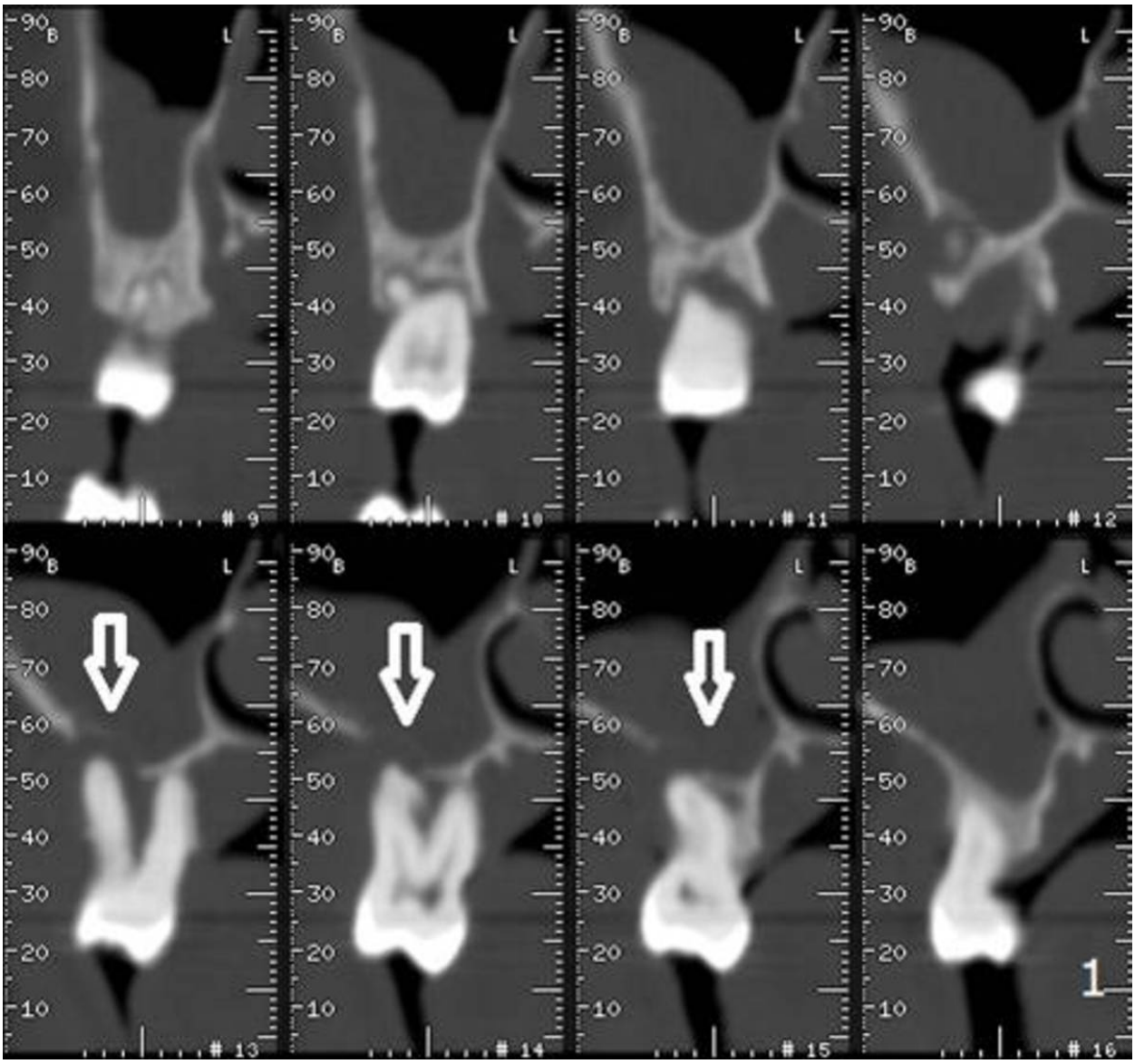

Fig. 1: In the cross-sectional images we can observe the inflammatory interruption of the vestibular wall and a fistulous communication with the right maxillary sinus.

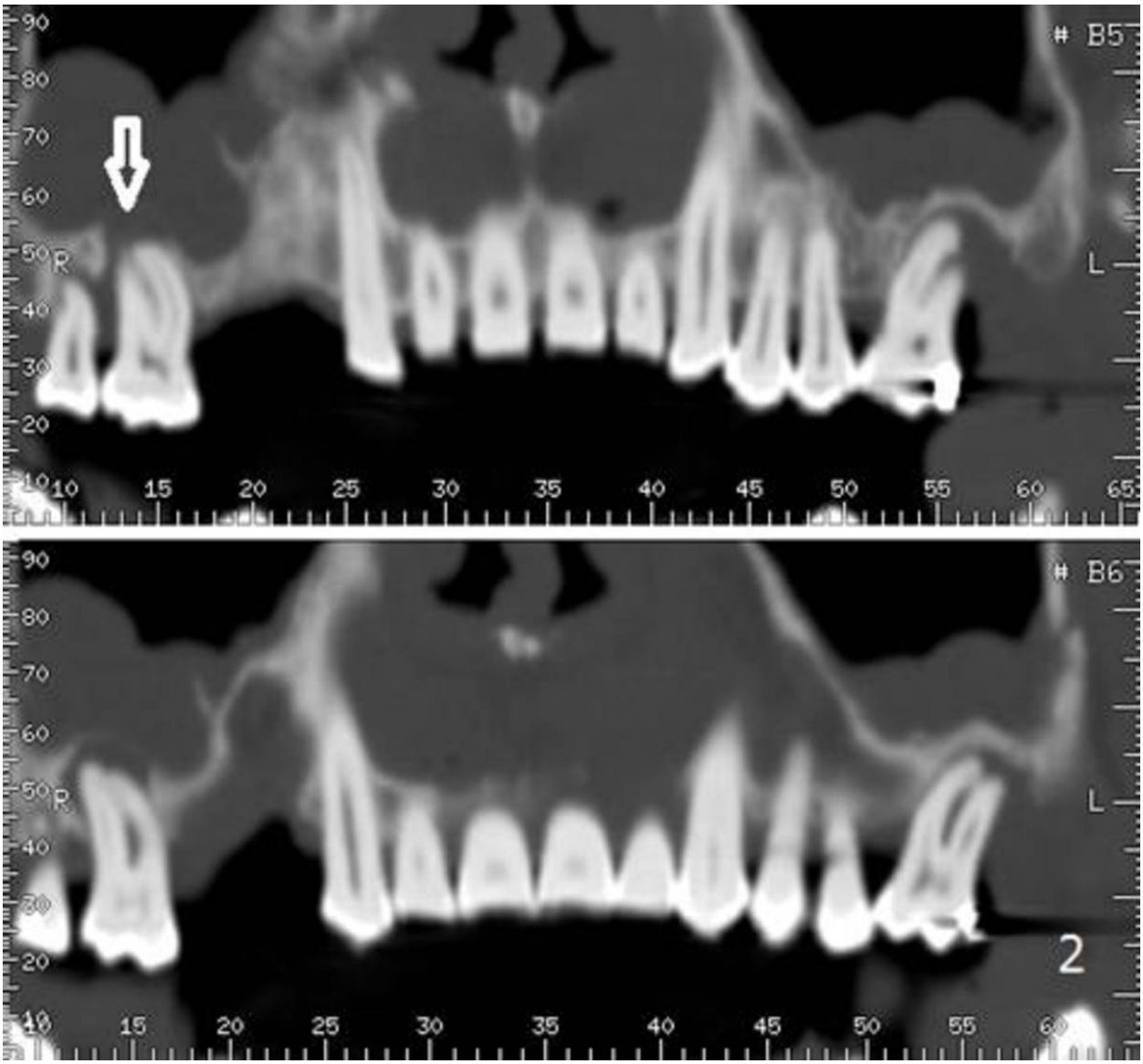

Fig. 2: Panorex images reveal a bilateral subantral bone resorption, more evident on the right where there is a polypoid sinusitis with erosion of the maxillary sinus floor.

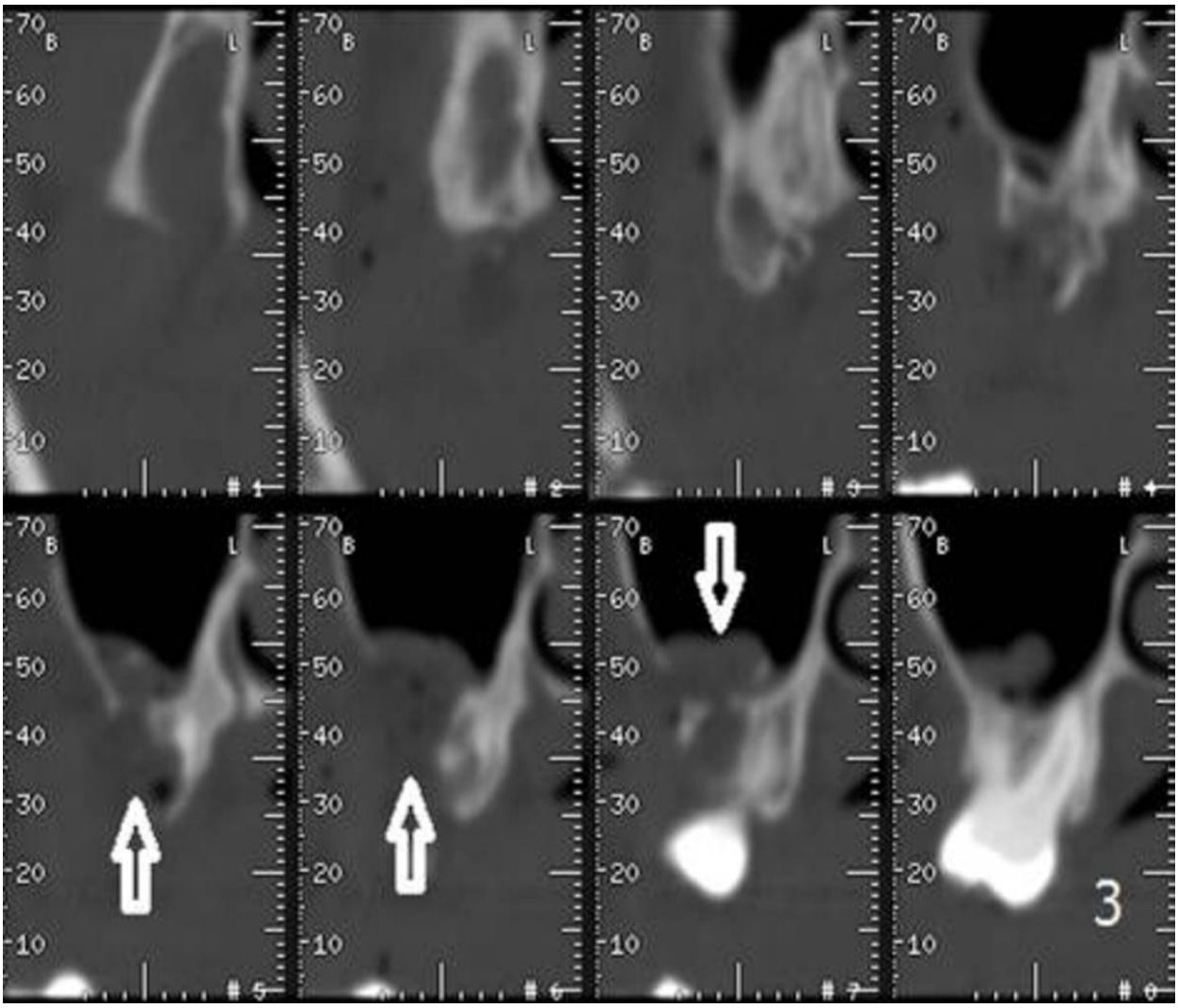

Fig. 3: Cross-sectional images of an odontogenic abscess with a fistulous canal between right maxillary sinus and oral cavity.

Results

Oroantral fistulas can be defined as a pathological communication between the maxillary sinus and the oral cavity through the hard palate floor. They usually occur after avulsion of posterior upper teeth (most commonly the first molars), traumas, disruption of the maxillary sinus floor by periapical lesions, or after excision of cystic or neoplastic lesions involving the sinus floor[17,18]. An oroantral fistula can occur as the consequence of a postoperative acute sinusitis or of a sinusal mucosa perforation sequent to implants placement[19,20] (Fig. 1,2).

Patients presented a positive anamnesis for: first molar avulsion (12/28=43%); cyst excision (6/28=21%); periapical lesions (8/28=29%); osteomyelitis (2/28=7%).

CT scans revealed in all patients a chronic inflammation in the maxillary sinus of the same side of the fistula. In some patients we evidenced an abscessual inflammation adjacent to the fistulous canal because of the involvement of the surrounding mucosa.

Fistulas were only a few millimeters in diameter and had a maximum lenght of 4 cm (Fig. 3,4).

Images for this section:

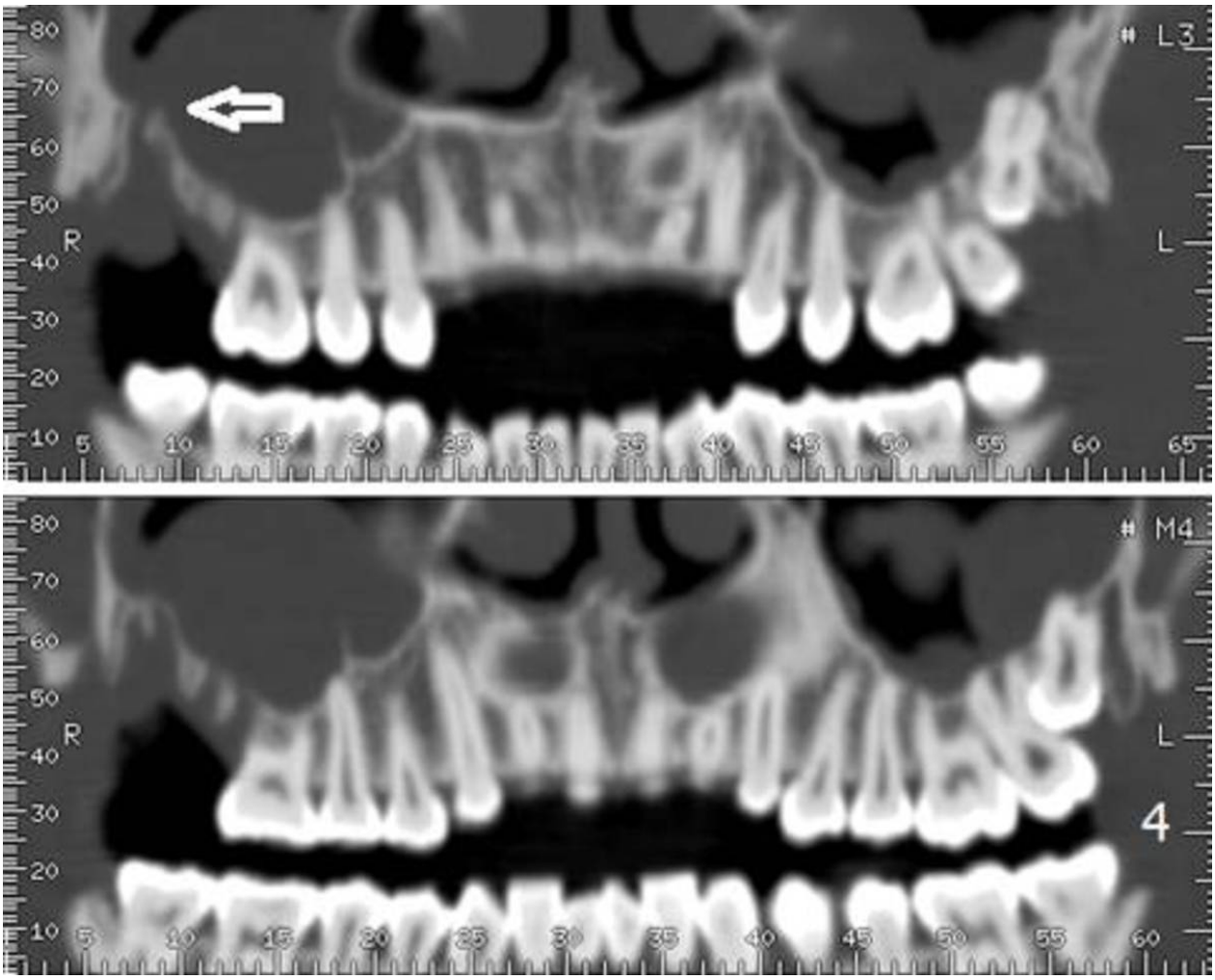

Fig. 1: Panorex images show hyperplastic inflammatory tissue in both maxillary sinuses, the erosion of the lateral and posterior wall of the right sinus, the presence of an oroantral fistula

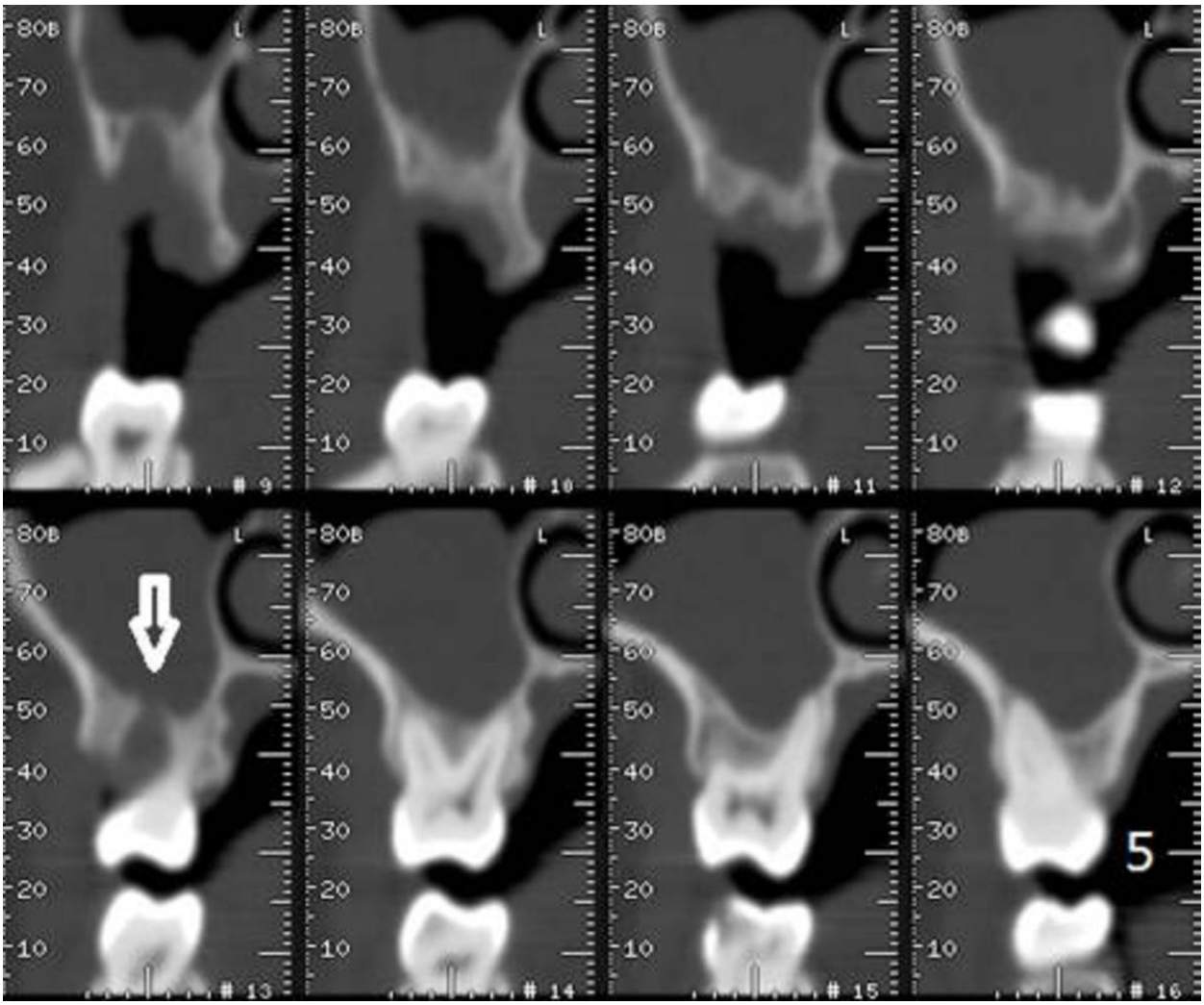

Fig. 2: Cross.sectional images of the right superior maxillary region reveal evident signs of periapical and parodontal suffering witha fistulous canal between maxillary sinus and oral cavity; we can also observe hyperplasia of the mucosa covering the maxillary sinus floor.

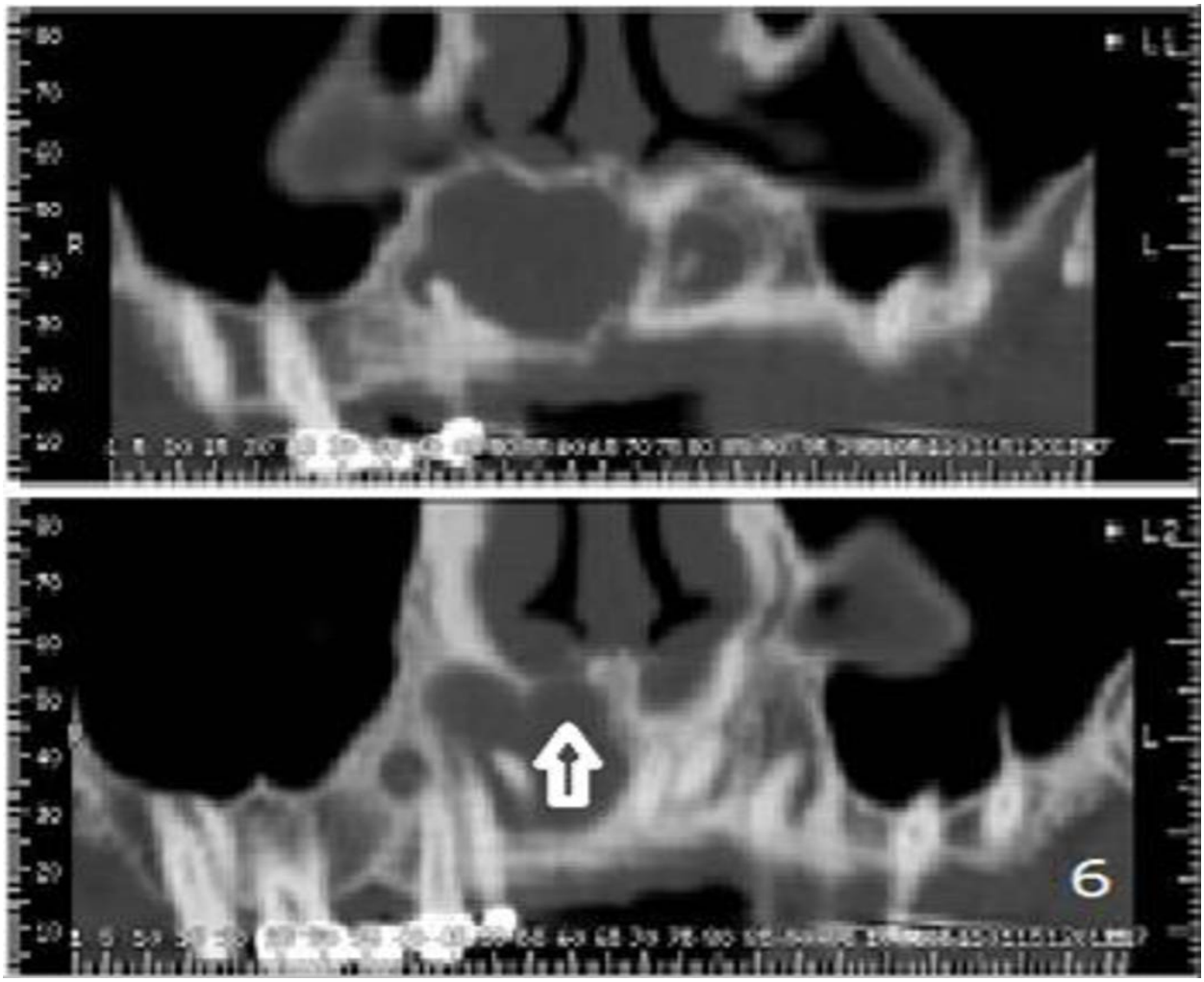

Fig. 3: Panorex images show a large cystic lesion in the canine-incisor region of the superior maxillary bone.

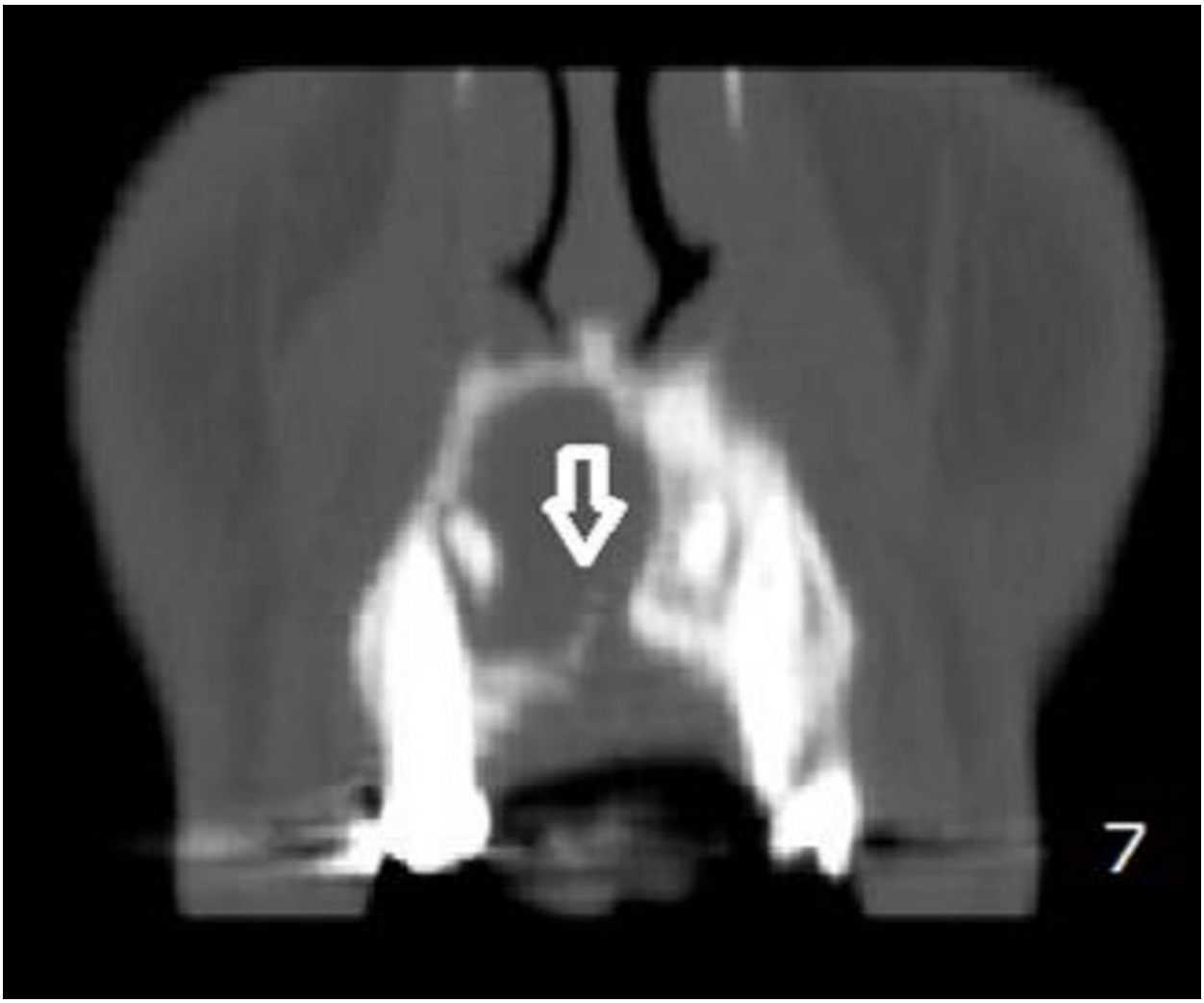

Fig. 4: Coronal reconstruction reveals a radicular cyst interrupting the cortical bone and opening into the oral cavity.

Conclusion

CT scan is a very useful imaging technique which allowes to define the exact location and typology of the fistulous communication (oroantral, orosinusal, oronasal), the extension of the inflammatory process in the ipsilateral sinus. In most patients we documented the presence of hypoattenuated inflammatory tissue, obliterating the maxillary sinus cavity with tickening of the covering sinusal mucosa. In a small percentage of patients the maxillary sinus was pneumatized with a mucosal tickening, thanks to a larger diameter of the fistulous allowing the drainage of the fluid collection.

CT allows to evaluate the maxillary sinus volume, its morpholoy and the thickness of the sinusal membrane (Fig. 1,2,3).

It was possibible to evaluate the erosion sof the bone surrounding the fistulas, the residual bone density, inflammatory collections in the soft tissue of the oral cavity. VR reconstructions allowed a better evaluation of the previous alterations (Fig. 4)

Images for this section:

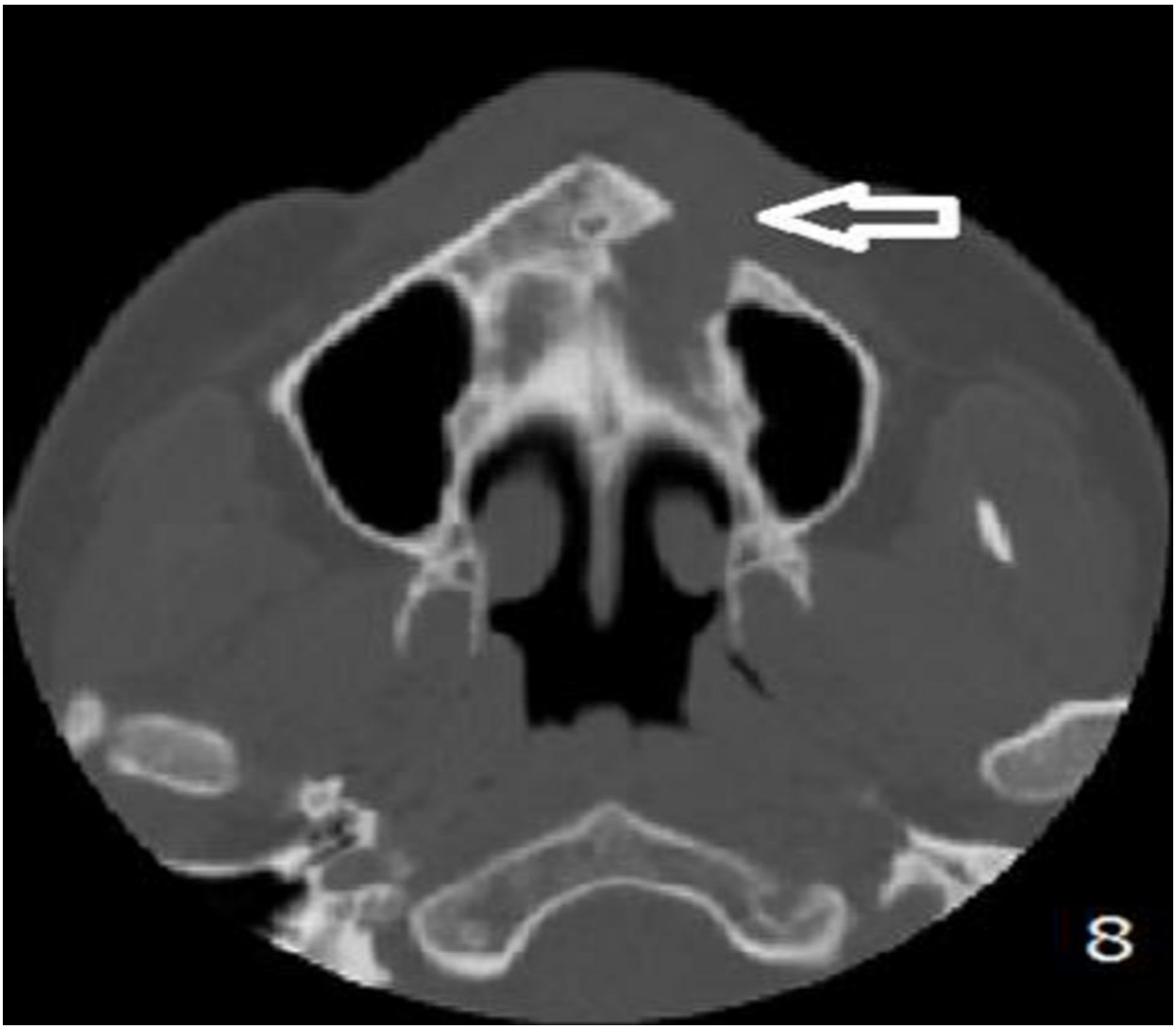

Fig. 1: CT axial image showing the fistulous communication between the hard palate and the oral cavity.

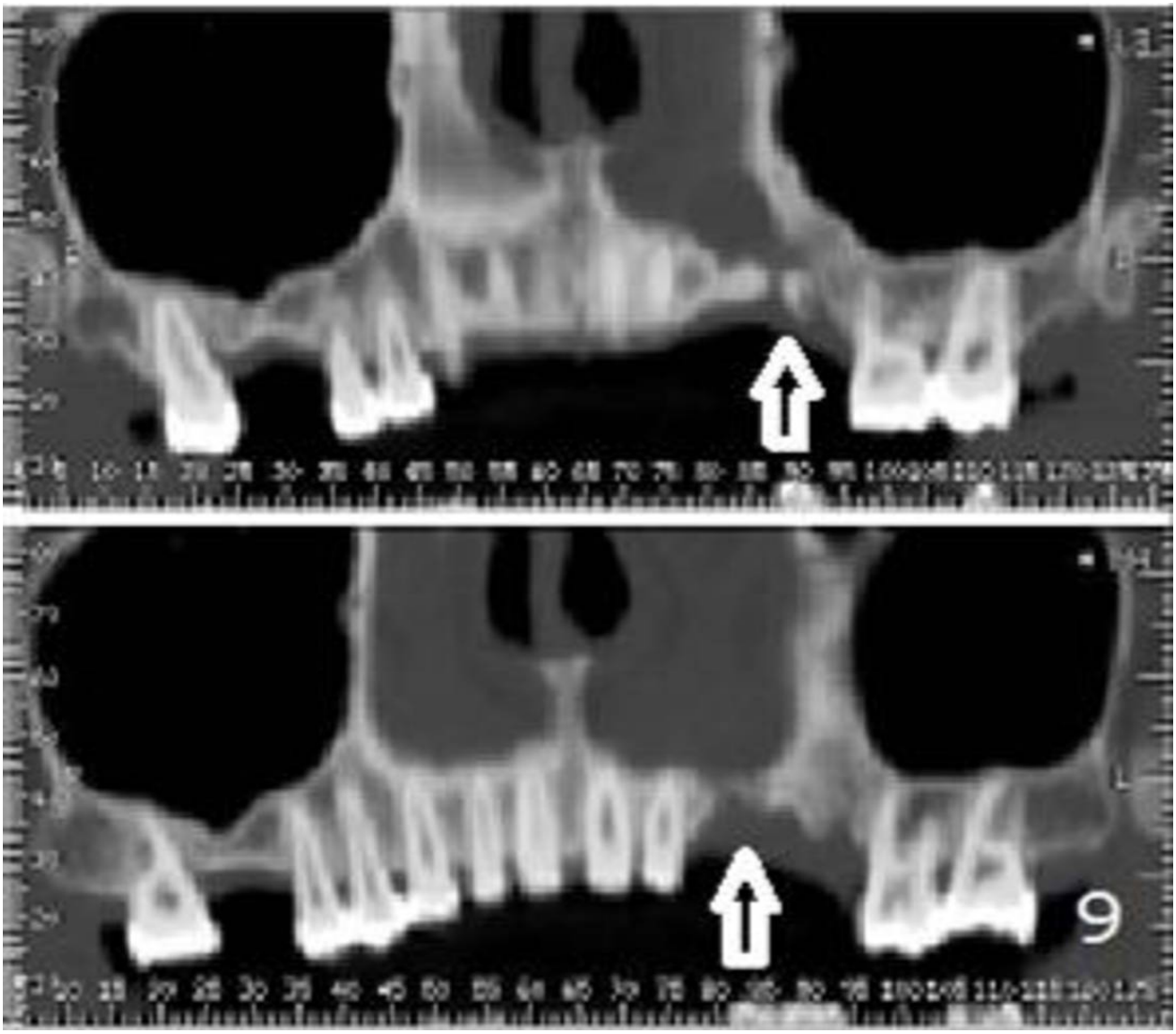

Fig. 2: Panorex images revealing a fistula between the nasal cavity and the oral cavity.

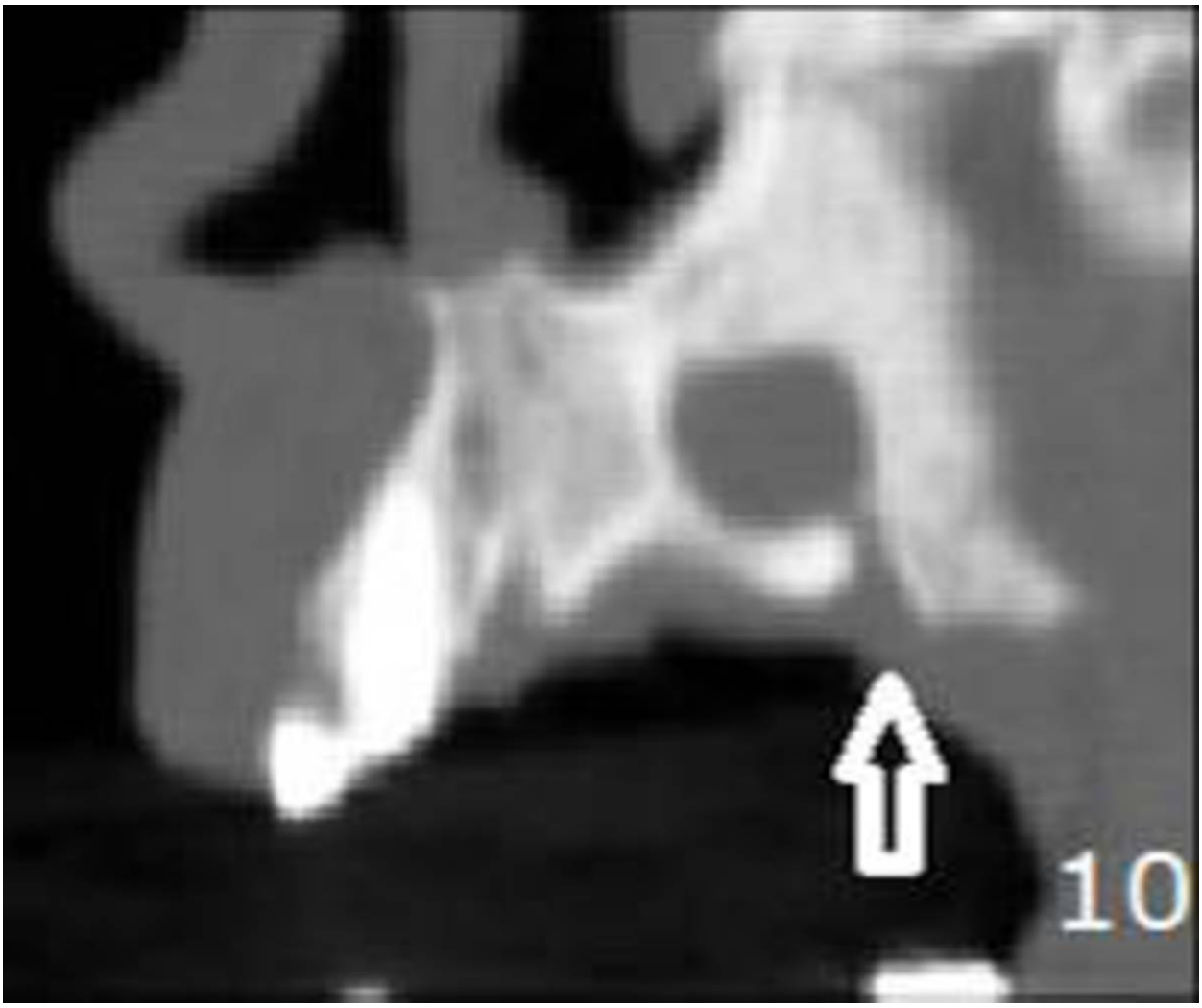

Fig. 3: MPR showing a round lesion in the palatal region, communicating with the oral cavity.

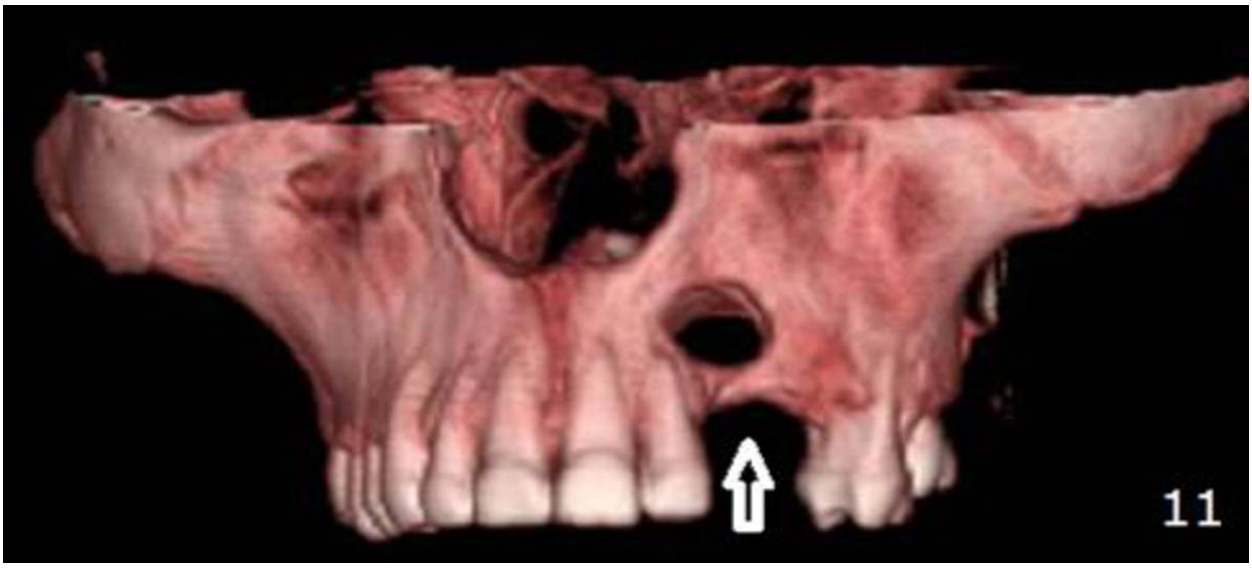

Fig. 4: 3D VR reconstruction showing a cyst with a fistulous communication between the superior maxillary bone and oral cavity.

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Personal Information