

Dentigerous cyst of the maxilla and its image diagnosis

Wataru Okita, Keiichi Ichimura and Toshitaka Iinuma

Dept. of O.R.L., Tokyo University Branch Hospital, Japan

SUMMARY

Dentigerous cysts may grow unnoticed to such extensive sizes as to occupy a considerable portion of the maxillary sinus. As they enlarge, the bony walls overlying the cysts thin out giving rise to an egg shell sensation upon palpation. Three cases of such extensive dentigerous cysts were experienced since 1987. These three cases were used to illustrate the advantages and disadvantages of the following imaging techniques in the preoperative evaluation of these cysts, conventional radiographs, sonography, CT, and MRI.

A dentigerous cyst is one which encloses the crown of an unerupted tooth and is attached to its neck. A very substantial majority of these involve the mandibular third molar and the maxillary permanent canine (Shear, 1976). Not very often, in the maxilla, it may grow unnoticed to such an extensive size as to occupy a considerable portion of the sinus or may obliterate the whole antral space (Killey et al, 1975). In this state, a common initial sign is a swollen cheek, often accompanied with moderate pain.

Since 1987, three cases of extensive dentigerous cysts, occupying the maxillary sinus, were seen in our hospital (Table 1). All cases were surgically treated. The preoperative diagnosis relied heavily on several imaging modalities. Compared with the postoperative diagnosis, findings of these imagings turned out to be very accurate. The following is a description of these cases. Discussion will centre around the results of the imagings.

CASE STUDY

Case 1 was a 12 year-old male, whose chief complaint was a slowly enlarging swelling of the left cheek accompanied by mild pain. His face was asymmetric,

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Table 1. Summary of three cases.

case no.	age, sex	initial signs	postoperative diagnosis
1	12, male	swollen cheek	follicular cyst
2	31, female	toothache	radicular cyst
3	20, male	nasal discharge (mucopurulent), toothache	follicular cyst with chronic sinusitis

and on palpation, there was an egg shell sensation at his left cheek (Figure 1). An orthopantomogram revealed a round, radiolucent area containing a crown of an unerupted tooth in the left maxilla (Figure 2). A CT scan showed smooth and multilobular soft tissue density. The high density of an unerupted tooth was also seen. The anterior wall of the maxillary sinus thinned out which gave rise to the egg shell sensation. A soft tissue density occupied the sinus floor. The floor of the left nasal cavity was also destroyed (Figures 3 and 4). The cyst was excised en



Figure 1.
Facial appearance of
case 1.

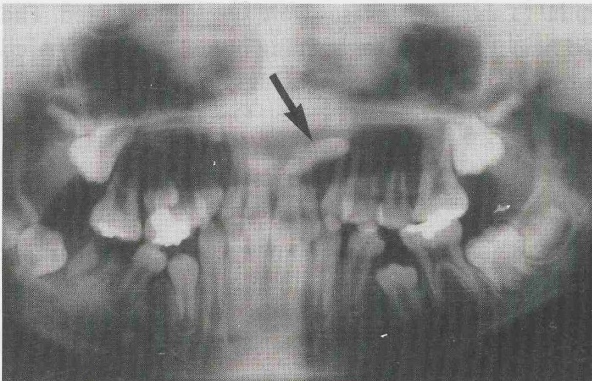


Figure 2.
Orthopantomogram of
case 1. An embedded
tooth is imperfect in
shape and supernumerary
(arrow).

bloc, and we confirmed the bone destruction in both the anterior wall of the maxillary sinus and the floor of the nasal cavity. These findings conformed to these of CT (Figure 5). MRI showed high signal intensity especially in T1-weighted spin echo sequences. A very high signal pattern with a sharp margin occupied almost all the antral space of the maxilla, but the supernumerary tooth lacked a definitive signal in MRI (Figure 6).

Figure 3.
Axial, soft tissue level CT of case 1. Smooth and multilobular soft tissue density containing very high density of an embedded tooth is seen.

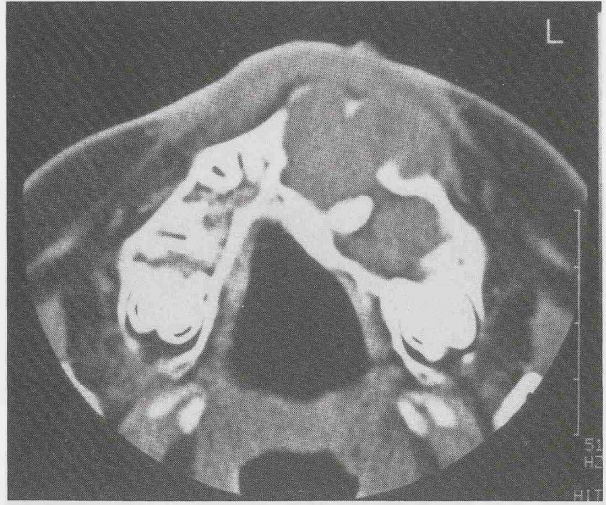
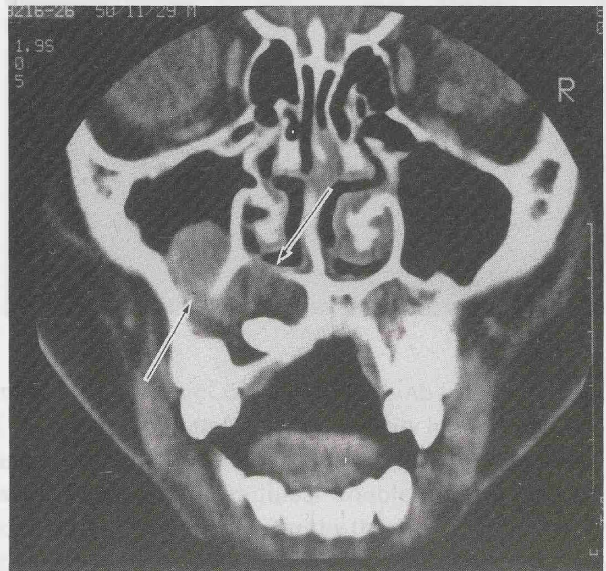


Figure 4.
Coronal CT of case 1. Both the left antral floor and the floor of left nasal cavity are destroyed (arrows).



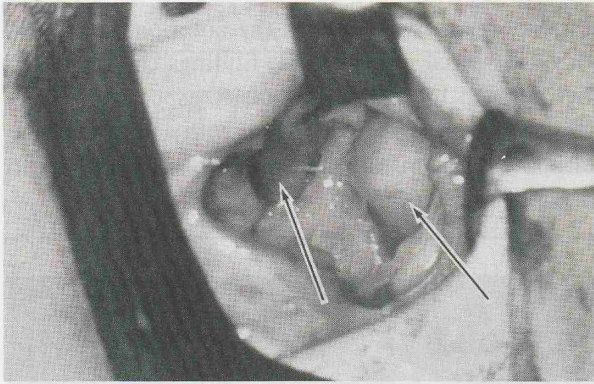


Figure 5. Photograph during surgery of case 1. Bone destruction is present in both the anterior wall of the maxillary sinus and the floor of nasal cavity (arrows).

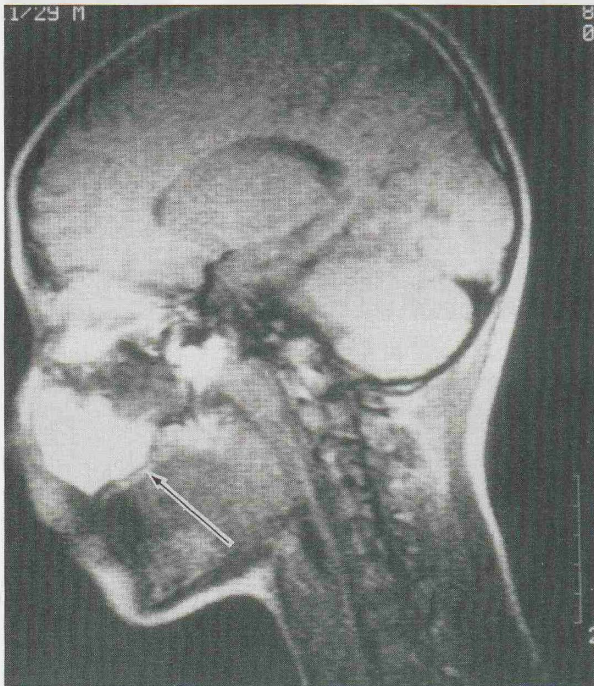


Figure 6. Sagittal scan of case 1 in T1-weighted MRI. A very high signal pattern with a sharp margin occupies almost all the antral space of the maxilla (arrow).

Case 2: a 31 year-old female was admitted, complaining of severe toothache. A conventional radiograph (Waters' view) showed diffuse opacity in the left maxillary sinus (Figure 7). CT demonstrated a round calcified wall of the cyst, but an embedded tooth was not seen (Figure 8).

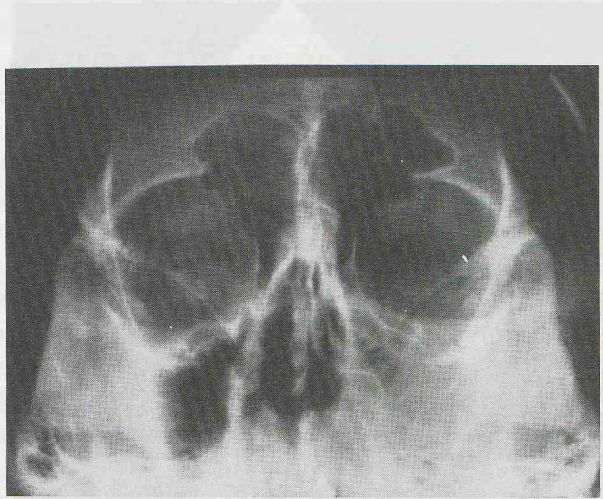


Figure 7
Waters' view of case 2.
Diffuse density is seen in
the left maxillary sinus.

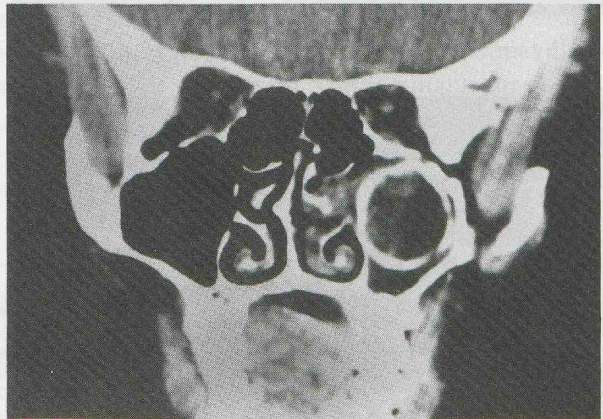


Figure 8
Enhanced, coronal CT of
case 2. A round calcified
wall of the cyst is seen in
the left maxilla.

Case 3 was a 20 year old male, with the chief complaint of toothache and nasal discharge. Conventional X-ray showed unilateral diffuse density in the maxillary sinus. A B-mode ultrasonogram revealed a homogeneous and low-echo-level cystic area in the left maxilla. There were curvilinear double lines in parallel which demonstrated the occupation of the whole sinus by the cyst (Figure 9). CT showed a slightly non-homogeneous soft tissue density surrounded by an

incomplete bony wall which occupied almost the whole antral space. In the middle of the cyst, the isolated high density of an unerupted tooth was seen (Figure 10).

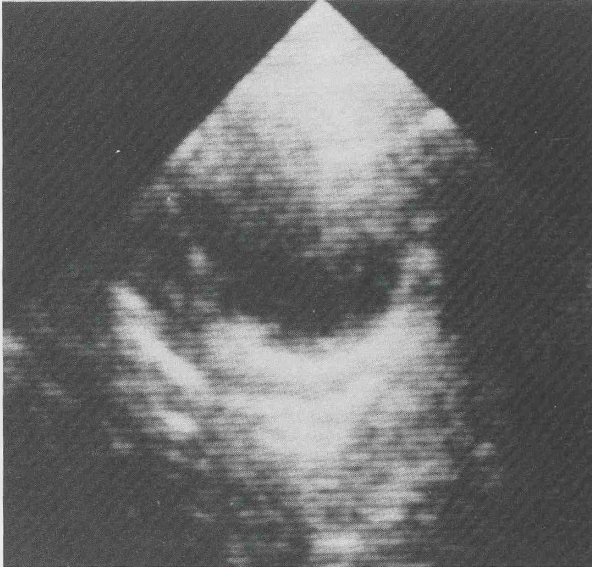


Figure 9.
B-mode ultrasonogram of case 3. Combined curvilinear lines show back wall echoes of the cyst and the sinus wall, respectively.

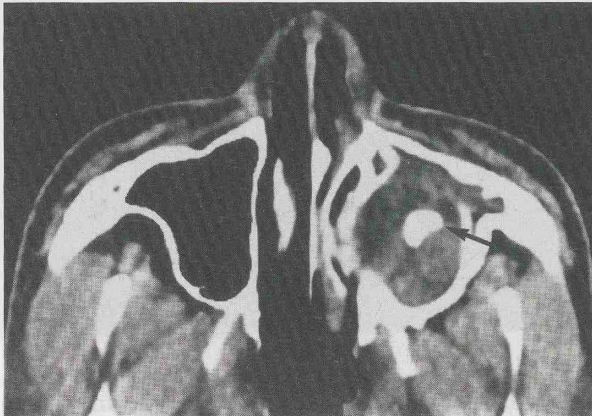


Figure 10.
Enhanced, axial CT of case 3. In the middle of the cyst, isolated high density of unerupted tooth is seen (arrow).

DISCUSSION

The findings of various imaging modalities are very accurate in the diagnosis of dentigerous cysts. Conventional radiographs demonstrate a unilocular radiolucent area and a well-defined cortical margin (Killey et al., 1975; Valvassori et al., 1984). When infection supervenes, the margins tend to be ill-defined. Of the conventional radiographs, the orthopantomogram is useful for demonstrating dentigerous cysts with impacted teeth. Ultrasound sonography, a safe, non-invasive, and easy method, is also a proper choice for cystic lesions.

In our hospital, we routinely evaluate the majority of complicated cases of paranasal sinus lesions with CT. In dentigerous cysts, CT reveals a homogeneous soft tissue density containing the high density of the embedded tooth. CT is very useful in evaluating the entire aspect of the cyst, as well as the modes of invasion and destruction of circumferential bone along with the number of cysts. When the high density of the tooth is lacking, however, the soft tissue density itself is not specific and we can not differentiate the cyst from other cystic lesions. CT is not a final method for the diagnosis of dentigerous cysts.

The MRI image in sagittal scan enables more accurate understanding of three dimensional structure than CT. MRI contributes much to the imaging of cystic lesions of the maxilla. MRI alone with its absent signals for bone and teeth, poses a limitation in identifying the dentigerous cyst.

Table 2 depicts the advantage and disadvantage of each imaging method for the evaluation of a dentigerous cyst. Of conventional radiographs, orthopantomogram is useful especially in evaluating the relation to the maxillary sinus. For the contents of the cyst, the ultrasonogram is more suitable than other techniques. CT and MRI contribute much to identifying the entire structure of the cyst. MRI is, however, not suitable for evaluating the embedded teeth and circumferential bony structures.

Table 2 Advantage and disadvantage of each imaging method for the evaluation of dentigerous cyst.

	Waters' view	orthopantomogram	ultrasonogram (B-mode)	CT	MRI
margin of the cyst	—	0	0	0	0
embedded teeth	—	0	—	0	—
three-dimensional structure	—	—	0	0	0
bone destruction	—	—	—	0	—
contents of cysts	—	—	0	0	0
relation on the maxillary sinus	—	0	0	0	0

Types of information (0: definite, 0: clear, -: limited or not contributive)

As mentioned above, if these imaging modalities are used systematically, they enable us to understand the three-dimensional structure of the cyst and to perform surgery with ease. For the definite diagnosis, histopathological findings are essential. But, we believe that there is a high correlation between preoperative diagnosis by imaging and the postoperative definite diagnosis.

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Wataru Okita, M.D.
Dept. of O.R.L., Tokyo University,
Branch Hospital,
3-28-6, Mejirodai, Bunkyo-ku
Tokyo 112, Japan