The maxillary antrolith

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A Survey of the literature reveals that calcareous bodies found within the maxillary antra are variously described as rhinoliths, antral rhinoliths, antral stones and antral calculi. The purpose of this paper is to suggest that 'Maxillary Antrolith' is a more accurate and appropriate term for these calcified bodies, in order to facilitate their future classification and description.

These concretions have a similar natural history to the rhinolith but should be considered as separate pathological entities. A suitable definition can be formulated by modification of the description of the rhinolith given by Polson (1943).

Definition of a maxillary antrolith

A maxillary antrolith is the result of complete or partial encrustation of an antral foreign body usually of endogenous but occasionally of exogenous origin. They are hard calcareous bodies found within the maxillary sinus consisting usually of a central nucleus upon which are deposited mineral salts, especially calcium phosphate and carbonate forming a rough surface, blackish-grey in colour.

Review of the literature

In a comprehensive review of the 384 rhinoliths reported in the literature up to 1943, Polson found only six cases which he termed antral rhinoliths. Four of these, the first an anonymous report in 1686 was republished by Lanzoni (1738), and those described by Zuckerkandl (1892), Harke (1895) and Kahnitz (1902) were reviewed by Oppikofer in 1908, who reported a further example. It is of interest that two were findings at postmortem, one presented with epistaxis and the other as a painful swelling in the upper jaw. The rhinoliths varied from pea to hazel-nut size and three were associated with antral infection. There is no record of an examination of the specimens for a nucleus. The case described by Oppikofer presented with a 20-year history of intermittent, unilateral, purulent nasal discharge associated with a rhinolith in the maxillary antrum some 12 mm. in diameter, examination of which revealed no nucleus.

The sixth case mentioned in Polson's review was reported by Wright (1927) and presented with an 8-year history of intermittent right-sided frontal headache and nasal discharge. A rhinolith 15 mm. in diameter,

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containing the apex of a tooth, was expelled spontaneously from the right side of the nose via an intra-nasal anstrostomy created to drain the right antrum several months previously. The only tooth missing in the right upper jaw was the first molar which had been removed many years before.

During the next 12 years to 1955, three further cases were reported. Lord (1944) removed an oval stone containing a nucleus of paper from a purulent antrum which had presented with a 1-year history of nasal obstruction and discharge. In 1945, Cunningham *et al.* reported a maxillary rhinolith associated with an oro-antral fistula, their patient having had a left-sided nasal discharge for some 30 years following the extraction of a tooth in the left upper jaw. A nucleus, thought to be either tooth or bone, was found but was not subjected to microscopic examination. The ninth recorded case, Marr (1955) was of an oro-antral fistula, which had been present for some 15 years following the extraction of a right upper molar tooth. A maxillary stone 12 mm. $\times$ 6 mm., in which no nucleus could be found, was expelled spontaneously via the fistula prior to an exploratory operation. He quite rightly pointed out that the term rhinolith was unsatisfactory for these stones, and that maxillary sinus stone or antrolith would be more accurate.

In the more recent literature, four additional cases variously described have been found, which fulfil the definition given in this paper for a maxillary antrolith. Three had a piece of tooth as the nucleus, a rhinolith described by Stafne (1962), a chronically infected rhinolith by Wallace (1963) and a maxillary calculus reported by Esser (1965), whereas no nucleus was found in the chalky concretion associated with an oro-antral fistula described by Tomaino and Picchi (1966). It would appear that the cases noted by Stafne and Esser were incidental radiological findings, although the actual presentation is not recorded. This mode of presentation is similar to the radiological incidental finding of a rhinolith by Varley (1964).

However, there are reports which do not fulfil the requirements of the definition for a maxillary antrolith. In 1957 for example, Brown and Allen report a case they called an antral rhinolith, which from their description would seem to be a rhinolith. This stone had eroded the lateral nasal wall, thus penetrating into the antrum. A postero-anterior radiograph would have revealed the true diagnosis. An extract from their operative findings reads as follows:

> 'at the inferior medial wall of the maxillary sinus, a blackish-green lithic mass with an irregular surface was found. The mass was 2 cm. in lateral dimension and did not adhere to bone. A thin wall of tissue separated it from the antral wall. The mass could be moved in its bed but could not be dislodged, as it obviously penetrated the medial wall of the antrum and was *larger on the nasal side*.'

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Their account is in keeping with the natural history of rhinoliths, which as they enlarge may cause destruction of the nasal septum and adjacent antral wall or more rarely present as oro-nasal fistulae having perforated the palate, Gilbert (1952) and Allen (1967).

Finally, the literature contains frequent reports of non-encrusted foreign bodies which have entered via a perforation in the oral wall of the antrum such as impression materials, Shelton (1964), Kanarek (1965), cotton wool, McEvoy (1959) and a metallic object, Moore and Hamman (1959). Paper, wood and cotton wool have been reported infrequently having apparently entered the sinus via the nasal ostium, Newcomb (1911). These are, of course, excluded by definition as are reports of cholesteatoma of the maxillary sinus, Millis and Sycamore (1958).

Oppikofer and Polson failed to find any record of calcareous bodies in the other paranasal sinuses and I have found none.

This summary of the relevant literature confirms the varied terminology used for calcareous bodies found in the maxillary antra, and the inaccuracies of classification which result. It also supports the view that a collective term i.e. 'maxillary antrolith' is necessary to describe and classify the stones which fulfil the given definition. This will serve to distinguish them in the future from the rhinolith, maxillary cholesteatoma and the non-encrusted antral foreign body.

A fourteenth case will now be presented which initiated the preparation of this paper.

Case report

History

A male patient aged 55, a professional flute and clarinet player, was referred by his dental surgeon to the Oral Surgery Unit, Queen Mary's Hospital, Roehampton, with an oro-antral fistula in the upper-left molar region. The patient gave a history that in 1948 two dental surgeons had made separate attempts to remove the upper-left wisdom tooth, and he understood that the second attempt had been successful. Two years later in 1950, he consulted his medical practitioner with nasal stuffiness and discharge. An X-ray at that time revealed a tooth high up in the face but removal was not suggested. In 1963, he received a course of injections for 'bronchial catarrh' which had been troublesome for several years, especially in the winter. Five months prior to consulting his dental surgeon in 1966, he experienced a sudden discharge of foul-tasting fluid into the mouth whilst playing the clarinet. Finally he sought help for bouts of dull pain lasting for 3–4 days, over the left cheek radiating on the left side to the temple, angle of the jaw and back of the neck. This was associated with a blood-stained discharge on nose blowing and this discharge diminished following a course of oral penicillin.

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Physical examination

A general examination showed an intelligent middle-aged man in good physical condition. There was no facial swelling or localized tenderness in the neck. Intra-oral examination revealed an edentulous upper jaw bearing a satisfactory full upper denture. An oro-antral fistula was present in the upper left molar region (Fig. 1). This was partially blocked by a hard object which could be readily displaced upwards releasing a copious discharge of purulent fluid.

Radiographic examination

Facial views showed an inverted molar tooth with an associated fluid level in the left antrum (Figs. 2a and 2b). The cervical spine showed only slight degenerative changes.

Operative procedure

Under general anaesthesia, the fistula was excised and the incision extended forwards in the buccal sulcus. A mucoperiosteal flap was raised exposing a large bony defect in the lateral wall of the antrum beneath the soft tissue perforation

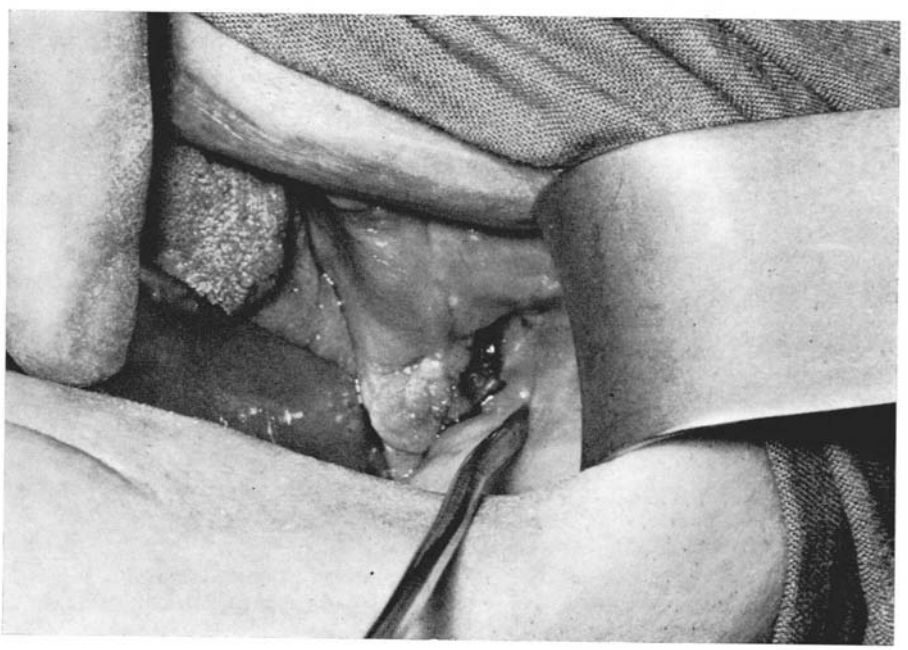


FIG. 1.
The oro-antral fistula presenting in the upper left molar region.

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FIG. 2*a*.
An occipito-mental radiograph showing an inverted molar tooth with an associated fluid level in the left antrum.

(Fig. 3). Through the opening, a blackish-grey encrusted molar tooth was readily delivered (Fig. 4). A standard Caldwell-Luc opening was then made through the canine fossa and the grossly thickened antral lining removed. A drain was inserted via an intra-nasal antrostomy and the buccal flap advanced by incising the periosteum to facilitate closure.

Post-operative progress

The wound healed by first intention (Fig. 5). A new denture was fitted 2 months after surgery, following which he was allowed to resume his usual musical activities. His mouth and respiratory tract were asymptomatic when he was reviewed 1 year later. Radiographic examination showed the left maxillary sinus to be translucent apart from slight mucosal thickening.

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FIG. 2*b*.
A true lateral view of the facial skeleton confirming the position of the tooth.

Discussion

The displacement of a complete tooth into the maxillary sinus would appear to be relatively uncommon. The upper second premolar and third molar are the teeth usually implicated in this mishap. The wisdom tooth can be squeezed upwards by the application of dental forceps during removal and is particularly vulnerable when unerupted and possessing a conical root formation. The necessary dislodging force for a second premolar can be produced whilst opening the mouth with a narrow-bladed adjustable mouth gag.

Killey and Kay (1964), in a review of possible sequelae of a tooth or root dislodged into the maxillary sinus, noted only one complete tooth, an upper third molar, amongst fifty-one consecutive cases presenting between 1959 and 1962 at the Institute of Dental Surgery, London. They do not mention encrustation in their series, although in five cases the tooth fragment had been present in the sinus for more than 6 months. This

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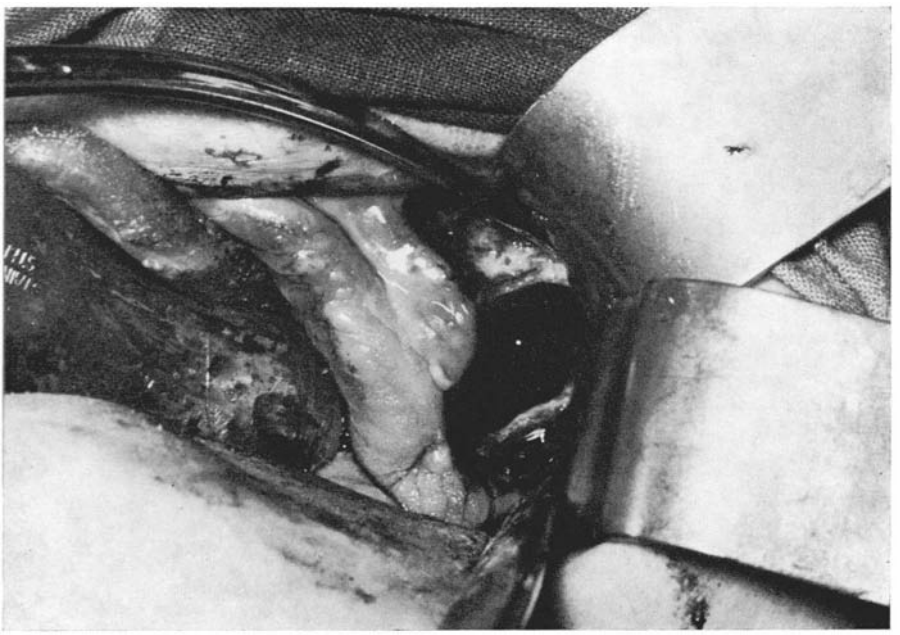


FIG. 3.
The bony defect in the floor and lateral wall of the left antrum through which the tooth was delivered.



FIG. 4.
The blackish-grey encrusted molar tooth or maxillary antrolith.

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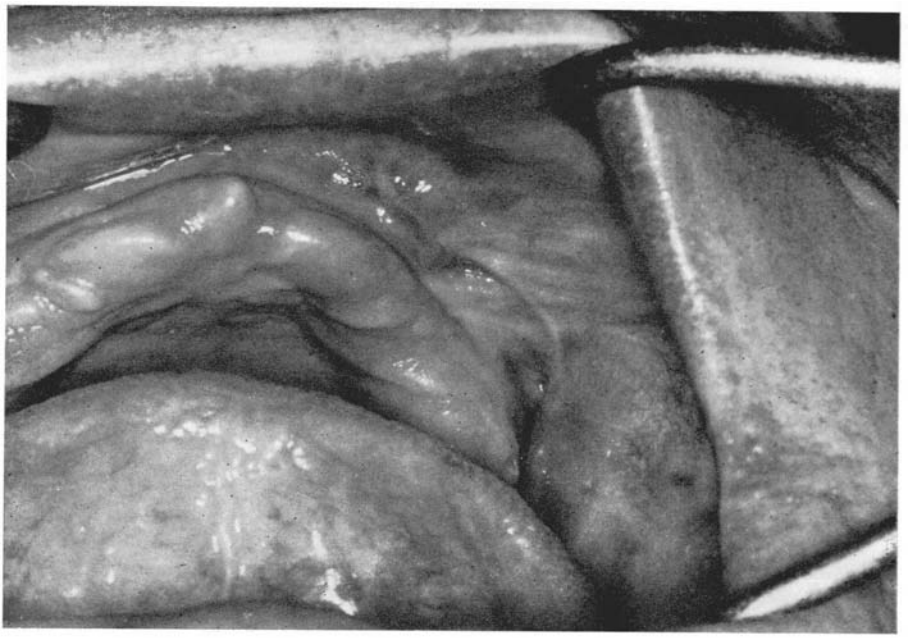


FIG. 5.
The final healed scar in the upper left buccal sulcus.

indirect evidence, the sparseness of reported cases of antrolith formation and absence of recorded lythic change in the other paranasal sinuses suggests that the factors necessary for encrustation are usually lacking in the maxillary sinus. This in part may be due to the early removal of most antral foreign bodies and the obvious anatomical difficulties for entry of a foreign body via the nasal ostium.

The evidence gained from a study of the fourteen reported cases shows that antral infection was associated with eleven of the antroliths. There was, however, no recorded evidence to prove the absence of infection in the remaining three. The commonest nucleus found was endogenous, being in five instances a tooth or fragment of a tooth (Table I). An exogenous

TABLE I.

TYPES OF NUCLEI FOUND IN THE FOURTEEN MAXILLARY ANTROLITHS.

Nucleus of antroliths	No. of cases
(*a*) Endogenous origin:	
Tooth structure	5
? Bone or tooth	1
(*b*) Exogenous origin:	
Paper	1
(*c*) None found	3
(*d*) Not examined	4

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nucleus was found only once and this contrasts with a ratio of 7 : 1 (Polson, 1943) in favour of exogenous nuclei associated with rhinoliths.

The clinical features most frequently found were unilateral nasal discharge, obstruction and epistaxis. An oro-antral fistula was associated with four of the antroliths.

It would seem that the factors usually necessary for antrolith formation are long-standing chronic infection associated with poor drainage and the presence in the sinus of a foreign body, most commonly of dental tissue, for a number of years. Presumably, it is necessary for the purulent fluid to be concentrated by air currents beyond the point at which salts remain in solution. There may, of course, be a biochemical agent in the normal antral secretions not present in the nasal secretions, which is inhibited or destroyed by a particular infecting organism.

Summary

It is suggested that a maxillary antrolith is a suitable descriptive term and a concise definition is given. The relevant literature is reviewed which confirms the varied terminology and the inaccurate classification of calcific bodies found in relationship to the maxillary antra. The essential facts of thirteen previously reported cases which fulfil the requirements of the definition are recorded. The presentation and removal of a fourteenth maxillary antrolith is described. The possible aetiological factors are discussed and a comparison made with the rhinolith.

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