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ORIGINAL ARTICLE

Foreign bodies in maxillary sinus

Eduard Bodet Agustí,* Ignacio Viza Puiggrós, Coia Romeu Figuerola, and Vicenç Martinez Vecina

Unidad de Otorrinolaringología, Hospital Nostra Senyora de Meritxell, Andorra

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Abstract
Introduction: Foreign bodies in maxillary sinus (FBMS), whatever their origin or nature, are an unusual clinical condition. Diagnosis is based on the radiological findings in a clinical context of unilateral chronic rhinosinusitis. Treatment is the surgical removal of the intrasinusal foreign body.
Patients and methods: To identify FBMS, the records of 68 patients with unilateral chronic rhinosinusitis operated on from 2000 to 2007 were reviewed.
Results: From 68 records reviewed, we found 11 FBMS (16%). Ten (91%) of these 11 foreign bodies were thought to come from the teeth and the last 1 (9%) had a non-odontogenic origin. Eight of the 11 patients with FBMS (73%) presented with chronic maxillary sinusitis symptoms and all patients showed radiological findings. Treatment was the surgical removal of the foreign body, in 9 patients (82%) through an endonasal approach by functional endoscopic sinus surgery (FESS) and in the other 2 patients (18%) a mixed surgical procedure by endonasal meatotomy and oral antrotomy was required.
Conclusions: Chronic maxillary sinusitis showing FBMS is rare and it must be suspected with a prior history of dental procedures. The most frequent source of FBMS is material of odontogenic origin, and non-odontogenic origin secondary to an external injury in an accident or assault is much more unusual. We also review the nature of these foreign bodies, their clinical implications and treatment options.

*Corresponding author.
E-mail address: ebodet@hotmail.com (E. Bodet Agustí).

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PALABRAS CLAVE
Cuerpos extraños;
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Cuerpos extraños en seno maxilar

Resumen
Introducción: La presencia de cuerpos extraños en el seno maxilar (CESM) de cualquier origen o naturaleza es una entidad clínica poco frecuente. Su diagnóstico es habitualmente radiológico en el contexto de una rinosinusitis crónica maxilar unilateral. El tratamiento es la extracción quirúrgica del cuerpo extraño.
Pacientes y métodos: Revisión de 68 casos intervenidos de sinupatía maxilar crónica unilateral en nuestro centro entre los años 2000 y 2007 en busca de CESM.
Resultados: De los 68 casos revisados, en 11 (16%) identificamos CESM. De estos 11 casos, en 10 (91%) se atribuyó el cuerpo extraño a un origen dentario y solamente en 1 (9%) a un origen no dentario. De los 11 pacientes, 8 (73%) presentaban clínica de rinosinusitis crónica en el momento del diagnóstico y todos tenían manifestaciones radiológicas. El tratamiento realizado es la extracción quirúrgica del cuerpo extraño, que en 9 (82%) pacientes se realizó mediante meatotomía endonasal y en los 2 restantes (18%) se precisó un abordaje combinado de meatotomía endonasal y antrotomía oral.
Conclusiones: La presencia de CESM es un hallazgo poco frecuente que debe sospecharse ante una sinusitis maxilar crónica unilateral con el antecedente de manipulación dentaria. Su origen es casi siempre dentario, y son mucho más raros los CESM de origen no dentario secundarios a traumatismos externos en accidentes o agresiones. Se discute también la naturaleza de estos cuerpos extraños, así como sus implicaciones clínicas y opciones terapéuticas.

Introduction

Maxillary sinusitis secondary to the presence of foreign bodies in the interior of the maxillary sinus (FBMS) is an unusual clinical entity and all the published series are very limited.[1-5]

Most cases of FBMS described in the literature are related to iatrogenic dental manipulation.[4] Foreign bodies of very different nature, such as fillings, tooth roots, fragments of broken parts or different types of implants are introduced into the maxillary sinus by different mechanisms[6]: the most common way is the apical migration of fragments of teeth fillings through the canalicular conduit, but in other cases it occurs as a result of accidental rough handling.

Far rarer are the FBMS of non-dental origin, which are described in isolation in relation to facial injuries in accidents or assaults.[7] In these cases, the foreign bodies, predominantly objects such as bullets or shrapnel, are introduced directly into the sinus through a penetrating wound, and may go unnoticed at first.

The clinical presentation of FBMS is variable and depends on the time elapsed since the introduction of the foreign body into the sinus and the time of diagnosis. Occasionally, they are asymptomatic patients who are referred by a dentist who suspects the accidental introduction of a foreign body in the maxillary sinus. On other occasions, when the introduction of the foreign body goes unnoticed at first, the manifestation is in the form of a unilateral chronic maxillary sinupathy[4,5] presenting one of the previously described precedents.

Treatment involves the surgical removal of the foreign body that, depending on size and location, can be performed using different techniques.[8,9] The most common technique is endoscopic sinonasal surgery allowing the removal of most FBMS through a wide endonasal meatotomy.[5] When this extraction is not possible by the endonasal approach, it can be conducted through an external approach by oral antrotomy or a combined approach of endonasal meatotomy and oral antrotomy.[8]

In this article, we review a series of unilateral maxillary sinupathies operated on at our department in the last 8 years in search of intrasinusal foreign bodies as a causal factor of the disease.

Patients and methods

To identify the presence of FBMS, we conducted a retrospective analysis of 68 cases (age range of the patients, 25-62 years), operated on at our hospital for chronic unilateral maxillary sinupathy between January, 2000 and December, 2007.

We excluded from the study inflammatory processes affecting both maxillary sinuses bilaterally, as well as bilateral chronic rhinosinusitis with or without polyposis, and those processes which were not purely inflammatory affecting the maxillary sinus, such as tumours or mucoceles.

The pre-operative diagnosis was reached on the basis of clinical suspicion, nasal endoscopy, and radiological studies. In the medical history we paid special attention to the history of dental manipulation or facial trauma with penetrating wound. Nasal endoscopy is useful in identifying indirect signs of infectious or inflammatory processes of the paranasal sinuses. In our experience, with regard to radiological studies, computerized tomography (CT) of the paranasal sinuses is the complementary test offering

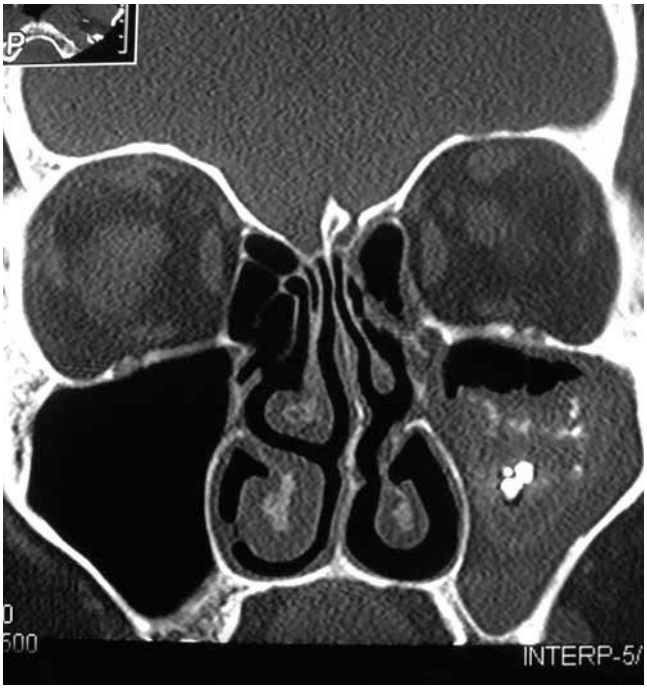

Figure 1 Coronal slice of a computerized tomography of paranasal sinuses. Chronic non-invasive fungal rhinosinusitis by *Aspergillus* secondary to an amalgam in the left maxillary sinus.

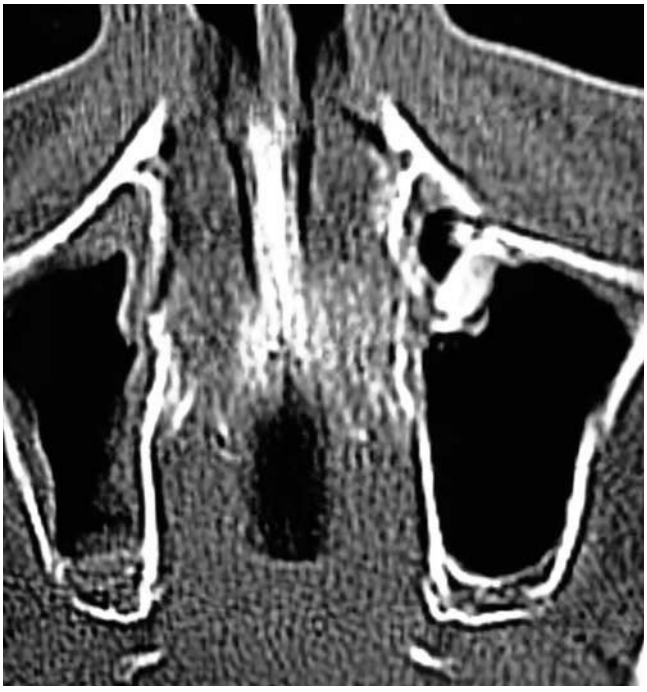

Figure 2 Axial slice of a computed tomography (CT) of paranasal sinuses. Fragment of glass in left maxillary sinus due to facial trauma. The CT was obtained in the emergency room within a few hours of the incident.

the greatest sensitivity in detecting FBMS before surgery. Finally, the definitive diagnosis was obtained after surgical removal of the foreign body.

For the treatment we performed the surgical removal of all FBMS. In 9 patients, this extraction was performed by nasal endoscopic surgery through a medial meatotomy and in the remaining 2 cases, using a combined approach of endonasal meatotomy and oral antrotomy.

Results

Among the 68 cases reviewed, we identified 11 patients with FBMS, which represents an incidence of 16%. Other causes of unilateral chronic maxillary sinusitis in our series are: obstruction of the osteomeatal complex with or without adjacent peripheral disease in 38 cases, another 4 cases of dental processes and chronic fungal sinusitis unrelated to FBMS in the remaining 5 cases.

Of the 11 cases in which FBMS was identified, in 10 (91%) the foreign body was attributed to a dental origin and in 1 case (9%) we identified a foreign body of non-dental origin.

In the group of FBMS with dental origin we have 2 titanium implants, 1 dental root and 7 cases of amalgam; 3 of the latter also showed hyphae and spores of *Aspergillus* in the maxillary sinus (Figure 1).

In the case of FBMS with non-dental origin, we extracted a piece of glass that had been inserted into the left maxillary sinus through a penetrating wound in the anterior wall of the sinus in an assault (Figure 2).

As for clinical presentation, 8 patients (73%) presented symptoms of chronic rhinosinusitis at the time of diagnosis and all (100%) showed radiological manifestations in the paranasal sinus CT.

Endonasal meatotomy by endoscopic endonasal surgery was performed for the surgical removal in the 7 cases of amalgam, the titanium implant and the tooth root (82%). In the remaining 2 cases (18%) a combined approach of endonasal meatotomy and oral antrotomy was required.

In all cases, the complete resolution of the process was verified through a CT performed 3 months after surgery.

Discussion

Foreign bodies in the maxillary sinus, whatever their origin, have been considered rare entities. It is difficult to estimate their frequency, first because of the rarity of the entity, second because of the small number of series published and, third because the frequency varies depending on the sample on which the study is based. We identified 11 cases intervened in our department over the past 8 years, which in our series represents 16% of the cases of unilateral maxillary sinusitis. Thévoz et al[4] conducted a review of FBMS with dental origin and calculated a frequency of 5%, a value obtained from a sample that did not differentiate between unilateral or bilateral maxillary sinupathies. In our study we obtain a slightly higher frequency (16%), but we only consider unilateral processes, which is the usual form of presentation.

Little is known about how foreign bodies operate in the maxillary sinus. Although the main mechanism remains unknown, there are multiple theories to explain how the inflammatory process is developed and bacterial or fungal superinfection take place inside the sinus. It has been

suggested that FBMS produce chronic physical and chemical irritation of the mucosa, leading to a degree of ciliary insufficiency and secondary infection.[7] It has also been proposed that the zinc from the material used for fillings helps and stimulates the growth of *Aspergillus*.[10] There has even been a report of one case in which the appearance of a malignant process is attributed to FBMS.[11]

As described in the introduction, FBMS can have a dental origin in relation to manipulation or a non-dental origin due to facial injuries with penetrating wounds in the direction of the sinus. In our series, 91% of FBMS have a dental origin (2 titanium implants, 1 dental root and 7 cases of dental amalgam) and in 1 case, we identified a FBMS of non-dental origin. The latter corresponds to a fragment of glass inserted into the maxillary sinus from a penetrating wound in the anterior wall of the maxillary sinus in the context of an assault. No previous article establishes this relation between FBMS of dental and non-dental origin.

With regard to treatment, although some authors argue that amalgams encapsulated under the sinus mucosa do not need surgery,[1] the removal of all FBMS is generally recommended, even when they do not produce symptoms.[6] The purpose of the intervention is to relieve symptoms when they are present or to prevent them when we intervene at an early stage. To this end, in our series we conducted the extraction of FBMS in 9 cases (7 cases of amalgam, 1 titanium implant and 1 tooth root) using only endoscopic nasal surgery. In the remaining 2 cases (a titanium implant and a fragment of glass), due to their larger size and/or location, we used a combined approach of endonasal meatotomy and oral antrotomy.

Conclusions

The presence of FBMS is a rare finding that must be suspected in the event of a unilateral chronic maxillary sinusitis with a history of dental manipulation. Its origin is almost always dental, and cases of FBMS with a non-dental origin secondary to external trauma in accidents or attacks are much rarer. The treatment is surgical removal of all FBMS, even when they cause no symptoms.

Conflict of interest

The authors have indicated there is no conflict of interest.

References

1. Lopatin AS, Sysolyatin SP, Sysolyatin PG, Melnikov MN. Chronic maxillary sinusitis of dental origin: Is external surgical approach mandatory? Laryngoscope. 2002;112:1056-9.
2. Costa F, Emanuelli E, Robiony M, Zerman N, Polini F, Politi M. Endoscopic surgical treatment of chronic maxillary sinusitis of dental origin. J Oral Maxillof Surg. 2007;65:223-8.
3. Selmani Z, Ashammakhi N. Surgical treatment of amalgam fillings causing iatrogenic sinusitis. J Craniofac Surg. 2006;17:363-5.
4. Thévoz F, Arza A, Jaques B. Dental foreign body sinusitis. Schweiz Med Wochenschr. 2000;Suppl 125:S30-4.
5. Tingsgaard PK, Larsen PL. Chronic unilateral maxillary sinusitis caused by foreign bodies in the maxillary sinus. Ugeskr Laeger. 1997;159:4402-4.
6. Mehra P, Murad H. Maxillary sinus disease of odontogenic origin. Otolaryngol Clin North Am. 2004;37:347-64.
7. Pagela F, Emanuelli E, Castelnuovo P. Endoscopic extraction of a metal foreign body from maxillary sinus. Laryngoscope. 1999;109:339-42.
8. Friedlich J, Rittenberg BN. Endoscopically assisted Caldwell-Luc procedure for removal of a foreign body from the maxillary sinus. J Can Dent Assoc. 2005;71:200-1.
9. Smith JL 2nd, Emko P. Management of a maxillary sinus foreign body (dental bur). Ear Nose Throat J. 2007;86:677-8.
10. Legent F, Billet J, Beauvillain C, Bonnet J, Miegeville M. The role of dental canal filling in the development of Aspergillus sinusitis. A report of 85 cases. Arch Otorhinolaryngol. 1989;246:318-20.
11. Brinson GM, Senior BA, Yarbrough WG. Endoscopic management of retained air gun projectiles in the paranasal sinuses. Otolaryngol Head Neck Surg. 2004;130:25-30.