Rom J Leg Med [23] 14-18 [2015]
DOI: 10.4323/rjlm.2015.14

Iatrogenic foreign bodies in the maxillary synus: between malpraxis and medico-legal consequences

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Abstract: *Objectives:* Due to the continuous development of invasive dental procedures, presently we encounter a permanent growing of medical complications, like protrusion of foreign bodies into the maxillary sinus during therapeutic maneuvers on the superior dental arch. Plus that we can find neglected foreign bodies in the maxillary sinuses after ENT surgical procedures. With this clinical study we evaluated the most frequent etiology of the iatrogenic foreign bodies of the maxillary sinus, the improper surgical maneuvers that can lead to protrusion of foreign bodies, and the complications produced by these.

Material and methods: We performed a prospective clinical study on 49 consecutive patients with various types of foreign bodies of the maxillary sinus admitted in our Department between January 2010 - January 2013. In all cases we performed cranio-facial CT scans and dental panoramic radiography. The removal of the foreign bodies was performed surgically.

Results: Most common foreign bodies encountered were dental implants (19 patients, representing 38.77%), followed by amalgam fragments (14 patients, 28.57%), Guttapercha points (5 patients, 10.20%), pieces of gauze used for nasal or sinusal packing (4 patients, 8.16%), tooth fragments (3 patients, 6.12%), dental burr (2 patients, 4.08%), Kerr needles (2 patients, 4.08%). The complications encountered were: acute or chronic rhinosinusitis (37 patients 75.51%), with 11 cases of fungal colonization proved at histopathological exam, and the rest of 26 rhinosinusitis patients with bacterial infection, 12 cases of oro-antral fistula (24.29%), 1 case of orbital abscess, 1 case of malar abscess.

Conclusion: Most of the cases of iatrogenic foreign bodies in the maxillary sinus are due to inadequate dental treatments. Dental implants and root canal fillings materials are the most frequent iatrogenic FB inserted into the maxillary sinus. Untreated, they can produce inflammatory – infective sinus pathology, like bacterial or fungal sinusitis, or even abscesses of the surrounding structures.

Key Words: iatrogenic foreign bodies, dental implant, filling materials.

Paranasal sinus foreign bodies (FB) are lately more and more frequent. The most commonly involved sinus is the maxillary sinus (75%) [1, 2], and most of these are introduced iatrogenic (60%) [3].

The continuous development of the dental-alveolar procedures has determined, as an unpleasant side-effect, the growing of the incidence of the presence of FB into the maxillary sinus. This can be attributed to insufficient radiological preparation of the patient previous to various dental procedures, poor knowledge of the regional anatomy by the dental practitioner, rough handling during endodontic maneuvers, or just due to the inattention of the clinician, associated with various degrees of osteodystrophy of the maxillary bone or general diseases involving the connective tissue and the bone.

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The range of the iatrogenic FB, as described in the literature, is very wide, including fragments of tooth roots, dental canal fillings, or different types of implants [2, 3]. The main complication, which can occur after the insertion of an FB into the maxillary sinusis, is sinusitis. This is due to the penetration of the endosinusal mucosa by the FB, with consecutive inflammatory reaction. Also, the dental fillings materials represent an excellent culture medium to support the growth of bacteria and fungi. This is the reason why the removal of the FB is generally recommended, even in the case of an asymptomatic patient [4].

Depending on the size, location and type of complication produced, the removal of the FB can be achieved using endoscopic endonasal surgery (golden standard for most of the ENT surgeons) [5], by external oral approach or using a combined technique [3, 6].

The current paper present the experience of the ENT Clinic from Sfanta Maria Hospital, Bucharest, Romania, in what it concern the management of the iatrogenic FB in the maxillary sinus, focusing on the nature of the FB, type of medical procedure that led to the insertion of the FB, and the complications produced.

MATERIAL AND METHODS

Between January 2010 - January 2013 we performed a prospective epidemiological clinical study on 49 consecutive patients with various types of FB of the maxillary sinus admitted in our Department. All the patients were referred to us either by dental practitioners or they addressed directly, due to the presence of rhinosinusitis.

Inclusion criteria: a) presence of a FB in the maxillary sinus inserted during a medical procedure, suspected radiologically and confirmed either macroscopically after the surgical removal or after histopathologic analysis.

Exclusion criteria: a) FB in the maxillary sinus introduced willingly by the patient or accidentally through an oroantral fistula.

The parameters followed in our patients were: demographic features, type of medical procedure that led to the insertion of the FB, type of the FB, presence or not of the sinusal complications.

In all cases we performed a clinic ENT examination, nasal endoscopy, followed by cranio-facial CT scans and dental panoramic radiography. The removal of the FB was performed surgically.

All the patients signed an informed consent giving their approval to participate into this clinical study.

RESULTS

We included in our study 49 patients, most of them being females (29 females, representing 59.18% and 20 males - 40.82%), aged between 21 and 71 years (mean age 43.51 years). In most cases, the iatrogenic procedure that lead to the protrusion of the FB in the maxillary sinus was performed by a dental practitioner (45 patients, representing 91.84%) and the other 4 patients (8.16%) suffered the consequences of various failed ENT surgical procedures (Fig. 1).

Most common FB encountered were dental implants (19 patients, representing 38.77%) (Fig. 2 a, b), followed by dental filling materials (14 patients, 28,57%)

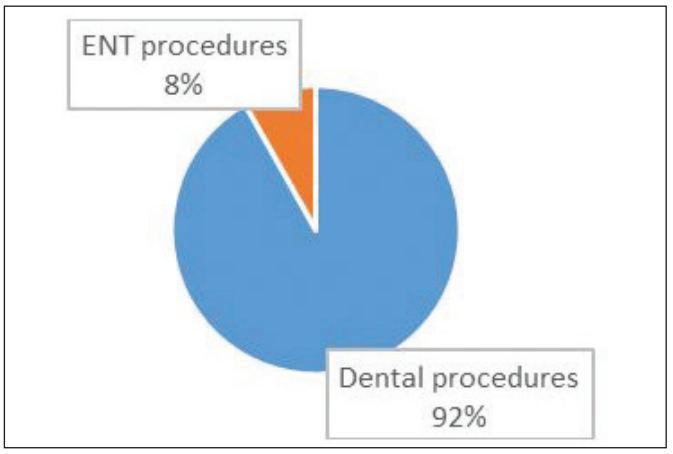

Figure 1. Types of iatrogenic procedures that lead to the protrusion of the FB in the maxillary sinus.

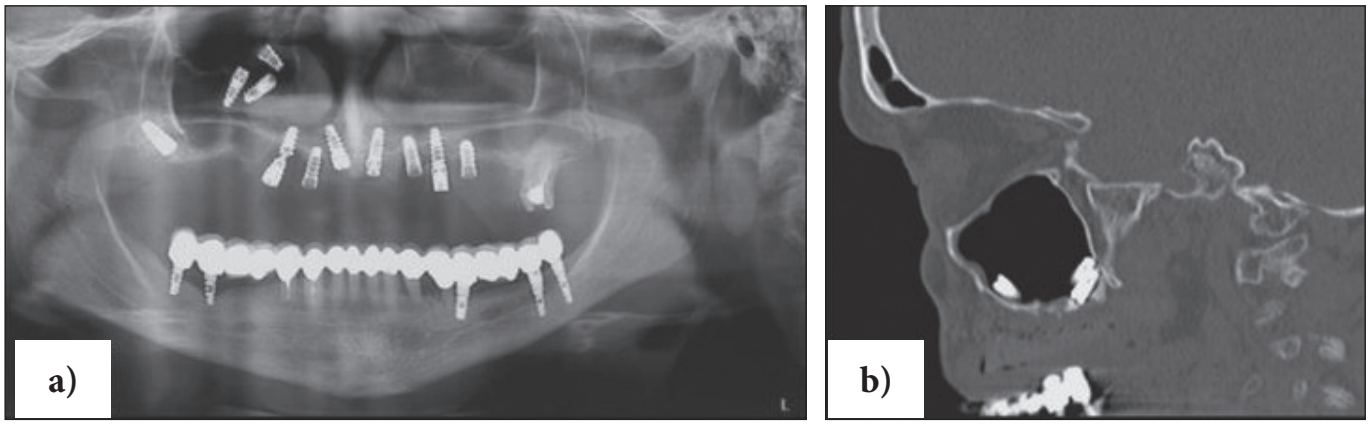

Figure 2. Dental panoramic radiography (a) and sagittal cranio-facial CT scan (b) showing multiple dental implants migrated in the right maxillary sinus and others protruding through the both nasal floors.

(Fig. 3 a, b), Gutta percha points (5 patients, 10.20%), pieces of gauze used for nasal or sinusal packing (4 patients, 8.16%) (Fig. 4 a, b), tooth fragments (3 patients, 6.12%) (Fig. 5 a, b), dental burr (2 patients, 4.08%), Kerr needles (2 patients, 4.08%) (Fig. 6).

The complications encountered were: acute/chronic rhinosinusitis (37 patients – 75.51%, with 11 cases of fungal colonization proved at histopathological exam, and the rest of 26 patients with bacterial infection), 12 cases of oro-antral fistula (24.29%), 1 case of orbital abscess, 1 case of malar abscess (Fig. 7).

DISCUSSION

The development of surgical maneuvers that are addressing to the dental-alveolar region and also to the paranasal sinuses lead to the growing of the incidence of iatrogenic complications, such as protrusion of FB into the maxillary sinus. These FB are not the "exclusive privilege" of dentists, in our study we encountered 4 cases of forgotten gauze in the maxillary sinus by ENT surgeons.

The displacement of the foreign iatrogenic bodies into the maxillary sinus cavity can be favoured by different internal or external factors [3, 4, 7]:

a. Internal factors which diminish the osseous layer between alveolar process and maxillary sinus floor:

extensive pneumatisation of maxillary sinus;

local inflammatory processes that can determine osteolysis and bone remodelling;

degenerative local processes induced by systemic pathology such as diabetes;

degenerative local processes induced by local pathology other than inflammatory, such as fibrous dysplasia, that makes the osseous tissue more fragile;

malignant degenerative local processes.

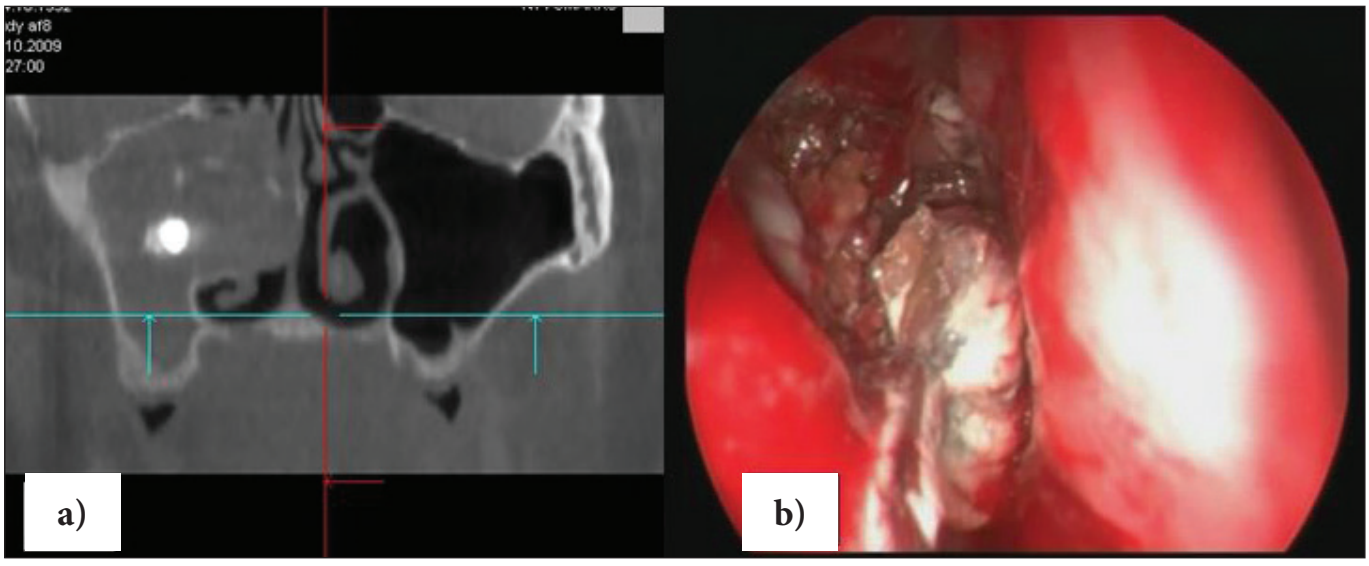

Figure 3. Radioopaque FB in the right maxillary sinus (filling material) covered by fungal material – a) coronal CT, b) endoscopic sinus surgery removal.

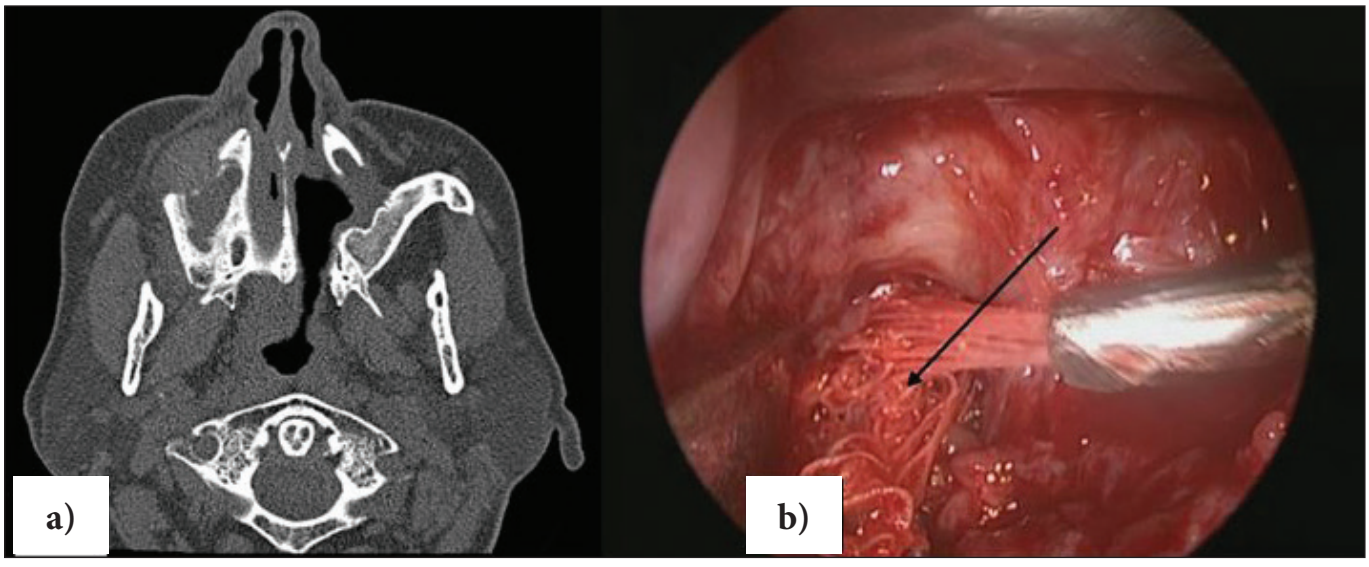

Figure 4. Cottoned pledges forgotten in the maxillary sinus after a radical Caldwell – Luc procedure – a) axial CT scan, b) removal of the FB (see black arrow) using combined approach.

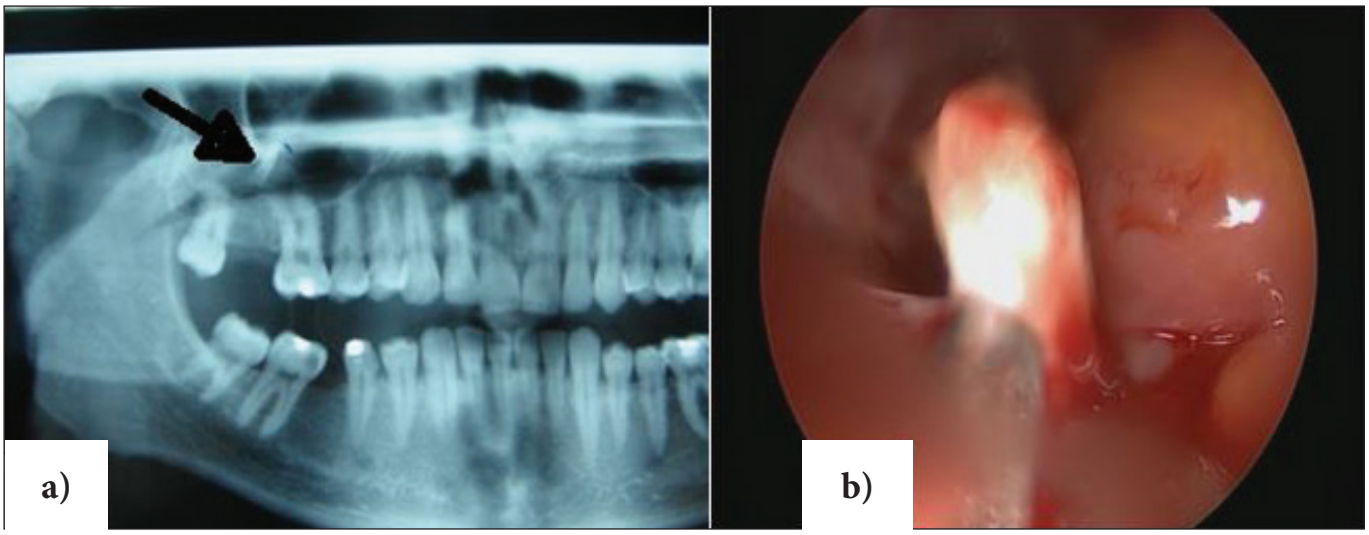

Figure 5. Tooth root fragment migrated into the maxillary sinus during an extraction maneuver – a) radiologic aspect (see black arrow), b) endoscopic removal.

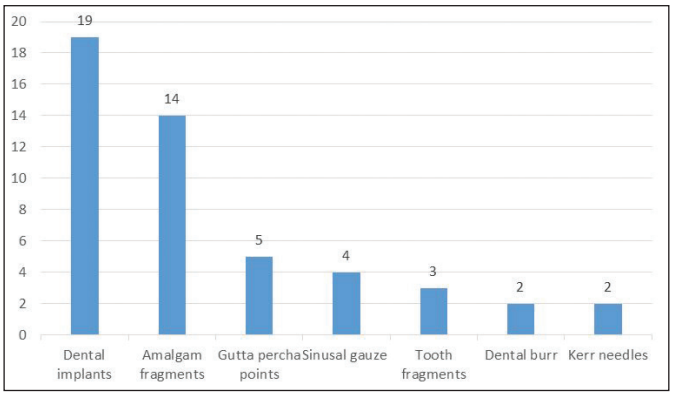

Figure 6. Types of foreign bodies.

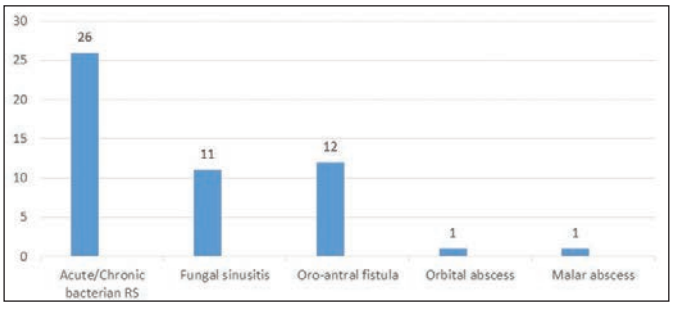

Figure 7. Complications encountered due to the presence of the FB.

b. External factors:

facial trauma;

multiple surgical interventions on the superior dental arch;

aggressive manoeuvres during dental treatment.

In the literature, dental implants migrated into the maxillary sinus are one of the most common FB. This is in accordance with our study, dental implants being the most frequently found FB (19 patients, representing 38.77%). This is always a consequence of inadequate medical procedures, due to either incorrect treatment planning (incorrect evaluation of the anatomic or pathologic status of the patient proposed for dental implantation), or because of the aggressive manoeuvres performed by the dental practitioner during dental treatment [7].

The presence of an FB into the sinusal cavity represent an irritation factor for the sinonasal mucosa and can cause marked structural reorganization of the mucous membrane usually with the predominance of hypertrophic and polypous changes [8].

Besides these changes, the presence of a FB of dental origin, especially root canal fillings, are well known factors for the development of a fungal infection (like fungus ball) of the maxillary sinus [9]. This is due to the fact that, because of chronic sinusal mucosal changes, in the sinus cavity can appear small nuclei on which salts can precipitate and form anthroliths, cysts or fungal sinusitis especially caused by Aspergillum spp [7, 8]. This hypothesis was also confirmed by our study, fungal sinusitis, confirmed histopathologically, was present in 11 patients, representing 29,8% of all rhinosinusitis encountered, an percentage much higher than normal.

An odontogenic maxillary sinusitis, fungal or bacterial, can very easily spread to involve other sinuses and ultimately cause a pansinusitis. Due to the direct anatomic relation between the orbit and paranasal sinuses, orbital complications are not uncommon. In our series of patients, we encountered only 1 case of orbital abscess, in a patient with maxillary and etmoidal sinusitis due to an amalgam fragment migrated into the maxillary sinus.

Extension of infection intracranially is the second most common complication of paranasal sinusitis [10] and can occur by the following mechanisms [11]: (a) direct extension – erosion through the posterior wall of the frontal sinus or skull base; and (b) indirect extension – by thrombophlebitis or septic emboli via the intracranial/ extracranial valveless connecting veins.

All of this are sufficient arguments in favor of the theory that all FB in the maxillary sinus, even if they have or not produced at the moment of identification an infectious pathology or other complications, must be removed [4].

The surgical removal of a FB in the maxillary sinus can be performed using endoscopic sinus surgery techniques, external approaches or both. Today, the method of choice, due to lower morbidity rate and better functional results, is considered to be the endonasal endoscopic removal [5, 7, 12].

CONCLUSION

Most of the cases of iatrogenic FB in the maxillary sinus are due to inadequate dental treatments. Dental implants and root canal fillings materials are the most frequent iatrogenic FB inserted into the maxillary sinus. Untreated, they can produce inflammatory – infective sinusal pathology, like bacterial or fungal sinusitis, or even abscesses of the surrounding structures. This is the reason why we recommend that, even if they have or not produced at the moment of identification an infectious pathology or other complications, all FB of the maxillary sinus must be removed.

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