INTRODUCTION
Paranasal sinuses mucoceles are benign, expansile cystic masses covered by respiratory epithelium, resulting from accumulation and retention of mucus secretion in cases where the sinus drainage is obstructed. Mucoceles rarely occur in the paranasal sinuses, but such pathology is the most common expansile lesion of these sinuses. In spite of being benign, the expansile nature of mucocele may cause paranasal sinuses bone erosion by compression and consequential bone resorption, leading to compromise of adjacent structures. Early diagnosis is of paramount relevance. Its incidence is higher between the third and fourth decades of life, but mucoceles may occur at any age range, with no predominance of sex. Such condition is rarely observed in the pediatric population, except for patients with predisponent factors for obstruction such as trauma, surgery, expansile lesion, chronic sinusitis, allergy or cystic fibrosis.

PATHOGENESIS
The exact etiology and pathogenesis of mucoceles still remain uncertain. Mucoceles may develop as the communication between the sinuses and the nasal cavity is obstructed. Usually, mucoceles are post-inflammatory complications (allergy, chronic infection, chronic inflammatory condition, mucociliary dysfunction) but, less usually, may be secondary to neoplastic obstruction (osteoma, juvenile nasoangiofibroma, carcinoma), inflammatory processes (Caldwell-Luc procedure) and post-traumatic processes (iatrogenic accidents), generally with long-term progression.

CLINICAL CONDITION
The clinical presentation is variable, according to the affected region, normally with insidious symptoms and slow course, possibly causing facial pain, headache, nasal pressure, nasal obstruction, dental pain, ophthalmological alterations and dacryo-
cystitis. As mucocele becomes infected, it is called mucopyocele and may course with sinusitis, orbital cellulitis, erythema, fever and pain. Rarely, intracranial extension may be found in association with meningitis, subdural or cerebral abscess, pneumocephalus or liquoric fistula(2).

**IMAGING FINDINGS**

Mucoceles can be diagnosed by means of computed tomography (CT) and magnetic resonance imaging (MRI), and suggested by facial sinuses radiography. CT offers detailed information on the bone structure, and is considered to be the complementary method of choice in the investigation of mucoceles(2,4). Usually, mucoceles is seen as an isodense/mildly hyperdense sinus opacity in relation to the cerebral tissue (Figure 1), but in cases of acute infection, it may appear as a more dense and peripherally enhanced image(3). Thus, considering that mucocele is not enhanced by contrast agents, it is possible to make the differential diagnosis with neoplasms(1). The neighboring bone structure is remodeled with areas of thickening and erosion(3). Additionally, in the areas of greater fragility, one may observe herniation into adjacent structures(4).

The differential diagnosis for mucocele is made with innumerable inflammatory, congenital, cystic and neoplastic conditions, such as Rathke’s cleft cyst, dermoid cyst, cysticercosis, hypophyseal adenoma, cranioopharyngioma, optic glioma, besides neoplastic lesions of skull base, facial sinuses and nasopharynx(1). It is important to observe the differentiation between mucoceles and retention cysts: mucoceles develop from sinus ostium obstruction, and the cavity becomes completely filled with mucus involved by the sinusal mucosa; on the other hand, retention cysts do not fill completely the cavity and are formed by the ductal epithelium and by the gland capsule.

**ATYPICAL PRESENTATIONS**

Paranasal sinuses mucoceles may be found in atypical locations, such as nasolacrimal duct, intersinus cell, turbinate, in association with osteoma and hematoma, among others.

The involvment of the nasolacrimal duct is uncommon and is found principally in the pediatric population, causing nasal obstruction and respiratory discomfort. Nasolacrimal duct mucocele is caused by obstruction of such duct, interrupting the normal flow of tears and resulting in the development of a mass in the medial corner of the orbit (Figures 3 to 6). Typically, patients with nasolacrimal mucoceles present the following triad of imaging findings a) mass in the medial corner of the orbit, representing nasolacrimal duct enlargement; b) nasolacrimal bone duct enlargement secondary to soft tissues which enlarge the...
nasolacrimal duct; c) intranasal mass representing inferior extension of the mucocele\(^{(6)}\).

Association between mucocele and osteoma is a rarity; only 21 cases with intracranial extension are reported in the literature. In such cases, osteoma is considered as the primary lesion and mucocele, secondary. In most cases, the diagnosis is based on the clinical symptoms associated with intraorbital or intracranial extension of the disease (Figures 7 and 8)\(^{(7)}\).

Mucoceles may also occur after trauma, and their differentiation is important in cases of coexistence with hematoma. In such cases, the higher density of the hematoma can be observed as compared with the density of the mucocele (Figure 9).

Intersinus cell is defined as pneumatization at the median line or paramedian bone lamella (septum) between the frontal sinuses. A mucocele may develop within such structure and be either sufficiently large to block unilaterally the frontal sinus ostium, or increase to form a giant mucocele involving both frontal sinuses. Generally, such mucocele erodes the anterior and/or posterior sinuses tables (Figure 10)\(^{(8)}\).

The pneumatization of the middle turbinate occurs as an extension of the ethmoidal cells, which extends through the superior meatus or through the frontal recess. The interior of the concha bullosa is lined by the respiratory epithelium and generally drains into the middle meatus. In case of obstruction of such drainage, infection may develop progressing to mucocele (Figures 11 to 14)\(^{(9)}\).

**MANAGEMENT**

The management of mucoceles is surgical, aiming at restoring the sinus drainage, and the approach may be either by means of conventional methods (transcranial and transeptal) or by nasal endoscopy\(^{(10,11)}\). Currently, the endoscopic surgery is considered...
the treatment of choice for paranasal sinuses mucoceles\(^2\). The main objective of such method is the complete removal of both the lesion and the sinusal mucosa, thus preventing disease recurrence. CT or MRI may be necessary in the suspicion of recurrence\(^1\).

**CONCLUSION**

It is important to know the common findings as well as the atypical presentations of mucoceles for a correct diagnosis and treatment of sinusal and extrasinusal lesions, thus avoiding possible pre- and postoperative clinical complications.

**REFERENCES**