

Voluminous frontoethmoidal mucocele with epidural involvement. Surgical treatment by coronal approach

Voluminoso mucocele etmoido-frontale con interessamento epidurale. Approccio chirurgico esterno con incisione bitemporale coronale

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Key words

Paranasal sinuses • Mucocele • Surgical treatment • Case report

Parole chiave

Seni paranasali • Mucocele • Trattamento chirurgico • Caso clinico

Summary

The case is described of mucocele of the right frontoethmoidal sinus with bilateral maxillary sinusitis and a large polyp in the right nasal cavity. The mucocele had determined erosion of the anterior and posterior walls of the frontal sinus and superomedial wall of the orbit. The patient was operated upon by a surgical team comprising ENT and maxillofacial specialists. Right maxillary sinusotomy (Caldwell-Luc procedure) was performed, and an osteoplastic flap was prepared, repositioned in the canine fossa and fixed with a titanium plate. Debris was removed from the left osteomeatal complex during endoscopy. To reach the mucocele, an external surgical approach was used, through a bitemporal coronal cutaneous incision, according to Unterberger. This approach was used in order to gain better access to the area of the lesion and in order to make reconstruction easier, with a view to achieving good functional results without untoward scarring. The scalp was detached down to the root of the nose to allow optimal visualisation of the anterior area of erosion determined by the mucocele, and, after excision and removal of the latter from the bony walls, of the posterior bony breach and underlying dura mater. Another bony breach involved the medial and superior walls of the orbit. The nasofrontal canal was obliterated with bone fragments and Tissucol; the posterior breach, with Surgicel and Tissucol. The orbit wall was repaired with high-density porous polyethylene sheeting; the frontal sinus was filled with fat. The anterior wall of the frontal sinus was repaired with two split of calvarial bone grafts harvested from the parietal bone and fixed with a titanium microplate. The morphological outcome of reconstruction was satisfactory, with no recurrences, as confirmed at post-operative follow-up, including computed tomography scan, at 5 months. Ocular motility and patency of the tear drainage system were also normal. No diplopia, or inflammation occurred.

Riassunto

Riportiamo un caso di mucocele del seno fronto-etmoidale di destra con sinusite mascellare bilaterale e grosso polipo della cavità nasale destra. Il mucocele ha causato erosione della parete anteriore e posteriore del seno frontale e della parete supero-mediale dell'orbita. Il paziente è stato sottoposto ad intervento chirurgico condotto in équipe da specialisti in otorinolaringologia e da chirurghi maxillo-facciali. È stata effettuata una sinusotomia mascellare destra sec. Caldwell-Luc con allestimento di sportello osseo a livello della fossa canina, riposizionato e fissato con placca di titanio. Si è inoltre eseguita la toilette in endoscopia del complesso osteo-meatale a sinistra. Il mucocele è stato affrontato con approccio chirurgico per via esterna con incisione cutanea bitemporale coronale sec. Unterberger. Si è scelta questa via al fine di meglio dominare l'area di lesione e di poter essere facilitati nella ricostruzione, non trascurando l'obiettivo di un risultato funzionale senza esiti cicatriziali evidenti. Lo scollamento dello scalpo fino alla radice del naso ha permesso di poter ben evidenziare l'area di erosione anteriore del mucocele e, dopo la sua escissione e lo scollamento dalle pareti ossee, la breccia ossea posteriore con la sottostante dura madre. Un'altra breccia ossea interessava la parete mediale e superiore dell'orbita. Il canale naso frontale è stato oblitterato con frammenti ossei e tissucol; la breccia posteriore con surgicel e tissucol. La parete dell'orbita è stata riparata con foglietto di polietilene poroso ad alta densità. Il seno frontale è stato riempito con tessuto adiposo. La parete anteriore del seno frontale si è riparata con due lamelle ossee di calvaria prelevate dall'osso parietale e fissate con microplacca di titanio. L'esito morfologico della ricostruzione è stato soddisfacente senza recidive come documentato ad un controllo post-intervento dopo 5 mesi, anche con immagini TC. Il controllo post-operatorio ha evidenziato inoltre normale motilità oculare e pervietà delle vie lacrimali.

Introduction

Mucocele of the paranasal sinuses is a slow-growing expanding lesion that develops when physiological drainage of the mucus, produced by the epithelial lining of the paranasal sinuses, fails to occur.

The mucus secreted by the mucosal glands progressively accumulates inside the cavity, eventually compressing the surrounding tissue and consequently determining a fibrous transformation of the submucosa with deformation and erosion of the contiguous bony structures^{1,3,4}, thus allowing invasion of the adjacent

structures, such as the orbital and intracranial regions.

The mucocele involves primarily the frontal sinus, more frequently in association with the anterior ethmoid (64%); less frequently the maxillary sinus (18.6%), sphenoidal sinus (8.4%) and ethmoid (6.7%)^{2,3}.

At times, the mucus is covered by a thin membrane that may cause the mucocele to be mistaken for a retention cyst that has developed in one of the glands adjacent to the mucosa of the paranasal sinus. This membrane is not always detectable. The mucocele, in 64% of cases, is considered secondary to obstruction of traumatic, inflammatory (polyposis), or malformative origin (outcomes of surgery or tumour pathology [osteomas] of the frontal orifice of the nasofrontal canal or of the nasofrontal canal itself); in the remaining cases, the aetiology cannot be identified^{4,6,9}. Histologically, the mucocele is comprised of ulcerated hyperplastic mucosa, evidence of chronic non-specific inflammation which presents a malpighian metaplasia and is surrounded by a reactive fibrous capsula^{4,7}.

The unexpected osteolytic capacity of a mucocele, given the benign nature of the lesion, is due to the presence of lytic substances like cytokines and interleukin-1 (IL-1) and -6 (IL-6)⁴.

Prior to the introduction of endoscopic surgery, most patients with a frontal sinus mucocele were treated with an external surgical approach that included removal of all the mucosa of the mucocele and obliteration of the sinus with fatty tissue; or, in more conservative procedures, positioning of a drainage tube, after the sinus floor had been removed⁹. Surgical treatment of the mucocele may, therefore, be carried out, as in the case of chronic purulent ethmoidofrontal sinusitis, with a radical procedure using an external approach (modified Ogston-Luc)^{5,8}.

Radical surgical management must follow these guidelines:

Safeguard, as far as clinical requirements allow, the aesthetics of the patient; allow opening and drainage of all those structures that may contribute to maintaining a state of chronic inflammation; ensure adequate, continuous drainage of the secretions, through a frontonasal route.

This ample frontonasal pathway is created by opening the anterior ethmoid and removing the intercellular septae; the ensuing frontonasal communication is of paramount importance in achieving full, definitive recovery⁵.

Most frontal sinus mucocèles can be treated endoscopically through the nasal fossae by means of functional endoscopic sinus surgery (FESS); the selection of candidates for such surgery must be effected by means of a thorough computed tomography (CT) imaging study with both axial and coronal projections.

The presence of bony erosion of the orbital walls and the posterior wall of the frontal sinus does not preclude an endoscopic surgical approach, provided no endocranial complications are present^{9,11}.

In other cases, a combined endoscopic-fronto-orbital approach may be used in the surgical procedure¹².

For very large lesions, with osteolysis of the contiguous structures, an open surgical approach may be mandatory in order not only to remove the lesion, but also to repair the damage caused, bearing in mind the importance of achieving reconstruction without untoward scarring¹³.

In the case described, the lesion was very large, involving both the anterior and posterior walls of the frontal sinus and the superior wall of the orbit; an external approach was, therefore, adopted with a coronal bitemporal incision (Unterberger incision)¹⁴.

Case report

A 69-year-old male patient had, for about 3 months, noticed a painful, gradually worsening swelling, taut and elastic to the touch, involving the inner corner of the right orbit.



Fig. 1.

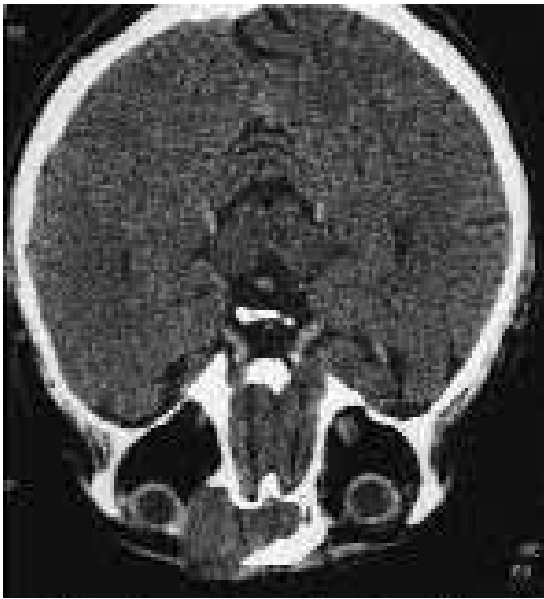


Fig. 2.

This protruding mass had determined a reduction of the eyelid (Fig. 1), with displacement of the ocular globe downwards and the onset of diplopia. Antero-posterior fibre optic rhinoscopy revealed a polypoid neoplasm of the lateral wall at the level of the right middle meatus.

A radiological work-up, encephalic magnetic nuclear resonance (MNR) and maxillofacial CT, revealed the presence of a mucocele localised in correspondence

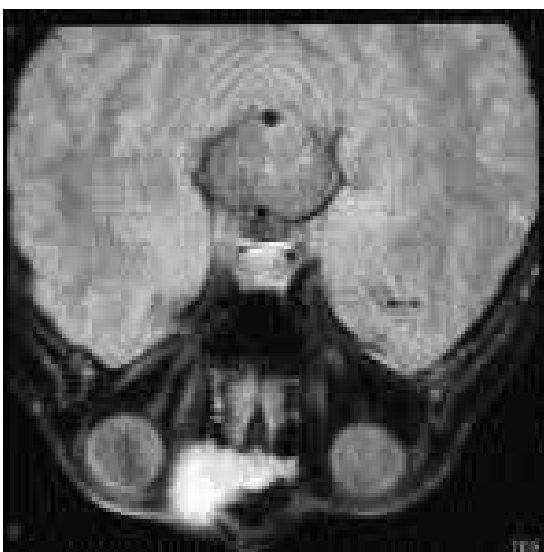


Fig. 3.



Fig. 4.

of the right frontoethmoidal region, with limited erosion of the posterior wall of the frontal sinus and the superior wall of the orbit, at the level of the inner corner (Figs. 2, 3).

The lesion presented minimal epidural involvement. A large polyp was also detected in the right nasal cavity, involving the osteomeatal complex, with massive opacification of the right maxillary sinus.

Partial opacification of the left maxillary sinus was also observed. Surgery, with removal of the lesion and reconstruction, was performed by a team of ENT and maxillofacial specialists. Right maxillary sinusotomy was carried out (Caldwell-Luc procedure) (Fig. 4), with preparation of an osteoplastic flap at canine fossa level which was then repositioned and anchored with a titanium plate (Fig. 5).

Debris was also removed endoscopically on the left. The frontoethmoidal region was then approached by means of a bitemporal skin incision, with the application of Raney clips along the edges of the incision, to promote haemostasis (Fig. 6), and detachment of the scalp down to the root of the nose.



Fig. 5.



Fig. 6.



Fig. 8.

The anterior wall of the right frontal sinus was partially eroded by the underlying mucocele (Fig. 7). The breach was then widened with a bone rongeur and the mucocele was removed from the bony walls; during this manoeuvre, the capsule of the mucocele was torn, with leakage of a greenish-yellow fluid. The capsule was completely removed, revealing a posterior wall bony defect measuring 2x1 cm through which the pulsating dura could be seen (Fig. 8). Another breach involved the medial and superior wall of the orbit (Fig. 9).

The superior orifice of the nasofrontal canal was then identified and obliterated with bone fragments and Tissucol. Surgicel and Tissucol were spread over the posterior breach.

The orbit wall was repaired with a piece of appropriately shaped high-density porous polyethylene (Medpor) (Fig. 10).

The frontal sinus was filled with abdominal fat.

The anterior wall of the frontal sinus was reconstructed with two split calvarial bone grafts harvested from the right parietal bone and fastened with a titanium microplate (Fig. 11).



Fig. 9.

After suturing, a suction drainage was positioned and left in situ for 4 days. Antibiotic treatment with Ceftriaxone was administered for 5 days, together with cortisone. Postoperative recovery was uneventful, with no complications.



Fig. 7.



Fig. 10.

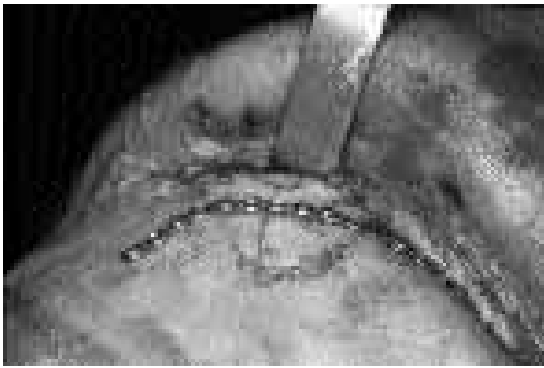


Fig. 11.

Postoperative follow-up at 5 months revealed normal motility of the eye balls, with patency of the tear drainage systems and absence of subjective diplopia (Fig. 12). The patient's general condition was good. Follow-up CT imaging showed a residual cavity in the right frontal sinus partially packed with fatty material. No extrinsic compression of the right orbital cavity was detected (Fig. 13).

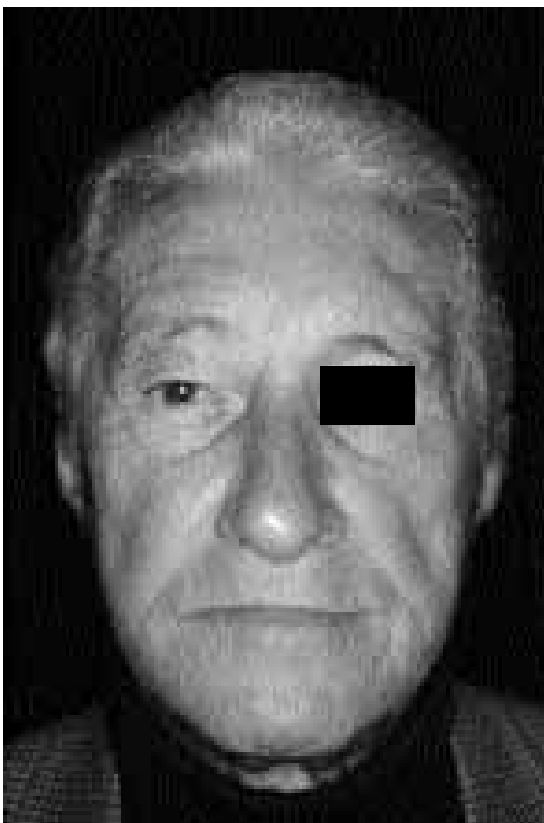


Fig. 12.

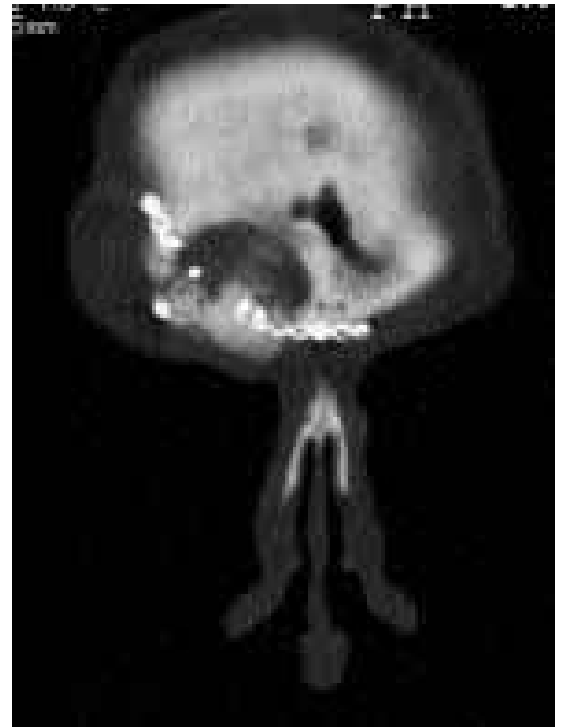


Fig. 13.

Discussion

In our opinion, the case described is of interest not only on account of the large dimensions of the neoplasm but also the involvement of the bony structures of the skull, which required an external surgical approach (coronal bitemporal incision according to Unterberger), which offered the possibility of full visualisation of the site of the lesion, followed by adequate reconstruction, and avoiding anti-aesthetic scarring.

Whilst there is general agreement in the literature in favour of radical excision of the mucosa lining the sinus in order to avoid recurrence, controversy exists concerning the choice between reopening of the nasofrontal duct and sinus vs obliteration, with exclusion of the sinus itself^{3 11}.

In our case, as the dura was exposed, it was deemed necessary to proceed with exclusion of the frontal sinus to avoid the risk of later infections. The nasofrontal ostium was, therefore, obliterated, and the frontal sinus was packed with fat while the damaged bony walls were reconstructed with high-density polyethylene (orbit wall) and split calvarial bone harvested from the parietal bone and anchored with titanium microplates (anterior wall of the frontal sinus). It is also extremely important, in the post-operative period, that the patient receives adequate wide-spec-

trum antibiotic treatment. Furthermore, the patient should be instructed, upon discharge from hospital,

to avoid fatigue and any strenuous activity that could determine a sudden rise in intracranial pressure¹².

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