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Case Report

Frontal Sinus Mucopyocele Presenting as Purulent Discharge in the Frontal Region Following a Neglected Frontal Fracture: A Case Report and Literature Review

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Abstract: Mucoceles are progressive growths of encapsulated mucus capable of eroding and destroying adjacent bone structures and compressing neighboring organs. They are caused by the presence of mucous cells from the sinus membrane in an undrained space. These mucoceles can become infected, leading to the formation of a mucopyocele. They may manifest many years after the initial trauma to the facial bones, especially those involving the frontal sinuses. The discovery is either fortuitous or secondary to imaging: Computed tomography (CT), magnetic resonance imaging, carried out during an etiological assessment of symptoms such as frontal pain, proptosis, diplopia, nasal obstruction, rhinorrhea. Rarely, purulent discharge through a frontal cutaneous fistula may be the initial sign of a frontal sinus mucocele or mucopyocele. We report a case of mucopyocele of the frontal sinus presenting in the form of purulent discharge at the frontal level following a neglected frontal fracture and present our therapeutic approach.

Keywords: Frontal, fracture, mucopyocele, management.

INTRODUCTION

Mucoceles are formations of encapsulated mucus most often in the ethmoid-frontal complex, caused by the presence of mucous cells of the sinus membrane in an undrained space [1]. Their origin would be linked to a blockage of the nasofrontal canal leading to a chronic inflammatory process with accumulation of mucous secretions. This blockage can develop after fractures of the facial bones, particularly those involving the frontal sinuses [2]. Progressively growing, mucoceles are capable of eroding and destroying bone structures and compressing nearby organs [1].

Patients suffering from these lesions exhibit ocular symptoms due to orbital involvement or neurological signs secondary to intracranial extension [3, 4]. Infected forms, known as mucopyocele, can in rare cases manifest as purulent discharge in the frontal region [3-5].

We report a case of a mucopyocele of the frontal sinus presenting as purulent discharge in the frontal region following a neglected frontal fracture, and present our therapeutic approach.

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CASE REPORT

This concerns a 55-year-old male patient who presented to the emergency department of the maxillofacial surgery service with purulent frontal discharge in a non-febrile context evolving for 15 days. He had a history of frontal impact trauma following a road traffic accident 16 years before his admission. The patient had never sought medical attention.

One month before admission, he consulted a physician for episodes of headaches, who prescribed antibiotics and anti-inflammatories for a few days without improvement. This prompted the admission to the maxillofacial surgery emergency department.

Clinical examination revealed irregularity of the frontal contour, fronto-glabellar bony overgrowth, and a depressed area above the left eyebrow covered with more or less inflamed skin with a fistula discharging frank pus (Fig 1).

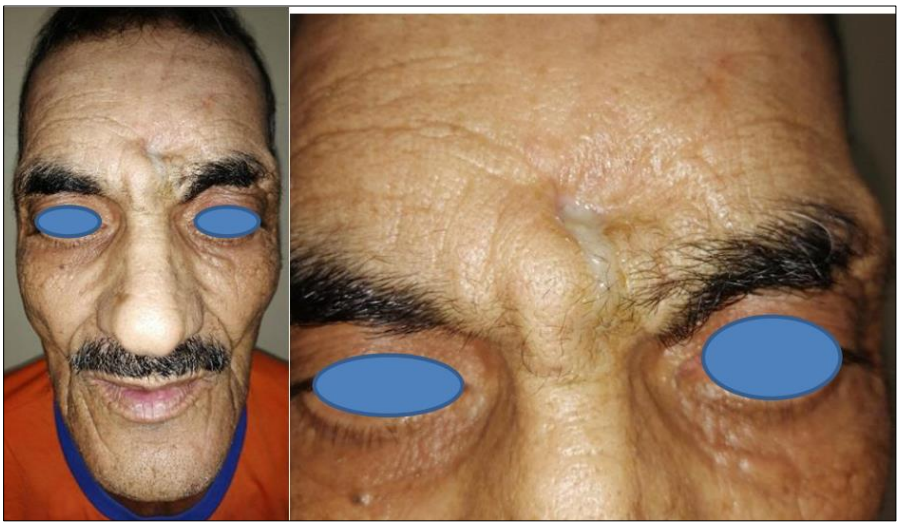

Fig. 1: Clinical appearance of the patient upon admission to the emergency department

Furthermore, frontal motor function and sensation were preserved. He denied experiencing any ocular or neurological symptoms, as well as any notable discharge from the nose or eyes. The rest of his physical examination was normal. Laboratory tests were normal: CRP at 2.3 and white blood cell count at 4000. Computed Tomography (CT) revealed a fronto-orbital bony overgrowth and opacification of the right frontal sinus with a defect in its anterior wall (Fig. 2).

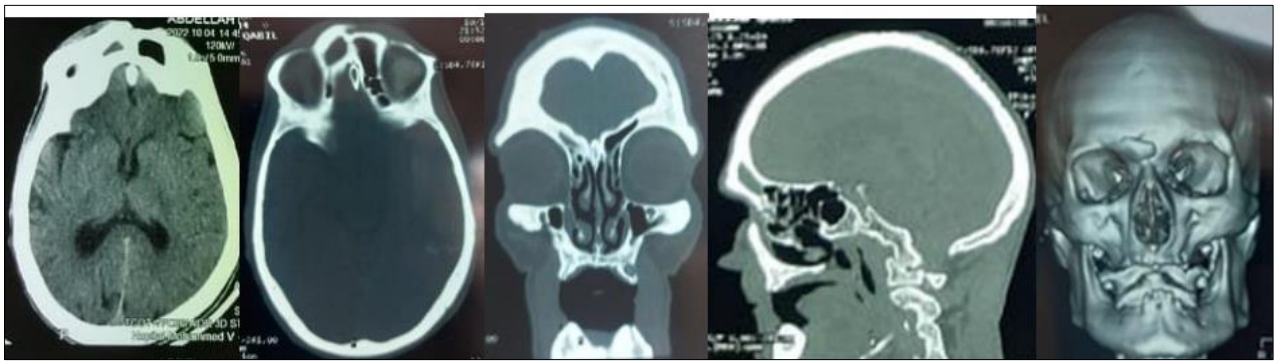

Fig. 2: Computed Tomography Result - Frontal Orbital Bony Overgrowth and Filling of the Right Frontal Sinus with a Defect in its Anterior Wall

Given these clinical and radiological findings, the most probable diagnosis was in favor of Frontal sinus mucopyocele. We suspect that his facial trauma 16 years ago may have fractured the anterior table of the frontal sinus and compromised the nasofrontal canal, leading to the development of a mucous cyst. This allowed the latter, when infected, to erode and extend into the soft tissues through the weakened anterior table of the sinus and subsequently fistulize.

The patient received medical management with amoxicillin + clavulanic acid antibiotic therapy, adjusted based on the results of the bacteriological

examination, for a total duration of 21 days. Within 5 days, the patient was scheduled for surgery.

A mid-frontal skin incision was performed, and the fistulous tract through the skin of the forehead was elliptically excised. Muscle dissection, periosteotomy, subperiosteal dissection; identification of the consolidated displaced fracture site with invagination of the mucosa of the frontal sinus. Osteotomy and removal of the bony fragment constituting the anterior wall of the frontal sinus were carried out. Purulent drainage was performed, and the mucopyocele was curetted and removed, along with the entire mucosa of the frontal sinus. The specimen was then sent for culture and histopathological examination. After thorough irrigation, the frontal bone fragment was repositioned and secured with steel wire. The skin incision was closed with an intradermal running suture using 5/0 skin thread (Fig.3).

The final histopathological examination revealed findings consistent with a mucopyocele, and the final cultures identified species of Streptococcus and Fusobacterium. She received a one-week course of amoxicillin/clavulanic acid (Augmentin), and the rest of her postoperative course proceeded without incident.

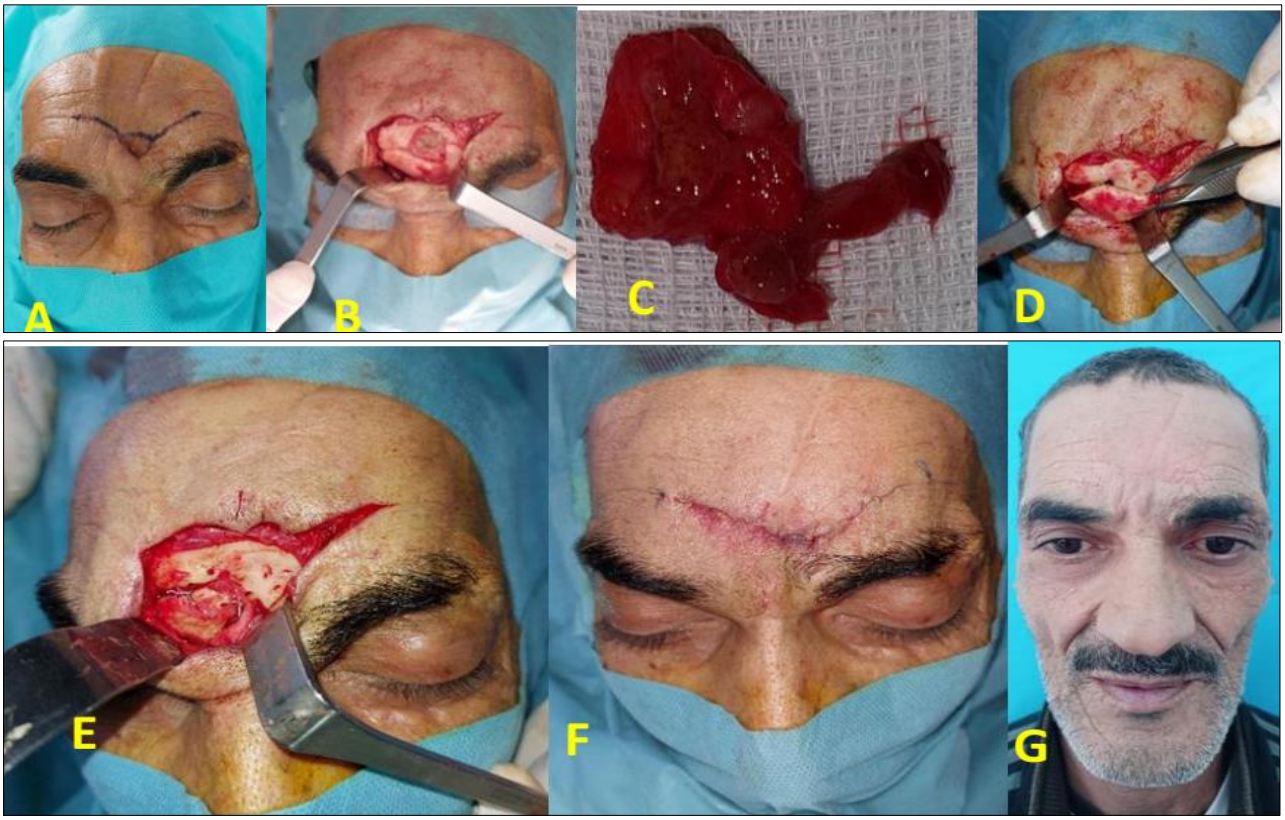

Fig. 3: A: Mid-frontal approach: Incision outline, B: Altered appearance of the frontal sinus mucosa, C: Operative specimen - sinus mucosa, D: Repositioning of the frontal bone fragment constituting the anterior wall of the frontal sinus, E: Osteosynthesis with steel wire, F: Closure of the incision, G: Result after 12 months.

DISCUSSION

Facial sinus mucoceles are a rare pathology [2], characterized by slow-growing benign pseudo-cystic tumors that develop from sinus mucosa. They result from the accumulation and retention of mucoid secretions in the sinus, trapped due to the obstruction of the sinus ostium [4]. They most commonly affect the frontal sinus, with the majority involving the ethmoid labyrinth, maxillary, and sphenoid sinuses [3-6]. Etiologies for the ostial occlusion of sinuses responsible for mucoceles include chronic inflammation, allergy, trauma, post-surgical lesions, benign neoplasms (osteomas or fibrous dysplasia), and malignant or metastatic tumors [4-6].

Over time, a mucocele can destroy adjacent bone structures and extend beyond the frontal sinus into adjacent structures such as the orbit, cranial vault, and facial tissues [1-6]. This effect of bone erosion can be explained by two mechanisms: the first is the mechanical effect of mucocele expansion on bone, and the second is chronic inflammation responsible for the release of certain chemical mediators (prostaglandins, cytokines, and collagenase), which, in turn, stimulate osteolysis [4].

The occurrence of post-traumatic mucocele can manifest many years after the initial trauma, as in our case; studies report findings of mucoceles ranging from 2 months to 50 years or even more after the initial trauma [1-3]. Frontal sinus mucoceles can occur at any age, in both sexes. However, most cases, including ours, are observed between the fourth and seventh decades of life [3-6].

The clinical presentation of mucoceles may go unnoticed for an extended period; it is variable depending on the affected sinus, size, local extension, involvement of adjacent tissues, and the complications incurred. Patients with these lesions often present with visual and oculomotor disturbances due to orbital involvement or signs of meningoencephalic complications secondary to intracranial extension [1-4].

Mucopyocele of the frontal sinus, the infected form, is less frequently reported in the literature. It can present as a frontal mass or, as in our case, as purulent discharge through a frontal cutaneous fistula with a risk of septicemia and meningitis [2-5].

The diagnosis of a mucocele is established through clinical examination with the assistance of computed tomography (CT) or magnetic resonance imaging (MRI) [4]. Contrast-enhanced computed tomography is the preferred imaging method, although magnetic resonance imaging (MRI) is useful in complicated cases with intracranial extension or infection due to the mucocele's relationship with the brain, orbit, and soft tissues. The CT scan highlights opacity in the frontal sinus, allowing for the assessment of mucocele expansion and erosion of the bony walls of the frontal sinus. A computed tomography presentation is rarely reported when the mucocele extends into the subcutaneous region and manifests as purulent discharge or a frontal ulcer, as seen in our case. The treatment of frontal sinus mucoceles is surgical, ranging from endoscopic sinus surgery to craniotomy, craniofacial exposure with or without sinus obliteration [3-5]. In the case of Mucopyocele, as in our case, surgery is indicated after antibiotic therapy, the duration of which varies according to the literature [2, 3].

The goal of treatment is to drain the mucocele and manage any potential intracranial or intraorbital complications. The sinus mucosa must be completely removed by curettage and milling, followed by the reconstruction of the anterior wall of the frontal sinus. Sinus filling and closure of the nasofrontal canal can be considered [3-7].

Numerous techniques and approaches have been described in the literature; endoscopic approaches may vary between teams. Thus, interventions can be carried out through an endonasal approach after frontal sinusotomy, through a superior approach with a scalp incision, or after sinus trephination through a superomedial palpebral approach.

In the case of multiloculated mucoceles or when there is doubt about complete mucocele drainage, the endonasal approach is excluded.

According to the literature, the use of external approaches remains minimal compared to the proportion of endonasal approaches. Indications for external approaches are cases where an endoscopic approach appears insufficient in terms of exposure and control for mucocele drainage and excision. Different incisions can be made to access the anterior wall of the frontal sinus, depending on the acceptable aesthetic impact on the patient, the extent of the lesion, and the desired access.

The most commonly performed incision is the bicoronal incision, with the advantage of a minimally visible scar on the scalp, and the possibility of placing it slightly further back for men with a receding hairline with age.

Other incisions are possible but provide less exposure to the anterior walls of the frontal sinuses. These include the superomedial palpebral and superomedial brow incision, which can be bisbrow for exposure to both anterior walls of the frontal sinuses. The frontal or mid-frontal incision is indicated in patients with alopecia but marked or deep wrinkles in the frontal region.

In our patient, the latter approach was favored due to its shorter execution time, less hemorrhagic nature compared to the bicoronal approach, and simplicity of implementation [1-8]. Additionally, it provides the opportunity to excise the cutaneous fistulous tract on the forehead with limited, acceptable aesthetic impact. After draining the Mucopyocele, the sinus mucosa was completely removed by curettage and milling, and a reconstruction of the anterior wall of the frontal sinus was performed to maintain the contour of the subcutaneous forehead; a technique in line with literature findings. Sinus filling and closure of the nasofrontal canal were not performed. There is no consensus in the literature regarding whether or not to fill the frontal sinus or close the nasofrontal canal [3-5].

Due to the potential period between trauma and the development of a mucocele, some authors recommend continued lifelong monitoring of these patients. Others emphasize the need for follow-up for up to 25 years. There is no consensus in the literature regarding the duration of follow-up. In our case, the patient never sought medical attention after the initial trauma. Generally, clinical and paraclinical assessment, including imaging, 6 to 12 weeks post-trauma, is crucial for the early diagnosis and management of this complication [1-5].

CONCLUSION

Mucopyocele, infected forms of mucoceles, represent a rare pathology that can complicate frontal sinus trauma. The clinical presentation is variable, and it is uncommon for purulent drainage through a frontal cutaneous fistula to be the initial sign of a mucocele or Mucopyocele of the frontal sinus. We emphasize the importance of closely monitoring patients with traumatic lesions of the frontal sinus, enabling early diagnosis and management of this pathology.

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