Acta Scientific Otolaryngology (ISSN: 2582-5550)

Volume 4 Issue 6 June 2022

Research Article

Revision Surgery After Frontal Sinus Obliteration

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Received: March 30, 2022

Published: May 18, 2022

Abstract

Inflammatory complications caused by obliteration of the frontal sinus can be difficult to treat.

Antibiotic treatment is usually ineffective and most patients require salvage surgery.

Many times the surgical approach can be performed endonasally or can be combined with an external approach.

Objectives: To determine the success rate of endoscopic frontal sinus revision surgery to treat chronic sinusitis and mucoceles caused by filling materials previously used in osteoplastic surgery with sinus obliteration technique.

Methods: The electronic medical records of patients who were treated for chronic inflammatory diseases (mucoceles and chronic sinusitis) caused by the filling material previously used in osteoplastic surgery with obliteration of the frontal sinus between March 2010 and January 2020 were analyzed

Results: Three patients were treated for chronic inflammation of the frontal sinus after obliterative surgery.

The three patients had a history of have been operated with osteoplastic technique with obliteration of the frontal sinus (average 19 years before).

In one patient, a Draf II-B endoscopic endonasal approach to frontal sinus was performed, extracting a material similar to wax, in another the type of material extracted using a modified Lothrop approach could not be identified, and in the third patient the material removed by a combination of Lothrop surgery and a transpalpebral approach was similar to bone.

No recurrences of the sinus infection were detected (resolution of symptoms and complications) and computed tomography (CT) showed improvement

Conclusions: Revision endoscopic surgery for chronic inflammatory disease caused by obliteration of the frontal sinus was successful in all three patients who were treated.

Extended endoscopic approaches to the frontal sinus are appropriate surgical techniques to resolve inflammatory pathology after obliteration due to the excellent exposure that they offer to extract the filling material and by the ample sinus drainage that they produce.

Keywords: Frontal Sinus; Obliteration; Chronic Sinusitis; Endoscopic Surgery; Lothrop Modified

Introduction

Treatment of chronic sinusitis after failed obliterative frontal sinus surgery is challenging.

The infection is often complicated by cellulitis, abscesses and mucoceles that can cause bone erosion of the walls of the frontal sinus, with the infection having contact with the meninges or with the orbital content.

Treatment consists of treating the exacerbation or complication with antibiotics and performing revision surgery to remove the filling material used in the obliteration and produce adequate and wide sinus drainage.

Objectives

To determine the success rate of endoscopic frontal sinus revision surgery to treat chronic sinusitis and mucoceles caused by filling materials previously used in osteoplastic surgery with sinus obliteration technique.

Methods

The electronic medical records of patients who were treated by endoscopic frontal sinus surgery due to chronic inflammatory diseases (mucoceles and chronic sinusitis) caused by the filling material previously used in osteoplastic surgery with obliteration of the frontal sinus between March 2010 and January 2020 were analyzed.

Demographic data, history of previous surgeries with obliteration technique, signs and symptoms, results of computed tomography, type of revision surgical technique used, possible material used in obliteration of the sinus, result of surgery and complications were collected.

All patients were evaluated by computed tomography and nasal endoscopy.

The salvage surgical techniques used were: Draf II-B (permeabilization of the frontal drainage between the orbit and the nasal septum by resecting the middle turbinate), modified Lothrop (permeabilization of the frontal drainage between the orbits with anterosuperior septectomy) and modified Lothrop combined with a transpalpebral approach to obliterate with fat only a supraorbital ethmoid cell.

Controls were performed with computed tomography and nasal endoscopy.

Results

Three patients were treated for chronic inflammation of the frontal sinus after obliterative surgery.

Two were men and one woman, the average age was 58 years.

Two had unilateral mucoceles in the frontal sinus, one of them with erosion of the posterior and inferior wall, and another bilateral chronic frontal sinusitis.

The symptoms and signs were: right palpebral abscess (1/3), preseptal cellulitis and intermittent swelling in the bilateral frontal region, coinciding with exacerbations of chronic sinusitis (1/3) and headache (1/3).

The three patients had a history of have been operated with osteoplastic technique with obliteration of the frontal sinus (average 19 years before).

In two the surgeries were for chronic inflammatory disease of the frontal sinus and in another the obliteration was performed after a frontal craniotomy performed by neurosurgery to clip an aneurysm of the posterior communicating artery 40 years earlier.

Two were previously hospitalized because the complication caused by the infection required treatment with intravenous antibiotics, and another received several courses of oral antibiotics before performing revision endoscopic surgery.

In one patient, a Draf II-B endoscopic endonasal approach to frontal sinus was performed, extracting a material similar to wax (Figure 1), in another the type of material extracted using a modified Lothrop approach could not be identified (Figure 2), and in the third patient the material removed by a combination of Lothrop surgery and a transpalpebral approach was similar to bone.

In this patient, the bone-like material used in the obliteration was not identified in the initial revision surgery and he had to be operated on again. The material was removed and a fat obliteration of a supraorbital cell was performed (Figure 3).

The average follow-up was 18 months.

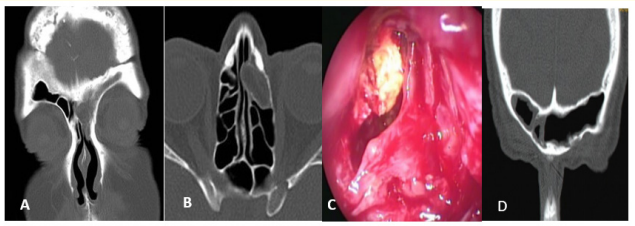

Figure 1: A-B: Computed tomography: a left frontoethmoidal mucocele is observed, C: Endoscopic view of the extraction of the filling material through a frontal approach type Draf II-B, D: Postoperative tomography.

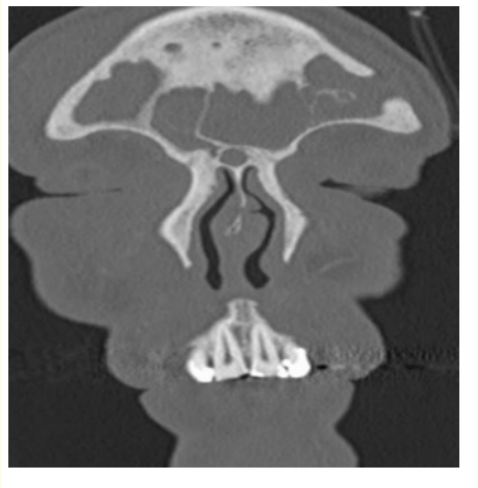

Figure 2: Computed tomography: bilateral sinusitis after frontal sinus obliteration with fat.

No recurrences of the sinus infection were detected (Resolution of symptoms and complications) and the CT scans showed improvement (Table 1).

Discussion

The history of osteoplastic surgery of the frontal sinus began in 1904 when Hoffman described obliteration of the sinus. In 1949, Tato., *et al*. described the technique by obliterating the frontal sinus with fat, and then Goodale and Montgomery in 1956 popularized the technique in North America, becoming the surgery of choice to treat frontal sinus infections [1]. In Argentina it was possibly the surgery of choice to treat frontal pathology until the end of 1990.

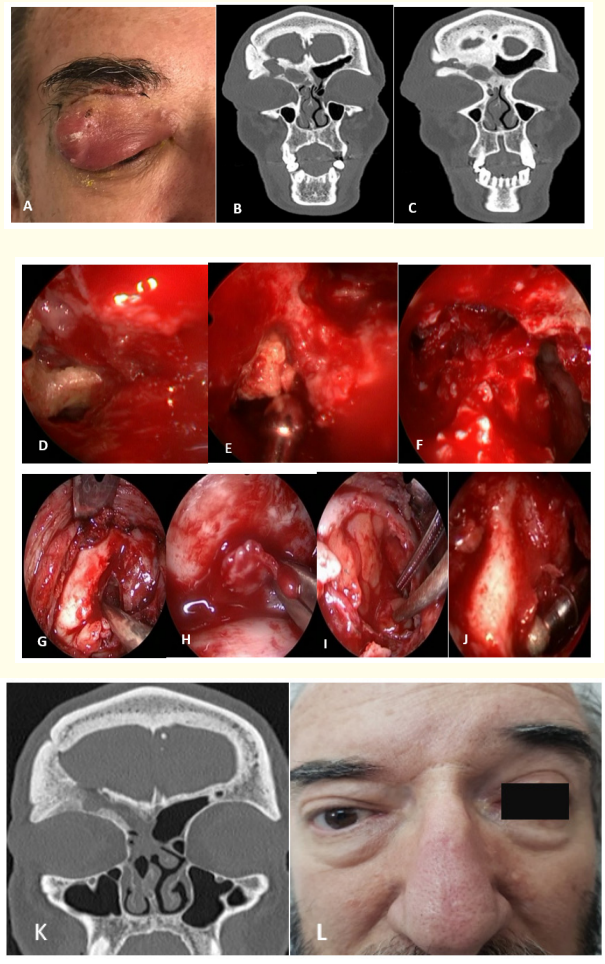

Figure 3: Complicated frontal sinusitis with palpebral abscess. A: Abscess recurred to Draf II and transpalpebral approach with marsupialization of right supraorbital cell to the nasal cavity, B-C: CT showing occupation of the frontal sinus and right supraorbital cell with erosion of the posterior and anteroinferior wall, D-E-F: Removal of bone-like material from the frontal sinus by modified Lothrop approach, G-H-I-J: Transpalpebral approach to supraorbital cell, resection of the mucosa and drilling of the cell with fat obliteration of the same, K: Postoperative CT, L: Patient with resolution of the infection.

Age	Sex	Previous surgery	Computed tomography	Signs and symptoms	Revisión surgery	Filler material	Evolution
62 (Figure 1)	Female	Unilateral osteoplastic (chronic sinusitis)	Left mucocele	Headache	Draf ii	Wax	Resolution
63 (Figure 2)	Male	Frontal craniotomy (aneurysm clipping)	Supraorbital cell mucocele with posterior and inferior wall erosion	Eyelid abscess	Draf II + transpalpebral (marsupialization) second surgery: modified Lothrop + transpalpebral approach and obliteration of supraorbital cell with fat	Similar bone (¿hydroaxiapatite?)	Resolution
49 (Figure 3)	Male	Osteoplastic (chronic sinusitis)	Bilateral chronic sinusitis	Forehead swelling/ cellulitis	Modified lothrop	Fat	Resolution

Table 1: Patients treated with salvage endoscopic surgery after osteoplastic surgery with obliteration of the frontal sinus.

The technique consists of approaching the frontal sinus externally, resecting all the mucosa and then exhaustively drilling the bone to avoid the persistence of mucosal foci that produce secretions. Then we proceed to block the drainage of the sinus and obliterate the cavity to defunctionalize it.

Different materials were described for obliteration: fat, wax, hydroxyapatite, etc.

Weber and Draf [2] reported a 10% incidence of mucocele formation after frontal osteoplastic surgery with obliteration, diagnosed by MRI five years later.

In another study they reported an incidence of mucoceles after sinus obliteration of 7.5% (3/40) and in another that mucocele formation occurred up to 18 years after obliteration [3].

In our study, the signs and symptoms caused by mucoceles and complicated chronic sinusitis occurred on average 19 years after obliterative surgery, and in two the infections were complicated by a palbebral abscess and in another by preseptal cellulitis and swelling in the frontal region.

Magnetic resonance imaging can differentiate a mucocele from the fat used in obliteration.

Mucoceles can be hyperintense or isointense on T2 according to their water and protein content, and the density of the fat graft can vary over time, possibly due to the formation of fibrosis or hemorrhage within the fat. It can be useful to diagnose whether or not the tissue that occupies the frontal sinus is fat using fat suppression techniques [4].

We did not request an MRI to evaluate our patients because all three, due to their signs/symptoms and the tomographic findings, had an indication for revision surgery.

In addition, all three reported a history of frontal obliteration with some material.

Today obliterative techniques have very few indications to treat mucoceles or chronic frontal sinusitis, it is preferable to avoid late complications, perform surgeries that produce extensive drainage of the affected sinuses.

The Draf II or modified Lothrop extended endoscopic approaches allow wide access to the frontal sinus to remove the material used in the previous obliteration and achieve ample and adequate drainage without the need to use an external approach.

In two of the three cases described in our study, we were able to extract the filling material without difficulty using extended endoscopic approaches to the frontal sinus. In one of them, due to the characteristics of the material, which was similar to bone and because of its fusion with it, we could not identify it in the initial surgery. In the endoscopic rescue surgery, when drilling, the bone-like fragment came off and could be extracted without difficulty.

In another case, when accessing the frontal sinus through a modified Lothrop, we only resected inflammatory tissue. The patient informed us that abdominal fat had been placed in his previous osteoplastic surgery and we identified the scar left by the abdominal incision to obtain the fat.

In a study [5] they reported in 17 patients treated for chronic sinusitis after obliteration of the frontal sinus an incidence of revision surgery of 29.41% (5/17). Most used some type of stent to keep the frontal drainage patent.

We prefer to leave a wide frontal drainage using the Draf II or modified Lothrop technique, without using stents, placing septal mucoperiosteal grafts to reduce the possibility of stenosis.

The extended approaches to the frontal sinus type Draf II and modified Lothrop are adequate options to use as revision surgeries, to treat infections after obliteration due to the excellent exposure and wide sinus drainage they produce.

External transpalpebro-orbital and osteoplastic approaches without obliteration can be useful in cases of laterality in highly pneumatized sinuses and supraorbital cell infections.

Conclusions

- Revision endoscopic surgery for chronic inflammatory disease caused by obliteration of the frontal sinus was successful in all three patients who were treated.
- Extended endoscopic approaches to the frontal sinus are appropriate surgical techniques to resolve inflammatory pathology after obliteration due to the excellent exposure that they offer to extract the filling material and by the ample sinus drainage that they produce.

Conflict of Interest

The authors have no conflicts of interest to declare.

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