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Frontal sinus revision rate after nasal polyposis surgery including frontal recess clearance and middle turbinectomy: A long-term analysis

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ABSTRACT

Objective: To determine the frontal sinus revision rate after nasal polyposis (NP) surgery including frontal recess clearance (FRC) and middle turbinectomy (MT), to search for predictive factors and to analyse surgical management.

Methods: Longitudinal analysis of 153 patients who consecutively underwent bilateral sphenoidectomy with FRC and MT for NP with a minimum follow-up of 7 years. Decision of revision surgery was made in case of medically refractory chronic frontal sinusitis or frontal mucocele. Univariate and multivariate analysis incorporating clinical and radiological variables were performed.

Results: The frontal sinus revision rate was 6.5% (10/153). The mean time between the initial procedure and revision surgery was 3 years, 10 months. Osteitis around the frontal sinus outflow tract (FSOT) was associated with a higher risk of frontal sinus revision surgery ($p = 0.01$). Asthma and aspirin intolerance did not increase the risk, as well as frontal sinus ostium diameter or residual frontoethmoid cells. Among revised patients, 60% required multiple procedures and 70% required frontal sinus ostium enlargement.

Conclusions: Our long-term study reports that NP surgery including FRC and MT is associated with a low frontal sinus revision rate (6.5%). Patients developing osteitis around the FSOT have a higher risk of frontal sinus revision surgery. As mucosal damage can lead to osteitis, FSOT mucosa should be preserved during initial NP surgery. However, as multiple procedures are common among NP patients requiring frontal sinus revision, frontal sinus ostium enlargement should be considered during first revision in the hope of reducing the need of further revisions.

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1. Introduction

Functional endoscopic sinus surgery (FESS) is widely accepted in the setting of failure of medical treatment in patients with nasal polyposis (NP) [1,2]. Nevertheless, the extent of initial surgery is still debated [3]. In our experience, sphenoidectomy with frontal recess clearance (FRC,

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equivalent to Draf 1 procedure) and middle turbinectomy (MT) is an effective procedure to control NP with good functional results and a low rate (4.1%) of revision surgeries for medically uncontrolled polyp recurrence [4]. However postoperative obstruction of the frontal sinus outflow tract (FSOT), as a cause of chronic frontal sinusitis and frontal mucoceles, is a major concern after NP surgery [5–7]. Some authors consider FRC to have a higher failure rate in case of NP and advocated for frontal sinus ostium enlargement (from Draf 2a to Draf 3 procedures) during primary NP surgery [8–11], but on the other hand, use of a drill may predispose to scarring and stenosis [38]. Other authors advocated for middle turbinectomy during NP surgery as it can prevent middle turbinate lateralization and subsequent FSOT obstruction, and it may reduce the risk of polyp recurrence [12–14]. Moreover, middle turbinate lateralization might increase the risk of revision surgery [15]. Literature is currently scarce concerning the long-term frontal sinus revision rate after nasal polyposis surgery including FRC and MT. Therefore, based on a series of 153 patients who consecutively underwent this procedure with a minimum follow-up of 7 years, we seek (i) to determine the frontal sinus revision rate, (ii) to search for potential statistical relationship with baseline variables and (iii) to analyze surgical management during revision.

2. Patients and methods

2.1. Diagnostic criterion and patient selection

153 patients with NP failing medical treatment were included (1991–2008). The initial diagnosis, in agreement with 2015 AAO-HNS clinical practice guidelines [16], was mainly based on two concomitant criteria: (i) visualization of bilateral polyps in the nasal cavities, and (ii) existence of bilateral ethmoidal opaque areas on CT located either in the anterior or in the posterior ethmoid sinuses.

All patients failed to a medical treatment that included (i) nasal douching twice a day, (ii) twice daily intranasal beclomethasone spray in each nasal cavity, and (iii) oral steroid administration (i.e., prednisone, 1 mg/kg body weight per day for a 6-day period tailored to the patient's need). FESS was proposed to the patient if more than three systemic courses of prednisone per year proved to be not sufficient to assess a significant quality of life.

The baseline clinical and anatomical data were collected for: gender repartition, age, prior NP surgery (polypectomy or limited ethmoidectomy without FRC or MT), Lund–Mackay score, asthma, bronchial provocation tests to methacholine (in patients without asthma) [17], abnormal clinical manifestations to non-steroidal anti-inflammatory drugs (NSAIDs) and aspirin intolerance (Table 1). Patients with primary ciliary dyskinesia, Churg–Strauss syndrome or cystic fibrosis were excluded from this study.

2.2. Initial surgical procedure and follow-up after initial FESS

FESS [4] was performed by the same surgeon (PB) under computerized sinus navigation and started with polypectomy

followed by uncinectomy and opening of the bulla and the retrobullar space. The lower half of the middle turbinate was then resected. The posterior ethmoid cells were opened, and their party walls were totally removed until fovea ethmoidalis was identified. Complete anterior ethmoidectomy was then performed with FRC, including removal of all frontal recess cells below the level of the frontal sinus ostium but not above: this extent of FRC was therefore equivalent to a Grade 2 endoscopic frontal sinus surgery (EFSS), according to the most recent classification of the extent of endoscopic frontal sinus surgery [19]. Mucosa of the FSOT was left untouched. A sphenoidotomy ended the procedure. All patients received postoperative care including washing of the nasal cavities and twice daily intranasal beclomethasone spray in each nasal cavity. This regimen was pursued through the entire follow-up for all patients.

Postoperative clinical evaluation was conducted twice to four times a year after FESS. At every visit at our clinic, mean symptom severity, eventual polyp recurrence and steroid consumption were evaluated. Systematic CT scan was performed every 3–4 years after surgery or if clinical evaluation suggested potential development of a complication (chronic frontal sinusitis, mucocele). In case of symptomatic polyp recurrence not responding to oral steroid course or requiring more than 3 oral steroid courses per year to obtain symptom relief, revision polypectomy was performed.

2.3. Decision of frontal sinus revision surgery

Frontal sinus revision surgery was performed in case of medically refractory chronic frontal sinusitis and/or frontal mucocele.

The diagnosis of chronic frontal sinusitis was suggested when the patient presented with 2 of these 3 symptoms for more than 12 weeks: frontal pain/pressure/fullness, mucopurulent drainage, nasal obstruction. Decision of revision surgery was made on the meeting of three criteria: acute exacerbation of symptoms, complete opacification of the frontal sinus on the CT scan and inefficacy of medical treatment which associated painkillers, ten day course of prednisone (1 mg/kg body weight per day) and antibiotics. Amoxicillin/clavulanic acid was the first line prescribed antibiotic as it has an action on the aerobic and anaerobic bacteria in frontal sinusitis [18]. Whenever possible, second line antibiotherapy was guided by mucopurulent drainage sample.

When clinically suspected, frontal mucocele diagnosis was based on sinus CT scan (showing a homogeneous opacity with smooth bone erosion). Magnetic resonance imaging (MRI) was implemented to confirm diagnosis in doubtful cases or to study surrounding orbit and brain. Decision for endoscopic marsupialization of the mucocele was performed in case of symptoms or, for asymptomatic patients, until erosion of the orbital walls or skull base was found on imaging.

2.4. Radiological evaluation of the FSOT

Before frontal sinus revision surgery, a CT scan based study of three anatomical parameters (frontal sinus ostium sagittal

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