Surgical treatment of nasal polyposis in patients with aspirin intolerance

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It is not fully understood why humans possess paranasal sinuses and for many years there has been speculation as to their physiological significance. Much the same uncertainty holds true for the pathophysiology of chronic paranasal sinusitis, a disease which represents a major therapeutic challenge despite recent medical and surgical progress. There are probably several distinct subtypes of chronic paranasal sinusitis ranging from remote mucosal thickening to diffuse polyposis. All types of symptomatic chronic sinusitis call for surgical intervention if medical treatment fails.

Corresponding to the diversity of chronic sinusitis, different microsurgical operative techniques have been developed during the last 15 years, all of which share the endonasal access route. Transfacial or transoral surgery has therefore become obsolete for treatment of uncomplicated paranasal mucositis.

Many cases with circumscribed hyperplastic changes of the remote paranasal sinus mucosa need only limited surgery of the superordinate anatomical ostiomeatal unit. Removing defined microanatomical narrow passes around this functional key area of the middle nasal meatus ("isthmus surgery") facilitates drainage and ventilation of the dependent paranasal sinuses (fig 1). Even severe changes in the peripheral sinus mucosa may heal subsequently without being specifically treated.

Other cases of diffuse polypoid sinusitis represent a unique disease which is less influenced pathogenetically by local microanatomy and, as a result, does not respond adequately to mere "isthmus surgery". A more aggressive surgical approach is called for which, nevertheless, should take into account the maximum conservation of nasal physiology.

The most severe mucositis associated with analgesic intolerance falls into this category of sinusitis.

Epidemiology of chronic sinusitis and nasal polyposis

About 5% of the European population suffer from chronic sinusitis. Nasal polyposis occurs in about 0.6% of adults, but this increases to 15% in patients suffering from bronchial asthma. However, up to 95% of patients with the bronchospastic type of analgesic intolerance will develop chronic polyoid sinusitis.

On the other hand, 15% of patients with nasal polyps have the bronchospastic type of analgesic intolerance, and this increases to 60% in patients who need revisional surgery for major regrowth of polyps following surgery. Patients with the "aspirin (ASA) triad" (nasal polyposis, bronchial asthma, and aspirin intolerance) represent about 7% of cases with chronic sinusitis. More than 80% of these patients suffer from an advanced stage of polypoid sinusitis.

Concepts of surgery for chronic sinusitis

The basis of modern endonasal surgery has been laid in the last 100 years by anatomists, physiologists, and clinicians such as van Alyea, Grünwald, Hajek, Halle, Hilding, Ingal, Kilian, Mosher, Mouret, Onodi, Zuckerkandl, and many others. The endonasal access route, however, was initially discredited because of the increased risk of severe complications. Since the introduction of optical aids (endoscope, microscope) a substantial renaissance of endonasal surgical techniques has taken place during the last 15 years. The "fathers and trail blazers" of modern endonasal surgery are thus H Heermann, Messerklinger, Wigand, Draf, Stammberger, Terrier and Kennedy, among others.

During the last three decades different surgical concepts have evolved. The term "functional endoscopic sinus surgery" ("FESS" or "FES") was coined by Kennedy.
and coworkers in 1985 to describe surgery relating to the systematic analysis of the microanatomy and physiology of the nose and sinuses. Functional endoscopic sinus surgery includes surgical techniques as well as the pathogenetic postulates mentioned above (“isthmus surgery”). Stammbarger has presented a comprehensive review of detailed microsurgical techniques, and Wigand has presented a global and systematic endoscopic approach to the treatment of the paranasal sinuses ranging from minor interventions comparable to “FESS” up to complete sphenethmoidectomy (“pansinus surgery”).

In most aspirin intolerant patients the rhinosurgeon is faced with a diffuse polyloid growth in need of a more extensive procedure (“pansinus surgery”). Polypectomy alone should be avoided in aspirin intolerant patients as the effects are short lived (table 1). Generally, polypectomy causes irregular scars which mask the anatomical landmarks. Inevitable revisional procedures are rendered more difficult and the accompanying risks are increased. In the long term the prognosis of an impaired sense of smell is worsened.

**Preoperative evaluation, microsurgical techniques**

Before every operation on the paranasal sinuses the patient undergoes a general examination by an otolaryngologist. The nasal cavity is examined with an endoscope (0°, 30° direction of view) before and after decongestion of the mucosa. It is a standard procedure to complete the preoperative examination with a computed tomographic (CT) or magnetic resonance imaging (MRI) scan. The CT scan demonstrates the extent and distribution of the disease and identifies anatomical landmarks, variants, and danger zones. There is no association between CT findings and severity of symptoms. Preoperative olfactory testing is expedient for diagnostic reasons and is also advisable for medicolegal reasons.

Major operations such as complete sphenethmoidectomy (“pansinus surgery”) are usually performed under a general anaesthetic. The layout of instruments and optical aids (endoscope and/or microscope) and the positioning of the patient, surgeon, anaesthetist, and scrub nurse are handled in a wide variety of ways.

Surgery for diffuse polyoid pansinusitis aims to clear the entire nose of disease, so adjunctive measures such as correction of septal deformities or turbinate reduction should be integrated into the treatment plan. Both central and peripheral areas of the sinus system are explored. Care is taken not to exclude areas of disease that are difficult to access or presumed to have no functional significance (fig 1). Incomplete removal of the inflammatory foci increases the potential for continued inflammation leading to disease recurrence.

The first stage of surgery is polypectomy which might be facilitated by powered instrumentation. The second step comprises a still limited anterior-to-posterior removal of the ethmoid cells with excision of the uncinate process. After resection of the posterior attachment of the middle turbinate, the anterior wall of the sphenoid sinus can be broadly exposed. The sphenoid sinus is then opened via the sphenethmoidal recess, with exposure of the ethmoid roof from posterior to anterior. Following removal of all major cell septa of the ethmoid, the access to the frontal sinus is exposed and widely opened under optical guidance. Draf has recently defined several types of extended endonasal interventions of the frontal sinuses which significantly increase the range of action in this area. The maxillary sinus is broadly fenestrated in the middle meatus by removing the anterior and posterior fontanelle. Accurate endoscopically aided manipulations in the maxillary and frontal sinuses require special instruments such as slim and long handled upturned cupped forceps. Special effort is taken to preserve the stability and dimensions of the vertical lamella of the middle turbinate for maximum maintenance of nasal physiology.

“Functional compartment surgery” has the special merit of providing a certain degree of standardisation of the procedure and greater clarity of the postoperative endoscopic findings. The creation of a well defined anatomical cavity allows even major revisional surgery to be performed with the shaver as an outpatient procedure using local anaesthesia only.

Following major sinus surgery, local wound healing takes about three months. With this fact in mind, every patient should be subjected to a special and intensive therapeutic regimen (local debridement; local and systemic medication with, for example, corticosteroids; induction of aspirin tolerance). Patients with aspirin intolerance should undergo regular follow up visits for almost the rest of their lives in

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**Table 1** Rhinological outcome of surgical treatment of nasal polyposis in patients suffering from analgesic intolerance (effects on accompanying asthma not given)

<table>
<thead>
<tr>
<th>Author</th>
<th>No of patients</th>
<th>Procedure</th>
<th>Follow up (months)</th>
<th>Objective results</th>
<th>Subjective results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patriarca et al</td>
<td>130</td>
<td>Polypectomy</td>
<td>24</td>
<td>80% relapse</td>
<td>?</td>
</tr>
<tr>
<td>Brown et al</td>
<td>101</td>
<td>Polypectomy + ethmoidectomy</td>
<td>12</td>
<td>40% relapse</td>
<td>?</td>
</tr>
<tr>
<td>Hosemann et al</td>
<td>21</td>
<td>Endonasal pansinus surgery</td>
<td>52</td>
<td>?</td>
<td>24% asymptomatic 38% improved</td>
</tr>
<tr>
<td>Schaitkin et al</td>
<td>36</td>
<td>Endonasal pansinus surgery</td>
<td>52</td>
<td>36% revisional surgery needed</td>
<td>0% asymptomatic 82% improved</td>
</tr>
<tr>
<td>Kennedy et al</td>
<td>11</td>
<td>Endonasal pansinus surgery</td>
<td>18</td>
<td>75% residual disease</td>
<td>?</td>
</tr>
<tr>
<td>McFadden et al</td>
<td>25</td>
<td>Conservative/radical surgery</td>
<td>41</td>
<td>24% revisional surgery needed</td>
<td>100% improved</td>
</tr>
<tr>
<td>McFadden et al</td>
<td>80</td>
<td>Conservative/radical surgery</td>
<td>36</td>
<td>“Significant number” of advanced stage disease needs subsequent surgery</td>
<td>85% improved</td>
</tr>
<tr>
<td>Rosen et al</td>
<td>39</td>
<td>Conservative/radical surgery</td>
<td>27-62</td>
<td>51% revisional surgery needed, still 33% persistent disease</td>
<td>50% asymptomatic 30% improved</td>
</tr>
</tbody>
</table>

Radical surgery = mostly transmaxillary approach in addition to endonasal surgery.
order to detect and eradicate regrowing polyps at an early stage.

Results
Notwithstanding the multitude of recent reports on endonasal sinus surgery for chronic sinusitis, there are few papers which focus exclusively on patients with aspirin intolerance (table 1).

In general, the subjective success rate for pansinus surgery is about 80%. The specific preoperative symptoms respond to surgery in an individual manner. Nasal congestion, headache, and susceptibility to local infections may be expected to be relieved in up to 90% of cases. On the other hand, “postnasal drip” has a less favourable prognosis. Many patients continue with nasal symptoms, recurrent sinus infections, and the occasional need for vigorous medical treatment. Comparatively more patients with aspirin intolerance suffer from preoperative anosmia and the impaired sense of smell is less likely to be relieved postoperatively in these patients. The subjective results are not generally in agreement with postoperative endoscopic findings. Depending on different criteria (definition of polyposis, patient subgroups, examination techniques), frank recurrence is observed in 10–40%. Nevertheless, most patients with a recurrence of polyg growth experience improvement in symptoms.

The accepted rate of revision surgery in chronic sinusitis is about 15% for all patients. The main risk factor indicating a less favourable outcome is an advanced preoperative stage of disease which may be determined, for example, according to Lund and Kennedy. Other risk factors include the polyoid type of chronic sinusitis, revision surgery, coexisting analgesic intolerance, bronchial asthma, respiratory allergy, smoking, and possibly gastro-oesophageal reflux disease. Besides having an increased risk for postoperative healing problems, patients with aspirin intolerance have a higher incidence of mucoceles and of inflammatory orbital complications.

Following restoration of the nasal physiology by surgery, improvement in the accompanying asthma may be expected in up to 80% of cases (range 32–84%). Patients with severe disabling asthma do much less well than those suffering from moderate asthma. Aspirin sensitive asthmatic patients also have a less favourable prognosis. On the other hand, selected cases with moderate pulmonary reactions to high doses of non-steroidal anti-inflammatory drugs (NSAIDs) may lose their aspirin intolerance postoperatively.

There are many possible complications and side effects of endonasal sinus surgery ranging from simple nasal bleeding up to rare disasters such as intracerebral injury or laceration of the carotid artery. The overall rate of major complications is less than 0.1%. 2% of patients may experience an asthma attack postoperatively. Patients with aspirin intolerance are especially endangered by the erroneous prescription of NSAIDs for relief of postoperative pain.

Conclusions
Rhinosurgery is indicated in all cases of symptomatic chronic sinusitis resistant to conservative treatment. This rule applies particularly to patients with the bronchospastic type of aspirin intolerance. Endonasal optically aided techniques represent the gold standard for surgery. Simple polypectomy inevitably leads to recurrence of polyoid growth within a short time period and should be avoided. Long term endoscopically guided aftercare of the operative field is mandatory for all patients. In spite of the use of sophisticated therapeutic methods, microsurgical techniques and intensive local aftercare, regrowth of polyps may occur in about 30% of patients. For this reason, aspirin intolerant patients should be given additional treatment—for example, topical/systemic steroids, induction of NSAID tolerance, possibly leukotriene modulators, outpatient “touch up” procedures. Continued care for the aspirin intolerant patient with complementary surgical and medical treatment may offer long lasting relief.

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