Recovery of Olfaction After Sinus Surgery for Chronic Rhinosinusitis: A Review

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Objective: Investigation of the postoperative olfactory function after sinus surgery for chronic rhinosinusitis (CRS) with and without polyps in a review.

Data Sources: PubMed.

Review Methods: A comprehensive literature search was conducted through June 2018 using relevant keywords. The titles/abstracts were reviewed to identify studies evaluating the sense of smell in CRS-patients pre- and postoperatively by either using the whole or parts of the University of Pennsylvania Smell Identification Test or the Sniffin' Sticks test. Study characteristics and outcome data of the included studies were extracted.

Results: In total, 106 studies were retrieved. Twenty-four studies comprising 1,956 patients were included after quality assessment. The number of patients investigated per study was 19 to 206. In the 24 studies, 959 patients with nasal polyps and 516 without nasal polyps were described. The follow-up times varied between 0.5 and 28 months. Twenty-three studies reported an improved sense of smell, at least in certain subgroups. An overall improvement was seen in approximately 50% of the included patients. Nasal polyposis and preoperative anosmia were associated with a higher chance of improvement in olfaction. In those studies that commented on deterioration after sinus surgery, a decrease in olfaction was found in a range from 0% to 10% of cases.

Conclusion: Olfaction can be improved by sinus surgery in about every second patient, especially if the patient had chronic rhinosinusitis with polyps, was anosmic, and had no prior surgery. A deterioration of sense of smell after surgery is rare.

Key Words: Olfaction, sense of smell, chronic rhinosinusitis, sinus surgery, outcome.

INTRODUCTION

Chronic rhinosinusitis (CRS) is a multifactorial disease that affects up to 12% of the population in Western countries.1,12 The burden of the disease includes nasal obstruction, rhinorhea, headache, and olfactory impairment.

The widely accepted and recommended standard medical therapy is the use of topical nasal steroids, nasal washings, antibiotic treatment, or systemic steroids in selected cases. In patients who do not benefit from this medical treatment, endonasal sinus surgery is proposed.

International guidelines divide CRS into chronic rhinosinusitis without nasal polyps (CRSsNP) and chronic rhinosinusitis with nasal polyps (CRSwNP), the latter representing about a third of all patients undergoing surgery for the disease.3,4

Whereas many studies report on the positive effects of nasal sinus surgery on patient’s symptoms,5 quality of life6 and nasal endoscopy,7 which have been published in the past, only limited data is available on the effect of sinus surgery on olfaction.8 This is remarkable because olfaction is one of the major symptoms for diagnosis of CRS in international guidelines.2,9

Quality-of-Life Aspects

One reason for this neglect might be that the value of olfactory impairment in CRS patients is often underestimated. The SNOT-22 questionnaire contains only one question on sense of smell, whereas other symptoms are incorporated much more frequently.10 On the other hand, it has been proven that patients with olfactory dysfunction due to nasal polyposis had a lower quality of life, which could be increased again by a course of systemic steroids.11

Olfactory Dysfunction in CRS

Impairments in sense of smell are frequently found in patients with CRS. According to the literature, 61% to 83% show olfactory dysfunction.12–15 These figures also include reports that evaluated sense of smell by subjective measures of olfactory function. Interestingly, up to 25% of patients seem not to be aware of their olfactory deficit.16
**Accurate Smell Testing Versus Self-Reporting**

Relying on self-assessment tools in patients with CRS-linked olfactory impairment (by only asking about improvement or using visual analogue scales) does not seem sufficient. Self-assessment does not always correlate with the results of psychophysical tests.17

Thus, the use of sophisticated testing methods for measuring sense of smell is recommended.18 There are more than 20 tests, described in different publications, that evaluate sense of smell.19 However, in terms of validated clinical trials, only two test batteries have been widely disseminated throughout the world. These are the University of Pennsylvania Smell Identification Test (UPSIT), introduced by Richard Doty,20 and the Sniffin’ Sticks test battery, developed by Hummel and Kobal.21 Both test systems are commercially available. These testing methods make it possible to measure olfactory identification (I), threshold (T), and discrimination (D), with age- and gender-adapted normative data also available.22,23

A meta-analysis of the testing results has also been attempted,24 which faced the following difficulties: the results of different test kits could not be combined, screening tests and more extended tests had been mixed; and, in particular, the study population could not be divided into CRSwNP and CRSSNP.

This review displays the current expertise on olfactory dysfunction in CRS and the possibilities of recovery of sense of smell after sinus surgery by reviewing studies that used well-accepted and widespread psychophysical testing methods.

**METHODS**

A comprehensive literature search was conducted in MEDLINE through June of 2018 using the terms “olfaction,” “sense of smell,” “chronic rhinosinusitis,” “sinus surgery,” and “FESS” (functional endoscopic sinus surgery). The titles/abstracts were reviewed to identify studies evaluating sense of smell in patients with CRS pre- and postoperatively by either using the UPSIT or the Sniffin’ Sticks test. The references in those studies obtained in full text were hand-searched for any additional relevant studies not identified by the original database search. Only studies that reported on more than 10 patients and displayed proper statistical data were included in the review.

**RESULTS**

The literature research revealed 362 results for the topics “olfaction” or “sense of smell” and “chronic rhinosinusitis,” 462 results for the topics “olfaction” or “sense of smell” and “sinus surgery,” and 47 results for the topics “olfaction” or “sense of smell” and “FESS.” Two relevant articles were found in the manual research.

In total, 106 studies were retrieved that analyzed the sense of smell before and after some kind of surgery to the nose and sinuses. Of the identified trials excluded from analysis, most used subjective evaluation methods to rate sense of smell or applied other olfactory tests. Additionally, all studies that described surgery to the nasal septum only, scull base procedures, or polypectomies, or that focused on special conditions, were eliminated.

After close evaluation of the publications, 24 studies reached the inclusion criteria for this review. These have been published over the last 20 years and used the UPSIT or single components or the whole battery of the Sniff’ Sticks test.25–48 Almost all included studies were published in the period from 2007 to 2018; only one earlier study from 1994 was identified.25

**Number of Study Participants**

The number of participants in all the studies was 1,956, with a range of 19 to 206 participants per study. In the 24 studies, 959 patients with nasal polyps and 516 without nasal polyps were described. Eight studies included patients with CRSwNP only,27,28,30,31,33,34,42,48; 13 studies included CRSwNP and CRSSNP patients,29,35–40,43–47,49; and three studies with 481 patients did not comment on the patients’ polyp status.25,26,41

**Testing Methods**

Five studies used screening test versions of the Sniff’ Sticks Identification Test (12 items)27,41,45 or the Brief Smell Identification Test (B-SIT) (12 items) as a screening version of the UPSIT.38,44 The complete Sniff’ Sticks Identification Test (16 items) was used in three studies.29,37,47 One study used the Sniff’ Sticks Threshold Test only.26 Six studies used the 40-item UPSIT.35,36,39,43,46,49 Two studies used a combination of at least two (sub-) tests (I and T),25,42 and seven trials used the whole TDI-score of the Sniff’ Sticks Set.28,30,31,33,34,40,48

**Baseline Olfactory Dysfunction in CRS**

The prevalence of olfactory dysfunction prior to surgery was reported in 15 studies. The percentage of abnormal baseline olfactory function ranged from 28% to 100% of the investigated study population. It was obvious that the more sophisticated the olfactory test (e.g., T, D, and I), the higher the percentage of impairment, which indicates that screening tests usually underestimate the grade of olfactory dysfunction. Those studies that used more than one modality showed impairment rates from 72% to 100%.25,28,30,33,34,40,42,48

**Recovery of Olfaction**

Of all the included studies, improvement in olfaction after sinus surgery was described in all 24 publications, except for one.26 However, this was true for only certain subgroups in nine studies.35–39,41,43,45,49 The main distinguishing factor for a positive outcome in these studies was the presence of polyps, revision versus primary surgery, or anosmia versus hyposmia preoperatively.
Influencing Factors

Of the 11 studies that described the grouped results of CRSwNP and CRSsNP, only four saw an improvement in olfaction in both groups, whereas seven reported an improvement only in the CRSwNP group. Two studies did not analyze the polyp subgroups.

Limited information on the influence of revision surgery on the recovery of olfaction could be extracted from the investigated studies; only six studies commented on this issue. In three of these studies, previous surgery was not associated with a reduced outcome in recovery of olfaction, whereas in one study revision surgery even showed a trend of improved outcome compared to the first surgery.

Six studies reported on the influence of the preoperative status of olfaction. If anosmia was present, this led to an improvement in sense of smell after surgery in all six studies. Preoperative hyposmia was not associated with a significant improvement in two studies.

Time for Recovery

Data regarding follow-up time since sinus surgery were usually available for 6 months; single studies described the data for 2 or 4 weeks after surgery, and the longest follow-up period was 2.3 years. In the studies describing short-term results, a significant improvement in test scores for olfaction was described after only 2 or 4 weeks. In patients with CRSwNP, a continual improvement over time was traced until 6 months after surgery.

Some studies added longer follow-up periods after a 6-month evaluation. Here, the improvement in olfaction that was found after 3.5 and 6 months, respectively, was stable over a period of 12 to 18 months, except in patients with polyps and asthma who began to show another decrease in olfaction.

Magnitude of Sense of Smell Recovery

In 13 studies, the rate of patients that showed an improvement in olfaction in the test scores after surgery is described or can be extracted. The numbers range from 19% to 74%, although these are difficult to compare because different test kits and definitions, for example, a specific number of increase in points, were used in these studies.

To make the results more comparable, if possible, the mean values before and after surgery (usually the 6-month results) were reviewed. The differences were set in relation to the maximum item number of the test used. This was possible in 22 studies. In those studies, the mean improvement rate ranged from 3% and 40%. In studies using single (screening) tests, the range was 3% to 25%; in studies using the UPSIT, the range was 3% to 30.5%; and in studies using combined tests (e.g., T and I), the rate ranged from 10.6% to 43.5%.

In some studies, an improvement in sense of smell was defined after a minimal increase in the test used that is known to be clinically relevant. In studies with the 40-item UPSIT, an improvement of approximately 50% of all included subjects was seen. For those investigated with the whole Sniffin’ Sticks test battery, between 42% and 74% improved subjects were identified.

Seven studies reported on the percentage of normosmics (definition adapted to normative data of the used testing method) after surgical intervention. The spread is between 7% and 83%, with values around 40% in the three studies using the Sniffin’ Sticks TDI-score.

Risk of Deterioration

Deterioration of olfaction after sinus surgery was described in 13 studies, with likelihood rates between 0% and 10%. Five studies described no instances of clinically significant decreases in olfaction. In one study, the rate of decline was 41%, meaning that at least 1 point less was reached in the SIT-40 score after surgery compared to the presurgical score. The author has summarized all results in Table I.

DISCUSSION

It must be admitted that it is very difficult to compare different studies on the development of olfaction after sinus surgery because different test kits, follow-up periods, and patient populations influence the outcome. Another bias factor could be the extent of the surgery that has been performed, from individualized functional sinus surgery to extensive surgery with resection of the middle turbinates, or full Lothrop (Draf III) procedures. Moreover, in most studies septumplasties have been done in addition to the sinus workup at least in some patients.

In 2016, Kohli et al. published a meta-analysis on olfactory outcomes. They included 31 studies in their analysis, divided into CRSwNP patient studies and a mixed group of data with CRSwNP and CRSsNP patient studies, because sole CRSsNP patient studies were not identified. In summary, the mixed patient group and the polyp group demonstrated a significant improvement in UPSIT scores. This improvement effect was even higher when only hyposmic and anosmic subgroups were included. The change in TDI score in polyp patients was also significantly improved after surgery. The same result was found in the mixed CRS group when looking only at the Sniffin’ Sticks Identification score. However, there are several drawbacks to this pooled analysis. Many studies were included with subgroups of only seven to 10 patients, and there were studies describing special conditions such as osteitis, or surgical maneuvers such as olfactory cleft polyp removal, which are not generally accepted. Additionally, in the analysis of the Sniffin’ Sticks Identification score results in the polyp group, tests with different numbers of items (12 in some trials and 16 in other trials) were merged, which could lead to a distortion of the results. The same applies to the mixed CRS group in which 12 items were used in some studies. Another difficulty in a meta-analysis like this is that only mean values are described, which does not necessarily indicate a clinically relevant improvement or even a change in the olfactory category, for example, anosmic to hyposmic or hyposmic to normosmic.
### TABLE I.
Summary of Results of 24 Studies Investigating Olfaction After Endonasal Sinus Surgery for CRS With University of Pennsylvania Smell Test and Sniffin’ Sticks Test Including Threshold, Discrimination, and Identification.

<table>
<thead>
<tr>
<th>Smell Test (items)</th>
<th>Number of initially included patients</th>
<th>Patients with olfactory dysfunction (%)</th>
<th>Time of test after surgery (w, weeks; m, months; y, years)</th>
<th>Improvement in olfaction (%)</th>
<th>Improvement in CRSwNP (%)</th>
<th>Improvement in CRSmP (%)</th>
<th>Improvement in revision surgery (%)</th>
<th>Improvement in anosmia (%)</th>
<th>Improvement in hyposmia (%)</th>
<th>Mean improvement in % in relation to total score of the used smell test</th>
<th>Maximum normosmic after surgery (%)</th>
<th>Deterioration in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-SIT (12)</td>
<td>280</td>
<td>30</td>
<td>6-12 m</td>
<td>66.1</td>
<td>41.1</td>
<td>25.1</td>
<td>?</td>
<td>?</td>
<td>19</td>
<td>66.4</td>
<td>38.0</td>
<td>0</td>
</tr>
<tr>
<td>B-SIT (12)</td>
<td>122</td>
<td>28</td>
<td>6-18 m</td>
<td>122.1</td>
<td>38.1</td>
<td>60.1</td>
<td>62.1</td>
<td>34</td>
<td>5</td>
<td>38.1</td>
<td>83</td>
<td>Levy 2016</td>
</tr>
<tr>
<td>SSI (12)</td>
<td></td>
<td>?</td>
<td>14-24 m</td>
<td>25.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Konstantinidis 2007</td>
</tr>
<tr>
<td>SSI (12)</td>
<td>97</td>
<td>?</td>
<td>6 m</td>
<td>97.1</td>
<td>75</td>
<td>72</td>
<td>73</td>
<td>24</td>
<td></td>
<td>8</td>
<td>25.1</td>
<td>Lind 2016</td>
</tr>
<tr>
<td>SSI (16)</td>
<td>157</td>
<td>?</td>
<td>3.5 m</td>
<td>157.1</td>
<td>15</td>
<td>19</td>
<td>30</td>
<td>48</td>
<td>13</td>
<td>61/44</td>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>SSI (16)</td>
<td>41</td>
<td>83</td>
<td>0.5, 8, 6 m</td>
<td>41.1</td>
<td>23</td>
<td>37</td>
<td>35</td>
<td>24</td>
<td>13</td>
<td>61/44</td>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>SI-T</td>
<td></td>
<td>64</td>
<td>3 m</td>
<td>64.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Elsherif 2007</td>
</tr>
<tr>
<td>SIT-40</td>
<td>111</td>
<td>68</td>
<td>6, 12 m</td>
<td>111.1</td>
<td>46</td>
<td>43</td>
<td>68</td>
<td>19</td>
<td>36</td>
<td>29</td>
<td>27.74</td>
<td>0</td>
</tr>
<tr>
<td>SIT-40</td>
<td>101</td>
<td>63</td>
<td>16.7 m</td>
<td>101.1</td>
<td>50</td>
<td>51</td>
<td>24</td>
<td>40</td>
<td>30.5</td>
<td>55</td>
<td>6</td>
<td>Soler 2010</td>
</tr>
<tr>
<td>SIT-40 (CV)</td>
<td>32</td>
<td>100</td>
<td>6,12 m</td>
<td>29.1</td>
<td>12</td>
<td>17</td>
<td>29</td>
<td></td>
<td>13</td>
<td>45</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>SIT-40 (CV)</td>
<td>100</td>
<td>?</td>
<td>2,3 m</td>
<td>100.1</td>
<td>52</td>
<td>48</td>
<td>100</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
<td>Jiang 2014</td>
</tr>
<tr>
<td>SIT-40</td>
<td>121</td>
<td>72</td>
<td>6 m</td>
<td>121.2</td>
<td>51</td>
<td>70</td>
<td>52</td>
<td>69</td>
<td>28</td>
<td>59</td>
<td></td>
<td>Soler 2016</td>
</tr>
<tr>
<td>SIT-40</td>
<td>113</td>
<td>?</td>
<td>&gt;50 m</td>
<td>113.1</td>
<td>60</td>
<td>53</td>
<td>100</td>
<td>13</td>
<td></td>
<td>6</td>
<td>46</td>
<td>41</td>
</tr>
<tr>
<td>T-SIT (40)</td>
<td>200</td>
<td>100</td>
<td>2.3 m</td>
<td>200.1</td>
<td>100</td>
<td></td>
<td>50</td>
<td></td>
<td></td>
<td>14</td>
<td></td>
<td>Lund 1994</td>
</tr>
<tr>
<td>SSI (11)</td>
<td>96</td>
<td>72</td>
<td>6 w</td>
<td>96.1</td>
<td>44</td>
<td>52.7</td>
<td>46</td>
<td>23</td>
<td>31/17/17.1</td>
<td>48.1</td>
<td>0</td>
<td>Nguyen 2015</td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>52</td>
<td>86.8</td>
<td>1.3,6 m</td>
<td>52.1</td>
<td>57</td>
<td>26</td>
<td>19</td>
<td>24</td>
<td>43</td>
<td>0</td>
<td>Federsispil 2008</td>
<td></td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>19</td>
<td>?</td>
<td>3 m</td>
<td>19.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
<td></td>
<td>Guertler 2009</td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>116</td>
<td>400</td>
<td>1,3, 6 m</td>
<td>116.1</td>
<td>78</td>
<td>88</td>
<td>99</td>
<td>17</td>
<td>43.5/32.9</td>
<td>39</td>
<td>Daniels 2009</td>
<td></td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>116</td>
<td>400</td>
<td>1,3, 6 m</td>
<td>116.1</td>
<td>78</td>
<td>88</td>
<td>99</td>
<td>17</td>
<td>43.5/32.9</td>
<td>39</td>
<td>Daniels 2009</td>
<td></td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>27</td>
<td>?</td>
<td>12-24 m</td>
<td>27.1</td>
<td>20</td>
<td>7</td>
<td>27</td>
<td>13</td>
<td>21.3</td>
<td>74.1</td>
<td>4</td>
<td>Konstantinidis 2010</td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>117</td>
<td>76</td>
<td>12 m</td>
<td>117.1</td>
<td>54</td>
<td>57</td>
<td>111</td>
<td>36</td>
<td>48</td>
<td>20</td>
<td></td>
<td>Katomichelakis 2014</td>
</tr>
<tr>
<td>SSI (TDI)</td>
<td>21</td>
<td>74</td>
<td>6 m</td>
<td>21.1</td>
<td>15</td>
<td>9</td>
<td>9</td>
<td>5</td>
<td>10.6</td>
<td>42.1</td>
<td>5</td>
<td>Walliscek-Owors, 2018</td>
</tr>
</tbody>
</table>

Those publications with lower SIT-items or SS-I or T only are marked by an orange frame, those using the SIT-40 item test by a yellow frame, and those using more than one component by a green frame. Green arrays symbolize statistically significant improvements, red arrays negative results, the numbers displaying the count of included patients. The colors of the arrays with the preoperative prevalence and the improvements of patients are explained by the following table:

<table>
<thead>
<tr>
<th>Prevalence (%)</th>
<th>Improvement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-100</td>
<td>0-20</td>
</tr>
<tr>
<td>60-80</td>
<td>20-40</td>
</tr>
<tr>
<td>40-60</td>
<td>40-60</td>
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<tr>
<td>20-40</td>
<td>60-80</td>
</tr>
<tr>
<td>0-20</td>
<td>80-100</td>
</tr>
</tbody>
</table>

- aBSIT-score ≤ 8.
- bIn multivariate analysis/regression model.
- cOnly patients with preoperatively hypo- or anosmia and with high Lund-MacKay score.
- dChange of at least 3 points in Sniffin’ Sticks Identification Score.
- eRecursive partitioning.
- fInitially anosmic patients.
- gAt least 4 points in 40 item University of Pennsylvania Smell Identification Test in hyposmics resp. anosmics.
- hTrend in statistics.
- iChange of at least 6 points in TDI-Score.
- jChange of at least 5 points in TDI-Score.
- kChange of at least 5 points in TDI-Score.
- lIn CRSwNP.
- mInitially anosmic patients.
- nPrimary surgery.
- oRevision surgery.
- pNo normosmic turned anosmic.
- qFrom anosmic to hyposmic or hyposmic to normosmic.
- rDecrease of at least 1 point in USPIT-Score.
- s7 patients with nonsignificant TDI-Score drop of 1 point.
- B-SIT = Brief Smell Identification Test; CRS = chronic rhinosinusitis; CRSwNP = chronic rhinosinusitis without nasal polyps; CRSwNP = chronic rhinosinusitis with nasal polyps; CV = Chinese Version; D = discrimination; I = identification; m = months; SIT = Smell Identification Test; SS = Sniffin’ Sticks Test; T = threshold; TDI = Threshold Discrimination Identification; UPSIT = University of Pennsylvania Smell Identification Test; w = weeks; y = years.
Limitations of the Present Review

Some limitations of the current review must be considered. This review included articles, in which not only different smell tests were used, but also tests with limited items or extended test batteries for different qualities of the sense of smell TDI (threshold, discrimination, identification) have been analyzed. This was the main reason that it seemed not to be productive to do a systematic review or to do a systematic statistical analysis. Additionally, the type of surgery that was done was described in detail in only a small number of studies. However, it can be claimed that in all articles more than just polypectomies were performed. In some trials, very extended surgical approaches such as Draf III (Lothrop) procedures also were mentioned.

Nevertheless, in this review 24 studies were identified that used standardized and widespread testing methods, which can provide some information on this topic. In all but one study, an improvement in olfaction after surgery was documented in psychophysical testing (at least in defined subgroups), which leads to the conclusion that sinus surgery in general can help patients with CRS regain their sense of smell. Interestingly, most studies using the UPSIT documented an improvement in olfaction in CRSwNP only, whereas trials with the UPSIT screening test (12 item B-SIT) or the Sniffin’ Sticks Identification (12 or 16 items) showed an improvement in the CRSwNP and CRSsNP groups. On the other hand, all the trials that used the whole Sniffin’ Sticks battery of T, D, and I excluded CRSsNP patients. Two of these studies seem to describe the same patient population.

Rhinosinusitis patients with polyps show lower smell test results preoperatively in comparison to patients without polyps, which is an already well-known fact. This is explained by an additional blocking component of the olfactory cleft by the polyps and higher inflammatory activity in the mucosa. This fact is supported by studies that investigate influencing factors on the recovery of olfaction by regression models because they reveal that polyposis and anosmia at baseline lead to a better output. Of course, an improvement in an olfactory test is more probable in individuals who have lower baseline scores. This might also explain why, in some studies, only anosmic persons showed a significant improvement in olfaction after surgery and hypoosmic individuals did not. In some studies using regression models, previous sinus surgery was accompanied by up to a threefold lower chance of improving olfaction after revision surgery, as compared to primary surgery.

The improvement in olfaction that was achieved 3 to 6 months after surgery seemed to be stable in the studies, with a further follow-up of 12 or even 24 months for most of the patients. These results are in accordance with long-term studies that have found a sustaining effect of sinus surgery on olfaction for a period of up to 5 years after surgery. It should be recognized that, in most of the studies, topical nasal steroids were used in the postoperative period to achieve a continuous anti-inflammatory effect on the sinus and olfactory mucosa.

The risk of deterioration in olfaction seems to be limited to a maximum of 5% to 10% of patients undergoing sinus surgery, which confirms early results of sinus surgery.

In addition to a 2012 review by Rudmik and Smith, it can be concluded that an improvement in olfactory function could be achieved to a clinically meaningful extent in at least every second patient in many studies if more sophisticated testing methods, such as the UPSIT or the whole Sniffin’ Sticks test battery, were applied. This was true for almost all CRSwNP subgroups, whereas the results in CRSsNP patients are still inconsistent, which perhaps to some extent is because almost all studies that used the whole Sniffin’ Sticks battery investigated patients with polyps only. Revision surgery per se does not seem to be an obstacle for improved sense of smell; however, recovery is usually poorer in cases in which more interventions have been necessary and the disease of a longer duration.

Comparison With Other Treatment Modalities

The success of recovery in olfaction after surgery should be compared with the results of patients who were treated only medically. One study using the whole Sniffin’ Sticks Test in 408 CRS patients treated only conservatively (topical or systemic steroids) describes a clinical improvement of 5.5 points in 43% of subjects after a mean follow-up period of 28 weeks. Interestingly, in the same cohort, deterioration was found in 24% of patients. Those patients with a longer duration of the disease (> 24 months) had a worse outcome than patients with a shorter duration (< 24 months).

A meta-analysis of the use of topical and systemic steroids in CRS patients showed significant improvements in subjective olfaction scores. In trials using psychophysical olfactory testing, this was true for systemic steroids (two studies) but not for topical steroids because in five of these studies only one of nine subgroups showed a statistically significant improvement.

It should be mentioned that topical steroids are considered standard therapy after sinus surgery at many centers performing these operations. Only 11 of the 24 studies included in this review commented on different methods of postoperative management, including various medications (topical and oral steroids, antibiotics, and local saline washes) for different time intervals.

One study addressed the change in olfaction after surgery compared with medical treatment only and found a significant improvement within both groups but no difference between the groups. However, in this study, an olfactory deficit could be detected at the initial testing in only 30% of patients when using the 12-item B-SIT score. This percentage is similar in studies analyzed with the same screening test in this review, but it differs significantly from other trials that used more extended testing methods with olfactory impairment rates between 63% and 100%. In a nonrandomized study comparing medical (topical steroids) and surgical (followed by topical steroid application) therapy for CRS using the Connecticut Chemosensory Clinical Research Center Test, the surgical group significantly outperformed the medical group. The surgical group showed a mean improvement of 50% in the olfactory test after 12 weeks, compared to a 20% mean improvement in the medically treated group.
CONCLUSION

Recovery of olfactory function after sinus surgery for CRS can be expected in many patients, especially if they show anosmic or hyposmic results in well-established testing methods such as UPSIT or Sniffin’ Sticks. In patients with CRSsNP, it seems to be more likely that sense of smell can be restored to a certain extent in comparison with CRSsNP patients. An ongoing recovery of olfaction in the polyp group can be detected during the first 6 postoperative months. A clinically relevant improvement in olfaction, which patients usually realize, can be achieved at least in every second patient; however, a complete reestablishment of normosmia seems likely for only one-third of patients. Previous sinus surgery, a longer history of sinus disease, and preoperative normosmia have a negative effect on the outcome of olfaction after surgery. Testing sense of smell in patients undergoing sinus surgery with established test kits is crucial to determine the full dimension of the disease and monitor the effects of surgery.

BIBLIOGRAPHY


