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Endoscopic sinus surgery: Its subjective medium-term outcome in chronic rhinosinusitis*

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SUMMARY

***Objective**: The subjective success of endoscopic sinus surgery (ESS) for chronic rhinosinusitis has been reported mainly after short-term follow-up studies, but may change with increasing time after surgery. We assessed in a retrospective study the medium-term clinical outcome of ESS as complete ethmoidectomy or pansinus surgery in 208 patients with chronic rhinosinusitis.*

***Patients and methods**: The senior author performed the surgeries according to his techniques. We used a questionnaire focusing on nasal obstruction, rhinorrhea, nasal dryness/crusts, sneezing, headache, smell, numbness in cheeks and lips, ear pressure, epiphora, and sore throat. Additionally the subjective influence of sinus surgery on asthma, bronchitis and allergic diseases was evaluated. The mean follow-up was 3.1 years.*

***Results**: Overall success was reported by 92% of all patients. Forty-one percent of all patients with complete ethmoidectomy and 32% of all patients with pansinus surgery described complete resolution of complaints. No differences in clinical success rates were noted when comparing primary surgery or revision. A favorable effect was also reported for asthma, bronchitis and allergic diseases.*

***Conclusion**: Improvements for nasal symptoms and coexisting complaints are demonstrated with a mean observation period of more than 3 years. The value of ESS is underlined for the treatment of patients with chronic rhinosinusitis.*

Key words: chronic rhinosinusitis, sinus surgery, endoscope, outcome study

INTRODUCTION

An estimated 5% of the western population suffers from chronic rhinosinusitis (Hosemann, 2000). Patients typically present with various symptoms including nasal obstruction, headache, rhinorrhea and olfactory disturbance with a considerable impact on the quality of life (Gliklich and Metson, 1995). The treatment of chronic rhinosinusitis is therefore a rising request on otolaryngologists. A cure can still not be offered to numerous patients, this encourages the search for a more detailed understanding of the disease and its various etiologies. In this context outcome evaluations are important for choosing the appropriate treatment modality (Kennedy, 1992). When conservative treatment fails, which is quite common, endoscopic sinus surgery (ESS) is recommended to many patients suffering from chronic rhinosinusitis (Hosemann, 2000; Kennedy, 1992). Otolaryngologists increasingly need to prove the benefits of this treatment option especially in terms of its long lasting effects on clinical symptoms (Garrel et al., 2003).

ESS has been used for over 20 years achieving overall success rates of over 80% for some complaints (Hosemann, 2000). The low incidence in surgical complaints and the minimal postoperative discomfort have contributed significantly to the wide acceptance of ESS in the treatment of chronic rhinosinusitis (Wigand, 1981a; Wigand, 1981b). However outcome studies are still of concern as mainly short-term follow-up studies have been reported. A comparison of these numerous studies is difficult due to the heterogeneous structure of the different study populations and the varying surgical techniques. Improvement rates between 71% and 98% have been reported for short-term follow-up studies (Levine, 1990; Vleming and de Vries, 1991; Stammberger, 1991) with patient satisfaction rates of 80% to 98% (Hoffmann, et al., 1991; Matthews, et al., 1991; Abdel-Hak, et al., 1998). However, it is still controversially discussed if these improvement rates are sustained similarly in long-term follow-up studies (Schaitkin, et al., 1993; Senior, et al., 1998).

The central issue of endoscopic sinus surgery is to recover drainage and ventilation of the diseased sinuses. The two main techniques of ESS are the limited approach focusing on distinct pathologies (Stammberger, 1986; Stammberger and Posawetz, 1990) and the extended approach advocating the

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removal of all ethmoid cells (Wigand, 1978; Wigand, et al., 1978; Wigand, 1981b; Wigand, 1981a). There is an ongoing discussion regarding the most beneficial technique for primary as well as for revision surgery, whereas recent data has shown similar outcome results in their assessment of symptoms (Kuehnemund et al., 2002).

To estimate the values of these surgical strategies for the treatment of chronic rhinosinusitis, the medium- and long-term subjective outcome achieved by a single surgeon are of special interest. The aim of this study was to evaluate comprehensive patient-centered outcome measurements on the extended ESS approach performed by the senior author. This was performed in a large patient population in order to quantify the benefits and the impact of the procedure on the overall health of the patients in a medium-term perspective.

MATERIALS AND METHODS

Study design

In order to evaluate the subjective outcome of ESS standardized questionnaires were sent to 506 patients treated surgically for advanced chronic rhinosinusitis by the senior author. Three hundred and twenty of these patients underwent complete ethmoidectomy or pansinus surgery according to the extent of the disease, either as primary intervention or revision. Two hundred and eight out of 320 patients responded to the questionnaire (return rate 65%) and reported their overall subjective judgment on success and the outcome of their symptoms presenting before and after surgery. The 186 patients that received partial resections of the ethmoid will be discussed separately.

The following leading symptoms were included in the questionnaire: nasal obstruction, rhinorrhea, dryness/crusts, sneezing, smell, taste, headache, ear pressure, epiphora, sore throat and numbness in cheek and lips. The questionnaire contained additional questions on coexisting morbidity factors and treatments connected with sinus disease. It asked for family history of asthma and allergies, the need for asthma and bronchitis medication; the need for seasonal and perennial allergic rhinitis treatment; the frequency of respiratory infections, and the overall satisfaction with the surgery.

The responses were rated as following: I, complete healing (patient reported freedom of symptom); II, major improvement (symptom occurs rarely); III, minor improvement (mild decrease of symptom after surgery); IV, no change in number and intensity of clinical symptoms; V, worse than before surgery. For each specific symptom the clinical outcome was assigned to the categories complete healing, major or minor improvement.

Surgical procedure

Surgery was performed under general anesthesia and controlled arterial hypotension. In primary interventions the surgery started very often with a septoplasty for both, a better intraoperative approach to the sinuses and amelioration of nasal respiration. This was followed by trimming of the middle turbinate. Complete ethmoidectomy was performed in combined anterior-posterior and posterior-anterior direction exposing the anterior skull base and the nasofrontal duct. The maxillary sinus was controlled by a supraturbinal fenestration. In pansinus surgery the complete ethmoidectomy was combined with a broad fenestration of the sphenoid cavity, this sphenoidotomy mostly preceded the posterior-anterior dissection of the ethmoid, and a frontal sinusotomy. Thus a broad communication between all sinuses was established for the enhancement of ventilation and drainage. The parietal mucosa even when severely diseased was left in place. Cysts and polyps were removed with sharp forceps or double-cup forceps.

For the management of the anterior ethmoid, the frontal and the maxillary sinuses angled optics of at least 70° with suction-irrigation were utilized. Nasal packing was removed on day 2 after surgery and careful postoperative management with daily endoscopic debridements from day 2 to 7 with daily instillation of steroid ointments followed. The intervals of the endoscopic postoperative care were gradually extended to 3 – 14 days, but lasted over two to three months, executed by the referring ENT colleagues (Wigand, 1981a; Wigand, 1981b; Hosemann, 2000).

RESULTS

All 208 patients suffering from extensive chronic, mostly polypoid sinusitis had been operated consecutively between 1986 and 1991. Both, bilateral endoscopic complete ethmoidectomy and pansinus surgeries were performed by the senior author (M.E.W.). For each surgical procedure there were two subgroups, patients with primary intervention and patients with revision, whose primary interventions had all been performed alieno loco. The time intervals between surgery and evaluation were 3.1 years in average, ranging from 11 months to 6.8 years. The age distribution of the patients varied from 5 to 79 years (mean, 47 years), sex distribution was 71% men, 29% women.

Table 1. Clinical symptoms of all patients with advanced chronic rhinosinusitis pre- and postoperatively; for each symptom the improvement score is calculated relative to its preoperative prevalence (n=208).

	preoperative score (%)	postoperative improvement score (%)
nasal obstruction	94	93
rhinorrhea	79	83
dryness · crusts	51	53
sneezing	31	34
smell	31	72
taste	33	93
headache	15	46
ear pressure	22	78
epiphora	30	78
sore throat	30	84
numbness in cheek, lips	6	96

Table 2. Preoperative prevalence and relative postoperative outcome of clinical symptoms after complete ethmoidectomy; postoperative rating as described (complete healing, major improvement, minor improvement, no change and worse). 2a) primary intervention (n = 52). 2b) revision (n = 49).

	preoperative symptoms (%)	postoperative symptoms (%)				
		complete healing	major improvement	minor improvement	no change	worse
nasal obstruction	96	46	31	15	4	4
rhinorrhea	77	33	34	12	15	5
dryness / crusts	44	52	17	13	21	0
sneezing	60	49	42	0	9	0
smell	42	20	36	17	27	0
taste	33	100	0	0	0	0
headache (main complaint)	10	30	30	0	0	0
ear pressure	24	33	50	0	17	0
epiphora	21	45	45	0	0	0
sore throat	21	55	27	18	0	0
numbness (cheeks, lips)	6	50	0	0	50	0

	preoperative symptoms (%)	postoperative symptoms (%)				
		complete healing	major improvement	minor improvement	no change	worse
nasal obstruction	92	34	20	19	15	2
rhinorrhea	90	13	39	26	15	7
dryness / crusts	65	34	21	22	14	3
sneezing	57	40	40	11	9	0
smell	33	15	18	29	38	0
taste	37	50	30	0	20	0
headache (main complaint)	14	57	0	43	0	0
ear pressure	23	16	45	16	16	9
epiphora	12	67	0	0	33	0
sore throat	41	20	25	35	10	0
numbness (cheeks,lips)	16	0	0	0	100	0

The postoperative subjective judgment scores for nasal symptoms showed major improvements after surgery in all categories (Table 1). Improvement scores of more than 90% were achieved for nasal obstruction, sneezing, headache and sore throat in relation to their prevalence. The percentage of preoperative headache reported here represents patients with headache as leading symptom, another 34% of patients reported headache as a minor complaint, with equally high postoperative benefits.

The preoperative complaints further differentiated according to the surgical procedure, showed no significant differences in benefits between the subgroups. Hundred and one patients had bilateral complete ethmoidectomy, with 52 patients as primary intervention and 49 as revision (Table 2 a/b). Hundred and seven patients had bilateral pansinus surgery, with 79 patients as primary intervention and 28 patients as revision (Table 3 a/b). The questionnaire applied in this study gave patients the option to grade their postoperative results and benefits. There is a clear

Table 3. Preoperative prevalence and relative postoperative outcome of clinical symptoms after pansinus surgery; postoperative rating as described (complete healing, major improvement, minor improvement, no change and worse). 3a) primary intervention (n = 79). 3b) revision (n = 28).

		postoperative symptoms (%)				
	preoperative symptoms (%)	complete healing	major improvement	minor improvement	no change	worse
nasal obstruction	90	48	42	10	1	1
rhinorrhea	76	52	44	18	3	3
dryness / crusts	51	64	23	4	10	3
sneezing	44	49	33	11	3	3
smell	26	37	37	12	14	0
taste	32	71	21	0	8	0
headache (main complaint)	20	60	31	13	6	0
ear pressure	22	10	47	6	25	8
epiphora	25	65	10	0	20	5
sore throat	34	49	41	7	4	0
numbness (cheeks, lips)	14	67	0	0	33	0

		postoperative symptoms (%)				
	preoperative symptoms (%)	complete healing	major improvement	minor improvement	no change	worse
nasal obstruction	89	44	28	24	4	0
rhinorrhea	71	16	37	9	18	16
dryness / crusts	43	43	14	14	29	0
sneezing	40	42	53	0	5	0
smell	23	25	20	5	50	0
taste	32	50	50	0	0	0
headache (main complaint)	14	50	0	25	25	0
ear pressure	21	33	33	17	17	0
epiphora	14	75	0	0	25	0
sore throat	4	25	25	25	0	25
numbness (cheeks, lips)	7	50	0	0	50	0

tendency to report major improvement or complete healing for most clinical symptoms and associated parameters (Table 2 a/b and Table 3 a/b). All patients with complete ethmoidectomy had complete relief from their headache. Smell disturbances and numbness in cheeks and lips were the most postoperatively persisting complaints in the presented series of 208 patients (Figure 1 a/b). Patients reporting coexisting conditions or treatments showed high benefits though independent of the type of surgical procedure. A clear benefit for bronchial asthma and bronchitis was found in more than two thirds of patients, whereas approximately 50% of these patients still needed medical treatment. Similarly, seasonal and perennial allergy as well as respiratory infections were improved postoperatively (Figure 2). Independently of the surgical procedure - complete ethmoidectomy or pansinus surgery - this retrospective study with 208 patients confirmed beneficial outcome for all recorded symptoms and also accordingly in the overall subjective judgment scores in the medium-term perspective (Table 4 a/b).

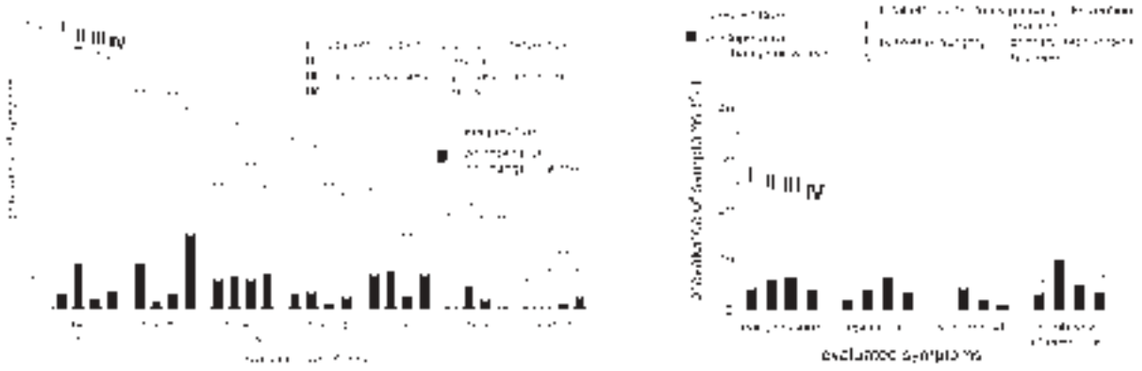

Figure 1. The preoperative prevalence of specific symptoms demonstrated as white bar; there are four white bars for each symptom, each representing a surgical method. Black bars integrated in white bars demonstrate the number of patients with no change or worsening of symptoms postoperatively. I (n= 52), II (n= 49), III (n=79), IV (n=28). 1a) frequent symptoms. 1b) less frequent symptoms of chronic rhinosinusitis.

DISCUSSION

Clinicians are increasingly being asked for the effectiveness of procedures to treat a particular condition and to choose the most effective one. This is of major importance in diseases of high epidemiological incidence such as chronic rhinosinusitis which are not cured completely in many patients. Although there are many reports describing endoscopic sinus surgery (ESS) procedures and analyzing patient satisfaction as well as endoscopic morphological outcome, it is difficult to compare these studies due to a heterogeneous structure of the presented patient groups, application of varying techniques of ESS, multiple surgeons, various postoperative care and different follow-up strategies. While many short-term follow-up studies for ESS have proven its benefit in the treatment of chronic rhinosinusitis, there is still a need for medium- and long-term results of ESS. It has even been stressed that persistent or recurrent diseases after ESS may become initially symptomatic only after years or even decades (Neel et al., 1987). In general, outcome measurements after ESS focus on subjective or objective endoscopic and radiological evaluations. But still, there are no definite objective standards to classify the results of ESS. The purely endoscopic control or radiological follow-up has limited value in terms of conclusive subjective results. In this context one needs to be aware that objective findings in recurrent or persistent disease may not directly be associated with unchanged or worse postoperative symptoms. Contrary judgments between patients and objective measurements are relatively common. In fact, in a series with 165 patients after ESS 52% reported persistent or recurrent disease, however feeling personally good (Vleming and de Vries, 1991). So one main goal in the analysis of ESS outcome is to evaluate the number of relevant clinical symptoms (Stammberger, 1986; Piccirillo et al., 1998).

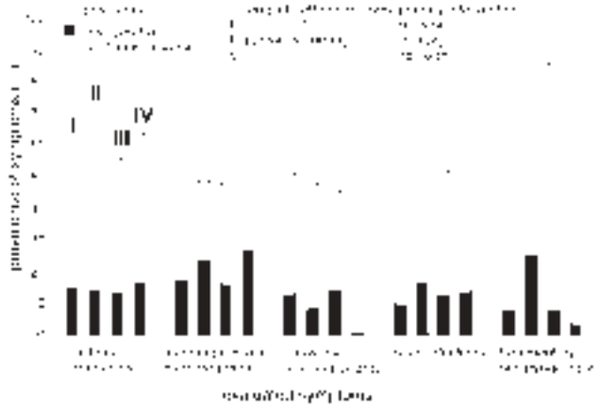

Figure 2. The preoperative prevalence of coexisting morbidity factors and treatments demonstrated as white bar; there are four white bars for each factor, each representing a specific surgical subgroup. Black bars integrated in white bars demonstrate the number of patients with no change or worsening of these parameters postoperatively.

The important finding of this retrospective study on chronic rhinosinusitis is the confirmation that there are strong subjective medium-term benefits after complete ethmoidectomy or pansinus surgery when ESS is performed according to the technique described above. While most previous studies included data from procedures of more than one surgeon (Freedman and Kern, 1979), the specific value of the data presented here is, that all patients were treated by a single surgeon, hence presenting a highly standardised patient population.

One of the first reports on the effectiveness of the technique described here was a short-term follow-up of 12 months with 84 patients. Relief from symptoms was achieved in 83% of patients (Wigand, 1981b). Another group of 44 patients with complete ethmoidectomy had a postoperative follow-up of up to 5 years. While nasal obstruction (72%), rhinorrhea (37.5%) and headache (69%) had improved significantly, smell disturbances improved only in 17%. Another 220 patients treated by ethmoidectomy or pansinus surgery reported complete resolution or at least improvements for headache in 93.4%, nasal obstruction in 93.3%, rhinorrhea in 85.5%, and smell disturbances in 84.9% after a median follow-up of 4.3 years (Hosemann et al., 1988). While improvement rates for nasal

Table 4. The postoperative overall subjective judgment scores; rated as described (complete healing, major improvement, minor improvement, no change and worse). 4a) complete ethmoidectomy. 4b) pansinus surgery.

	complete healing (%)	major improvement (%)	minor improvement (%)	no change (%)	worse (%)
primary intervention	29	42	17	8	4
revision	13	55	16	14	2

	complete healing (%)	major improvement (%)	minor improvement (%)	no change (%)	worse (%)
primary intervention	33	50	13	4	0
revision	32	25	29	14	0

obstruction are commonly 90% and 80% for headache according to literature, the improvement rates for postnasal discharge vary between 25% and 92% (Hosemann, 2000). In this study smell disturbances and numbness in cheeks and lips improved the least. However, there is less improvement in olfactory function here than in other studies. It has already been postulated that the improvement of olfactory function is less than generally assumed (Delank and Stoll, 1994; Delank and Stoll, 1998). Numbness is rarely mentioned in follow-up studies.

The alternative endoscopic surgical concept developed by Messerklinger and Stammberger, uses the surgical approach adapted to the severity of the disease for each individual patient. This might be a limited opening of the ethmoid or an extensive approach with opening and draining all sinuses, but usually preserving the turbinates (Stammberger, 1986; Stammberger and Posawetz, 1990; Wolf et al., 1995). They showed postoperative data of 500 patients with more than one surgeon and a follow-up of 8 months to 10 years. More than 85% of the patients had very good, 6% good, 4,2% fair results and 4,6% no improvements (Stammberger and Posawetz, 1990).

The postoperative follow-up presented here showed not only benefits for all symptoms reported, but also for the severity of asthma and allergic rhinitis. This finding is according to previous findings. In patients with concomitant asthma it has been reported that ESS decreases significantly the intensity of anti-asthmatic therapy (Hosemann et al., 1990; Nakamura et al., 1999) and airway hyperresponsiveness (Freedman and Kern, 1979; ; Stammberger, 1985; Wolf et al., 1987; Hosemann and Wigand, 1992). It is now clear that this effect is independent from the extent of the surgery or the fact of being a revision. In summary, the patients' general impressions regarding the surgical procedures were as following: more than 80% of the patients, independently from the subgroup, had benefits from surgery. Over 88% of patients with primary complete ethmoidectomy and 84% patients with revision had complete healing from sinus disease, major or minor benefits. Ninety six percent of the patients with primary pansinus surgery and 86% with revision had at least minor benefits. In patients with complete ethmoidectomy 29% with primary intervention and 12% with revision reported complete healing with freedom of symptoms; in patients with pansinus surgery this was achieved in 33% for primary intervention and in 32% for revision.

The outcome of this retrospective study proves that the technique reported here is equally good for primary and revision surgery, making this procedure especially valuable for revisions. In the hands of an experienced surgeon patients of all categories had similar subjective judgments on the success of the surgery regarding clinical symptoms and coexisting morbidity factors, hence underlining the benefit of endoscopic sinus surgery.

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