

# Long term effects of cutting forceps in Endoscopic Sinus Surgery

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## SUMMARY

**Background:** At present, some authors prefer cutting forceps to conventional non-cutting forceps in Endoscopic Sinus Surgery, based on the assumption of superior wound healing due to mucosal preservation, without any proof of better clinical outcome. The purpose of this study was to elaborate our previously reported short-term results, by evaluating the long-term outcome.

**Methods:** One hundred consecutive patients, who underwent a bilateral Endoscopic Sinus Surgery procedure, received follow-up in a prospective, double-blinded way. Cutting forceps had been randomly used on one side and non-cutting forceps on the other side. Lateralised symptoms (headache, maxillary pressure, nasal obstruction and secretions) and endoscopic findings (secretion, pus, blood, crusts, oedema, polyps and adhesions) were evaluated on both sides 1 year postoperatively.

**Results:** Both types of instruments gave satisfactory healing situations. Similar to the short-term follow-up results, no significant difference in the global symptom and endoscopic score between the 2 types of instruments was found. The analysis of individual symptoms and endoscopic parameters also showed no difference.

**Conclusion:** Cutting forceps do not result in a better subjective or endoscopic healing evaluation after one year, compared to non-cutting forceps.

*Key words:* endoscopic sinus surgery, instruments, cutting forceps, non-cutting forceps, long-term results

## INTRODUCTION

“Endoscopic Sinus Surgery (ESS)” is presently accepted to be the standard surgical technique when operating on inflammatory paranasal sinus pathology [1,2]. With this minimally invasive procedure, surgeons aim to restore ventilation and mucociliary drainage while maximally preserving healthy mucosa [3-5]. Undeniably, mucosal preservation is paramount and in the last few years techniques as well as equipment have been designed to achieve this goal. In the field of equipment, the discussion remains however what dissection instruments achieve this goal best. At present, cutting forceps, non-cutting forceps and microdebriders are used separately or in combination [1,2 6-9]. With all combinations, excellent short-term and long-term results are reported [1,7,8,10-12].

In the literature, a theoretical advantage is hypothesized for the cutting forceps. Non-cutting dissection instruments are thought to be not delicate enough as required by a functional approach. They tend to grab and strip mucosa imprecisely, leading to exposure of bony surfaces [6,13]. Cutting forceps are believed to remove diseased tissue more selectively or together with the underlying bony partitions, leaving behind healthy mucosa lining the resulting cavities [1,13,14]. Less denudation

of bone would cause faster and improved healing and better prevention of scar formation, leading to a better long-term outcome. We wanted to test the validity of this hitherto unproven hypothesis. If the type of instrument plays a role in the mucosal preservation and the cutting instruments are indeed more mucosa-saving, than the subjective and objective evaluation of the postoperative cavities would have to differ.

Previously, we reported the short-term results of a study comparing cutting forceps with non-cutting forceps [15]. Both types of instruments were effective in resolving sinus pathology and there were no differences in symptom score and endoscopic assessment of the healing process in the first 3 postoperative weeks [15].

The goal of the present study is to report on the results at long-term follow-up. Because pathologic changes in the mucosa in the healing process occur up till 1 year after endoscopic surgery [13], the double-blind study with paired observations is extended to 1 year by evaluating symptoms as well as endoscopic findings. In addition, we studied the percentage of recurrent pathology and bone abnormalities on available postoperative CT scans.

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## MATERIAL AND METHODS

### Patients

The demographic data of the one hundred consecutive patients with a diagnosis of bilateral symmetric sinus disease are enumerated in Table 1. Twenty-five patients had undergone previous sinus surgery, a Caldwell-Luc operation, ESS procedures or multiple polypectomies.

Table 1. demographic data.

Distribution of indication for surgery	
- chronic rhinosinusitis without polyps	43%
- chronic rhinosinusitis with polyps	35%
- recurrent acute rhinosinusitis	18%
- various indications	4%
Exclusion criteria	
- bilateral asymmetric disease	
- paranasal sinus tumours	
- paediatric patients (<12 years)	
- cystic fibrosis or ciliary dysfunction	
- immune-compromised patients	
Presence of associated diseases	
- asthma	22%
- allergy	15%
- APA syndrome	1%

Table 2. Used forceps.

cutting side	non-cutting side
Blakesley nasal cutting forceps (Rhinoforce, Karl Storz) straight, size 3 mm straight, size 4 mm	Weil-Blakesley ethmoid forceps (Richard Wolf) straight, size 2 45° upturned, size 2 90° upturned, size 2
Grünwald-Henke nasal cutting forceps (Rhinoforce, Karl Storz) straight, size 3 mm straight, size 3,5 mm 45° upturned, size 3 mm 45° upturned, size 3,5 mm	
backbiting punch Ostrum-Wolf (Richard Wolf)	backbiting punch Ostrum-Wolf (Richard Wolf)
giraffe forceps (Lapperre) 70° upturned, vertical opening 70° upturned, horizontal opening 110° upturned, vertical opening 110° upturned, horizontal opening	giraffe forceps (Lapperre) 70° upturned, vertical opening 70° upturned, horizontal opening 110° upturned, vertical opening 110° upturned, horizontal opening

### Operation procedures

The operative procedures, with random assignment of cutting instruments to one side and non-cutting instruments to the other side of the nose, were performed under local or general anaesthesia from November 7, 1997 to August 5, 1998. Anaesthetic techniques were described earlier [16]. Four mm diameter 0°, 30° and rarely 70° endoscopes were used. Blood was removed from the operation field, using classical straight and curved suction cannulas. Surgery started with an uncinectomy, incising the lateral nasal wall with a sickle knife. From this moment on, a distinction between the 2 sides was made. On the one side, there was a choice between the different cutting forceps, while on the other side one had to choose between non-cutting forceps (Table 2). Exceptions to the rule of strict separation of cutting and non-cutting instruments were the backbiting and the giraffe forceps, being only available as cutting and respectively as non-cutting forceps. If needed, the cutting backbiter was used bilaterally to enlarge the maxillary ostium anteriorly and the non-cutting giraffe forceps to remove thin bony septa and pathologic mucosa from the frontal recess. The anterior ethmoid was always addressed first and based on preoperative computer tomographic and endoscopic evaluations, additional regions were opened and cleared.

### Postoperative care

Postoperative care was similar for both methods. The day following surgery, the regions addressed were suction-cleaned and nasal irrigations were started. Each patient received dexamethasone (Celestone®) for 20 days. Randomly and within the scope of another clinical trial, a part of the patient group was treated for 10 days with postoperative antibiotics (cefuroxime, Zinnat®). Given the paired observations with regard to the surgical instruments to be compared, this random administration of antibiotics can be assumed to have no effect on the observed differences according to surgical techniques. Moreover, the above-mentioned study concluded that antibiotics did not influence the immediate postoperative clinical evaluation after ESS [17]. After discharge, patients returned on 4 fixed points in time (day 3, 8, 15 and 22) for symptom and endoscopic evaluation and suction cleaning.

### Follow-up

After one year, patients were invited for a final visit in the scope of the study.

The long-term follow-up visit ranged from August 6, 1998 until October 15, 1999. The mean time interval between operation date and long-term follow-up visit was 369 days (standard deviation of 95 days). Ten patients dropped out. At this final visit, the appreciation of the patient for the left and the right side was noted on the basis of 4 lateralised symptoms: headache, maxillary pressure, obstruction of the nose and secretions. Each parameter evaluation was performed in a 0-3 grading scale (no, little, moderate and severe subjective burden),

adding up to a total symptom score between 0 and 12 for both sides of the nose. The patients were asked to indicate a best side or no difference and to give a global symptom score (0-3) to each side. Subsequently, an experienced rhinologist, blinded of the side where cutting instruments had been used, performed an endoscopic examination. Seven parameters (secretions, pus, blood, crusts, oedema, polyps and adhesions) were checked in order to score the two sides. Grading the presence of these parameters between 0 and 3 (not, rarely, moderately and severely present at endoscopy) rendered a total endoscopic score between 0 and 21 for both sides of the nose. The endoscopist also gave a global endoscopic score from 0 to 3 to each side and indicated a best side or no difference.

*Retrospective study*

The files of all patients were searched for postoperative CT scan imaging, as we were interested in problems of postoperative (sided) osteogenesis. Because of the non-ethical aspect of radiological exposure of asymptomatic patients, we did not include a systematic long term CT screening. If the osteogenesis pathology were to be important, we suspected it to be in the "problem cases".

In a period of 855 days (standard deviation of 527 days), 22 of the 100 patients received this investigation. Nineteen patients were complaining of possible nasally related problems, three had otological (otitis media serosa) or neurological (vertigo, commotio cerebri) pathology. Of the 22 CT scans, only 17 were available for inspection by the authors, looking at recurrent pathology and bony alterations on both sides.

*Statistics*

The results were statistically analysed using the Chi-square-test of Mac Nemar for paired observations. Each patient served as his own control, eliminating all possible confounding effects based on differences between the subjects (degree of disease, associated diseases). This test observes the difference in fraction success between cutting methods and non-cutting methods, resulting in a "p" value. This "p" value was then corrected by the Bonferroni factor for multiple comparisons.

**RESULTS**

*Subjective symptoms*

The total symptom score (0-12) of the 90 patients increased slightly in the one-year period after surgery. The 50<sup>th</sup>, 75<sup>th</sup> and 95<sup>th</sup> percentile of the total symptom score of the cutting side at the final visit was 1, 3 and 6 compared to 1, 2 and 5 at the visit 22 days postoperatively (Figure 1). Non-cutting surgery resulted in an increase of the P50, P75 and P95 to 1, 3 and 5, coming from the short-term scores of 1, 2 and 5. In this raise of complaints, no significant difference in global symptom score between the two methods could be noted (Figure 2). The remaining amount of global subjective burden after both types of surgery was comparable.

Division of subgroups according to the indication, the extent

of surgery and the use of postoperative antibiotics, gave no significant difference between treatments.

Individual analysis of the 4 lateralised symptoms was performed. The occurrence of each parameter, after cutting as well as after non-cutting surgery, increased in 1-year time. Again, no statistically significant difference between treatments could be detected for each parameter (headache: p=1.00; maxillary pressure: p=0.55; obstruction of the nose: p=0.79; secretions: p=1.00) (Figure 2).

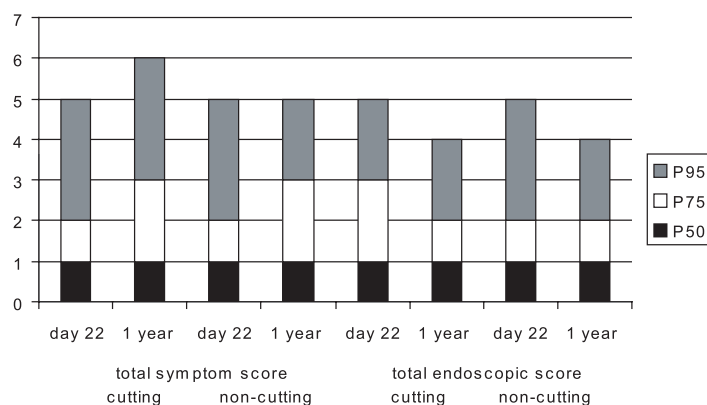


Figure 1. Evolution of the 50<sup>th</sup>, 75<sup>th</sup> and 95<sup>th</sup> percentile of the total symptom and endoscopic score in one year.

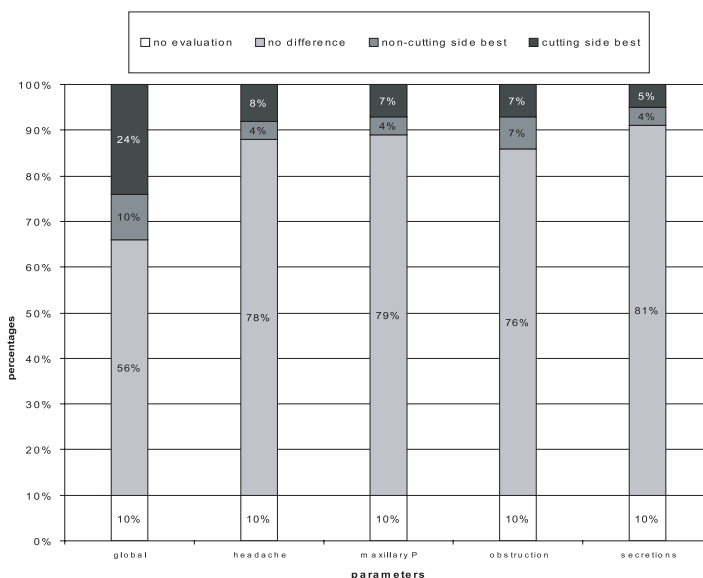


Figure 2. Percentages of subjective difference 1 year after surgery.

*Endoscopic findings*

The total endoscopic score (0-21) comparison of the visit after 3 weeks against the visit after 1 year showed a further healing of the nasal cavities. We documented a decrease of the 50<sup>th</sup>, 75<sup>th</sup> and 95<sup>th</sup> percentile of the total endoscopic score of the cutting side (initially 1, 3, 5 and finally 1, 2, 4) and of the non-cutting side (initially 1, 2, 5 and finally 1, 2, 4) (Figure 1). Again, no statistically significant difference in global endoscopic score between both treatments could be detected (Figure 3).

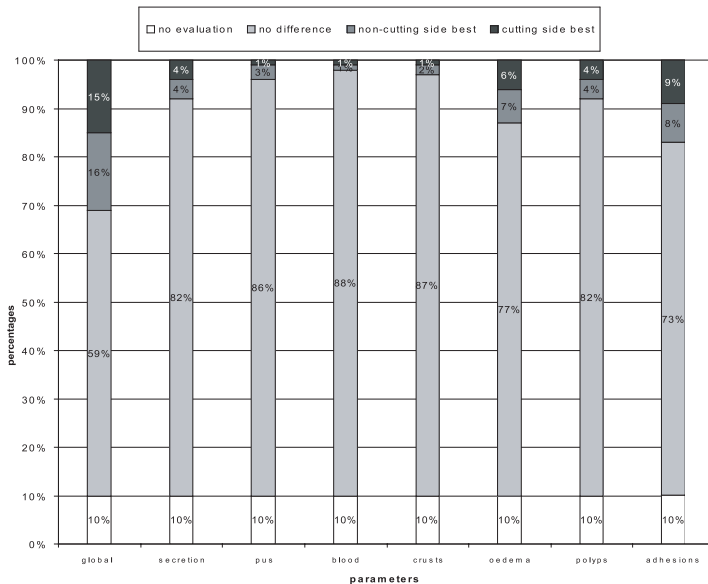


Figure 3. Percentages of endoscopic difference 1 year after surgery.

The endoscopist scored the one-year global healing process after cutting and non-cutting surgery equally.

The results of the patients were analysed in subgroups of indication, extent of surgery and postoperative use of antibiotics. No significant difference between those subgroups could be found.

The occurrence of the 7 endoscopic parameters was individually studied and no significant difference comparing the 2 surgical techniques was found (Figure 3). The parameters secretion, pus, blood, crusts and oedema decreased in the same way in 1 year. The hypothesis “there is no difference in the observed parameter between both sides compared” could not be rejected at respectively  $p=0.72$ ;  $p=0.62$ ;  $p=0.48$ ;  $p=1.00$  and  $p=1.00$ . The recurrence of polyps and the occurrence of adhesions were similar after the two treatments (respectively  $p=0.72$ ;  $p=1.00$ ).

#### CT findings

Of the 17 scans available, one showed bony alterations, namely bone sclerosis of the posterior ethmoid cells on the non-cutting side. Twelve patients had radiologically equal distribution of mucosal swelling on both sides, in 2 patients the nose and sinuses on the cutting side was more obliterated and in 3 patients the non-cutting side was worse.

#### DISCUSSION

In Endoscopic Sinus Surgery, the used dissection instruments are considered to be an important determining factor in mucosal preservation, which on his turn is an important determining factor of better healing and postoperative outcome. Several alternatives for the standard non-cutting forceps are available, as there are the microdebrider and the cutting forceps [1,2,6-9]. Moriyama et al. [7] first brought up the idea of superiority of the cutting forceps in mucosal preservation.

Our previous study of the postoperative follow-up in the first 3 weeks could not confirm this claimed theoretical advantage of the cutting forceps. The evaluation of symptom evolution and

of endoscopic postoperative healing (scarring and adhesions) in 100 consecutive patients did not reveal a significant difference between the cutting-treated side and the non-cutting-treated side of the nose.

As a longer period of follow-up would be a useful supplement, the present cohort was followed up and re-evaluated after 1 year. The visit 1 year following surgery revealed a slight increase in all nasal complaints, a recurrence of polyps, an occurrence of adhesions and a further decrease in other endoscopic parameters in both sides of the nose. These global and parameter-specific, subjective and endoscopic scores could not be proven to differ significantly in the 2 sided treatment groups. A retrospective inspection of available CT scans over a postoperative period of 4 years showed no significant difference in pathology distribution or bone alterations of the differently treated sides. We should mention again that the lack of systematic CT screening could underestimate the problem of osteogenesis as a possible side difference.

In the literature, no comparative studies between cutting and non-cutting instruments can be found to supplement our findings. It therefore remains difficult to establish whether the clinical failure of the mucosa saving cutting theory is due to the incorrectness of the theory itself or to a shortcoming of the used materials and methods or statistical power of this study. However, the strength of the used materials and methods is that the possibility of confounding of the effect of the type of forceps used on treatment outcome by other variables (e.g. pathology type) is accounted for by the within-patient comparison.

A remark to be made is the incomplete separation of cutting and non-cutting instruments in the 2 nasal cavities. Both the cutting backbiting forceps as the non-cutting giraffe forceps are used bilaterally.

An additional explanation why no difference is found could be the use of corticosteroids postoperatively. Although this systemic medication influences both sides equally, the masking effect could leave a small potential difference undiscovered.

Limitation of this study is that instruments were only investigated for postoperative outcome. Perioperative parameters such as blood loss, performance of the instrument, easy-to-use-index or operation time were not taken into account. We wanted to look at the parameters relevant to the patient, not to the surgeon.

Another possible bias, inherent to studies involving surgery instruments, is that of the behaviour of the surgeon. A surgeon may change his technique on a particular side and can be more careful to preserve mucosa while using non-cutting instruments, hence hiding a benefit of the cutting instruments. Our single surgeon-investigator however tried especially to work as mucosa saving as possible on the cutting side. The fact that the long-term result after both types of instruments is similar lets us believe that mucosal preservation or loss caused by the surgeon is the determining factor and that this can be achieved with both types of instruments.

## CONCLUSION

Endoscopic Sinus Surgery with cutting instruments is effective in resolving sinus pathology, but the symptom score and the endoscopic assessment of the healing process after one year are not better than with conventional non-cutting instruments. Cutting and non-cutting instruments provide an identical long-term outcome.

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