The impact of intraoperative antiseptic nasal irrigation during endoscopic sinus surgery on early postoperative results

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ABSTRACT:

Introduction: The main objective of the study was to determine the validity of intraoperative antiseptic treatment during endoscopic sinus surgery and the impact of such a treatment on the postoperative outcomes.

Material and methods: Fifty-five patients with chronic sinusitis, qualified for surgical treatment were enrolled into the trial. It was designed as a prospective, randomized, blinded study. The surgical procedures were performed on both sides, in the same scope. In the next stage, after opening, one side was flushed with saline solution, and the other side with octenidine solution.

Results: The analysis showed a statistically significant reduction in postoperative crusting measured using the Lund-Kennedy scale between the test and the control group. Intraoperative lavage of the paranasal sinuses in both control and study group showed an effect on decreasing the total number of positive postoperative cultures relative to preoperative ones.

Discussion: Study showed a beneficial effect of the intervention consisting in rinsing with Octenisept on the reduction of crusting in the postoperative assessment.

KEYWORDS: anti-infective agents, endoscopic sinus surgery, sinusitis, treatment

ABBREVIATIONS

CRS – chronic rhinosinusitis
SSI – surgical site infections

INTRODUCTION

Chronic rhinosinusitis (CRS) is a complex inflammatory disease of the upper respiratory tract that affects an increasing number of people in the adult population. It causes a significant decrease in the quality of life and is often associated with other diseases. Chronic rhinosinusitis of the paranasal sinuses is a heterogeneous group of diseases caused by comprehensive interactions between the so-called host and the environment. Bacterial pathogens play an important role in this process. Immune system pathophysiological changes of the disease have not been fully understood [1].

The effectiveness of rinsing the sinuses with sodium chloride or sodium carbonate solution in postoperative management was proved, as it reduced the incidence of early complications in the form of acute inflammations. Furthermore, it improved the mucosal condition in the endoscopic image in the early postoperative period (Lund-Kennedy scale). The effect of intraoperative sinus irrigation with sodium chloride solution on the reduction of the number of S. aureus, P. aeruginosa, and S. pneumoniae bacterial colonies (measured with PCR technique) was demonstrated [2, 3]. The use of octenidine may affect the reduction of MRSA colonization.

However, it may show no significant side effects when used intranasally [4]. Therefore, it was possible to make a hypothesis that intraoperative lavage with an antiseptic solution may improve early postoperative outcomes and reduce recovery time or reduce the need for revision surgery. There is a trend within minimally invasive procedures or endoscopic procedures. Functional endoscopic sinus surgery is a minimally invasive, safe treatment method of the paranasal sinuses. This technique provides a drainage of the sinuses and it preserves normal function and anatomic structures [5, 6].

The main objective of the randomized clinical trial was to determine the validity of intraoperative antiseptic treatment during endoscopic sinus surgery and the impact of such a treatment on the postoperative outcomes.

Additionally, the present analysis includes the assessment of the correlation between the intraoperative irrigation of the paranasal sinuses and the changes regarding the complaints associated with surgery itself, as well as with chronic sinusitis. We also assessed the relationship between the intraoperative irrigation of the paranasal sinuses and the composition of the flora inhabiting the mucosa of the paranasal sinuses postoperatively. The relationship between the intraoperative antiseptic lavage of the paranasal sinuses and the above-mentioned changes were evaluated separately, considering the phenotype of chronic rhinosinusitis (groups with nasal polyps and without polyps). Each patient belonged to both the study group and the control group – both nasal cavities were examined separately.
A randomized, clinical trial was performed in years 2017–2018. Eligibility criteria of the trial were: chronic sinusitis diagnosed based on EPOS 2012, ineffective optimal medical treatment, bilateral lesions characteristic for chronic sinusitis, informed consent form. Exclusion criteria were: no informed consent form, unilateral lesions, cystic fibrosis, ciliary dyskinesis, suspected fungal infection, sympathomimetic drugs abuse, suspicion of proliferative diseases, autoimmune diseases, immunodeficiency, intra- or postoperative complications, antibiotic therapy one month before surgery or after surgery to control visit.

Fifty-five patients with chronic sinusitis, qualified for surgical treatment, were enrolled into the trial. It was designed as a prospective, randomized, blinded study including 23 female and 32 male patients. In the group 32 persons had chronic rhinosinusitis with nasal polyposis and 23 without. Both nasal cavities were evaluated separately, each patient belonged to the control and the study group. Finally, data from 110 nasal cavities were collected.

Randomization was performed by an independent person who was not related to the trial.

The chi-squared test showed that no statistically significant difference may be observed in the normal distribution and random sample \( \chi^2(1) = 2.33; P = 0.127 \).

The mean age of patients was 47.82 ± 12.33 years, with the median of 45 years, and the range from 25 to 70 years. CRS was diagnosed in the years 1979–2017. The mean time from the diagnosis to the current surgery was 7.8 years (Tab. I).

The majority of patients (63.6%) had not undergone an endoscopic sinus surgery before. Most patients had bronchial asthma, allergic rhinitis, atopy or food allergies, with \( N = 16 \) in both groups. Only 4 people had nonsteroidal anti-inflammatory drug intolerance (\( N = 4 \)). Eight people (\( N = 8 \)) reported a disease different from those indicated in the survey.

The patients underwent the same scope of endoscopic sinus surgeries performed bilaterally by the same specialist experienced in the surgery of the paranasal sinuses. One surgeon performed postoperative nasal endoscopies and another did the follow-up. Intraoperatively, a swab from the middle nasal meatus was performed prior to the removal of the uncinate process. The next stage, after opening the maxillary sinus, involved the delivery of 5 mL of 0.9% NaCl sterile saline solution to its lumen. Subsequently, it was aspirated and collected into a sterile container for microbiological examination. After surgery, the sites were isolated from each other using a Foley catheter placed within the posterior nasal cavity under endoscopic control and then filled with sodium chloride solution to the extent that the lumen of the nasal cavity was closed. The test site was then rinsed with 100 mL of Octenisept solution (containing octenidine dihydrochloride, phenoxy-ethyl alcohol and excipients) diluted 1:1 with sterile 0.9% sodium chloride solution, the excess of which was removed via suction. The contralateral side, being the control one, was rinsed with 100 mL of 0.9% NaCl saline solution. After those interventions, the remaining unevenness and fragments of bony debris were removed. During those activities, a comparative assessment of the test and control side was performed evaluating bleeding according to the Boezaart and van der Merwe scale which is an ordinal scale grading the operative field from 0 to 5 [7]. Postoperatively, antibiotic therapy was not applied. It was recommended to rinse both nasal cavities using an irrigation set for the paranasal sinuses and an isotonic sodium chloride solution, and to lubricate nasal cavities with sesame oil. Furthermore, oral steroid treatment in decreasing doses was introduced in patients with CRS and polyps. The follow-up visit was carried out in accordance with the standards of care of the hospital, i.e. after 7 to 14 days following the procedure. Both preoperatively and during the postoperative follow-up the patients underwent assessment with the Lund–Kennedy endoscopic scale [8], and the POSE scale [9]. The Lund–Kennedy endoscopy scoring system assesses the pathologic states of the nose and paranasal sinuses with reference to polypos, edema, discharge, crustling and scarring [8]. The POSE scale is a perioperative sinus endoscopy scoring system assessing the nasal cavities [8]. Patients completed the SNOT-22 questionnaire [10] and evaluated complaints independently for both nasal cavities using theVAS scale pre- and postoperatively.

Statistical analysis was performed using IBM SPSS Statistics 25. Descriptive statistics were performed including Shapiro–Wilks tests, various chi-squared tests, and various U Mann–Whitney tests, Student’s t-tests for independent samples and Wilcoxon test. The significance level was assessed at \( \alpha < 0.05 \).

The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments (Fortaleza). The participants were informed about the aim of the study and their informed consent was obtained. The study was performed under the permission of the Ethical Commission of the Military Institute of Medicine.
In both groups the total number of cultures was lower postoperatively. It was shown preoperatively that the microflora examined after culture collection from the middle nasal meatus was not always identical with the microflora of the maxillary sinus lumen (they were different in 42.7% of cases).

The alleviation of symptoms measured with VAS and SNOT-22 scales in the early postoperative period was confirmed in both groups. No statistically significant differences were noted between the study and the control group.

Furthermore, no statistically significant differences were observed as regards the change of endoscopic parameters measured with the Lund-Kennedy scale, the POSE and the subjective symptoms assessed with the VAS scale between the study and the control group in relation to the group with CRS with polyps and without polyps (Tab. III.–V.).

No correlation was demonstrated between bleeding during surgery measured with the Boezaart and van der Merwe scale and the intraoperative lavage of the paranasal sinuses using an antiseptic agent.

**DISCUSSION**

The effect of intraoperative antiseptic management during endoscopic sinus surgery on postoperative results has not been studied so far. However, in other branches of surgery such a management has been proved beneficial.

A study in rats showed a positive effect on the healing of a palatal wound (which seems to be similar to the sinus mucosa as regards the conditions) using a chlorhexidine paste [11]. In another study, also conducted in an experimental animal model, antiseptics (iodopovidone, chlorhexidine) were shown to be superior to antibiotics (erythromycin) when used early in the post-traumatic wound healing [12].

A review by Yadav et al. showed that rinsing the surgical wound reduced the number of bacteria in bioplates and accelerated the healing process. They also concluded that intraoperative lavage after plastic implant surgery is a standard in care, being a prophylactic measure for acute implant-related infections [13]. It seems reasonable to try to translate such practices into research on the endoscopic surgery of the paranasal sinuses in order to improve their results.

Another study, also in the field of general surgery, compared postoperative wound flushing with saline and flushing with chlorhexidine solution, showing the advantage of the antiseptic solution in reducing the percentage of surgical site infections (SSI) [14].

**RESULTS**

The effect of intraoperative sinus lavage with Octenisept on the postoperative healing was demonstrated. In the postoperative assessment, the analysis showed a statistically significant reduction of the crust measured with the Lund-Kennedy scale in the study group compared to the control group (Tab. II., Fig. 1.).

No statistically significant differences occurred between the compared groups, either before or after the surgery. Subjective complaints before and after the surgery did not differ significantly between the study and the control group.

The intraoperative lavage of the paranasal sinuses in both the control and the study group decreased the total number of positive postoperative cultures relative to the preoperative ones, but without significant differences between the groups (P = 0.248).

Both in the group of patients with chronic rhinosinusitis with nasal polyps and chronic rhinosinusitis without nasal polyps, the obtained probability value (P) was higher than the assumed level of significance, which indicated the lack of statistically significant differences between the study and the control group in assessing the degree of changes in endoscopic image parameters and patient complaints.

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No correlation was demonstrated between bleeding during surgery measured with the Boezaart and van der Merwe scale and the intraoperative lavage of the paranasal sinuses using an antiseptic agent.
A more rapid improvement in endoscopic scales was also noted, a better picture of the nasal mucosa was maintained during prolonged follow-up despite the discontinuation of the intervention, which leads to the conclusion that such an antiseptic treatment may be beneficial.

Seiberling et al. [18] added mupirocin to intraoperative irrigation in their study. Irrigation with mupirocin was shown to significantly reduce the amount of S. aureus found in the maxillary sinus mucosa compared to flushing with saline alone, for up to 10 days after surgery.

At the same time, some reports tackled the issue of limitations associated with local antibiotic therapy and offered an indication that it may be used in limited cases, thus directing research towards the local use of antiseptics [19].

In conclusion, it is worth noting that the present study showed the beneficial effect of the intervention consisting in rinsing with Octenisept on the reduction of crusting in the postoperative assessment, measured with the Lund-Kennedy scale. It is one of the indicators of proper healing. The obtained results show the beneficial effect of intraoperative antiseptic treatment on the quality of healing.

The limitation of such proceedings is evidenced by the lack of improvement in summary results measured with the POSE and Lund-Kennedy scale. Further research is to be considered, including the extension of the procedure on the use of an antiseptic in the postoperative period. In addition, the beneficial effect of surgery in correctly qualified patients was confirmed, as measured by the improvement of subjective feelings on the SNOT-22 and VAS scale.

Similarly, a reduction in SSI percentage was observed after intraoperative lavage with a povidone solution in eye surgery and orthopedic surgery [16].

Ottaviano et al. [17] conducted a prospective, randomized, double-blind and placebo-controlled study which evaluated the effect of a nasal gel containing a combination of an antiseptic compound (with silver ions) in wound healing after endoscopic surgery. However, this intervention was also used postoperatively. In the study group, the improvement of specific symptoms (assessed on the validated SNOT22 scale) was faster than in the placebo group.
REFERENCES


