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## IMPROVEMENT OF THE METHODS OF STOPPING NOSE BLEEDS IN PATIENTS UNDER ANTITHROMBOTIC THERAPY

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**The aim of the research.** Comparative study of the effectiveness of various methods of stopping epistaxis in patients under antithrombotic therapy.

**Materials and methods.** The study of the effectiveness of various methods of stopping bleeding in 156 patients with epistaxis, which developed against the background of antithrombotic therapy, was conducted. All patients were divided into two groups: the main group (104 patients), in which the stoppage of nosebleeds was carried out by a combined method, which includes the use of a two-chamber hydrotampon of our own design in combination with "Nosochem" gel and thermal exposure, and a control group (52 patients), where classic gauze tamponade of the nasal cavity was used.

**Results.** The method proposed by us showed its effectiveness in stopping nosebleeds in 100 (96.1 %) patients of the main group. In the control group of patients with gauze tamponade of the nasal cavity, tamponade ensured stable hemostasis in 44 (84.6 %) patients.

**Conclusions.** The combined method of stopping epistaxis, which includes the use of a two-chamber hydrotampon of our own design in combination with "Nosochem" gel and thermal exposure, is more effective and safer compared to traditional gauze tamponade and can be recommended as the method of choice for stopping epistaxis against the background of antithrombotic therapy. The proposed method is easy to use, provides a reliable hemostatic effect, preserves the function of nasal breathing, reduces the trauma of tamponade and the risk of recurrent bleeding. One of the advantages of the hydrotampon is the absence of the tampon sticking to the mucous membrane and its impregnation with blood and wound exudate, which allows you to extend the period of tamponade if necessary, and the tampon removal procedure is less painful with a lower risk of bleeding recurrence

**Keywords:** epistaxis (nosebleed), antithrombotic therapy, antiplatelet therapy, anticoagulant therapy, hydrotampon

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### 1. Introduction

Against the background of taking anticoagulants and antiplatelet agents, the risk of developing hemorrhagic complications is always higher. Antithrombotic therapy increases the risk of nosebleed (NB) and the number of inpatients with NK who are on antithrombotic therapy ranges from 29 % to 48 % [1, 2].

When choosing a method for stopping NB, the following factors should be considered: the localization of the source and intensity of bleeding, the probable etiology of NB, and the presence of concomitant diseases [3, 4]. Features of local hemostatic measures in NB against the background of antithrombotic therapy are little studied, and there are isolated reports on the effectiveness of various methods of stopping NB in this category of patients [5, 6].

The main requirements for local hemostatic agents when stopping NB are: stopping NB in the shortest possible time, high adhesiveness, tight fit to the area of the bleeding nasal mucosa, prevention of rebleeding,

no negative impact on the nasal mucosa and no effect on the system of general hemostasis, simplicity, accessibility and ease of use, non-traumatic when removed from the nasal cavity [7].

Mechanical methods of stopping bleeding are the most reliable, but, given the anatomical features of the nasal cavity, the most common method is plugging, the effectiveness of which is 80–90 % [8]. An alternative to the classical tamponade of the nasal cavity are pneumatic and hydrotampons, which are easily inserted into the nasal cavity, do not stick to the mucous membrane of the nasal cavity and are easily removed. To date, the effectiveness, degree of traumatization of the nasal mucosa and the tolerance of patients with pneumo- and hydrotamponade in comparison with classical tamponade have not been fully studied [4]. Some types of tampons are used in combination with other methods of stopping NB to increase the hemostatic effect [9].

Thus, the issue of searching for new plugging materials to achieve successful results of stopping NB with

a decrease in the risk of its recurrence remains relevant to this day. The development of a method for stopping NB, which allows us to combine several types of impact on the bleeding area with a reasonable decrease in the compression load on the nasal mucosa and maintaining the function of nasal breathing, seems to us an extremely urgent task.

**The aim of this study** is to compare the effectiveness of various methods of stopping NB in patients on the background of antithrombotic therapy.

## 2. Materials and methods

The work was carried out based on a comprehensive clinical and laboratory examination of 156 patients with NB who were treated in the otolaryngological and therapeutic departments of the Kharkiv Clinical Hospital on railway transport No. 2 Branch "Health Care Center" of Public Joint Stock Company "Ukrainian Railway" for the period of 2017–2022 years. All patients had developed NB during antithrombotic therapy.

Among the examined patients, there were 73 (46.8 %) women and 83 (53.2 %) men. The age of the patients ranged from 39 to 89 years, the average age was  $66.7 \pm 11.8$  years. 37 (23.7 %) patients were on anticoagulant therapy and 119 (76.3 %) patients received antiplatelet therapy.

Patients were examined with written informed consent. The study was conducted in full compliance with the ethical principles contained in the Declaration of Human Rights adopted in Helsinki, which follows the Rules of Good Practice in Clinical Research and legal norms, and with the approval of the Bioethical Commission of the Kharkiv Postgraduate Medical Academy (protocol No. 4 in 2016).

NB from the anterior parts of the nasal cavity, when the source was located in the Kiesselbach's plexus, was noted in 144 (92.3 %) patients. NB from the posterior parts of the nose was diagnosed in 12 (7.7 %) patients. Unilateral NB was observed in 150 (96.1 %) and bilateral – in 6 (3.9 %) patients.

To determine the localization of NB and assess the condition of the nasal mucosa, patients underwent anterior rhinoscopy and endoscopy of the nasal cavity. Videoendoscopy was carried out using KarlStorz rhinoscopes with an optical viewing angle of  $0^\circ$  and  $30^\circ$ , a length of 180 mm and a diameter of 4 mm.

All patients were divided into two groups: the main group (104 patients), in which NB was stopped by a combined method, including the use of a two-chamber hydrotampon of its own design (the basis of the tampon is an endotracheal tube on the outer surface of which there are two latex balloons with separate channels for filling their saline) in combination with Nosochem gel and thermal exposure, and the control group (52 patients), where classical gauze tamponade of the nasal cavity was used.

In the main group of patients, before tamponing, Nosochem gel was introduced into the nasal cavity, then nasal tamponing was performed with a two-chamber hydrotampon. The front balloon of the hydrotampon was filled with saline cooled to  $4-8^\circ\text{C}$  (selective hypothermia).

Statistical processing of the obtained data was carried out using the STATISTICA 10.0 statistical software

package. The significance of differences in quantitative traits obeying a normal distribution was assessed using Student's t-test. For the analysis of qualitative values, one-tailed Fisher's exact test for unrelated groups was used. Differences were considered significant in the case of  $p < 0.05$ .

## 3. Results

Rhinoscopically, only in 31 ( $19.9 \pm 0.2$  %) patients a bleeding vessel with fresh blood leakage was visualized. In the rest of the patients ( $80.1 \pm 0.4$  %), NB was diapedetic in nature of varying intensity and did not have a specific single source. Diapedetic NB was characterized by the presence of multiple equivalent sources of hemorrhage, dispersed throughout the nasal mucosa, mainly in the Kiesselbach's zone. At the same time, multiple hemorrhages and hemorrhagic impregnation of the nasal mucosa were visualized by rhinoscopy.

Tamponade of the nasal cavity was performed in all patients of the main group, and 4 ( $3.8 \pm 0.1$  %) patients of them underwent bilateral tamponade of the nasal cavity. A feature of plugging the nasal cavity to stop NB from the anterior-middle parts of the nasal cavity in 95 ( $91.3 \pm 0.5$  %) patients of the main group was the sparing mode of filling the posterior balloon with saline (no more than 8 ml), which contributed to a decrease in the compression load on the mucous membrane of the nasopharynx and at the same time ensured the prevention of hydrotampon dislocation. In 9 ( $8.7 \pm 0.2$  %) patients of the main group with NB from the posterior parts of the nasal cavity, the posterior balloon was filled with saline heated to  $45-48^\circ\text{C}$  (selective hyperthermia) in a volume of 10.4 to 10.8 ml.

In the control group of patients, anterior tamponade of the nasal cavity with a gauze swab was performed in 49 ( $94.2 \pm 0.5$  %) patients, of which 2 patients underwent bilateral anterior tamponade of the nasal cavity. Posterior tamponade of the nasal cavity was required in 3 ( $5.8 \pm 0.1$  %) patients of the control group due to intense "posterior" NB.

The proposed method showed its effectiveness in stopping NB in 100 ( $96.1 \pm 0.4$  %) patients of the main group. At the same time, convenience and low traumatism were noted during the introduction of a hydrotampon. The hemostatic effect (time to completely stop bleeding) occurred  $5.9 \pm 0.9$  minutes after tamponade. During the packing period, single episodes of NB occurred in 3 ( $2.9 \pm 0.1$  %) patients. In all cases, bleeding was due to insufficient inflation of the anterior hydrotampon balloon. When measuring intranasal pressure in these patients, it ranged from 31 to 33 mm Hg. To eliminate NB in these cases, the following actions were taken: removal of the hydrotampon from the nasal cavity, removal of blood clots from the nasal cavity with the help of an electric suction, and repeated plugging of the nasal cavity until the NB stopped completely.

The average duration of nasal tamponade in the main group was  $52.2 \pm 5.1$  hours. After removal of the hydrotampon, 12 ( $11.5 \pm 0.2$  %) patients had painless discharge from the nasal cavity without NB recurrence. One ( $0.9 \pm 0.1$  %) patient had a relapse of NB on the 3rd day after removal of the hydrotampon. Bleeding was minor and did not require re-tamponade of the nasal

cavity. Hemostasis in the patient was achieved by introducing Nosochem gel into the nasal cavity. Thus, the total number of NB recurrences in the main group was recorded in 4 ( $3.8 \pm 0.1$  %) patients.

In the control group, gauze tamponade of the nasal cavity provided stable hemostasis in 44 ( $84.6 \pm 0.3$  %) patients. The time of complete stoppage of bleeding after tamponade was  $11.2 \pm 1.2$  minutes, which is statistically significant ( $p < 0.001$ ) more than that of the main group. During the period of tamponade before removal of the gauze tampon from the nasal cavity, 5 ( $9.6 \pm 0.2$  %) patients had a recurrence of NB, which required changing the gauze tampon to hydrotamponade of the nasal cavity according to the standard proposed method.

The average duration of nasal tamponade in patients of the control group was  $64.3 \pm 5.9$  hours, which is 12.1 hours longer when hydrotamponade was used in the main group of patients. After tamponade removal, the presence of purulent discharge from the nasal cavity was observed in 23 ( $44.2 \pm 0.3$  %) patients of the control group, which is  $32.7 \pm 0.3$  % more than in the main group. The discharge was serous in nature without a hemorrhagic component. In 3 ( $5.8 \pm 0.1$  %) patients of the control group, NB recurrence was observed after removal of the gauze swab. The total number of relapses in the control group was observed in 8 ( $15.4 \pm 0.2$  %) patients, which significantly exceeds that of the main group (4 ( $3.8 \pm 0.1$  %) patients). Differences between groups in this criterion of tamponade efficiency are statistically significant (one-tailed Fisher's exact test  $p < 0.05$ ).

The length of stay in the hospital of patients of the main group averaged  $7.2 \pm 1.1$  bed-days, which is statistically significant ( $p < 0.05$ ) less than the same indicator in the control group ( $9.8 \pm 1.4$  bed-days).

#### 4. Discussion

Considering that in NB against the background of antithrombotic therapy they are predominantly diapedetic in nature, we considered the use of local physical and chemical methods to stop bleeding to be ineffective and inappropriate. In addition, with local exposure, subsequent destruction of the mucous membrane is possible, which can lead to the occurrence of iatrogenic recurrence of bleeding. Thus, the main method of stopping NB during antithrombotic therapy was tamponade of the nasal cavity.

The combination of several types of influence on the bleeding area in NB enhances the local hemostatic effect. The local hemostatic effect of Nosochem gel is provided by its two components: glycine (the main component of collagen) and calcium ions. The use of the gel leads to vasoconstriction of the nasal mucosa and activation of the coagulation system [10, 11].

Currently, the requirements have increased not only for the effectiveness of tamponade, but also for the comfort (quality of life) of patients during the period when the tampon is in the nasal cavity. Difficulty in nasal breathing is one of the main symptoms affecting the quality of life with the tampon method of stopping NB. In the vast majority ( $95.2 \pm 0.5$  %) of patients in the main group, the nasal breathing function was satisfactory. All patients in the control group complained of the absence of nasal breathing, and 24 hours after plugging, the inten-

sity of nasal breathing difficulty increased. Thus, the proposed method for stopping NB, along with efficiency and safety, allows you to save the function of nasal breathing.

All patients of the control group complained of pain during the introduction of a gauze tampon, while patients of the main group indicated discomfort during the introduction of a hydrotampon. Tamponade of the nasal cavity in the main group was carried out quickly and was easily tolerated by the patients. Hydrotampons were easily and almost painlessly removed from the nasal cavity since they did not stick to the mucous membrane. When removing gauze swabs from the nasal cavity, most patients in the control group experienced significant pain.

Reducing the time, the tampon stays in the nasal cavity undoubtedly helps to reduce the compression load on the mucous membrane and, as a result, to reduce reactive phenomena in the nasal cavity after the removal of the tampons.

#### Study limitations:

1. Small sample size.
2. The study did not include patients with diseases of the blood coagulation system and chronic diseases of internal organs with the development of liver or kidney failure.

**Prospects for further research.** Thus, further research with a larger sample size is warranted to reaffirm the findings of this study.

#### 5. Conclusion

1. The use of a two-chamber hydrotampon of its own design in combination with Nosochem gel and thermal exposure as a tamponade of the nasal cavity in NB patients on the background of antithrombotic therapy provides a reliable hemostatic effect in 96.1 % of patients, preserves the function of nasal breathing in 95.2 % of patients, reduces the trauma of tamponade and the risk of recurrent bleeding to 3.9 %.

2. One of the advantages of a hydrotampon is that the tampon does not stick to the mucous membrane and is soaked with blood and wound discharge, which allows, if necessary, to extend the tamponade period and the tamponing procedure is less painful with a lower risk of bleeding recurrence.

3. The presence of coagulation factors in the composition of the Nosochem gel increases the hemostatic effect of the proposed method and provides hemostasis even with a decrease in the compression load of the hydrotampon.

#### Conflict of interests

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this article.

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#### Data availability

Data will be made available on reasonable request.

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