

# Effectiveness of Sorption-Applection Therapy in the Clinic of Maxillofacial Surgery for Purulent Diseases

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**Abstract Relevance.** Local treatment of purulent wounds continues to be a relevant and challenging task in modern surgery. Today, there are such a large number of proposed means of influencing a purulent wound that we can state both their lack of effectiveness and the need to find new ways to improve them [1-5]. The goal is to conduct a comparative assessment of the clinical effectiveness of the cotton cellulose sorbent “Celoform-Neo”. We examined 101 patients aged 20-49 years (men - 53, women - 48), admitted for inpatient treatment with an established diagnosis: Acute odontogenic osteomyelitis of the lower jaw, complicated by phlegmon of one cellular space (submandibular, submental, masticatory, pterygo-submandibular phlegmon) and divided into 2 groups: the main group (MG) of 55 people and the comparison group (CG) - 46 people. The study groups were statistically significantly comparable in age ( $p=0.90$ ). **Conclusion.** A study conducted to evaluate the clinical effectiveness of the cotton cellulose sorbent “Celoform-neo” revealed the advantages of sorption-application therapy in all comparable parameters, such as the dynamics of clinical indicators, reduction of pain, improvement of regional blood circulation in the area of purulent inflammation.

**Keywords** Acute odontogenic osteomyelitis, Purulent-inflammatory process, Celoform-Neo, Sorbents – cellulose and odontogenic phlegmon

## 1. Topicality

Local treatment of purulent wounds continues to be a relevant and challenging task in modern surgery. Today, there are such a large number of proposed means of influencing a purulent wound that we can state both their ineffectiveness and the need to find new ways to improve them [1-5].

At the present stage, a variety of methods and methods are used for the treatment of wounds in the maxillofacial area. The basis of scientific approaches to the problem of local treatment of wounds is the concept of choosing the optimal drug in accordance with the stages of the wound process [6,7].

Significant progress in the treatment of wounds is associated with the introduction into clinical practice of a group of medical sorbents that have an active cleansing effect on the wound. Sorbents – cellulose and its derivatives – are widely used in medicine.

From this point of view, based on the cotton-cellulose sorbent “Celoform”, which had previously proven its clinical effectiveness [8], a new cotton-like sorbent “Celoform-Neo” was developed.

**Objective** is to conduct a comparative assessment of the clinical effectiveness of the cotton -cellulose sorbent

“Celoform-Neo”.

## 2. Materials and Methods

**We examined** 101 patients aged 20-49 years (men - 53, women - 48), admitted for inpatient treatment with a diagnosis: Acute odontogenic osteomyelitis of the lower jaw, complicated by phlegmon of one cellular space (submandibular, chin, chewing, pterygo-submandibular phlegmon) and divided into 2 groups: the main group (MG) - 55 people and the comparison group (CG) - 46 people. The study groups were statistically significantly comparable in age ( $p=0.90$ ).

During the clinical examination, all patients had pain in the area of the purulent-inflammatory process, limited mouth opening due to increased pain, facial asymmetry due to the presence of severe inflammatory edema of the soft tissues of the affected side, which intensified after the operation. (opening of phlegmon).

The examination included general clinical (history, assessment of general and local status) and special (laboratory, instrumental) research methods. Laboratory indicators: leukocytosis, increase in ESR (up to 20 - 30 mm/hour and higher), shift of bands to the left, phenomena of micro- and anisocytosis.

OS patients complained of local intense pain, dysfunction

of the affected area, increased body temperature, swelling or swelling of the soft tissues of the maxillofacial area.

When carrying out complex treatment, we were guided by the well-known principles of purulent surgery: *opening* a purulent-inflammatory focus by layer-by-layer dissection of the tissue above it, *washing* and adequate *drainage* of the resulting purulent wound with drainage tubes, or rubber graduates. Patients of the main group (MG), in contrast to patients of the comparison group (CG), after opening the phlegmon, the sorbent “Celoform-neo” was added to the surgical wound (Figure 1).



**Figure 1.** View of the surgical wound after opening the phlegmon chin area in a patient of the main group

All patients were prescribed traditional general treatment (antibiotics, desensitizing drugs, etc.).

In addition to the generally accepted ones, the following examination methods were used: assessment of pain intensity using a visual analogue scale (VAS); measurement of the size of postoperative edema and color duplex scanning.

The intensity of the pain syndrome was assessed using a visual analogue scale (VAS) the next day after the operation of opening the phlegmon (on the 1st day), then on the 3rd and 5th days. VAS (abbreviated visual analogue scale) is a line 10 cm long, divided into 5 gradations of pain (0-1 cm - extremely mild pain; from 2 to 4 cm - mild; from 4 to 6 cm - moderate; from 6 to 8 cm - very strong; 8-10 points -

unbearable) (Fig. 2).

The patient was asked to select from 5 gradations the one to which, in his opinion, the level of his pain syndrome belonged.

Color duplex scanning was carried out using a Madison ultrasound machine (Republic of Korea).

The maximum linear blood flow velocity (MLBV) and the following indicators were assessed: PI - Gosling pulsation index and RI - Purcelot resistance index.

The Gosling index is the ratio of the difference between the maximum systolic and diastolic velocities to the average velocity, reflecting the elastic-elastic properties of the arteries. The Purselot index is the ratio of the difference between the maximum systolic and end-diastolic velocities to the maximum systolic velocity, reflecting the state of peripheral vascular resistance.

### 3. Results

During the treatment process, the dynamics of clinical indicators of patients with OS were recorded, which are reflected in the comparative aspect in Table. 1.

**Table 1.** Dynamics of clinical indicators of patients with odontogenic phlegmon (on treatment days)

Clinical indicators	Main group	Comparison group
	1	2
Pain relief	$1.8 \pm 0.5$ _ _	$4.4 \pm 0.7$ _
	$p_1 - p_2 < 0.01$	
Stopping suppuration	$2.5 \pm 0.4$ _	$4.2 \pm 0.5$ _
	$p_1 - p_2 < 0.05$	
Appearance of granulations	$4.5 \pm 0.6$	$8.7 \pm 1.2$
	$p_1 - p_2 < 0.01$	
Beginning of marginal epithelialization	$6.5 \pm 1.3$	$9.0 \pm 1.4$
	$p_1 - p_2 < 0.01$	
Application of secondary sutures	$6.0 \pm 0.6$ _	$8.8 \pm 0.8$ _
	$p_1 - p_2 < 0.01$	
Duration of treatment	$11.5 \pm 0.5$ _ _	$15.2 \pm 0.8$ _
	$p_1 - p_2 < 0.01$	



**Figure 2.** Visual analogue scale for assessing pain level

**Table 2.** Dynamics of pain reduction on the VAS scale (in points)

Options IS YOURS Groups	1st day		3rd day		5th day	
	OG	H.S.	OG	H.S.	OG	H.S.
	1	2	3	4	5	6
Points	5.4±0.5	5.3±0.4	2.5±0.4	4.8±0.3	0.8±0.2	2.2±0.4
	$p_1 - p_2 > 0.05$		$p_3 - p_4 < 0.001$		$p_5 - p_6 < 0.001$	

**Table 3.** Dynamics of blood flow parameters of the operated side according to color duplex scanning data

Blood flow recording area	Blood flow parameters	Blood flow recording modes			
		Basic quantity		In 5 days	
		H.S.	OG	H.S.	OG
		1	2	3	4
Facial artery	LSK (cm/min)	73.4±1.5	74.8±1.7	75.1±2.3	79.3±2.5
		$p_2 - p_4 < 0.05$ , other values are statistically insignificant.			
	PI	2.51±0.28	2.49±0.43	1.95±0.64	1.76±0.29
		$p_2 - p_4 < 0.05$ , other values are statistically insignificant.			
	RI	0.99±0.05	0.98±0.04	0.92±0.08	0.89±0.04
		$p_2 - p_4 < 0.05$ , other values are statistically unreliable.			

For all the parameters given in the table, a statistically significant predominance of clinical indicators of patients with OH over those of patients with HS was determined ( $p < 0.05-0.01$ ).

There was a decrease in the duration of inpatient treatment by  $3.7 \pm 0.6$  bed days ( $p < 0.01$ ).

In no case of use of Celoform-Neo were there any adverse reactions, complaints or complications noted.

The results of the pain reduction study are presented in Table 2.

As can be seen from Table 2, the next day after the operation of opening the phlegmon in patients OG (with the use of “Celoform-Neo”) and GS (without “Celoform-Neo”), pain was noted in the area of the surgical wound, which corresponded to the parameter “moderate pain” according to VAS scale. However, no statistically significant differences were found between the groups ( $p_1 - p_2 > 0.05$ ).

On the 3rd day, a significant difference was determined between the indicators of the groups ( $p_3 - p_4 < 0.001$ ). At the same time, the VAS score in the main group decreased almost to the lower limit of the “moderate pain” parameter (4-6 points), while in the comparison group the scores remained at the same values.

On the 5th day, the indicator of the main group decreased to the level of “extremely mild pain” (0-1 point), while the indicator of the comparison group also decreased, but only to the level of “mild pain”. The difference between them remained statistically significant ( $p_5 - p_6 < 0.001$ ).

Thus, the assessment of pain intensity on the VAS scale indicated a positive effect of sorption-application therapy with the drug “Celoform-Neo” on the severity of pain in the area of the surgical wound.

Using color duplex scanning, we determined blood circulation parameters in the area of purulent inflammation

in patients with OH (using “Celoform-Neo”) and GS (without “Celoform-Neo”) (Table 3).

Based on changes in blood flow, the following picture was revealed: blood pressure after 5 days increased significantly only in representatives of the group of patients ( $p < 0.05$ ).

At the same time, the values of resistance coefficients PI and RI after 5 days decreased in patients of both groups, but significantly only in patients OG ( $p < 0.05$ ).

Consequently, the tendency we noted towards an increase in the speed of linear blood flow and a decrease in vascular resistance indicates an improvement in the state of blood flow on the operated side under the influence of sorption-application therapy using the Celoform-Neo sorbent, which, as previously established, reduces the severity of inflammatory edema, which worsens blood circulation in the area of interest due to compression of blood vessels, which disrupts arterial inflow and venous outflow.

Thus, the reduction of pain and improvement of regional blood circulation in the area of purulent inflammation under the influence of sorption-application therapy using the new cotton-cellulose sorbent “Celoform-Neo” confirms the positive dynamics of clinical indicators.

## 4. Conclusions

A study conducted to evaluate the clinical effectiveness of the cotton-cellulose sorbent “Celoform-neo” revealed the advantages of sorption-application therapy in all comparable parameters, such as the dynamics of clinical indicators, reduction of pain, improvement of regional blood circulation to the site of purulent inflammation.

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