

## **Morphological Features of the Drugs used in Treatment of Anal Incontinence**

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### **Abstract**

The morphological characteristics of injectable formulations of foreign production "NOLTREX" and local production of "Polyacrylamide gel", "Biopiant" and "Polyacrylamide gel + Biopiant", after injection into the subcutaneous abdomen in laboratory mice, were studied. Morphological studies were studied: fixation of the drug in the subcutaneous part, cell infiltration, vascular invasion and the formation of granulation tissue around the implant. The timing of morphological studies corresponded to 10, 20 and 30 days for 2 mice from each observation group. Intensive cell infiltration in the comparative group, after the introduction of "Noltrex", as well as in the experimental group, after the introduction of the drug "Polyacrylamide gel". With the coordinated administration of the "Polyacrylamide gel + Biopiant" preparations, the granulation capsule around the bolus is less pronounced and formation is noted.

**Keywords.** Experimental study, morphology, volume forming gel, polyacrylamide gel, biopiant.

### **RELEVANCE**

In studies Altomare DF, La Torre F, et al (2008) [7] 136 patients received anal injections with a volume-forming dextranomer in stabilized hyaluronic acid (NASHA Dx), which is used to treat fecal incontinence. Six months later, 52% of study participants had reduced incontinence episodes by 50% or more. [1, 3, 4, 12]

In the literature, there are numerous works on injection methods for the treatment of anal incontinence using different drugs. Studies by Maeda Y, (2013) [11] show that silicone biomaterial (PTQ <sup>TM</sup>) provides several benefits and is safer in the treatment of fecal incontinence than carbon coated beads (Durasphere®) in the short term. Similarly, short-term benefits have been observed with ultrasound-guided injections [2, 6, 9].

In the works of Tjandra J.J. (2009) [13] in the group of patients who underwent Durasphere were observed complications of pain in the rectum (5%), erosion of the rectal mucosa (10%) and type III hypersensitivity reaction (5%). There were no complications in the PTQ group. Compared to PTQ, the Durasphere group has a faster action, with improved incontinence 2 weeks after injection [5, 8, 10, 14].

The available literature lacks long-term results of drugs of the injection method for correcting anal incontinence. Many questions regarding the choice of a specific volume-

forming material remain controversial. From this point of view, the development of new highly effective volume-forming drugs of local production at an affordable price is relevant.

**Purpose:** study of the morphological features of the locally produced drugs "Polyacrylamide gel", "Bioplant" and "Polyacrylamide gel + Bioplant", in a comparative aspect with the drug "Noltrex" used in the treatment of postoperative anal incontinence.

## MATERIAL AND RESEARCH METHODS

We performed an experimental study on 30 labarotor mice, weighing 20-22 grams. in the Department of Experimental Biomodelling of the Institute of Biological Sciences of the Academy of Sciences of the Republic of Uzbekistan in Tashkent The mice were kept in quarantine for 10 days in order to adapt to the conditions of the vivarium. All mice were divided into 5 groups: 1-group of control animals, which were injected into the subcutaneous part of the abdomen in a volume of 1.5 ml. 2 - comparison group, animals in the subcutaneous part of the abdomen in the same volume were injected with synthetic material "Noltrex" produced by JSC "Scientific Center Bioform", Moscow, Russia. 3 - experimental group, the animals were injected with local injections developed by the Institute of Bioorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan. This group was also divided into 3 groups: 3.1-group - "Polyacrylamide gel" was injected into the subcutaneous part of the abdomen; Group 3.2 - "Bioplant" was injected into the subcutaneous part of the abdomen, group 3.3 - "Polyacrylamide gel + Bioplant" was injected into the subcutaneous part of the abdomen.

Morphological studies were studied: fixation of the drug in the subcutaneous part, cell infiltration, vascular invasion and the formation of granulation tissue around the implant. The timing of morphological studies corresponded to 10, 20 and 30 days for 2 mice from each observation group.

During histomorphological examination, the fixation of the preparation in the subcutaneous part, vascular invasion and the formation of granulation tissue around the implant were studied. And also echo scanning was carried out in dynamics to determine the location of the implant and the volume of the gel boluses (Table 1).

**Table-1**  
**Dynamic ultrasound control to locate the implant**

№	Groups	The volume of the drug at the initial injection (cm <sup>3</sup> )	The volume of the drug in dynamics (cm <sup>3</sup> )		
			10 days	20 days	30 days
1	1-group (n=6)	1,0	-	-	-
2	2- group (n=6)	1,0	0.94±0.18	0.76±0.10	0.86±0.44
3	3.1- group (n=6)	1,0	1.03±0.09	1.05±0.13	1.24±0.72
4	3.2- group(n=6)	1,0	0.76±0.07	0.20±0.24	-
5	3.3- group (n=6)	1,0	0.88±0.06	1.03±0.15	1.14±0.63

During ultrasound scanning, the longitudinal, transverse and diagonal dimensions of the bolus were measured and the volume of the devices was calculated. In group 2 of animals, which was injected with synthetic material polyacrylamide gel "Noltrex" for 10-20-30 days, the volume of the preparation slightly decreased. In 3.1 - group "Polyacrylamide gel" of local production by 10-20-30 per turnover in dynamics, the volume of the drug slightly increased. In group 3.2 of the "Bioplant" group, by the 30th day the drug was completely absorbed. In 3.3 of the "Polyacrylamide gel + Bioplant" group, the volume of the preparation from 0.88 cm<sup>3</sup> increased by 1.14 cm<sup>3</sup>.

Thus, according to the ultrasound data, we can say the best result was obtained in 3.3 of the group "Polyacrylamide gel + Bioplant" and satisfactory in 3.1 - group "Polyacrylamide gel".

## RESEARCH RESULTS

Visually, at all times of the experiment, thickening was observed in the area of drug administration. Microscopic data showed that on the 10th day after the injection of Noltrex, Polyacrylamide gel, Bioplant, and also with the combined administration of Polyacrylamide gel + Bioplant, formation in the form of a bolus with clear boundaries is determined in the subcutaneous region (Fig. 1 -3).

On the 20th day of the experiment, it is noted that after the administration of the drugs, the gel remains in the subcutaneous region, the germination of the gel into other underlying layers is not observed. It should be noted that after the introduction of the drug "Bioplant" on the 20th day, the volume of the bolus formation decreased, the boundaries became not clear, apparently this is due to the resorption of this drug, since the germination of the bolus into the surrounding tissues is not observed.

On the 30th day of the experiment, damage to the layers of the skin and underlying tissues is not observed, the preparations are preserved within the subcutaneous region, and the germination of the gel into the surrounding tissues is not observed. Cell infiltration is observed only at the border of the administered drugs. Intensive cell infiltration is noted in the comparative group, after the introduction of "Noltrex", as well as in the experimental group, after the introduction of the drug "Polyacrylamide gel". (Fig. 4)

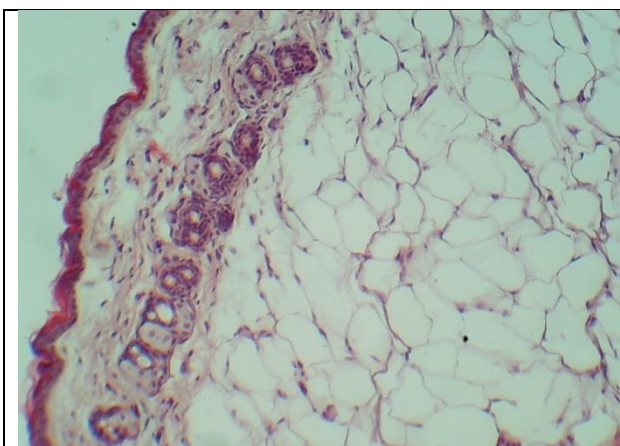


Fig. 1. 10 days of the experiment. The

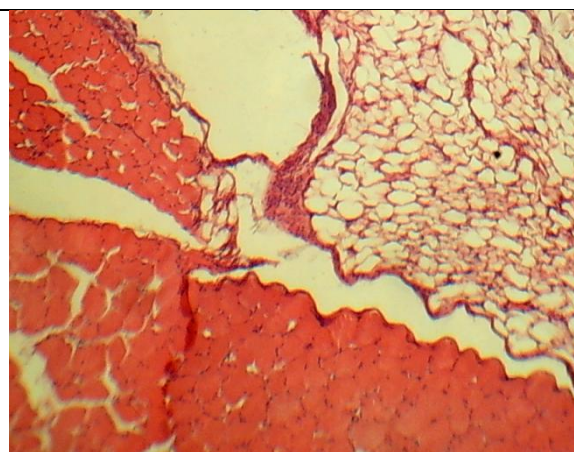

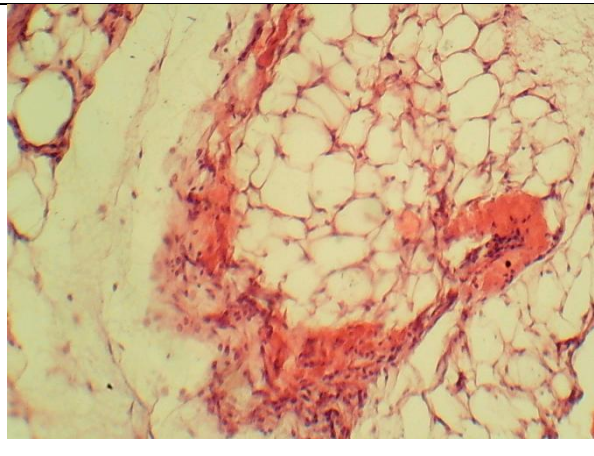
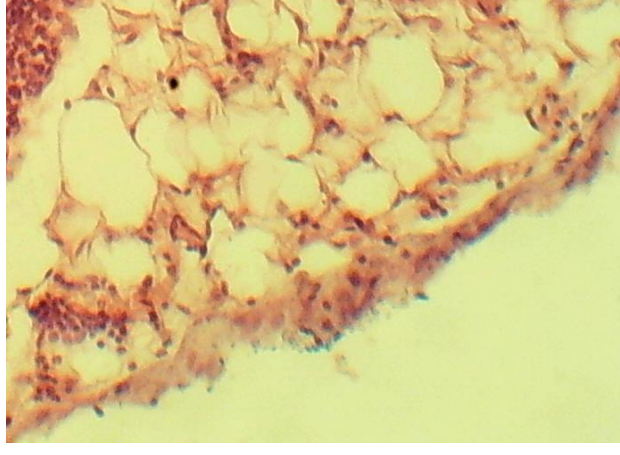



Fig. 2. 10 days of the experiment. The

<p>formation of a gel pain in the subcutaneous region of the mouse after the introduction of "Noltrex". Coloring GE.Uv. 10 x 20.</p>	<p>formation of a gel pain in the subcutaneous region of the mouse after the administration of the drug "Polyacrylamide gel". Coloring GE.Uv. 10 x 10.</p>
	
<p>Fig. 3. 10 days of the experiment. The formation of a gel pain in the subcutaneous region of the mouse after the combined administration of the preparations "Polyacrylamide gel + Bioplant". Coloring GE.Uv. 10 x 20.</p>	<p>Fig. 4. 30 days of the experiment. Cell infiltration at the border of the bolus after administration of "Noltrex". Coloring GE.Uv. 10 x 10.</p>

The "Bioplant" preparation has completely resolved. With the combined administration of the drugs "Polyacrylamide gel" and "Bioplant", cellular infiltration is less pronounced (Fig. 5). And only in this group, at 20 knocks, the formation of a granulation capsule around the injected drug was noted (Fig. 6).

	
<p>Fig. 5. 30 days of the experiment. Infiltration with cells at the border of the bolus after administration of "Polyacrylamide gel" + "Bioplant". Coloring GE.Uv. 10 x 20.</p>	<p>Fig. 6. Formation of a connective tissue capsule (arrow) around the gel bolus after administration of "Polyacrylamide gel + Bioplant".</p>

The formation of a connective tissue capsule around the gel bolus, germination of its connective tissue, as well as vessels, during these periods of the experiment, uheggs were observed 3.3. "Polyacrylamide gel + Bioplant".

## CONCLUSION

Based on the results obtained on histomorphological studies, we came to the following conclusions: Experimental studies have shown that after the introduction of injectable drugs "Noltrex", "Polyacrylamide gel", as well as with the combined administration of "Polyacrylamide gel + Bioplant" on 10, 20 and 30 days the experiment lacks damaging, local irritating effects of the investigated drugs; After the injection of Noltrex and Polyacrylamide Gel, as well as with the combined administration of Polyacrylamide Gel + Bioplant into the subcutaneous region of laboratory mice, a thickening in the form of a bolus is noted at all times of the experiment, which does not grow into the surrounding skin tissues; After the introduction of the drug "Bioplant", on the 20th day, resorption of the bolus formation was noted; Cell infiltration was observed only at the border of the injected drugs. Intensive cell infiltration is noted in the comparative group, after the introduction of "Noltrex", as well as in the experimental group, after the introduction of the drug "Polyacrylamide gel". With the introduction of the drug "Polyacrylamide gel + Bioplant", cellular infiltration is less pronounced and the formation of a granulation capsule around the bolus is noted.

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