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# PATHOGENESIS OF THE REGENERATORY PROCESS OF THE LARYNX

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## ABOUT ARTICLE

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**Abstract:** Inflammation of the mucous membrane is caused by various irritating environmental factors. These include not only climatic and natural factors such as cooling, but also industrial factors, air pollution from production waste, allergens of plant and industrial origin. If viruses, bacteria, fungi and allergens are some kind of specific causes of mucosal inflammation, then the influence of cold, chemical and physical irritations cause inflammation through tissue damage or activation of mast cells, macrophages and lymphocytes.

## INTRODUCTION

Chronic inflammatory diseases of the larynx (CIDL) are a collective concept of a fairly large number of diseases with different etiologies. Nosological forms of diseases of the larynx are presented in a wide range - from functional disorders leading to respiratory failure, benign formations of the larynx to rough, long-term cicatricial stenosis, requiring complex reconstructive operations [2,13].

Pathological assessment of this condition of the larynx is primarily associated with the presence of chronic inflammation of the mucous membrane and elements of the larynx, including the submucosal layer, as well as the muscles and cartilages of the larynx [4-12]. Most often, chronic inflammation of the larynx is localized in the region of the vocal cords, the subvocal region of the larynx with the transition to the cervical trachea and is a secondary manifestation of the damaging factor.

Despite the apparent differences associated with localization and etiology, all of these diseases have one common component, characterized by damage to the mucous membrane and elements of the

larynx. The mucous membrane of the laryngotracheal part of the respiratory tract reacts differently to the influence of one or another damaging factor and leads to the development of one of the pathologies [1-4]. When the region of the vocal folds is involved, this is manifested by hypertrophic growth or atrophy. Damage to the underlying sections leads to the melting of the cartilage of the larynx and trachea and contributes to the formation of scars [7,14].

In this regard, the solution of the problem of restoration of the mucous membrane and elements of the larynx and trachea as a result of the intervention, as well as options for preventing their damage, are priority in the treatment of the above diseases [11,15].

To understand the processes of mucosal inflammation, it is necessary to know the physiology of the mucosa. In order to understand how, with what actions and what medicinal substances to treat inflammation, it is necessary to know the mechanism of inflammation development.

Results and discussions. We conducted an experimental study in which we set the goal of highlighting the pathogenesis of the regenerative process of the larynx. In this regard, we set ourselves the task of identifying the factors that affect the processes of apoptosis and proliferation of the connective tissue of the larynx and trachea, which today most objectively allow us to judge the ongoing changes in the mucous membrane of the larynx and trachea.

The implementation of an experimental study from the standpoint of biomedical ethics was justified by the following reasons: many aspects of the pathogenesis of chronic inflammatory diseases of the larynx (CIDL), including chronic cicatricial stenosis of the larynx, are not well understood and cannot be studied in the clinic. Non-surgical biopsy of the tissues of the larynx in patients with inflammatory lesions of the larynx is not performed in clinical practice. In a sick person, as a rule, it is not possible to observe the development of a cicatricial process in the larynx at all stages of its formation.

The features of the tasks set determined some differences in the distribution of laboratory rabbits into groups and the frequency of intervention. So, in rabbits was produced:

1. morphological assessment of damaged neck tissues after various surgical interventions on the larynx;
2. comparative characteristics of various therapeutic effects on cicatricial processes;
3. measures have been developed to prevent and reduce the frequency of postoperative re-scarring;

**4.** comparative assessment of apoptosis and proliferation indicators after repeated excisions of the laryngeal scar.

**Table 1.**

**The distribution of animals in groups and the timing of the study of the material**

| | Number of animals | Observation duration | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 3 | 7 | 21 | thirty | 60 | 90 | 120 |
| I group of rabbits | 15 | 3 | 3 | 3 | 3 | 3 | - | - |
| II group rabbits | 28 | - | - | - | 8 | 20 | - | - |
| III group rabbits | 26 | - | - | - | - | | 10 | 16 |
| IV group rabbits | 14 | | 7 | 3 | - | 4 | - | - |

For this, subgroups of animals comparable in number were formed (Table 1), the description of which is given below.

Morphological assessment of damaged tissues of the neck after various surgical interventions on the larynx. Treatment of patients with inflammatory pathology of the larynx and trachea has a whole range of unresolved issues. Currently, there is no consensus, both regarding the most optimal methods of conservative ¬therapy, and the timing of the next restorative operations on the larynx and trachea after acute inflammation or trauma.

In this regard, in order to objectively justify the rational timing of surgical treatment of inflammatory stenosing processes of the larynx and trachea, drug treatment regimens , it is necessary to conduct a ¬study to determine the degree of damage to the organs ¬and tissues of the neck.

In the light of the foregoing, we conducted an experimental study in rabbits, the purpose of which was to study the morphological changes in the mucous membrane and elements of the larynx, trachea in the dynamics of the pathological process after the defeat of these organs.

As shown in the Materials and Methods section, all rabbits were divided into 3 groups depending on the methods of surgical intervention.

Monitoring of the state of 15 experimental animals was carried out in vivarium conditions daily. It should be noted that in a number of animals, as a rule, on the 7th-10th day and later, spontaneous closure of the stoma lumen was noted with deterioration of breathing, accompanied by noise. In such cases, we carried out measures to restore breathing.

According to the tasks set, the surgical material was studied ¬in each group of animals, followed by a morphological assessment of the ongoing changes from the moment after the surgical exposure.

The most significant changes were observed in scars ¬excised from the lumen of the larynx and trachea in rabbits of the first and second groups. At the same time, the tissue of the larynx and trachea in rabbits with short periods of study was characterized by the usual pattern of early inflammation. In the animals of the first and second groups, the granulation tissue was characterized by a dense infiltration of lymphohistiocytic elements, the density of which was highest ¬in the deeper sections. Along with this, in areas with a high content of cellular elements and edema, a large number of vertically oriented vessels in a state of stagnant plethora with a wide lumen and thin walls were noted.

Among the cellular elements of the stroma, neutrophilic leukocytes and a small number of macrophages predominated ¬; in the deeper layers, the content of macrophages increased, and fibroblasts appeared. Fibrinoid deposits and oriented blood vessels were detected in the stroma .

In animals with the final stage of the inflammatory process, the area of the defect consisted of connective tissue rich in various ¬cellular elements, which were mainly represented by lymphocytes, macrophages, and single plasma cells. Foci of fibrosis were observed between the areas of granulation tissue. The vessel walls were infiltrated with lymphocytes.

In animals with chronic productive inflammation, intercellular interstitial edema and focal accumulations of lymphoid- histiocytic elements were observed in the removed piece.

In the submucosal layer, foci of scarring were determined, between which cellular elements and vessels with an enlarged lumen were detected.

Analyzing the results of a morphological study of the tissues of the damaged larynx, we came to the conclusion that during the formation of persistent deformities of the respiratory tract in the early post-traumatic period, ¬a ¬residual (32%) or chronic productive (68%) inflammatory ¬process took place in the internal structures of the larynx and trachea. .

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In the long term, in a number of rabbits (41%), against the background of fibrosis, chronic inflammation continues in the formed scar, as evidenced by the accumulation of various lymphohistiocytic elements. In most ¬cases, during these periods, the scar is represented by a coarse fibrous tissue, which, however, has a tendency to further restructuring due to the preservation of lymphoid infiltrates around the vessels.

The outer layers of the cartilaginous skeleton of the larynx and the external muscles in the early period after injury in animals of the third group had significantly less pronounced inflammatory ¬changes. In later periods, in these zones, against the background of moderately pronounced fibrosis, the structure of muscle and cartilage tissue was also preserved with the presence of cambial cellular elements. The skin adjacent to the edges of the tracheostomy was subjected to sclerosis in ¬the dermal layer with a general decrease in the elements of the microcirculatory ¬bed (small caliber vessels and capillaries).

## CONCLUSIONS

Summarizing the results of morphological studies of the surgical material, we came to the conclusion that the outer layers of the cartilaginous framework of the larynx and trachea, as well as the external muscles, are the least susceptible to destruction and vascular changes. Moreover, these qualities ¬are found already in the early stages after the elimination of the clinical symptoms of the inflammatory process in the tissues of the neck. The skin lining of the stoma edges, both in the early and late periods, loses part of the elements of the microvascular tract and partially loses the structure of the subepidermal reticular layer against the background of progressive dermal fibrosis. The internal structures of the respiratory tube in the early period after injury are characterized by an increased regenerative capacity of the ¬submucosal connective tissue, with a tendency to degradation and resorption of the underlying cartilage. At the same time, in the early stages after the subsidence of clinical signs of inflammation, microscopically in this area, an abacterial stage of productive inflammation often occurs with a tendency to chronicity . In the later stages, the cicatricial regenerate formed in the submucosa ¬of that area, in most cases, also does not lose the ability for further restructuring, since it has paravasal ¬foci of young cells of the connective tissue.

From these positions, for the successful elimination of chronic inflammatory stenosing processes ¬and volume defects of the larynx and trachea framework in a clinical ¬situation, it is necessary to reduce the proliferative activity of the submucosal layer of the connective tissue of the larynx and trachea in order to ensure the best ability for engraftment and regeneration. The search for ways to reduce the inflammatory response in response to various etiological factors of damage to the larynx and trachea will be discussed in the following sections.

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