

# Information Technology for Implementing the Electrophysiological Method of Identifying the Reverse Laryngeal Nerve During Surgery on Thyroid

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**Abstract** - In this paper the information technology based on electrophysiological method for identification the reverse laryngeal nerve that reduce the risk of its damage during surgery operation on thyroid are given.

**Keywords** - Electrophysiological method, Information Technology, Reverse Laryngeal Nerve, Signal selection.

## I. INTRODUCTION

Electrophysiological methods are widely used in medicine for early diagnostics of diseases and for identification in muscle tissues the nerve endings. These methods have become especially important in Ukraine due to a significant increase the thyroid diseases which medical treatment carried out by surgical operation. The main idea of these methods is stimulation the surgery area by alternating current and estimation the results of stimulation on vocal cords [2-3]. If the area of stimulation include reverse laryngeal nerve then the vocal cords are contracted, if the muscle tissue is contracted then the reaction on stimulation is insignificant. The intensity of the reaction depends on the patient's physiological properties, which significantly complicates the development of tools for reverse laryngeal nerve identification or determining the distance from the stimulation point to the nerve. So the task of creating the methods, tools and high-performance technology for processing the results of stimulation the muscle tissue during surgical operation on the thyroid for identification the reverse laryngeal nerve independently of the patient's physiological properties is actual.

## II. ELECTROPHYSIOLOGICAL METHOD OF IDENTIFICATION THE REVERSE LARYNGEAL NERVE BY ALTERNATING CURRENT

Scheme of electrophysiological method described in patent [1].

The tissues in the surgical wound are stimulated by a alternating current with fixed frequency for which was provided an electrical signal conduction in the muscle tissues in surgical wound and high conduction of electrical signal by the laryngeal nerve and muscles that control the vocal cords tension. Then the vocal cords contraction on the given frequency is registered by sound sensor, installed in the respiratory tube which placed in patient's larynx above the vocal cords. An electric signal from the sound sensor via a standard audio input goes for further processing to the personal computer.

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## III. INFORMATION TECHNOLOGY FOR REDUCING THE RISK OF DAMAGE THE REVERSE LARYNGEAL NERVE DURING SURGERY OPERATION

Output information signal characterize proximity the probe placement to reverse laryngeal nerve. It's determined by change the amplitude of the extracted electrical sinusoidal signal with given frequency. If distance to the nerve is decreasing then signal's amplitude is increasing. In fact, the vocal cords vibration modulate the audio noisy signal which is formed by air flow during patient's breathing and has a quasi-periodic kind with the momentary growth and attenuation. This modulated noise-like signal contains the required information signal. However, for each patient the characteristic of information signal is different and is not depending on the probe placement to the reverse laryngeal nerve. In order to ensure invariance the parameters of information signal it is proposed to create a database with the results of surgery operations and on this basis using a productive model to develop information technology for reducing the risk of damage the reverse laryngeal nerve.

## IV. CONCLUSION

The electrophysiological method for identification the reverse laryngeal nerve is considered and proposed the information technology for its implementation during surgery operation on the thyroid. It is shown that the main problem of this method has various physiological characteristics of patients and on this basis justified the creation of a database with parameters of information signals and the model of production type for reducing the risk of damage the reverse laryngeal nerve.

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