

# Features of Information Signal Selection for Visualization of Laryngeal Nerves Location

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**Abstract** - In this paper the method of information signal selection visualization of laryngeal nerves location during the performing of surgical operations on a thyroid is proposed.

**Keywords** - Information Signal, Laryngeal Nerves Identification, Interval Model.

## I. INTRODUCTION

During the performing of surgical operations on a thyroid the main problem is identification of reverse laryngeal nerve. Its damage results in the loss of patient voice and also to other negative consequences related to functioning of the human respiratory system. Modern technical devices which are used in the process of performing of such operations doesn't provide the visualization of laryngeal nerve identification process, and also are based on dangerous procedure of transition of patient to the high risk third stage of anaesthesia.

One from the complex of tasks on development of technical devices and software for the construction of interval models for identification of tolerance area for safe surgery and providing visualization of reverse laryngeal nerve location is the task of selection of information signal.

## II. TASK STATEMENTS

The analysis of the known technical devices [1] for identification of reverse laryngeal nerve during the performing of surgical operations on a thyroid allows to assert that their work principle based on the irritation of surgery area by direct electric current and estimation of this results. Although the considered technical devices are widespread but they have such failings:

- 1) necessity of sensor inserting to the area of vocal cords location for registering of their reaction on laryngeal nerve stimulation. That is require the patient transition to 3 stage of anaesthesia that is danger for his life;
- 2) absence of tools for visualization of laryngeal nerves location without the section of muscular tissue which results in its damage.

For the removal of the higher noted failings the new approach is offered. It is based on the stimulation of tissues in a surgical wound by the alternating current with fixed frequency. This current provides small conductivity of electric signal by muscular tissues and high conductivity of electric signal by a laryngeal nerve which controls the tension of vocal cords. Result of vocal cord contraction on this frequency (sound signal) is registered by sound sensor which inserted in a respiratory tube that is placed in the patient larynx. This sensor convert the sound signal into the electric signal. Then information signal which characterizes a proximity to the laryngeal nerve will be defined by change of electric current amplitudes of the given frequency [2].

## III. METHOD OF INFORMATION SIGNAL SELECTION

The schema of method of electric signal identification is shown on Fig. 1.

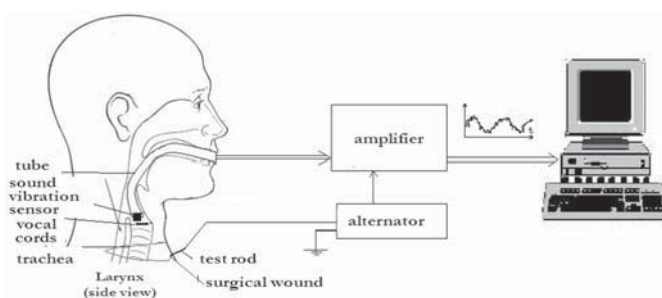


Fig. 1. Schema of electric signal obtaining.

One from problems which arises during of electric signal obtaining is the selection of information signal from received noised electric signal. For signal processing the software tool is developed which performs the filtration of signal on stimulation frequency and determination of the maximal amplitude of filtered signal for every conducted observation and record of the received data in the interval kind taking into account the errors of different nature. Thus interval estimation of amplitude  $[U_{\max}^-; U_{\max}^+]$  records to the table with  $(x, y)$  coordinates on a surgical wound that are fixed on the abacterial net.

Comparison of the filtered information signals shows that maximal amplitude of information signal received during the stimulation of laryngeal nerve is about 5,35 times higher, than maximal amplitude of information signal received during the stimulation of muscular tissue.

## IV. CONCLUSION

The method of selection and processing of information signal during the performing of surgical operations on the thyroid is offered. The result of experiments confirmed that than greater distance from the point of stimulation of the laryngeal nerve, then the amplitude of information signal is less.

## REFERENCES

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