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ORIGINAL ARTICLE

Restoration of the act of swallowing and rehabilitation of patients with tumors of the oral cavity

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ABSTRACT

Aim: To assess the restoration of the act of swallowing in patients with cancer of the oral cavity and oropharynx using an objective method - ultrasound examination of the contraction of the muscles involved in the act of swallowing in complex treatment.

Materials and Methods: The study was conducted in 76 patients (58 (76.3%) men and 18 (23.7%) women, mean age 58.05±12.31 years) with tumors of the oral cavity and oropharyngeal mucosa of stages II-IVa, with the possibility of surgical removal, without distant metastases. Patients are divided into two groups depending on treatment and postoperative analgesia. The act of swallowing and its restoration were studied using the ultrasound method of research for 1 and 10 days.

Results: During the study, it was found that the difference in the indicators of contractions of the muscles of the oral cavity on day 10 in the main group almost corresponded to the initial indicators before the operation and the proposed treatment. This indicates that patients with cancer of the oral cavity and oropharynx in the postoperative period resumed the act of swallowing on the 10th day and such patients could switch from zonal to self-feeding. That is, on the 10th day, a nasogastric tube can be removed from them. And in the patients of the comparison group, on the 10th day, the indicators of muscle contraction decrease. Therefore, the nasogastric tube was removed for 12-14 days, depending on the volume of removed muscles.

Conclusions: The developed ultrasound study of the act of swallowing is of practical importance as an objective research method with a mathematical justification of the functional activity of the muscles. Combined treatment contributes to the rapid recovery of swallowing, which is confirmed by ultrasound examination of the contraction of the muscles involved in the act of swallowing.

KEY WORDS: oral cancer, dysphagia, swallow, reconstructive operations, ultrasound

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INTRODUCTION

The act of swallowing is a complex reflex process that ensures the transport of food and fluids from the oral cavity to the stomach. It is made up of three main phases: oral, pharyngeal, and esophageal. During the oral phase, there is a movement of food through the tongue to the pharynx. The pharyngeal phase involves closing the nasopharynx with the soft palate, elevating the larynx, and closing the glottis to prevent food from being aspirated into the airways. During the esophageal phase, there is a movement of the food lump through the esophagus towards the stomach due to the peristalsis of its muscles [1, 2].

Swallowing requires coordinated work of more than 25 pairs of muscles in the mouth, pharynx, soft palate, larynx, and esophagus [3, 4]. These muscles are innervated by the glossopharyngeal, vagus and hypoglossal nerves. The regulation of the act of swallowing occurs with the participation of the respiratory, salivary and taste centers of the brain stem [5].

Swallowing disorders (dysphagia) can occur in a variety of diseases, including neurological (stroke, Parkinson's disease), muscular (myasthenia gravis, scleroderma), as well as tumors of the oral cavity, oropharynx, pharynx, larynx and esophagus [6, 7]. Dysphagia is especially common in patients with malignant tumors of the oral cavity (cancer of the tongue, floor of the oral cavity, tonsils), which worsens in the postoperative period.

Various methods are used to objectively assess the act of swallowing. Clinical examination of swallowing includes medical history (complaints of choking, food stuckness, pain during swallowing), examination and palpation of the muscles of the oral cavity, assessment of the motor function of the tongue. Video fluoroscopy makes it possible to visualize in real time the stages of movement of the contrast agent during swallowing. Fiber-optic swallowing endoscopy involves inserting a flexible endoscope through the nose into the pharynx to directly observe swallowing. Electromyography makes it possible to assess the bioelectrical activity of the muscles involved in the act of swallowing. These methods make it possible to determine which phases of swallowing are impaired, the location and degree of impairment [6, 8-10]. However, the use of these methods in the postoperative period in the presence of edema, wound and pain is not always possible. Therefore, we have proposed a non-invasive and objective method for examining the contraction of the muscles involved in the act of swallowing, such as ultrasound examination of the act of swallowing. Where several indicators for the study are displayed [11].

Restoration of swallowing function in patients with oral tumors is extremely important. After all, adequate nutrition is the key to successful treatment of these patients, both surgically and by radiation or chemotherapy methods. In addition, swallowing disorders significantly worsen the quality of life of patients, leading to social isolation and depression. Therefore, in the early postoperative period, when conventional nutrition becomes impossible, we use artificial nutrition through a nasogastric tube. And when the act of swallowing is resumed, the nasogastric tube is removed.

AIM

The aim of the study to assess the restoration of the act of swallowing in patients with cancer of the oral cavity and oropharynx using an objective method - ultrasound examination of the contraction of the muscles involved in the act of swallowing in complex treatment.

MATERIALS AND METHODS

The study was conducted in 76 patients (58 (76.3%) men and 18 (23.7%) women, mean age 58.05±12.31 years) with tumors of the oral cavity and oropharynx, who were treated in the department of head and neck tumors of the Podilsky Regional Center of Oncology of Vinnytsia Regional Council in the period 2021 to 2022 inclusive.

The study included patients with locally advanced cancer of the oral and oropharyngeal mucosa of stages II-IVa, with the possibility of surgical removal, without distant metastases. Exclusion criteria: refusal of the patient to participate in the study, other malignant neoplasm in anamnesis, severe comorbidity, patients of stage IV with the presence of distant metastases who required only palliative treatment. In all cases, the diagnosis was verified histologically.

The main group included 39 patients who underwent a preoperative course of radiation therapy, followed by surgical intervention (removal of the tumor with plastic surgery with local tissues (56%) and regional, removed arteralized flaps (44%)) and the appointment of complex clinical enteral nutrition (Peptamen and the amino acid complex Glutargin), with combined anesthesia (long-term postoperative conduction anesthesia and non-steroidal anti-inflammatory drugs) in the postoperative Period. The second group consisted of 37 patients who underwent a preoperative course of radiation therapy and surgery (with plastic surgery with local tissues (74%) and regional and removed flaps (26%)) followed by nasoesophageal nutrition and postoperative anesthesia with non-steroidal anti-inflammatory drugs.

Clinical observation of patients and their subjective sensations of the ability to take a sip was carried out on days 1 and 10 of the postoperative period.

Ultrasound examination in B- and M-mode was performed on days 1 and 10 after surgery in combination with the proposed supportive treatment. The following parameters were measured, before and after surgery: chin-hyoid distance, longitudinal length of the suprahyoid muscle group and the length of the anterior abdomen of the digastric muscle on the side without a tumor and with a tumor in lateral projection.

Statistical processing of the obtained data was performed using a mathematical statistical method on a PC using Excel software from Microsoft Office 2003, STATISTICA 5.5 (owned by CNIT VNMU named after MI Pirogov, licensed № AXXR910A374605FA) according to Student's criteria. Differences between groups were considered statistically significant at $p<0.05$ [11].

RESULTS

According to clinical observations and subjective sensations, patients of the main group, where long-term postoperative conduction anesthesia was performed, could swallow movements and swallow saliva painlessly as early as 3 days. And patients in the comparison groups, where non-steroidal anti-inflammatory drugs were used for pain relief, had swallowing problems, which are associated with pain and salivation. On the 7th day, a similar picture was observed in the subjective sensations of patients, where patients of the main group made swallowing movements painlessly, and in patients of the comparison group, swallowing is painful and impossible, there is constant salivation, which leads to maceration of the skin and edges of the wound, which complicates the course of healing. It is easier for such patients to spit saliva than to swallow. On the 10th day, patients of the main group made swallowing movements painlessly and could even drink water freely. Patients in the comparison groups indicated the possibility of taking a sip with effort, noted mild pain during the act of swallowing.

For an objective study of the dynamics of restoration of the functional activity of the muscles of the oral cavity and oropharynx, the possibility of the act of swallowing, we have chosen the 10th day of the postoperative period, taking into account the clinical manifestation, subjective sensations of patients and regenerative capabilities of tissues.

During the ultrasound examination of the act of swallowing, a decrease in muscle contraction was observed in both observation groups. A more significant decrease in indicators occurred on the side of surgical intervention. However, when comparing the indicators between the groups, a positive trend was found in the approximation of the indicators of the act of swallowing after surgery to the initial indicators of the patient in the main group (Fig. 1-6).

DISCUSSION

Ultrasound examination of the act of swallowing revealed a decrease in the amplitude of contraction of the muscles of the supragastric group in the longitudinal projection in patients with cancer of the oral cavity and oropharynx of both groups before surgery and amounted to 31.6 % and 32.3 %, with the normal act of swallowing - ≥40 %. On the 10th day, this indicator was reduced, but in the main group it was 30.9%, and in the comparison group - 27.7%. When analyzing the data of the indicator «length of the anterior abdomen of the digastric muscle in lateral

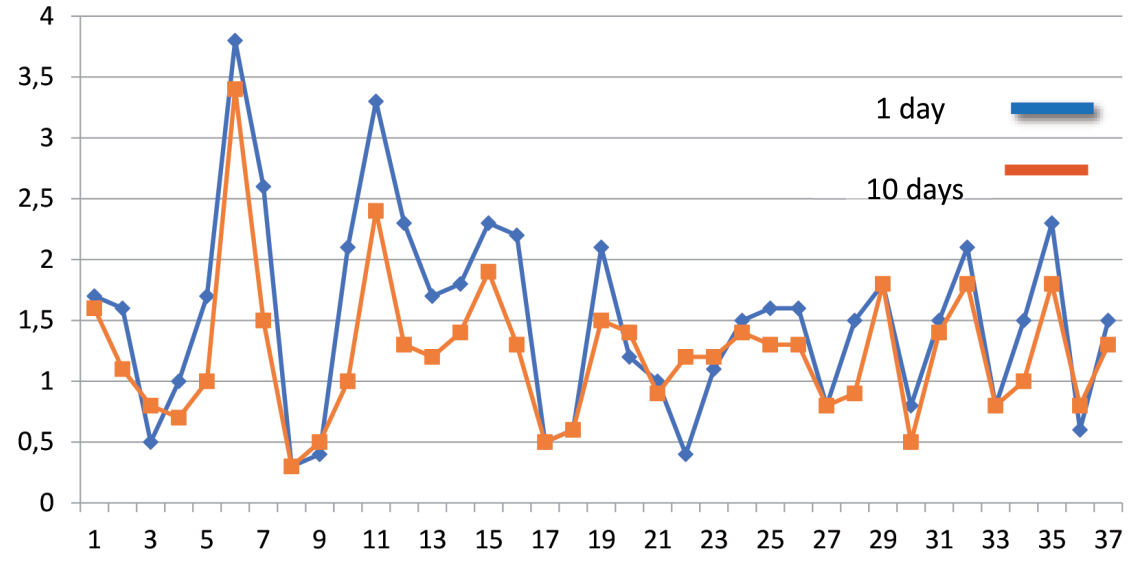

Fig. 1. Length of the anterior abdomen of the digastric muscle in lateral projection on the side without tumor (control group).

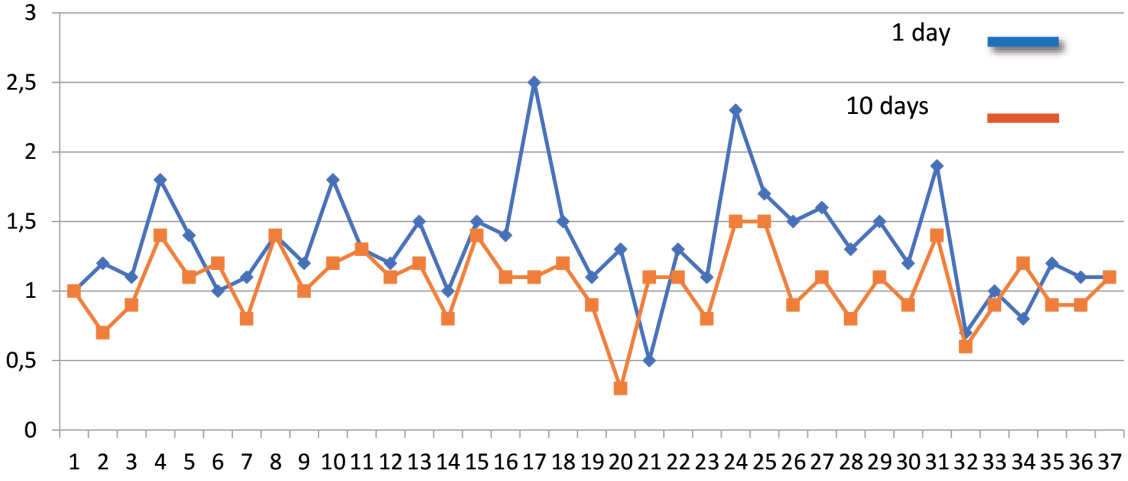

Fig. 2. Length of the anterior abdomen of the digastric muscle in lateral projection on the side with the tumor (control group).

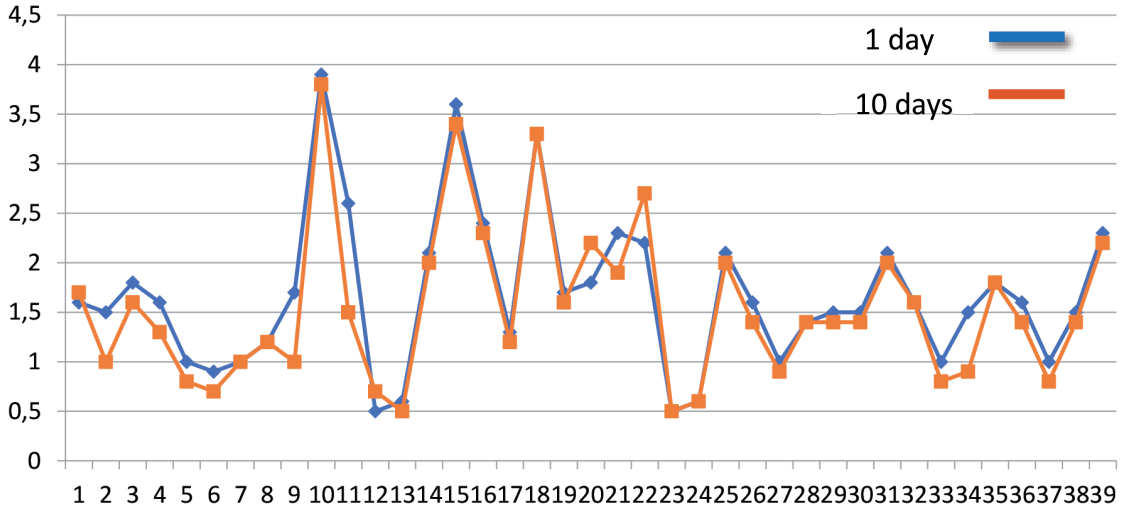

Fig. 3. Length of the anterior abdomen of the digastric muscle in lateral projection on the side without a tumor (main group).

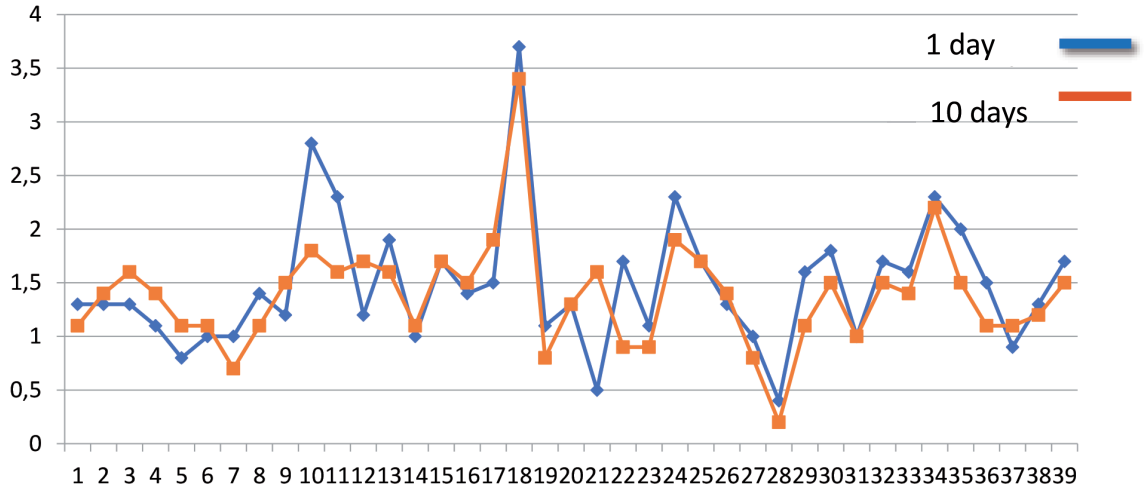

Fig. 4. Length of the anterior abdomen of the digastric muscle in lateral projection on the side with the tumor (main group).

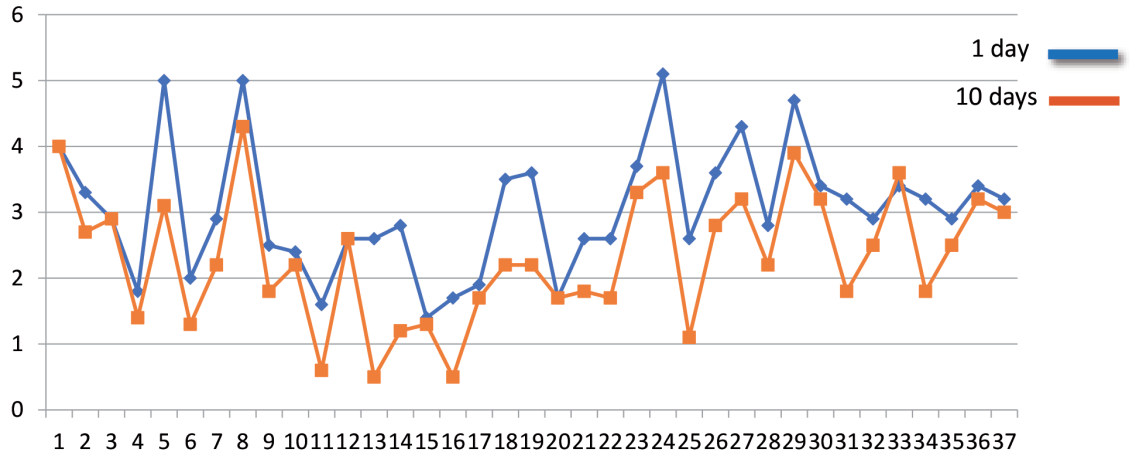

Fig. 5. The difference in the reduction of the indicator, the length of the suprahyoid muscle group in the longitudinal projection in dynamics (control group).

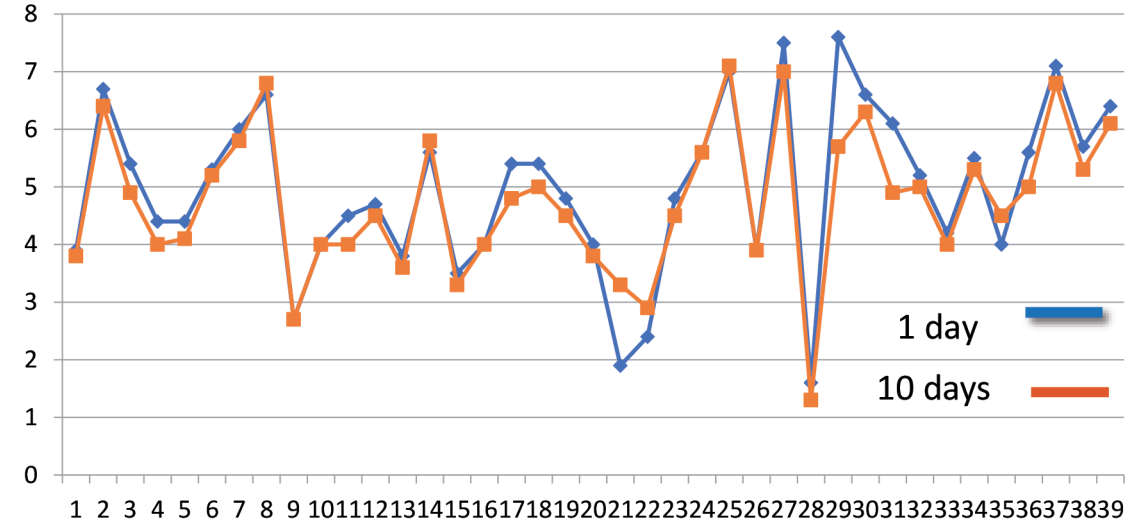

Fig. 6. Difference in the reduction of the indicator, the length of the suprahyoid muscle group in the longitudinal projection in dynamics (main group).

projection on the side without a tumor» before treatment, a decrease in muscle contraction was also found in both groups of the study and amounted to 14.5% and 15.5%. With the normal act of swallowing, the percentage of contraction was ≥20%. This indicator continued to decrease in patients of the comparison group in the postoperative period (12.7%), in contrast to the indicators of patients in the main group, where it did not change from the initial indicators – 14.5%. The indicator «length of the anterior abdomen of the digastric muscle in lateral projection on the side with the tumor» before treatment was also reduced and amounted to 12.7% in the main group and 13.6% in the comparison group. However, pronounced changes in this indicator were observed on day 10 in the main group, where muscle contraction is 13.6%, although a decrease in indicators in absolute numbers was detected compared to the initial data. And in patients of the comparison group, this indicator did not recover to the initial data, but, on the contrary, almost halved (7.3%).

Thus, the difference in the indicators of contractions of the muscles of the oral cavity on day 10 in the main group almost corresponded to the initial indicators before surgery and the proposed treatment. This indicates that in patients with cancer of the oral cavity and oropharynx in the postoperative period on the 10th day, the act of swallowing was restored and such patients could switch from zone nutrition to independent nutrition. That is, on the 10th day, it is already possible to remove the nasogastric tube from them. And in patients of the comparison group on day 10, the indicators of muscle contraction are reduced. Therefore, the nasogastric tube was removed for 12-14 days, depending on the volume of the removed muscles.

Thus, objective indicators of the effectiveness of muscle contraction were derived, at which the act of swallowing is possible. They represent ≥20% in the longitudinal contraction of the suprahyoid muscle group and ≥13% in the contraction of the anterior abdomen of the digastric muscle in lateral projection. Readings below the percentage reduction data indicate the inability to swallow.

Therefore, timely diagnosis and adequate correction of swallowing disorders in patients with oral and oropharyngeal cancer can prevent severe complications such as aspiration pneumonia, nutritional deficiency, and also significantly improves their quality of life.

CONCLUSIONS

1. The developed ultrasound examination of the act of swallowing is of practical importance as an objective method of research with mathematical substantiation of the functional activity of muscles.
2. With the restoration of the act of swallowing, the range of motion of the hyoid bone with a reference measurement along the edge of the chin of the lower jaw is from 20 to 25%, the contraction of the suprahyoid muscle group by ≥35% in the B-mode and ≥40% in the M-mode, and the range of contractions of the anterior abdomen of the digastric muscle in the lateral projection during swallowing reached ≥17-20%.
3. Combined treatment promotes rapid recovery of swallowing, which is confirmed by ultrasound examination of the contraction of the muscles involved in the act of swallowing.

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CONFLICT OF INTEREST
The Authors declare no conflict of interest

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