DOI: https://doi.org/10.64124/DMR-2025-1-32

Anoetic Treatment of Atypical Swallowing in the Context of State Healthcare Policy

UDC 616-089.882+616-089+616.314.17-008.1

Makhlynets, N. P.
0000-0002-1199-8086
Fellus, P.
0000-0002-2775-9135
Pyuryk, M.
0000-0002-6065-831X
Kokoshko, M.

Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine

Keywords:
atypical swallowing,
anxiety,
stress,
anoethical treatment,
myofunctional rehabilitation

Abstract

Objective: This study aims to assess the efficacy of the *Froggy Mouth* myofunctional rehabilitation approach for atypical swallowing in juveniles with acquired maxillomandibular anomalies who exhibit oral and posture habits due to the influence of stressors. Justification of the need to introduce anoetic treatment of atypical swallowing into the health care system, identify key areas of state policy to ensure the availability, effectiveness and integration of these methods into medical practice.

Methods. The study population consists of 56 patients aged 15–17 years. Among them, 35 patients were diagnosed with atypical swallowing using the Fellus Patrick method. These 35 patients with acquired maxillomandibular anomalies were divided into two equal groups. The assessment includes the State-Trait Anxiety Inventory questionnaire, a survey of stressors and habits, clinical examination, determination of swallowing and breathing types, facial aesthetics analysis, cephalometry, and functional respiratory tests. Patients in Group I (16 individuals) received traditional orthodontic treatment. The patients in Group II (19 individuals) underwent treatment that was supplemented with myofunctional rehabilitation using the *Froggy Mouth* appliance for 15 minutes per day.

Results. A prevalence of high anxiety and stress-related strain has been found among the study population. Detrimental habits have been noted in over 96% of subjects, with a dominance of posture habits, including resting the head on the hand, sleeping with the head on the hand, and text neck. Over a third of patients suffer from impaired breathing, facial muscle dysfunction, and 62.5% have atypical swallowing. The *Froggy Mouth*, a myofunctional rehabilitation for patients with atypical swallowing or mouth breathing, was administered. After 10 weeks, no independent normalization of swallowing was observed in patients in Group I. The circular muscle of the mouth and the muscles of the chin area continued to participate in swallowing. Functional improvement was noted in 57.8% of patients aged 15–17 years after 10 weeks of rehabilitation. Four months after the start of orthodontic treatment, 89.47% of Group II patients had achieved normal swallowing function, a correct head position relative to the spine, and an accurate position of the second cervical vertebra (axis). In Group I, changes in tooth movement of the patients were observed during active treatment. However, clinical studies indicated the presence of atypical swallowing in all patients in this group. In 56.25% of Group I patients, no changes in posture were noted, which was confirmed by changes in the position of the axis.

Conclusions. The findings of this study underscore the effectiveness of *Froggy Mouth* myofunctional rehabilitation in addressing atypical swallowing among children aged 15–17 years and adolescents with maxillomandibular anomalies and stress-induced habits.

Аноетичне лікування атипового ковтання у контексті державної політики охорони здоров'я

Анотація

Метою цього дослідження є оцінка ефективності підходу до міофункціональної реабілітації з використанням апарату *Froggy Mouth* при атиповому ковтанні у підлітків із набутими аномаліями верхньої та нижньої щелепи, що страждають

Махлинець Н. П.
0000-0002-1199-8086
Феллус П.
0000-0002-2775-9135
Пюрик М.
0000-0002-6065-831X
Кокошко М.

Івано-Франківський національний медичний університет,
Івано-Франківськ, Україна

Ключові слова:
атипове ковтання,
тривожність,
стрес,
аноетичне лікування,
міофункціональна реабілітація

від порушень шкідливих ротових звичок і позатонічних рефлексів через вплив стресорів. Оцінка необхідності впровадження аноетичного лікування атипового ковтання в систему охорони здоров'я, визначення основних напрямів державної політики щодо забезпечення доступності, ефективності та інтеграції цих методів у медичну практику.

Методи: У дослідженні брало участь 56 пацієнтів віком 15–17 років. Серед них 35 пацієнтів було діагностовано з атиповим ковтанням за методом П. Феллуса. Ці 35 пацієнтів із набутими аномаліями верхньої та нижньої щелепи були розділені на дві рівні групи. Оцінка включала використання анкети State-Trait Anxiety Inventory, опитування стресорів і звичок, клінічне обстеження, визначення типу ковтання та дихання, аналіз естетики обличчя, цефалометрію та функціональні тести дихання. Пацієнти групи I (16 осіб) отримували традиційне ортодонтичне лікування. Пацієнти групи II (19 осіб) проходили лікування, яке доповнювалося міофункціональною реабілітацією за допомогою апарату *Froggy Mouth* по 15 хвилин на день.

Результати: Було виявлено високий рівень тривожності та стресової напруги серед учасників дослідження. Шкідливі звички були відзначені у понад 96 % учасників, із домінуванням звичок, що стосуються постави (підтримка голови рукою, спання на руці, текстова шия). Більше трьох пацієнтів страждають від порушення дихання, дисфункції м'язів обличчя, 62,5 % мають атипове ковтання. Міофункціональна реабілітація за допомогою апарату *Froggy Mouth* була проведена для пацієнтів із атиповим ковтанням або ротовим диханням. Після 10 тижнів у пацієнтів групи I самостійної нормалізації ковтання виявлено не було. Круговий м'яз рота та м'язи підборіддя продовжували брати участь у процесі ковтання. Функціональне поліпшення було відзначено у 57,8 % пацієнтів віком 15–17 років після 10 тижнів реабілітації. Через чотири місяці після початку ортодонтичного лікування 89,47 % пацієнтів групи II досягли нормальної функції ковтання, нормальної позиції голови відносно хребта і позиції другого шийного хребця (осі). У пацієнтів групи I були помічені зміни в русі зубів під час активного лікування, але клінічні дослідження показали наявність атипового ковтання у всіх пацієнтів цієї групи. У 56,25 % пацієнтів групи I не було відзначено змін у поставі, що підтвердило зміни в положенні осі.

Висновки: Результати цього дослідження підкреслюють ефективність міофункціональної реабілітації за допомогою апарату *Froggy Mouth* для лікування атипового ковтання серед дітей і підлітків віком 15–17 років, а також осіб з аномаліями верхньої та нижньої щелеп та стресовими звичками.

Introduction

Swallowing is one of the most essential functions in the human body. Every day, a person swallows more than 2,000 times. At birth, a child receives a primary swallowing type that ensures sucking reflexes. The transition from infantile to mature swallowing typically occurs around the age of 4 ***[1–3]***. In every person's life, various types of stressors cause individual or social stress. As a result, there is a response in the form of a change in the nervous system's activity: the facial nerve starts functioning during swallowing ***[4]***. Over time, habits become ingrained behaviors due to a high frequency of repetitions and possess a strong neurobiological framework ***[4–6]***. Patients require support from myofunctional therapy. The anoetic myofunctional rehabilitation of atypical swallowing in orthodontic patients has been demonstrated by the *Froggy Mouth* appliance ***[7]***.

Materials and Methods

This longitudinal study involves 56 patients with acquired maxillomandibular anomalies aged 15–17 years. Among them, 35 patients were diagnosed with atypical swallowing using the Fellus Patrick method. These 35 patients with acquired maxillomandibular anomalies were divided into two equal groups. The assessment includes the State-Trait Anxiety Inventory questionnaire, a survey of stressors and habits, clinical examination, determination of swallowing and breathing types, facial aesthetics analysis, cephalometry, and functional respiratory tests. Patients in Group I (16 individuals) received traditional orthodontic treatment. The patients in Group II (19 individuals) underwent treatment that was supplemented with myofunctional rehabilitation using the *Froggy Mouth* appliance for 15 minutes per day—each group has a comprehensive and balanced representation in terms of gender.

The survey was designed to assess anxiety levels using the State-Trait Anxiety Inventory, developed by Spielberger et al. ***[8]***. Clinical assessment includes extra- and intraoral examination, determination of swallowing and breathing types, assessment of the temporomandibular joint, and functional respiratory test.

For confirmation of acquired maxillomandibular anomalies, all patients underwent cone-beam computed tomography (CBCT). It was preferred due to its ability to provide various formats of research results after processing with the help of computer software. This radiological method involved examining the patient using an X-ray device with a computer tomography function—Veraview X800CP, manufactured by J. MORITA MFG. CORP., Japan. During the scan, the patient was seated with their jaw in occlusion and their head in a stable, resting position in three planes (axial, sagittal, and transverse). Three-dimensional cephalometry assessment was conducted using Sim Plant Pro 11.04 software.

The presence of oral habits was assessed through facial esthetics analysis, which involved analyzing patients' photos in frontal and overhead views with closed lips, as well as both sagittal perspectives with a cheek retractor dental expander. Subsequently, the hypertonia of *m. orbicularis oris* was assessed. In cases of a positive assessment, which may potentially indicate impairment of speech and swallowing, a swallowing kinematic analysis was conducted ***[9]***.

The evaluation of swallowing patterns is designed to identify individuals with atypical swallowing ***[9]***. The assessment comprises two sequential phases: 1) in the first phase, the patient is instructed to perform a natural swallow of saliva; 2) in the second phase, the patient is guided to insert the little finger delicately into the oral vestibule, gently retract the cheek laterally, and then execute a controlled swallow of saliva. The movement of the little finger, influenced by the contraction of the buccinator muscle, will be observed during the second phase.

Patients in Group II, in addition to treatment with fixed orthodontic appliances, received myocorrective therapy for swallowing dysfunction and whole-body strengthening exercises. Myofunctional rehabilitation was administered through the *Froggy Mouth* appliance, which is available in three sizes (S, M, L). According to the instructions, the size should be slightly smaller than the patient's lips. The rehabilitation duration usually lasts several weeks ***[2]*** and includes phases performed both in the dental clinic and at home. Daily use lasting 15 minutes (Fig. 1) is enough to modify the subcortical process during treatment.

Fig. 1. Patient H., 17 years old with *Froggy Mouth*.

Myofunctional treatment aims to assess the tongue's position, its appearance between dental arches, and its participation in swallow kinematics. The goal is to achieve positive labial dynamics and establish a new swallowing pattern that involves the active use of the tongue.

Results and discussion

It has been found that all respondents reveal high anxiety (Spielberger State-Trait Anxiety Inventory score > 45). Detrimental habits have been noted in over 96% subjects, with dominance of posture habits (resting head on hand, sleeping on hand, text neck). Over a third of patients suffer from impairment breathing, facial muscles dysfunction, 62.5% atypical swallowing. Oral habits demonstrate age-related decreasing, that align with other studies in this field ***[10, 11]***. Moreover, during the survey, patients noted that habits allow them to experience rich emotional relief.

The *Froggy Mouth* myofunctional rehabilitation for patients with atypical swallowing was administrated. After 10 weeks, no independent normalization of swallowing was observed in Group I patients. The circular muscle of the mouth and the muscles of the chin area continued to participate in swallowing. In Group I patients, changes in tooth movement during active treatment were observed, but clinical studies indicated the presence of atypical swallowing in all patients in this group. In 56.25% of Group I patients, no changes in posture were noted, which was confirmed by changes in the position of the axis. Clinical studies correlated with radiological data. The position of the tongue on the floor of the oral cavity and the displacement of the tooth axis in relation to the midline were observed (Fig. 2). In adolescence, clinical symptoms will not

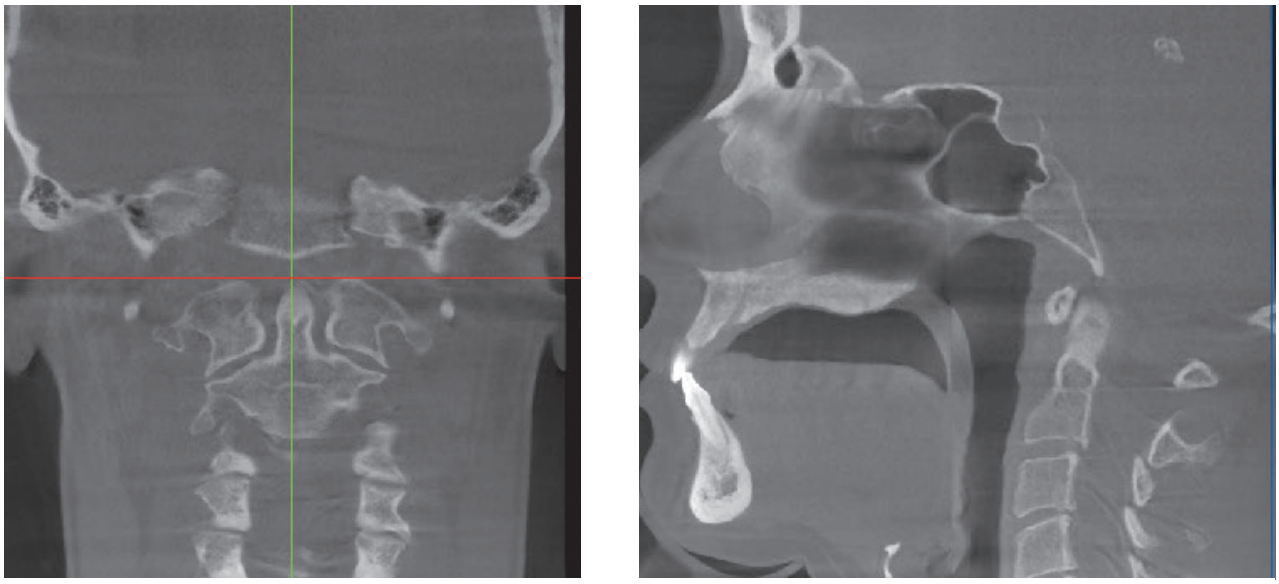

Fig. 2. Patient N., 17 years old. Radiological examination 4 months after the start of treatment (Group I of patients).

always manifest in the atlanto-occipital joint (persistent headaches, fatigue). However, without eliminating the etiological factors (functional, positional harmful habits, absence of teeth on one side), clinical symptoms will actively indicate pathology.

Functional improvement was noted in 57.8% of patients aged 15–17 years after 10 weeks of rehabilitation. Four months after the start of orthodontic treatment, 89.47% of Group II patients had achieved normal swallowing function, a correct head position relative to the spine, and a proper position of the second cervical vertebra (axis).

Our results show superiority compared to those reported by Quinzi V et al. ***[12]***, in terms of success over treatment time.

The effective implementation of anoetic treatment of atypical swallowing in the healthcare system requires a systematic approach that includes the following key directions:

Accessibility of Medical Services

State policy should ensure the availability of anoetic treatment methods of atypical swallowing for the entire population, including the development of national or regional programs that finance the treatment of atypical swallowing through medical institutions, regardless of their ownership type. This primarily involves providing the necessary equipment and materials for diagnosis and therapy.

Implementation of Modern Treatment Methods

Anoetic treatment of atypical swallowing often requires the application of advanced technologies and therapeutic techniques. State policy should promote the integration of these methods into official medical practice, particularly by funding

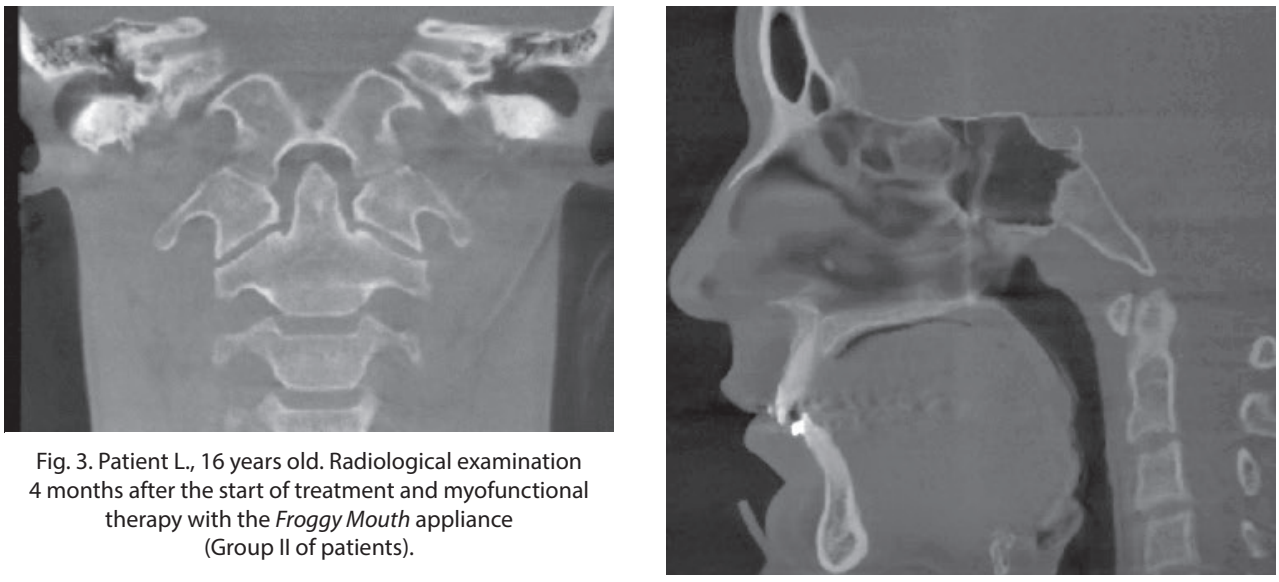

Fig. 3. Patient L., 16 years old. Radiological examination 4 months after the start of treatment and myofunctional therapy with the *Froggy Mouth* appliance (Group II of patients).

research, conducting clinical trials, and certifying new treatment methods.

Training and Professional Development of Medical Personnel

An essential aspect is the education of doctors, speech therapists, therapists, and other specialists capable of correctly diagnosing and treating swallowing disorders. At the state level, specialized training and certification programs should be implemented for these professionals to ensure a high level of qualification among medical personnel.

Integration of Interdisciplinary Approaches

Atypical swallowing is often a multifaceted disorder that requires a comprehensive approach from various specialists, including speech therapists, neurologists, otolaryngologists, and physiotherapists. It is necessary to: ensure access to such assistance through rehabilitation centers and medical institutions; organize training and professional development programs for specialists (speech therapists, rehabilitators, otolaryngologists, neurologists); support the development of interdisciplinary teams working on these issues.

Monitoring and Evaluation of Treatment Effectiveness

A state system for monitoring and evaluating the effectiveness of anoetic treatment methods for atypical swallowing should be established to adapt them to new challenges and changes in medical standards. This includes research and patient feedback to adjust policies and treatment approaches accordingly.

Funding and Insurance

Ensuring the financial accessibility of treatment is crucial, including support through state health insurance programs, coverage of treatment costs for atypical swallowing, and activation of compensation mechanisms for those unable to pay for treatment independently.

Development of a Medical Service Package

To be included in the healthcare guarantee program, a separate package of services covering the full cycle of atypical swallowing treatment should be developed. This may include:

1) initial consultation with a specialist doctor (speech therapist, neurologist, otolaryngologist).

2) Diagnostics (including examinations to determine the causes of atypical swallowing).

3) Therapeutic procedures (physiotherapy, anatomical corrections, rehabilitation measures).

4) Psychological support and behavioral correction, if necessary.

Integration into Existing Rehabilitation Programs

Atypical swallowing is often part of the comprehensive rehabilitation process for patients recovering from strokes, traumatic brain injuries, brain surgeries, or other neurological conditions. Therefore, its treatment should be included in rehabilitation programs within medical guarantees, allowing patients to receive comprehensive care in a single package.

Public Awareness Campaigns

Increasing awareness among both the general population and healthcare professionals about the available anoetic treatment methods for atypical swallowing is also an essential aspect of state policy. Since many people are unaware of such disorders, public awareness campaigns can help with early diagnosis and the prevention of complications. Additionally, promoting the effectiveness of *Froggy Mouth* myofunctional rehabilitation is crucial.

Conclusions

The myofunctional rehabilitation of atypical swallowing in juveniles with acquired maxillomandibular anomalies and stress-induced oral and posture habits, using *Froggy Mouth*, demonstrated high efficacy and positive short-term outcomes. It has been found that high levels of anxiety and chronic stress-related strain were prevalent among the study population, with age-related variations in stressors. Despite this psychological background, functional improvement was achieved in 89.47% of Group II patients. Moreover, patients demonstrated the successful formation of automated functional balance in swallowing and head position. The implementation of the above proposals will ensure effective anoetic treatment of atypical swallowing into the health care system, improving the quality of medical services and accessibility to the population.

REFERENCES

1. Patrick Fellus. (2018). A Simplified Approach to Rehabilitation of Swallowing: Labiotherapy. On J of Dent & Oral Health, 1(2). DOI: https://doi.org/10.33552/OJDOH.2018.01.000506.

2. S, Di Vecchio, P, Manzini, E, Candida, M, Gargari. (2019). Froggy mouth: a new myofunctional approach to atypical swallowing. European Journal of Paediatric Dentistry, 20(1), 33–37.

3. Catiane Maçaira de Lemos, Paula Andreya de Souza Junqueira, Maria Valéria S. Goffi Gomez, Maria Estela Justamante de Faria, Silmara de Cássia Basso. (2006). Study of the relationship between the dentition and the swallowing of mouth breathers. Int otorrinolaringol, 10(2),114–118. https://arquivosdeorl.org.br/additional/acervo_eng.asp?Id=370.

4. Saba H Al Zubaidi, Mustafa M H Alsultan, Lamiaa A Hasan. (2023). Stress effect on the mandibular dental arch by mentalis muscle over activity, finite element analysis. J Orthod sci, 2(12), 61. DOI: https://doi.org/10.4103/jos.jos_16_23.

5. Kyle S. Smith, Ann M. Graybiel. (2016). Habit formation. Dialogues in Clinical Neuroscience, 18(1), 33–43. DOI: https://doi.org/10.31887/DCNS.2016.18.1/ksmith.

6. Eric R. Kandel. (2009). The Biology of Memory: A Forty-Year Perspective. The Journal of Neuroscience, 29(41), 12748–12756. DOI: https://doi.org/10.1523/JNEUROSCI.3958-09.2009.

7. Patrick Fellus. (2021). Innovative rehabilitation for orofacial praxis. International Dental Journal, 71, 37. DOI: https://doi.org/10.1016/j.identj.2021.08.014.

8. Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P.R. and Jacobs, G.A. (1983) Manual for the State-Trait Anxiety Inventory. Consulting Psychologists Press, Palo Alto, CA. https://www.scirp.org/reference/referencespapers?referenceid=2379332.

9. Fellus Patrick, and Lecendreux Michel. (2019). Swallowing Rehabilitation in a Child with Narcolepsy and Cataplexy. Scientific Archives Of Dental Sciences, Vol 2, (6), 36–28. https://saods.net/saods-volume-2-issue-6/.

10. Trudee A. Hoyte, Anil Ali, David R. Bearn. (2020). A cross-sectional survey to ascertain the prevalence of oral habits among eleven to twelve year old children in Trinidad and Tobago. Pediatric Dental Journal, 30(2), 86–91. DOI: https://doi.org/10.1016/j.pdj.2020.03.003.

11. Andrija Bosnjak, Vanja Vućićević-Boras, Ivana Miletić, Darko Bozić, Milko Vukelja. (2002). Incidence of oral habits in children with mixed dentition. J Oral Rehabil, 29(9), 902–5. DOI: https://doi.org/10.1046/j.1365-2842.2002.00925.x.

12. Vincenzo Quinzi, Alessandro Nota, Eleonora Caggiati, Sabina Saccomanno, Giuseppe Marzo, and Simona Tecco. (2020). Short-Term Effects of a Myofunctional Appliance on Atypical Swallowing and Lip Strength: A Prospective Study. J Clin Med. 9(8), 2652. DOI: https://doi.org/10.3390/jcm9082652

The article was received by the editorial office on 12/30/2024,
accepted for publication on 02/27/2025.

How to cite / Як цитувати:

Makhlynets, N. P., Fellus, P., Pyuryk, M., Kokoshko, M. (2025). Anoetic Treatment of Atypical Swallowing in the Context of State Healthcare Policy. *Dentistry. Medicine. Rehabilitation.* 2025;1(1):30–35. DOI: https://doi.org/10.64124/DMR-2025-1-32

Махлинець Н. П., Феллус П., Пюрик М., Кокошко М. Аноетичне лікування атипового ковтання у контексті державної політики охорони здоров'я. *Стоматологія. Медицина. Реабілітація.* 2025. № 1(1). С. 32–37. DOI: https://doi.org/10.64124/DMR-2025-1-32