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## Lingual Frenulum in a Pre-School Child. Case Study

### SUMMARY

The aim of this study is to present the influence of a shortened lingual frenulum on the change in the quality of articulation in a pre-school child. The intense growth in the orofacial complex is observed in children between 4 and 6 years old, which results in enlarged space for tongue movements. The girl, whose case is described in this article, found it difficult to achieve proper articulation contacts in the enlarging structures of the orofacial complex.

**Key words:** lingual frenulum, speech, orofacial complex, development, child

### INTRODUCTION

The logopedist employed in the kindergarten monitors the development of speech in each child in the kindergarten from the moment the child begins pre-school education until s/he completes it.<sup>1</sup> While working in such an institution

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<sup>1</sup> The logopedist employed in the kindergarten is subject to specific legal regulations inter alia: The Minister of National Education Regulation of 9 August 2017 on the principles of organization and provision of psychological-pedagogical assistance in public, kindergartens, schools, and educational facilities (Dz.U. [Journal of Laws] 2017, item 1591); The Minister of National Education Regulation of 17 March 2017 on the detailed organization of public schools and public kindergartens (Dz.U. 2017 item 649); Act of 14 December 2016, Education law (Dz.U. 2017 item 59). The logopedist carries out screening in individual kindergarten groups and conducts logopedic treatment of children in whom s/he has observed speech development abnormalities. His task is first of all to support children's speech development through individual and collective preventive measures in the kindergarten and by educating and training parents and kindergarten personnel. Owing to such organization of work, s/he is able to prevent various logopedic problems before they appear or become established, by correcting early detected abnormalities and eliminating at the early development stage the factors that can disrupt or impede this development.

for a long time, the logopedist is able to observe the development of children's speech and impact it through his/her activities. S/he can also observe a large group of children at the same time. As a researcher, s/he can thus study both individual cases as well as conduct longitudinal and vertical studies in a statistically significant group. The current article describes the case of a girl, a public kindergarten pupil, in a large city. The purpose of this study is to present the effect of the shortened lingual frenulum on the articulation of the child at the developmental age in the context of changes in the structures of the orofacial complex.

## MATERIALS AND METHODS

The collected material was obtained with parental consent while the child stayed at the kindergarten at the time intervals in the course of 1 year and 5 months between 2015 and 2017, during which the child attended the kindergarten. The diagnostic procedure<sup>2</sup> consisted of several parts and comprised the areas described below.

All aspects of speech are put through logopedic examinations<sup>3</sup>. To attain the goal of this study, the aspects connected with changes in articulation will be presented first of all because the examination of the other aspects revealed no abnormalities. In this study, of crucial significance were the lowest level of the tongue and the assessment of speaking in phonetic terms. In the testing, first of all the skills in sound realization were therefore evaluated. The research material was gained at three time intervals. Each time, a preliminary assessment was carried out when the patient was observed during her spontaneous utterances in the course of dialog and narrative. In order to thoroughly examine articulation, the modified G. Demel picture questionnaire was used (Demel, 1998)<sup>4</sup>. Both the store of sounds

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<sup>2</sup> The aim of diagnostic procedures is to make a correct diagnosis, on the basis of which appropriate therapeutic measures are selected using adequate methods and tools. That is why, according to standards (Grabias, 2015; Grabias, 2008) diagnostic procedures involve a range of basic and complementary examinations, and data are collected during anamnesis to establish the potential cause of a disorder and eliminate it if possible. For more on logopedic diagnosis, see (Jastrzębowska and Pelc-Pękala, 1999; Sołtys-Chmielowicz, 2008).

<sup>3</sup> The primary goal of diagnostic procedures was not to collect data for research purposes but to monitor children's speech as part of performing standard activities associated with the logopedist's work. Therefore, it was not a planned research activity: the case of the girl-patient as an interesting one is presented after the fact.

<sup>4</sup> The picture questionnaire allows the logopedist to carry out an accurate and systematized analysis of the patient's articulation, taking into account the quality of each realized phoneme in different positions in a word and different phonetic environments. The examination used G. Demel's questionnaire (Demel, 1998), which was modified to change some pictures so that they could be readable to contemporary language users. In the testing, the patient first named the pictures by herself, and then repeated their names after the therapist.

and the way of their realization were determined. In the logopedic examination, the patient's articulation was assessed in the hearing, visual and, if necessary, experimental manner.

When examining tongue mobility<sup>5</sup>, B. Ostapiuk's tests and scale for its assessment were used (Ostapiuk, 2005): (1) raising the wide tongue beyond the front teeth of the jaw with the maximum abduction of the mandible; (2) raising the wide tongue beyond the jaw with a tongue depressor placed before the front part of the tongue, the depressor forcing the raising of the tongue dorsum and widening of the tongue with the maximum abduction of the mandible; (3) covering the red of the upper lip – with the freely parted lips and teeth – by the dorsal surface of the end part of the wide tongue; (4) touching the last tooth of the lower dental arch with the tongue tip; (5) sticking the tongue onto the chin with the maximum abduction of the mandible. Taking into account the way of executing tests and the range of movements in accordance with the proposed scale, the level of tongue mobility (and of the shortened lingual frenulum) was determined.

In the function test<sup>6</sup>, the motor efficiency of the lip and mandible muscles and the course of primary functions<sup>7</sup>, such as swallowing and breathing, were assessed. The course of swallowing was assessed while this function was performed by observing the positioning of the lips, and by the digital palpation of the work of the masseter muscle (by means of the thumb with the simultaneous placement of the fingers on the larynx) and the work of the hyoid muscles (by using four

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<sup>5</sup> The examination of tongue mobility (examination of the lingual frenulum) was distinguished as a separate point in diagnostic procedure because it is important for the achievement of the goal of the present study. The assessment of the frenulum is basically an element of morphological (static) examination, while the assessment of tongue mobility is a functional (dynamic) diagnosis, the condition of the structure influencing its function, which has already been said earlier. In the diagnostic procedure, the logopedist is interested in both the quality of the lingual frenulum and its impact on tongue mobility, in particular, in the possibility of the tongue achieving correct articulation positions.

<sup>6</sup> Functional examination is a dynamic examination and pertains to the functioning of structures. This area comprises inter alia the assessment of swallowing and of the respiratory pattern, and the analysis of the work of the lips, tongue, mandible, and the soft palate in the course of conducting specific tests; it is so-called muscular balance (Łuszczuk, 2017; Pisulska-Otremba, 1995a; Jeżewska-Krasnodębska, 2015). By performing appropriate sets of movements for individual elements of the orofacial complex, information is obtained on the kinesthesia and motor activity of muscles, the level of the exercises, precision and purposefulness of movements being assessed. Function – which has been emphasized earlier – is closely connected with the anatomy of structure.

<sup>7</sup> Both speech and biological functions connected with taking food and drinking as well as breathing take place within the shared space of the orofacial complex. The functions connected with communication taking place within the orofacial space also include facial expressions, while other biological-physiological functions in this area include inter alia yawning, sneezing, self-experimentation and orofacial self-plays. Biological functions are primary functions, a secondary function being speech, which developed secondarily (Pluta-Wojciechowska, 2009).

fingers placed wide on the neck in the median line)<sup>8</sup>. The basis for recording the respiratory pattern was the observation of the subject child while this function was performed at ease, and the assessment of the respiratory pattern by means of hands. Examination of the patient was complemented by the data from anamnesis.<sup>9</sup> A rough examination of the functions of the mandible and temporomandibular joint was carried out by sight and touch, determining the range of symmetry of mandibular movements on three planes. Special attention focused on the size of the freeway space and the presence of painful symptoms and /or acoustic symptoms while these activities were performed, or at rest.

In the morphological examination<sup>10</sup>, visual, tactile or additional tests were used to assess the elements of the anatomy of the orofacial complex structures<sup>11</sup> at rest. The appearance of the patient's face in profile and *en face* was assessed taking into account the proportions on three spatial planes<sup>12</sup>, as was her occlusion<sup>13</sup>. The morphological examination also included a general assessment of the

<sup>8</sup> When the larynx was raised, the lips were parted with the fingers of the other hand, and the behavior of the tongue was observed (Pisulska-Otremba, 1995a). (Cf. Sambor, 2014/15).

<sup>9</sup> The patient's appearance indirectly shows the way of breathing. The following symptoms can be observed: the constantly slightly open oral fissure, dry mucosa of the lips, usually also the shortened upper lip, exposed upper front teeth, the retracted or protruding chin, changes in the length of the lower part of the face, narrow nasal passages, pale skin, with the lips closed – a muscular hump in the chin area. In the examination, a horizontally positioned hand can be used in the subnasal area. In persons who breathe normally, the stream of the exhaled air will be felt on the hand dorsum, and in those breathing through the mouth – on the lower surface of the hand. The respiratory pattern can be also recorded additionally using a two-side mirror placed in the above-described ways. See also (Bielawska, 1998; Pisulska-Otremba, 1995; Konturek, 2012; Skorek and Rządźka, 2011).

<sup>10</sup> Morphological examination is a static one and assesses the anatomy of the structure/ organ. At the same time, the state of the structure/organ impacts its function, which is especially observable in the case of realization of functions, including speech, in the orofacial complex area by patients with defects of the facial skeleton (Pluta-Wojciechowska, 2010) – and conversely: a change in the functional model contributes to the restructuring of hard elements. (Kuczkowski, 2014)

<sup>11</sup> According to the definition proposed by D. Pluta-Wojciechowska, the orofacial complex “*is the place where different biological functions take place, and those associated with human communication: facial expressions, speech and others. Within this complex there occur not only significant life functions like breathing and taking food, but it is also the area of a child's specific self-examinations and self-experimenting, as well as the place where orofacial self-plays occur*”. (Pluta-Wojciechowska, 2009, 122).

<sup>12</sup> Spatial planes are mutually perpendicular and facilitate the assessment of the face in profile and *en face*. The underlying task is to determine the symmetry and proportions of the patient's face and assess the profile. Extraoral appearance reflects the intraoral proportions; it is thus the first clue for the researcher. Occlusal and dental defects and other morphological defects are reflected in the patient's features and facilitate the researcher's further steps in diagnostic procedures. A detailed manner of assessing a patient's face can be found in orthodontic textbooks, for example (Karlowska, 2016; Proffit and Field., 2001)

<sup>13</sup> The logopedist seldom has an opportunity to thoroughly analyze the patient's occlusion using diagnostic models or digital radiography. He therefore mainly relies on the extraoral assessment and direct intraoral analysis, which includes inter alia such elements as Angle's/Baume's clas-

oral cavity, during which attention was paid *inter alia* to the elements like the lips, palate, tongue, and tonsils<sup>14</sup>. Morphological examination enables not only the assessment of the current state of the structures serving to realize speech but also to define a biological norm for the child<sup>15</sup>.

A significant complement to the physical examination was the information gained during anamnesis as a result of interviews with the child, parents and teachers.

## INTRODUCTORY INFORMATION

The girl, born in January 2011, together with her slightly older sister (by 1.2 years), is brought up in a conjugal, supportive family. She has attended kindergarten since she was three (3 years and 8 months), having started education in the youngest class. She goes to the kindergarten eagerly, has easy contact with her peers and does not present problems in class. Her parents' information shows that she enjoys good health, is not under care of any medical specialist, and does not use medical care apart from standard, average ailments that a pre-school age child has. On the basis of the information obtained from anamnesis, no abnormalities were found in the early stages of the child's development, i.e. during fetal development or in early childhood (before she started preschool education).

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sification, the size of overjet and overbite, the position or slope of the teeth and others (Łuszczuk, 2017). The description of detailed orthodontic diagnostic procedures can be found in orthodontic textbooks, for example in (Karłowska, 2016; Proffi and Field, 2001). To avoid the risk of a diagnostic error and of exceeding competence, it should be stressed the assessment of facial and occlusal conditions, conducted by the logopedist may only be preliminary, but the principal diagnosis is made by an orthodontist. The logopedist, when assessing the intraoral conditions focuses first of all on determining the effect of the existing occlusal conditions on the possibility of achieving correct articulation positions for individual realizations and, if necessary, refers the patient for consultations or orthodontic treatment.

<sup>14</sup> During the direct intraoral evaluation, the logopedist can accurately assess only the condition of the palatine tonsils because neither the pharyngeal (third) tonsil nor lingual tonsil is accessible for examination without additional instruments. However, the condition of the palatine tonsils indirectly shows the condition of the other adenoid structures in the area because it functions as a whole. Consequently, if the palatine tonsils are enlarged, reddened, plugged, infected, etc., then we can surmise that the condition of the others is similar. If, additionally on the basis of anamnesis or in the assessment of the patient, other abnormalities have been found which may indicate problems related to the upper airways, the patient requires laryngological consultation.

<sup>15</sup> When assessing the patient, morphological and functional changes are taken into account. At the developmental stage these changes are particularly intense, and what is normal at one stage, ceases to be so in another, which is why the term biological norm is used. The norm is a dynamic concept depending on the patient's age (Łuszczuk, 2017; Szczepańska and Jackowska, 1993; Pisul-ska-Otremba, 1995b; Kulewicz, 2002; Bielawska-Victorini et al. 2008).

The parents' accounts show that the girl "began to speak early," and it follows from the teacher's accounts and the author's observations that the girl speaks a lot and willingly, has good interpersonal skills, and is open to contacts with children and adults

The girl is of slight build, which also concerns her facial skeleton. What draws attention in the context of the slight facial structure is the protruding lips, which appears to be a genetically determined feature, because a similar feature was observed in her mother and older sister.

## PRESENTATION OF RESEARCH RESULTS

Below will be described the results of the examination of the girl at three time intervals; emphasis will be laid on the elements that are significant from the standpoint of the presented case

Examination I

Date: May 2015

Age: 4 years and 4 months

In the logopedic examination, the correct development of speech was found in the phonetic, lexical, grammatical and expressive aspects. The girl participated in the dialog and readily engaged in it herself, spontaneously initiating a conversation with the therapist. She correctly used grammatical forms and she used elaborate complex sentences and rich vocabulary in narrative. Her articulation assessed auditorily and visually was described as correct, including the realization of [š], [ž], [č], [ž] and [r]. After tests were made, the examination of tongue mobility found the shortened lingual frenulum. During tests 1–4, a slight adduction of the mandible and the accompanying reduction in the size of the opening of the mouth was observed, which proves the shortening of the lingual frenulum. In the function test, no irregularities in the realization of primary functions (swallowing, breathing) were observed. The motor activity of the lips and the mandible was assessed as correct. The initial examination of the functions of the temporomandibular joints showed no abnormalities. The morphological examination assessed the appearance of the *en face* face, including the proportions, symmetry axis, and the parallelism of horizontal spatial planes, as correct. When analyzing the profile, a slight anterior shift of the lower lip relative to the upper lip was observed. During the general assessment of the oral cavity, no irregularities were found in the structure of such elements as the lips, palate, tongue, and the tonsils. The examination of malocclusion based on the intraoral assessment found a class II defect (distocclusion with retroclination of upper incisors) with a negligible intensity.

The information was passed to the parents with a recommendation for orthodontic consultations. Physical hearing and phonematic hearing were termed as correct.<sup>16</sup>

Examination II

Date: January 2016

Age: 5 years

The result of the logopedic examination provoked the therapist's anxiety. From the lexical, grammatical and expressive angle, the child's speech was assessed as correct. Although her articulation assessed in auditory terms provoked no worry, the excessive, unnatural protruding of the upper lip was observed during the articulation of rustling sibilants; it was recognized, however, that this was caused by the child's exaggerated facial expressions, a certain theatricality of speaking (emphasis). An annotation was added in the child's documentation and it was recommended that she should be kept under further observation according to the standards of logopedic care in the institution. In tests 1-4, tongue mobility examination revealed a comparable slight adduction of the mandible and the accompanying reduction in the size of the opening of the mouth; both these features indicate shortness of the lingual frenulum. Swallowing and breathing functions were realized in the same way as in the previous examination, with the exception of the lips: excessive forward movement of the upper lip was observed during the articulation of rustling sibilants; it was, however, assumed – as has already been mentioned – that this was caused by the exaggerated theatricality of the child's way of speaking. The appearance of the face had not significantly changed. The presence of small spaces (gaps) between the outer edges of the lower incisors and a small space behind the final molars were observed; these changes are connected with the growth (in length and width) of jawbones, which is natural in this period. In the examination, the temporomandibular joints, as well as physical and phonematic hearing were diagnosed as normal, as was the case in the previous examination.

Examination III

Date: October 2016

Age: 5 years and 9 months

The examination showed the normal development of speech, with the exception of the phonetic aspect. The articulation of rustling sounds was described as

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<sup>16</sup> An approximate assessment of the patient's physical and phonematic hearing was carried out, with no abnormalities being found in this respect. These tests are an important element of diagnostic procedure, because the quality of perception impacts the quality of realization. Additionally, in the case of children it is particularly significant because of the occurrence frequency of infections of the upper airways, ears and tonsils, which may contribute to the reduced quality of hearing, which is often unnoticed by the parents and guardians, whereas its effects can be noticeable in the form of the incorrect realization of speech sounds. Hence, the quality of hearing in pre-school children should be systematically assessed by the kindergarten logopedist.

abnormal, the realizations of phonemes [š], [ž], [č], [ž] were classified as distorted since their place of articulation was further back than the normal one, which was assessed visually in experimental analysis and was also reflected in the auditory assessment of pronunciation. Moreover, it seems that the shape of the tongue and its width deviated from the norm established for the realization of these sounds. As was the case before, in the examination of tongue mobility, the adduction of the mandible and the accompanying reduction in the size of the opening of the mouth were observed in tests 1–4, the degree of the adduction of the mandible being apparently greater than in the previous examination and so was the reduction in the size of the opening of the mouth. This fact should therefore be interpreted as the shortened lingual frenulum, and the degree of the shortening should be described as larger than in examinations I and II. The examination of swallowing and breathing did not reveal any irregularities and neither did the examination of the temporomandibular joints or the approximate assessment of the quality of physical and phonematic hearing. In the morphological examination, a change in facial features was observed in comparison with the earlier period, which was connected with an increase in the size of the chewing organ related to the growth of its forming structures in all directions. The examination of the oral cavity revealed the presence of four permanent molars (partially erupted) and of spaces between front teeth<sup>17</sup>; at this stage, however, the teeth had not yet become obviously loose. The malocclusion diagnosed in the previous examination had not self-corrected<sup>18</sup>.

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<sup>17</sup> Both the presence of spaces in the front section of dental arches, which was observed in the patient, and the eruption of the first permanent teeth indicate the growth of alveolar processes in width and length, which is connected with the natural growth mechanisms of this period. Simultaneously, the oral cavity will gradually grow in height and the level of the high palate vault. At the same time, the tongue does not grow as dynamically, which means that the proportions of the oral cavity volume and the tongue change. Thus, the tongue has more space and the possibility of more precise movements, which is reflected in the ability to realize the more demanding phonemes, such as /r/, /ʃ/, /z/, /tʃ/, /dʒ/. According to the norm, the period between the fourth and sixth year of age is the time of dynamic growth which precedes the replacement of milk teeth by permanent ones. During this time, alveolar processes grow intensively in all directions, the growth of the mandible being faster than the growth of the maxilla by 6-9 months, resulting in edge-to-edge bite in the frontal section. The growth of alveolar processes leads to the emergence of spaces between subsequent teeth in the arch and to the development of free space at the back, behind the final molars. The growth occurs so as to provide room for future permanent teeth, which are bigger than milk teeth. The shape of dental arches changes and teeth become loose due to the slow resorption of their roots (Łuszczuk, 2017; Karłowska, 2016; Kulewicz, 2002).

<sup>18</sup> According to the norms of morphological development in this period, the mandible, which grows faster than the maxilla, should shift forwards until the incisors are positioned *tête-a-tête*. However, due to the malocclusion and the inclination of upper incisors towards the palate, the forward growth of the mandible is not possible and its posterior (irregular) position becomes fixed.



## SUMMARY

The summary contains the possible interpretation of the set of examination results presented above.

- A.** The easiest explanation is that from the beginning the logopedist inaccurately assessed the way of realization of the phonemes produced by the patient, and having mistakenly described as normal the realizations that had in fact always been abnormal. The potential cause for this could be the logopedist's limited experience; his/her insufficiently/improperly developed phonetic hearing or other factors negatively affecting the proper assessment of the patient's articulation, such as noise or lack of adequate concentration during the examination.
- B.** What is also possible is the following interpretation. The development of anatomical structures occurs in several stages<sup>19</sup>. The girl whose case is described in this article was kept under logopedic observation from the age of four years and four months until the age of five years and nine months, i.e. during the period of one year and five months, from May 2015 until October 2016. The age of four is the beginning of the period in which the facial skeleton grows intensively in all directions, i.e. in length, width and further in height; this growth occurs before, and in preparation for, the replacement of milk teeth by permanent ones. Therefore, the emergence and gradual enlargement of spaces between teeth positioned in the dental arch are observable during this time; this process was also observed in the patient in question. What is also worth noting is the accelerated growth of the mandible in comparison with the maxilla, which manifests itself, among others, in the decrease in the size of overjet and the emergence of the occlusion close to the edge-to-edge one. This change was not observed in the subject patient, which was, it seems, due to her malocclusion and to the position of her teeth, which hindered the growth-related forward shift of the mandible<sup>20</sup>. In the period between the fourth and sixth year of age the proportions of the oral cavity volume and the tongue size change; the growth of the tongue is significantly slower than the growth of bone structures forming the skeleton of the oral cavity. In practice, this means that the tongue has more space for movement and can therefore be more precisely positioned. It appears that in the case described it was

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<sup>19</sup> The concept of biological norm has been explained before. For more information on the description of the subsequent developmental stages see (Łuszczuk, 2017; Karłowska, 2016, Orlik-Grzybowska, 1976).

<sup>20</sup> The patient was diagnosed with Class II malocclusion (distocclusion with retroclination of upper incisors) in the intraoral examination at the first stage. Such an alignment of teeth hinders the forward shift of the growing mandible.

possible for the patient with short lingual frenulum to position the tongue correctly when the volume of her oral cavity was smaller<sup>21</sup>, but – despite the patient’s effort<sup>22</sup> – this was no longer achievable once the oral cavity had grown as predicted in the developmental norm.

## CONCLUSIONS

1. In their examination of a child at the developmental age logopedists should include not only the assessment of speech but also the evaluation of the morphological norm, connected with the construction of structures responsible for the realization of speech, and of the functional norm, connected with the realization of primary functions, since the biological norm changes dynamically in the developmental period. It is worth remembering that – as in medical practice – a child must not be treated as a “smaller version of an adult” because s/he is a completely different being – both physiologically and anatomically. The aspects important for logopedic assessment, and particularly for the evaluation of the functioning of articulation organs, include, for example, the proportions of individual structures responsible for the realization of speech, or functional abilities, which is also visible at the subsequent stages of the development of speech. These norms are different for children at different ages; consequently, different age-related anatomical conditions in which the realization of speech takes place must be taken into consideration in the same way as in the assessment of speech itself the articulatory abilities of a three-year-old are perceived differently from the articulatory abilities of a six-year-old.
2. The logopedist should be familiar not only with the successive stages of the development of speech, but also with the dynamics of the changes within the area where speech is realized, in terms of both anatomy (examining the structure) and functioning (examining the functions). S/he should also be able to evaluate their influence on the quality of articulation, and to recognize the necessity for interdisciplinary cooperation in order to achieve the expected therapeutic outcome. It must be noted here that the assessment of orofacial conditions conducted by the logopedist is a preliminary one, while the final diagnosis is made by an orthodontist.
3. Considering the instability of anatomical structures during the developmental period, the logopedist should monitor the development of speech

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<sup>21</sup> The patient was of slight build, which was also reflected in the size of her oral cavity, the shape of which was additionally affected by the existing malocclusion.

<sup>22</sup> The patient’s effort was observed in the second examination as excessive forward movements of the lips.

in a child throughout the period of dynamic growth of the structures in the orofacial complex, even – which is confirmed by the case study presented here – if s/he does not find abnormal realizations in the logopedic examination. This is particularly true in cases when the logopedist detects the presence of factors that might potentially impede this development, such as – as in the presented example – the shortened lingual frenulum or malocclusion. Such observation should continue at least until the end of the period of dynamic growth of the orofacial complex area, i.e. until about the age of eight. It is therefore even more important to be cautious about qualifying younger children's realizations as “developmental substitutions” or “childlike pronunciation” (Pluta-Wojciechowska, 2005; Ostapiuk, 2002).

4. Any deviations from the correct position of articulatory organs (such as excessive, insufficient, asymmetrical or incorrect movement of the lips, lateral movement of the mandible, etc.) should arouse the logopedist's concern. Such realizations should not be classified as normal – even though they sound correct in aural assessment – since their articulatory structure is not correct (Ostapiuk 2006). In the case described in this article, the excessive forward movement of the lips was – incorrectly – interpreted by the logopedist as a mannerism, partly due to the fact that the child's articulation was earlier diagnosed as “correct and fully-developed”; in fact, this was an attempt at compensation, which was found after the fact<sup>23</sup>.
5. B. Ostapiuk's scale enables repeatable assessment of the patient's tongue mobility. Tests of tongue mobility are a particularly vital tool of logopedic evaluation despite the fact that conducting them on some children, especially younger children at kindergarten age, may pose special difficulties and does not always provide straightforward therapeutic indications, particularly for inexperienced logopedists. It might be worth considering the development of supplementary criteria for the assessment and interpretation of tongue mobility in children at different ages since the proportions of various structures responsible for realizations of speech are different depending on a child's age<sup>24</sup>; what is particularly important is the proportion of the size of the tongue to the oral cavity volume, which determines the motor ability of the tongue and articulatory precision. As proposed by D. Pluta-Wojciechowska, it would be advisable that the assessment

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<sup>23</sup> Interestingly, the American Speech-Language-Hearing Association (ASHA) advises compensatory positioning of the tongue while pronouncing troublesome phonemes and significantly limits the indications for the surgical clipping of the frenulum [tongue-tie division] (Stańczyk et al., 2015).

<sup>24</sup> Examples of tools for the assessment of the lingual frenulum in babies can be found in the cited publication (Stańczyk et al., 2015).

of tongue mobility – especially in children – should consider not only the length of the frenulum, but also its other features, such as its place of attachment, both to the floor of the mouth and to the underside of the tongue, as well as its quality (thickness), because these factors may also have a considerable influence on the motor ability of the tongue (Pluta-Wojciechowska, Sambor, 2016)<sup>25</sup>. Standard norms for various age brackets developed on the basis of research on large groups of patients would be immensely helpful from the perspective of logopedic practice.

6. The quality of the occlusion is vital for the realization of phonemes because it affects the conditions of articulation. Generally, there is a tendency to emphasize the co-occurrence of malocclusion and speech impediments or to indicate cause-and-effect relationships between these two factors (Konopska, 2006). In the case presented in this article, during a specific developmental period, malocclusion made it easier for the child with the shortened lingual frenulum to correctly realize rustling sounds, thus masking the influence of the shortness of the frenulum on articulation and the accompanying limited tongue mobility<sup>26</sup>.
7. Children with the normal level of auditory self-control aim to position their articulatory organs in such a way that they can produce sounds which match the model ones<sup>27</sup>. It is therefore possible for them to produce realizations which are correct in terms of sound (though not necessarily in terms of the position of the articulatory organs), on condition that this does not exceed their compensatory abilities<sup>28</sup>.

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<sup>25</sup> It would also be worth considering the fact that the maximum mouth opening, which is part of this test, may be determined by the condition and capability of the temporomandibular joints and the muscles responsible for their mobility; additionally, it may differ significantly in various patients (on the basis of the author's own research which included the evaluation of 150 adults it was concluded that the difference in the tested group was 26mm). This may result in incorrect assessment, as in practice this means that two patients with the frenulum of the same length may have different test results due to the differences in the range of movement at the joints.

<sup>26</sup> It is therefore advisable that the logopedist should carefully examine and correctly (though approximately) assess all the factors linked to the realization of speech, including the characteristics of the occlusion.

<sup>27</sup> This is usually a subconscious process. It can be seen, for example, in patients with correct pronunciation at the initial stages of orthodontic or prosthetic treatment, when the quality of articulation temporarily suffers. It should be emphasized that the acoustic effect is sometimes achieved at the expense of the esthetic one (i.e. the positioning of the lips).

<sup>28</sup> If the correct positioning of the articulatory organs is determined by the normal anatomical conditions (Lorenc, 2013; Lorenc, 2016), including the occlusion (normal ['ideal'] occlusion is seen in 10-15% of the population; Szczepańska, Jackowska, 1993, 81) and the frenulum, it should be recognized that only the members of this group (and only on condition that both these features occur simultaneously and there are no other disturbing factors) correctly position their articulatory organs, while others, seeking to produce the acoustically correct sound of speech, position them in

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a more or less compensatory way. In general, however, articulation is classified as correct in a larger proportion of the population. In practice, when should the position of the articulatory organs still be regarded as compensatory, and when should it be seen as abnormal? This refers to the realizations that are classified as normal in auditory assessment. The question opens up a field of discussion among logopedists. Therefore, might it be advisable to – following the example of orthodontists – introduce the concept of "ideal pronunciation", satisfying all the criteria of its assessment?

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