

SPEECH DISTURBANCES CAUSED BY CLEFT PALATES
(Phoniatric aspects)

IRAIDA KRUSHEVSKAYA

Dept. of Oto-Rhino-Laryngology
Research Institute of Capacity to Work
Minsk, Byelorussia, USSR, 220081

Palate developmental defects result in voice and speech disturbances due to:
a) incomplete closure of the throat ring; b) disturbances of the resonator function of the mouth cavity. In spite of an obvious theoretical value this problem has an urgent practical aim of restoring speech communication of the cleft palate carriers, and their social and labour rehabilitation.

With the modern rates of development of social, political and scientific life, the actuality and social significance of the problem of restoring the lost communicative functions have grown greatly. Hearing, speech and voice disturbances should be looked at from the standpoint of pathophysiology of these organs, which makes it possible to develop a more rational system of measures to restore these functions.

Clinical and social observations indicate that the restoration of speaking and vocal functions of the cleft palate carriers is a complex process of rehabilitation, and it is insufficient to make one operation to create a plastic resonator. The analysis of the results of the investigations, which we have carried out, shows that the presence of pathophysiological and conditioned-reflex relations in the central nervous system of the cleft palate carriers before the operation has caused the absence of acquired reflexes of correct phonational respiration, of

the voice formation process, and have resulted in disturbances of the neurophysiological speech mechanisms. According to the statistic data, cleft palates are a frequent occurrence: 1.5 - 2 cases per 1000 new-born children. Face and jaw developmental defects may be caused by various exogenous and endogenous factors affecting the fetus at the early stage of its development before 7-9 weeks. Cleft lips and palates are one of the most serious psychotraumatizing defects since the early childhood, as they create a feeling of inferiority of their carriers.

The representatives of phonetic sciences will certainly get interested in and find useful the submitted results of investigations of a live model of an anatomic defect of the mouth cavity resonator with all the disturbances, which follow, including the muscular system function of the loud speech motor apparatus: breathing, phonation and articulation muscles. In this pathology a hearing disturbance aggravates the influence upon the phonetic system of speech. The most characteristic feature of a speech disturbance at cleft palates is rhinolalia sperta: nasalization, which has appeared due to the absence of a demarcation between the nasal and mouth cavities, changes greatly the acoustic characteristics of phonemes. A voice disturbance is versatile. The most prominent features are timber alterations, the presence of an unpleasant nasal resonance, a clear nasal shade of oral sounds. The nasal sounds (M, H) are pronounced quite normally. The sounding of vowels changes insignificantly. Rhinolalia may be accompanied by rhinolalia, i.e. incorrect pronunciation and distortion of sounds in the following cases: 1) if the acquired factors, developed due to a cleft palate, begin to make its influence during the first years of a child's life when the articulation mechanisms have not yet been formed; 2) if an articulation disturbance of the central origin joins; if a hearing disturbance (even of short duration), causing the formation of wrong articulation reflexes, joins during the articulation formation period. Palate developmental defects

result in voice and speech disturbances due to: a) incomplete closure of the throat ring; b) disturbances of the resonator function of the mouth cavity; c) accompanied hearing disturbances.

At the absence of voice caused by deformations in the mouth cavity and incomplete closure of the throat ring, functional derangements are observed in all resonator cavities.

Pathological changes of the sort palate muscles usually develop at the age of 4 - 5. Due to a lower functional load in the muscles and mucous pharynx, a dystrophic process grows progressively worse. The mucous membrane of the back wall of the pharynx becomes gradually pale, atrophic. The absence of a pharyngeal reflex is indicative of the atrophy of muscular fibers of the pharynx constrictor, and of degenerative changes of the sensitive and trophic nerve fibers of this region.

The chronaximetry data (time necessary for the muscles to react to an electric stimulus) testify to a significant disturbance of the muscle function of the closing throat ring expressed by increased chronaxy of these muscles from 0.32 to 0.40 mm/sec. Eventually chronaximetric asymmetries appear between the right- and leftside muscles, if the clefts have not been operated on. The upper pharynx constrictor, whose chronaxy becomes longer and longer, is subject to much deeper dystrophic and functional changes, and then the muscle ceases reacting to an electric stimulus. In cases of disturbances of the closing throat ring function, the speech becomes monotonous without any melody or accent.

Investigations of the external respiration function have revealed a versatile respiratory impairment. At congenital clefts the phonational respiration suffers most of all: at phonation children and teen-agers continue to breathe simultaneously through the nose and mouth at the exclusively clavicular breathing. During the process of expiration a large amount of air (from 20 to 32 per cent) escapes through the nose, thus shortening the time of expiration, lowering the air pressure in the suprafold space. Hence, the phonational respiration becomes shallow and hurried. From the age of 7 - 8 a functional derangement of the motor muscles and of the diaphragm in particular is revealed: the function of these muscles becomes weaker, their contractions are flabby, slow. Very often they are asymmetric and not co-ordinated with the phonation and articulation. The time and degree of expressiveness of the above-mentioned pathology depend upon the cleft morphology with regard for the defect width. Such patients have a low, constrained, weak and thin voice with a

vivid nasal shade. Acoustic changes of the voice spectrum deprive it of clarity and make the speech less legible.

A change of the voice timbre of the cleft palate carriers is connected with an anatomic defect of the supratracheal pipe, which results in construction asymmetries of the resonator cavities of the larynx, pharynx, nose as well as discoordinates the function of the palate-larynx complex, in which the palate plays the role of a starting mechanism. At palate clefts the phonation mechanism is so specific that at rhinolalia the voice is singled out as a separate disturbance and is called "palatony dysphonia" or "palatophonia". The combination of an anatomic defect of the palate, laryngeal sound formation, motor disfunction with an incorrect voice behaviour provokes the development of organic changes in the larynx of the type of nodulations and chronic inflammatory processes, motor - as a cut of internal muscles of the larynx, functional - as phonasthenia.

Violations of the integrity, anatomical and functional asymmetries of the soft palate and pharynx muscles bring with age to a functional asymmetry of the vocal folds, which is well determined with characteristic asynchronism of the vocal folds vibration at the electronic laryngostroboscopy. This pathology of the functional state of the internal muscles of the larynx as well as the asymmetry of forms of the larynx resonator cavities are clearly expressed since the age of 9 - 11.

There are three main reasons for the voice pathology:

1. Additional articulation function of the larynx. The laryngeal way of forming a number of voiced consonants, their sounding by the friction of air along the edges of the vocal folds result in a functional overload of the vocal apparatus and a growth of organic motor or functional diseases of the vocal folds.

2. The cleft palate carriers have a low voice because since their childhood they consider themselves to be inferior members of our society, are ashamed of their face malformation and speech defects, and don't want to attract the attention of those who surround them.

3. The muscles, lifting and stretching the palate, work as antagonists instead of being synergisms, their functional load becomes lower and the dystrophic process worsens. At cleft palates the speech develops under pathological conditions, and so it suffers more than other functions. The absence of a palatopharyngeal closure makes the nasal cavity a double resonator of the mouth cavity giving a nasal timbre to all phonemes. The degree of the sound nasalization expressiveness depends on

the inadequacy of closure, the mobility of the palate curtain and the co-ordination of the tongue and soft palate motions. Due to the escape of air into the nose, the pressure falls sharply and it becomes impossible to sound the apertures (closure breakage) during the articulation of consonant phonemes. Besides, the escape of air into the nose makes it more difficult to form a directed air flow in the mouth, and as a result almost all the plosive and fricative voiceless consonants are pronounced in a pharyngeal way. The mediolingual palatal and backlingual palatal sounds cannot be articulated because of the absence of one of the closure components - palate. The forelingual T, T^h, D, D^h become weaker or are replaced with a laryngeal or pharyngeal closure on H, H^h.

All the latest results of the pathophysiological investigations, which have revealed detailed peculiarities of the phonational respiration, voice and speech formation at rhinophonia and rhinolalia, have been assumed as a basis of methodical recommendations developed in our country by I.I. Yermakova to correct the speech of children and teen-agers at rhinolalia. The author has taken into account that no spontaneous speech occurs after uranoplasty, but the pathological sound formation at rhinolalia has anthropophonic (sound distortion) and phonologic (replacement of one phoneme with another) signs. The correction of each sound provides the following: 1) an ability to single it out from others; 2) to correlate it with some definite articulation; 3) to correctly pronounce the articuleme; 4) to use this ability in a flow of connected speech.

In spite of an obvious theoretical value this problem has an urgent practical aim of restoring speech communication of the cleft palate carriers, and their social and labour rehabilitation.