

MARIA HORTIS-DZIERZBICKA, ELŻBIETA RADKOWSKA,
WIKTOR GONET

Institute of Mother and Child, Warsaw
Maria Curie-Skłodowska University, Institute of English, Department of Phonetics
and Phonology, Lublin

Visual aspects of speech in patients with cleft lip and palate

SUMMARY

Cleft lip and palate belongs to the most severe developmental defects. Its treatment is long-lasting and requires multidisciplinary approach, while its stigmatization in the form of disturbance of facial aesthetics and/or speech disorders often remains forever, despite long and complex surgical treatment, correction of occlusion and laborious speech therapy. The speech of a patient with cleft lip and/or palate (henceforth: cleft lip/palate) reflects the location and extent of the anatomical defect. In cleft palate speech, one can distinguish active and passive compensations of the structural disorders. This article presents a less widely known visual aspect of cleft lip/palate speech production, i.e. compensatory facial movements during speech, as well as dysfunctional activity of the tongue that is inserted between the teeth or even operates outside the oral cavity in the production of anterior sounds in patients with considerable maxillary hypoplasia and occlusal disorders typical of cleft lip/palate manifested as severe pseudo-progenia.

Key words: cleft lip and palate, speech outcome assessment, open nasalisation, compensatory facial grimacing, interdental lisping, malocclusion

Cleft lip/palate is one of the most severe developmental disorders and, at the same time, it is the most frequently occurring craniofacial anomaly ranking second after inborn heart defects. Its treatment is very difficult, time-consuming and requiring multidisciplinary approach, while its stigmatization comprising facial aesthetic disorders and/or speech disorders often remains forever, despite long-term multi-aspect surgical and orthodontic treatment and laborious rehabilitation of specific speech disorders.

The facial expression that communicates varying emotions and carries non-verbal information for the surrounding can also be disturbed by distortions of the facial aesthetics caused by scars remaining after the surgical closure of the cleft lip (even after best possible surgery) or a small flattening of the nostrils or the tip of the nose. If this is accompanied by specific disfiguring compensatory nasal/facial grimacing aiming at decreasing air escape through the nose to enable the production of pressure-requiring sounds, the distortions of facial expressions can seem shocking. (Hortis-Dzierzbicka i Izdebski, 2008).

The speech of a patient with cleft lip and/or palate constitutes a reflection of the location and extent of the anatomical defect that has survived surgical treatment. Although the basic stigma of cleft palate speech is open nasalization that results from the velopharyngeal insufficiency, or from the presence of the oronasal fistula, the substitute strategies used to compensate these structural deficiencies vary widely. These strategies include: vocalic speech, voice weakening, fronting, backing, palatalizations, pharyngeal and glottal compensations, or active nasal fricatives.

In accordance with the proposal made by Hutter and Broensted (1987), the extra-systemic closures, retracted articulation and other forms of substitution of oral sounds, vocal overexertion, or the accompanying compensatory nasal/facial grimacing are referred to as active compensations of palato-pharyngeal inefficiency. On the opposite pole there are the so-called passive compensations in the form of hypernasality, excessive muffling of the voice, or avoidance of oral consonants that in an extreme form in the Polish terminology is called 'vocalic speech'.

Thus the presence of the compensatory facial expressions in the speech of the cleft palate patient with concomitant palate-pharyngeal insufficiency, or with an oronasal fistula, alters also the appearance of the face, disturbing further the facial aesthetics that is already present in cases of cleft lip and alveolus. The compensatory facial movements are implemented as more or less visible grimaces that accompany speech and are caused by unconscious attempts to decrease the escape of the air through the nose by increasing nasal resistance. (Warren et al., 1989). Their effect exerted upon the appearance and expression of the face depends on the degree of their manifestation that can be assessed on a three-valued scale. Grade 1 is a slight movement of the nostril, Grade 2 includes also the midface musculature, while Grade 3, the most severe one, embraces also the muscles of the forehead (Fig. 1–2).

In a monograph by the first author concerning the results of surgical treatment of velopharyngeal insufficiency in cleft palate patients with the use of a pharyngeal flap (the so-called pharyngofixation), compensatory facial expressions accompanying speech, evaluated against a generally accepted three-valued scale were present in 48% of the studied population (Hortis-Dzierzbicka, 2004). Thus



Fig. 1. A 9-year-old boy after isolated cleft palate repair. A fistula in the hard palate, slight open nasalization, severe compensatory facial grimacing. (a) face at rest, (b) a dynamic image while speaking.



Fig. 2. A 17-year-old patient after total cleft palate surgery. Open nasalization, compensatory facial grimacing. (a) face at rest, (b) a dynamic image while speaking.

such compensatory facial movements are not marginal, both in their frequency of occurrence, and in their characteristic disfiguring appearance of the face.

The disturbance in the articulation of the anterior consonants, described as interdental lispings, also has a mainly visual aspect. Although it is not characteristic of the cleft lip/palate, this disturbance very frequently coexists with this defect, with the accompanying abnormal mouth breathing or/and strongly manifested dento-occlusal distortions and a secondary pathological tongue placement

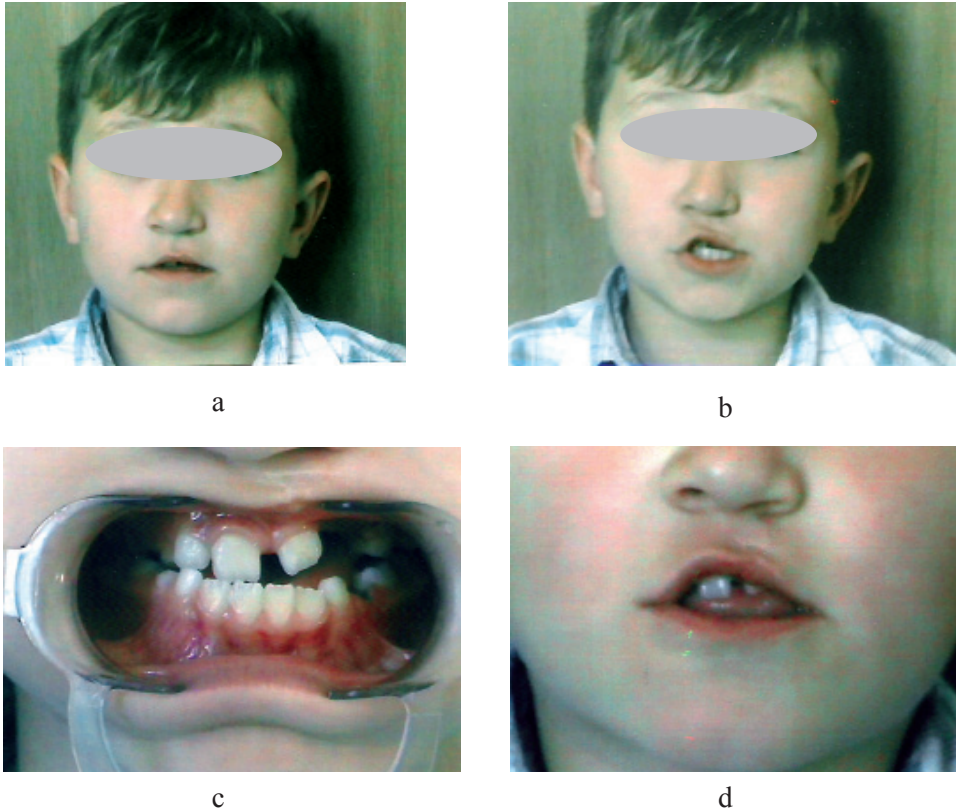


Fig. 3. A 7-year-old boy after closure of unilateral cleft lip and palate. (a) face at rest, noticeable mouth breathing; (b) a dynamic image while speaking – discrete nasal grimacing, noticeable pseudoprognathia; (c) an occlusion image: missing second incisor bud on the cleft side; first incisor shortened and rotated, lateral and anterior crossbite; (d) close-up photo of lip and nose area – typical tongue placement at articulation of dentalized consonants.

(Fig. 3). With considerable maxilla underdevelopment and a following pseudoprognathia, the tongue has insufficient room in the oral cavity and places itself on the lower teeth, often more anteriorly. This is seen particularly well seen in the articulation of dentalized consonants. In patients with most severe forms of cleft lip/palate deformity (complete unilateral cleft lip and palate, complete bilateral cleft lip and palate) this visual defect is frequently very intense, to a degree corresponding to disorders in occlusion and teeth placement (Fig. 4). In turn, lateral lispings in these cleft subtypes is usually manifested by pushing the tip of the tongue in the alveolar cleft. However, articulation disturbances such as interdental and lateral lispings are not specific for cleft lip and palate (Stecko i Hortis-Dzierzbicka, 2000; Konopska, 2006) and they have no relation with the velopharyngeal insufficiency. In the literature they are often referred to as “minor articulation errors”. Because



Fig. 4. An 18-year-old female patient after closure of complete bilateral cleft lip and palate. Well manifested pseudo-progenia caused by a considerable maxillary underdevelopment in relation to the mandible; the lower dental arch significantly protruding over the upper arch. (a) A static image – typical sinking in of the upper lip and the subnasal region; (b) a dynamic image while speaking – typical tongue placement at the realization of dentalized consonants.

of their frequent occurrence and high intensity they are described as a “visual aspect of cleft speech”. (Witzel, 1995).

In children born with cleft lip and/or palate, social withdrawal, excessive shyness or, conversely, aggressive behaviour are observed. Such behaviour is often an unconscious reaction to the requirements of the contemporary world, the world of the media imposing canons of beauty and overcome with the idea “what is beautiful is good”. This increases the distance from the social environment towards persons with cleft lip/palate. If the visual speech distortions in the population of patients described in the present article occur, they can often significantly intensify this negative perception of persons with cleft lip/palate. They also hinder the choice of the path of life and make unavailable the professions in which the visual aspect is significant.

Another reason why we point out this problem is the fact that in attempts at standardization of cleft lip/palate speech, attention is paid to auditory evaluation that is regarded as the “golden standard”. In this assessment there is a growing tendency to use anonymous speech recordings and evaluation by at least two raters well acquainted with the issue of cleft lip/palate speech, who have at least a five-year-long experience in working with cleft lip/palate children. In our opinion, such evaluations are taken out of context, because they do not include a simultaneous clinical examination of the patient with regard to air tightness and efficiency of the palate, lips or the alveolus. Such assessments do not contain evaluation of facial expressions, whose distortions while speaking, as was argued, constitute very important compensatory element of speech of a patient with cleft lip/palate.

Thus, in the evaluation of clinical results with regard to speech, in order to attain its full credibility, the present authors employ for each individual patient a broad detailed package of examinations embracing: (1) perceptual auditory assessment of spontaneous speech as well as recordings of speech; (2) assessment of video recordings of facial expressions during speech; (3) if open nasalization has been ascertained auditorily, we employ videonasofiberscopy of the vocal tract, with special attention paid to the velopharyngeal sphincter function while speaking; (4) detailed clinical ORL and phoniatic assessment; (5) examination of hearing.

Recordings of speech are done with the use of a broadened word test that comprises all sounds of the Polish language, developed specially for the needs of speech examinations in patients with cleft lip and palate. The test is compatible with tests used in Western countries (Zdunkiewicz-Jedynak and Hortis-Dzierzbicka, 2000). Simultaneously, video recordings of facial expressions are performed.

The word material used in videonasofiberscopic recordings of the palatopharyngeal sphincter function has been constructed so that it would include all the three plosives and fricatives and affricates representative of the Polish language in sequences with both high and low vowels, as well as single nasal consonants. It also contains syllables and short utterances, and counting to 10 or 20, depending on the patient's age. In order to ensure compatibility of assessment outside the clinical and international forum, the test was composed basing partly on word material created for the need of cleft speech assessment in Sweden, Denmark, Great Britain and USA. (Hortis-Dzierzbicka, 2004; Hortis-Dzierzbicka et al., 2012).

Clinical ORL and phoniatic assessment includes detailed examination of oral cavity, air tightness, symmetry and mobility of the palate, nasal patency, adenoid and tonsils' configuration, otoscopic examination and hearing test.

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