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*Voice disorders in children with gastroesophageal
reflux disease*

Zaburzenia głosu u dzieci z chorobą refluksową

Recurrent chemical burns of esophagus caused by acid gastric content result in the chronic inflammation of mucous membrane.

The effluvium having reached the upper pyloric sphinster causes lesions of the mucous membrane in the pharynx and larynx. The development of inflammatory lesions in the larynx in the course of esophageal reflux is also explained by the effect of acid-induced reaction of vagus nerve causing a persistent cough.

Gastroesophageal reflux disease is diagnosed on the basis of case history (pyrosis, retrosternal pains in over 50% of subjects, disorders in swallowing in more than 30% and on the basis of 24-hour pH-tests of the larynx). Endoscopy of the upper part of alimentary tract makes the diagnosis of reflux-induced esophagitis possible. Manometric test gives additional information about peristalsis and pressure in the esophagus. Videolaryngoscopic and stroboscopic tests constitute the basis for phoniatic diagnosis.

There are many research works concerning voice disorders connected with gastroesophageal reflux disease in adults. Various pathological changes of the larynx have been described. However, not all of the patients with gastroesophageal reflux disease have visible changes in the voice organ. Some of the authors, as Nielson, Putnam (2, 3) described stridor resulting from esophagitis that is related with reflux disease in children. However, there are different mechanisms of stridor and hoarseness development. Stridor occurs in the upper respiratory tract during inspiration and is due to oedema of mucous membrane of the larynx vestibule while hoarseness is related to the quality of voice created during expiration phase and is associated with inflammatory le-

sions of the vocal ligaments. Putnam states that hoarseness cannot be considered the symptom of gastroesophageal reflux disease in children.

The objective of the study was the morphological and phonatic evaluation of the larynx in children with gastroesophageal reflux disease. The study material included 17 children aged 4-18 who were diagnosed with reflux disease on the basis of case history and 24-hour pH-test of esophagus.

METHODS

Clinical test included laryngoscopic evaluation of the larynx. The voice having been recorded on the tape was subjected to acoustic analysis. During the voice acoustic analysis there were defined some parameters of speech that were characteristic of the evaluation of laryngeal changes.

Thus the mean value of the basic frequency F_0 , jitter and shimmer values and the ratio of harmonic signal to noise, were determined.

RESULTS

In the laryngoscopic evaluation of the larynx the following parameters were determined: hyperaemia (congestion) and oedema of arytenoids and aryepiglottic region in 17 patients. In 14 patients there was a clear hyperaemia of the posterior part of the vocal ligaments. In 1 patient the noduli vocales of typical localisation were diagnosed.

During phoniatric test hoarse voice was diagnosed in all the patients of the discussed group. The phonation time in one person was within the standard values (25s.), however in the remaining 16 persons it was shortened: in one patient it was 10s.; in 15 patients it oscillated between 15-18 s. The range of articulated voice, limited to the octave was diagnosed in 3 persons. In the remaining ones it oscillated from 8 tones to two octaves. During stroboscopic evaluation of the larynx – irregular and non-symmetrical vibrations were observed in 3 patients. The manner of incomplete shutting of the glottis in the posterior part was observed in 15 persons, and glottis closing (shutting) in the shape of eclipse and hour-glass – in 1 patient. Also in 1 patient complete shutting of the glottis was confirmed. Marginal shift was observed in all of the cases.

The evaluation of the voice intensity for whisper, ordinary speech and shouting indicated correct values in 16 persons; in 1 subject the voice intensity was lowered (30-40-65 dB).

The obtained results of acoustic tests pointed out that the frequency of laryngeal tone was mean 228.8 Hz. (mediana 245.5), which is the standard value for children. Jitter analysis confirmed big extent of the results from 0.36 – 4.08% (mean 1.4%). Correct jitter values were confirmed in 6 subjects (35.3%), however in 11 patients (64.7%) they exceeded the correct values to the extent suggesting the onset of changes in the regular functioning of the larynx. The standard shimmer value was confirmed only in 3 patients; in the remaining ones it got increased by 0.8 dB. The harmonic signal to noise ratio in the majority of patients (13) was lower than 10.0 dB, and it confirms a great predominance of noise over the periodic signal.

The acoustic analysis of voice indicated that jitter and shimmer values and H/N ratio in more than half of the studied subjects differ from the standard to such an extent that they suggest a disordered phonatory function of the larynx. Similar results were obtained by Shaw and co. (4) in acoustic tests of voice performed on 96 patients. However, Wiener and co-worker (5) described changes in the larynx and voice disorders with the reflux disease without acoustic analysis. Kjellen and co-worker (1) did not confirm any correlation between gastroesophageal reflux disease and voice disorders.

On the basis of our investigations a negative influence of gastroesophageal reflux disease on the vocal organ can be confirmed.

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STRESZCZENIE

W przebiegu refluksu żołądkowo-przelykowego dochodzi do oparzenia błony śluzowej krtani i rozwinięcia się w jej obrębie zmian zapalnych. Celem pracy była ocena morfologiczna i fonacyjna krtani u dzieci z odpływem żołądkowo-przelykowym. Badanie kliniczne obejmowało ocenę lupo-laryngoskopową i stroboskopową krtani. Nagrane na taśmie magnetofonowej głos poddano analizie akustycznej, określając niektóre parametry mowy, charakterystyczne dla oceny zmian krtani.

W ocenie morfologicznej krtani stwierdzono zmiany zapalne w tylnym odcinku krtani (*laryngitis posterior*). Analiza akustyczna głosu wykazała, że wartości jittera, shimmera oraz H/N odbiegają od normy w stopniu świadczącym o zaburzonej czynności fonacyjnej krtani.