European Annals of Otorhinolaryngology, Head and Neck diseases 131 (2014) 309–312

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Review

Assessment of chronic childhood dysphonia

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ARTICLE INFO

Keywords:
Voice
Dysphonia
Children
Endoscopic examination

ABSTRACT

Chronic childhood dysphonia is a common condition in the school-age period. Perceived functional disorder is subjective and the alert is usually given by a person not belonging to the child's immediate environment. History-taking often suggests a malformation or acquired lesion. Functional assessment helps measure and diagnose the vocal impairment. Physical and endoscopic assessment in consultation is the key examination: it is only rarely impossible in children and can often found diagnosis. Additional examinations are sometimes necessary.

1. Introduction

Chronic childhood voice disorder is a frequent condition, especially in the school-age period [1–4]. When there are no associated symptoms, consultation is usually triggered by the child's school or music teachers rather than by family members.

It impacts on school, family, and social life [4,5]. Impaired communication may impair social integration (difficulty in making oneself heard, remarks about vocal timbre or intensity, etc.) [6]; it may be a source of anxiety for parents and/or cause physical discomfort that may in some cases be painful.

The present article describes the epidemiology of chronic childhood voice disorder and the diagnostic approach, which must be multidisciplinary [6–9].

We shall deal only with laryngeal conditions liable to induce isolated chronic childhood voice disorder, excluding acute dysphonia of infectious onset and vocal disorder induced by endocrine pathology.

2. Epidemiology

The few studies of the frequency of childhood dysphonia report prevalence of 6% to 38% in school-age children [1,10,11].

Two large-scale systematic studies found a peak incidence between 8 and 10 years (43–44%), although about 30% of patients were aged 7 or under [12,13].

Age at onset is often difficult to determine precisely. In the absence of associated symptoms, the interval between onset and consultation tends to be more than 1 year.

There is a strong male predominance of about 60% in dysphonia [1,2,11–13]; this is less marked before 7 years of age, followed by a male predominance which equalizes by 11 years and then turns into a female predominance as of 13 years [5,12,13]. Nodular pathology is the most frequent (55–68%), followed by congenital lesions (27–41%).

3. Clinical presentation

3.1. Functional impairment

Assessment criteria for dysphonia vary greatly [14,15].

A recent transverse study of a large cohort of 8 years old from the UK [1] reported a prevalence of 6% when assessment was made by a clinician and of almost 12% when made by the child's parents. Almost 5% of children were assessed by clinicians as being dysphonic despite their parents having noticed no signs of dysphonia.

It is unusual (1%) for consultation to be the child's own request; it is more often (about 60%) that of an outside party (family physician, speech therapist, music teacher, etc.) and in about 40% of cases that of a close friend or family member [4,16].

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http://dx.doi.org/10.1016/j.anorl.2013.02.001
1879-7296/

3.2. Anamnesis and history

3.2.1. Anamnesis

The first consultation includes history-taking with the child and parents [6,12].

A fundamental point, which might at first sight seem unimportant, concerns the person who reported or noticed the dysphonia and triggered consultation. This is an important indication when the time comes to suggest the optimal form of treatment.

The interview determines the history of the dysphonia, and notably the age at onset of vocal disturbance.

Dysphonia may be reported by friends or relatives as early as the first years or even months of life, without the parents themselves being at all worried by what they take to be simply the child's own particular voice.

Vocal disorder may be noticed when the child begins school, at around 3 or 4 years of age, after a more or less clear period in which the child's voice had been considered normal.

Schematically, longstanding dysphonia going back to the child's first vocalizations, although not pathognomic, is suggestive of congenital pathology.

Onset later than the beginning of schooling is suggestive of acquired pathology.

A correlation with onset of ENT inflammation may also be a trigger.

Evolution, and especially variation in dysphonia according to varying vocal demand, provides useful information for both diagnosis and treatment. Improvement at weekends or school holidays suggest that the child's vocal behaviour is an important factor. Dysphonia, however severe, that is stable over the year or presenting variations unrelated to any vocal effort is suggestive of congenital malformation of vocal fold structure.

3.2.2. History

Prematurity, neonatal intensive care, a particularity about the first cry or familial history of dysphonia are suggestive of a congenital lesion, especially in case of associated respiratory symptoms.

Any psychomotor developmental abnormalities and the chronology of language acquisition are to be noted.

Previous or current swallowing impairment and associated ENT (infection, auditory disorder, allergy), pneumologic (asthma, allergy) or digestive pathology (gastro-oesophageal reflux) should be screened for [1,8].

Finally, the interview should cover corticosteroid inhalation therapy [17] and history of tracheal intubation or ENT surgery.

3.2.3. General presentation

It is essential to obtain details of the child's personality and environment.

It needs to be established whether the child is introverted or extraverted, carefree or anxious, sociable or solitary and how easily he or she communicates with adults and other children in the family and school environment.

The existence of siblings and the patient's position among them, a noisy home environment and a family habit of talking loudly are factors for functional dysphonia.

School level, school-related and sports activities (individual or team sports) and musical or arts activities shed light on the child's personality and help assess the degree of personal trouble.

Finally, very young children may be mimicking a dysphonic parent [18].

4. Voice function assessment

Laryngeal examination, although central, is not the only clinical examination to be performed in consultation for childhood dysphonia. Vocal characteristics should be noted, observing and assessing the attitudes the child adopts when using the voice [4].

Such assessment may be made, in whole or in part, during each of the examinations performed and is especially important at the first examination, setting an initial benchmark from which to assess the impact of the vocal disorder and the potential investment and motivation of child and family in any intended therapy; later, it will serve to assess treatment benefit and guide subsequent indications.

Direct listening to the voice, by ear [19], is fundamental and is one of the most precise and reliable means of perceptual assessment when performed by an experienced examiner.

It begins during the interview with the child and the parents, with a general assessment of the impact of the dysphonia on the child's communication.

Subsequently, more systematic assessment is required [20], including if at all possible recordings that can be kept for reference; these may be digital (computerized or not) or analogic. They should allow easy comparison during successive consultations. Various samples of voice use should be recorded [21]: reading a simple, fairly short text, if the child can read; singing voice (with a well-known children's song); increased-volume speaking voice (e.g., counting as loudly as possible) and possibly prolonged vowel-sounds (/a/ /e/ /u/).

Ideally, collecting and recording samples should be associated to measuring the mean intensity of each on a sonometer.

These recordings allow the main acoustic features of the voice to be assessed: tone, volume and pitch.

Pitch is assessed as the mean fundamental frequency for the sample [22]. It will vary greatly according to age and type of expression [8,12,21,23–25] but, for the conversational voice or the reading voice after 6 years of age, averages 320 Hz around 3 years, 280–300 Hz around 4–5 years and 250–270 Hz around 6–7 years; it also depends on gender, averaging 240–260 Hz in boys and 250–270 Hz in girls around 11 years.

With puberty-induced voice changes, tone varies radically in boys (120–140 Hz) but little in girls (220–250 Hz).

It can be assessed by ear, with the help of a keyboard, with a little practice, or by asking the child to prolong the final syllable for a count of three [12]. It can also by measured on a frequency analysis system [26–28].

Volume is measured in dB_{SPL}, using a sonometer. It generally approximates 65–70 dB for the speaking voice and 90 dB for the increased-volume speaking voice [12].

It can be useful to note the minimum sustainable intensity for a continuous vowel-sound; this is one of the parameters used in calculating the DSI (dysphonia severity index) [29].

Tone is "characteristic" of each individual, and largely results from transformation of the sound emitted from the laryngeal vestibule by crossing resonance cavities. It is the hardest aspect of voice quality to assess. The human ear is able to discern voice pitch and its variations with great finesse, but the difficulty lies in describing these observations. The most widely used scale in phoniatrics is Hirano's [4,20], rating 5 voice pathology parameters on 4 levels (0 = normal to 3 = severe): G (grade), R (roughness), B (breathiness), A (asthenicity), S (strain). It was usefully supplemented by a 6th parameter (I: instability) by Dejonckere et al. [30].

Finally, although it is not always feasible to obtain a voice range profile [31] in due form in consultation, a rough assessment of vocal ambit (range between the lowest and highest sound the child can emit) can easily be made. The highest producible frequency is also a parameter in the DSI [29].

Objective instrumental voice assessment has developed spectacularly over the last two decades and numerous parameters have been reported. Their interest for diagnosis and follow-up in everyday clinical practice is debatable, but three are worth assessing and are relatively accessible.