DIAGNOSIS AND TREATMENT OF VOICE DISORDERS IN SCHOOL CHILDREN

William M. Shearer

Northern Illinois University, DeKalb, Illinois

A diagnostic program for children with voice disorders was established at Northern Illinois University at the request of local school speech clinicians. The diagnostic team, meeting four times a year, consisted of a speech pathologist, a laryngologist, and a school psychologist, with the clinic providing audiological services. Referring school clinicians accompanied the children through the diagnostic procedure and conferred with team members at the various stations. Vocal nodules were found in 57% of the children, most of whom had been referred because of hoarseness. The evaluation procedure and therapy recommendations are discussed in detail. The clinicians expressed an increased confidence in dealing with voice problems and tended to include voice disorders more readily in their regular case loads.

Speech clinicians in the public schools frequently bypass the voice disorders in their potential case load because they lack specialized training in this area or because hoarseness in school children usually does not seem to warrant professional help. This tendency appears to stem from a lack of instruction and clinical training in the treatment of voice disorders and, perhaps indirectly, from the emphasis on the medical and psychiatric aspects of voice problems as they are discussed in the literature. Furthermore, the arrangement for medical referral, routinely suggested for voice cases, is inconvenient in some localities and represents an additional procedure in the initiation of therapy.

In an effort to increase their effectiveness in dealing with voice disorders, the 11 school clinicians in DeKalb County, Illinois, organized a diagnostic team in cooperation with the Speech and Hearing Clinic at Northern Illinois University. The team consisted of a speech pathologist, a laryngologist, and a school psychologist, with hearing testing provided by the clinic.

DIAGNOSTIC TEAM PROCEDURE

Selected voice cases were brought to the clinic by the school clinicians, who acted as observers during the examinations and staffing. Four all-day clinics were held during the year. Each clinic saw 10 new referrals plus children who were brought back for a brief check of clinical progress.

After the laryngologist examined the vocal structures, the speech pathologist evaluated the voice and noted other related characteristics such as articulation, fluency, motor coordination, and general behavior, depending on the nature of each patient's problem. As time permitted, the recommended therapy was discussed with the referring clinician and sometimes demonstrated with the child during the evaluation.

At the staffings, the psychological evaluation and the hearing test results were added to the information from the speech pathologist and laryngologist. The presence of the laryngologist during the staffing greatly facilitated any medical recommendations, such as treatment of tonsils, adenoids, frenulum, palate, or nasal passage, which were indicated in some of the cases. The conclusions of the team, together with recommendations for therapy and referrals, were given to the appropriate clinicians and summarized in written reports.

EVALUATION OF THE VOICE

Although the diagnostic process varied according to the specific nature of each case, several basic procedures were routinely used in assessing all the children. The first consisted of several minutes of critical listening while the child described pictures or read aloud. Since most of the referrals were made on the basis of hoarseness,[1] the severity and consistency of this vocal anomaly were usually the primary concern. The various aspects of quality, pitch, intensity, and rate were also noted, including the normal and the deviant features of the voice and speech pattern. While some vocal problems tended to improve after several minutes of speaking, others became more pronounced, and a further diagnostic note was made if such trends appeared.

The next step in the speech evaluation was to note the relative intensity of the child's glottal attack on the initiation of vowel sounds. Hard glottal attack was taken to indicate a hypertonic functioning of the vocal cords, creating a somewhat plosive type of vowel production (see Figure 1). This method of phonation tends to precipitate and aggravate vocal nodules and similar pathologies (Brodnitz, 1965, p. 93; Van Riper and Irvin, 1958, p. 303). Such vocal productions usually could be distinguished by the sound of a small glottal catch at the beginning of an initial vowel sound in the oral reading, but any tendencies toward hard glottal attack were even more apparent when the child made a series of repeated vowels.

As a routine part of the diagnostic procedure, habitual pitch was measured using a storage oscilloscope, in which the child's fundamental frequency was matched with that from an oscillator. This involved the use of equipment usually not available in the public schools; but with the diagnostic measure

[1] Because of the wide variation and subjectivity encountered in descriptive labels for voice disorders, we use the term *hoarse* to indicate harsh-breathy quality as defined by Fairbanks (1960) and by Van Riper and Irwin (1958). *Harsh* is taken to mean phonation associated with excessive vocal effort. Other terms, such as *strained, weak, raspy, gutteral,* and *strident* were also accepted, but appear to be less well defined.

of pitch used as a standard, many of the school clinicians subsequently developed adequate matching skills with a pitch pipe for use in their own therapy sessions. Also, at this point in the diagnostic procedure, a sample of the child's

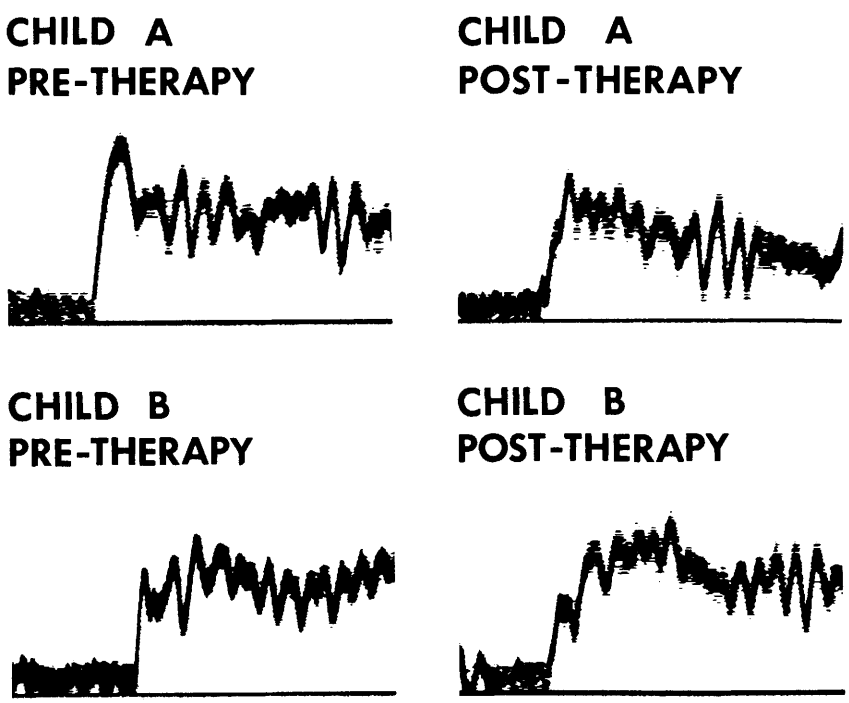

Figure 1. Sonograph amplitude displays of the vowel /ɑ/ from two children (Child A and Child B) before and after therapy. Before therapy the plosive characteristic of the vowel is considerably stronger, as determined by the high spike at the initiation of the /ɑ/ production. After therapy the same vowel displays a comparatively softer production, with a slightly more gradual rise time and diminution of the initial amplitude.

speech was made on a language master card, which could be filed conveniently in his case folder with the rest of the diagnostic results.

The final step in the speech evaluation was a therapy session designed to select techniques which would probably be most conducive to improvement. One of the activities required the child to prolong a vowel—usually the /ɑ/—while varying the pitch both upward and downward. The children with vocal nodules often demonstrated improved quality with slight elevation in pitch. Other activities which helped alter the habitual method of producing voice included speaking during relaxation, using different postures of the head and neck, increasing breath support, opening the mouth wider, speaking on a yawn or a sigh, altering rate and intensity, negative practicing, and imitating vocal patterns made by the clinician. This procedure, in addition to being useful in selecting appropriate therapeutic techniques, aided the clinician in assessing the child's responsiveness to the therapy situation.

THERAPY BY THE SCHOOL CLINICIANS

Voice therapy carried out by the clinicians participating in this program can be summarized under four main goals. These were (1) reduction of vocal tension and harshness, (2) development of new pitch levels and flexibility, (3) reduction of hard glottal attack, and (4) development of better vocal discrimination and awareness of vocal abuse.

Reduction of Vocal Tension and Harshness. In most cases this was aided by the use of overall bodily relaxation prior to and during phonation. Slow, rolling movements of the head and neck also served to reduce tension in the areas of the mandible and larynx. Tense speech postures such as retraction of the jaw and tightening of the neck and shoulder muscles were improved by instructing the child to read aloud while looking upward at the reading material held above eye level. These procedures were sometimes used in conjunction with massage of the neck and shoulder muscles.

A deliberate yawn or sigh inserted at intervals during oral reading helped greatly to reduce the habitual tension in harsh voices and to enable the child to experience a more relaxed phonatory quality. The child usually was able to make a good transition from a sigh into the first few words of the reading passage, but would return immediately to his habitually tense voice. In these cases it was necessary to guide the child into lengthening his periods of relaxed phonation until he was able to retain a smoother quality throughout the whole paragraph.

The Development of New Pitch Levels and Pitch Flexibility. This was usually conducted by widening the child's effective pitch range and by practice in oral reading at pitches higher and lower than the habitual pitch. As the child became accustomed to hearing himself speaking at various other pitches he was encouraged to shift gradually toward a pitch which sustained a smoother voice quality (Shearer, 1959). As mentioned earlier, a slight rise in pitch would usually improve the voice,[2] particularly where the hoarseness was associated with vocal nodules. Fisher and Logemann (1970) and Van Riper and Irwin (1958) report similar observations.

The emphasis on improving pitch range and flexibility, rather than on raising the pitch by a more direct approach, helped particularly in working with children who seemed to associate higher pitch with a less mature or even infantile manner of speaking. Such children would strongly reject the suggestion of raising their habitual pitch. Surprisingly, this preference for low pitch seemed equal in males and females and extended through preadolescent and adolescent age levels. The child who resisted raising his pitch usually would

[2] The question of whether the lower pitch is more apt to be a cause or a result of vocal nodules is still unresolved. The weighting of the nodule upon the movement of the vocal cord would tend to reduce its vibrating frequency (Moore, 1971, p. 73; Van Riper and Irwin, 1958, p. 186) and therefore lower the pitch. However, as Moore has pointed out, this relationship assumes that all other variables remain constant, which is rarely the case. Fisher and Logemann (1970), on the other hand, believe that a hypertensive low voice is often the cause of the nodular condition. Our clinical observations seem to confirm this latter view.

respond well to the concept of speaking both above and below his habitual pitch in order to widen his effective range. This method was termed the "five voices" technique, since it involved the child's practice in speaking at (1) the bottom of his range, (2) the top of his range, (3) his habitual pitch, (4) a pitch somewhere between habitual and lowest pitch, and (5) a pitch somewhere between habitual and highest pitch. Once he developed skill in speaking at each of the five pitches and in changing readily from one to the other, the gradual shift of his pitch to a more suitable tone could appear as a natural trend.

Reduction of the Hard Glottal Attack. This was largely a matter of helping the child to become more aware of his vocal production and to learn the difference between hard and soft contact of the vocal cords. Through the clinician's example, the child learned to listen for and to imitate selected versions of hard and soft glottal attack on repeated vowels and to detect the effect of laryngeal irritation produced by excessively hard glottal contacts. Even young children seemed to grasp this concept during the therapy session, although the problem of carry-over into daily speech habits was much greater among the less mature children. Another technique which was found to be helpful has been described by Vennard (1962) as the "imaginary H" method of producing a softer vowel production. In this method, intended originally for the training of singers, the speaker begins an initial vowel sound as though he were forming an /h/, to eliminate any tendency toward a plosive type of vowel phonation.

Of particular interest to the clinician is that one of the first signs of progress in voice therapy appeared in the reduction of hard glottal attack (Figure 1) rather than in the reduction of the hoarseness itself. Once the softer glottal attack was mastered consistently with exercise materials, the child could be shown how to produce smooth vocal quality with greater amplitude in spontaneous speech. This fostered good voice habits after the termination of therapy and indicated to the child that a good voice, properly used, could also be loud enough to meet his needs on the playground.

Development of Better Vocal Discrimination and Awareness of Vocal Abuse. This tended to follow in a natural course as a result of the other goals, but some additional counseling and reminders were also included in the reeducation process. Discussions about the effects of poor vocal habits and of the daily situations in which vocal abuse was apt to take place seemed to help the child assume more personal responsibility for improvement. Children who appeared not to benefit from the therapy were primarily those who remained unaware of the concept of vocal abuse and failed to discriminate the instances of good and poor vocal quality in their daily speech.

RESULTS OF THE DIAGNOSTIC PROGRAM

As a result of the diagnostic clinics, the primary goal of the program was

achieved—an increase in the number of voice cases seen regularly by the school clinicians. Before the diagnostic program voice cases typically constituted from 2% to 5% of the case loads for the participating clinicians, with a few clinicians having seen no voice cases on a regular basis. By the end of the first year of clinics, the active cases represented 5% to 15% of the clinicians' case loads, with all clinicians seeing some voice cases. The clinicians in general expressed greater confidence in working with voice disorders and began to accept this type of speech problem on a priority approaching that given to articulatory disorders. Some clinicians who were uncertain of their skills expressed surprise as well as satisfaction when their patients improved.

Of the children referred over a two-year period, 57% were found to have vocal nodules; of these, 60% were bilateral. In an earlier report Wilson (1961, p. 19) also stated that nodules were generally bilateral, but added that "the speech clinician may see only an occasional child with vocal nodules since this condition is relatively infrequent in children." The striking difference between this statement and the findings of the present study cannot be readily explained, but does suggest that our previous concept of vocal nodules should be re-evaluated as to incidence and causal influences and that clinical training should place more emphasis on this particular disorder.

The unexpectedly high incidence of nodules revealed by the voice clinics illustrated the significance of the problem to parents, teachers, principals, and other responsible individuals who might otherwise be inclined to consider hoarseness in children as a routine matter associated with the common cold.

Slightly more boys (55%) than girls were referred to the voice clinics. Thirty-six percent of all cases had normal vocal cords, and in 7% this factor could not be determined because of a strong gag reflex or similar difficulties.

In general the clinicians reported that the recommended therapy techniques were useful and successful, although the preference for the most effective approach varied according to the clinician. Some, for example, preferred to work toward better vocalization through music, singing, and humming, while others tended to emphasize relaxation. A few tried chewing methods. Most of the clinicians felt that the most difficult part of the therapy program was helping the child to maintain his awareness of vocal abuse and to carry over his vocal improvements outside the therapy sessions.

In addition to the request from the DeKalb County group that the diagnostic clinics be continued, inquiries have been received indicating that the program not only has fulfilled its original intent, but also has come to serve as a pilot project for the establishment of similar programs in other regional districts.

ACKNOWLEDGMENT

Requests for reprints should be directed to William M. Shearer, Speech and Hearing Clinic, Northern Illinois University, DeKalb, Illinois 60115.

REFERENCES

BRODNITZ, F., *Vocal Rehabilitation.* (3rd ed.) Rochester, Minn.: Amer. Acad. Ophthalm. Otolaryng. (1965).

FAIRBANKS, G., *Voice and Articulation Drillbook.* New York: Harper (1960).

FISHER, H. B., and LOGEMANN, J. A., Objective evaluation of therapy for vocal nodules: A case report. *J. Speech Hearing Dis.,* **35,** 277-285 (1970).

MOORE, P., *Organic Voice Disorders.* Englewood Cliffs, N.J.: Prentice-Hall (1971).

SHEARER, W., Cybernetics in the treatment of voice disorders. *J. Speech Hearing Dis.,* **24,** 280-282 (1959).

VENNARD, W., Building correct singing habits. Ch. 13 in N. Levin (Ed.), *Voice and Speech Disorders.* Springfield, Ill.: Charles C Thomas (1962).

VAN RIPER, C., and IRWIN, J., *Voice and Articulation.* Englewood Cliffs, N.J.: Prentice-Hall (1958).

WILSON, D. K., Children with vocal nodules. *J. Speech Hearing Dis.,* **26,** 19-25 (1961).