

Laryngeal Web as a Possible Cause for Nonabsorption of Vocal Nodules in Boys After Puberty

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Summary: Objectives: Vocal nodules are frequent in children and tend to be reabsorbed after puberty, especially in boys. The aims of the present study were to analyze the progression of nodules in boys after puberty and to investigate the role of microweb in the persistence of these lesions.

Methods: Clinical and videolaryngoscopy evaluations were carried out in boys with vocal nodules treated between 2009 and 2016, followed up to the age of 17 years or until remission of symptoms and reabsorption of the nodules. Boys with vocal nodules who underwent regular vocal therapy are included in the study. The outcomes were remission of symptoms and of the nodular lesions.

Results: A total of 34 boys with vocal nodules were diagnosed, of which 21 completed follow-up. Mean age of the first evaluation was 9 years (5–11 years) and of end of treatment was 14 years (13–18 years). Mean number of videolaryngoscopy per child was five. After adolescence there was complete remission of symptoms and of the lesions in 15 children (71.4%), partial remission in four (19.0%), and no remission of symptoms and of the lesions in two cases. In these two, videolaryngoscopy identified the presence of microweb and nodules.

Conclusions: Favorable reabsorption of the vocal nodules after adolescence was observed in the majority of the boys who underwent voice therapy; however, in two cases there was no remission of symptoms and of the lesions. The unfavorable course can be attributed to anterior laryngeal microwebs.

Key Words: Boys—Dysphonia—Vocal nodules—Larynx—Microweb.

INTRODUCTION

Vocal nodules are benign laryngeal lesions, frequently diagnosed in school-age children, and directly related to voice abuse.^{1,2} After puberty, they tend to reabsorb, even spontaneously, especially in boys, due to the substantial growth of the structures of the male larynx under the action of sexual hormones.^{3–5} However, the favorable prognosis of vocal nodules may be impaired in some situations, specifically in children who maintain the vocal pattern of hyperkinesia after adolescence, those with recurrent upper respiratory tract infections, hearing impairment, velopharyngeal insufficiency, and those with microwebs in the anterior commissure of the glottis. The association between microweb and vocal nodules has been described by several authors,^{6–8} but the literature fails to present the progression of vocal nodules after puberty in children with this malformation.

Laryngeal web corresponds to less than 5% of the congenital anomalies of the larynx and results from a partial defect in the recanalization of the epithelial lamina of the laryngeal lumen during the process of embryogenesis, around the 10th week of intrauterine life.^{9,10} The milder cases of these defects result in laryngeal microwebs restricted to the anterior commissure of the glottis (Figure 1). The more severe cases present with laryngeal stenosis and atresia.¹⁰ One of the largest series of laryngeal web described in the literature

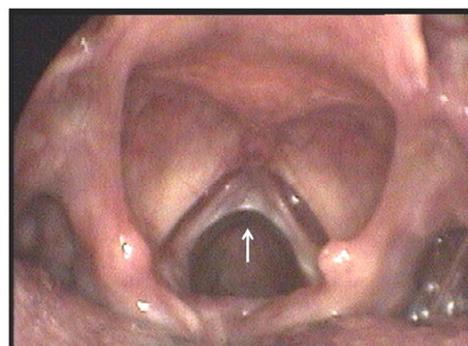


FIGURE 1. Laryngeal microweb (arrow).

was reported by Cohen⁹ and it included 51 patients. The anomaly was classified as type 1, laryngeal membrane extending to less than 35% of the glottis; type 2, from 35% to 50%; type 3 between 50% and 75%; and type 4 between 75% and 90%. Types 1 and 2 are less aggressive, and the symptoms are strictly vocal. The voice is high-pitched and sometimes dysphonic.

The presence of type 1 microweb in the anterior commissure of the vocal folds is usually detected in the endoscopic examination, especially in children with vocal nodules. It is probable that the web changes the dimensions of the phonatory portion of the larynx, favoring the growth of vocal nodules. The microweb may also be responsible for the failure of voice therapy and maintenance of the vocal nodules after adolescence. However, we did not identify studies that proved this supposition, and this is the main objective of this study.

METHODS

All boys with diagnosis of vocal nodules treated between 2009 and 2016 in the Otorhinolaryngology outpatient clinics

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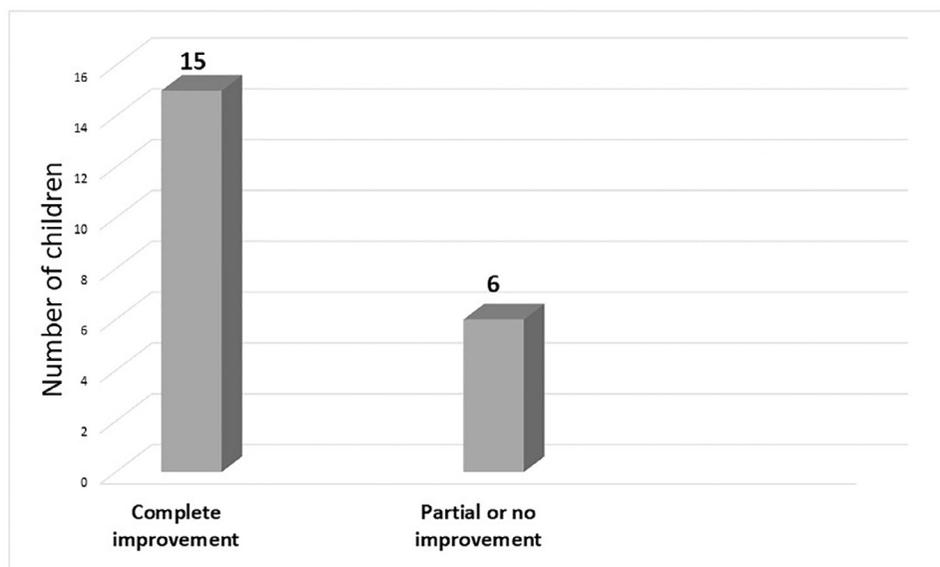


FIGURE 2. Evolution of vocal symptoms and vocal nodules in children after puberty.

of Botucatu Medical School (São Paulo, Brazil) were invited to participate in this longitudinal cohort study. We analyzed the demographic dates, vocal symptoms, and videolaryngoscopic findings before and after puberty. The children were questioned about the presence of hoarseness (if permanent or eventual) and if the symptoms have lessened or not over the years.

The children underwent videolaryngoscopic examinations using rigid endoscopic lenses (70° Azap telescopes, Baden-Württemberg, Germany) or flexible nasofibroscope, 3.5 mm, (Olympus, Tokyo, Japan) to confirm the diagnosis.

The following protocol has been standardized in our service for children with vocal nodules: treatment with regular voice therapy once a week with annual follow-up to reassess the symptoms and carry out a new videolaryngoscopy. These children were followed up periodically to puberty to assess the course of symptoms and lesions. The children were asked if vocal symptoms are present or not and if these are sporadic or permanent. Exceptionally, discharge from follow-up was indicated before puberty, in cases of early remission of symptoms and reabsorption of the lesions.

The primary outcomes were the complete remission of symptoms and the total reabsorption of lesions. The secondary outcomes were partial or no improvement of the voice or no reabsorption of the nodules.

The exclusion criteria are the following: children submitted to laryngeal microsurgery, girls, children with sensorineural hearing loss, those with genetic syndromes or cleft lip and palate, children with velopharyngeal incompetence, children who did not undergo regular voice therapy, and children with dubious diagnosis.

RESULTS

During the study period, 34 boys with vocal nodules were diagnosed, of which 21 completed follow-up. The mean age



FIGURE 3. Laryngeal microweb (arrow) and bilateral vocal nodules.

of the first evaluation was nine years (from 5 to 11 years; standard deviation ± 1.17), and of the end of treatment 14 years (from 13 to 18 years, standard deviation ± 1.11). The mean number of videolaryngoscopy and of therapy sessions per child were 5 examinations and 28 sessions, respectively.

After puberty, 15 children (71.4%) had complete remission of symptoms and nodular lesions (primary outcome). In the secondary outcome, six children were included (28.6%), four with partial voice improvement and two whose conditions did not improve (Figure 2). These last two children who did not present reabsorption of the nodules and who maintained the dysphonia were followed up to the age of 17. The videolaryngoscopy of these children identified the concurrent presence of microweb in the anterior commissure of the glottis, in addition to the nodules (Figure 3). These children did not report vocal overuse or nasal symptoms. The four children who presented incomplete reabsorption of the lesions presented recurrent upper airways infections as comorbidity.

DISCUSSION

Vocal nodules are responsible for 38%–78% of the causes for chronic dysphonia in childhood.^{11,12} They mainly affect school-age boys, a period in which the phonatory demand is more intense. Although several authors report good prognosis of vocal nodules after puberty, few cohort studies that confirm this scientifically are available. Santos et al⁴ reassessed 11 adolescents aged 13–17 years who had the diagnosis of nodules and vocal cysts in childhood. Among these children, the symptoms of dysphonia persisted after adolescence in only three patients with vocal cysts, indicating the favorable progress of vocal nodules. De Bodt et al³ called for reevaluation of 91 youngsters who had had the diagnosis of vocal nodules in childhood; 34 returned to evaluation. Of these, 37% of the girls and 8% of the boys had persistent symptoms of dysphonia; vocal nodules were present in 47% of the girls and 7% of the boys, demonstrating the different progression of vocal nodules in both genders.

For most authors, the treatment of choice for vocal nodules is voice therapy^{11–13}; however, this treatment is lengthy and costly. There is also the possibility of spontaneous improvement of the lesions with no treatment. As a consequence, the uncertainty as to the best treatment of vocal nodules remains. Longitudinal studies become essential and important to shed light on the decision because they enable the evaluation of the course of the disease with the many treatment modalities, as well as the identification of the causes of failures.

Senkal and Çiyiltepe¹³ evaluated 99 dysphonic children (ages 7–15 years) with diagnoses of vocal nodules (n = 62), muscle tension dysphonia (n = 9), polyps (n = 2), mutational falsetto (n = 8), edema (n = 6), gastroesophageal reflux (n = 9), paralysis (n = 1), and normal examinations (n = 2). The children underwent three types of voice therapy (physiological, vocal, and symptomatic hygiene). The clinical improvement of the voice was evaluated by the General degree of dysphonia, Roughness, Breathiness, Asthenia, Strain, and Instability scale. Vocal nodules corresponded to 62% of the causes of dysphonia. There was improvement of the vocal parameters with the three techniques of voice therapy; however, the symptomatic technique was more beneficial than the others. Nardone et al¹⁴ evaluated the benefits of voice therapy in 67 children with vocal nodules (ages between 3.8 years and 20.6 years), based on the decrease in the size of the lesion, classified as 1–3. The authors found important rates of lesion reabsorption before adolescence, favored by voice therapy.

Machkiewicz-Nartowicz et al¹¹ evaluated 29 adolescents (15–20 years old) treated during prepuberty for hyperkinetic dysphonia and nodules. All underwent voice therapy, and the postpubertal evaluation demonstrated complete regression of dysphonia in 8 of the 15 girls and complete regression of lesions and symptoms in all boys.

Four children of our study had only partial voice improvement after puberty. All of them had chronic nasal obstruction and repetitive respiratory infection. We therefore believe that in those children these comorbidities

contributed for the persistence of vocal symptoms after puberty. In other two children in whom after puberty the vocal nodules were not reabsorbed, microweb in an anterior glottic commissure was diagnosed. Probably, the presence of such anomaly justifies the unfavorable course of the vocal nodules because it maintains the infantile glottic configuration and renders lesion reabsorption more difficult.

Perhaps, the surgical removal of the microweb before puberty could facilitate the reabsorption of the vocal nodules. However, surgical manipulation of the anterior glottic commissure may result in local adherence and maintenance of the lesion. We did not identify scientific articles that confirm the benefits of microsurgery to the microweb in children with nodules. The main surgical indications to the laryngeal webs are restricted to the most severe cases with obstruction of the airways.^{6,7,10}

CONCLUSIONS

We observed the favorable progression of vocal nodules after adolescence in the majority of boys who underwent voice therapy; however, in two cases there was no remission of symptoms and lesions, attributed to the concurrent presence of microweb in the anterior commissure of the glottis.

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