COEXISTENCE OF BILATERAL SULCUS VERGETURE AND BILATERAL FIBROUS MASS OF THE VOCAL FOLDS: CASE REPORT

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Abstract

Background: This study presents the case of a 32-year old woman who presented with severe dysphonia. She had experienced voice problems since childhood.

Material and methods: The patient underwent otolaryngological and phoniatric examination including videolaryngostroboscopy (VLS), perceptual evaluation (GRBAS scale), and acoustic analysis of voice (MDVP software). Microsurgery was performed using a CO2 Acupulse laser (Lumenis) with AcuBlade micromanipulator.

Results: VLS revealed glottal incompetence, an intracordal mass on the right vocal fold, and capillary ectasia on the superior surface of the right vocal fold. Atrophy was seen along the free edge of the left vocal fold. GRBAS and MDVP revealed significant voice disturbances. The patient was referred for direct microlaryngoscopy. Initial inspection of the vocal folds showed bilateral intracordal mass and sulcus vergeture. Using a microflap technique the fibrous mass was removed. For the sulcus vergeture a surgical technique based on a concept by Cornut and Bouchayer and modified by Remacle was used. Complementary hyaluronic acid (Surgiderm 24XP) was injected to correct the left vocal fold volume. Stroboscopic evaluation performed 3 months postoperatively showed significant improvement of glottis closure and vibratory parameters. Perceptual and objective voice assessment revealed improvement in the acoustic structure of the voice after surgery.

Conclusions: Coexistence of bilateral sulcus vergeture and bilateral fibrous mass is a very rare occurrence. The preoperative diagnosis is often not obvious. Severe voice disturbances make surgery the first treatment option in such cases.

Key words: sulcus vergeture • fibrous mass • epidermoid cyst • laryngoplasty injection

COEXISTENCIA DEL SULCUS GLOTIS BILATERAL DEL TIPO VERGETURE Y DE LA PULPA FIBROSA BILATERAL DE LOS PLIEGUES: ESTADO DE CASOS

Resumen

Antecedentes: La prueba presenta un caso de una mujer de 32 años con disfonía de nivel considerable. Los problemas con la voz existieron desde la infancia.

Material y métodos: El la paciente se realizó una prueba otolaringlógica y foniatra incluidos la videoestroboscopia de la laringe (VLS), la evaluación de la percepción (escala de GRBAS) y el análisis acústico de la voz (programas MDVP). Se aplicó un tratamiento fonoquirúrgico con láser Acupulse CO2 (Lumenis) y micromanipulador AcuBlade.

Resultados: El examen de VLS demostró una masa patológica en la zona del pliegue vocal derecho y una dilatación de los vasos sanguíneos en su superficie superior. Se observaron también rasgos de atrofia con abolladura del borde libre del pliegue vocal izquierdo. La evaluación acústica de la voz con escala de GRBAS y análisis de MDVP mostró trastornos serios de la calidad de la voz. La paciente fue remitida para la evaluación de la laringe en una laringoscopia directa. Las pruebas previas de os pliegues vocales demostraron una presencia bilateral de la masa patológica del pliegue vocal y del sulcus glottis del tipo vergeture. La pulpa fibrosa fue eliminada con uso de la técnica *microflap*. En cuanto al surcus glottis del tipo vergeture se usó una técnica quirúrgica basada en la concepción de Cornut y Bouchayer modificada por Remacle. Con el fin mejorar el volumen y la forma del pliegue vocal izquierdo se inyectó ácido hialúrgico (Surrgiderm 24 XP). La Prueba estroboscópica realizada a los 3 meses de la intervención demostró una mejora considerable del cierre de la ranura de la glotis y de parámetros de la vibración de los pliegues vocales. La percepción y una evaluación objetiva demostraron una mejora de las estructuras acústicas de la voz después de la intervención.

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Conclusiones: La coexistencia del sulcus glottis del tipo vergeture y de la pulpa fibrosa de los pliegues es muy rara. El diagnóstico de antes de la intervención muchas veces no es evidente. En caso de un trastorno considerable de la voz, la primera forma de tratamiento es una intervención quirúrgica.

Palabras clave: sulcus glottis del tipo vergeture • pulpa fibrosa • quiste epidermoide • inyección laringplástica

СОСУЩЕСТВОВАНИЕ ДВУСТОРОННЕЙ БОРОЗДЫ ГОЛОСОВОЙ СКЛАДКИ ТИПА VERGETURE И ДВУСТОРОННЕЙ ВОЛОКНИСТОЙ МАССЫ ГОЛОСОЫХ СВЯЗОК: КЕЙС-СТАДИ

Изложение

Фон: Настоящее исследование представляет случай 32-летней женщины с дисфонией значительной степени тяжести. Проблемы с голосом проявлялись с детства.

Материал и методы: У пациентки проведены отоларингологические и фониатрические исследования, в том числе видеостробоскопию гортани (VLS), перцептивную оценкку (шкала GRBAS) и акустический анализ голоса (программа MDVP). Было применено фонохирургическое лечение с использованием лазера Acupulse CO2 (Lumenis) с микроманипулятором AcuBlade.

Результаты: Исследование VLS показало патологическую массу в области правой голосовой складки и расширение кровеносных сосудов на ее верхней плоскости. Были также замечены признаки атрофии со впадиной свободного края левой голосовой складки. Акустичекая оценка голоса с использованием шкалы GRBAS и анализа MDVP показала значительные нарушения качества голоса. Пациентка была направлена для оценки гортани в прямой ларингоскопии. Предварительные исследования голосовых связок показали двустороннее наличие патологической массы голосовой складки и борозды голосовй складки типа *vergeture*. Волокнистая масса была удалена с применением техники *microflap*. В случае борозды голосовой складки типа *vergeture* была использована хирургическая техника, основанная на концепции Корнута и Боухайера, модофицированную Ремаклем. С целью улучшения объема и формы голосовой складки, была сделана инъекция гиалуроновой кислоты (Surgiderm 24XP). Стробоскопическое исследование, выполненное через 3 месяця после операции, показало значительное улучшение смыкания голосовой щели и параметров вибрации голосовых связок. Перцептивная и объективная оценка показали улучшение акустической структуры голоса после операции.

Итоги: Сосуществование обусторонней борозды голосовой складки типа *vergeture* и обусторонней волокнистой массы голосовых связок является очень редким. Предоперационный диагноз зачастую не очевиден. В случаях значительного нарушения голоса первой формой лечения является хирургическая операция.

Ключевые слова: борозда голосовой складки типа vergeture • волокнистая масса • эпидермальная киста • инъекционаая ларингопластика

WSPÓŁWYSTĘPOWANIE OBUSTRONNEGO ROWKA GŁOŚNI TYPU *VERGETURE* I OBUSTRONNEJ MASY WŁÓKNISTEJ FAŁDÓW GŁOWACH: STADIUM PRZYPADKU

Streszczenie

Tło: Badanie to przedstawia przypadek 32-letniej kobiety z dysfonią znacznego stopnia. Problemy z głosem występowały od dzieciństwa.

Materiał i metody: U pacjentki przeprowadzono badanie otolaryngologiczne i foniatryczne, w tym wideostroboskopię krtani (VLS), ocenę percepcyjną (skala GRBAS) i analizę akustyczną głosu (oprogramowanie MDVP). Zastosowano leczenie fonochirurgiczne z wykorzystaniem lasera Acupulse CO2 (Lumenis) z mikromanipulatorem AcuBlade.

Wyniki: Badanie VLS wykazało masę patologiczną w obrębie prawego fałdu głosowego i poszerzenie naczyń krwionośnych na jego górnej powierzchni. Zaobserwowano również cechy atrofii z wklęśnięciem wolnego brzegu lewego fałdu głosowego. Ocena akustyczna głosu z wykorzystaniem skali GRBAS i analizy MDVP wykazała znaczące zaburzenia jakości głosu. Pacjentka została skierowana do oceny krtani w laryngoskopii bezpośredniej. Wstępne badanie fałdów głosowych wykazało obustronnie obecność masy patologicznej fałdu głosowego oraz rowka głośni typu *vergeture*. Masę włóknistą usunięto z wykorzystaniem techniki *microflap*. W przypadku rowka głośni typu *vergeture* użyto technikę chirurgiczną opartą na koncepcji Cornuta i Bouchayera, zmodyfikowaną przez Remacle'a. W celu poprawienia objętości i kształtu lewego fałdu głosowego, wstrzyknięto

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kwas hialuronowy (Surgiderm 24 XP). Badanie stroboskopowe przeprowadzone 3 miesiące po operacji wykazało znacząca poprawę zamknięcia szpary głośni i parametrów wibracji fałdów głosowych. Percepcyjna i obiektywna ocena wykazały poprawę struktury akustycznej głosu po operacji.

Wnioski: Współwystępowanie obustronnego rowka głośni typu *vergeture* i obustronnej masy włóknistej fałdów głowach jest bardzo rzadkie. Diagnoza przedoperacyjna często nie jest oczywista. W przypadkach znacznego zaburzenia głosu pierwsza formą leczenia jest operacja chirurgiczna.

Słowa kluczowe: rowek głośni typu *vergeture* • masa włóknista • cysta epidermoidalna • laryngoplastyka iniekcyjna

Background

The sulcus is a groove at the free edge of the vocal fold. Bouchayer and Cornut [1] described a linear depression of atrophic epithelium along the free margin of the vocal fold as sulcus vergeture, and an invaginated hyperkeratotic epithelium attached to the vocal ligament as sulcus vocalis. Fibrous mass of the vocal folds is an accumulation of fibrous amorphous material within the lamina propria of the vocal fold. Such a mass can be found in the superficial space or involve the ligament. Both lesions are benign pathologies of the vocal folds [2,3].

Material and methods

An otherwise healthy 32-year old woman presented with severe dysphonia and vocal fatigue, episodes of aphonia, diminished voice intensity, and strained, breathy voice. She had experienced chronic mild to severe dysphonia since childhood. She had been employed as a teacher but 5 years ago changed her job because of voice problems. At the time of presentation she was undergoing medical therapy for laryngopharyngeal reflux.

The patient underwent otolaryngological and phoniatric examination including videolaryngostroboscopy (VLS), perceptual evaluation (GRBAS scale), and acoustic analysis of voice (MDVP). The VLS was performed with a 70° rigid laryngoscope (EndoStrob DX 327, Xion GmbH, Germany); glottic closure, quality of vocal fold vibration, and differences in the position of the vocal folds were assessed. The patient's voice was assessed on the GRBAS scale of the Japanese Society of Logopedics and Phoniatrics [4]. The scale evaluates grade of hoarseness (G), voice roughness (R), voice breathiness (B), asthenic voice (A), and strained voice (S). Each parameter is estimated on a 4-grade scale to describe its intensity (from 0 to 3). Assessments were made by two trained phoniatricians and the scores were averaged.

The objective acoustic voice analysis was performed with a Kay Elemetrics Computerized Lab version 4300 B. Three samples of the sustained vowel "a" were used for analysis, and recorded with an AKG microphone positioned 3 cm from the mouth. Companion software from Kay Elemetrics, the Multidimensional Voice Program (MDVP), was used to obtain objective voice quality data: the average fundamental frequency, parameters describing frequency perturbation (Jitt, PPQ, and vFo), parameters assessing amplitude perturbations (Shim, APQ, and vAm), and noise (NHR and SPI).

The microsurgical procedure was performed under general anesthesia using suspension laryngoscopy. A CO2 Acupulse laser (Lumenis) with AcuBlade micromanipulator was used for dissection.

Results

The preoperative VLS examination revealed glottal incompetence with irregular shape of the glottis during phonation. We identified an intracordal mass (suspected cyst) in the middle segment of the right vocal fold and a capillary ectasia on the superior surface of the right vocal fold. During phonation stroboscopy showed stiffness of both vocal folds in the middle segment, the vibrations were asymmetrical, irregular and reduced in amplitude, and there was a mucosal wave. Atrophy was seen along the free edge of the left vocal fold (sulcus suspicion). A presumptive diagnosis of a cyst on the right vocal fold and suspicion of sulcus vergeture of the left vocal fold was made (Figure 1).

Subjective assessment of the voice on the GRBAS scale revealed voice disturbance on all assessed parameters: G2-R2-B1-A1-S2. The mean fundamental frequency (Fo) was 261 Hz. Objective voice analysis (MDVP) showed no significant disturbance of acoustic parameters. We observed incorrect value of vFo (2.3%) in the frequency parameters, and vAm (12.7%) and sAPQ (5.7%) in the amplitude parameters. The values of Jitt, PPQ, Shim, APQ, SPI, and NHR were correct (Figure 2).

The patient was referred to the Oto-Rhino-Laryngology Surgery Clinic of WHC for direct microlaryngoscopy. Initial inspection of the vocal folds confirmed the right intracordal mass and sulcus vergeture of the left vocal fold along the superior surface near the free edge. It also revealed sulcus vergeture of the right vocal fold, intracordal mass, and another (smaller) sulcus vergeture on the free edge of the left vocal cord. A right cordotomy was performed and a fibrous mass involving the ligament was found. It extended anteriorly and posteriorly from the focal mass of fibrous material. We applied a microflap approach to remove the mass. For the sulcus vergeture, a surgical technique based on a concept by Cornut and Bouchayer and modified by Remacle was used. The steps were as follows: 1) freeing of the mucosa adhering to the vocal ligament; 2) detachment of the ligamentous fibers along the inferior edge; 3) redraping of the mucosa with fibrin glue. The procedure was done bilaterally during the same surgery. A left cordotomy revealed a fibrous mass. The same procedure of excision of fibrous tissue was applied on the left vocal fold. In the second step, surgery of the sulcus vergeture on the superior surface of the left vocal fold was done. The smaller sulcus was left without surgical intervention. Finally,

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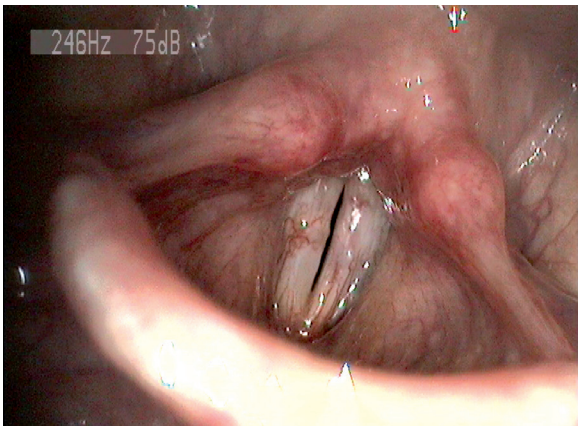

Figure 1. Stroboscopic view before surgery

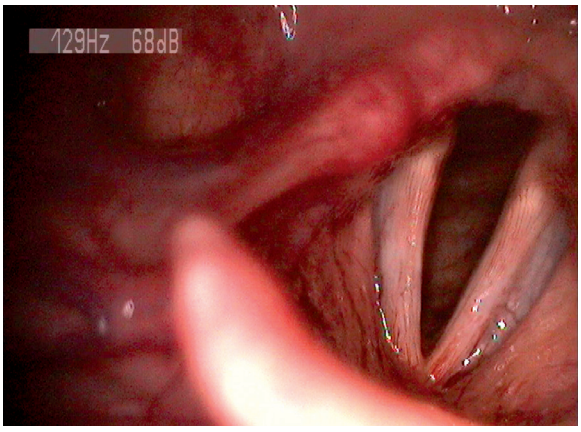

Figure 3. Stroboscopic view 9 months after surgery

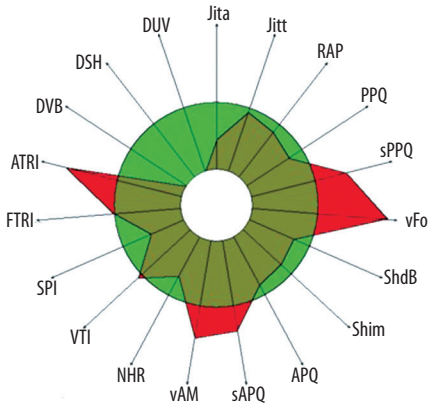

Figure 2. Multidimensional voice analysis before surgery

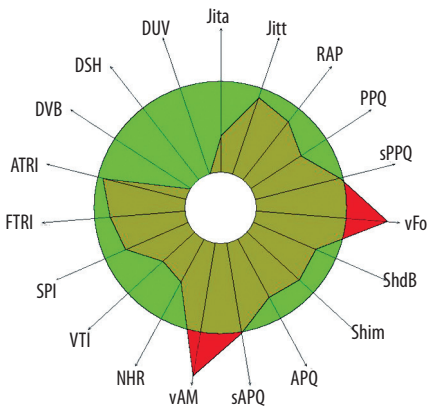

Figure 4. Multidimensional voice analysis 9 months after surgery

complementary hyaluronic acid (Surgiderm 24XP) injection was performed to correct the left vocal fold volume.

Postoperative care included complete voice rest for 7 days, proton pump inhibitors, and follow-up after 10 days. Two weeks after surgery speech therapy was started and continued for 3 months after the operation (1 visit per week).

Stroboscopic evaluation performed 9 months postoperatively showed improvement but incomplete glottic closure. Full correction was obtained of the free margin of the left vocal fold (where hyaluronic acid was injected), but the right vocal fold (without injection) was bowed. We also observed enlargement of vocal fold vibration and a return of mucosal wave and amplitude (Figure 3). In GRBAS assessment we noted a reduction in every single parameter: G1-R1-B0-A0-S0.

Objectively, MDVP revealed improvement in the acoustic structure of the voice after surgery (Figure 4). We observed a reduction of vFo (1.7%) and vAm (9.6%). Values of Jitt (0.9%), RAP (0.5%), and PPQ (0.5%) showed a slight increase. The mean fundamental frequency decreased to 233 Hz.

Discussion

Sulcus vergeture is often associated with other lesions, mainly epidermoid cyst, mucosal bridge or polyps, nodules, and Reinke's edema. During surgery for those lesions sulcus vergeture can be detected or confirmed in approximately 30% [5]. Diagnosis of sulcus vergeture or sulcus vocalis is often made intraoperatively. In our previous study, preoperative diagnosis of sulcus was confirmed during microlaryngoscopy in 40% of studied cases [6]. Some authors have speculated that sulcus vergeture and more often sulcus vocalis may be the consequence of a rupture of an epidermoid cyst [1,7,8]. Ruptured cysts within the vocal fold produce a severe inflammatory reaction, and neovascularization and fibrosis occur in the vocal fold ligament during the healing process [9]. This may result in sulcus vergeture or vocalis. A histological study of the sulcus reported that tissues adjacent to the sulcus proliferate to form fibrous tissue [10], which could explain the coexistence of a sulcus and a fibrous mass in our patient. Capillary ectasia is often present in patients with a sulcus. If cysts or capillary ectasia of the vocal fold are present, the possibility of a sulcus should always be considered [11]. In our case we also noted pathological vessels on the sulcus fold.

The etiology of a sulcus has not been yet elucidated. Bouchayer and Cornut proposed a congenital theory, that a sulcus is associated with a defect of the 4th and 6th brachial arches. This theory is supported by the onset of dysphonia in childhood in 55% of cases [1,7]. Our patient probably belongs to this group and had a congenital disorder.

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A number of surgical treatments have been proposed for sulcus vocalis/vergeture [1,5,7,12–14]. The goal of all methods is to improve voice quality, but full recovery of the normal voice is almost never achieved [11]. Postoperative voice therapy is indispensable to correct inadequate compensatory mechanisms of phonation. Voice re-education should be given a prominent role in therapeutic planning. In patients with mild or moderate dysphonia this option is often useful. In our studied case, coexistence of a bilateral sulcus and a bilateral fibrous mass resulted in significant voice disturbances, so the first stage of treatment was surgery followed by sessions of voice therapy.

Conclusions

1. Coexistence of bilateral sulcus vergeture and bilateral fibrous mass is a very rare occurrence.
2. The preoperative diagnosis is often not obvious. Sometimes only intraoperative examination provides a final diagnosis.
3. Severe voice disturbances make surgery the first treatment option in such cases, but the voice results are often not fully satisfactory.
4. Post-operative voice therapy can improve the results of surgical treatment.

Statement

This material has never been published and is not currently under evaluation in any other peer-reviewed publication. Sponsors did not have any role in study design: the collection, analysis, and interpretation of data; the writing of the report; and the decision to submit the paper for publication. The Institute of Physiology and Pathology of Hearing covered all expenses incurred during the study.

References:

1. Bouchayer M, Cornut G. Microsurgical treatment of benign vocal fold lesions: indications, techniques, results. Folia Phoniatr, 1992; 44: 155–84.
2. Rosen CA, Gartner-Smith J, Hathaway B et al. A nomenclature paradigm for benign midmembranous vocal fold lesions. Laryngoscope, 2012; 122: 1335–41.
3. Rosen CA, Simson CB. Operative technique in laryngology. Berlin Heidelberg: Springer Verlag; 2008.
4. Hirano M. Clinical Examination of Voice. Wien: Springer Verlag; 1981.
5. Remacle M, Lawson G, Evrard I, Degols JC, Jamart J. Microsurgery of sulcus vergeture with carbon dioxide laser and injectable collagen. Ann Otol Rhinol Laryngol, 2000; 109(2): 141–8.
6. Miaśkiewicz B. Diagnostic difficulties in sulcus vocalis. Now Audiofonol, 2015; 4(1): 60–3.
7. Bouchayer M, Cornut G. Microsurgery for benign lesions of the vocal folds. Ear Nose Throat J, 1988; 67: 446–66.
8. Akbulut S, Altintas H, Oguz H. Videolaryngostroboscopy versus microlaryngoscopy for the diagnosis of benign vocal cord lesions: a prospective clinical study. Eur Arch Otorhinolaryngol, 2015; 272: 131–6.
9. Gray SD, Hammond E, Hanson DF. Benign pathologic responses of the larynx. Ann Otol Rhinol Laryngol, 1995; 104: 13–18.
10. Nakayama M, Ford CN, Brandenburg JH, Bless DM. Sulcus vocalis in laryngeal cancer: a histopathologic study. Laryngoscope, 1994; 104: 16–24.
11. Giovanni A, Chanteret C, Lagier A. Sulcus vocalis: a review. Eur Arch Otorhinolaryngol, 2007; 264: 337–44.
12. Ford CN, Inagi K, Bless DM, Khidr A, Gilchrist KW. Sulcus vocalis: a rational analytical approach to diagnosis and management. Ann Otol Rhinol Laryngol, 1990; 105: 189–200.
13. Pontes P, Belhau M. Treatment of sulcus vocalis: auditory perceptual and acoustical analysis of slicing mucosa surgical technique. J Voice, 1993; 7: 365–76.
14. Yilmaz T. Sulcus vocalis: excision, primary suture and medialization laryngoplasty: personal experience with 44 cases. Eur Arch Otorhinolaryngol, 2012; 269: 2381–9.

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