

Bamboo Node as an Unusual Cause of Dysphonia in a Filipino Patient with Mixed Connective Tissue Disease

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Abstract

Introduction: Bamboo node is a rare vocal cord pathology causing dysphonia among patients with autoimmune disorders. These “bamboo-joint-like” transverse deposits on the vocal cords interfere with the vibratory cycle during phonation leading to voice hoarseness. A review of Schwemmler from 1993-2009, showed seven cases of bamboo node among patients with mixed connective tissue disease (MCTD). With the patient’s consent, this case is presented to contribute to current knowledge about MCTD.

Case Presentation: A 36-year-old Filipino female developed voice hoarseness one year after she was diagnosed with MCTD. Videostroboscopic findings revealed bilateral bamboo nodes, vibratory defects, and amplitude abnormalities. Treatment with prednisone, methotrexate,

hydroxychloroquine, along with voice rest and speech therapy resulted in normalization of amplitude, mucosal wave and vibratory behavior during repeat videostroboscopy.

Conclusion: To date, this is the first known case of bamboo nodes associated with MCTD in a Filipino patient. This case highlights the importance of properly investigating the symptom of hoarseness among patients with rheumatologic diseases. A multidisciplinary approach involving the rheumatologist, otorhinolaryngologist, and speech therapist play an important role in the complete care of this patient.

Keywords: bamboo nodes, dysphonia, mixed connective tissue disorder, filipino, case report

Introduction

Bamboo node was first described by Hosako¹ in 1993 in a patient with systemic lupus erythematosus (SLE) and several other reports followed.^{2,3,4,5,6} It has also been seen in relation with autoimmune hepatitis,^{2,7} Hashimoto’s thyroiditis,³ progressive systemic sclerosis,^{3,5} Sjogren’s disease,⁴ rheumatoid arthritis,^{4,5,8} undifferentiated connective tissue syndrome,⁷ with elevated ANA and no clinical signs,⁹ and even among patients without autoimmune diseases.⁴ This poorly recognized deposit is cream to yellow colored and located at the midpoint of the upper surface of the vocal fold.¹ It resembles the horizontal division of a bamboo stem

describing it as “bamboo-joint-like”.¹ Murano reported this finding as the first manifestation leading to the diagnosis of connective tissue disease and coined the term “vocal cord bamboo node.”⁴ It is just one of the laryngeal abnormalities in autoimmune connective diseases; other findings are cricoarytenoid arthritis, epiglottitis, laryngeal edema, laryngeal mucosal inflammation, and rheumatoid vocal fold nodules. The latter are rounded nodules unlike the fusiform ones of bamboo node.⁵

The worldwide incidence and prevalence of bamboo node is unknown. A few published case reports describe the association of bamboo nodes with autoimmune disorders, particularly mixed connective tissue disease (MCTD). A review by Schwemmler from 1993- 2009, showed only seven cases of bamboo node among patients with MCTD.² In a 13-year review of records of 14 MCTD cases in the Philippine General Hospital, there was no patient with chronic voice hoarseness and vocal cord lesion.³

We report the case of a 36-year-old Filipino female with polyarthritis, cutaneous lesions, constitutional symptoms, and Raynaud’s phenomenon diagnosed with MCTD who developed voice hoarseness secondary to bamboo nodes.

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Case Presentation

In December 2012, a 36-year-old Filipina manifested with photosensitivity, malar rash and generalized body weakness. She had moderate pain at the metacarpophalangeal (MCP) and proximal interphalangeal joints (PIP) of both hands, ankles, and temporomandibular joints with morning stiffness more than 30 minutes in duration. She took paracetamol and ibuprofen with minimal pain relief.

After three months, there was additional pain and swelling of shoulders and elbows, undocumented febrile episodes, body malaise, and weight loss. On consultation, she had the following test results: elevated erythrocyte sedimentation rate (ESR=40 mm/hr), positive rheumatoid factor (RF=8.0 IU/ml), positive anti nuclear antibody enzyme linked immuno assay (ANA-ELIA: 1.403 IU/ml), normal complete blood count and urinalysis. Celecoxib did not relieve her arthritis so she was referred to the Philippine General Hospital for rheumatology evaluation.

Her sister died from SLE complications. She does not smoke cigarettes nor drink alcoholic beverage. She had three uncomplicated pregnancies. She finished secondary level of education and previously managed the family's merchandising store. She had to stop working and was limited to simple house work because of arthritis. She was a church choir member from 2001 to 2013 but had to stop singing when she developed hoarseness of voice.

In April 2013, she consulted at the Philippine General Hospital and was assessed to have SLE based on the 1997 Revised American College of Rheumatology Classification Criteria (ACR): malar rash, photosensitivity, arthritis, positive ANA Immunofluorescence +4 speckled pattern.^{6,7} At the same time, she fulfilled the criteria for definite rheumatoid arthritis (RA) based on the 2010 ACR-European League Against Rheumatism (EULAR) Classification Criteria for RA (>10 small joints, positive RF, elevated ESR, > 6 weeks duration) in high disease activity (DAS- 28 score, 6.05) (8). She was treated with prednisone 10 mg/day, hydroxychloroquine 200 mg/day, calcium carbonate and vitamin D supplementation, methotrexate 7.5 mg/week, folic acid, and sunscreen. After one month, there was reduced malar rash, photosensitivity and pain intensity at the joints (NRS 3/10) but persistent arthritis in high disease activity (DAS-28, 6.56).

In September 2013, she complained of throat discomfort characterized as choking sensation and voice hoarseness which interfered with her church choir participation. There were no complaints of dysphagia, sore throat, palpable neck mass and febrile episodes. Direct laryngoscopy conducted by otorhinolaryngology service showed erythema of false vocal cords and absence of masses. Videostroboscopy was advised for further evaluation but she did not comply. Concurrently, there were still polyarthritis (wrists, PIPs, MCPs) in high disease

activity and methotrexate was increased to 15 mg/week and prednisone to 10 mg/day.

She had no clinic consultations for a year and on return in December 2014, there was still voice hoarseness but decreased joint tenderness. She had new-onset puffiness and swelling of fingers and Raynaud's phenomenon affecting all the fingers of both hands. Anti-U1RNP tested positive. She fulfilled the diagnosis of MCTD based on the Alarcon-Segovia et al. classification criteria.¹⁷ Nifedipine was added to her treatment regimen for control of Raynaud's phenomenon.

On pursuing the work-up for hoarseness, videostroboscopy (January 2014) showed bilateral bamboo nodes with mild anterior glottic and subglottic web. There were slightly rough vocal fold edges, with incomplete glottis closure, moderately decreased amplitude, severely decreased mucosal waves, and partially absent vibratory behaviors (Figures 1-2, Table 1). She was given with omeprazole, voice rest, dietary modification to prevent laryngopharyngeal reflux, and advised speech therapy. At the index speech therapy consult, there was vocal hyperfunction secondary to

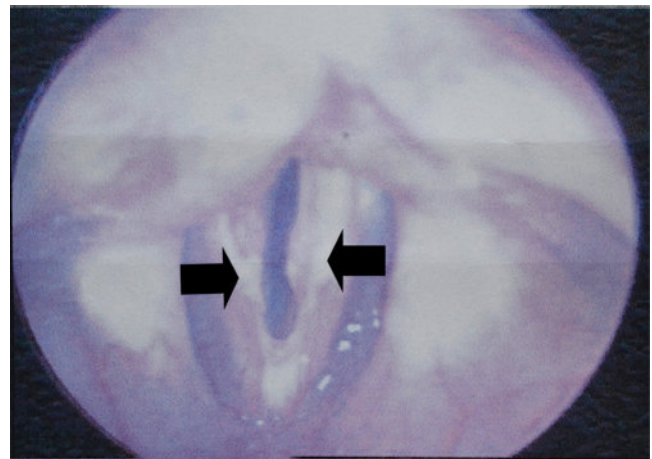


Figure 1. Still Image [00:04:19 (6:1)] - Open phase
Black arrows points to bamboo nodules bilateral (Image taken during actual videostroboscopy procedure)

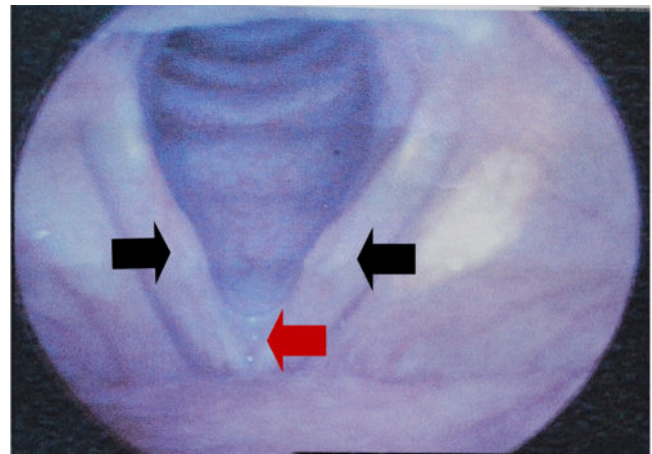


Figure 2. Still Image [00:03:08 (5:1)] - Fully abducted position
Black arrow points to bamboo nodes, red arrow points to glottic/subglottic web (image taken during actual videostroboscopy procedure)

Table I. Initial videostroboscopy* results (January 2014)

Vocal Fold Edge- Left:	Cyst or bamboo nodules, slightly rough	Vocal Fold Edge- Left:	Cyst or bamboo nodule
Glottic Closure:	Hourglass		
Amplitude- Right:	Moderately Decreased	Amplitude- Left:	Moderately Decreased
Mucosal Wave- Right:	Severely Decreased	Mucosal Wave- Left:	Severely Decreased
Vertical Level of Approximation:	Equal		
Vibratory Behavior- Right:	Partial Absence Always	Vibratory Behavior- Left:	Partial Absence Always
Ventricular Folds (Symmetry):	Equal Movement/ Symmetric	Ventricular Folds (Movement):	Equal Movement/ Symmetric
Periodicity (Regularity):	Regular	Arytenoids (Symmetry):	Equal Movement/ Symmetric
Arytenoids (Movement):	Equal Movement/ Symmetric		

*Videostroboscopy is a term used to describe a video endoscopic procedure with stroboscopic light source for visualization of the vocal folds. This allows the examiner to evaluate the vibratory patterns of the vocal fold mucosa, vocal fold physiology, detailed vocal fold anatomy/pathology to establish a medical diagnosis

bamboo nodules, moderate dysphonia, hoarse, rough vocal quality with episodic pitch or voice breaks and reduced ability to vary loudness. Her longest maximum phonation time (MPT) of 4.16 seconds is significantly lower than normative values (15-20 seconds). The s/z ratio >1 indicates vocal cord pathology consistent with bamboo nodules (Tables 3 & 4). She initiated one-hour voice therapy sessions once a week for six weeks, one hour per session focusing on remediation of vocal fold nodules. Her medications were maintained as methotrexate 15 mg/week, hydroxychloroquine 200 mg/day, prednisone 10 mg/day, folic acid and calcium carbonate + vitamin D supplementation. Repeat videostroboscopy was done after five speech therapy sessions showed smoother vocal fold edges, fully present vibratory patterns, and normalization of the amplitude and mucosal waves (Figure 3-5). She reported some improvement in voice hoarseness. On her latest clinic visit on September 2015, our patient was able to efficiently perform activities of daily living. She was assessed to be in MCTD remission based on the disease activity index proposed by Burdt et al.¹⁸ Prednisone was tapered and the rest of the medications were maintained. The planned microlaryngeal surgical excision of the bamboo nodes were postponed due to the patient's good response to medical management hence, tissue biopsy was not initiated.

In the meantime, she was not yet cleared to resume her singing career, however, she was satisfied with the current status of her therapy and medical management. She still can perform her activities of daily living well.

Discussion

Vocal cord lesions or vocal fold lesions are generally benign growths which can lead to dysphonia. Differential diagnosis includes vocal cord polyp which tends to be more vascularized, reddish in appearance, and usually larger than nodules. Although both vocal cord polyp and bamboo node can be present among singers, the former features were not present with our case. Polypoid corditis (Reinke's edema) is also another type of vocal cord polyp exclusively seen among smokers, however, our patient is non-smoker thus ruling this out. Vocal cord cysts are associated with fluid-filled sac, less common than nodules and polyp, not related to singing, and mostly associated with upper respiratory

Table III. Speech and language initial evaluation (Phonatory- efficiency performance*)

Trial	MPT	s/z ratio (s)	s/z ratio (z)
1	3.69 sec	10.74 sec	4.28 sec
2	4.16 sec	10.40 sec	4.60 sec
3	3.70 sec	9.69 sec	3.12 sec
		= 2.33	
Normative values	15- 20 sec	< 1	

*The normal adult males can sustain vowel sounds for between 25-35 seconds and normal adult females between 15-20 seconds. The MPT is reduced with laryngeal pathology. As with the S/Z Ratio, MPT is not diagnostic of laryngeal pathology but as an indicator of laryngeal pathology and monitoring progress.

Table IV. Praat Results*

	Previous evaluation results	Normative values
Frequency (Pitch)		
Mean Fo	140.11 Hz	180- 250 Hz
Pitch Range (low)	57.643 Hz	134 Hz
Pitch Range (high)	384.161 Hz	895 Hz
Intensity (Loudness)		
Average Intensity (SPL)	77.855 dB	70 -80 dB
Minimum	55.55 dB	115 dB
Maximum	80.22 dB	50 dB
Perturbation		
Jitter %	0.602 %	< 1.0 %
Shimmer %	6.386 %	< 5 %
Shimmer in dB	0.544 %	< 0.5 dB
Mean Harmonics to Noise Ratio (HNR)	14.596 dB	> 12 dB

*This was assessed using Praat 5.13.17, using earphones with built-in microphone distances 3-4 inches away from the chin. She was asked to phonate a prolonged /a/ and the values were obtained for analysis. *Praat is a computer program for analysing, synthesizing and manipulating speech and other sounds, and for creating publication-quality graphics. It is open source, and available free of charge for all major computer platforms (MacOS, Windows, Linux), on both 32-bit and 64-bit operating systems.

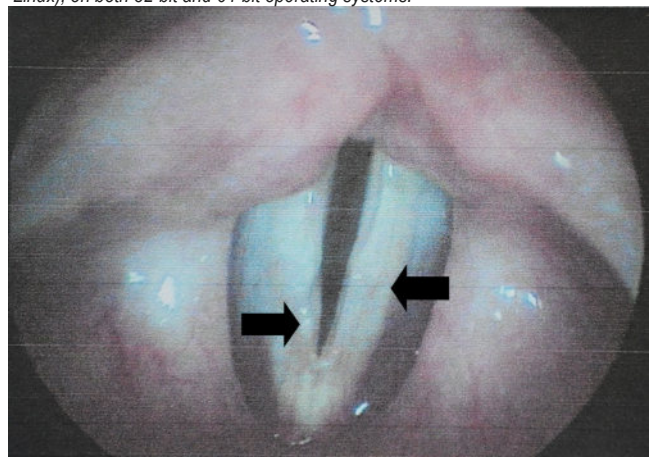


Figure 3. Still Image [00:16:05 (6:1)]- Open phase: Black arrow points to a bamboo nodule formation bilateral (Image taken during actual videostroboscopy procedure)

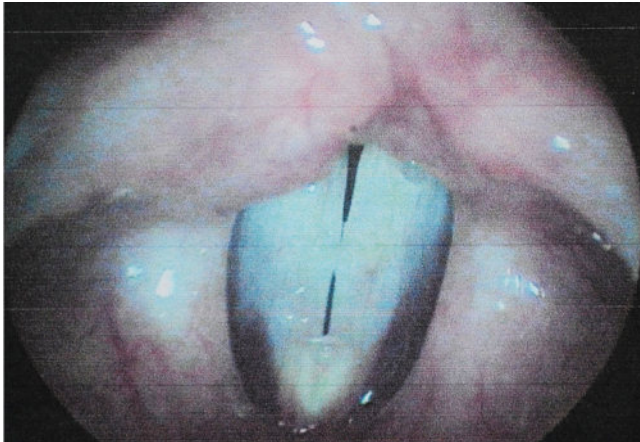


Figure 4. Still Image [00:16:01 (6:1)] - Opening phase (Image taken during actual videostroboscopy procedure)

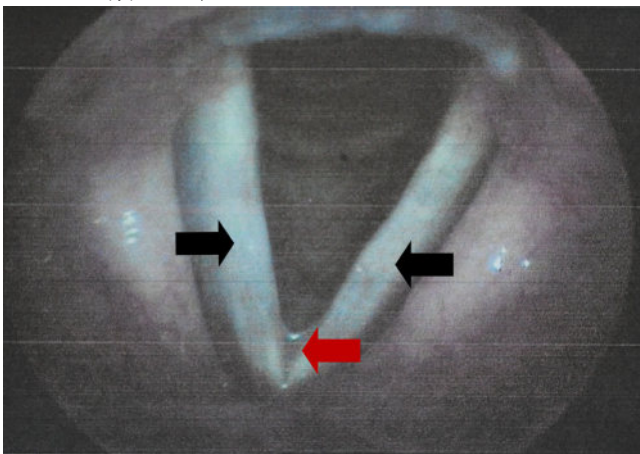


Figure 5. Still Image [00:17:05 (6:1)] - Fully abducted position
Black arrow points to bamboo nodes, red arrow points to mild glottic web (Image taken during actual videostroboscopy procedure)

tract infections or laryngitis. This was also ruled out since our patient had no current infection at that time.

Murano describes a bamboo node as a creamy-white transverse deposits in the submucosal layer of the vocal cord that can be unilateral or bilateral, with predilection for the middle third of the vocal cord mucosa where larger mucosal wave and vibration amplitude can be found.¹⁰ These nodules cause failure of the vocal cords to adduct smoothly due to their added mass resulting in voice breaks from air leakage leading to hoarse and rough quality of voice. Schwemmler et al reported histopathology on hematoxylin-eosin stain of extensive fibrinoid necrosis surrounded by a rim of histiocytes in a palisading fashion and Murano showed granulomatous lesions surrounded by fibrosis with a central area of amorphous eosinophilic material surrounded by histiocytic cells and multinucleated giant cells.^{2,4,12}

The development of bamboo node has been attributed to vocal abuse, gastroesophageal reflux disease,^{6,19} and chronic inflammation of autoimmune disease.¹⁰ In our patient's case, there are two such risk factors- vocal abuse from singing as a choir member and MCTD.

Videostroboscopic evaluation is the most practical confirmatory technique to detect the presence of bamboo nodes through direct visualization of vocal cord morphology and to assess the mucosal properties, vibratory patterns, and depth estimation of the lesion in the mucosal layer.^{21, 22} Indeed, this procedure confirmed the patient's multiple vocal cord abnormalities and the improvement of post-therapy. The patient tolerated the procedure well without any adverse reactions such as discomfort, pain, and difficulty in breathing.

There is no single best treatment guide for bamboo nodes; both medical and surgical management can be offered. Medical management, a combination of systemic steroid with voice rest has led to improvement in voice hoarseness and complete remission of bamboo nodes.¹⁰ A local injection of prednisolone into the vocal cords, not more than three times with 14-day interval between injections, is also recommended by some experts.¹² Hilgert et al favors voice rest and logopedic therapy prior to more invasive procedure such as local steroid injection and surgery.¹¹

Surgical therapy with good outcome was described by Perouse et al among 19 cases of bamboo node with RA, SLE, Sjogren's disease, MCTD, and without autoimmune disease.⁴ Indications for surgical excision included incomplete disappearance of the lesions, urgency to improve voice quality, and persistence of hoarseness despite controlled disease activity. Complete excision of recurrent bamboo node with post-operative oral steroid treatment was described by Hosako-Naito.³ In the case presented, because of the remarkable improvement in the patient's voice quality, surgery was not planned.

Conclusion

A 36-year-old-patient diagnosed with diagnosed with SLE-RA overlap but later fulfilled the Alarcon-Segovia criteria for MCTD developed voice hoarseness on the 10th month of her illness. Bamboo node, evident through videostroboscopy, was the cause of her dysphonia. Medical management with prednisone, methotrexate, hydroxychloroquine along with voice rest and speech therapy resulted in better phonation.

Disclosure

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