



Relationship Between The Location Of Benign Vocal Cord Lesion And The Degree Of Voice Handicap Index-30

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ABSTRACT

Introduction. Voice disorder or dysphonia is a condition that includes all changes in a person's voice including tone, intensity, phonation, and others caused by laryngeal disorders. Each sound production disorder can be evaluated through the VHI-30 questionnaire. Therefore, data are needed regarding the relationship of the extent of the lesion location site to the degree of VHI-30 produced in dysphonic patients with benign vocal cord lesions. **Methods.** Observational research using cross sectional design. Data collection using medical record data on 30 dysphonic patients with benign vocal cord lesions who underwent surgery in the ENT department in RSMH in January 2019 to June 2022. **Results.** Out of the 30 patients with benign vocal cord lesions, age of 31-45 and 46-60 age groups were most found 11(36,7%) Female gender was found 16(53,3%) and the non-professional voice user category was found the highest 28 (93,3%). The 1-6-month onset group was the highest 12(40,0%). The most common location of benign vocal cord lesions was in 1/3 anterior 8(26,7%), and the most common type of benign lesion was vocal cord nodules 13(43,3%). Severe degree VHI-30 were most found 18(60,0%). The area of bilateral locations along the vocal cords had a significant relationship, with p-value of 0,040 ($p < 0,05$), to the degree of VHI-30 when compared to the unilateral location of the anterior 2/3 of the vocal cords. **Conclusion.** The benign lesions' position of bilateral along the vocal cord has a significant relationship to the severe degree of VHI-30.

1. Introduction

Voice has an important role in individual daily life of communication, in social and quality of life. Larynx has several functions, including protection, respiration, and phonation. Any pathological process in the larynx can affect speech production. In a study of benign vocal cord lesions in professional voice user report, vocal cord nodules were found to be the highest (65.2%), followed by vocal cord polyps (23.9%), and vocal cord cysts (10.9%).^{1,2,3,4}

Early detection of benign vocal cord lesions is not always visible, because hoarseness persisting for more than 6 weeks is the only early sign to suspect vocal cord lesions until proven otherwise. It is important for a laryngologist to know the extent of the lesion that affects the vocal cord, so that a thorough and adequate pre-operative examination is needed regarding the vocal cord lesion involvement. Any voice disorder can be evaluated through the VHI-30 questionnaire (Voice Handicap Index-30) as an effective measurement tool that has been validated for diagnosing voice disorders and for evaluating treatment outcomes. The extent of the

location of the vocal cord lesion affects the level of voice produced, which affects the level of individual judgement and disability of the voice. Therefore, data is needed regarding the relationship between the location of benign vocal cord lesion and the degree of VHI-30 produced in dysphonic patients.^{1,2,4,5,6,7}

2. Methods

This study is an observational research study using a cross-sectional design. The sample obtained from medical record data of dysphonic patients with benign lesions of vocal cords at ENT clinic at RSUP Dr. Mohammad Hoesin Palembang, who underwent surgery at RSMH Palembang during January 2019 – June 2022. This study has ethical exemption no.85/kepkrsmh/2022. The inclusion criteria were dysphonic patients with benign lesions of the vocal cord who went to ENT clinic of RSMH and underwent surgery, with histopathological results proven to be benign lesions, with the age above 18 years old, and with complete data of medical record containing information about patient's data, examination of dysphonia status, operation reports,

and results of anatomical pathology.

Exclusion criteria were patients with benign vocal cord lesions accompanied by other neurological deficits, patients who had undergone vocal cord surgery before, or benign vocal cord lesions patients with location on the posterior vocal cords. Data were obtained from medical records, with a minimum sample of 30 samples with consecutive sampling technique. Univariate analysis was used to determine the pattern of frequency distribution such as age, gender, occupation, onset, location and type of benign vocal cord lesions, and degree of VHI-30. Each categorical variable between the degree of VHI-30 will be analyzed in bivariate data analysis using the Chi-square test. Based on literature, the location of vocal cord lesions in the anterior 1/3 is the greatest site of the friction and stress on vocal cord which causes voice disturbances, so that it is often the reason patients seek for treatment compared to the location anterior 2/3 of vocal cord. That made the researchers in this study use the site anterior 2/3 of vocal cord as a comparison with the minimal clinical appearance than other site of vocal cord lesion location. Data

processing results will be assisted by SPSS software for windows version 26.0.

3. Results

Univariate analysis in this study included demographic factors; age, gender, occupation, onset, location of vocal cord lesions, type of benign vocal cord lesions, and degree of VHI-30. Of the 30 patients with benign vocal cord lesions, age of 31-45 and 46-60 age groups were most found 11(36,7%) Female gender was found 16 (53,3%) and the non-professional voice user category was found the highest 28 (93,3%). The 1-6-month onset group was the highest 12(40,0%). The most common location of benign vocal cord lesions was in 1/3 anterior 8(26,7%), and the most common type of benign lesion was vocal cord nodules 13(43,3%). Severe degree VHI-30 were most found 18(60,0%). The subject's characteristic is shown in table 1.

Table 1. Study Subject's Characteristic (n=30)

Variable	N	%	X ± SD
Age			
18-30 years	2	6,7	46,23 ± 14,743
31-45 years	11	36,7	
46-60 years	11	36,7	
61-75 years	6	20,0	
> 75 years	0	0,0	
Gender			
Male	14	46,7	
Female	16	53,3	
Occupation			
Professional voice user	2	6,7	
Non-professional voice user	28	93,3	
Onset			
< 1 month	0	0,0	22,00 ± 27,968
1-6 months	11	36,7	
7-12 months	9	30,0	
> 1 years	10	33,3	
Location of vocal cord lesions			
1/3 anterior unilateral	8	26,7	
2/3 anterior unilateral	6	20,0	
Along the vocal cord unilateral	5	16,7	
1/3 anterior bilateral	5	16,7	
2/3 anterior bilateral	0	0,0	
Along the vocal cord bilateral	6	20,0	
Type of benign vocal cord lesions			
Reinke's edema	10	33,3	
Polyp	6	20,0	
Cyst	1	3,3	
Nodule	13	43,3	
Papilloma	0	0,0	

VHI-30 degree			
Mild-moderate (0-60)	12	40,0	62,20 ± 20,283
Severe (61-120)	18	60,0	

Table 2. Relationship Between Variable To VHI-30 Degree (n=30)

Variable	Degree of VHI-30				Total		P value	OR	(CI 95%)	
	Severe		Mild-moderate							
	N	%	N	%	N	%			Lower	Upper
Age										
18-30 years	1	50,0	1	50,0	2	100	0,942			
31-45 years	6	54,5	5	45,5	11	100				
46-60 years	7	63,6	4	36,4	11	100				
61-75 years	4	66,7	2	33,3	6	100				
Gender										
Male	9	64,3	5	35,7	14	100	0,654	1,400	0,321	6,109
Female	9	56,3	7	43,8	16	100				
Occupation										
Professional voice user	1	50,0	1	50,0	2	100	0,765	0,647	0,037	11,454
Non-professional voice user	17	60,7	11	39,3	28	100				
Onset										
1-6 months	5	45,5	6	54,5	11	100	0,340			
7-12 months	7	77,8	2	22,2	9	100				
>1 years	6	60,0	4	40,0	10	100				
Location of benign vocal cord										
1/3 anterior unilateral	5	62,5	3	37,5	8	100	0,141			
2/3 anterior unilateral	1	16,7	5	83,3	6	100				
Along vocal cord unilateral	4	80,0	1	20,0	5	100				
1/3 anterior bilateral	3	60,0	2	40,0	5	100				
Along vocal cord bilateral	5	83,3	1	16,7	6	100				
Type of benign vocal cord										
Reinke's edema	6	60,0	4	40,0	10	100	0,530			
Polyp	3	50,0	3	50,0	6	100				
Cysts	0	0,0	1	100,0	1	100				
Nodule	9	69,2	4	30,8	13	100				

Table 3. Relationship Between Location Of Benign Vocal Cord Lesion To VHI-30 Degree (n=30)

Location of benign vocal cord lesions	VHI-30 degree				Total		P value	OR	(CI 95%)	
	Severe		Mild-moderate							
	N	%	N	%	N	%			Lower	Upper
2/3 anterior Unilateral	1	16,7	5	83,3	6	100	1 (Reference)			
Along vocal cord bilateral (*)	5	83,3	1	16,7	6	100	0,040	25,000	1,200	520,734
Along vocal cord unilateral (**)	4	80,0	1	20,0	5	100	0,067	20,000	0,930	429,904
1/3 anterior unilateral (***)	5	62,5	3	37,5	8	100	0,121	8,333	0,631	110,022
1/3 anterior bilateral (****)	3	60,0	2	40,0	5	100	0,197	7,500	0,458	122,696
TOTAL	18	60,0	12	40,0	30	100				

Notes:

- (*) Bilateral location along the vocal cords to 2/3 anterior unilateral vocal cords,
- (**) Unilateral location along the vocal cords to 2/3 anterior unilateral vocal cords,
- (***) Unilateral location of 1/3 anterior to 2/3 anterior unilateral vocal cords,
- (****) Bilateral location of 1/3 anterior to 2/3 anterior unilateral vocal cords.

Bivariate analysis using the Chi-square test analyzed each categorical variable and the location site of benign vocal cord lesions between the degree of VHI-30. The subject characteristics included age, gender, occupation, onset, location, and type of benign vocal cord lesions were not significantly related to the degree of VHI-30. The area of bilateral locations along the vocal cords had a significant relationship, with p-value of 0,040 ($p < 0,05$), to the degree of VHI-30 when compared to the unilateral location of the anterior 2/3 of the vocal cords. The location of 1/3 anterior bilateral, 1/3 anterior unilateral, and unilateral along vocal cords has no significant related to the degree of VHI-30 compared to 2/3 anterior unilateral vocal cords

4. Discussion

There are variations of changes in the structure of the vocal cords associated with age. Along with age, dryness, atrophy, and elasticity of the vocal cords occurs. The dryness of the vocal cords is caused by atrophy if the mucous glands, while the loss of flexibility of the vocal cords occurs along with reduced collagen fibers and elastic fibers of the lamina propria so that the condition of the vocal cords tends to be more rigid. There are minimal changes in epithelium, but superficial layer of lamina propria tends to become edematous and thickens with age. The elastic fibers in the middle layer of vocal cords become looser and atrophy, so they become thinner. Meanwhile the collagen fibers in the inner layer thicken and the vocal cord muscles tend to atrophy with age. Women's larynx tends to be sensitive to hormonal fluctuations, while in postmenopausal women, laryngeal changes occur such as edema and mucosal dystrophy, as well as atrophy. In this study, the largest age group was found in the age group of 31-45 and 46-60 years with 11 patients each (36.7%), while female was found more in 16 patients (53.3%). In this study, severe degree of VHI-30 was found in both groups. This is in accordance with the study by Yanti et al, who reported that severe VHI values were more frequently found in both groups. Yusuf et al⁹, in Semarang found that 85.5% of patients with benign lesions of vocal cords were <60 years old with dominant in female, in 32 patients (51.6%), and male in 30 patients (48.4%).^{8,9,10,11}

Based on the results of this study, most of the subjects included in the non-professional voice user group, 28 (93.3%), with the onset of event until patients came to seek treatment at ENT clinic which in 1-6 months group, 11 (36.7%), with mean onset in $22,00 \pm 27,968$ days. Where this group in this study mostly consists of office workers, freelancers, self-employed or housewives, who are at risk of involving vocal violence, because this occupation group using their voice without any professional training, so there is a risk of developing benign vocal

cord lesions. For more in this group, they tend to ignore any changes in voice, because they don't pay attention to voice quality in work every day in life. Yusuf et al, patients who experienced dysphonia for more than 2 weeks had a VHI degree 38.3 times more severe than patients who experienced dysphonia for less than 2 weeks. Fredlina et al, was found that there were 8 people (32%) with high risk jobs and 17 people (68%) with routine jobs, while the highest onset of chief complaint was in the 12-24 month group with 9 people (36%).^{9,10,12,13,14,15}

Based on the area, the location of 1/3 anterior unilateral vocal cord lesions were found to be the highest, 8(26.7%), and nodule lesion was found dominant in 13(43.3%), while the VHI-30 value of severity was found to be the highest in 18(60.0%) with mean VHI-30 value $62,20 \pm 20,283$. Fredlina et al, who reported that out of total 24 samples, the anterior 1/3 vocal cords was found the most in 22 people (88%) with unilateral location in 14 patients and most types of nodule lesions in 6 people (24%). Hardianingwati et al, reported that more locations were found in cases of polyps and cysts, in the 1/3 anterior unilateral in 2 patients (66.7%) and 3 patients (75%) respectively, while vocal cord nodules were most found in bilateral 1/3 anterior vocal cords in 11 patients (91.7%). Yanti et al, based on degree of handicap, as many as 23 subjects (57.5%) had severe handicaps, and this is accordance with Hidayat et al, who reported severe degree of VHI-30 found the most in 33 patients (71%).^{8,10,12,16}

Location on the anterior 1/3 of vocal cords is the membranous part, which is often the cause of reactive phonation hyperplasia, which is the location of the greatest stress in the vocal cords, so that the membrane will easily have friction and rub between the main parts of vocal cords. In long term use of phonation will cause congestion and swelling of the membrane, this is what causes 1/3 anterior to be found more frequently and often the reason patients come for treatment. In this study vocal cord nodules were the most found, where these results are in accordance with other studies in various places. Most patients with vocal cord nodules have voice work as their primary need. This causes patients with vocal cord nodules to seek treatment earlier than other benign vocal cord lesions. Patient that complaints severe disability of voice disorder for long time will disturbed the patient functionally, physically, and emotionally, therefore patient will tend to come and seek for treatment at hospital.^{12,14}

Severe degree of VHI-30 was found more frequently in bilateral location along the vocal cords in 5 subjects (83.3%). The result of analysis with Chi-square obtained a p value of 0.040 ($p < 0.05$), meaning that there is an association between the location of 2/3 anterior unilateral and along vocal cords bilateral with degree of VHI-30. A bilateral

lesion along the vocal cords with diffuse edema of the vocal cords, involves the entire vocal cord membrane. Changes in the condition of the vocal cords then cause disruption of mucosal wave bilaterally which have an impact on voice disorders, while the edema will exacerbate voice changes in patients. In relation to benign lesions this shows that the greater involvement of the vocal cord structure the more it will affect the increase in voice changes, which affect the patient's disability of the voice, which in this study found a significant with p value 0.040 ($p < 0,05$).^{1,4,13}

The limitation of this study is needed further study with larger number of samples and an appropriate study design so that future studies are expected to be able to evaluate the relationship between the area of benign vocal cord lesions and the degree of VHI-30 specially for better accuracy.

5. Conclusion

The incidence of benign vocal cord lesions in patients with dysphonia due to vocal cord lesions at Dr. Mohammad Hoesin Palembang during period January 2019-June 2022 is 4.73%. The site of bilateral location along the vocal cords has a significant relationship, with p value of 0.040 ($p < 0.05$), to the degree of VHI-30 when compared to unilateral site 2/3 anterior of the vocal cords. Bilateral along the vocal cords have 25 times greater chance of experiencing severe VHI-30 degrees than unilateral locations 2/3 anterior of the vocal cords.

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