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Correlation Between Septal Body and Quality of Life Based on Sinonasal Outcome Test 20 (SNOT-20)

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The objective of study was to determine the correlation of septal body and the quality of life-based on sinonasal outcome test (SNOT-20). The potential role of the septal body in inducing the nasal obstruction is important because it can be expanded as an effect of nasal septum deviation. This study was using cross-sectional design method. The quality of life of 70 samples patient with nasal septum deviation was measured with SNOT-20 and the coronal plane of paranasal sinuses CT scan then continued with the measurement of nasal septum deviation degree, septal body's direction and size. Data analysis was performed using bivariate and partial correlation test using SPSS. Statistical analysis confirmed that there were significant correlations between nasal septal deviation levels with the size of the septal body ($p<0.05$). The degree of nasal septum deviation had a positive correlation with the size of contralateral and had a negative correlation with the size of ipsilateral of the septal body. Nasal septum deviation and the size of ipsilateral of the septal body had a significant correlation with the quality of life in middle position ($p<0.05$) based on bivariate and partial correlation test. There was a correlation between the degrees of nasal septum deviation with the size of ipsilateral and contralateral of the septal body and they were correlated with the quality of life in a medial position of the septal body.

Key words: Septal body, nasal septum deviation, quality of life, sinonasal outcome test 20 (SNOT 20), nasal airflow

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INTRODUCTION

The septal body is a distinct anatomic structure located on the nasal septum and is the effect of a nasal septum deviation. Nasal septum deviation is one of the most common nose disorder. There is a deviation of bone or cartilage of nasal septum a few degrees from the center line and was often associated with nasal obstruction, epistaxis, rinorhoe, headache and snoring which can affect the quality of life[1-4]. Nasal septum deviation can cause an excessive growth of inferior nasal concha and mucosa of the nasal cavity, including the septal body in a wider contralateral side[3].

The reported incidence of nasal septum deviation was varied in each country. In Brazil, the incidence reached 60.3% with nasal obstruction as symptoms were 59.9% in 2004. In Indonesia, at Dr. Hasan Sadikin Hospital, Bandung, 33 nasal septum deviation patients who had septoplasty in 2013-2014 were with the most common symptom, that was nasal obstruction and headache[2,5].

Septal body, located in the nasal septum, consists of mucosa and soft tissue lumps covering the cartilage and bone on both sides of nasal septum along the anterior and the middle nasal septum and may affect the nasal valve and airflow[3,6]. Some researchers suggest that septal body should be considered as a nasal valve component, along with soft tissue around the pyriform aperture, nasal septum and upper lateral cartilage. The anatomical variations found in anterior cavity contribute to greater nasal resistance compared to posterior nasal cavum[3,6,7].

More severe nasal septum deviation can cause a nasal obstruction that can disrupt the function of the nose and cause complications or even aesthetic disturbance of the face. Symptoms of nasal obstruction can decrease the quality of life and activity of the patient. The SNOT-20 is one of the most used instruments to evaluate the quality of life in sinonasal condition[2,7-10].

There were many studies about the influence of nasal septum and inferior nasal concha in nasal airflow regulation and the quality of life of patients with sinonasal. However, the study of the septal body is still rare. This study aims to determine the correlation of septal body as the effect of nasal septum deviation on the quality of life.

MATERIALS AND METHODS

The population of this study was patients with nasal septum deviation at Dr. Wahidin Sudirohusodo Hospital, Mitra Husada Hospital and Hasanuddin University Hospital. It is collected from September, 2016 until March, 2017. Inclusion criteria of samples were compliant to do paranasal sinuses CT scan. Exclusion criteria were patients with sinonasal tumors, nasal polyps, maxillofacial fractures and had a history of functional endoscopic sinus surgery.

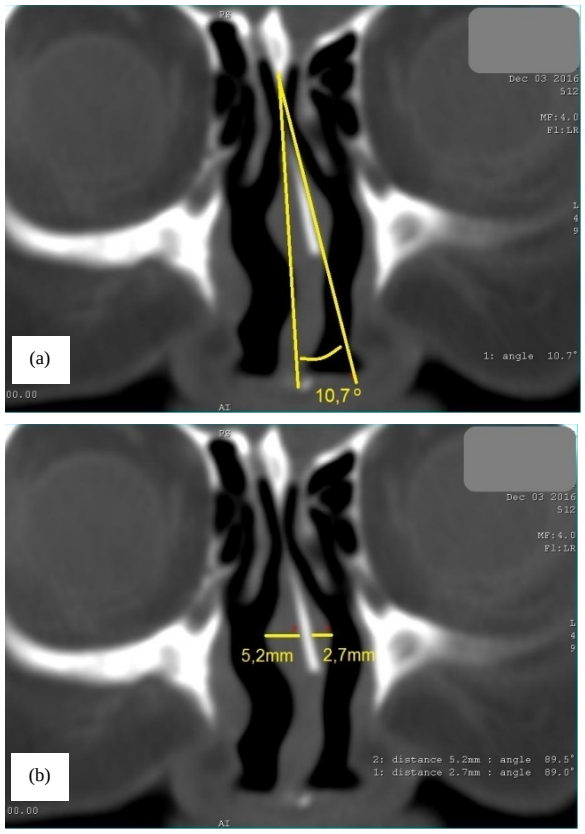

Fig. 1(a-b): (a) Measurement of nasal septum deviation degree and (b) Analysis of contralateral and ipsilateral septal body in paranasal sinuses CT scan of coronal plane

Seventy samples of patients having nasal septum deviation were examined by CT scan at the coronal plane of paranasal sinuses, with a thickness of incision was 3 mm. Density was fit to Hounsfield Units (HU), bone density on nasal septum deviation was +400 HU to +1000 HU. The thickness of soft tissue in the septal body was +40 HU to +80 HU. Window width was 2000-2500 HU and window level was 200-350 HU, then the degree of nasal septum deviation was measured. The degree of nasal septum deviation was measured as an angle between 2 lines to obtain a consistent result. The first line was drawn from crista Galli and premaxilla. The second line was drawn between the crista Galli and the most prominent point of the septum or cartilage. The angle between the two lines was measured and recorded (Fig. 1a). The result was divided into three groups: Mild ($\leq$8°), moderate (9°-15°) and severe ($\geq$16°).

On the same CT scan, the septal body was identified and the thickness was measured on both sides. The size of the septal body was measured from the most prominent lateral portion of the septal body to the bone or cartilage of the septum with millimeters (mm). The ipsilateral septal body size

lies in the direction of nasal septum deviation, while the contralateral lies in the opposite direction (Fig. 1b). Next, the direction of the septal body was identified based on the area of nasal septum deviation according to Cottle. Cottle I, II and III was the anterior, Cottle IV was medial and Cottle V was posterior[3,11].

Assessment of quality of life-based on SNOT-20 which contains 20 predefined standard questions. SNOT-20 question consisted of the symptoms of the nose, face, ear, sleep and psychological symptoms. Each statement was scored from 0-5, with a total score was 0-100. The data were grouped into a mild symptom with a score of 0-10, a moderate complaint with a score of 11-40, a moderate, severe complaint with a score of 41-69, while severe complaints with a score of 70 Until 100[8,9].

Statistical analysis: All data obtained were grouped according to purpose and data type. Data analysis was performed using bivariate and partial correlation test using Statistical product and service solution (SPSS) version 22 with statistical significance level was $p \leq 0.05$.

RESULTS

Table 1 showed the characteristic of samples. The samples age varied from 17-60 years old which consist of mostly female (64.3%) and fewer male (35.7%). The size of the ipsilateral septal body was 1.1-5.3 mm, contralateral 2.0-7.6 mm with septal body lied more in average (54.3%) than anterior (45.7) and there was nothing in the posterior area.

Nasal septum deviation was mostly found in mild stage (51.4%) rather than moderate (41.4) and severe (7.1) stage. Most of the samples had a moderate quality of life based on SNOT-20, that is 77.1%. The mild symptom was 11.4%, the moderate-severe symptom was 10.0% and the severe symptom was 1.4%.

Bivariate correlation test between nasal septum deviation and ipsilateral and contralateral septal body is presented in Table 2. To determine the exact correlation, partial correlation test was conducted. The result showed that nasal septum deviation had a positive correlation with the contralateral septal body and negative correlation with the ipsilateral septal body. Increasing degree of the septal septum deviation in line with increasing of the contralateral septal body size but contrary with the size of the ipsilateral septal body that become smaller.

Table 3 showed a significant correlation between ipsilateral septal body's size in medial and the quality of life, either with bivariate or partial correlation test. When the ipsilateral septal body was small; the quality of life was increased. Therefore, septal body in anterior did not show a significant correlation with the quality of life, neither in bivariate nor partial correlation test.

Table 1: Characteristics of sex, age, septal body size and quality of life

Variables	Characteristic	n	Minimum /maximum	Mean (deviation)
Sex	Male	25 (35.7%)	-	-
	Female	45 (64.3%)	-	-
Age (years)		70	17/60	34.74 (11.97)
Size of ipsilateral septal body (mm)		70	1.1/5.3	3.14 (0.95)
Size of contralateral septal body (mm)		70	2.0/7.6	5.04 (1.27)
Septal body's direction		70		
	Anterior	32 (45.7%)	-	-
	Medial	38 (54.3%)	-	-
	Posterior	0 (0.0%)	-	-
Nasal septum deviation degree		70	4.8/19.8	9.56 (3.29)
	Mild	36 (51 4%)	4.8/8.9	7.17(1.10)
	Moderate	29 (41 4%)	9.0/15.2	11.14(1.86)
	Severe	5 (7 1%)	16.0/19.8	17.54(1.43)
Quality of life score based on SNOT-20		70	2/72	26.8 (14.1)
	No symptom/mild	8 (11.4%)	2/10	7.9(2.5)
	Moderate	54 (77.1%)	11/39	25.4(8.5)
	Moderate-severe	7 (10.0%)	44/68	52.3(7.7)
	Severe	1 (1.4%)	72/72	72.0(0.0)

Table 2: Correlation between the degree of nasal septum deviation and the size of ipsilateral and contralateral septal body

	Bivariate correlation		Partial correlation	
Variables	r	p	r	p
Degree of nasal septum deviation with the size of ipsilateral septal body	-0.358	<0.001	-0.515	<0.001
Degree of nasal septum deviation with the size of contralateral septal body	0.168	0.082	0.358	0.001
Size of ipsilateral and contralateral septal body	0.495	<0.001	0.603	<0.001

Table 3: Correlation of the degrees of nasal septum deviation, the size of ipsilateral and contralateral of septal body and the quality of life-based on septal body's direction

Direction of septal body	Variables	Bivariate correlation r	Bivariate correlation p	Partial correlation r	Partial correlation p
Anterior	Degree of nasal septum deviation with the quality of life	-0.051	0.391	-0.091	0.316
	Size of ipsilateral septal body with the quality of life	0.029	0.438	-0.073	0.351
	Size of contralateral septal body with the quality of life	0.131	0.337	0.153	0.210
Medial	Degree of nasal septum deviation with the quality of life	0.300	0.034	0.214	0.105
	Size of ipsilateral septal body with the quality of life	-0.352	0.015	-0.327	0.024
	Size of contralateral septal body with the quality of life	-0.156	0.174	0.077	0.325

DISCUSSION

Data show that female research subjects were more than male and mean age was 70 years. Mean of size of ipsilateral and septal body size of contralateral septal body were 70 mm. Most of septal body's direction was medial and nasal septum deviation degree was moderate. Most of the quality of life patient's score based on SNOT-20 was moderate and just one person has severe Quality of life's score (Table 1).

Partial correlation test showed a positive correlation between size of a contralateral septal body but negatively correlated with size of the ipsilateral septal body. Increasing degree of the septal septum deviation in line with increasing of the contralateral septal body size but contrary with the size of the ipsilateral septal body that become smaller (Table 2).

Analysis of data in Table 3 showed that quality of life has significance correlation with septal body only if the septal body is located at dimedial and it is mainly affected by ipsilateral septal body due to a deviation of the nasal septum (Table 3).

The number of female samples who experienced septal deviation in this study is more than male, several previous studies stated that the incidence of nasal septum deviation varies by sex. The sample age was ranged from 17-60 years old with mean 34.74 years old, in this study the sample was limited to age 17 and above because nasal septum deviation developed optimally at that age[12]. The result of septal body's measurement in 70 CT scans of paranasal sinuses in which contralateral septal body was bigger than the ipsilateral septal body is parallel with the study by Setlur and Goyal[3], who also found that the size of the contralateral septal body is greater than the ipsilateral septal body.

It shows that the scale of the septal body is significantly larger in the contralateral direction of the nasal septum deviation. It proves that the size of the septal body is a dynamic structure whose size and shape can change as a compensation mechanism of nasal airflow's cycle.

This study result in line with Elwany *et al*.[6] study about the characteristic of septal body's histological structure. On septal body found a thicker ciliated pseudo-stratification epithelium with goblet cells. There are many seromucinous glands and sinusoidal veins compared to nasal septum mucous in other areas. According to that fact, the septal body is an essential part of obstruction segment of nasal airflow because of its extensive surface and increase of sinusoid veins.

In result of nasal septum deviation measurement in this study, the authors found that the degree of nasal septum deviation was mostly in mild stage, in contrast with the study by Setlur and Goyal[3] which found the sample of nasal septum deviation was mostly in moderate stage.

Nasal septum deviation can occur after birth, at birth, or even during intrauterine. The variation in the degree of nasal septal deviation in subjects of study occurred because of the multifactorial determinants of its and one of the most influential factor is trauma. Another reason is the imbalance of the growth of nasal septum cartilage, in which the cartilage grows continuously, although the superior and inferior bounds have settled.

Study result show significant correlation between ipsilateral septal body's size in medial and the quality of life assessed using SNOT-20. The quality of life of patients with nasal septum deviation was often disturbed because there was disruption of air flow and obstruction in a narrow side of nasal cavum. There will be an airflow interruption in the ipsilateral side if the size of the septal body is large. Meanwhile, the nasal cavity in contralateral side, which is bigger than ipsilateral and not to disrupt the airflow[8,9].

The disruption of the quality of life was more correlated with the septal body in medial position and primarily influenced by the size of septal body which caused by nasal septum deviation. The anatomical variation in the anterior direction was more influential to nasal resistance than in posterior direction. It was related to nasal obstruction in nasal valve area which is a narrow area. Therefore, it affected the nasal airflow and caused the nasal obstruction symptom subjectively[13].

Statistical analysis confirmed that there were significant correlations between nasal septal deviation degrees with the size of the septal body. The level of nasal septum deviation had a positive correlation with the size of contralateral and had a negative correlation with the size of ipsilateral of the septal body. Nasal septum deviation and the size of ipsilateral had a significant correlation with the quality of life in medial position.

CONCLUSION

The findings of this study help to characterize the septal body as a dynamic structure. On the large degree of nasal septum deviation, the contralateral septal body size increases and the ipsilateral septal body size decreases. This suggests a change in the structure and shape of the septal body as a result of the compensatory response to nasal airflow regulation due to the nasal septum deviation. In the medial direction, the ipsilateral septal body as the effect of nasal septum deviation can affect the quality of life. It is associated with nasal obstruction as a result of the structural change, which is a narrow area that can cause a complaint.

SIGNIFICANCE STATEMENT

This study provides an overview of the size and direction of the septal body and the effect of a nasal septum deviation on the quality of life in patients with nasal septum deviation. This study will help the researchers to be considered in clinical applications in the management of patients with nasal septum deviation.

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