

## Saber Sheath Trachea as a marker of severe airflow obstruction

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### Abstract

Saber sheath trachea is the diffuse static narrowing of intrathoracic portion of trachea with concomitant widening of sagittal diameter. Sagittal: coronal diameter  $<0.67$  or  $2:3$  as a conventionally measured 1 cm above arch of aorta top. It is an age old indicator of airway obstruction. In this study we are trying to find out whether we can use this as an indicator of COPD or is there any prognostic value in managing COPD. In this study we included 25 COPD diagnosed patients and compared the tiffenau index and presence of Saber sheath trachea in them. Out of 25 patients, 8 had Saber sheath trachea. Conclusion, we cannot predict chances of COPD only by analysing the presence of Saber sheath trachea.

**Keywords:** Saber sheath trachea, Prognostic marker of airway obstruction, GOLD guidelines

### Introduction

Saber sheath trachea is an age old marker to find out the airway obstruction. But over a period of time it has become obsolete and found out that it is non-specific. With the invent of new technologies, the use of Saber sheath trachea as a marker for airway obstruction has been reduced. Our aim of this study was to use newer techniques to find out the reliability of Saber sheath trachea in obstructive airway disease and to check whether the prognostic value of same.

### Materials and methods

In this study we included 25 patients from OPD/IPD of department of pulmonary medicine, DR DY Patil Medical college pune India. Our objectives were to find out the correlation of Saber sheath trachea and spirometric grading of COPD. We included

all patients who were willing to give consent for this study. Written consent was taken from patients. A thorough clinical examination was done to look for any contraindications for spirometry in those patients. We diagnosed COPD by spirometry and included the patients with irreversible or partially reversible obstruction (post Bronchodialator fev1/fvc  $<70\%$  and fev1 reversibility  $<12\%$  and 200 ml) and classified them according to severity as per GOLD guidelines (global initiative of obstructive lung diseases). All patients were smokers of different smoking index and the mean age of study group was 67.43 years. We excluded patients who had undergone recent chest, ocular and abdominal surgeries, diseases of mediastinum or rib cage.



**Fig. 1: RCT Thorax showing Saber sheath trachea.**



**Fig. 2: Chest X-ray of same patient.**

The patients were subjected to following tests:

Spirometry

Chest x-ray lateral

Chest x-ray PAview

High resolution computerised tomography

We confirmed the diagnosis of COPD and classified the patients according to GOLD guidelines.

In patients with  $FEV_1/FVC < 0.70$ :

GOLD 1: Mild. ( $FEV_1 \geq 80\%$  predicted)

GOLD 2: Moderate. ( $50\% \leq FEV_1 < 80\%$  predicted)

GOLD 3: Severe ( $30\% \leq FEV_1 < 50\%$  predicted)

GOLD 4: Very Severe ( $FEV_1 < 30\%$  predicted)

We analysed the HRCT thorax of each patients and looked for saber sheath trachea and compared there severity of obstruction in spirometry.

### Results

The present study included 25 male patients with COPD. The mean age of the COPD patients was 67.43 years, and the mean duration of illness was  $12.63 \pm 6.76$  years. The smoking index ranged from 200 to 800 years. The  $FEV_1 / FVC$  ratio varied from 29% to 68%. Saber sheath trachea was found in only 8 out of 25 COPD patients. It was noticed that saber sheath trachea has a great prevalence in patients with low tiffenau index ( $FEV_1/FVC$  ratio) that is GOLD 3 and 4.

Other important finding of our study is prevalence of saber sheath trachea is not related to other radiological signs of COPD. Other HRCT findings in COPD are

1. Thoracic cage ratio: A ratio of anteroposterior to transverse diameter. It was evaluated at two planes: [a] tracheal carina, [b] 5 cm below carina.
2. Sterno-aortic distance: Distance from posterior surface of sternum to anterior margin of aorta at carinal level.
3. Thoracic cross-sectional area: Thoracic cross-sectional area (TCSA) was measured on HRCT images made 1 cm below the top of aortic arch. The ratio of TCSA to the square of height ( $TCSA/height^2$ ) was calculated for each patient.
4. Vascular attenuation: Vascular attenuation was considered when there was thinning of pulmonary vessels and reduction in their number peripherally.
5. Mosaic attenuation pattern: Mosaic attenuation meant non-homogeneous lung density.

## **Discussion**

Saber sheath trachea is an age old marker of airway obstruction. Intrathoracic trachea diameter Sagittal: coronal  $<0.67$  is called saber sheath trachea. It is measured at level 1 cm above arch of aorta top. In this condition extrathoracic trachea will be normal. It is expressed as “tracheal index”. Trachea with conventional rounded cross section has index of 1. All measurements are taken in full inspiration. In these cases, mediastinal masses should be excluded as it can cause extraluminal compression of trachea. In cases of extraluminal compression, only a part of the intrathoracic trachea will be affected. So to confirm saber sheath trachea, whole length of intrathoracic trachea should be affected.

The pathophysiology of saber sheath trachea is supposed to be cartilage weakness of trachea and intrathoracic tracheal wall thickening. There is inward bowing of lateral walls which becomes worse in expiration. Although these are the pathophysiology behind saber sheath trachea, it is not a constant sign in COPD patients. It just shows the functional severity and can be used as a prognostic marker in COPD, because it is more prevalent in

patient with low tiffenau index. Other drawback of saber sheath trachea is that it is an isolated finding. It is independent of other radiological findings of obstructive airway disease.

## **Conclusion**

To conclude, Saber sheath trachea alone cannot be used as a HRCT marker to predict COPD. It is not specific. It is an isolated finding in obstructive airway disease. It can be considered as prognostic indicator and severity quotient of obstructive airway disease.

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