

The Egyptian Society of Chest Diseases and Tuberculosis

Egyptian Journal of Chest Diseases and Tuberculosis

www.elsevier.com/locate/ejcdt www.sciencedirect.com



ORIGINAL ARTICLE

Evaluation of maximum inspiratory and expiratory pressure in patients with chronic obstructive pulmonary disease

M. Khalil, K. Wagih *, O. Mahmoud

Chest Department, Ain Shams University Hospital, Cairo, Egypt

Received 11 December 2013; accepted 16 January 2014 Available online 6 February 2014

KEYWORDS

Chronic obstructive pulmonary disease; Maximal inspiratory pressure; Maximal expiratory pressure; Six minute walk distance; Pulmonary function test **Abstract** Respiratory muscle dysfunction is a cardinal feature of acute and chronic respiratory failure in COPD. Diaphragm and accessory inspiratory muscles face increased load due to increased lung resistance and elastance, as well as increased ventilatory demand.

Aim of the work: The objective of this work is to measure maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) in stable COPD patients and to correlate it with degree of airway obstruction and functional disability.

Subjects, methods and result: Forty known COPD male patients were enrolled in this study with mean age 56.8 ± 7.7 . Spirometry was done for all patients with mean FEV₁ $39.5 \pm 15.1\%$, mean FVC $59.5 \pm 19.2\%$, mean FEV₁/FVC $52.9 \pm 10.3\%$. Maximum inspiratory and expiratory pressures were done with mean $43.6 \pm 26.9\%$ and $46.8 \pm 26\%$ respectively. As regards 6 min walk distance, its mean was 131.41 ± 41.73 m. A quantification of dyspnea using the Modified Medical Research Council Scale (MRC) was done. The results of the present study showed: a highly significant positive statistical correlation between MIP, MEP and 6 min walk distance, also highly significant negative statistical correlation between MIP, MEP and MRC dyspnea scale. We note a

Abbreviations: MIP, maximal inspiratory pressure; MEP, maximal expiratory pressure; 6MWD, 6 min walk distance; COPD, chronic obstructive pulmonary disease; PFT, pulmonary function test; FEV_1 , forced expiratory volume in 1 sec; FVC, forced vital capacity

* Corresponding author. Address: 28 Othman ebn Affan Street, Heliopolis, Cairo, Egypt. Tel.: + 201001240282.

E-mail addresses: magdymkhalil@hotmail.com (M. Khalil), khaledwagih1970@yahoo.com (K. Wagih), osamammahmoud@ yahoo.com (O. Mahmoud).

Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.



0422-7638 © 2014 The Egyptian Society of Chest Diseases and Tuberculosis. Production and hosting by Elsevier B.V. Open access under CC BY-NC-ND license. http://dx.doi.org/10.1016/j.ejcdt.2014.01.010

significant positive correlation between MIP and each of PaO_2 and SaO_2 , while MEP has a significant correlation with SaO_2 , also a highly significant negative statistical correlation between MIP, MEP and $PaCO_2$.

Conclusion: A highly significant positive statistical correlation between MIP, MEP and 6 min walk distance and a highly significant negative statistical correlation between MIP, MEP and subjective dyspnea evaluated by MRC dyspnea scale were found.

© 2014 The Egyptian Society of Chest Diseases and Tuberculosis. Production and hosting by Elsevier B.V. Open access under CC BY-NC-ND license.

Introduction

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases [1].

Respiratory, and particularly inspiratory, muscle function is altered in COPD. Many of these alterations are secondary to a mechanical disadvantage related to hyperinflation. Other factors, including corticosteroid therapy and nutritional depletion, are also deleterious to muscle function. Moreover, the imbalance between respiratory muscle function and load is an important determinant of dyspnea and hypercapnia. Because much of the lung and airway derangements are irreversible in COPD, the respiratory muscles appear to be an attractive target for therapeutic interventions [2].

Maximal inspiratory pressure (MIP) is the maximum negative pressure that can be generated from one inspiratory effort starting from functional residual capacity (FRC) or residual volume (RV). Maximal expiratory pressure (MEP) measures the maximum positive pressure that can be generated from one expiratory effort starting from total lung capacity (TLC) or FRC. Unlike inspiratory muscles, expiratory muscles (abdominal and thoracic muscles) reach their optimal force– length relationship at high pulmonary volumes [3].

Respiratory muscle dysfunction is a cardinal feature of acute and chronic respiratory failure in COPD. Diaphragm and accessory inspiratory muscles face increased load due to increased lung resistance and elastance, as well as increased ventilatory demand [4].

Measurement of the maximum static inspiratory pressure that a subject can generate at the mouth (PImax) or the maximum static expiratory pressure (PEmax) is a simple way to gauge inspiratory and expiratory muscle strength. When respiratory muscle weakness occurs, the PImax can be more sensitive than the VC because the relationship between VC and PImax is curvilinear, so that decreases in respiratory muscle strength occur before decreases in lung volume can be identified [5].

Aim of the work

The objective of this work is to measure maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) in stable COPD patients and to correlate MIP and MEP values with degree of airway obstruction and functional disability.

Subjects and methods

The present study was conducted upon forty known COPD patients according to GOLD 2010 guidelines at Ain Shams University Hospital in the period between August 2011 and March 2012.

For all patients the following were done

- Full history taking.
- Physical examination.
- Chest X-ray.
- Spirometric pulmonary function.
- Maximal inspiratory pressure and maximal expiratory pressure.
- Arterial blood gases.
- Six minute walking test according to ATS standards [6].

Subjective dyspnea scale

A quantification of dyspnea using the Modified Medical Research Council Scale (MRC) is indicated since it predicts quality of life and survival (Functional Dyspnea):

Exclusion criteria

- Patients with primary muscular or neuromuscular diseases.
- Patients with clinically significant co morbidities those are likely to affect test results.
- COPD patients in exacerbation.
- NB: Spirometry, MIP and MEP were done using Master Screen PFT with built in program for measuring MIP and MEP.

Measurement of MIP and MEP

We can measure MIP and MEP according to [7].

Subject preparations

The subjects were instructed not to engage in heavy exercise immediately before testing.

Equipment

System description. We use a pulmonary function testing instrument with software and hardware adaptations that allow for the measurement of respiratory muscle pressures.

Download English Version:

https://daneshyari.com/en/article/3400342

Download Persian Version:

https://daneshyari.com/article/3400342

Daneshyari.com