

**LETTER TO THE EDITOR**

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# Intensive care and non-invasive mechanical ventilation in kyphoscoliosis: are new perspectives still needed?

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## Abstract

Non-invasive ventilation (NIV) assists breathing and thus improves oxygenation in patients with Kyphoscoliosis. The benefits of short- and long-term intermittent nocturnal in such patients have been reported previously (improvement of vital capacity, total lung capacity, muscle strength, daytime oxygenation, exercise capacity, and pulmonary hypertension). We review this important study reporting patients with kyphoscoliosis and acute respiratory failure along with their long-term outcomes. We believe that this letter may provide important information regarding the prognosis and efficacy of NIV.

**Keywords:** Care unit, Kyphoscoliosis, Non-invasive mechanical ventilation, Intensive, Prognosis

## Correspondence

Dear Editor:

Non-invasive ventilation (NIV) assists breathing and thus improves oxygenation in patients with acute respiratory failure. This effect improves outcome and quality of life in long term application [1]. Kyphoscoliosis is a common cause of pulmonary restrictive lung disease [2]. The benefits of short- and long-term intermittent nocturnal therapy have been previously reported as improvement in lung vital capacity, muscle strength, daytime oxygenation, exercise capacity, and pulmonary hypertension [2,3]. In severe stages kyphoscoliosis demonstrates impaired ventilatory mechanics and NIV appears to be the treatment of choice [3]. However, there are scarce results of prospective randomized trials to analyze NIV efficacy.

We have reviewed this original study reporting effects of NIV in kyphoscoliosis patients in acute respiratory failure and long-term outcomes [4]. We believe that it provides important information regarding the prognosis and efficacy of NIV. However, we want to add some comments regarding some particular aspects.

Firstly, contrary to previous results, the authors determined that there was no correlation between the levels of IPAP/EPAP setting applied and the levels and tendency of hypercapnia [4]. We believe that this relationship does not always exist regarding control of pCO<sub>2</sub> levels and that the following factors may contribute to hypercapnia in this study such as: 1) leakage level and ventilation efficiency, 2) body mass index (BMI), 3) muscular fatigue and strength and 4) duration of NIV at home, 5) poorly controlled oxygen therapy [5–8].

Secondly, long-term O<sub>2</sub> therapy may contribute to pCO<sub>2</sub> level, significant reduction in pulmonary artery pressure (PAP) and sleep quality [2,6]. These factors were not evaluated in this study.

Thirdly, in this study the prevalence of cardiac disease remains unknown and this could be a contributing key factor in outcomes [4]. We suggest that future studies should conduct research regarding the use of transthoracic echocardiography as a routine evaluation tool for determining the response of patients with pulmonary arterial hypertension and cor pulmonale, because these factors may contribute to hypoventilation and hypoxia [6,8].

We hope that our comments could improve the extrapolation of this study. In future, large prospective clinical trials will be required to evaluate this study and provide the clinical relevance of NIV in acute and long term applications.

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**Reply Title: Non-invasive mechanical ventilation in the ICU is not a new perspective but varies from patient to patient with kyphoscoliosis**

We thank Dr Esquinas and Dr Matsuoka for their interest and comments in helping us to improve the interpretation of our article [4].

Firstly, we agree with the contributing factors of hypercapnia [7,8]. In the Budweiser study, prior to the initiation of non-invasive mechanical ventilation (NIV),  $\text{PaCO}_2$  obtained from arterial blood gas, either on room air ( $\text{PaCO}_2: 54.5.0 \pm 8.0$ ), or normal oxygen flow ( $\text{PaCO}_2: 57.0 \pm 7.7$ ), was accepted as baseline in the respiratory ward [5]. However, in our study we included the baseline  $\text{PaCO}_2$  for the first outpatient clinic control, one month after ICU discharge, and while under NIV treatment. Therefore, the difference in  $\text{PaCO}_2$  in our study was low, as expected [4]. The relationship between pressure differences and  $\text{PaCO}_2$  differences was not correlated in stable outpatients with kyphoscoliosis and chronic respiratory failure [4]. Secondly, we did not measure pulmonary arterial pressure (PAP), and we did not perform a sleep study [4]. However, in our previous study of 34 kyphoscoliosis patients, six (24%) with chronic respiratory failure had a PAP over 40 mmHg. Surprisingly, only two (33%) who had the higher PAP had a  $\text{PaO}_2/\text{FiO}_2$  less than 300 [9]. The majority of the patients ( $n = 28$ ) who had abnormal PAP had hypoxemia ( $\text{PaO}_2/\text{FiO}_2 < 300$ ) [9]. The studies on pulmonary hypertension in patients with kyphoscoliosis are very limited [3,9]. Besides hypoventilation and hypoxemia, the reasons for increased pulmonary artery pressure may involve different mechanisms. Thirdly, we recorded but did not present the cardiac co-morbidities, such as hypertension ( $n = 20$ , 32.3%), cor pulmonale ( $n = 14$ , 22.6%), and supraventricular tachycardia ( $n = 27$ , 43.5%), in our study sample.

We agree that, in future, large prospective clinical trials will be needed to assess respiratory mechanics with either spontaneous breathing, or non-invasive and invasive mechanical ventilation, with detailed cardiac function. We are willing to participate in any such study to deal with this issue.

**Abbreviations**

BMI: Body mass index; EPAP: End positive airway pressure; IPAP: Inspiratory positive airway pressure; NIV: Non-invasive mechanical ventilation; PAP: Pulmonary artery pressure.

**Competing interests**

Authors declare that they have no competing interests.

**Authors' contributions**

AM, E and YM carried out review analysis to prepare this manuscript. All authors read and approved the final manuscript.

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**References**

1. Gonzalez C, Ferris G, Diaz J, Fontana I, Nuñez J, Marín J: Kyphoscolioticventilatory insufficiency: effects of long-term intermittent positive-pressure ventilation. *Chest* 2003, **124**:857–862.
2. Fuschillo S, De Felice A, Gaudiosi C, Balzano G: Nocturnal mechanical ventilation improves exercise capacity in kyphoscoliotic patients with respiratory impairment. *Monaldi Arch Chest Dis* 2003, **59**(4):281–286.
3. Schlenker E, Feldmeyer F, Hoster M, Röhle KH: Effect of noninvasive ventilation on pulmonary artery pressure in patients with severe kyphoscoliosis. *Med Klin (Munich)* 1997, **92**(Suppl 1):40–44.
4. Adiguzel N, Karakurt Z, Güngör G, Moçin OY, Balcı MK, Saltürk C, Karg NF, Tak RHB, Güven AE, Yarkın NT: Management of kyphoscoliosis patients with respiratory failure in the intensive care unit and during long term follow up. *Multidiscip Respir Med* 2012, **7**:30.
5. Budweiser S, Heinemann F, Fischer W, Dobroschke J, Wild PJ, Pfeifer M: Impact of ventilation parameters and duration of ventilator use on non-invasive home ventilation in restrictive thoracic disorders. *Respiration* 2006, **73**:488–494.
6. Buysse B, Meersman W, Demedts M: Treatment of chronic respiratory failure in kyphoscoliosis: oxygen or ventilation? *Eur Respir J* 2003, **22**(3):525–528.
7. Turkginton PM, Elliott MW: Rationale for the use of non-invasive ventilation in chronic ventilatory failure. *Thorax* 2000, **55**(5):417–423.
8. Ferris G, Servera-Pieras E, Vergara P, Tzeng AC, Perez M, Marin J, Bach JR: Kyphoscoliosisventilatory insufficiency: noninvasive management outcomes. *Am J Phys Med Rehabil* 2000, **79**(1):24–29.
9. Karakurt Z, Güven AO, Moçin OY, Karavelioğlu Y, Güngör G, Altınöz H, Adigüzel N, Yarkın T, Baran R: Six minute walking distance in kyphoscoliosis patients with chronic respiratory failure. *Multidiscip Respir Med* 2010, **5**:244–249.

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