

hospital stay, in comparison to the control group ( $P = .042$ ).

Dr Unnikrishnan and colleagues reported their indecision about the comparison of helmet interface over oxygen therapy via commonly used face mask. The authors' interest was to compare the standard institutional method of oxygen delivery after pulmonary lobectomy to a noninvasive method of ventilation, and not to compare 2 different ways (helmet and mask) of positive pressure oxygen supply. As described in the paper, the choice of the helmet interface was made by a definitely better acceptance, as compared to an oronasal mask.<sup>4,5</sup>

Comparing helmet interface versus facial interface, as proposed by Unnikrishnan et al, could certainly be the aim of a subsequent study.

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## REFERENCES

- Barbagallo M, Ortu A, Spadini E, Salvadori A, Ampollini L, Internullo E et al. Prophylactic use of helmet CPAP after pulmonary lobectomy: a prospective randomized controlled study. *Respir Care* 2012; 57(9):1418-1424.
- Licker MJ, Widikker I, Robert J, Frey JG, Spiliopoulos A, Ellenberger C, et al. Operative mortality and respiratory complications after lung resection for cancer: impact of chronic obstructive pulmonary disease and time trends. *Ann Thorac Surg* 2006;81(5):1830-1837.
- Dulu A, Pastores SM, Park B, Riedel E, Rusch V, Halpern NA. Prevalence and mortality of acute lung injury and ARDS after lung resection. *Chest* 2006;130(1):73-78.
- Rocco M, Dell'Utri D, Morelli A, Spadetta G, Conti G, Antonelli M, Pietropaoli P. Noninvasive ventilation by helmet or face mask in immunocompromised patients: a case-control study. *Chest* 2004;126(5):1508-1515.
- Navalesi P, Costa R, Ceriana P, Carlucci A, Prinianakis GG, Antonelli M, et al. Non-invasive ventilation in chronic obstructive pulmonary disease patients: helmet versus facial mask. *Intensive Care Med* 2007;33(1):74-81.

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## Noninvasive Mechanical Ventilation and Helmet After Lung Resection: Oxygenation Improvement: A Small Step or a Large Step?

*To the Editor:*

Noninvasive ventilation (NIV) may control the incidence of postoperative complications in selected patients who develop hypoxemia after some elective thoracic and abdominal surgery. As a prophylactic intervention, NIV may be important in patients at risk of hypoxemia after cardiac surgery or lobectomy.<sup>1,2</sup> After lung surgery, early NIV may reduce pulmonary dysfunction and improve respiratory function.<sup>3</sup>

Barbagallo et al<sup>4</sup> used helmet for prophylactic CPAP following lung resection and found short-term improved  $P_{aO_2}/F_{IO_2}$  and shorter hospital stay, but no difference in complications. These results may improve our understanding of postoperative ventilatory support for preventing postoperative complications, but we see 5 important issues with their methods and results.

First, the extent of lung resection (lung lobectomy) means that the postoperative lung function in their patient population (which had a mean FEV<sub>1</sub> of > 85% of predicted and a mean FVC of > 90% of predicted) was not substantially affected, and this may explain the high success rate in the Barbagallo et al study.

Second, the preoperative arterial blood gas exchange is a key to understanding their results, but  $P_{aO_2}/F_{IO_2}$  immediately before initiating helmet CPAP (hCPAP) was not reported, so we can't determine the benefit obtained after the first hCPAP cycle. The study could not be blinded, but were any similar postoperative supportive measures used in the control group?

Third, it is not known whether prophylactic hCPAP resulted in overtreatment of some subjects.

Fourth, the relationship between improved oxygenation and hospital stay is un-

known, and hCPAP only transiently improved oxygenation and did not significantly influence complications, so it is doubtful that hCPAP influenced stay. We would like to know the relationship between a short-term improved oxygenation and the decision to discharge the patient earlier, which might have been influenced by physician bias, since the surgeon responsible for the discharge knew that the patient was given hCPAP.

Fifth, the relationship between the existence of minor complications in the hCPAP group versus the control group is interesting. Considering the absence of complications in the hCPAP group, the stay should have been compared to the stay of patients without major complications, and not to the stay of the control group, which had 4 patients with pneumonia and wound infection.

More studies are needed to determine hCPAP's effects on prognosis and postoperative complications. Also the presence of associated comorbidities at various postoperative periods needs to be studied.<sup>2,5-7</sup> Despite these limitations and the necessity of randomized trials, we should consider helmet as a prophylactic and therapeutic tool to improve gas exchange in postoperative patients.<sup>2,8</sup> We compliment them on their study.

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## REFERENCES

- Squadrone V, Coxa M, Cerutti E, Schellino MM, Biolino P, Occella P, et al; Piedmont Intensive Care Units Network (PICUN). Continuous positive airway pressure for treatment of postoperative hypoxemia: a randomized controlled trial. *JAMA* 2005; 293(5):589-595.
- Jaber S, Michelet P, Chanques G. Role of non-invasive ventilation (NIV) in the perioperative period. *Best Pract Res Clin Anaesthesiol* 2010;24(2):253-265.
- Perrin C, Jullien V, Vénissac N, Berthier F, Padovani B, Guillot F, et al. Prophylactic use of noninvasive ventilation in patients

undergoing lung resectional surgery. *Respir Med* 2007;101(7):1572-1578.

4. Barbagallo M, Ortu A, Spadini E, Salvadori A, Ampollini L, Internullo E, et al. Prophylactic use of helmet CPAP after pulmonary resection: a prospective randomized controlled study. *Respir Care* 2012; 57(9):1418-1424.
5. Glossop AJ, Shepherd N, Bryden DC, Mills GH. Non-invasive ventilation for weaning, avoiding reintubation after extubation and in the postoperative period: a meta-analysis. *Br J Anaesth* 2012;109(3):305-314.
6. Lorut C, Rabbat A, Chatelier G, Lefevre A, Roche N, Regnard JF, Huchon G. [The place of routine immediate non-invasive ventilation following pulmonary resection in preventing pulmonary complications in patients with COPD (POPVNI Trial)]. *Rev Mal Respir* 2005;22(1 Pt 1):127-134. *Article in French.*
7. Kushibe K, Kawaguchi T, Kimura M, Takahama M, Tojo T, Taniguchi S. Influence of the site of lobectomy and chronic obstructive pulmonary disease on pulmonary function: a follow-up analysis. *Interact Cardiovasc Thorac Surg* 2009;8(5):529-533.
8. Chiumello D, Chevallard G, Gregoretti C. Non-invasive ventilation in postoperative patients: a systematic review. *Intensive Care Med* 2011;37(6):918-929.

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### **The authors respond to: Noninvasive Mechanical Ventilation and Helmet After Lung Resection: Oxygenation Improvement: A Small Step or a Large Step?:**

We thank Esquinas and Papadakis for their careful analysis of our paper.<sup>1</sup> The authors of the letter are completely correct that our patient population had favorable features to undergo lung lobectomy. However, we investigated an unselected population that represents the mean standard population of lung cancer patients suitable for surgical resection. Nevertheless, the majority of our patients had mild to moderate COPD according to Global Initiative for Chronic Obstructive Lung Disease classification.<sup>2</sup> Additionally, 86% of them (43/50) were active or former heavy smokers (median of 40 pack/years) and 62% (31/50) had cardiovascular diseases.

Regarding the blood gas values, they were collected at admission to ICU and immediately before and after the first helmet CPAP treatment, immediately before and after the second helmet CPAP treatment, and so on,

according to time points scheduled. In the paper, Figure 2 nicely showed the evolution and trend of  $P_{aO_2}/F_{IO_2}$  during the study period. After the first CPAP course a mild increase of  $P_{aO_2}/F_{IO_2}$  was observed; it was also detected after the second course, but the difference was not statistically significant.

Regarding the hospital stay and the transient improvement of  $P_{aO_2}/F_{IO_2}$ , on one hand, our study showed that prophylactic use of helmet CPAP can progressively improve  $P_{aO_2}/F_{IO_2}$ , reaching a statistically significant higher value after the second course of CPAP, compared to the control group ( $P = .004$ ). On the other hand, the hospital stay was statistically shorter in the helmet CPAP group than in the other group ( $P = .042$ ). In our institution the overall median hospital stay after lobectomy is 7 days, which is in line with our results. The slight but significant difference between the 2 study groups, probably came from the 3 patients in the control group who developed pneumonia, even if that fact did not cause any significant difference in postoperative complications between the groups. So we can't be sure there is a correlation between the 2 variables. Nevertheless, hospital stay might have been influenced by various factors on which helmet CPAP had a positive impact. In any case, it would have been nonambiguous if the  $P_{aO_2}/F_{IO_2}$  improvement had been long lasting; in that case, a convincing association could be hypothesized. Further study could focus on the continuation of postoperative CPAP in order to find a relationship between hospital stay and oxygenation improvement.

Thanks again to Esquinas and Papadakis for their important comments, which underline that our data give interesting insights into a prophylactic approach in the management of postoperative period after lung lobectomy.

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### **REFERENCES**

1. Barbagallo M, Ortu A, Spadini E, Salvadori A, Ampollini L, Internullo E, et al. Prophylactic use of helmet CPAP after pulmonary resection: a prospective randomized controlled study. *Respir Care* 2012; 57(9):1418-1424.
2. Vestbo J, Hurd SS, Agustí AG, Jones PW, Vogelmeier C, Anzueto A, et al. Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease. GOLD Executive Summary. *Am J Respir Crit Care Med* 2013;187(4):347-365.

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### **High-Flow Nasal Cannula Oxygen Therapy in the Emergency Department: Welcome, But Selection Should Be the First Step**

*To the Editor:*

We read with great interest the observations by Lenglet et al<sup>1</sup> on heated and humidified high-flow nasal cannula (HFNC) oxygen therapy. This technique represents a new alternative to conventional oxygen therapy in the emergency department. The authors' hypothesis was that HFNC is feasible and efficient in patients with acute respiratory failure in the emergency department. This is a potential relevant hypothesis, but, in our view, some concerns must be underlined regarding HFNC in the emergency department.

First, a major factor is the variability in this patient population, which makes it difficult to extrapolate the findings to all patients, and we believe the conclusions should be softened. Although there are some data from pediatric studies,<sup>2,3</sup> information is lacking on HFNC versus noninvasive ventilation in adult patients with acute respiratory failure.<sup>4</sup> Also, there are some concerns about the optimal  $F_{IO_2}$  level to use, since  $F_{IO_2}$  could be influenced by the type of mask, the amount of leak, the flow, and the breathing pattern. The results from pediatric studies with regards to the level of pressure applied during HFNC cannot be extrapolated to adults, because of differences in, for example, nasopharynx volume, nasal resistance, and respiratory pattern.<sup>5,6</sup>