□ LETTERS TO THE EDITOR □

The Mechanism of Improvement of Gas Exchange by Noninvasive Ventilation (NIV) Therapy for the Post-Operative State of Liver Cirrhosis Patients**Key words:** noninvasive ventilation, liver cirrhosis, Nitric oxide, ventilation/perfusion mismatching**(Intern Med 50: 267, 2011)****(DOI: 10.2169/internalmedicine.50.4352)**

To the Editor In a recent issue of Internal Medicine, Narita and coworkers (1) reported that noninvasive ventilation (NIV) improves the outcome of pulmonary complications after liver resection. NIV was well tolerated in most of the patients (1).

We highly agree with the authors that NIV is effective in patients with respiratory failure and/or massive atelectasis after liver resection. Their observation is very important for new indications of NIV for non-pulmonary diseases and for new strategies for post-operative management. Evidence suggests that NIV has been proven to be an effective strategy to reduce intubation rates, nosocomial infections, intensive care unit and hospital lengths of stay, and morbidity and mortality in postoperative patients (2).

However, the merit of NIV and its mechanism of NIV-associated gas exchange improvement in hepatic diseases were not described in their article.

After NIV treatment for 24 hours, the $\text{PaO}_2/\text{FiO}_2$ ratio and PaCO_2 were improved significantly but no significant improvement was noted in the non-NIV group (1). The NIV may improve alveolar recruitment with better gas exchange (oxygenation and ventilation) and reduce left ventricular after load increasing cardiac output and improving hemodynamics (2). Furthermore, in the liver cirrhotic patients, intrapulmonary shunting is the main determinant mechanism of impaired arterial oxygenation (3).

Studies have suggested that nitric oxide may play a role in the abnormal oxygenation seen in patients with cirrhosis, and it correlates with the abnormalities in P(A-a)O_2 (4, 5). Nitric oxide can increase the ventilation/perfusion mismatch-

ing by eliminating hypoxic vasoconstriction. The impairment of arterial oxygenation is markedly observed in patients with clinically significant port pulmonary hypertension complicating their advanced liver disease. However, the degree of the impairment of gas exchange is not totally the advanced disease state of liver disorders. That is why not all of the patients show improvement of $\text{PaO}_2/\text{FiO}_2$ ratio after NIV in the patients of the current study.

The NIV may be effective for the improvement of ventilation-perfusion mismatching even in liver cirrhosis with pulmonary hypertension. In the end, the rate of reintubation was significantly lower in the NIV group than in the non-NIV group. Thus, understanding of the mechanisms of improvement of gas exchange is important for the optimal indication for NIV therapy for the post-operative state of liver cirrhosis patients.

The authors state that they have no Conflict of Interest (COI).**Acknowledgement**

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