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Transoesophageal echocardiography during prone positioning for ARDS: watching the heart to care for the lung

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In this issue of *Intensive Care Medicine* Mekontso Dessap et al. [1] report on the use of transoesophageal echocardiography (TEE) in 34 patients suffering from severe ARDS, of whom 25 were in shock at the time of TEE, undergoing prolonged sessions in the prone position and mechanical ventilation. The authors aimed to evaluate the feasibility, tolerance and therapeutic implications of TEE in the prone position, and to compare it with TEE performed supine. They showed that TEE probe insertion can be successfully and quickly achieved (10–60 s) in almost all patients either with the patient's head rotated to the right or to the left: in only 1 out of 34 patients was it not possible to introduce the probe; direct laryngoscopy was never needed to introduce the probe. Neither haemodynamic nor respiratory vital signs showed any significant change during the manoeuvre. Interestingly, all standard TEE views and measures could be obtained, except for patent foramen ovale in one patient, and cardiac output assessment in four patients. Undesirable effects like dislodgment of orogastric tube, vomiting or significant gastrointestinal bleeding were never observed.

From a clinical point of view, TEE examinations were all conclusive and affected management in 70% of cases. TEE detected a superior vena cava collapse in 5 cases, a decreased left ventricle systolic function in 11 cases, a cor pulmonale in 11 cases, low filling pressures in 27 and high filling pressures in 6 cases, and a shunting across patent foramen ovale in 7 cases. The authors also compared TEE performed in both supine and prone position in 16 patients within a median delay of 3 days, and found no difference in terms of feasibility, tolerance, therapeutic implication and image quality.

On the basis of the overall results, Mekontso Dessap et al. concluded that TEE can be performed safely and efficiently in severe ARDS patients in the prone position.

The results from this study have a clinical relevance that is not limited to the feasibility of TEE in the prone position. In fact, the application of echocardiography in the prone position can prevent earlier interruption of the session due to unexplained haemodynamic impairment, and help in providing the most appropriate circulatory treatment. The prone position should be prolonged to be effective [2]. Its earlier cessation, for any reason, would waste the time spent till interruption and lose what was clinically gained. Therefore, the comprehensive evaluation of cardiac function in the prone position can affect the results of such treatment by preventing ineffective duration.

TEE was performed in prone patients because of persisting respiratory compromise and/or haemodynamic worsening with no obvious explanation. An obvious explanation in such critical conditions, where profound change in cardiac and lung physiology can be present, is difficult to obtain with standard haemodynamic monitoring, whereas integrating ultrasound information into the haemodynamic evaluation shows that “the sicker the patient, the less reliable the haemodynamic monitoring.”

Although there are no absolute recommendations for prone position in ALI/ARDS patients, till now the

common feeling was that any patient with severely impaired oxygenation ($\text{PaO}_2/\text{FiO}_2 < 100$ mmHg) unresponsive to standard measures might be a candidate for a prone positioning trial, and that only those patients showing fast improvement should then continue. The recent data on the favourable effect from prolonged sessions in the most severe patients will push intensivists to apply the prone position strategy in the worst lung compliance and arterial oxygenation cases. Prolonged high PEEP values imposed on an either previous or de novo increased right ventricular afterload, although in the setting of protective ventilation, may precipitate a right

ventricle/pulmonary arterial uncoupling, a setting where a specific imaging modality can exert a crucial role [3, 4].

For these reasons the study by Mekontso Dessap opens a new frontier for cardiac ultrasound evaluation in severe respiratory failure needing prone positioning and mechanical ventilation, as it demonstrates that a careful cardiac assessment is feasible and leads to change in management in the majority of cases. This exciting approach should prompt intensivists to more largely investigate the role of TEE in this setting and its potential impact on the patient's outcome.

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