Predicting Fluid Responsiveness in Mechanically Ventilated Children under General Anaesthesia using Dynamic Parameters and Transthoracic Echocardiography.


Background
Dynamic variables are accurate predictors of fluid responsiveness in adults undergoing mechanical ventilation. They can be determined using respiratory variation in aortic flow peak velocity (▵Vpeak), arterial pulse pressure [▵PP and pulse pressure variation (PPV)], or plethysmographic waveform amplitude [▵POP and pleth variability index (PVI)]. These indices have not been validated in children. We studied the ability of these variables to predict fluid responsiveness in mechanically ventilated children.

Methods
All results are expressed as median [median absolute deviation (MAD)]. Thirty mechanically ventilated children were studied after undergoing general anaesthesia. Mechanical ventilation was maintained with a tidal volume of 10 ml kg(-1) of body weight. △PP, PPV, △POP, PVI, △Vpeak, and aortic velocity-time integral were recorded before and after volume expansion (VE). Patients were considered to be responders to VE when the aortic velocity-time integral increased more than 15% after VE.

Results
VE induced significant changes in △PP [13 (MAD 4) to 9 (5)%], PPV [15 (5) to 9 (5)%], △POP [15 (10) to 10 (6)%], PVI [13 (6) to 8 (5)%], and △Vpeak [16 (9) to 8 (3)%] (P<0.05 for all). Differences in △PP, △POP, PPV, and PVI did not reach statistical significance. Only △Vpeak was significantly different between responders (R) and non-responders (NR) to VE [22 (3) vs 7 (1)%, respectively; P<0.001]. The threshold △Vpeak value of 10% allowed discrimination between R and NR.

Conclusions
In this study, △Vpeak was the most appropriate variable to predict fluid responsiveness.