Reviewer’s report

Title: General anesthesia and positive pressure ventilation suppress left and right ventricular myocardial shortening in patients without myocardial disease – a strain echocardiography study

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Reviewer: Fabio Guarracino

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In the study "General anesthesia and positive pressure ventilation suppress left and right ventricular myocardial shortening in patients without myocardial disease - a strain echocardiography study" dr. Dalla and colleagues studied the influence of general anaesthesia and PPV on RV and LV longitudinal strain in patients without myocardial disease.

To do so, they enrolled twenty-one patients scheduled for non-cardiac surgery. The baseline examination was performed on the un-premedicated patients within 60 minutes of anesthesia. The second examination was performed 10-15 minutes after induction of anesthesia (propofol, remifentanil), intubation and start of PPV.

They found that general anesthesia and PPV reduced the mean arterial blood pressure (-29%, p<0.0019), stroke volume index (-13%, p<0.001) and cardiac index(-23%, p<0.001). RV end-diastolic area index and LV end-diastolic volume index decreased significantly, while systemic vascular resistance was not significantly affected. The LV GLS decreased from -19.1±2.3% to -17.3±2.9% (p<0.001) and RV free wall strain decreased from -26.5±3.9% to -24.1±4.2% (p=0.001). One patient (5%) had at baseline a LV GLS > -16% compared with 6 patients (28%) during general anesthesia and PPV. Three patients (14%) had a RV free wall strain > -24% compared to eight patients (38%) during general anesthesia and PPV.

Based on their findings the authors concluded that general anesthesia and PPV reduces systolic LV and RV function to levels considered indicating dysfunction in a substantial proportion of patients without myocardial disease.

Studying the impact of anesthetic drugs and ventilation on ventricular function is of interest and in this study the authors added the value of advanced echocardiography (speckle strain) on its assessment. However, the study rises several concerns that need to be addressed by authors.
Major comments

* The different impact of positive pressure ventilation and drugs on ventricular function is not explored and cannot be distinguished in this study. It's well known that both have impact on ventricular function, but it must be differentiated (for example by modifying PEEP or tidal volume or changing drug dosage).

* Statistical approach as logistic regression could differentiate the impact of dosage of drugs and ventilation on ventricular function in a bigger sample

* Fluid responsiveness parameters are not measured and can be one important point of ventricular adaptation to general anesthesia and positive pressure ventilation. Moreover, mean filling pressure should be integrated to corroborate the impact of loading condition on ventricular function

* Authors studied arterial impact of general anesthesia and ventilation measuring EA, but not ventricular elastance, that can be assessed in a noninvasive manner. The information from non invasive ventricular elastance can be of value in such analysis.

* The impact of loading conditions on strain is debated in literature. The authors could corroborate their results adding strain rate parameters.

* The intraobserver analysis shows big coefficients of variation (around 10%) with low modification of strain parameters (around 5%). In my opinion, considering these results, interobserver analysis and larger sample is needed.

* It could be useful to analyze the same parameters after awakening from general anaesthesia. Restoration or amelioration of echocardiographic parameters could help to correlate drugs and ventilation to presumed reduction of ventricular function.

* Use of ephedrine to restore mean arterial pression could be an important source of bias.

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