

THE EFFECTS OF AN IV-FLUID BOLUS ON THE ASSESSMENT OF DIASTOLIC FUNCTION

S Ayala, D Li, O Badakhsh, N Fleming

Background:

Diastolic dysfunction (DD) is the result of impaired left ventricular (LV) relaxation, with or without reduced storing forces, and increased LV chamber stiffness. DD exists in over 50% of patients presenting for cardiac or high-risk non-cardiac surgery and is an independent predictor of adverse postoperative outcome specifically associated with prolonged ventilation, death, and longer ICU and hospital length of stay.

Comprehensive characterization of diastolic function can be logistically difficult in the intraoperative setting. We explored the perioperative assessment and reproducibility of grading diastolic function with a simplified algorithm before and after an IV-fluid bolus in sequential patients undergoing cardiac surgery.

Methods:

This Institutional Review Board approved prospective study enrolled adult American Society of Anesthesiologists physical status 2, 3, or 4 patients scheduled for elective cardiac surgery with planned intraoperative transesophageal echocardiography (TEE). Patients were studied following induction and prior to sternotomy. After a 5-minute period of hemodynamic stability with no changes in anesthetic management and no volume expansion, TEE was used to determine peak early mitral flow velocity (E), peak late mitral flow velocity (A) and lateral mitral annular tissue Doppler velocity (e'), with E/A and E/e' ratios calculated subsequently. Patients then received 500cc of a crystalloid solution infused over 10 minutes. A second set of TEE measurements were collected 5 minutes after this volume expansion.

Results:

In 84 patients, the paired comparison of early diastolic mitral annular velocities before and after the fluid bolus was not statistically significant ($p=.10$). Comparison of trans-mitral flow velocities revealed statistically significant changes of E/A ($p=0.002$, and E/e' ($p=.0002$). Overall, the distribution of diastolic function grades did not change. However, 15% of patients had progressive diastolic dysfunction assessment changes.

Conclusion:

Our results are consistent with previous studies. Early diastolic mitral annular velocity is a relatively pre-load independent assessment of LV relaxation allowing for surveying of DD despite the grade of severity. We demonstrated the clinical utility of a simplified algorithm as the grading of diastolic function was reproducible and consequently could offer prognostic value when appreciating the worsening of diastolic grading across our sample before and after a fluid bolus in this study population. Further studies are warranted to explore the intraoperative effects of anesthetic agents on diastolic function and to characterize longitudinal changes in assessment that might occur during the course of an anesthetic and surgical procedure.