0475

Mortality from Aortic Stenosis Across the Spectrum of Severity: Analysis of Big Data from the National Echo Database of Australia

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Background: Echocardiogram (echo) is pivotal in evaluating aortic stenosis. We evaluated mortality with aortic stenosis in a large cohort, matched with mortality.

Methods: Using the National Echo Database of Australia (>530,000 echos) linked with National Death Index, survival was determined from the last recorded echo to census in October 2017. Data were available from 352,844 individuals (186,820 men, mean age 60.8 ± 18.0 years; 166,024 women, mean age 60.9 ± 19.2 years) with a mean follow-up of 5.4 years.

Results: Peak aortic valve velocity (AVvel) was recorded in 278,955 patients, demonstrating a J-shaped mortality pattern with highest age- and sex-adjusted risk profile in those individuals ($n = 52{,}010$) in the upper quintile (>1.8 ms and mean aortic gradient of 13 mmHg; hazard ratio 1.29 [95% confidence interval 1.25–1.32]; $p < 0.001$) relative to the lowest quintile. One- and 5-year mortality was 5.0% and 14.9% in the lowest vs 9.2% and 28.1% in the highest ($p < 0.0001$) quintile, respectively. The upper quintile was then further examined for survival against increasing gradients ($n = 44{,}340$). Adjusting for age, sex and ejection fraction, the long-term mortality risk (up to 15 years) plateaued at a mean gradient ≥30.9 ± 1.3 mmHg (AVvel >3.71 ± 0.26 ms), with an adjusted hazard ratio of 0.94 (95% confidence interval 0.82–1.08; $p = 0.4$) compared with the highest quintile of that group (mean gradient 59.9 ± 9.4 mmHg, AVvel = 4.96 ± 0.47 ms). One- and 5-year mortality were similar for those with mean gradient 20–30 mmHg (10.9% and 32.6%, respectively), 30–40 mmHg (11.8% and 33.0%, respectively), and >40 mmHg (13.7% and 34.5%, respectively).

Conclusion: Aortic stenosis is associated with significant mortality across the spectrum of severity, including mild disease. There is no discernible difference in survival between 'moderate' and 'severe' aortic stenosis.

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0476

Mortality from Left Atrial Enlargement Based on Method of Measurement: Analysis of Big Data from the National Echo Database of Australia

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Background: There are multiple echocardiographic (echo) methods of measuring left atrial size; however, these have not been directly compared in a large patient cohort, matched with mortality data.

Methods: The National Echo Database of Australia is a vendor-agnostic cloud-based database, containing echo measurement data (1997–2017) from laboratories ($n = 10$) across Australia. Data linkage to the National Death Index provided survival status on each individual from the last recorded echo to the census in October 2017.

Results: Left atrial volume indexed to body surface area (LAVI) and two-dimensional parasternal left atrial dimension was recorded in 161,489 and 85,298 patients, respectively. Four-chamber and two-chamber left atrial area measurements were available in 26,315 and 6,528 patients, respectively. Corresponding four-chamber (and two-chamber atrial length was available in 19,609 and 5,857 patients, respectively. Each measurement demonstrated a J-shaped mortality pattern, with LAVI showing the strongest association with survival risk. Excluding the lowest LAVI quintile (<22 mL/m^2, to correct for J-shaped mortality profile), analysis of each decile identified an increase in mortality risk beginning with the LAVI decile of 29–31 mL/m^2 ($p < 0.0001$ for each decile).

Conclusion: Increased left atrium size is strongly associated with mortality above a size threshold. Left atrial volume index appears to be the most robust predictor of mortality, increasing in a predictable fashion when LAVI >29 mL/m^2.

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