

Exercise Capacity after Repair of Ebstein Anomaly: The Cone Era

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Introduction: Over the past decade, the circumferential “cone” repair has become the preferred method of repairing Ebstein anomaly of the tricuspid valve. Reported surgical outcomes have been excellent overall, with low mortality and good tricuspid valve function over time. However, there have been no recent studies examining exercise or functional capacity in patients who have undergone tricuspid valve surgery in the modern era.

Purposes: To compare exercise capacity before and after surgery of those undergoing tricuspid valve repair or replacement for Ebstein anomaly at Mayo Clinic.

Methods: We performed a retrospective chart review of all patients with Ebstein anomaly who underwent tricuspid valve surgery at Mayo Clinic between June 2007 and January 2015. We compared pre- and post-surgical echocardiograms, exercise tests, and clinic visits. Statistical analysis was completed using paired t-test and one-way ANOVA.

Results: Tricuspid valve surgery was done in 322 patients. Among this cohort, 32 patients met our criteria of native tricuspid valve repair or replacement and maximal pre and post-surgery exercise tests. Nineteen patients had valve repairs, and 13 had valve replacements. The average age of this cohort was 41 years old (range 18-64), and consisted of 69% females. Surgery for Ebstein anomaly was successful in this cohort, with significant reduction in tricuspid regurgitation ($p = 0.0001$) and right ventricular size ($p = 0.0003$), with 72% of patients having trivial or no tricuspid regurgitation after surgery. Among the 32 patients who had both pre and postoperative exercise tests, there was a significant improvement in NYHA functional class ($p = 0.0008$), with 69% of patients categorized as NYHA class I after surgery. There was no significant difference in functional aerobic capacity (FAC), metabolic equivalents (METs), or exercise time. There was a trend toward a decreased VO_2 max after surgery ($p = 0.056$). Peak heart rate during exercise declined after surgery ($p = 0.032$). Those who had a PFO or ASD closed during surgery did have significantly improved minimum saturations during exercise ($p = 0.045$), though they did not have any significant difference in measured exercise capacity. There was no significant difference in exercise outcome between those that had repair or replacement of the tricuspid valve.

Conclusions:

In our cohort, patients who had tricuspid valve repair or replacement for Ebstein anomaly reported an improvement in functional capacity as quantified by NYHA classification. However, patient-described functional status did not reflect improvement in measured exercise capacity, despite excellent surgical results by echocardiogram. Further follow-up and more consistent testing may provide more reliable information regarding these patients' exercise and functional capacity after surgery.