Circulation: Cardiovascular Interventions

RESEARCH LETTER

Percutaneous Mitral Repair as Salvage Therapy in Patients With Mitral Regurgitation and Refractory Cardiogenic Shock

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Few data have described the role of percutaneous mitral repair with the MitraClip (Abbott Laboratories, IL) as salvage in patients with refractory cardiogenic shock.[1] Cardiogenic shock is often associated with functional mitral regurgitation (MR), and it remains unclear if the MR represents the principal cause for hemodynamic compromise or is a secondary phenomenon. Importantly, recent trials evaluating percutaneous repair of functional MR have excluded patients with INTERMACS 3 (Interagency Registry for Mechanically Assisted Circulatory Support) or worse heart failure.[2]

Herein, we describe outcomes in patients with refractory cardiogenic shock of prohibitive risk for surgery with an estimated Society of Thoracic Surgeons score >15%, or not suitable for mechanical circulatory support as defined by guidelines.[3] Patients were followed prospectively in a dedicated clinic, and ethics approval was obtained from our institutional review board to present these data. These data may be available to others pending future ethics approval of individual requests. Between 2012 and 2018, 170 percutaneous mitral repair procedures with the MitraClip NT device were performed at the University of Ottawa Heart Institute. Of these, 27 patients had refractory cardiogenic shock, defined as the inability to wean inotropic support with or without concomitant intraaortic balloon counterpulsation or remained ventilator-dependent secondary to pulmonary edema, after at least 7 days of medical optimization.

These patients had a mean INTERMACS score of 2.6±0.6, and 24 (89%) had a hospital admission for congestive heart failure within the preceding 6 months. The highest preprocedural lactate level was 4.7±3.2 mmol/L, and 6 were intubated (23%). Patients were supported with an intraaortic balloon counterpulsation in 5 (19%), one vasopressor in 10 (38%), 2 vasopressors in 2 (7%), one inotrope in 23 (88%), 2 inotropes in 2 (7%), or renal replacement therapy in 4 (15%). Two (7%) patients had MR in the context of a ST-elevation myocardial infarction, and 3 (11%) underwent percutaneous coronary intervention within 30 days of percutaneous mitral repair.

Patients in this cohort were 71.0±13.0 years, 10 (37%) were female, and 10 (37%) had diabetes mellitus. The mean preprocedural left ventricle ejection fraction was 33.5±13.8% with the Society of Thoracic Surgeons score and Euroscore II of 18.5% and 27.2%, respectively.

All patients had severe MR without stenosis. The median duration of hospital admission before proceeding to percutaneous mitral repair was 23 (9–37) days. The average preprocedural left ventricle end-systolic and diastolic dimension were 51±21 mm and 59±22 mm, respectively whereas the indexed left ventricle end-systolic and diastolic volume were 91±35 mL/m^2 and 120±41 mL/m^2, respectively. The mitral valve area, effective regurgitant orifice area, and right ventricle systolic pressure were 5.3±1.9 cm^2, 0.46±0.11 mm^2, and 54.4±17.1 mm Hg, respectively. The etiology of MR was functional in 25 (93%), in which an ischemic etiology was present in 23. The 2 patients with organic MR had posterior leaflet prolapse. At the time of the procedure, the median cardiac index and pulmonary vascular resistance were 2 L/min per m^2 and 4.9 Woods units, respectively.

Procedural MR reduction to <3+ was observed in 25 (93%) with a mean of 1.6±0.7 clips. There were no device-related technical failures. The mean

Key Words: diabetes mellitus ■ heart failure ■ hemodynamics ■ length of stay ■ liver failure

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Circulation: Cardiovascular Interventions is available at www.ahajournals.org/journal/circinterventions

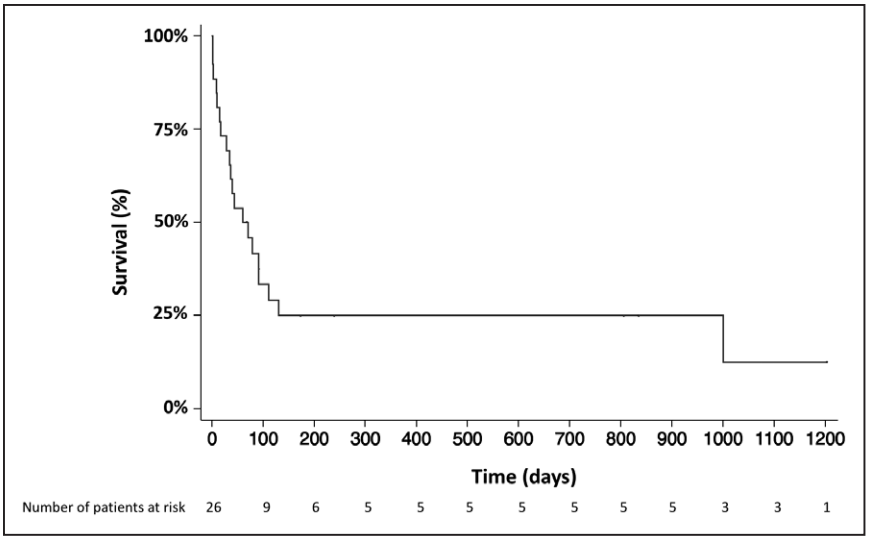

Figure. Survival following percutaneous mitral repair as salvage.
This figure shows the actuarial survival of patients in this cohort.

trans-mitral repair gradient was <5 for all patients, and there were no intraprocedural conversions to surgery. Total hybrid operating room time and fluoroscopy time were 130±40 minutes and 36±17 minutes, respectively.

The median hospital length of stay after the procedure was for 40 days (22–70); 7 (26%) patients died within 30-days of percutaneous repair. In-hospital mortality was observed in 8 (30%) patients, and the median duration in the coronary care unit post-procedure among surviving patients was 3 days. Over the course of follow-up that averaged 202±266 days, 17 (63%) patients died at a mean of 121±242 days post-procedure (Figure). The causes of death were due to cardiogenic shock in 12, appendicitis in 1, cerebral bleed in 1, ischemic bowel in 1, liver failure in 1, and sepsis in 1. Of the survivors, all were weaned off inotropic support and were in New York Heart Association Functional Classification class I (N=1), II (N=7), or III (N=2) at most recent follow-up. Immediately following the MitraClip procedure, 3 (11%) patients had MR ≥3+ whereas 11 (41%) had less than mild MR The 3 patients with persistent MR≥3+ ultimately died over the course of follow-up at a median of 8 days. At most recent follow-up, the left ventricle ejection fraction was 29.9±15.3% for patients in this cohort.

Patients in refractory cardiogenic shock with MR represent a challenging cohort.[4] In patients after acute myocardial infarction, in-hospital mortality was ≈60% in patients with severe MR.[4] In a recent series comprised of 12 patients with MR and cardiogenic shock, 30-day mortality was 17% with a median survival of 198 days.[5] Therefore, in a cohort of patients without therapeutic option, our data suggests that percutaneous mitral repair might be associated with a lower mortality than medical therapy. Further research is needed to verify this hypothesis.

ARTICLE INFORMATION

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Disclosures

None.

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