

A Decade of Robotic Beating-Heart Totally Endoscopic Coronary Bypass (TECAB) at a Single Institution: Outcomes with 10-Year Follow-Up

Objective

Robotic beating-heart totally-endoscopic coronary bypass (TECAB) is one option for sternal-sparing CABG. It can be performed off-pump using single or bilateral ITAs (BITA), including multi-arterial grafting. Results have shown quick patient recovery, good long-term outcomes, and satisfactory graft patency. Despite slow adoption by the cardiac surgery community and limited industry support, we have iterated our practice and continue to routinely perform TECAB. We describe our series of 811 patients undergoing robotic beating-heart TECAB at a single institution with 10-year follow-up.

Methods

Retrospective review of all patients (n=811) undergoing robotic beating-heart TECAB (7/2013-9/2023). All were contacted for mid-term follow-up, and angiographic data were collected in those undergoing hybrid revascularization. Multivariate regression analysis and cox proportional hazard modeling were used to analyze risk factors (RFs) for early/midterm outcomes, respectively.

Results

Mean STS score was $1.5 \pm 2.3\%$. 368 patients (45%) underwent single-vessel grafting and 443 (55%) multivessel TECAB, x2, 3, or 4, of which 86% received BITA. Of 1317 total anastomoses, 45% were done with a distal anastomotic device and 53% (current method) via robotic suturing. There was 1 intraoperative conversion (0.12%); 6 patients required takeback for bleeding (4 via sternotomy). Mean LOS was 2.3 ± 0.8 days. 12% had POAF; there was 1 MI and 2 strokes. Hospital mortality was 0.86% (O/E 0.57). 291 patients (36%) completed hybrid revascularization, of which 238 had graft evaluation during postop PCI. Overall graft patency was 97% (388/400); LIMA-LAD patency was 98%. Midterm follow-up was complete in 100% of patients at mean 42 months (longest 10.2 years). Cardiac-related mortality and all-cause mortality were 2.2% and 16%, respectively. Freedom from MACCE was 93%.

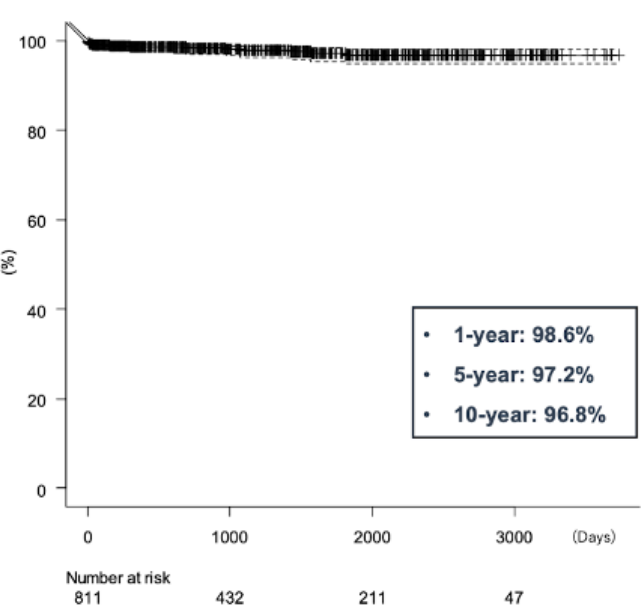
In the multivariate analysis, left-main disease/LMD $\geq 70\%$ was a RF for mid-term cardiac mortality (OR 6.7, CI 1.9-24, $P=0.003$). CKD, LMD, and prior PCI were RFs for midterm MACCE (OR 2.15, CI 1.0-4.5, $P=0.045$; OR 2.12, CI 1.0-4.4, $P=0.041$; OR 2.06, CI 1.06-4.0, $P=0.034$).

Conclusions

In this series of over 800 patients with 10-year follow-up, we show that robotic TECAB can be performed with excellent early and mid-term results using an iterative approach, despite significant challenges. Further industry support and wider surgeon adoption are necessary to ensure sustainability of this procedure.

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Freedom from Cardiac Mortality



Freedom from MACCE

