

Endovascular Repair of One-Hundred Urgent and Emergent-Free or Contained Thoraco-Abdominal Aortic Aneurysm Ruptures: An International Multicenter Transatlantic Experience



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Objective: A ruptured thoracoabdominal aortic aneurysm (rTAA) is a challenging situation, and while endovascular repair used for elective cases has shown satisfactory outcomes, it has been scarcely described in an emergent setting. The aim of this study was to analyze the outcomes of urgent/emergent endovascular aortic repair of patients with free or contained rTAAs.

Methods: An international multicenter retrospective observational study (ClinicalTrials.gov: NCT05956873) was performed from January 2015 to January 2023 in 7 (6 European, 1 United States) vascular surgery centers. All consecutive treated rTAA patients were included and analyzed. Primary endpoints were technical success, 30-day and/or in-hospital mortality, and follow-up patient survival.

Results: A total of 100 rTAA patients were included (75 male; mean age 73 years). All patients presented with symptoms and were treated within 24 hours, including 86 patients with contained ruptures, and 14 with free ruptures. Stent-grafts included multi-branched off-the-shelf devices (Zenith t-Branch, Cook Medical) in 88 patients, physician-modified endografts in 8, and patient-specific devices or parallel grafts in 2 patients (each). Primary technical success was achieved in 89 patients, and 30-day and/or in-hospital mortality was 24%. Major adverse events (MAEs) occurred in 34% of patients. Patients with free rupture had lower technical success (57% vs. 94%, $p < 0.001$), higher rates of MAEs (69% vs. 28%, $p < 0.001$), and pulmonary complications (77% vs. 11%; $p < 0.001$). No statistical differences were detected in mortality rates (43% vs. 21%, $p = 0.075$). Multivariate analysis revealed that contained rupture was the only factor favoring technical success (odds ratio [OR] 10.1; 95% CI: 3.0–33.6; $p < 0.001$).

MAEs (OR 9.4; 95% CI: 2.8–30.5; $p < 0.001$) and pulmonary complications (OR 11.3; 95% CI: 3.0–41.5; $p < 0.001$) were independent risk factors for 30-day in-hospital mortality. The median follow-up time was 13 months (interquartile range 5–24), and survival rate at 12 months was 65%. Aneurysm diameter >80 mm (hazard ratio [HR] 2.0; 95% CI: 1.0–3.0; $p = 0.037$), technical failure (HR 2.6; 95% CI: 1.1–6.5; $p = 0.045$) and pulmonary complications (HR 3.0; 95% CI: 1.2–7.9; $p = 0.021$) were identified as independent risk factors for follow-up mortality.

Conclusion: Endovascular repair of rTAAs can achieve high technical success, however the presence of free rupture increases mortality. Effective management to prevent post-operative complications is crucial for patient survival. Specific long-term studies and guidelines for these subgroups of patients are needed to explore this trend.

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Predictors of Failure to Rescue After Fenestrated-Branched Endovascular Aortic Repair of Thoracoabdominal Aortic Aneurysms



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Objective: Failure to rescue (FTR) is defined as any mortality from an in-hospital complication and has been shown to be an important differentiating factor among centers performing complex operations. The study aimed to assess incidence and predictors for FTR among centers performing fenestrated-branched endovascular aortic repair (FB-EVAR) of thoracoabdominal aortic aneurysms (TAAAs).

Methods: Consecutive patients treated by FB-EVAR for TAAAs between 2005 and 2022 in 27 centers were analyzed. Failure to rescue was defined as in-hospital mortality following ≥ 1 major adverse event (MAE), including major cardiac (myocardial infarction, cardiovascular collapse, acute congestive heart failure) and respiratory events, major stroke, paraplegia, acute kidney injury (AKI) and bowel ischemia requiring surgical resection or escalation of care. Primary endpoints were rates of MAEs and FTR. Predictors for MAEs and FTR were identified using logistic binary regression.

Results: There were 3,634 patients (68% males; mean age 71 \pm 9 years) treated by FB-EVAR for 246 (7%) extent I, 1,226 (34%) extent II, 1,115 (31%) extent III and 1,047 (29%) extent IV TAAAs. Technical success was achieved in 94% with 5% of postoperative mortality. There were 195 mortalities (5%) within 30 days or in-hospital stay. Median incidences of MAEs and FTR were 27% (interquartile range [IQR], 18–33%) and 15% (IQR, 6–21%). There was a significantly ($p < 0.05$) higher rate of MAEs among centers with annual volume below the median. MAE-specific FTR was the highest for bowel ischemia at 50% (IQR, 0–100%) and the lowest for paraplegia at 3% (IQR, 0–24%). Symptomatic/ruptured TAAA was an independent predictor for FTR (odds ratio [OR] 2.99; 95% CI 1.62–5.52; $p < 0.001$). Centers with the highest FTR (20%) had significantly ($p < 0.05$) higher proportion of Stage III–IV CKD, symptomatic or ruptured TAAA and extent I–III TAAAs, as compared to centers with intermediate (10–20%) and low ($<10\%$) FTR rates.

Conclusion: FB-EVAR was performed with low mortality (5%) and high technical success (94%) in this multicenter study. Low volume centers had higher rates of MAEs. The highest FTR was observed for bowel ischemia. Symptomatic/ruptured TAAAs were independently predictive of FTR. Centers with the highest FTR rates had higher proportion of high-risk patients and non-elective procedures for symptomatic or ruptured TAAAs.

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A New Hybrid Graft for Thoracoabdominal Aortic Repair: From Bench to Bedside



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2. Wipper S, Sandhu HK, Kölbel T, et al. In vivo evaluation of a new hybrid graft using retrograde visceral perfusion for thoracoabdominal aortic repair in an animal model. *JTCVS Tech.* 2022;15:1–8.

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