**Long-term outcomes of Fenestrated Endovascular Repair (FEVAR): A GLOBALSTAR registry study**

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**Background**
GLOBALSTAR contains 1401 FEVAR cases (UK, 2003-2022). The aims of this study are to report long-term outcomes for survival and freedom from re-intervention for FEVAR.

**Method**
Inclusion criteria: all aneurysm morphologies, cmFEVAR. Dissections excluded. Time-to-event analyses were conducted for survival and freedom from re-intervention. A 10% threshold was applied to determine data maturity.

**Results**
N= 1401 (14 centres). Demographics: median age was 75 years [69-80,IQR], 87.9% male, highly co-morbid, 44.8% ischaemic heart disease. Survival data maturity reached 10 years and estimated survival [n=1401] at 3, 5 and 10 years were 79.0% [76.9- 81.2%, 95%CI], 63.4% [60.9- 66.1%] and 31.2% [28.2- 34.5%]. Median survival was 6.8 years [6.5-7.2, 95%CI]. Re-intervention data maturity reached 7 years and estimated freedom from re-intervention [n=1395] at 3, 5 and 7 years were 75.3% [72.7-77.9%], 68.5% [65.5-71.6%] and 64.4% [61.1-68.0%]. Mean time to re-intervention was 3.2 years. Females have significantly worse early survival (78.9%, [73.0-85.4%]) than males (86.0%, [84.1-88.0%]) up to 2 years (log-rank, $p<0.01$). Beyond 2 years, differences in survival do not reach significance. Octogenarians have equivalent survival (89.5%, [86.3-92.7%]) to non-octogenarians (91.6%, [90.0-93.4%]) up to 1 year (log-rank, $p=0.19$). Beyond 1 year, survival differences reach statistical significance, though octogenarians' median survival is 5.3 years [4.9-6.1]. There were 27 secondary ruptures over follow-up (1.9%, n=1401), with late ruptures (>8 years) accounting for 3.9% of late deaths (n=129).

**Conclusion**
FEVAR carries risk, especially of re-intervention, but provided effective case selection, may offer an acceptable treatment option for complex AAA patients, including females and octogenarians.

**Comparison of outcomes of Physician Modified Grafts and Custom Made Devices: A matter of aesthetics?**

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**Background**
Physician modified endografts (PMEGs) are increasingly used in the treatment of complex abdominal and thoracoabdominal aortic aneurysms, yet robust comparative data with Custom Made Devices (CMDs) remain scarce. This study compares outcomes between PMEG and CMD repairs.

**Method**
We analysed patients undergoing elective complex juxtarenal and thoracoabdominal aneurysm repair using CMD (fenestrated EVAR) and urgent PMEG (ruptures excluded) between 2010 and 2024. Propensity score matching (1:1 nearest neighbour) was applied to adjust for confounders including aneurysm extent, prior repair, referral source, proximal landing zone, and number of target vessels.

**Results**
A total of 898 patients (753 men, 83.9%) with a median age of 75 years (IQR 70–79) were identified. Aneurysm types comprised juxtarenal (554; 61.7%), Extent IV (217; 24.2%), and Extent I–III (127; 14.1%). Of these, 117 (13.0%) underwent PMEG repair and 781 (87.0%) underwent CMD repair. PMEG patients were more likely to be referred from other centres (79.5% vs 51.7%, $p<0.001$) and to present with thoracoabdominal aneurysms (67.5% vs 32.8%; OR=0.25, 95% CI 0.16–0.37, $p<0.001$). In the matched cohort, 30-day mortality was higher in the PMEG group (8.5% vs 0.9%, $p=0.013$), although long-term survival was comparable (median follow-up 20.2 months; HR=1.20, 95% CI 0.74–1.94, $p=0.456$).

**Conclusion**
In selected patients, PMEG represents a viable option for urgent repair with acceptable long-term outcomes. Multi-centre studies are warranted to further substantiate these findings.

**The detrimental effects of Endovascular Aneursym Repair on aortic compliance**

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**Background**
Aortic compliance cushions left ventricular ejection, converting pulsatile cardiac function into steady peripheral arterial flow. When the aortic wall stiffens, haemodynamics are impaired, provoking damage in multiple organs. Endovascular repair of aortic aneurysms (EVAR) may affect aortic compliance, with significant subsequent cardiovascular and other consequences. We sought to explore the exact effects of EVAR on aortic stiffness.

**Method**
We conducted a non-randomised, prospective study with 140 consecutive patients undergoing elective EVAR or (Open Surgical Repair) OSR for AAA. Aortic stiffness was measured pre-operatively (T0), within one week of the operation (T1), 4-6 weeks (T2), and at one year (T3), using a validated non-invasive device (Vicorder) to measure carotid-femoral (cfPWV) and brachial-femoral Pulse Wave Velocity (bfPWV), as accurate estimates of aortic stiffness.

**Results**
Of 140 patients, 130 (93%) underwent EVAR. CfPWV was significantly correlated with bfPWV ($\rho$=0.467, p<0.001). EVAR resulted in a significant increase in cfPWV (T0: 9.9±1.3, T1: 11±1.6, T3: 12.2±3.8, and T4: 12.5±2.6 m/s; p<0.001 for comparison with T0) and bfPWV (T0: 34.6±12, T2: 40.4±12.4, T3: 44.2±14.6, and T4: 44.3±12.6; p=0.002 for comparison of T1 to with T0, p<0.001 for comparison of T2 and T3 with T0). There were no significant differences across all time-points post-OSR.

**Conclusion**
In this study, the first to use both CfPWV and bfPWV in this context, EVAR, but not OSR, significantly reduced aortic compliance not only immediately post-intervention, but steadily over one year. The clinical significance of enhanced stiffness post-EVAR remains to be explored.

**Unsupervised machine learning for identifying thrombogenic morphological phenotypes in abdominal aortic aneurysms using fully automated volume-segmented imaging**

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**Background**
Thrombo- and microembolic complications following abdominal aortic aneurysm repair are hypothesised to be associated with wall thrombus burden, which is higher in women. Fully automatic volume segmentation (FAVS) of imaging enables extraction of morphological features from which thrombogenic phenotypes may be identified.

**Method**
This was a multi-centre retrospective cohort study using FAVS to examine pre-operative imaging for elective AAA repairs (2013-2023). Radiological data were matched with National Vascular Registry thromboembolic outcomes data (cerebral, bowel, renal or limb ischaemia). Principal component analysis was used for dimensionality reduction, followed by unsupervised machine learning with k-nearest neighbours (kNN) clustering based on radiological parameters. The optimal number of clusters was determined using silhouette scores. Clusters were compared using multivariate logistic regression, adjusting for aortic size index, cardiovascular risk parameters, and repair type.

**Results**
Of 1655 patients, 1455 had sufficient quality imaging for FAVS (145 women, 1310 men). kNN clustering identified two morphological subtypes (n=878 and n=577), with notable sex imbalance (13.8% vs. 4.1% women, $p<0.001$). The clusters differed in wall thrombus burden across 16 of 24 parameters ($p<0.01$). Thromboembolic outcomes were few in both clusters (2.6% vs 1.7%, $p=0.35$). Adjusted multivariate regression suggested a trend towards higher thromboembolic events in high thrombus burden cluster (OR 1.56 95%CIs 0.71-3.43, $p=0.23$).

**Conclusion**
Unsupervised machine learning can identify distinct morphological phenotypes with significant thrombus burden difference. These phenotypes exhibit sex imbalance and may correlate with thromboembolic outcomes. Further research is needed to explore mechanisms underlying the increased thromboembolic event rate in women, which is likely multifactorial.

**Fenestrated-branch endovascular aortic repair after prior endovascular or open AAA repair is associated with inferior mid-term survival compared to primary repair**

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**Background**
To compare the outcome of elective fenestrated and branch endovascular aortic repair (FBEVAR) in patients with and without prior abdominal aortic aneurysm (AAA) repair.

**Method**
Single-centre retrospective study of consecutive patients who underwent elective FBEVAR between December 2007 and December 2024. Primary endpoint was Kaplan-Meier estimates of medium-term survival. Data are presented as median (IQR). A P-value of <0.05 was considered significant.

**Results**
Of 917 patients [761 men; median age, 75 (70-79) years] treated for juxtarenal (JR) AAA (n=519) or thoracoabdominal aortic aneurysms (TAAA) (n=398), 120 (12.4%) had prior AAA repair. Patients with prior EVAR (n=72) were significantly older [median age 77 (71-82) yrs vs. prior OSR/primary repair 74 (69-79); p=.008] and more likely to have JRAAA repair (81%), while those with prior OSR (n=48) were more likely to have extent I-III TAAA repair (52%) (p<.001). 30-day mortality was 2.1% (n=19; none in the prior repair cohort; NSD). Median follow-up was 46 months (19-80). Estimated 5-year survival (±SE) was significantly worse in patients who had prior EVAR (53%±7%) and prior OSR (56%±8%) compared with primary repair (66%±2%; p=.002).

**Conclusion**
FBEVAR after prior AAA repair is as safe as primary repair, but mid-term survival is inferior. This may be a consequence of older patients being treated after prior EVAR, and more extensive disease requiring repair after prior OSR.

**Novel protocol for comprehensive assessment of Type B Aortic Dissection morphology: A validated and reproducible protocol for clinical and research applications**

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**Background**
This study aims to demonstrate the reproducibility of a novel imaging protocol for the analysis of aortic morphology of Type B Aortic Dissection (TBAD) for clinical and research purposes.

**Method**
Protocol was designed based on systematic review and expert opinion. A total of 56 morphological parameters were assessed across six morphological domains. To validate the protocol, 4 observers measured these variables on 20 computed tomographic (CT) angiograms on a total of 10 patients using 3-dimensional imaging reconstruction software. One observer performed repeated measurements. The intra- and inter-observer variabilities were calculated for all continuous variables. Cohen's kappa was used to assess agreement between observers for categorical variables. Measurement time for all 56 features was recorded.

**Results**
Aortic arch; false lumen morphology; endovascular intervention and aortic remodelling showed strong levels of agreement. Aortic measurements showed satisfactory intra- and interobserver variability with maximum repeatability coefficient (RC) for interobserver variability of 5.02 mm and intraobserver variability of 2.42 mm across all measurements. Dissection morphology demonstrated least favourable levels of agreement. Entry tear morphology including primary entry tear (PET) size and distance from left subclavian artery (LSCA) showed small mean differences but was associated with high RCs. The measurement protocol was completed in a median time of 28 (22-35) minutes.

**Conclusion**
Accurate three-dimensional analysis of TBAD morphology can be reliably performed within a reasonable timeframe. Measurements based on consistent anatomical landmarks demonstrated the highest reproducibility. It is suggested that this protocol is adopted for clinical studies and trials on acute TBAD.