Univariate Analysis for the VQI FBVAR Dataset

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p-value

We use Welch's Two Sample t-test for continuous variables and Pearson's Chi-squared Test for categorical variables.

Descriptive statistics tables

population of interest

	Overall
	(N=3510)
PRESENTATION	
Asymptomatic	3026 (86.2%)
Symptomatic	484 (13.8%)

Patient demographic and co-morbidities

Table: A comparison of the baseline demographic and co-morbidities characteristics for symptomatic versus asymptomatic patients who undergo the F-BEVAR procedure

	Asymptomatic	Symptomatic	P-value
	(N=3026)	(N=484)	
AGE			
Mean (SD)	73.1 (8.31)	68.1 (11.7)	<0.001
Median [Min, Max]	74.0 [0, 90.0]	70.0 [33.0, 90.0]	
AGECAT			
<40	4 (0.1%)	15 (3.1%)	<0.001
>89	26 (0.9%)	5 (1.0%)	
40-49	27 (0.9%)	19 (3.9%)	
50-59	122 (4.0%)	59 (12.2%)	
60-69	762 (25.2%)	144 (29.8%)	
70-79	1454 (48.1%)	175 (36.2%)	
80-89	631 (20.9%)	67 (13.8%)	
GENDER			
female	704 (23.3%)	184 (38.0%)	<0.001
male	2322 (76.7%)	300 (62.0%)	
ETHNICITY			
Hispanic or Latino	122 (4.0%)	20 (4.1%)	1
None Hispanic or Latino	2900 (95.8%)	464 (95.9%)	
Missing	4 (0.1%)	0 (0%)	
RACE			
American Indian or Alaskan Native	6 (0.2%)	1 (0.2%)	<0.001
Asian	71 (2.3%)	10 (2.1%)	

	Asymptomatic	Symptomatic	P-value
Black or African American	215 (7.1%)	109 (22.5%)	
More than 1 race	3 (0.1%)	2 (0.4%)	
Native Hawaiian or other Pacific Islander	4 (0.1%)	2 (0.4%)	
Unknown/Other	205 (6.8%)	41 (8.5%)	
White	2522 (83.3%)	319 (65.9%)	
TRANSFER			
Hospital	39 (1.3%)	238 (49.2%)	<0.001
No	2985 (98.6%)	245 (50.6%)	
Rehab Unit	2 (0.1%)	1 (0.2%)	
PRIMARYINSURER			
Commercial	846 (28.0%)	168 (34.7%)	<0.001
Medicaid	63 (2.1%)	40 (8.3%)	
Medicare	1675 (55.4%)	214 (44.2%)	
Military/VA	93 (3.1%)	12 (2.5%)	
Non US Insurance	207 (6.8%)	12 (2.5%)	
Self Pay	15 (0.5%)	17 (3.5%)	
Missing	127 (4.2%)	21 (4.3%)	
LIVINGSTATUS			
Home	3003 (99.2%)	477 (98.6%)	0.273
Homeless	2 (0.1%)	1 (0.2%)	
Nursing home	21 (0.7%)	6 (1.2%)	
PREOP_FUNCSTATUS			
Assisted care	49 (1.6%)	18 (3.7%)	0.024
Bed bound	4 (0.1%)	1 (0.2%)	
Full	2023 (66.9%)	305 (63.0%)	
Light work	643 (21.2%)	105 (21.7%)	
Self care	306 (10.1%)	54 (11.2%)	
Missing	1 (0.0%)	1 (0.2%)	
PRIOR_CVD			
No	2724 (90.0%)	426 (88.0%)	0.205
Yes	302 (10.0%)	58 (12.0%)	
PRIOR_CAD			
No	2188 (72.3%)	345 (71.3%)	0.68
Yes	838 (27.7%)	139 (28.7%)	
PRIOR_CHF			
No	2640 (87.2%)	408 (84.3%)	0.088
Yes	386 (12.8%)	76 (15.7%)	
COPD			
No	1893 (62.6%)	305 (63.0%)	0.886
Yes	1133 (37.4%)	179 (37.0%)	
DIABETES			
No	2477 (81.9%)	397 (82.0%)	0.98
Yes	549 (18.1%)	87 (18.0%)	
PREOP_DIALYSIS			
No	2980 (98.5%)	453 (93.6%)	<0.001
Yes	46 (1.5%)	31 (6.4%)	
HTN			
No	340 (11.2%)	42 (8.7%)	0.115
Yes	2679 (88.5%)	439 (90.7%)	
Missing	7 (0.2%)	3 (0.6%)	
PREOP_SMOKING			
No	388 (12.8%)	108 (22.3%)	<0.001

	Asymptomatic	Symptomatic	P-value
Yes	2638 (87.2%)	376 (77.7%)	
PRIOR_CABG			
No	2515 (83.1%)	419 (86.6%)	0.068
Yes	510 (16.9%)	65 (13.4%)	
Missing	1 (0.0%)	0 (0%)	
PRIOR_PCI			
No	2317 (76.6%)	403 (83.3%)	0.001
Yes	707 (23.4%)	81 (16.7%)	
Missing	2 (0.1%)	0 (0%)	
PRIOR_ANEURREP			
No	2370 (78.3%)	351 (72.5%)	0.005
Yes	656 (21.7%)	133 (27.5%)	
STRESS			
No	1519 (50.2%)	385 (79.5%)	<0.001
Yes	1505 (49.7%)	99 (20.5%)	
Missing	2 (0.1%)	0 (0%)	
PREOP_CREAT			
Mean (SD)	1.18 (0.624)	1.20 (0.776)	0.554
Median [Min, Max]	1.08 [0, 14.4]	1.00 [0.300, 7.50]	
Missing	60 (2.0%)	23 (4.8%)	
DC_ASA			
No	429 (14.2%)	78 (16.1%)	0.2
Yes	2527 (83.5%)	383 (79.1%)	
Missing	70 (2.3%)	23 (4.8%)	
DC_P2Y			
No	1333 (44.1%)	265 (54.8%)	<0.001
Yes	1622 (53.6%)	196 (40.5%)	
Missing	71 (2.3%)	23 (4.8%)	
DC_STATIN			
No	536 (17.7%)	102 (21.1%)	0.047
Yes	2420 (80.0%)	359 (74.2%)	
Missing	70 (2.3%)	23 (4.8%)	

Operative Variables

Table: A comparison of the operative characteristics for symptomatic versus asymptomatic patients who undergo the F-BEVAR procedure

	Asymptomatic	Symptomatic	P-value
	(N=3026)	(N=484)	
PRIOR_AORSURG			
Both	75 (2.5%)	12 (2.5%)	0.002
Endo	292 (9.6%)	73 (15.1%)	
None	2372 (78.4%)	348 (71.9%)	
Open	287 (9.5%)	51 (10.5%)	
PATHOLOGY			
Aneurysm	2826 (93.4%)	314 (64.9%)	<0.001
Aneurysm from dissection	109 (3.6%)	37 (7.6%)	
Dissection	55 (1.8%)	100 (20.7%)	
PAU/IMH	36 (1.2%)	33 (6.8%)	
PREOP_MAXAAADIA			
Mean (SD)	60.8 (10.7)	61.6 (18.6)	0.371

	Asymptomatic	Symptomatic	P-value
Median [Min, Max]	60.0 [5.00, 130]	60.0 [5.50, 126]	
Missing	13 (0.4%)	13 (2.7%)	
URGENCY			
Elective	2989 (98.8%)	243 (50.2%)	<0.001
Emergent	2 (0.1%)	55 (11.4%)	
Urgent	35 (1.2%)	186 (38.4%)	
PATHOLOGY_ANEURYSM_TYPE			
Anastomotic	39 (1.3%)	6 (1.2%)	<0.001
Degenerative, fusiform	2453 (81.1%)	264 (54.5%)	
Degenerative, saccular	270 (8.9%)	35 (7.2%)	
Intercostal or visceral patch	16 (0.5%)	1 (0.2%)	
Prior trauma	1 (0.0%)	3 (0.6%)	
Missing	247 (8.2%)	175 (36.2%)	
PATHOLOGY_DISSECT_TYPE			
Acute, <= 30 days	10 (0.3%)	85 (17.6%)	<0.001
Chronic, >30 days	154 (5.1%)	52 (10.7%)	
Missing	2862 (94.6%)	347 (71.7%)	
PROXZONE_DISEASE			
Mean (SD)	6.60 (1.82)	4.91 (2.18)	<0.001
Median [Min, Max]	7.00 [2.00, 9.00]	5.00 [2.00, 9.00]	
GENHIST			
Ehlers-Danlos	1 (0.0%)	2 (0.4%)	0.042
Loeys-Dietz	1 (0.0%)	0 (0%)	
Marfans	11 (0.4%)	3 (0.6%)	
Non-specific	84 (2.8%)	8 (1.7%)	
None	2929 (96.8%)	471 (97.3%)	
DISTZONE_DISEASE			
10B	600 (19.8%)	63 (13.0%)	<0.001
10L	131 (4.3%)	26 (5.4%)	
10R	182 (6.0%)	31 (6.4%)	
11B	56 (1.9%)	12 (2.5%)	
11L	31 (1.0%)	8 (1.7%)	
11R	36 (1.2%)	10 (2.1%)	
3	10 (0.3%)	3 (0.6%)	
4	37 (1.2%)	14 (2.9%)	
5	51 (1.7%)	38 (7.9%)	
6	21 (0.7%)	10 (2.1%)	
7	15 (0.5%)	23 (4.8%)	
8	145 (4.8%)	32 (6.6%)	
9	1711 (56.5%)	214 (44.2%)	
extent			
Juxtarenal AAA	1205 (39.8%)	83 (17.1%)	<0.001
Type 1 TAAA	84 (2.8%)	54 (11.2%)	
Type 2 TAAA	165 (5.5%)	103 (21.3%)	
Type 3 TAAA	477 (15.8%)	95 (19.6%)	
Type 4 TAAA	871 (28.8%)	104 (21.5%)	
Type 5 TAAA	44 (1.5%)	13 (2.7%)	
Missing	180 (5.9%)	32 (6.6%)	
ANESTHESIA			
General	2991 (98.8%)	474 (97.9%)	0.095
Local	21 (0.7%)	8 (1.7%)	
Regional	14 (0.5%)	2 (0.4%)	

	Asymptomatic	Symptomatic	P-value
CONTRAST			
Mean (SD)	123 (70.8)	119 (74.0)	0.284
Median [Min, Max]	110 [0, 677]	100 [0, 501]	
Missing	56 (1.9%)	11 (2.3%)	
EBL			
Mean (SD)	435 (719)	375 (446)	0.015
Median [Min, Max]	250 [0, 25000]	200 [0, 3000]	
Missing	32 (1.1%)	8 (1.7%)	
FLUOROTIME			
Mean (SD)	72.1 (39.2)	59.7 (43.7)	<0.001
Median [Min, Max]	64.4 [1.00, 320]	52.3 [4.00, 285]	
Missing	147 (4.9%)	15 (3.1%)	
INTRAOP_PRBC			
Mean (SD)	0.665 (4.11)	0.983 (1.95)	0.006
Median [Min, Max]	0 [0, 200]	0 [0, 15.0]	
Missing	2 (0.1%)	2 (0.4%)	
TOTALPROCTIME			
Mean (SD)	252 (113)	247 (135)	0.431
Median [Min, Max]	230 [25.0, 911]	213 [41.0, 852]	
Missing	2 (0.1%)	1 (0.2%)	
IVUSTEE			
Both	27 (0.9%)	15 (3.1%)	<0.001
IVUS	512 (16.9%)	190 (39.3%)	
No	2445 (80.8%)	270 (55.8%)	
TEE	32 (1.1%)	8 (1.7%)	
Missing	10 (0.3%)	1 (0.2%)	
ACCESS			
Open	1086 (35.9%)	170 (35.1%)	0.315
Percutaneous	1620 (53.5%)	226 (46.7%)	
Missing	320 (10.6%)	88 (18.2%)	
ARMNECK_ACCESS			
For both	243 (8.0%)	73 (15.1%)	<0.001
For branch treatment	514 (17.0%)	140 (28.9%)	
For femoral-brachial wire	114 (3.8%)	30 (6.2%)	
No	2155 (71.2%)	241 (49.8%)	
AORDEV_NUM			
Mean (SD)	2.25 (0.918)	2.41 (1.20)	0.006
Median [Min, Max]	2.00 [1.00, 6.00]	2.00 [1.00, 6.00]	
AORDEV_CMOD			
No	791 (26.1%)	171 (35.3%)	<0.001
Yes	2235 (73.9%)	313 (64.7%)	
DEV_GTYPE			
Custom	1581 (52.2%)	97 (20.0%)	<0.001
Physician modified	577 (19.1%)	188 (38.8%)	
Standard	868 (28.7%)	199 (41.1%)	
ILIACDEV_END_R			
Common	1555 (51.4%)	133 (27.5%)	0.085
External, Unintended	18 (0.6%)	3 (0.6%)	
External,Intended	200 (6.6%)	28 (5.8%)	
None	24 (0.8%)	1 (0.2%)	
Missing	1229 (40.6%)	319 (65.9%)	
ILIACDEV_END_L			

	Asymptomatic	Symptomatic	P-value
Common	1595 (52.7%)	130 (26.9%)	0.168
External, Unintended	9 (0.3%)	2 (0.4%)	
External,Intended	157 (5.2%)	20 (4.1%)	
None	21 (0.7%)	1 (0.2%)	
Missing	1244 (41.1%)	331 (68.4%)	
BRANCH_STAGED			
No	2854 (94.3%)	442 (91.3%)	0.009
Yes	167 (5.5%)	42 (8.7%)	
Missing	5 (0.2%)	0 (0%)	
BRANCH_LSUB			
No	2851 (94.2%)	354 (73.1%)	<0.001
Yes	175 (5.8%)	130 (26.9%)	
BRANCH_CELIAC			
No	1399 (46.2%)	125 (25.8%)	<0.001
Yes	1627 (53.8%)	359 (74.2%)	
BRANCH_SMA			
No	487 (16.1%)	83 (17.1%)	0.605
Yes	2539 (83.9%)	401 (82.9%)	
BRANCH_RRENAL			
No	105 (3.5%)	80 (16.5%)	<0.001
Yes	2921 (96.5%)	404 (83.5%)	
BRANCH_LRENAL			
No	105 (3.5%)	80 (16.5%)	<0.001
Yes	2921 (96.5%)	404 (83.5%)	
ANESTHESIA_GEN_TIMEEXT			
<12 hrs	175 (5.8%)	33 (6.8%)	<0.001
>24 hrs	67 (2.2%)	41 (8.5%)	
12-24 hrs	101 (3.3%)	24 (5.0%)	
In OR	2641 (87.3%)	374 (77.3%)	
Missing	42 (1.4%)	12 (2.5%)	
POSTOP_SPINALDRAIN			
None	2403 (79.4%)	290 (59.9%)	<0.001
Post-op for spinal ischemia	19 (0.6%)	5 (1.0%)	
Post-op, prophylactic	13 (0.4%)	6 (1.2%)	
Pre-op	591 (19.5%)	183 (37.8%)	
lrenal			
Chimney	35 (1.2%)	10 (2.1%)	<0.001
None	323 (10.7%)	78 (16.1%)	
Occluded/Covered	76 (2.5%)	25 (5.2%)	
Scallop/Fen/Branch	2480 (82.0%)	290 (59.9%)	
Missing	112 (3.7%)	81 (16.7%)	
rrenal			
Chimney	32 (1.1%)	9 (1.9%)	<0.001
None	357 (11.8%)	96 (19.8%)	
Occluded/Covered	72 (2.4%)	22 (4.5%)	
Scallop/Fen/Branch	2374 (78.5%)	265 (54.8%)	
Missing	191 (6.3%)	92 (19.0%)	
sma			
Chimney	18 (0.6%)	6 (1.2%)	<0.001
None	267 (8.8%)	76 (15.7%)	
Occluded/Covered	3 (0.1%)	0 (0%)	
Scallop/Fen/Branch	2243 (74.1%)	319 (65.9%)	

	Asymptomatic	Symptomatic	P-value
Missing	495 (16.4%)	83 (17.1%)	
celiac			
Chimney	9 (0.3%)	3 (0.6%)	0.014
None	381 (12.6%)	94 (19.4%)	
Occluded/Covered	69 (2.3%)	28 (5.8%)	
Scallop/Fen/Branch	1163 (38.4%)	234 (48.3%)	
Missing	1404 (46.4%)	125 (25.8%)	
lsub			
Chimney	6 (0.2%)	0 (0%)	0.014
None	15 (0.5%)	10 (2.1%)	
Occluded/Covered	3 (0.1%)	10 (2.1%)	
Scallop/Fen/Branch	125 (4.1%)	99 (20.5%)	
Missing	2877 (95.1%)	365 (75.4%)	

The levels of `lrenal`,`rrenal`,`sma`,`celiac`,`lsub` are really messy.

75 patients have at least one 'Chimney'.

206 patients have at least one 'Occluded/Covered'.

3510 patients have at least one 'Scallop/Fen/Branch'.

0 patients have all 'None'.

Outcomes

Table 3: A comparison of the long term follow-up outcomes for symptomatic versus asymptomatic patients who undergo the F-BEVAR procedure

	Asymptomatic	Symptomatic	P-value
	(N=3026)	(N=484)	
DEAD			
No	2651 (87.6%)	389 (80.4%)	<0.001
Yes	375 (12.4%)	95 (19.6%)	
PROC_SURVIVALDAYS			
Mean (SD)	787 (769)	673 (747)	0.002
Median [Min, Max]	484 [0, 3390]	400 [0, 3290]	
LTF_NUM_REINT			
Mean (SD)	1.10 (0.299)	1.17 (0.384)	0.332
Median [Min, Max]	1.00 [1.00, 2.00]	1.00 [1.00, 2.00]	
Missing	2844 (94.0%)	455 (94.0%)	

Table 3: A comparison of the procedure outcomes for symptomatic versus asymptomatic patients who undergo the F-BEVAR procedure

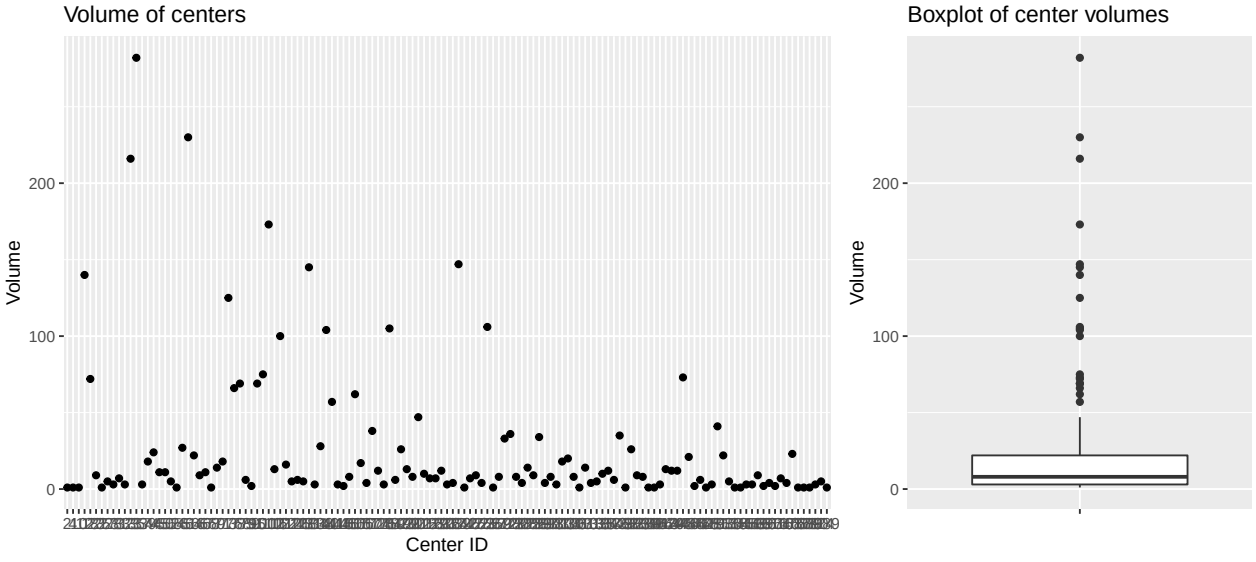
	Asymptomatic	Symptomatic	P-value
	(N=3026)	(N=484)	
TOTAL_LOS			
Mean (SD)	6.40 (21.2)	12.9 (28.0)	<0.001
Median [Min, Max]	3.00 [0, 372]	8.00 [1.00, 376]	
POSTOP_LOS			
Mean (SD)	5.62 (18.6)	8.04 (8.52)	<0.001

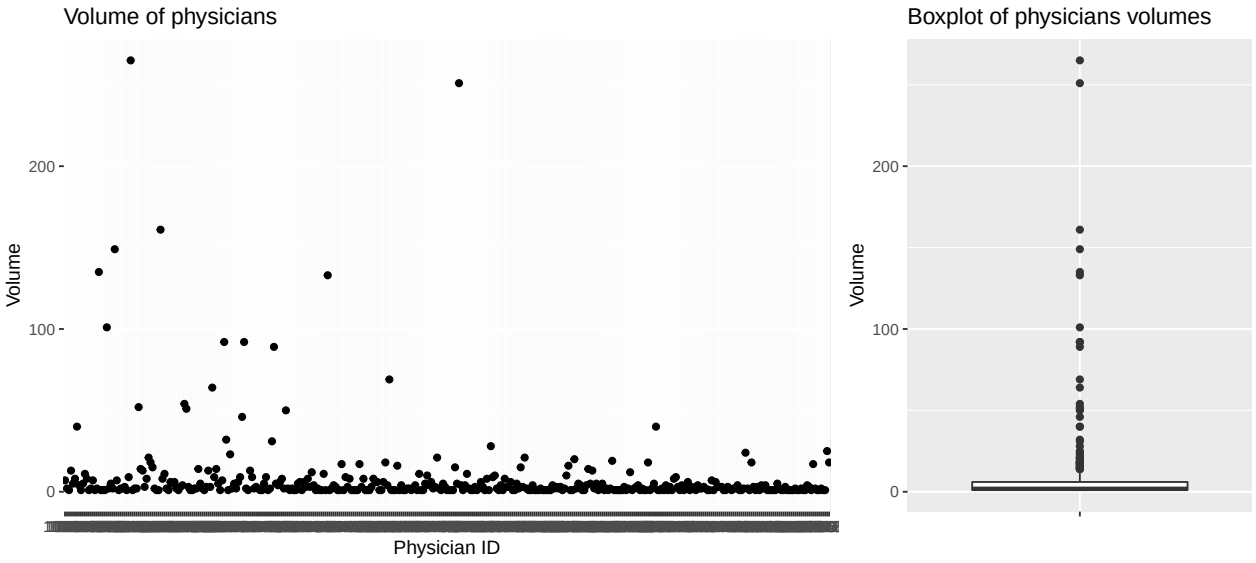
	Asymptomatic	Symptomatic	P-value
Median [Min, Max]	3.00 [0, 372]	5.00 [0, 80.0]	
AORDEV_TECHSUCC			
No	78 (2.6%)	17 (3.5%)	0.231
Yes	2669 (88.2%)	403 (83.3%)	
Missing	279 (9.2%)	64 (13.2%)	
CONVTOOPEN			
No	3016 (99.7%)	483 (99.8%)	0.988
Yes	10 (0.3%)	1 (0.2%)	
LEAKATCOMP_NONE			
No	981 (32.4%)	105 (21.7%)	0.189
Yes	1893 (62.6%)	240 (49.6%)	
Missing	152 (5.0%)	139 (28.7%)	
ICUSTAY			
Mean (SD)	2.12 (4.35)	4.77 (6.28)	<0.001
Median [Min, Max]	1.00 [0, 85.0]	3.00 [0, 49.0]	
Missing	3 (0.1%)	1 (0.2%)	
POSTOP_PRBC			
Mean (SD)	1.22 (4.07)	1.91 (3.85)	<0.001
Median [Min, Max]	0 [0, 77.0]	0 [0, 38.0]	
Missing	2 (0.1%)	0 (0%)	
POSTOP_VASO			
No	2493 (82.4%)	333 (68.8%)	<0.001
Yes	531 (17.5%)	151 (31.2%)	
Missing	2 (0.1%)	0 (0%)	
POSTOP_HIGHCREAT			
Mean (SD)	1.45 (1.10)	1.88 (1.88)	<0.001
Median [Min, Max]	1.19 [0.0100, 15.4]	1.20 [0.450, 11.8]	
Missing	16 (0.5%)	4 (0.8%)	
POSTOP_COMPLICATIONS			
No	2410 (79.6%)	345 (71.3%)	<0.001
Yes	615 (20.3%)	139 (28.7%)	
Missing	1 (0.0%)	0 (0%)	
ACCESS_COMPLICATION			
No	2995 (99.0%)	477 (98.6%)	0.551
Yes	31 (1.0%)	7 (1.4%)	
POSTOP_AH			
No	2725 (90.1%)	436 (90.1%)	1
Yes	301 (9.9%)	48 (9.9%)	
POSTOP_CEREBROSX			
Mean (SD)	0.0731 (0.642)	0.153 (0.933)	0.07
Median [Min, Max]	0 [0, 7.00]	0 [0, 7.00]	
Missing	1 (0.0%)	0 (0%)	
POSTOP_RESPIRATORY			
No	2901 (95.9%)	440 (90.9%)	<0.001
Yes	125 (4.1%)	44 (9.1%)	
POSTOP_DIALYSIS			
No	2937 (97.1%)	438 (90.5%)	<0.001
Yes	50 (1.7%)	24 (5.0%)	
Missing	39 (1.3%)	22 (4.5%)	
POSTOP_ARMEMBO			
No	3013 (99.6%)	480 (99.2%)	0.415
Yes	13 (0.4%)	4 (0.8%)	

	Asymptomatic	Symptomatic	P-value
POSTOP_LEGEMBO			
No	2962 (97.9%)	464 (95.9%)	0.011
Yes	64 (2.1%)	20 (4.1%)	
POSTOP_LEGCOMPART			
No	2999 (99.1%)	480 (99.2%)	1
Yes	27 (0.9%)	4 (0.8%)	
POSTOP_INTISCH			
Mean (SD)	0.0357 (0.327)	0.0599 (0.444)	0.25
Median [Min, Max]	0 [0, 4.00]	0 [0, 4.00]	
POSTOP_RENALISCH			
No	2937 (97.1%)	467 (96.5%)	0.59
Yes	89 (2.9%)	17 (3.5%)	
POSTOP_SPINAL_ISCHEMIA			
No	2940 (97.2%)	453 (93.6%)	<0.001
Yes	86 (2.8%)	31 (6.4%)	
RETX_R_RTOR			
No	2844 (94.0%)	434 (89.7%)	<0.001
Yes	181 (6.0%)	50 (10.3%)	
Missing	1 (0.0%)	0 (0%)	
DC_STATUS			
Dead	69 (2.3%)	22 (4.5%)	<0.001
Home	2566 (84.8%)	350 (72.3%)	
Homeless	1 (0.0%)	1 (0.2%)	
Nursing Home	107 (3.5%)	38 (7.9%)	
Other Hospital	24 (0.8%)	17 (3.5%)	
Rehab Unit	259 (8.6%)	56 (11.6%)	
BRANCH_POST			
No	2611 (86.3%)	364 (75.2%)	<0.001
Yes	412 (13.6%)	119 (24.6%)	
Missing	3 (0.1%)	1 (0.2%)	

Volume Variables

Volume Variables: `REGIONID`, `CENTERID`, `PHYSICIANID`





19 regions, 133 centers, 385 physicians.

Quantiles of centers' volume: 1, 3, 8, 22, 282

Quantiles of physicians' volume: 1, 1, 2, 6, 265

Code Appendix

```
knitr::opts_chunk$set(echo = FALSE,message = FALSE,warning = FALSE,fig.width = 10)
library(tidyverse)
library(table1)
library(survival)
library(Hmisc)
library(ggplot2)
library(ggpubr)

## ------------- working directories for Lily ----------
wd_lily = '/Users/hanyiwang/Desktop/Comparative-analysis-of-treatments-of-CAA'
path_lily = c("../data/FBVAR.csv")


## ------------- working directories for Jenn ----------
#wd_jenn = '/Users/jenniferci/Desktop/Comparative-analysis-of-treatments-of-CAA'
#path_jenn = c(
#  "/Users/jenniferci/Desktop/Comparative-analysis-of-treatments-of-CAA/TEVAR_International_20210712/TE
#  "/Users/jenniferci/Desktop/Comparative-analysis-of-treatments-of-CAA/TEVAR_International_20210712/TE
#  "/Users/jenniferci/Desktop/Comparative-analysis-of-treatments-of-CAA/TEVAR_International_20210901/TE
#  "/Users/jenniferci/Desktop/Comparative-analysis-of-treatments-of-CAA/TEVAR_International_20210901/TE

## ------------- read data ----------
setwd(wd_lily)
FBVAR = read.csv(path_lily)

#setwd(wd_jenn)
#TEVAR_LTF_07 = read.csv(path_jenn[1])
#TEVAR_PROC_07 = read.csv(path_jenn[2])
#TEVAR_LTF_09 = read.csv(path_jenn[3])
#TEVAR_PROC_09 = read.csv(path_jenn[4])
pvalue <- function(x, ...) {
    y <- unlist(x)
    g <- factor(rep(1:length(x), times=sapply(x, length)))
    if (is.numeric(y)) {
        # For numeric variables, Welch's Two Sample t-test
        p <- t.test(y ~ g)$p.value
    } else {
        # For categorical variables, Pearson's Chi-squared Test
        p <- chisq.test(table(y, g))$p.value
    }
    c("", sub("<", "&lt;", format.pval(p, digits=3, eps=0.001)))
}

## ------------- variables labels and units----------
# var.labels = c(AGE="Age", AGECAT="Age category")
# label(FBVAR) = as.list(var.labels[match(names(FBVAR), names(var.labels))])
#
# units(FBVAR$AGE) = "years"

## ------------- population of interest ----------
table1(~  PRESENTATION, data = FBVAR)
```

```
## ------------- table: Patient demographic and co-morbidities----------

table1(~   AGE+AGECAT+GENDER+ETHNICITY+ RACE+ TRANSFER+ PRIMARYINSURER+ LIVINGSTATUS+ PREOP_FUNCSTATUS+
       | PRESENTATION, data = FBVAR,overall=F, extra.col=list(`P-value`=pvalue))
## ------------- table:  Operative Variables----------
table1(~ PRIOR_AORSURG+ PATHOLOGY+ PREOP_MAXAAADIA+ URGENCY+ PATHOLOGY_ANEURYSM_TYPE+ PATHOLOGY_DISSECT
       | PRESENTATION, data = FBVAR,overall=F, extra.col=list(`P-value`=pvalue))

## ------------- table: primary outcomes----------
table1(~ DEAD+PROC_SURVIVALDAYS+LTF_NUM_REINT | PRESENTATION, data = FBVAR,overall=F, extra.col=list(`P
## ------------- table: secondary outcomes----------
table1(~ TOTAL_LOS+ POSTOP_LOS+ AORDEV_TECHSUCC+ CONVTOOPEN+ LEAKATCOMP_NONE+ ICUSTAY+ POSTOP_PRBC+ POS
       | PRESENTATION, data = FBVAR,overall=F, extra.col=list(`P-value`=pvalue))

## ------------- Survival curves----------

## ------------- clustering variables----------

#FBVAR %>% select(REGIONID) %>% table()
#FBVAR %>% select(CENTERID) %>% table()
#FBVAR %>% select(PHYSICIANID) %>% table()

## ------------- plots of volume----------
center_vol = as.data.frame(FBVAR %>% select(CENTERID) %>% table())
phys_vol = as.data.frame(FBVAR %>% select(PHYSICIANID) %>% table())

p1 = ggplot(data = center_vol, aes(x=CENTERID, y=Freq)) +
  geom_point() +
  labs(title = 'Volume of centers',x='Center ID',y='Volume')

p2 = ggplot(data = center_vol, aes(x='', y=Freq)) +
  geom_boxplot() +
  labs(title = 'Boxplot of center volumes',x='',y='Volume')

print(ggarrange(p1, p2, widths = c(20,10),ncol = 2, nrow = 1, align = "h"))

p3 = ggplot(data = phys_vol, aes(x=PHYSICIANID, y=Freq)) +
  geom_point() +
  labs(title = 'Volume of physicians',x='Physician ID',y='Volume')

p4 = ggplot(data = phys_vol, aes(x='', y=Freq)) +
  geom_boxplot() +
  labs(title = 'Boxplot of physicians volumes',x='',y='Volume')

print(ggarrange(p3, p4, widths = c(20,10),ncol = 2, nrow = 1, align = "h"))
```