

Swissvasc Performance Report 2019 - 2022

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1 Introduction

The aim of this report is to transparently present the treatment results of a series of vascular interventions performed in Switzerland. To maximize comparability, the cases compared are defined within narrow limits. This automatically leads to lower case numbers compared to the figures in the SwissVasc Annual Report, where a broader filter is intended to reflect the annual case number (i.e. workload) for each clinic. To increase the number of cases (and events), this report includes cases treated within a period of four years, i.e. between 2019 and 2022.

1.1 Statistical Analysis

Number of procedures and patient’s characteristics are summarized and presented by tables. Continuous variables were summarized by mean and standard deviation if normally distributed or by median and range if skewed. Continuous variables are compared using student’s t-test if normally distributed or Mann-Whitney-U test if skewed, respectively. Categorical variables were summarized with counts and percentages for each level of the variable and compared using Pearson’s Chi2 test. All p-values are two-sided.

1.1.1 Density Plots

Density plots are used to visualize continuous variables such as aneurysm diameter. Density plots are a variation of a classical histogram. Instead of bins, a weighted average of neighboring observations is used (i.e. Kernel smoother).

1.1.2 Funnel Plots

The funnel plots shown reflect the proportion of patients for whom the event in question did not occur (i.e. living patients; patients without stroke; patients with open reconstruction). Missing information was not counted as “event-free”. Missing information therefore includes both the occurrence of the event (i.e. death, stroke, occluded reconstruction) as well as missing information.

Each participating clinic is represented by a grey dot on the diagram. On the x-axis is the total number of procedures performed. On the y-axis is the proportion of event-free patients (“higher is better”). The blue dashed line shows the mean value in Switzerland (=benchmark). The black lines indicate the 95% “control limit” for the benchmark, which is based on a normal approximation to the binomial distribution. The control limit separates samples that differ significantly from the population from those that do not. However, it does not allow statistical comparisons between samples.

Further reading:

Spiegelhalter D. J. (2005). Funnel plots for comparing institutional performance. *Statistics in medicine*, 24(8), 1185–1202. <https://doi.org/10.1002/sim.1970>

Rakow, T., Wright, R. J., Spiegelhalter, D. J., & Bull, C. (2015). The pros and cons of funnel plots as an aid to risk communication and patient decision making. *British journal of psychology* (London, England : 1953), 106(2), 327–348. <https://doi.org/10.1111/bjop.12081>

1.2 SwissVasc Dataexport

Date of data export: 12th of October 2023.

A minimum set of information is required to be included in this analysis:

- Date of procedure, date of admission, and date of discharge must be reported.

Data must be plausible:

- Length of Stay must be >0 days (i.e. date of discharge must be $>$ than date of admission).
- Age must be > 0 years (i.e. date of birth must be $>$ than date of admission).
- Date must be plausible (i.e. segment and treatment must be a plausible combination).

1.3 Use of Figures and Tables

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1.4 Errors

Please report inconsistencies or mistakes of this report to lorenz.meuli@pm.me

2 Abdominal Aortic Aneurysms - Overall Analysis

To increase comparability, the cohort was defined as follows: Open or endovascular procedures at the native suprarenal or infrarenal aorto-iliac segment for true aneurysms; only sterile procedures for patients with no clinical problem, symptomatic patients or bleeding and no previous intervention at the same location. Further, only patients where the vascular intervention was either a “vascular graft” or a “bifurcated graft”, were included. Thus, complex open or endovascular abdominal aortic aneurysm repairs are excluded.

2.1 Baseline Characteristics

Table 1: Patients treated for AAA (asymptomatic, symptomatic, or ruptured)

	2019 (N=630)	2020 (N=621)	2021 (N=616)	2022 (N=655)	p value
Segment					0.833
Aorto-iliac including suprarenal segment	115 (18.3%)	106 (17.1%)	108 (17.5%)	124 (18.9%)	
Aorto-iliac including infrarenal segment	515 (81.7%)	515 (82.9%)	508 (82.5%)	531 (81.1%)	
Clinical Problem					0.070
No problem	495 (78.6%)	454 (73.1%)	489 (79.4%)	518 (79.1%)	
Symptomatic	74 (11.7%)	85 (13.7%)	60 (9.7%)	64 (9.8%)	
Bleeding	61 (9.7%)	82 (13.2%)	67 (10.9%)	73 (11.1%)	
Sex					0.744
N-Miss	0	0	1	0	
Male	555 (88.1%)	539 (86.8%)	532 (86.5%)	564 (86.1%)	
Female	75 (11.9%)	82 (13.2%)	83 (13.5%)	91 (13.9%)	
Age (years)					0.050
N-Miss	0	0	0	1	
Mean (SD)	73.0 (9.3)	73.0 (8.7)	74.0 (8.4)	73.9 (8.4)	
Median (Q1, Q3)	74.0 (68.0, 79.0)	74.0 (67.0, 79.0)	75.0 (69.0, 80.0)	74.5 (69.0, 80.0)	
Renal Failure					< 0.001
G1 eGFR > 90	53 (8.4%)	73 (11.8%)	64 (10.4%)	84 (12.8%)	
G2 eGFR 60-89	180 (28.6%)	202 (32.5%)	239 (38.8%)	273 (41.7%)	
G3a eGFR 45-59	60 (9.5%)	67 (10.8%)	89 (14.4%)	96 (14.7%)	
G3b eGFR 30-44	36 (5.7%)	34 (5.5%)	45 (7.3%)	30 (4.6%)	
G4 eGFR 15-29	10 (1.6%)	13 (2.1%)	13 (2.1%)	7 (1.1%)	
G5 eGFR <15 or dialysis	2 (0.3%)	7 (1.1%)	5 (0.8%)	4 (0.6%)	
Unknown	289 (45.9%)	225 (36.2%)	161 (26.1%)	161 (24.6%)	
COPD					0.093
N-Miss	127	123	112	80	
No COPD	312 (62.0%)	332 (66.7%)	316 (62.7%)	368 (64.0%)	
COPD w/o medication	69 (13.7%)	40 (8.0%)	56 (11.1%)	48 (8.3%)	
COPD with medication	36 (7.2%)	42 (8.4%)	40 (7.9%)	47 (8.2%)	
COPD with O2 therapy	0 (0.0%)	1 (0.2%)	2 (0.4%)	5 (0.9%)	
Unknown	86 (17.1%)	83 (16.7%)	90 (17.9%)	107 (18.6%)	
Heart Failure					0.906
N-Miss	128	123	112	80	
No heart failure	290 (57.8%)	280 (56.2%)	297 (58.9%)	347 (60.3%)	
NYHA I	70 (13.9%)	70 (14.1%)	57 (11.3%)	73 (12.7%)	
NYHA II	47 (9.4%)	45 (9.0%)	40 (7.9%)	52 (9.0%)	

	2019 (N=630)	2020 (N=621)	2021 (N=616)	2022 (N=655)	p value
NYHA III	14 (2.8%)	14 (2.8%)	15 (3.0%)	18 (3.1%)	
NYHA IV	1 (0.2%)	1 (0.2%)	2 (0.4%)	0 (0.0%)	
Unknown	80 (15.9%)	88 (17.7%)	93 (18.5%)	85 (14.8%)	

2.2 Multivariable Analysis on Survival at Discharge

This multivariable analysis on survival at discharge of the overall AAA cohort (described above) was performed as follows:

- A multivariable logistic regression model on survival at discharge was built including baseline characteristics (age and sex), comorbidities (diabetes, renal function, hearth failure, and COPD), procedural factors (asymptomatic vs symptomatic vs rupture; supra- vs. infrarenal; endovascular vs. open-repair), and your clinic vs the rest of Switzerland
- Some factor levels were merged to avoid small numbers per level (e.g. KDIGO G4 & G5 are merged to one categor; NYHA III & IV are merged to one category).
- Outliers for the continuous variable age were removed (i.e. patients with age < 40)
- Multiple imputations were performed for missing comorbidities. This is a statistical method used to analyze datasets where some values are missing. Predictive mean matching was used for age, multinomial logistic regressions were used to impute factor variables. The number of imputed datasets was m=25. Details on the missingness of data are available in Appendix I.
- Data imputation is generally preferred to a complete case analysis. This method intends to reduce bias due to a selection of complete cases only.

Variable	N	Odds ratio	OR with 95%-CI	p-value
Age (years)	2518		1.06 (1.04, 1.10)	<0.001
Sex				
Male	2188		Reference	
Female	330		1.30 (0.73, 2.20)	0.351
Diabetes				
No (incl. only diet)	2075		Reference	
Oral antidiabetics	327		0.74 (0.33, 1.49)	0.434
Insulin	116		5.31 (2.55, 10.52)	<0.001
RenalFailure				
G1 eGFR > 90	407		Reference	
G2 eGFR 60–89	1308		0.79 (0.39, 1.68)	0.517
G3a eGFR 45–59	465		1.19 (0.56, 2.67)	0.661
G3b eGFR 30–44	227		1.09 (0.44, 2.72)	0.847
G4–5 eGFR <30 or dialysis	111		1.89 (0.77, 4.70)	0.164
HeartFailure				
No heart failure	1690		Reference	
NYHA I	422		0.21 (0.08, 0.46)	<0.001
NYHA II	276		0.66 (0.29, 1.36)	0.290
NYHA III / IV	130		1.06 (0.45, 2.30)	0.881
COPD				
No COPD	1897		Reference	
COPD w/o medication	307		1.25 (0.69, 2.18)	0.447
COPD with medication	314		0.74 (0.34, 1.46)	0.409
Presentation				
Asymptomatic	1953		Reference	
Symptomatic	283		1.34 (0.66, 2.56)	0.390
Rupture	282		6.87 (4.38, 10.81)	<0.001
Segment				
Aorto-iliac, suprarenal	453		Reference	
Aorto-iliac, infrarenal	2065		1.20 (0.74, 1.99)	0.467
Approach				
Open surgery	1037		Reference	
Endovascular intervention	1481		0.26 (0.16, 0.42)	<0.001

3 Elective repair of AAA

To increase comparability, the cohort was defined as follows: Open or endovascular procedures at the native suprarenal or infrarenal aorto-iliac segment for true aneurysms; only sterile procedures for patients with no clinical problem and no previous intervention at the same location. Further, only patients where the vascular intervention was either a “vascular graft” or a “bifurcated graft” were included. Thus, complex open or endovascular abdominal aortic aneurysm repairs are excluded.

3.1 Diameter Analysis 2020 - 2022

Diameter is only available since 1st of January 2020. This analysis excludes patients treated prior to this this date.

Table 2: AAA Diameter (overall)

	2020 (N=454)	2021 (N=489)	2022 (N=518)	p value
Aneurysm Diameter (mm)				0.958
N-Miss	1	2	1	
Mean (SD)	57.5 (11.4)	57.6 (10.7)	57.4 (10.7)	
Median (Q1, Q3)	56.0 (53.0, 62.0)	56.0 (53.0, 60.0)	56.0 (53.0, 61.0)	
Sex				0.632
N-Miss	0	1	0	
Male	399 (87.9%)	419 (85.9%)	447 (86.3%)	
Female	55 (12.1%)	69 (14.1%)	71 (13.7%)	

3.1.1 AAA Diameter Females

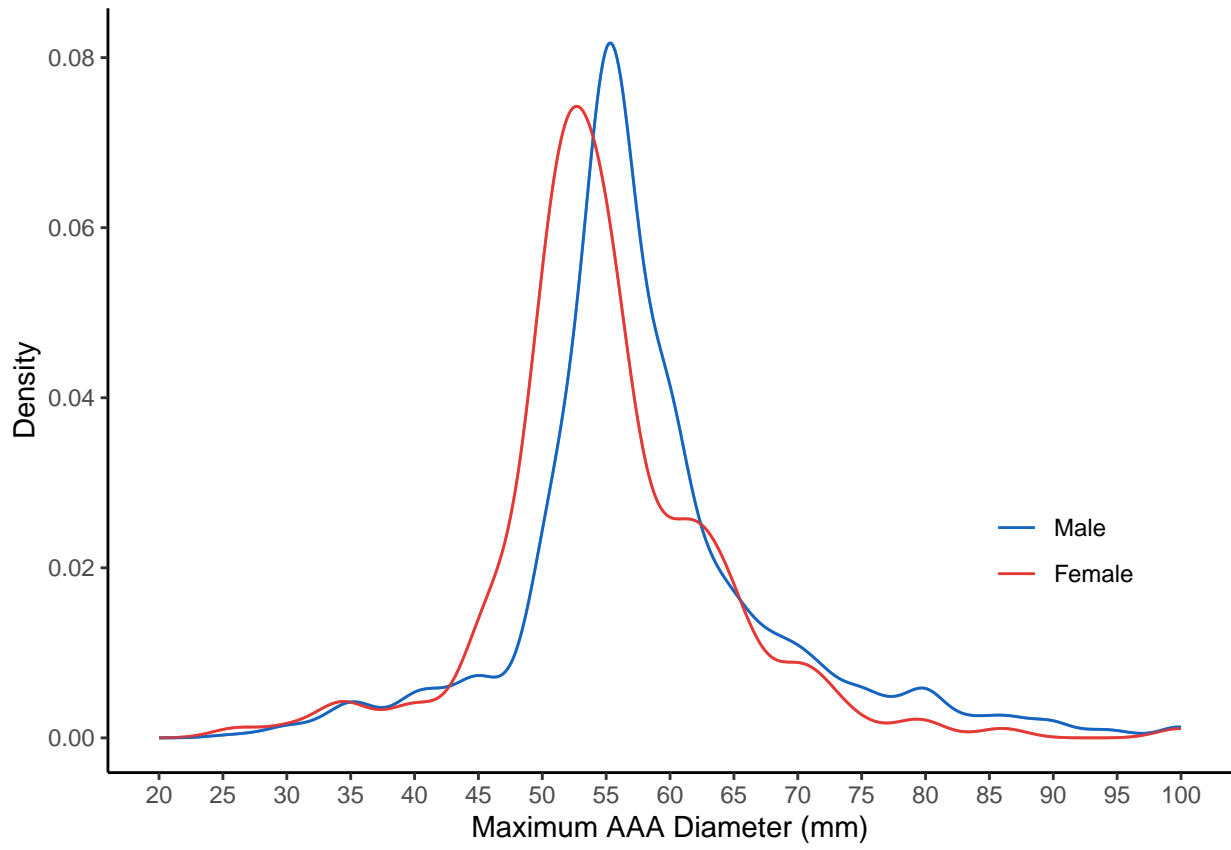
Table 3: AAA Diameter (female only)

	2020 (N=55)	2021 (N=69)	2022 (N=71)	p value
Aneurysm Diameter (mm)				0.021
N-Miss	1	0	0	
Mean (SD)	56.4 (7.8)	56.2 (9.8)	52.3 (10.4)	
Median (Q1, Q3)	55.0 (52.0, 61.0)	54.0 (51.0, 59.0)	52.0 (50.0, 56.0)	

3.1.2 AAA Diameter Males

Table 4: AAA Diameter (male only)

	2020 (N=399)	2021 (N=419)	2022 (N=447)	p value
Aneurysm Diameter (mm)				0.774
N-Miss	0	2	1	
Mean (SD)	57.7 (11.8)	57.8 (10.9)	58.2 (10.5)	
Median (Q1, Q3)	56.0 (53.0, 62.0)	56.0 (53.0, 60.0)	56.0 (54.0, 62.0)	

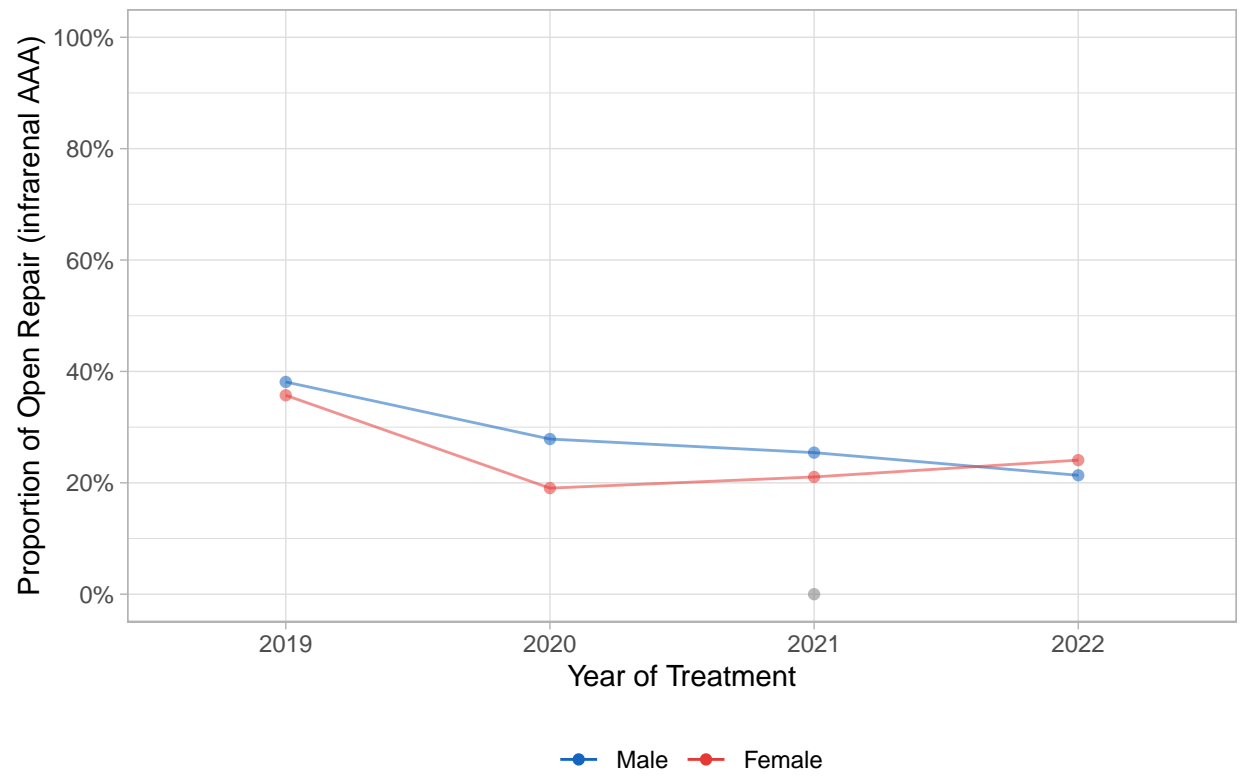


Note: Diameter is only available since January 1st 2020.

3.2 Baseline Characteristics and Treatment Approach

Table 5: Patients treated for asymptomatic AAA

	2019 (N=495)	2020 (N=454)	2021 (N=489)	2022 (N=518)	p value
Technical Approach					< 0.001
Open surgery	229 (46.3%)	165 (36.3%)	164 (33.5%)	172 (33.2%)	
Endovascular intervention	266 (53.7%)	289 (63.7%)	325 (66.5%)	346 (66.8%)	
Segment					0.539
Aorto-iliac, suprarenal	83 (16.8%)	71 (15.6%)	73 (14.9%)	94 (18.1%)	
Aorto-iliac, infrarenal	412 (83.2%)	383 (84.4%)	416 (85.1%)	424 (81.9%)	
Sex					0.208
N-Miss	0	0	1	0	
Male	445 (89.9%)	399 (87.9%)	419 (85.9%)	447 (86.3%)	
Female	50 (10.1%)	55 (12.1%)	69 (14.1%)	71 (13.7%)	
Age (years)					0.025
N-Miss	0	0	0	0	
Mean (SD)	72.6 (9.0)	72.9 (8.7)	74.0 (8.2)	73.7 (8.1)	
Median (Q1, Q3)	73.0 (68.0, 79.0)	74.0 (68.0, 79.0)	75.0 (69.0, 80.0)	74.0 (68.2, 79.0)	
Renal Failure					< 0.001
G1 eGFR > 90	38 (7.7%)	56 (12.3%)	54 (11.0%)	63 (12.2%)	
G2 eGFR 60-89	147 (29.7%)	165 (36.3%)	201 (41.1%)	235 (45.4%)	
G3a eGFR 45-59	51 (10.3%)	47 (10.4%)	71 (14.5%)	71 (13.7%)	
G3b eGFR 30-44	26 (5.3%)	21 (4.6%)	34 (7.0%)	24 (4.6%)	
G4 eGFR 15-29	10 (2.0%)	3 (0.7%)	7 (1.4%)	4 (0.8%)	
G5 eGFR <15 or dialysis	2 (0.4%)	5 (1.1%)	3 (0.6%)	2 (0.4%)	
Unknown	221 (44.6%)	157 (34.6%)	119 (24.3%)	119 (23.0%)	
COPD					0.012
N-Miss	96	101	87	63	
No COPD	257 (64.4%)	249 (70.5%)	253 (62.9%)	304 (66.8%)	
COPD w/o medication	60 (15.0%)	29 (8.2%)	46 (11.4%)	34 (7.5%)	
COPD with medication	30 (7.5%)	28 (7.9%)	34 (8.5%)	46 (10.1%)	
COPD with O2 therapy	0 (0.0%)	1 (0.3%)	2 (0.5%)	5 (1.1%)	
Unknown	52 (13.0%)	46 (13.0%)	67 (16.7%)	66 (14.5%)	
Heart Failure					0.707
N-Miss	97	101	87	63	
No heart failure	245 (61.6%)	203 (57.5%)	247 (61.4%)	282 (62.0%)	
NYHA I	58 (14.6%)	59 (16.7%)	49 (12.2%)	69 (15.2%)	
NYHA II	43 (10.8%)	39 (11.0%)	37 (9.2%)	45 (9.9%)	
NYHA III	10 (2.5%)	10 (2.8%)	12 (3.0%)	15 (3.3%)	
NYHA IV	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	
Unknown	42 (10.6%)	42 (11.9%)	56 (13.9%)	44 (9.7%)	



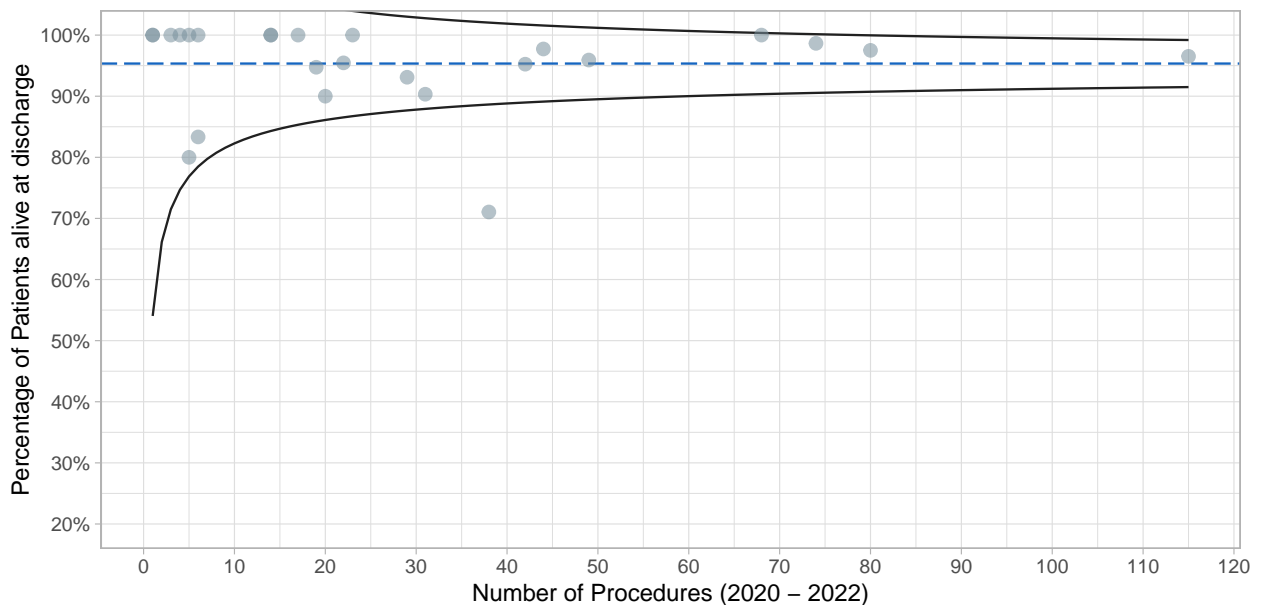
3.3 Elective open repair for AAA

3.3.1 Inhospital outcomes

Table 6: Inhospital outcomes for open repair of asymptomatic AAA

	2019 (N=229)	2020 (N=165)	2021 (N=164)	2022 (N=172)	p value
Segment					0.029
Aorto-iliac, suprarenal	73 (31.9%)	62 (37.6%)	61 (37.2%)	80 (46.5%)	
Aorto-iliac, infrarenal	156 (68.1%)	103 (62.4%)	103 (62.8%)	92 (53.5%)	
Inhospital Mortality					< 0.001
Dead	7 (3.1%)	4 (2.4%)	5 (3.0%)	4 (2.3%)	
Alive	209 (91.3%)	160 (97.0%)	159 (97.0%)	168 (97.7%)	
Missing	13 (5.7%)	1 (0.6%)	0 (0.0%)	0 (0.0%)	
Clavien Dindo at Discharge					0.064
N-Miss	78	45	32	13	
Grade 0 - No Complication	82 (54.3%)	82 (68.3%)	94 (71.2%)	100 (62.9%)	
Grade I	11 (7.3%)	6 (5.0%)	4 (3.0%)	7 (4.4%)	
Grade I disability	1 (0.7%)	0 (0.0%)	0 (0.0%)	3 (1.9%)	
Grade II	27 (17.9%)	17 (14.2%)	16 (12.1%)	36 (22.6%)	
Grade II disability	4 (2.6%)	1 (0.8%)	0 (0.0%)	4 (2.5%)	
Grade IIIa	3 (2.0%)	3 (2.5%)	0 (0.0%)	1 (0.6%)	
Grade IIIa disability	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)	
Grade IIIb	14 (9.3%)	4 (3.3%)	12 (9.1%)	3 (1.9%)	
Grade IIIb disability	0 (0.0%)	1 (0.8%)	1 (0.8%)	0 (0.0%)	
Grade IVa	3 (2.0%)	3 (2.5%)	1 (0.8%)	2 (1.3%)	
Grade IVa disability	1 (0.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Grade IVb	0 (0.0%)	1 (0.8%)	1 (0.8%)	0 (0.0%)	
Grade V - Death	5 (3.3%)	2 (1.7%)	3 (2.3%)	2 (1.3%)	

3.3.2 Survival at Discharge



Note: This plot does NOT show mortality at discharge! For Inhospital Mortality, see Table above.

3.3.3 Outcomes during Follow-up

	2019 (N=229)	2020 (N=165)	2021 (N=164)	2022 (N=172)	p value
30d Mortality					0.004
Alive	133 (58.1%)	107 (64.8%)	116 (70.7%)	133 (77.3%)	
Dead	14 (6.1%)	6 (3.6%)	8 (4.9%)	6 (3.5%)	
Missing	82 (35.8%)	52 (31.5%)	40 (24.4%)	33 (19.2%)	
30d Stroke					0.043
Yes	1 (0.4%)	0 (0.0%)	1 (0.6%)	0 (0.0%)	
No	149 (65.1%)	114 (69.1%)	118 (72.0%)	138 (80.2%)	
Missing	79 (34.5%)	51 (30.9%)	45 (27.4%)	34 (19.8%)	
30d Myocardial infraction					0.081
Yes	2 (0.9%)	1 (0.6%)	1 (0.6%)	0 (0.0%)	
No	148 (64.6%)	113 (68.5%)	119 (72.6%)	136 (79.1%)	
Missing	79 (34.5%)	51 (30.9%)	44 (26.8%)	36 (20.9%)	

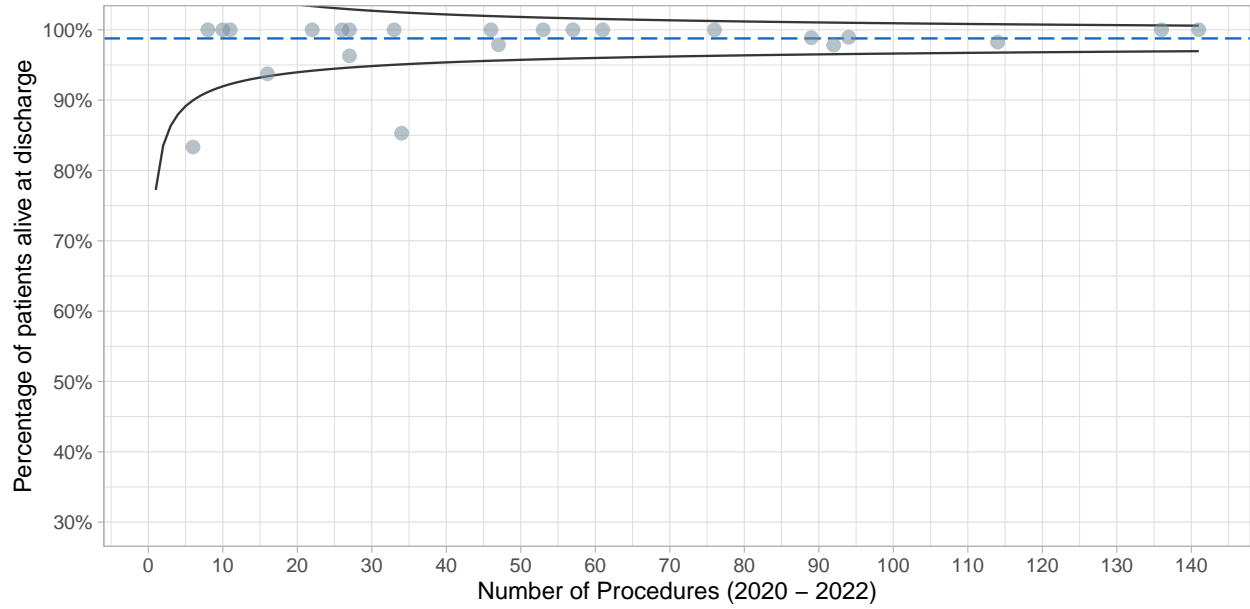
3.4 Elective endovascular repair for AAA

3.4.1 Inhospital Outcomes

Table 8: Inhospital outcomes for endovascular repair of asymptomatic AAA

	2019 (N=266)	2020 (N=289)	2021 (N=325)	2022 (N=346)	p value
Inhospital Mortality					0.003
Dead	1 (0.4%)	0 (0.0%)	1 (0.3%)	3 (0.9%)	
Alive	258 (97.0%)	286 (99.0%)	324 (99.7%)	343 (99.1%)	
Missing	7 (2.6%)	3 (1.0%)	0 (0.0%)	0 (0.0%)	
Clavien Dindo at Discharge					0.256
N-Miss	108	60	59	36	
Grade 0 - No Complication	138 (87.3%)	194 (84.7%)	229 (86.1%)	263 (84.8%)	
Grade I	8 (5.1%)	13 (5.7%)	6 (2.3%)	9 (2.9%)	
Grade I disability	1 (0.6%)	0 (0.0%)	1 (0.4%)	2 (0.6%)	
Grade II	3 (1.9%)	10 (4.4%)	13 (4.9%)	17 (5.5%)	
Grade II disability	4 (2.5%)	1 (0.4%)	2 (0.8%)	0 (0.0%)	
Grade IIIa	1 (0.6%)	4 (1.7%)	3 (1.1%)	5 (1.6%)	
Grade IIIb	3 (1.9%)	5 (2.2%)	9 (3.4%)	7 (2.3%)	
Grade IIIb disability	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
Grade IVa	0 (0.0%)	1 (0.4%)	3 (1.1%)	2 (0.6%)	
Grade IVa disability	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
Grade IVb disability	0 (0.0%)	1 (0.4%)	0 (0.0%)	0 (0.0%)	
Grade V - Death	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (1.0%)	

3.4.2 Survival at Discharge



Note: This plot does NOT show mortality at discharge! For Inhospital Mortality, see Table above.

3.4.3 Outcomes during Follow-up

	2019 (N=266)	2020 (N=289)	2021 (N=325)	2022 (N=346)	p value
30d Mortality					< 0.001
Alive	185 (69.5%)	195 (67.5%)	207 (63.7%)	186 (53.8%)	
Dead	2 (0.8%)	4 (1.4%)	7 (2.2%)	12 (3.5%)	
Missing	79 (29.7%)	90 (31.1%)	111 (34.2%)	148 (42.8%)	
30d Stroke					0.872
Yes	1 (0.4%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	
No	197 (74.1%)	220 (76.1%)	246 (75.7%)	247 (71.4%)	
Missing	68 (25.6%)	68 (23.5%)	78 (24.0%)	98 (28.3%)	
30d Myocardial infraction					0.210
Yes	0 (0.0%)	3 (1.0%)	1 (0.3%)	0 (0.0%)	
No	196 (73.7%)	218 (75.4%)	245 (75.4%)	249 (72.0%)	
Missing	70 (26.3%)	68 (23.5%)	79 (24.3%)	97 (28.0%)	

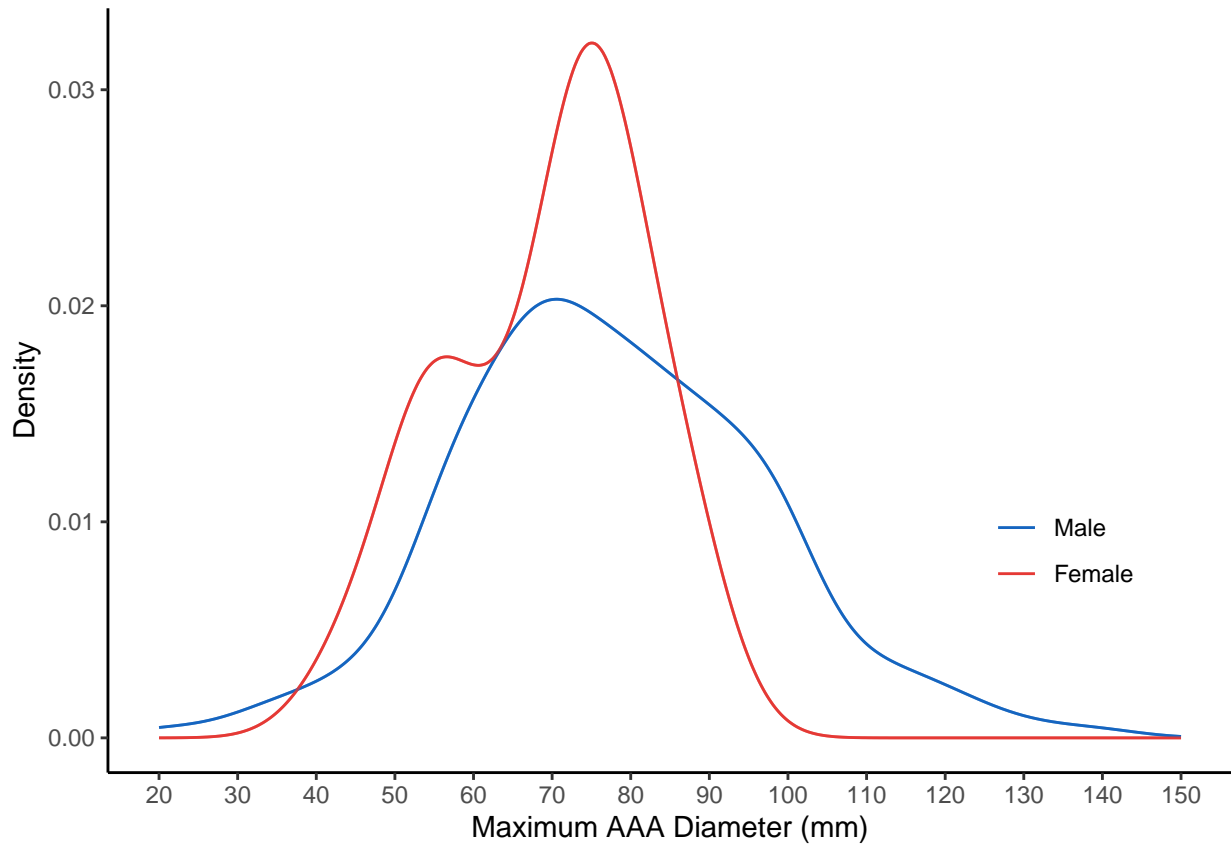
4 Emergent repair of ruptured AAA

To increase comparability, the cohort was defined as follows: Open or endovascular procedures at the native suprarenal or infrarenal aorto-iliac segment for true aneurysms; only sterile procedures for patients with rupture (=bleeding), and no previous intervention at the same location. Further, only patients where the vascular intervention was either a “vascular graft” or a “bifurcated graft” were included. Thus, complex open or endovascular abdominal aortic aneurysm repairs are excluded.

4.1 Diameter Analysis 2020 - 2022

Table 10: AAA Diameter (ruptured)

	2020 (N=79)	2021 (N=67)	2022 (N=72)	p value
Aneurysm Diameter (mm)				0.299
N-Miss	0	0	3	
Mean (SD)	71.4 (26.7)	77.2 (21.6)	74.7 (18.1)	
Median (Q1, Q3)	75.0 (59.0, 90.0)	78.0 (60.0, 90.0)	74.0 (66.0, 83.0)	



Note: Diameter is only available since January 1st 2020, this analysis excludes patients treated prior to this date.

4.2 Baseline Characteristics and Treatment Approach

Table 11: Patients treated for ruptured AAA

	2019 (N=61)	2020 (N=79)	2021 (N=67)	2022 (N=72)	p value
Technical Approach					0.122
Open surgery	41 (67.2%)	52 (65.8%)	34 (50.7%)	39 (54.2%)	
Endovascular intervention	20 (32.8%)	27 (34.2%)	33 (49.3%)	33 (45.8%)	
Segment					0.981
Aorto-iliac, suprarenal	13 (21.3%)	19 (24.1%)	15 (22.4%)	17 (23.6%)	
Aorto-iliac, infrarenal	48 (78.7%)	60 (75.9%)	52 (77.6%)	55 (76.4%)	
Sex					0.085
Male	52 (85.2%)	67 (84.8%)	65 (97.0%)	64 (88.9%)	
Female	9 (14.8%)	12 (15.2%)	2 (3.0%)	8 (11.1%)	
Age (years)					0.152
N-Miss	0	0	0	1	
Mean (SD)	76.1 (11.0)	74.5 (8.5)	73.0 (9.5)	76.3 (8.8)	
Renal Failure					0.019
G1 eGFR > 90	3 (4.9%)	4 (5.1%)	3 (4.5%)	9 (12.5%)	
G2 eGFR 60-89	10 (16.4%)	21 (26.6%)	16 (23.9%)	17 (23.6%)	
G3a eGFR 45-59	5 (8.2%)	10 (12.7%)	14 (20.9%)	15 (20.8%)	
G3b eGFR 30-44	5 (8.2%)	7 (8.9%)	7 (10.4%)	3 (4.2%)	
G4 eGFR 15-29	0 (0.0%)	8 (10.1%)	5 (7.5%)	3 (4.2%)	
G5 eGFR <15 or dialysis	0 (0.0%)	2 (2.5%)	1 (1.5%)	2 (2.8%)	
Unknown	38 (62.3%)	27 (34.2%)	21 (31.3%)	23 (31.9%)	
COPD					0.031
N-Miss	21	14	13	8	
No COPD	23 (57.5%)	33 (50.8%)	33 (61.1%)	31 (48.4%)	
COPD w/o medication	4 (10.0%)	2 (3.1%)	6 (11.1%)	4 (6.2%)	
COPD with medication	2 (5.0%)	8 (12.3%)	2 (3.7%)	0 (0.0%)	
Unknown	11 (27.5%)	22 (33.8%)	13 (24.1%)	29 (45.3%)	
Heart Failure					0.996
N-Miss	21	14	13	8	
No heart failure	18 (45.0%)	28 (43.1%)	23 (42.6%)	29 (45.3%)	
NYHA I	2 (5.0%)	4 (6.2%)	4 (7.4%)	4 (6.2%)	
NYHA II	1 (2.5%)	2 (3.1%)	1 (1.9%)	3 (4.7%)	
NYHA III	2 (5.0%)	3 (4.6%)	1 (1.9%)	1 (1.6%)	
Unknown	17 (42.5%)	28 (43.1%)	25 (46.3%)	27 (42.2%)	

4.2.1 Treatment Approach for infrarenal rAAA

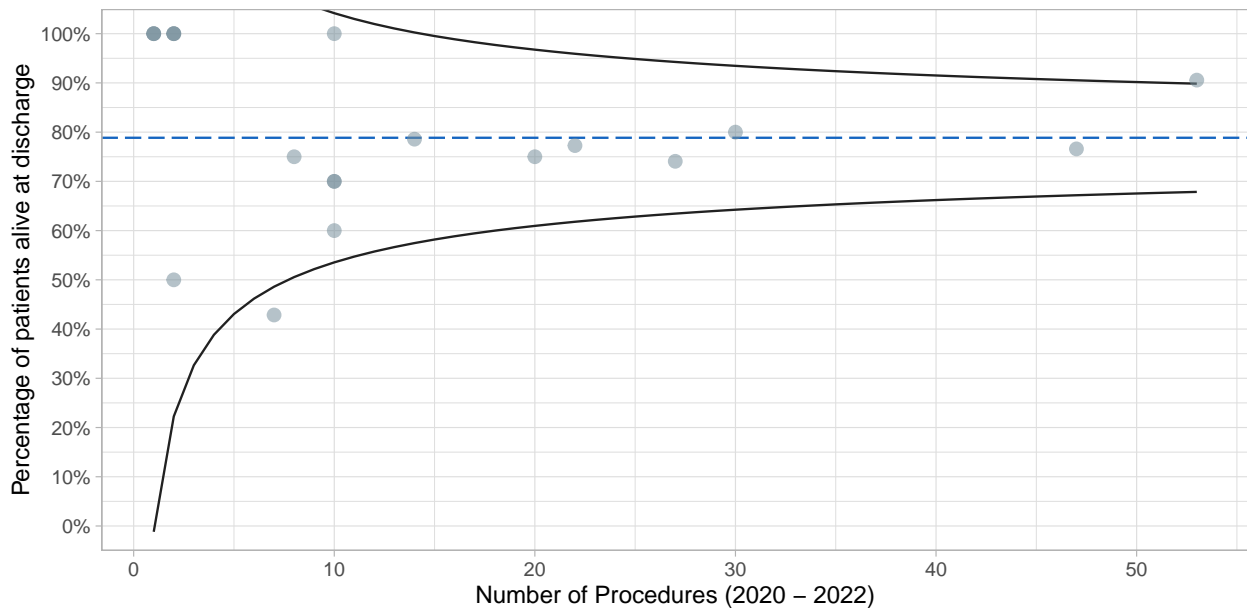


4.3 Inhospital Outcomes

Table 12: Inhospital outcomes for emergent repair of ruptured AAA

	2019 (N=61)	2020 (N=79)	2021 (N=67)	2022 (N=72)	p value
Inhospital Mortality					0.759
Dead	13 (21.3%)	17 (21.5%)	12 (17.9%)	16 (22.2%)	
Alive	48 (78.7%)	62 (78.5%)	55 (82.1%)	55 (76.4%)	
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.4%)	
Clavien Dindo at Discharge					0.631
N-Miss	23	8	8	2	
Grade 0 - No Complication	8 (21.1%)	27 (38.0%)	24 (40.7%)	23 (32.9%)	
Grade I	1 (2.6%)	4 (5.6%)	1 (1.7%)	2 (2.9%)	
Grade II	7 (18.4%)	8 (11.3%)	12 (20.3%)	8 (11.4%)	
Grade II disability	1 (2.6%)	2 (2.8%)	1 (1.7%)	2 (2.9%)	
Grade IIIa	1 (2.6%)	5 (7.0%)	2 (3.4%)	2 (2.9%)	
Grade IIIa disability	1 (2.6%)	1 (1.4%)	0 (0.0%)	0 (0.0%)	
Grade IIIb	7 (18.4%)	6 (8.5%)	5 (8.5%)	6 (8.6%)	
Grade IIIb disability	2 (5.3%)	1 (1.4%)	2 (3.4%)	1 (1.4%)	
Grade IVa	3 (7.9%)	1 (1.4%)	2 (3.4%)	9 (12.9%)	
Grade IVa disability	0 (0.0%)	3 (4.2%)	2 (3.4%)	1 (1.4%)	
Grade IVb	0 (0.0%)	0 (0.0%)	1 (1.7%)	1 (1.4%)	
Grade IVb disability	0 (0.0%)	1 (1.4%)	0 (0.0%)	1 (1.4%)	
Grade V - Death	7 (18.4%)	12 (16.9%)	7 (11.9%)	14 (20.0%)	

4.3.1 Survival at Discharge



Note: This plot does NOT show mortality at discharge! For Inhospital Mortality, see Table above.

4.4 Outcomes during follow-up

	2019 (N=61)	2020 (N=79)	2021 (N=67)	2022 (N=72)	p value
30d Mortality					0.891
Alive	39 (63.9%)	43 (54.4%)	37 (55.2%)	37 (51.4%)	
Dead	11 (18.0%)	18 (22.8%)	15 (22.4%)	18 (25.0%)	
Missing	11 (18.0%)	18 (22.8%)	15 (22.4%)	17 (23.6%)	
30d Stroke					0.901
Yes	0 (0.0%)	1 (1.3%)	1 (1.5%)	2 (2.8%)	
No	37 (60.7%)	45 (57.0%)	37 (55.2%)	42 (58.3%)	
Missing	24 (39.3%)	33 (41.8%)	29 (43.3%)	28 (38.9%)	
30d Myocardial infraction					0.992
Yes	2 (3.3%)	2 (2.5%)	2 (3.0%)	3 (4.2%)	
No	36 (59.0%)	44 (55.7%)	36 (53.7%)	41 (56.9%)	
Missing	23 (37.7%)	33 (41.8%)	29 (43.3%)	28 (38.9%)	

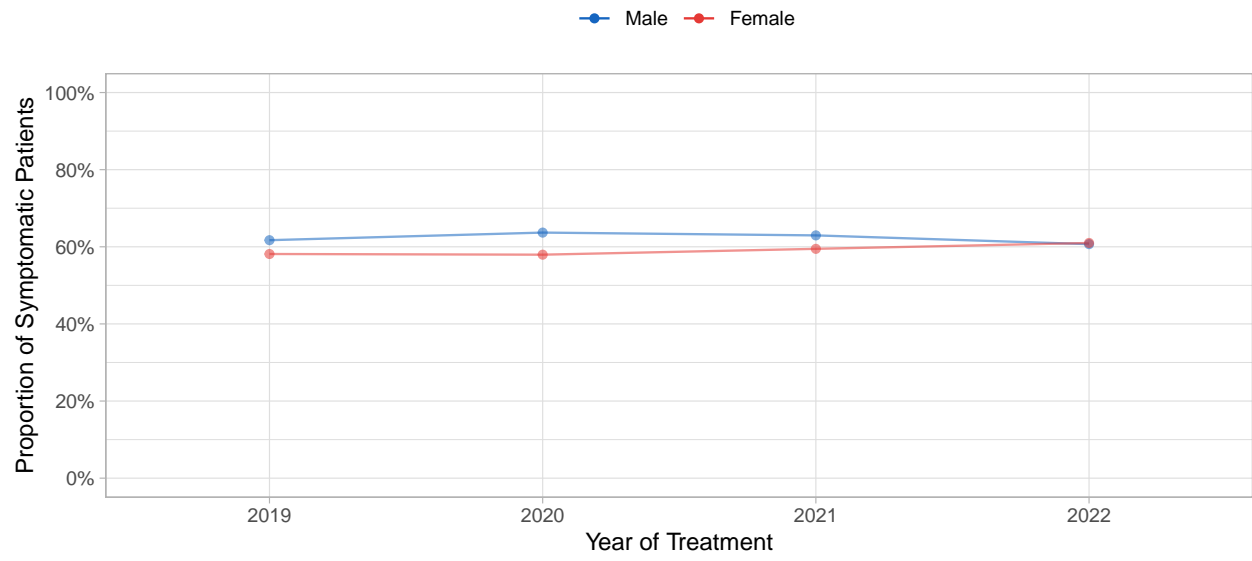
5 Carotid Artery Stenosis

To increase comparability, the cohort was defined as follows: Open or endovascular procedure at the native carotid bifurcation or the carotid artery (CCA, ICA, ECA) for obstructing wall pathology or intraluminal obstruction. Only sterile procedures, only procedures with no previous intervention at the same location, and only symptomatic patients (including “acute ischemia”) or patients with no clinical problem.

5.1 Overview

	2019 (N=818)	2020 (N=856)	2021 (N=930)	2022 (N=951)	p value
Technical Approach					0.022
Open surgery	687 (84.0%)	693 (81.0%)	742 (79.8%)	803 (84.4%)	
Endovascular intervention	131 (16.0%)	163 (19.0%)	188 (20.2%)	148 (15.6%)	
Clinical Problem					0.333
No problem	258 (31.5%)	244 (28.5%)	276 (29.7%)	307 (32.3%)	
Symptomatic	496 (60.6%)	530 (61.9%)	575 (61.8%)	578 (60.8%)	
Acute Ischemia	64 (7.8%)	82 (9.6%)	79 (8.5%)	66 (6.9%)	

Note: Endovascular procedures are presumably not covered as thoroughly as open surgical procedures.



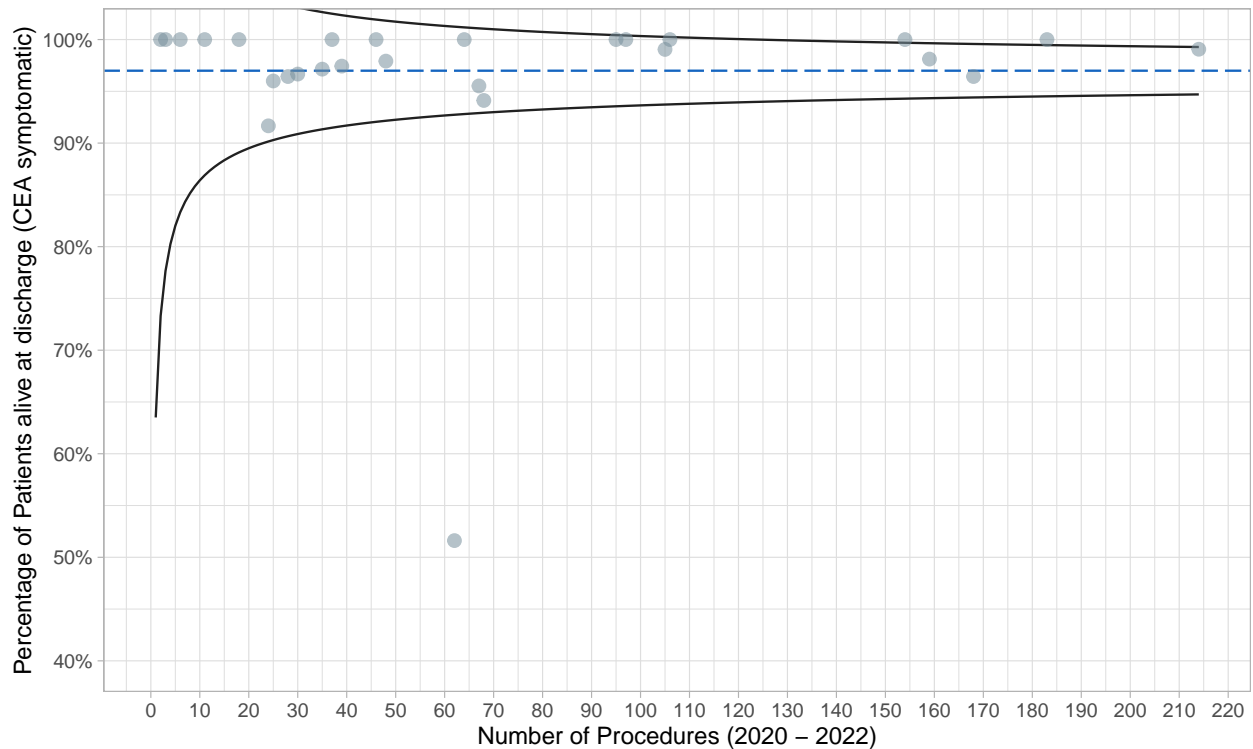
5.2 Symptomatic Patients

5.2.1 Baseline Characteristics (CEA and CAS)

	2019 (N=560)	2020 (N=612)	2021 (N=654)	2022 (N=644)	p value
Technical Approach					0.007
Open surgery	450 (80.4%)	459 (75.0%)	477 (72.9%)	508 (78.9%)	
Endovascular intervention	110 (19.6%)	153 (25.0%)	177 (27.1%)	136 (21.1%)	
Sex					0.545
Male	397 (70.9%)	429 (70.1%)	441 (67.4%)	453 (70.3%)	
Female	163 (29.1%)	183 (29.9%)	213 (32.6%)	191 (29.7%)	
Age (years)					0.007
N-Miss	1	0	0	0	
Mean (SD)	73.1 (9.1)	74.5 (9.6)	74.9 (9.2)	74.6 (9.3)	
Renal Failure					< 0.001
G1 eGFR > 90	48 (8.6%)	45 (7.4%)	56 (8.6%)	83 (12.9%)	
G2 eGFR 60-89	109 (19.5%)	170 (27.8%)	225 (34.4%)	224 (34.8%)	
G3a eGFR 45-59	43 (7.7%)	48 (7.8%)	75 (11.5%)	65 (10.1%)	
G3b eGFR 30-44	13 (2.3%)	19 (3.1%)	29 (4.4%)	47 (7.3%)	
G4 eGFR 15-29	10 (1.8%)	11 (1.8%)	12 (1.8%)	6 (0.9%)	
G5 eGFR <15 or dialysis	2 (0.4%)	3 (0.5%)	1 (0.2%)	1 (0.2%)	
Unknown	335 (59.8%)	316 (51.6%)	256 (39.1%)	218 (33.9%)	
COPD					0.127
N-Miss	171	196	216	159	
No COPD	271 (69.7%)	293 (70.4%)	315 (71.9%)	362 (74.6%)	
COPD w/o medication	21 (5.4%)	14 (3.4%)	26 (5.9%)	29 (6.0%)	
COPD with medication	15 (3.9%)	15 (3.6%)	24 (5.5%)	17 (3.5%)	
COPD with O2 therapy	2 (0.5%)	0 (0.0%)	1 (0.2%)	2 (0.4%)	
Unknown	80 (20.6%)	94 (22.6%)	72 (16.4%)	75 (15.5%)	
Heart Failure					0.013
N-Miss	171	196	216	160	
No heart failure	262 (67.4%)	261 (62.7%)	321 (73.3%)	320 (66.1%)	
NYHA I	36 (9.3%)	31 (7.5%)	26 (5.9%)	39 (8.1%)	
NYHA II	22 (5.7%)	26 (6.2%)	13 (3.0%)	25 (5.2%)	
NYHA III	5 (1.3%)	11 (2.6%)	9 (2.1%)	21 (4.3%)	
NYHA IV	3 (0.8%)	0 (0.0%)	2 (0.5%)	1 (0.2%)	
Unknown	61 (15.7%)	87 (20.9%)	67 (15.3%)	78 (16.1%)	

5.2.2 Outcomes at Discharge (CEA symptomatic)

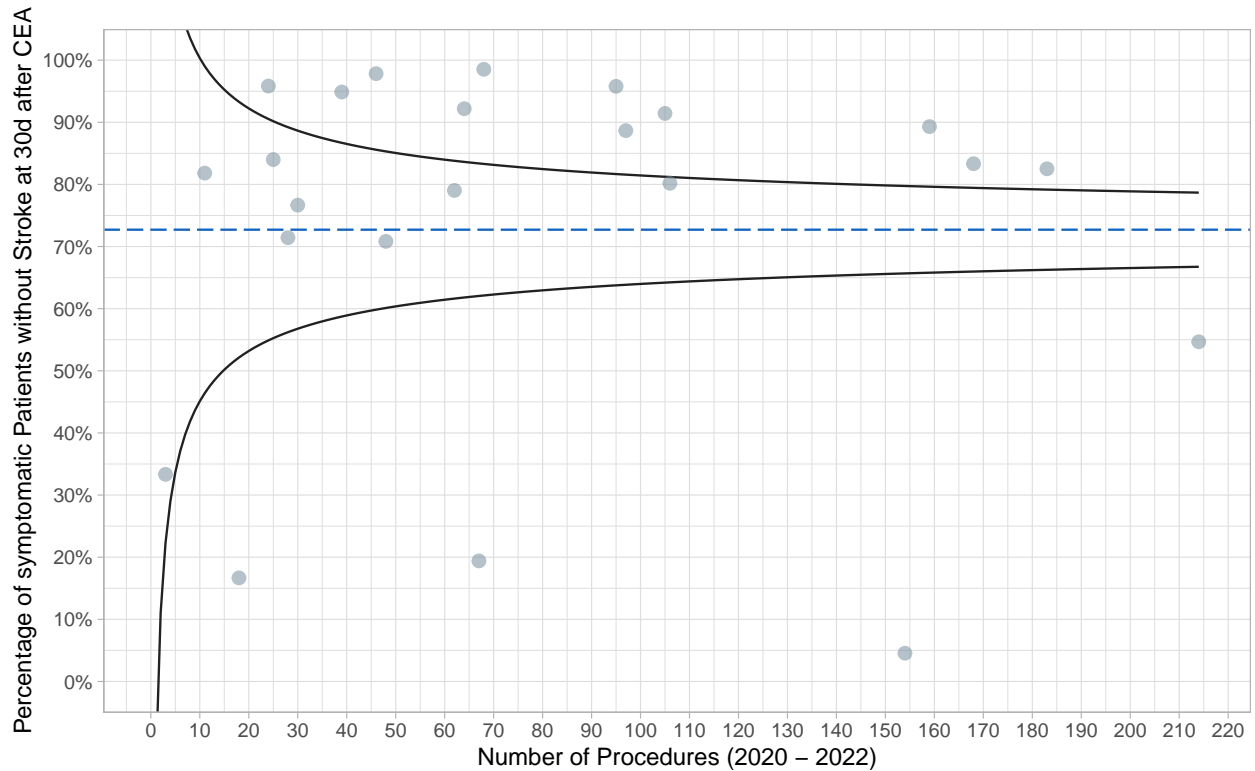
	2019 (N=450)	2020 (N=459)	2021 (N=477)	2022 (N=508)	p value
Inhospital Mortality					< 0.001
Dead	5 (1.1%)	9 (2.0%)	2 (0.4%)	3 (0.6%)	
Alive	422 (93.8%)	437 (95.2%)	474 (99.4%)	504 (99.2%)	
Missing	23 (5.1%)	13 (2.8%)	1 (0.2%)	1 (0.2%)	
Clavien Dindo at Discharge					0.275
N-Miss	137	128	65	60	
Grade 0 - No Complication	259 (82.7%)	272 (82.2%)	362 (87.9%)	378 (84.4%)	
Grade I	8 (2.6%)	13 (3.9%)	9 (2.2%)	15 (3.3%)	
Grade I disability	6 (1.9%)	5 (1.5%)	6 (1.5%)	9 (2.0%)	
Grade II	13 (4.2%)	10 (3.0%)	15 (3.6%)	27 (6.0%)	
Grade II disability	4 (1.3%)	3 (0.9%)	3 (0.7%)	4 (0.9%)	
Grade IIIa	2 (0.6%)	7 (2.1%)	4 (1.0%)	3 (0.7%)	
Grade IIIb	16 (5.1%)	11 (3.3%)	8 (1.9%)	9 (2.0%)	
Grade IIIb disability	1 (0.3%)	2 (0.6%)	1 (0.2%)	0 (0.0%)	
Grade IVa	1 (0.3%)	4 (1.2%)	1 (0.2%)	2 (0.4%)	
Grade IVb disability	0 (0.0%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	
Grade V - Death	3 (1.0%)	4 (1.2%)	2 (0.5%)	1 (0.2%)	



Note: This plot does NOT show the stroke rate! For stroke rate, see Table above.

5.2.3 Outcomes during Follow-up (CEA symptomatic)

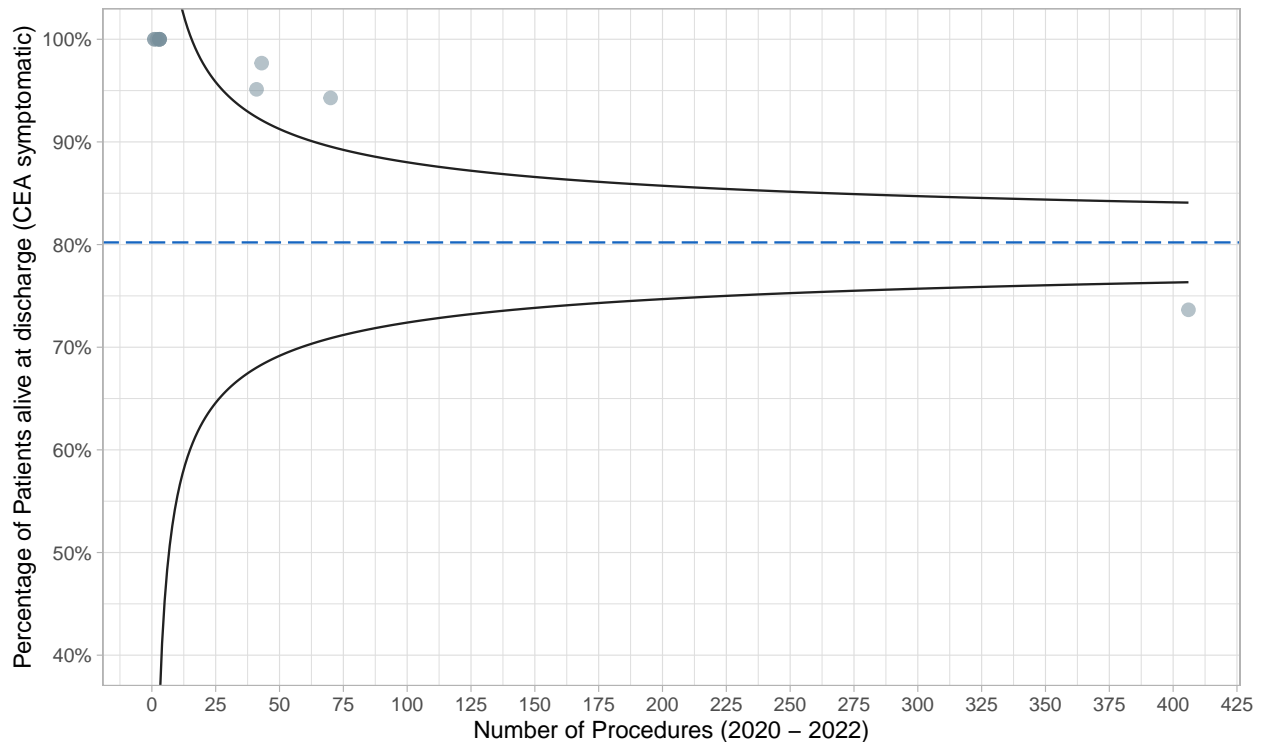
	2019 (N=450)	2020 (N=459)	2021 (N=477)	2022 (N=508)	p value
30d Mortality					0.105
Alive	290 (64.4%)	261 (56.9%)	299 (62.7%)	335 (65.9%)	
Dead	5 (1.1%)	9 (2.0%)	9 (1.9%)	9 (1.8%)	
Missing	155 (34.4%)	189 (41.2%)	169 (35.4%)	164 (32.3%)	
30d Stroke					0.022
Yes	10 (2.2%)	9 (2.0%)	11 (2.3%)	7 (1.4%)	
No	335 (74.4%)	304 (66.2%)	312 (65.4%)	368 (72.4%)	
Missing	105 (23.3%)	146 (31.8%)	154 (32.3%)	133 (26.2%)	



Note: This plot does NOT show the stroke rate! For stroke rate, see Table above.

5.2.4 Outcomes at Discharge (CAS symptomatic)

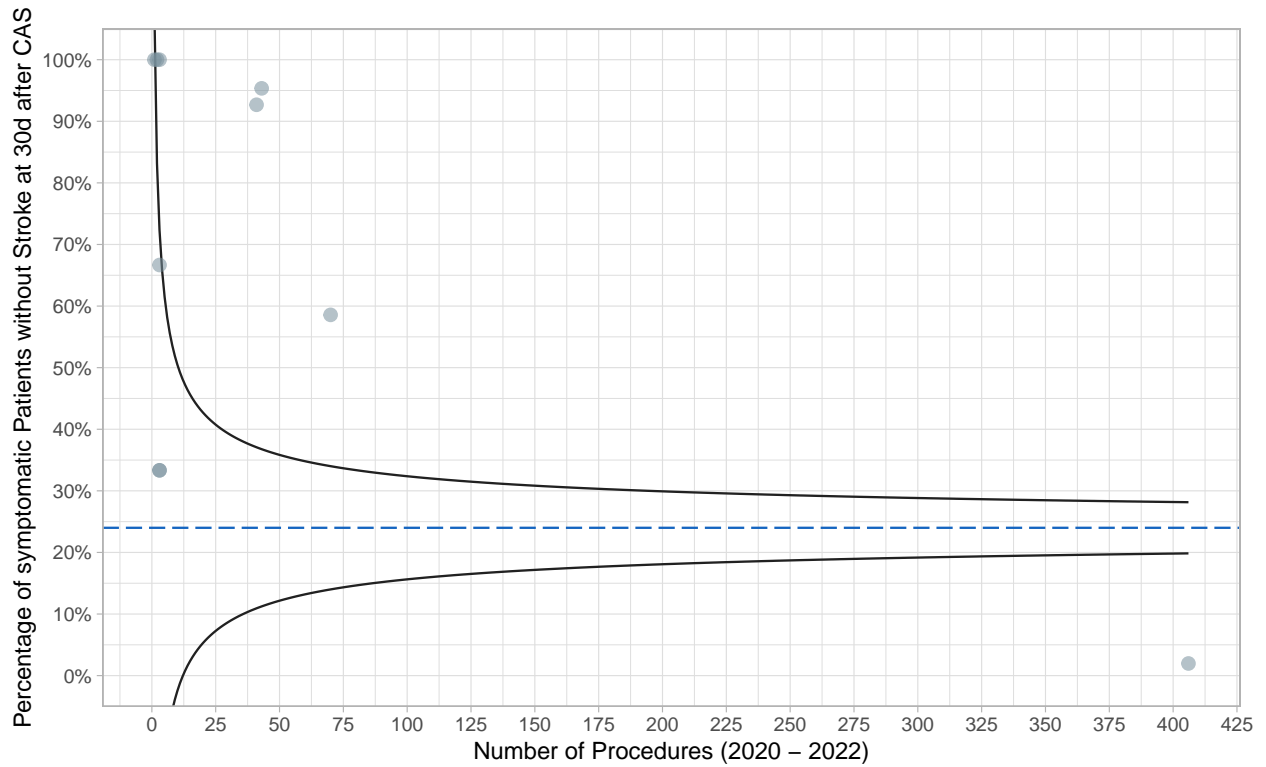
	2019 (N=110)	2020 (N=153)	2021 (N=177)	2022 (N=136)	p value
Inhospital Mortality					< 0.001
Dead	7 (6.4%)	19 (12.4%)	9 (5.1%)	5 (3.7%)	
Alive	29 (26.4%)	134 (87.6%)	168 (94.9%)	131 (96.3%)	
Missing	74 (67.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Clavien Dindo at Discharge					0.051
N-Miss	3	0	44	100	
Grade 0 - No Complication	103 (96.3%)	144 (94.1%)	129 (97.0%)	31 (86.1%)	
Grade I	1 (0.9%)	1 (0.7%)	0 (0.0%)	0 (0.0%)	
Grade I disability	0 (0.0%)	1 (0.7%)	1 (0.8%)	1 (2.8%)	
Grade II	0 (0.0%)	3 (2.0%)	0 (0.0%)	1 (2.8%)	
Grade II disability	0 (0.0%)	2 (1.3%)	0 (0.0%)	0 (0.0%)	
Grade IIIa	0 (0.0%)	0 (0.0%)	2 (1.5%)	0 (0.0%)	
Grade IIIa disability	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.8%)	
Grade IIIb	1 (0.9%)	1 (0.7%)	1 (0.8%)	0 (0.0%)	
Grade IIIb disability	0 (0.0%)	1 (0.7%)	0 (0.0%)	1 (2.8%)	
Grade IVa disability	1 (0.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Grade V - Death	1 (0.9%)	0 (0.0%)	0 (0.0%)	1 (2.8%)	



Note: This plot does NOT show the mortality rate! For mortality rate, see Table above.

5.2.5 Outcomes during Follow-up (CAS symptomatic)

	2019 (N=110)	2020 (N=153)	2021 (N=177)	2022 (N=136)	p value
30d Mortality					0.288
Alive	25 (22.7%)	30 (19.6%)	50 (28.2%)	31 (22.8%)	
Dead	7 (6.4%)	21 (13.7%)	21 (11.9%)	15 (11.0%)	
Missing	78 (70.9%)	102 (66.7%)	106 (59.9%)	90 (66.2%)	
30d Stroke					0.694
Yes	0 (0.0%)	3 (2.0%)	2 (1.1%)	1 (0.7%)	
No	24 (21.8%)	37 (24.2%)	47 (26.6%)	30 (22.1%)	
Missing	86 (78.2%)	113 (73.9%)	128 (72.3%)	105 (77.2%)	



Note: This plot does NOT show the stroke rate! For stroke rate, see Table above.

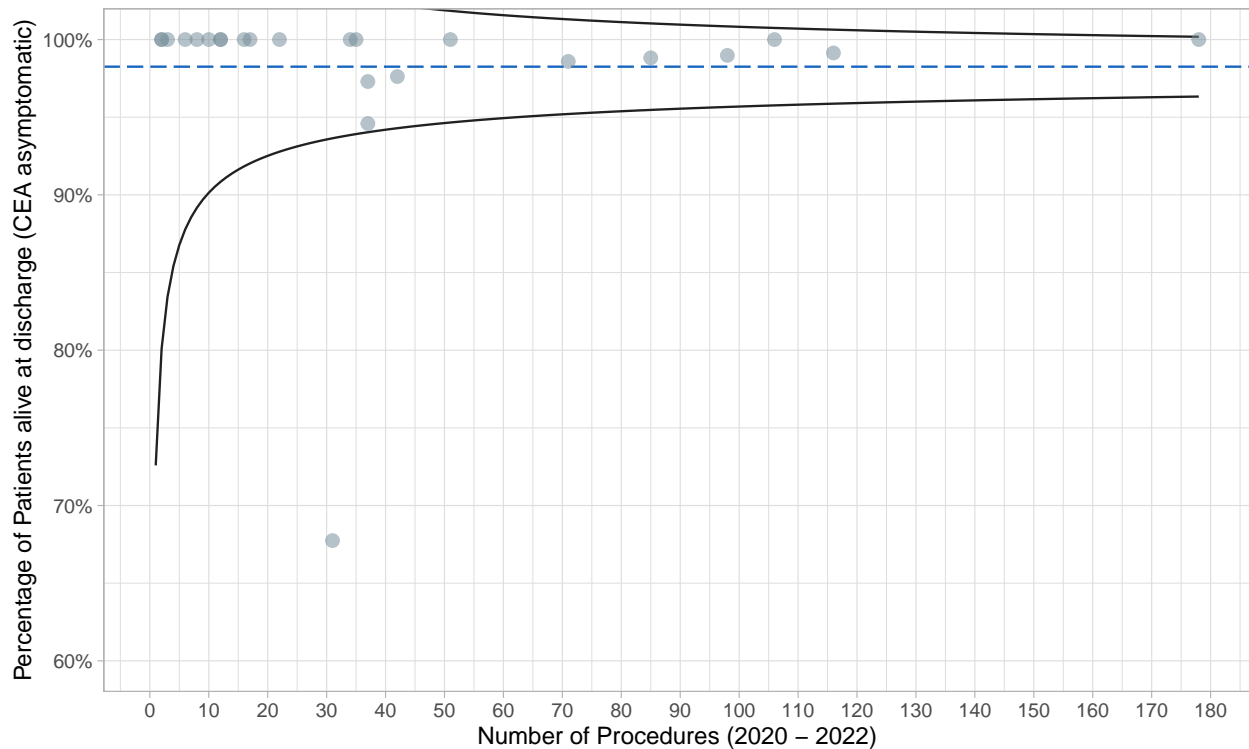
5.3 Asymptomatic Patients

5.3.1 Baseline Characteristics (CEA and CAS)

	2019 (N=258)	2020 (N=244)	2021 (N=276)	2022 (N=307)	p value
Technical Approach					0.067
Open surgery	237 (91.9%)	234 (95.9%)	265 (96.0%)	295 (96.1%)	
Endovascular intervention	21 (8.1%)	10 (4.1%)	11 (4.0%)	12 (3.9%)	
Sex					0.830
Male	175 (67.8%)	163 (66.8%)	188 (68.1%)	216 (70.4%)	
Female	83 (32.2%)	81 (33.2%)	88 (31.9%)	91 (29.6%)	
Age (years)					0.109
N-Miss	0	0	0	0	
Mean (SD)	72.4 (7.8)	71.3 (8.5)	72.3 (8.0)	73.0 (7.5)	
Renal Failure					< 0.001
G1 eGFR > 90	23 (8.9%)	23 (9.4%)	34 (12.3%)	44 (14.3%)	
G2 eGFR 60-89	59 (22.9%)	79 (32.4%)	114 (41.3%)	135 (44.0%)	
G3a eGFR 45-59	31 (12.0%)	30 (12.3%)	30 (10.9%)	40 (13.0%)	
G3b eGFR 30-44	10 (3.9%)	12 (4.9%)	16 (5.8%)	25 (8.1%)	
G4 eGFR 15-29	4 (1.6%)	0 (0.0%)	3 (1.1%)	6 (2.0%)	
G5 eGFR <15 or dialysis	0 (0.0%)	2 (0.8%)	4 (1.4%)	1 (0.3%)	
Unknown	131 (50.8%)	98 (40.2%)	75 (27.2%)	56 (18.2%)	
COPD					0.044
N-Miss	53	62	47	30	
No COPD	132 (64.4%)	133 (73.1%)	176 (76.9%)	198 (71.5%)	
COPD w/o medication	17 (8.3%)	8 (4.4%)	11 (4.8%)	17 (6.1%)	
COPD with medication	10 (4.9%)	11 (6.0%)	3 (1.3%)	13 (4.7%)	
COPD with O2 therapy	0 (0.0%)	1 (0.5%)	3 (1.3%)	0 (0.0%)	
Unknown	46 (22.4%)	29 (15.9%)	36 (15.7%)	49 (17.7%)	
Heart Failure					0.423
N-Miss	53	62	47	30	
No heart failure	120 (58.5%)	119 (65.4%)	143 (62.4%)	186 (67.1%)	
NYHA I	21 (10.2%)	20 (11.0%)	27 (11.8%)	28 (10.1%)	
NYHA II	14 (6.8%)	11 (6.0%)	20 (8.7%)	26 (9.4%)	
NYHA III	9 (4.4%)	3 (1.6%)	6 (2.6%)	6 (2.2%)	
NYHA IV	1 (0.5%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	
Unknown	40 (19.5%)	28 (15.4%)	33 (14.4%)	31 (11.2%)	

5.3.2 Outcomes at Discharge (CEA asymptomatic)

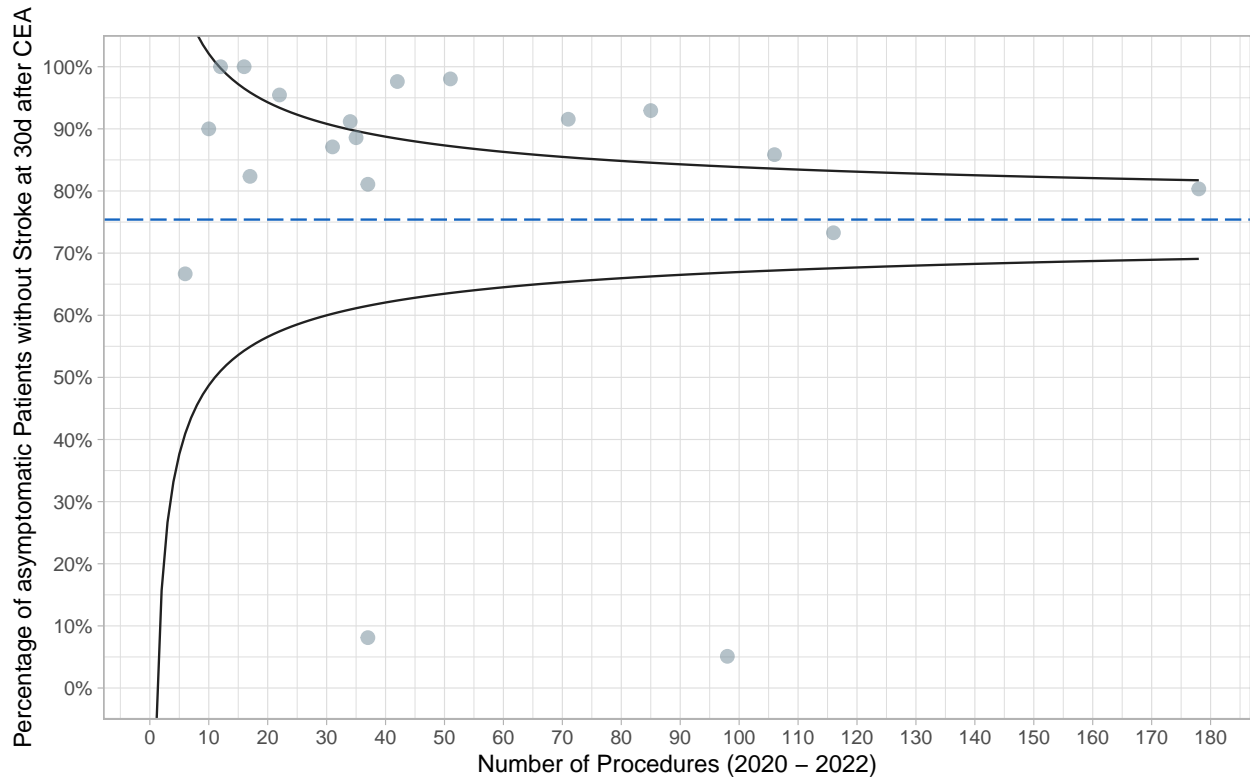
	2019 (N=237)	2020 (N=234)	2021 (N=265)	2022 (N=295)	p value
Inhospital Mortality					0.001
Dead	2 (0.8%)	1 (0.4%)	2 (0.8%)	0 (0.0%)	
Alive	226 (95.4%)	229 (97.9%)	263 (99.2%)	295 (100.0%)	
Missing	9 (3.8%)	4 (1.7%)	0 (0.0%)	0 (0.0%)	
Clavien Dindo at Discharge					0.333
N-Miss	61	52	37	33	
Grade 0 - No Complication	147 (83.5%)	166 (91.2%)	191 (83.8%)	227 (86.6%)	
Grade I	9 (5.1%)	2 (1.1%)	10 (4.4%)	7 (2.7%)	
Grade I disability	3 (1.7%)	3 (1.6%)	5 (2.2%)	4 (1.5%)	
Grade II	7 (4.0%)	3 (1.6%)	8 (3.5%)	15 (5.7%)	
Grade II disability	1 (0.6%)	4 (2.2%)	2 (0.9%)	3 (1.1%)	
Grade IIIa	2 (1.1%)	0 (0.0%)	5 (2.2%)	1 (0.4%)	
Grade IIIb	4 (2.3%)	4 (2.2%)	3 (1.3%)	4 (1.5%)	
Grade IIIb disability	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.4%)	
Grade IVa	1 (0.6%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	
Grade IVa disability	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	
Grade V - Death	2 (1.1%)	0 (0.0%)	2 (0.9%)	0 (0.0%)	



Note: This plot does NOT show the mortality rate! For mortality rate, see Table above.

5.3.3 Outcomes during Follow-up (CEA asymptomatic)

	2019 (N=237)	2020 (N=234)	2021 (N=265)	2022 (N=295)	p value
30d Mortality					0.496
Alive	147 (62.0%)	146 (62.4%)	167 (63.0%)	187 (63.4%)	
Dead	3 (1.3%)	1 (0.4%)	4 (1.5%)	0 (0.0%)	
Missing	87 (36.7%)	87 (37.2%)	94 (35.5%)	108 (36.6%)	
30d Stroke					0.870
Yes	4 (1.7%)	5 (2.1%)	3 (1.1%)	2 (0.7%)	
No	174 (73.4%)	171 (73.1%)	193 (72.8%)	219 (74.2%)	
Missing	59 (24.9%)	58 (24.8%)	69 (26.0%)	74 (25.1%)	



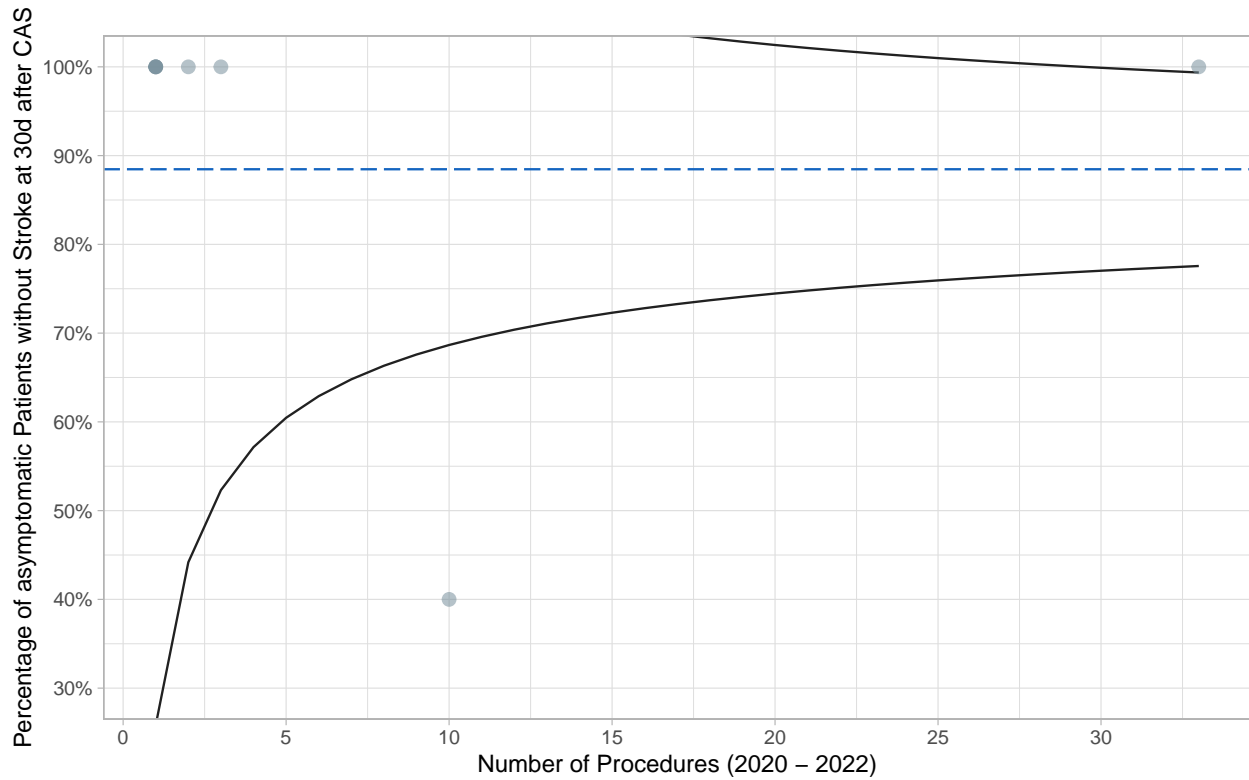
Note: This plot does NOT show the stroke rate! For stroke rate, see Table above.

5.3.4 Outcomes at Discharge (CAS asymptomatic)

	2019 (N=21)	2020 (N=10)	2021 (N=11)	2022 (N=12)	p value
Inhospital Mortality					0.127
Alive	21 (100.0%)	10 (100.0%)	11 (100.0%)	12 (100.0%)	
Clavien Dindo at Discharge					0.206
N-Miss	0	0	1	0	
Grade 0 - No Complication	21 (100.0%)	9 (90.0%)	9 (90.0%)	11 (91.7%)	
Grade I	0 (0.0%)	1 (10.0%)	0 (0.0%)	0 (0.0%)	
Grade II	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (8.3%)	
Grade IIIb	0 (0.0%)	0 (0.0%)	1 (10.0%)	0 (0.0%)	

5.3.5 Outcomes during Follow-up (CAS asymptomatic)

	2019 (N=21)	2020 (N=10)	2021 (N=11)	2022 (N=12)	p value
30d Mortality					0.525
Alive	18 (85.7%)	7 (70.0%)	8 (72.7%)	10 (83.3%)	
Dead	0 (0.0%)	0 (0.0%)	1 (9.1%)	0 (0.0%)	
Missing	3 (14.3%)	3 (30.0%)	2 (18.2%)	2 (16.7%)	
30d Stroke					0.425
No	19 (90.5%)	7 (70.0%)	9 (81.8%)	11 (91.7%)	
Missing	2 (9.5%)	3 (30.0%)	2 (18.2%)	1 (8.3%)	



Note: This plot does NOT show the stroke rate! For stroke rate, see Table above.

6 Bypass Surgery for Femoro-Popliteal Occlusive Disease

This cohort includes patients with open procedure at the native femoro-popliteal (supragenicular, infragenicular, or isolated popliteal) segment for obstructing wall pathology or intraluminal obstruction. Only sterile procedures, only procedures with no previous intervention at the same location, and only patients with chronic ischemia (both critical and relative).

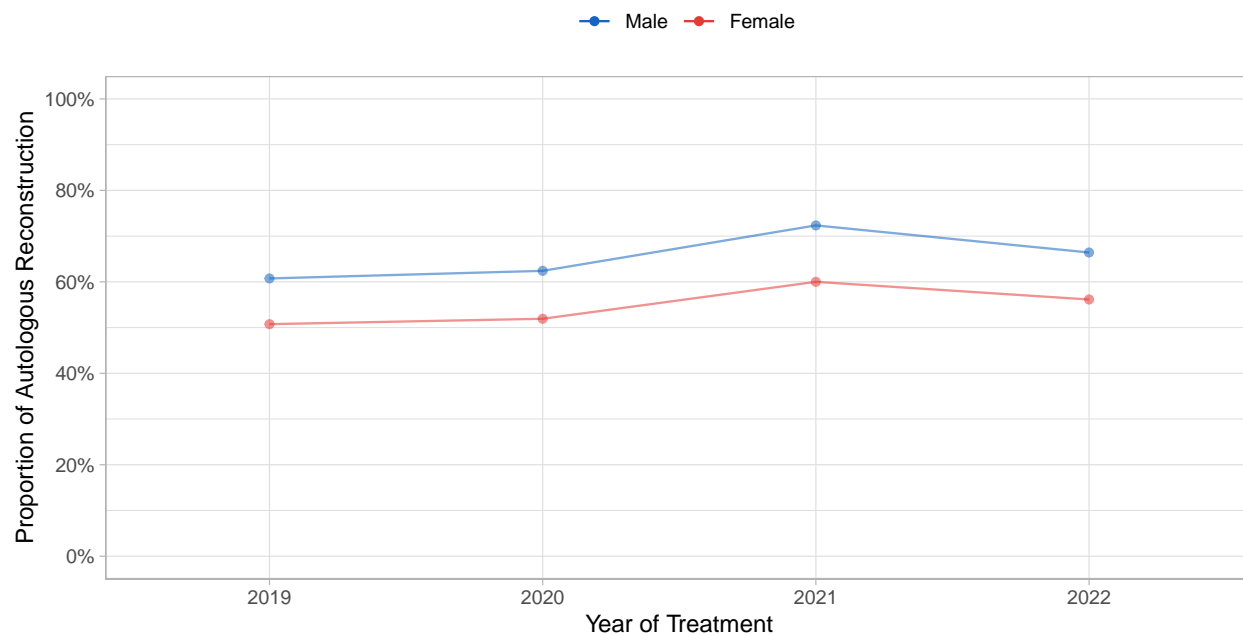
6.1 Baseline Characteristics

	2019 (N=202)	2020 (N=185)	2021 (N=211)	2022 (N=191)	p value
Sex					0.629
Male	135 (66.8%)	133 (71.9%)	141 (66.8%)	134 (70.2%)	
Female	67 (33.2%)	52 (28.1%)	70 (33.2%)	57 (29.8%)	
Age (years)					0.928
N-Miss	0	0	0	0	
Mean (SD)	71.9 (9.8)	71.5 (11.4)	71.5 (10.4)	72.0 (10.0)	
Renal Failure					< 0.001
G1 eGFR > 90	21 (10.4%)	31 (16.8%)	38 (18.0%)	36 (18.8%)	
G2 eGFR 60-89	36 (17.8%)	38 (20.5%)	61 (28.9%)	61 (31.9%)	
G3a eGFR 45-59	15 (7.4%)	12 (6.5%)	24 (11.4%)	19 (9.9%)	
G3b eGFR 30-44	15 (7.4%)	9 (4.9%)	7 (3.3%)	8 (4.2%)	
G4 eGFR 15-29	4 (2.0%)	3 (1.6%)	4 (1.9%)	10 (5.2%)	
G5 eGFR <15 or dialysis	2 (1.0%)	1 (0.5%)	2 (0.9%)	2 (1.0%)	
Unknown	109 (54.0%)	91 (49.2%)	75 (35.5%)	55 (28.8%)	
COPD					0.792
N-Miss	73	63	63	39	
No COPD	70 (54.3%)	82 (67.2%)	87 (58.8%)	87 (57.2%)	
COPD w/o medication	14 (10.9%)	12 (9.8%)	12 (8.1%)	14 (9.2%)	
COPD with medication	11 (8.5%)	7 (5.7%)	13 (8.8%)	12 (7.9%)	
COPD with O2 therapy	1 (0.8%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	
Unknown	33 (25.6%)	21 (17.2%)	36 (24.3%)	38 (25.0%)	
Heart Failure					0.638
N-Miss	72	63	63	39	
No heart failure	69 (53.1%)	79 (64.8%)	80 (54.1%)	74 (48.7%)	
NYHA I	12 (9.2%)	9 (7.4%)	12 (8.1%)	15 (9.9%)	
NYHA II	12 (9.2%)	4 (3.3%)	9 (6.1%)	14 (9.2%)	
NYHA III	6 (4.6%)	5 (4.1%)	5 (3.4%)	9 (5.9%)	
NYHA IV	1 (0.8%)	2 (1.6%)	2 (1.4%)	1 (0.7%)	
Unknown	30 (23.1%)	23 (18.9%)	40 (27.0%)	39 (25.7%)	

6.2 Treatment Details

	2019 (N=202)	2020 (N=185)	2021 (N=211)	2022 (N=191)	p value
Segment					0.129
Fem-pop, supragenicular	121 (59.9%)	92 (49.7%)	96 (45.5%)	98 (51.3%)	
Fem-pop, infragenicular	76 (37.6%)	88 (47.6%)	110 (52.1%)	90 (47.1%)	
Isolated popliteal	5 (2.5%)	5 (2.7%)	5 (2.4%)	3 (1.6%)	
Clinical Problem					0.030
Chronic relative ischemia	114 (56.4%)	79 (42.7%)	95 (45.0%)	97 (50.8%)	
Chronic critical ischemia	88 (43.6%)	106 (57.3%)	116 (55.0%)	94 (49.2%)	
Material					0.024
Autologous	116 (57.4%)	110 (59.5%)	144 (68.2%)	121 (63.4%)	
Biological	6 (3.0%)	7 (3.8%)	15 (7.1%)	8 (4.2%)	
Synthetic	80 (39.6%)	68 (36.8%)	52 (24.6%)	62 (32.5%)	

6.2.1 Proportion of autologous reconstructions



6.3 Critical Limb Ischemia

To increase comparability, the cohort was defined as follows: Open or endovascular procedure at the native femoro-popliteal (supragenicular or infragenicular) segment for obstructing wall pathology or intraluminal obstruction. Only sterile procedures, only procedures with no previous intervention at the same location, and only patients with chronic critical ischemia.

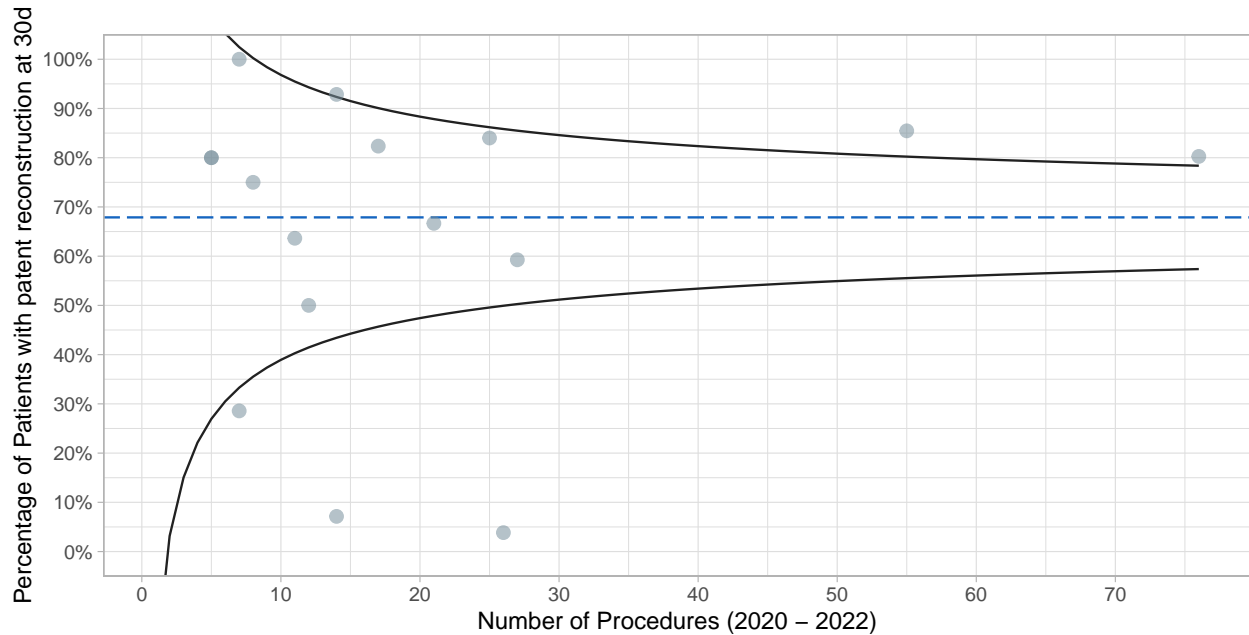
6.3.1 Characteristics and Hospital Outcomes

Table 27: Revascularisation for Critical Limb Ischemia

	2019 (N=88)	2020 (N=106)	2021 (N=116)	2022 (N=94)	p value
Segment					0.154
Fem-pop, supragenicular	41 (46.6%)	45 (42.5%)	36 (31.0%)	40 (42.6%)	
Fem-pop, infragenicular	45 (51.1%)	59 (55.7%)	80 (69.0%)	53 (56.4%)	
Isolated popliteal	2 (2.3%)	2 (1.9%)	0 (0.0%)	1 (1.1%)	
Material					0.174
Autologous	57 (64.8%)	58 (54.7%)	81 (69.8%)	64 (68.1%)	
Biological	2 (2.3%)	6 (5.7%)	7 (6.0%)	5 (5.3%)	
Synthetic	29 (33.0%)	42 (39.6%)	28 (24.1%)	25 (26.6%)	
Inhospital Mortality					0.536
Dead	1 (1.1%)	3 (2.8%)	6 (5.2%)	3 (3.2%)	
Alive	84 (95.5%)	100 (94.3%)	109 (94.0%)	90 (95.7%)	
Missing	3 (3.4%)	3 (2.8%)	1 (0.9%)	1 (1.1%)	
Clavien Dindo at Discharge					0.066
N-Miss	44	24	23	14	
Grade 0 - No Complication	29 (65.9%)	56 (68.3%)	65 (69.9%)	41 (51.2%)	
Grade I	2 (4.5%)	8 (9.8%)	0 (0.0%)	2 (2.5%)	
Grade I disability	1 (2.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Grade II	3 (6.8%)	5 (6.1%)	6 (6.5%)	12 (15.0%)	
Grade II disability	0 (0.0%)	1 (1.2%)	1 (1.1%)	0 (0.0%)	
Grade IIIa	0 (0.0%)	1 (1.2%)	2 (2.2%)	1 (1.2%)	
Grade IIIb	6 (13.6%)	8 (9.8%)	12 (12.9%)	15 (18.8%)	
Grade IIIb disability	1 (2.3%)	1 (1.2%)	1 (1.1%)	4 (5.0%)	
Grade IVa	2 (4.5%)	1 (1.2%)	2 (2.2%)	3 (3.8%)	
Grade IVa disability	0 (0.0%)	1 (1.2%)	0 (0.0%)	0 (0.0%)	
Grade V - Death	0 (0.0%)	0 (0.0%)	4 (4.3%)	2 (2.5%)	

6.3.2 Outcomes during Follow-up

	2019 (N=88)	2020 (N=106)	2021 (N=116)	2022 (N=94)	p value
30d Mortality					0.826
Alive	59 (67.0%)	72 (67.9%)	73 (62.9%)	68 (72.3%)	
Dead	4 (4.5%)	6 (5.7%)	9 (7.8%)	4 (4.3%)	
Missing	25 (28.4%)	28 (26.4%)	34 (29.3%)	22 (23.4%)	
30d Reconstruction patency					0.085
Yes	44 (50.0%)	54 (50.9%)	64 (55.2%)	62 (66.0%)	
No	3 (3.4%)	6 (5.7%)	1 (0.9%)	1 (1.1%)	
Missing	41 (46.6%)	46 (43.4%)	51 (44.0%)	31 (33.0%)	



Note: This plot does NOT show the occlusion rate! For occlusion rate, see Table above.

6.4 Chronic Relative Ischemia (Claudication)

To increase comparability, the cohort was defined as follows: Open or endovascular procedure at the native femoro-popliteal (supragenicular or infragenicular) segment for obstructing wall pathology or intraluminal obstruction. Only sterile procedures, only procedures with no previous intervention at the same location, and only patients with chronic relative ischemia.

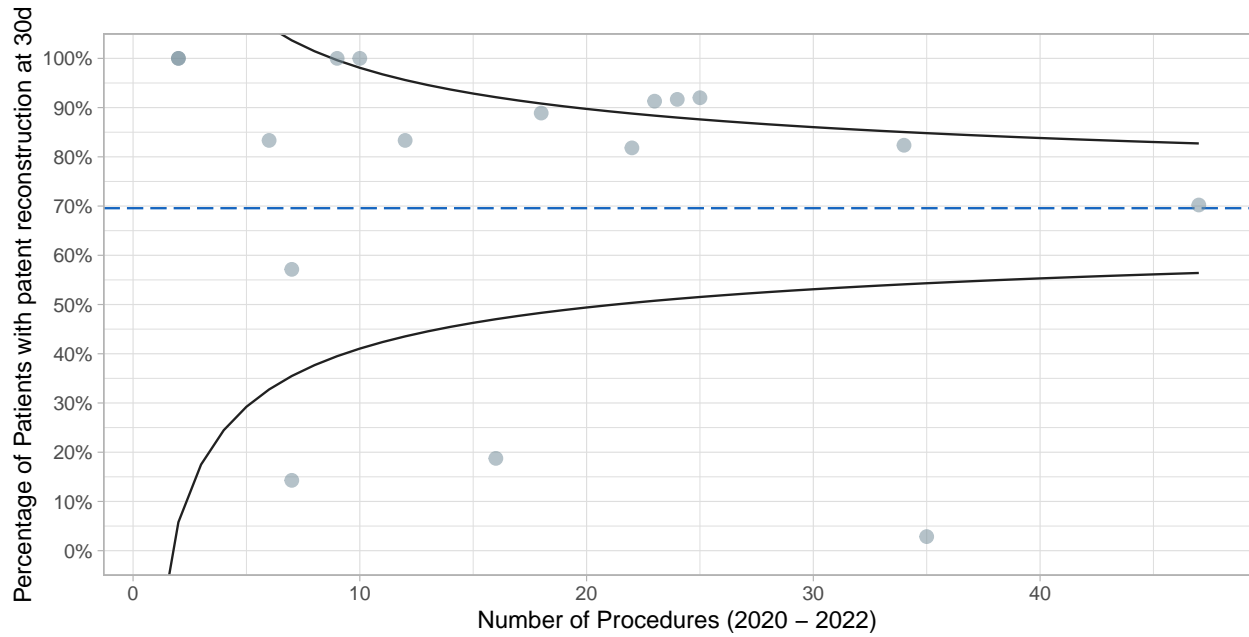
6.4.1 Characteristics and Hospital Outcomes

Table 29: Revascularisation for Claudication

	2019 (N=114)	2020 (N=79)	2021 (N=95)	2022 (N=97)	p value
Segment					0.510
Fem-pop, supragenicular	80 (70.2%)	47 (59.5%)	60 (63.2%)	58 (59.8%)	
Fem-pop, infragenicular	31 (27.2%)	29 (36.7%)	30 (31.6%)	37 (38.1%)	
Isolated popliteal	3 (2.6%)	3 (3.8%)	5 (5.3%)	2 (2.1%)	
Material					0.026
Autologous	59 (51.8%)	52 (65.8%)	63 (66.3%)	57 (58.8%)	
Biological	4 (3.5%)	1 (1.3%)	8 (8.4%)	3 (3.1%)	
Synthetic	51 (44.7%)	26 (32.9%)	24 (25.3%)	37 (38.1%)	
Inhospital Mortality					0.311
Alive	112 (98.2%)	76 (96.2%)	93 (97.9%)	97 (100.0%)	
Missing	2 (1.8%)	3 (3.8%)	2 (2.1%)	0 (0.0%)	
Clavien Dindo at Discharge					0.548
N-Miss	65	25	22	32	
Grade 0 - No Complication	38 (77.6%)	45 (83.3%)	58 (79.5%)	48 (73.8%)	
Grade I	2 (4.1%)	3 (5.6%)	2 (2.7%)	4 (6.2%)	
Grade I disability	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.5%)	
Grade II	2 (4.1%)	1 (1.9%)	8 (11.0%)	5 (7.7%)	
Grade IIIa	1 (2.0%)	2 (3.7%)	1 (1.4%)	0 (0.0%)	
Grade IIIb	6 (12.2%)	3 (5.6%)	4 (5.5%)	7 (10.8%)	

6.4.2 Outcomes during Follow-up

	2019 (N=114)	2020 (N=79)	2021 (N=95)	2022 (N=97)	p value
30d Mortality					0.417
Alive	68 (59.6%)	45 (57.0%)	62 (65.3%)	59 (60.8%)	
Dead	2 (1.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Missing	44 (38.6%)	34 (43.0%)	33 (34.7%)	38 (39.2%)	
30d Reconstruction patency					0.064
Yes	53 (46.5%)	36 (45.6%)	61 (64.2%)	58 (59.8%)	
No	5 (4.4%)	2 (2.5%)	3 (3.2%)	1 (1.0%)	
Missing	56 (49.1%)	41 (51.9%)	31 (32.6%)	38 (39.2%)	

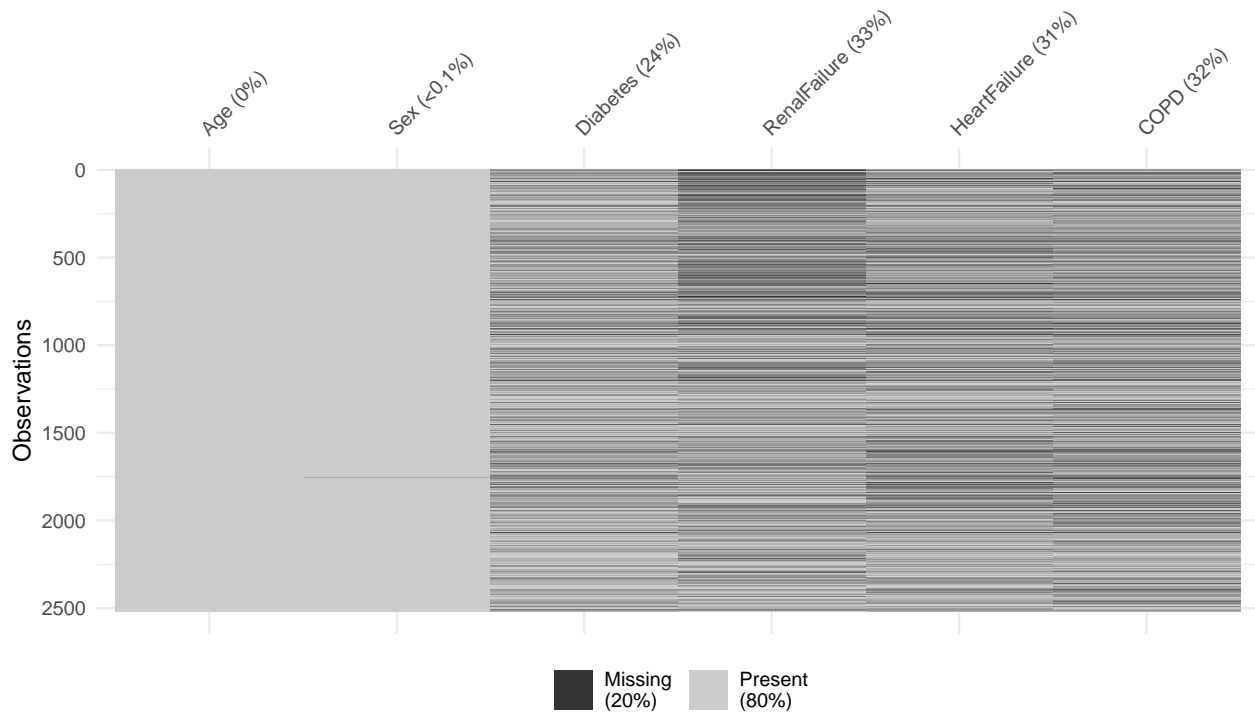


Note: This plot does NOT show the occlusion rate! For occlusion rate, see Table above.

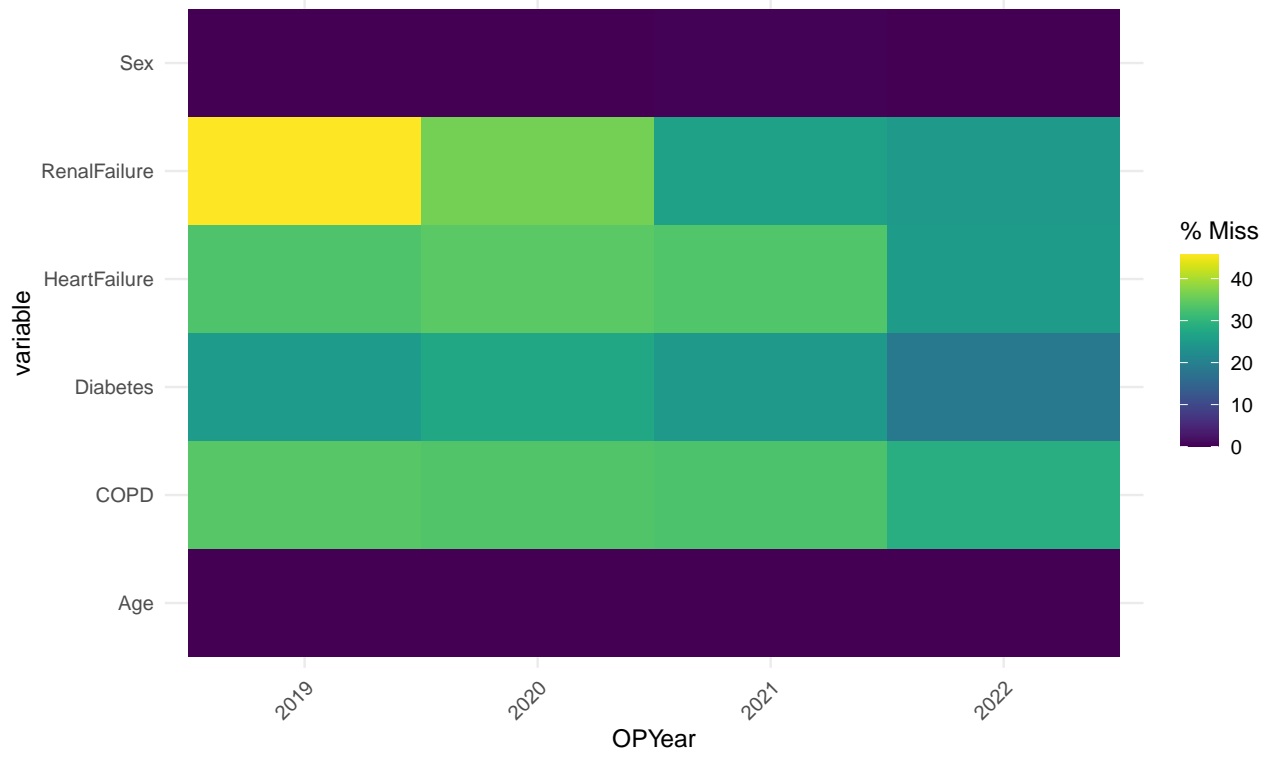
7 Appendix I

7.1 Missing Data in the AAA Cohort

Missing in AAA Cohort – Overall



Missing in AAA Cohort Your Clinic over time



8 Session Info

```
## R version 4.2.3 (2023-03-15)
## Platform: aarch64-apple-darwin20 (64-bit)
## Running under: macOS Monterey 12.5.1
##
## Matrix products: default
## BLAS: /Library/Frameworks/R.framework/Versions/4.2-arm64/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/4.2-arm64/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods    base
##
## other attached packages:
## [1] naniar_1.0.0      forestmodel_0.6.2  mice_3.15.0      Hmisc_5.0-1
## [5] reshape2_1.4.4   gridExtra_2.3      funnelR_0.1.0    RColorBrewer_1.1-3
## [9] ggrepel_0.9.3    markdown_1.5       arsenal_3.6.3     kableExtra_1.3.4
## [13] survival_3.5-3   survminer_0.4.9    cowplot_1.1.1    jtools_2.2.1
## [17] ggpubr_0.6.0     lubridate_1.9.2    forcats_1.0.0    stringr_1.5.0
## [21] dplyr_1.1.0      purrr_1.0.1        readr_2.1.4      tidyr_1.3.0
## [25] tibble_3.2.1     ggplot2_3.4.1      tidyverse_2.0.0
##
## loaded via a namespace (and not attached):
## [1] webshot_0.5.4    httr_1.4.5         tools_4.2.3        backports_1.4.1
## [5] utf8_1.2.3       R6_2.5.1           rpart_4.1.19       colorspace_2.1-0
## [9] nnet_7.3-18      withr_2.5.0        tidyselect_1.2.0   compiler_4.2.3
## [13] cli_3.6.0        rvest_1.0.3        htmlTable_2.4.1    xml2_1.3.3
## [17] labeling_0.4.2   scales_1.2.1       checkmate_2.1.0    survMisc_0.5.6
## [21] systemfonts_1.0.4 digest_0.6.31      foreign_0.8-84     rmarkdown_2.20
## [25] svglite_2.1.1    base64enc_0.1-3    pkgconfig_2.0.3    htmltools_0.5.4
## [29] highr_0.10       fastmap_1.1.1      htmlwidgets_1.6.2  rlang_1.1.0
## [33] rstudioapi_0.14 farver_2.1.1       generics_0.1.3     zoo_1.8-11
## [37] car_3.1-1        magrittr_2.0.3     Formula_1.2-5      Matrix_1.5-3
## [41] Rcpp_1.0.10      munsell_0.5.0      fansi_1.0.4        viridis_0.6.2
## [45] abind_1.4-5      visdat_0.6.0       lifecycle_1.0.3    stringi_1.7.12
## [49] yaml_2.3.7       carData_3.0-5      MASS_7.3-58.2      plyr_1.8.8
## [53] grid_4.2.3       crayon_1.5.2       lattice_0.20-45    splines_4.2.3
## [57] pander_0.6.5     hms_1.1.3          knitr_1.42         pillar_1.8.1
## [61] ggsignif_0.6.4   glue_1.6.2         evaluate_0.20      data.table_1.14.8
## [65] vctrs_0.5.2      tzdb_0.3.0         gtable_0.3.3       km.ci_0.5-6
## [69] xfun_0.37        xtable_1.8-4       broom_1.0.4        rstatix_0.7.2
## [73] viridisLite_0.4.1 KMsurv_0.1-5       cluster_2.1.4      timechange_0.2.0
## [77] ellipsis_0.3.2
```