SwissVasc Overall Annual Report 2022

Lorenz Meuli MD MSc, Thomas Lattmann MD & Florian Dick MD

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Contents

1 Introduction **3**
1.1 Statistical Analysis . . . 3
1.2 SwissVasc Dataexport . . . 3
1.3 Use of Figures and Tables . . . 3
1.4 Errors . . . 3

2 Participating Hospitals 2023 **4**

3 All Interventions **5**
3.1 Inpatient versus Outpatient Surgery . . . 5

4 Overview of Vascular Interventions **6**
4.1 Cumulative Incidence of all Vascular Operations - Year-on-Year Change . . . 6

5 Treatment of the supraaortic Arteries **7**
5.1 Treatment of Carotid Stenosis (CEA & CAS) . . . 7
5.2 Other Interventions on Supraaortic Arteries in 2023 . . . 9
5.3 Treatment of Supraaortic Arteries - Year-on-Year Change . . . 9
5.4 Treatment of Supraaortic Arteries in 2023 - National Overview . . . 9

6 Treatment of Arteries of the Upper Extremity **10**

7 Surgery of the Abdominal Aorta and the Iliac Arteries **13**
7.1 Overview . . . 13
7.2 Open Repair for Aneurysms of the Abdominal Aorta and the Iliac Arteries . . . 17
7.3 Endovascular Repair for Aneurysms of the Abdominal Aorta and the Iliac Arteries . . . 20
7.4 Open Repair for Occlusive Disease of the Abdominal Aorta and the Iliac Arteries . . . 23
7.5 Endovascular Repair for Occlusive Disease of the Abdominal Aorta and the Iliac Arteries . . . 25

8 Surgery of the Thoracic Aorta **27**
8.1 Treatment of the Thoracic Aorta in 2023 - National Overview . . . 29

9 Surgery of the Renovisceral Arteries **30**
9.1 Treatment of the Renovisceral Arteries in 2023 - National Overview . . . 31

10 Treatment of the Femoral Bifurcation **32**
10.1 Treatment of the Femoral Bifurcation - Year-on-Year Change . . . 34
10.2 Surgery on Femoral Bifurcation in 2023 - National Overview . . . 34

11 Treatment of Arteries of the Lower Extremity **35**
11.1 Surgery on the supragenicular femoro-popliteal Arteries . . . 39
11.2 Surgery on the popliteal Artery . . . 41

11.3 Surgery on the infragenicular and crural Arteries 43

12 Access Surgery **45**
12.1 Catheters versus AV-Fistula/Shunts 46

13 Treatment of Deep Veins **49**

14 Treatment of Varicosis **51**

15 Amputations and other Soft Tissue Procedures **52**

16 R Session Info **54**

1 Introduction

This report is provided free of charge for all clinics participating in SwissVasc. Data is summarized by the year of intervention (OP date) and compared with the preceding year (2021 versus 2020) if not stated otherwise.

1.1 Statistical Analysis

Number of procedures and patient's characteristics are summarized and presented by tables. Continuous variables were summarized by mean ± standard deviation if normally distributed or by median and range if skewed. Continuous vatiables are compared using student's t-test if normally distributed or Mann-Whitney-U test if skewed, respectively. Normality was tested using the Shapiro-Wilk test. Categorical variables were summarized with counts and percentages for each level of the variable and compared using Pearson's Chi2 test. All analyses were done with R-Studio, version 3.6.3 (R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.), on MacOS version 11.4, all p-values are two-sided.

1.2 SwissVasc Dataexport

Date of data export: 19th of April 2024.
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. data 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 Participating Hospitals 2023

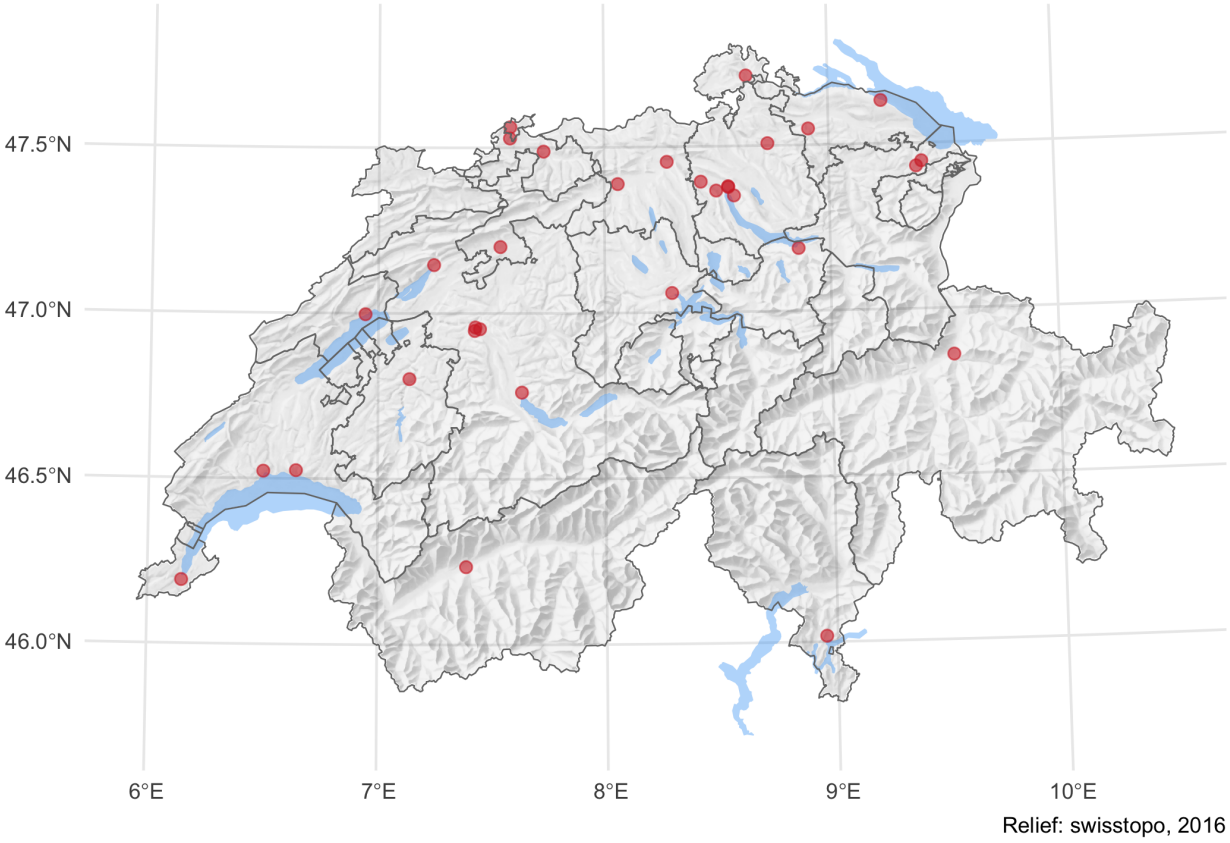


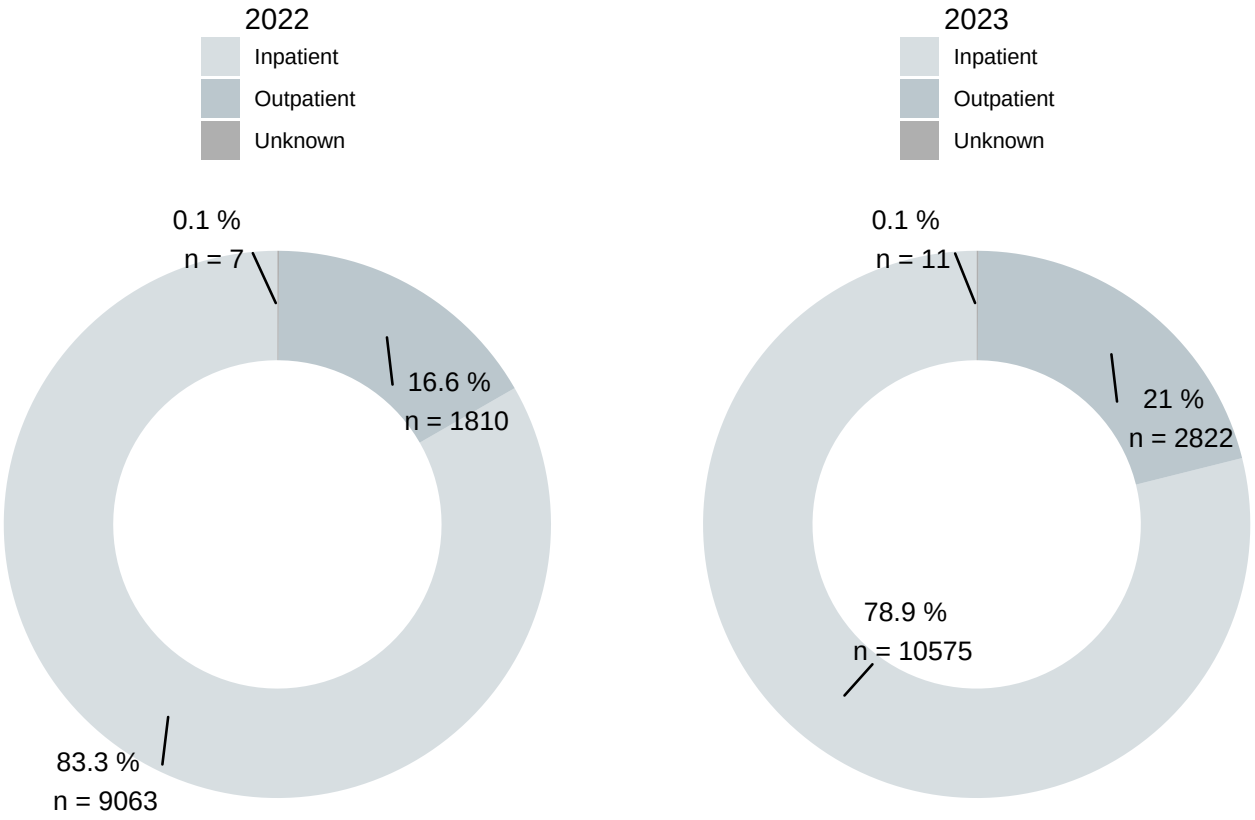
Figure 1: All participating Hospitals - Geolocations

3 All Interventions

Table 1: General Overview

OPYear	2022	2023
Cases	6357	8559
Patients	7913	9872
Operationen	10880	13408
Inpatient Operationen	9063	10575
Outpatient Operationen	1810	2822
Procedures	14406	18662

3.1 Inpatient versus Outpatient Surgery



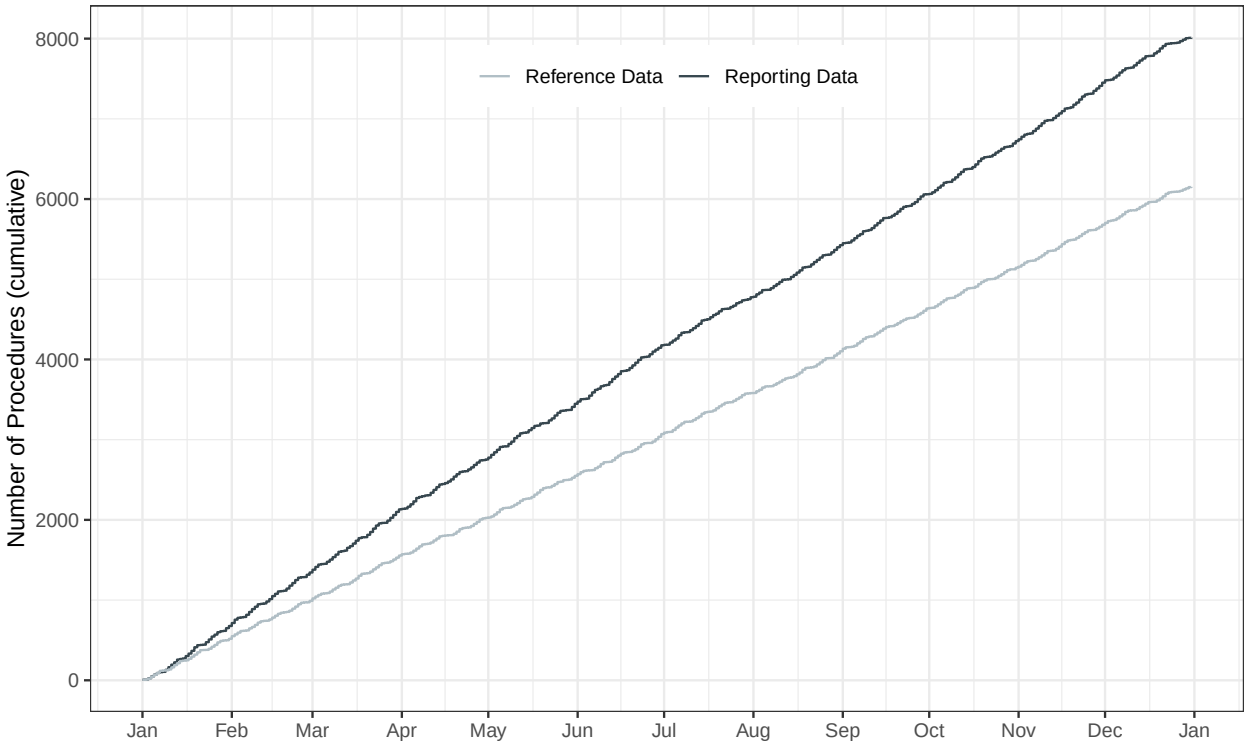
4 Overview of Vascular Interventions

Table 2: Overview on Vascular Procedures

OPYear	2022	2023
Cases	4060	5609
Patients	5355	6680
Operationen	6152	8012
Inpatient Operationen	5889	7329
Outpatient Operationen	260	675
Procedures	8094	10513

Vascular interventions include all procedures where the "technical approach" was either "open surgery" or "endovasculuar intervention". Procedures for superficial veins of the lower limb (i.e. surgery for varicose veins) and procedures, where no vascular segment was defined, were excluded.

4.1 Cumulative Incidence of all Vascular Operations - Year-on-Year Change



5 Treatment of the supraaortic Arteries

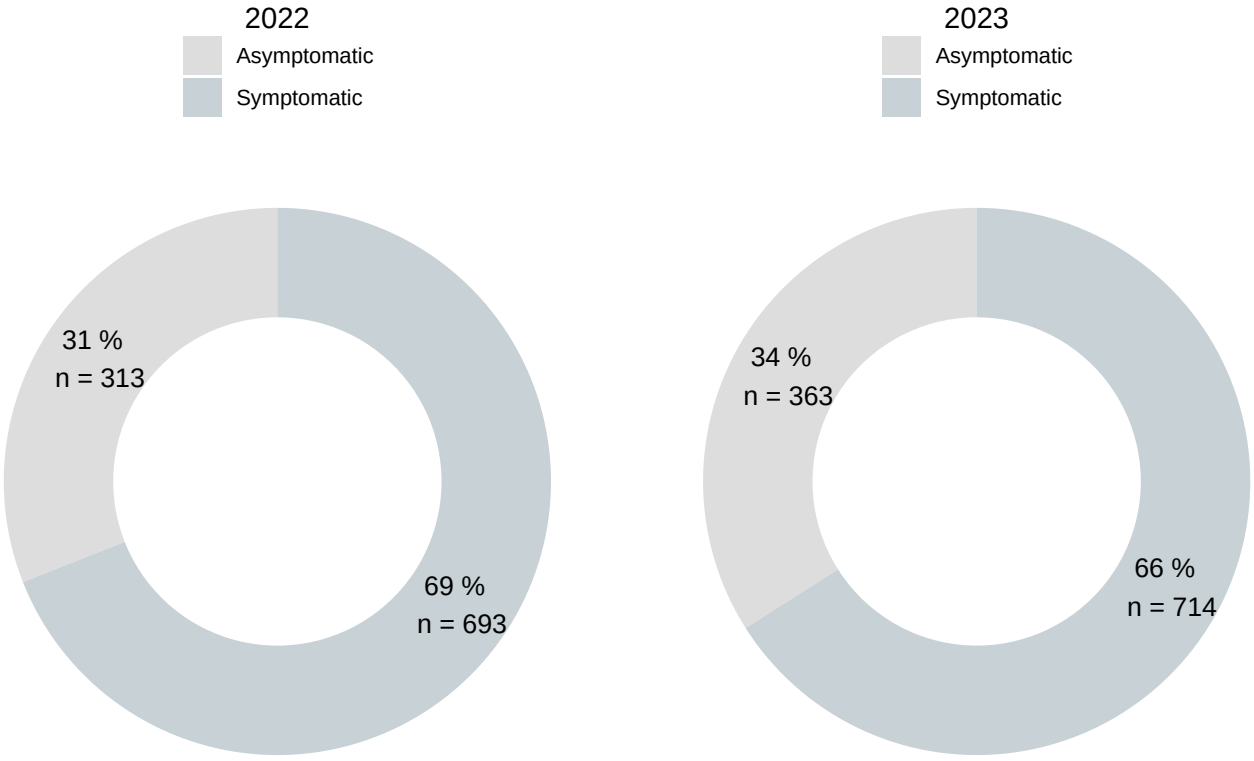
Your clinic performed 1202 procedures on supraaortic arteries in 1096 operations in 2023.

5.1 Treatment of Carotid Stenosis (CEA & CAS)

Table 3: Endarterectomy and Stenting of the Carotid Bifurcation

	2022 (N=1008)	2023 (N=1080)	p value
Technical Approach			
Open surgery	820 (81.3%)	834 (77.2%)	
Endovascular intervention	188 (18.7%)	246 (22.8%)	
No vascular procedure	0 (0.0%)	0 (0.0%)	
Clinical Problem			0.207
N-Miss	2	3	
Asymptomatic	313 (31.1%)	363 (33.7%)	
Symptomatic	693 (68.9%)	714 (66.3%)	
Inflow Optimization			0.001
N-Miss	234	220	
Same Approach	0 (0.0%)	15 (1.7%)	
Hyprid Approach	2 (0.3%)	2 (0.2%)	
No Inflow Optimization	772 (99.7%)	843 (98.0%)	
Sex			0.667
N-Miss	0	1	
Male	714 (70.8%)	755 (70.0%)	
Female	294 (29.2%)	324 (30.0%)	
Age (years)			0.665
Mean (SD)	73.4 (9.8)	73.2 (9.8)	
Range	20.0 - 96.0	40.0 - 97.0	
Complication at Discharge			0.283
N-Miss	238	251	
No	656 (85.2%)	690 (83.2%)	
Yes	114 (14.8%)	139 (16.8%)	
droplevels(ClavienDindo)			0.398
N-Miss	238	251	
Grade 0 - No Complication	656 (85.2%)	690 (83.2%)	
Grade I	24 (3.1%)	27 (3.3%)	
Grade I disability	13 (1.7%)	15 (1.8%)	
Grade II	43 (5.6%)	38 (4.6%)	
Grade II disability	7 (0.9%)	8 (1.0%)	
Grade IIIa	4 (0.5%)	5 (0.6%)	
Grade IIIa disability	1 (0.1%)	1 (0.1%)	
Grade IIIb	15 (1.9%)	29 (3.5%)	
Grade IIIb disability	3 (0.4%)	1 (0.1%)	
Grade IVa	2 (0.3%)	9 (1.1%)	
Grade IVa disability	0 (0.0%)	2 (0.2%)	
Grade IVb disability	0 (0.0%)	1 (0.1%)	
Grade V - Death	2 (0.3%)	3 (0.4%)	
30d Reconstruction patency			< 0.001
Yes	582 (57.7%)	513 (47.5%)	
No	6 (0.6%)	8 (0.7%)	
Missing	420 (41.7%)	559 (51.8%)	

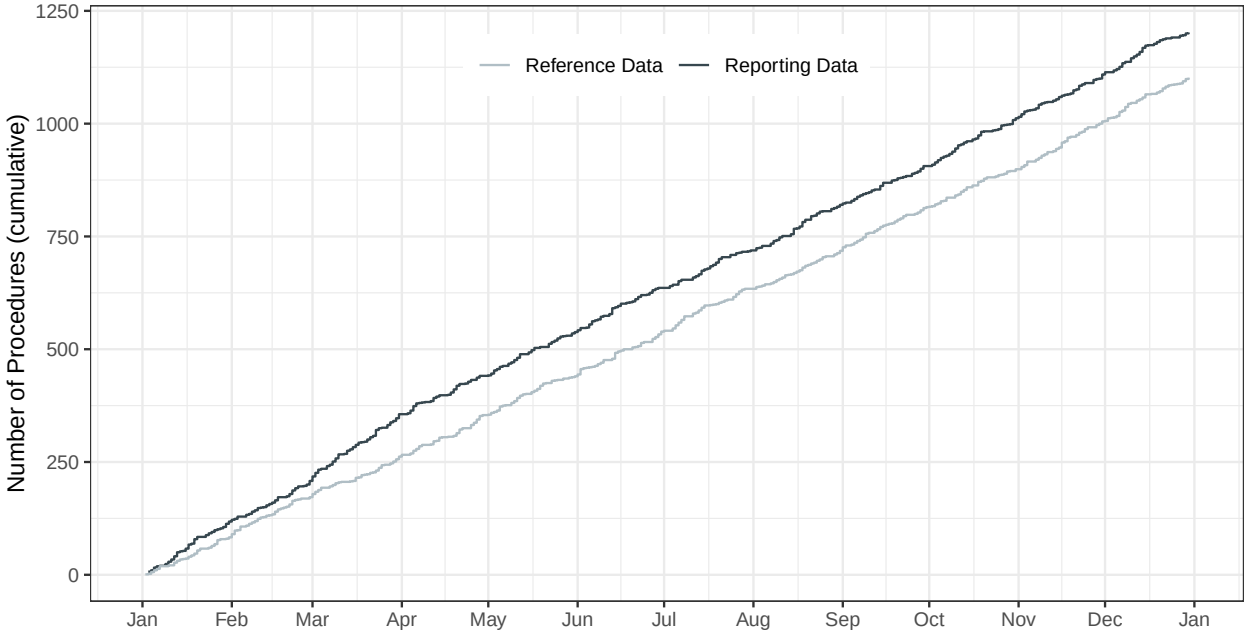
5.1.1 Clinical Problem



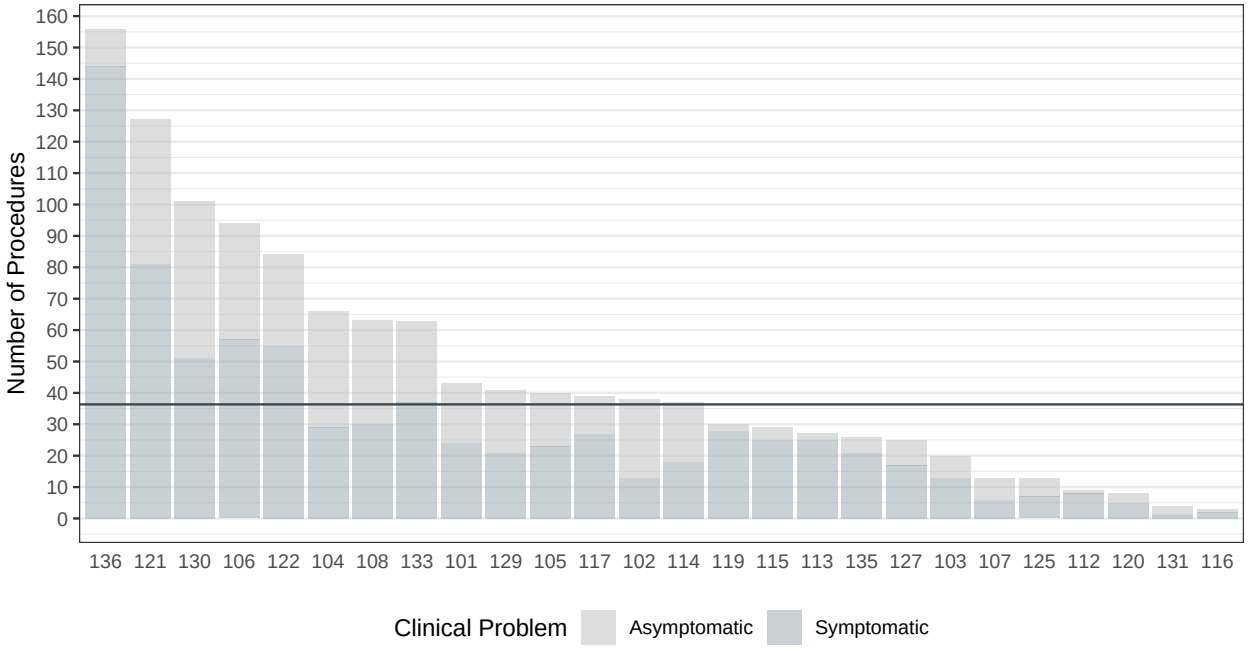
5.2 Other Interventions on Supraaortic Arteries in 2023

- 6 procedures for glomus tumors or other tumors affecting the carotid arteries.
- 5 procedures for thoracic outlet syndrom.
- 30 procedures for debranching or rebranching of supraaortic arteries.
- 30 procedures for symptomatic occlusion of the subclavian artery or the brachiocephalic trunk.
- 51 other procedures on supraaortic arteries.

5.3 Treatment of Supraaortic Arteries - Year-on-Year Change



5.4 Treatment of Supraaortic Arteries in 2023 - National Overview



6 Treatment of Arteries of the Upper Extremity

Table 4: Surgery for Acute Ischemia of the Upper Extremity

	2022 (N=79)	2023 (N=125)
Vascular Intervention		
Vascular graft	10 (12.7%)	12 (9.6%)
Bifurcated graft	1 (1.3%)	3 (2.4%)
Repair of vessel wall	3 (3.8%)	5 (4.0%)
Isolated dilatation (PTA/Stent)	10 (12.7%)	20 (16.0%)
Mural desobliteration w/wo patch	14 (17.7%)	16 (12.8%)
Luminal desobliteration (e.g. embolectomy)	41 (51.9%)	67 (53.6%)
De-/rebranching	0 (0.0%)	1 (0.8%)
Imaging	0 (0.0%)	1 (0.8%)
Sex		
Male	39 (49.4%)	62 (49.6%)
Female	40 (50.6%)	63 (50.4%)
Age (years)		
Mean (SD)	72.4 (15.7)	67.3 (16.5)
Range	26.0 - 95.0	12.0 - 94.0
Complication at Discharge		
N-Miss	18	20
No	49 (80.3%)	70 (66.7%)
Yes	12 (19.7%)	35 (33.3%)
Clavien Dindo at Discharge		
N-Miss	18	20
Grade 0 - No Complication	49 (80.3%)	70 (66.7%)
Grade I	2 (3.3%)	0 (0.0%)
Grade I disability	1 (1.6%)	0 (0.0%)
Grade II	5 (8.2%)	12 (11.4%)
Grade II disability	1 (1.6%)	0 (0.0%)
Grade IIIa	0 (0.0%)	1 (1.0%)
Grade IIIb	2 (3.3%)	5 (4.8%)
Grade IVa	0 (0.0%)	2 (1.9%)
Grade IVb	0 (0.0%)	6 (5.7%)
Grade V - Death	1 (1.6%)	9 (8.6%)
30d Reconstruction patency		
Yes	16 (20.3%)	42 (33.6%)
No	0 (0.0%)	2 (1.6%)
Missing	63 (79.7%)	81 (64.8%)

Table 5: Surgery for Vascular Wall Injury and Pseudoaneurysms

	2022 (N=16)	2023 (N=22)
Clinical Problem		
No problem	1 (6.2%)	5 (22.7%)
Bleeding	13 (81.2%)	11 (50.0%)
Local swelling, inflammation or displacement	2 (12.5%)	5 (22.7%)
Pathologic AV-fistula	0 (0.0%)	1 (4.5%)
Sterility		
Infected or presumably infected	1 (6.2%)	0 (0.0%)
Sterile operation	15 (93.8%)	22 (100.0%)

	2022 (N=16)	2023 (N=22)
Sex		
Male	8 (50.0%)	12 (54.5%)
Female	8 (50.0%)	10 (45.5%)
Age (years)		
Mean (SD)	67.3 (21.7)	62.9 (21.1)
Range	21.0 - 88.0	9.0 - 83.0
Complication at Discharge		
N-Miss	7	7
No	8 (88.9%)	14 (93.3%)
Yes	1 (11.1%)	1 (6.7%)

Note: Patients with vascular wall injuries and pseudoaneurysms presenting with acute ischemia, distal embolisation, or otherwise symptomatic are included in the table "Surgery for Acute Ischemia of the Upper Extremity" if the clinical presentation was coded accordingly.

Table 6: Other Interventions on Upper Extremity Arteries

	2022 (N=29)	2023 (N=57)	p value
Clinical Problem			0.443
No problem	17 (58.6%)	23 (40.4%)	
Bleeding	2 (6.9%)	3 (5.3%)	
Local swelling, inflammation or displacement	0 (0.0%)	2 (3.5%)	
Chronic relative ischemia	7 (24.1%)	22 (38.6%)	
Chronic critical ischemia	3 (10.3%)	7 (12.3%)	
Sterility			0.003
Sterile operation	29 (100.0%)	57 (100.0%)	
Sex			0.053
Male	22 (75.9%)	31 (54.4%)	
Female	7 (24.1%)	26 (45.6%)	
Age (years)			0.475
Mean (SD)	66.6 (15.6)	64.3 (13.8)	
Range	22.0 - 88.0	21.0 - 93.0	
Complication at Discharge			0.296
N-Miss	5	6	
No	12 (50.0%)	32 (62.7%)	
Yes	12 (50.0%)	19 (37.3%)	
Clavien Dindo at Discharge			0.713
N-Miss	5	6	
Grade 0 - No Complication	12 (50.0%)	32 (62.7%)	
Grade I	2 (8.3%)	4 (7.8%)	
Grade II	4 (16.7%)	4 (7.8%)	
Grade II disability	1 (4.2%)	1 (2.0%)	
Grade IIIa	1 (4.2%)	2 (3.9%)	
Grade IIIb	3 (12.5%)	7 (13.7%)	
Grade IVb	0 (0.0%)	1 (2.0%)	
Grade V - Death	1 (4.2%)	0 (0.0%)	
30d Reconstruction patency			0.604
Yes	10 (34.5%)	26 (45.6%)	
No	1 (3.4%)	2 (3.5%)	
Missing	18 (62.1%)	29 (50.9%)	

7 Surgery of the Abdominal Aorta and the Iliac Arteries

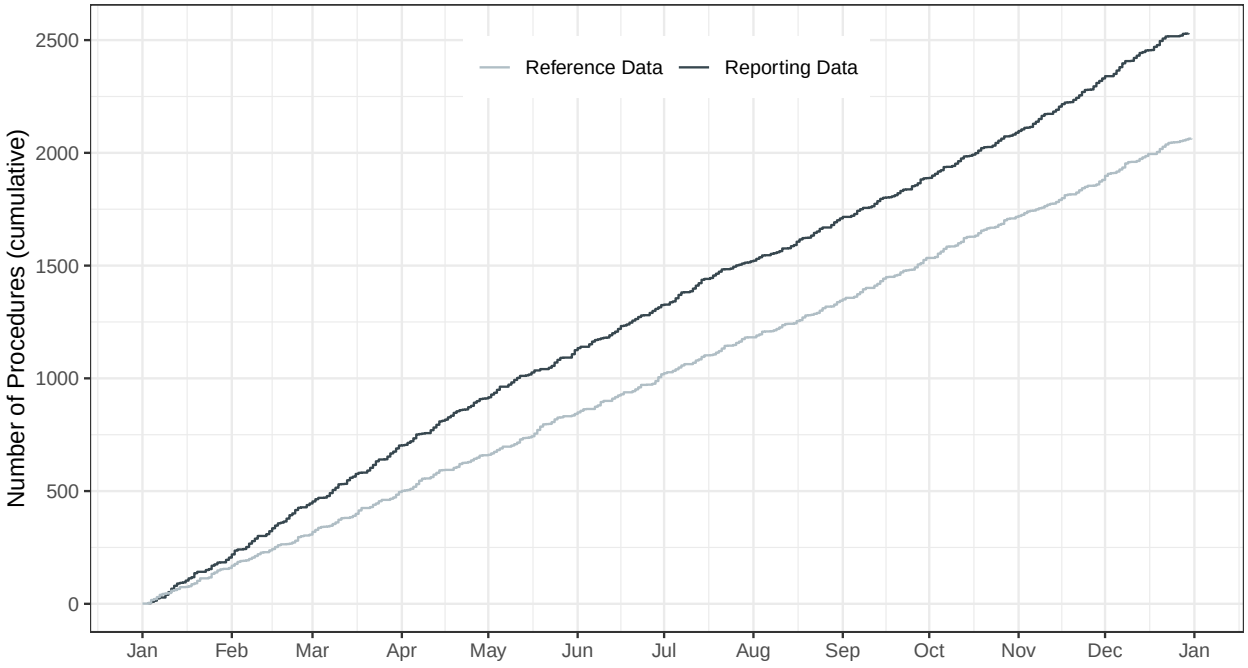
7.1 Overview

Table 7: Overview - Abdominal Aorta and Iliac Arteries

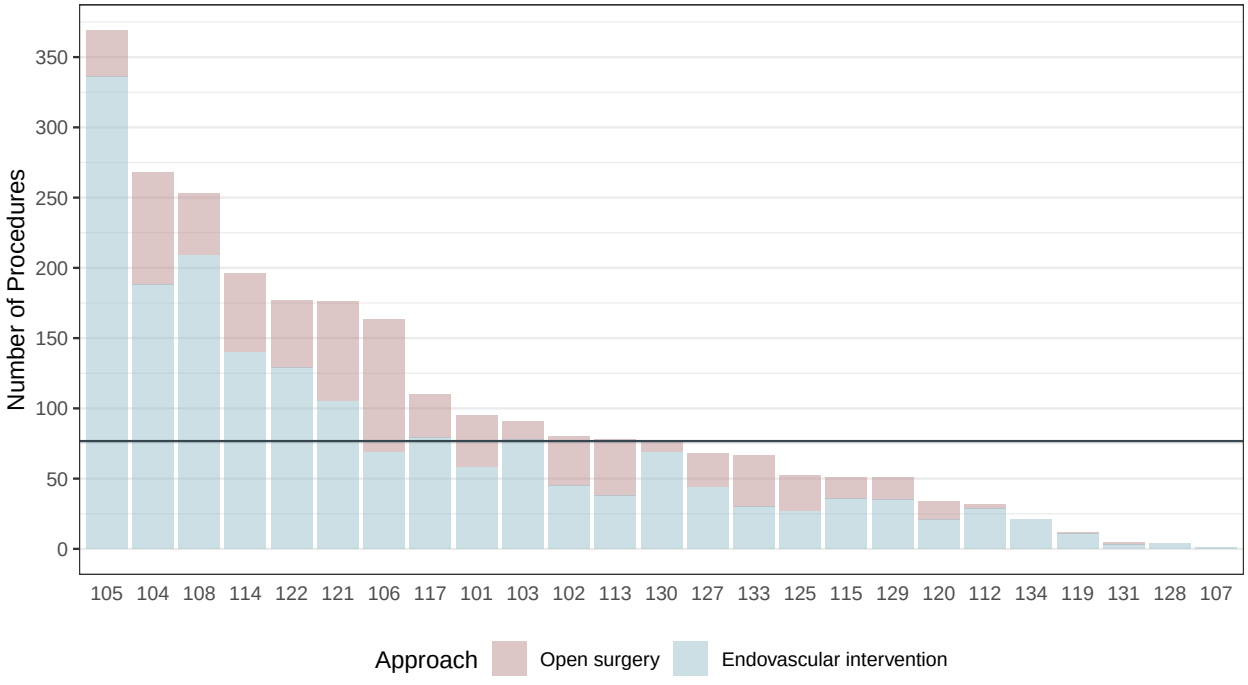
	2022 (N=2064)	2023 (N=2531)	p value
Segment			< 0.001
Thoracoabdominal Crawford 4	50 (2.4%)	91 (3.6%)	
Aorto-iliac including suprarenal segment	274 (13.3%)	300 (11.9%)	
Aorto-iliac including infrarenal segment	951 (46.1%)	1002 (39.6%)	
Isloated iliac arteries	789 (38.2%)	1138 (45.0%)	
Technical Approach			< 0.001
Open surgery	761 (36.9%)	726 (28.7%)	
Endovascular intervention	1303 (63.1%)	1805 (71.3%)	
Leading Pathology			0.002
N-Miss	0	13	
No vascular pathology	40 (1.9%)	30 (1.2%)	
Vascular wall injury / pseudoaneurysm	80 (3.9%)	78 (3.1%)	
Aneurysm (true)	1074 (52.0%)	1201 (47.7%)	
Inflammatory aneurysm (sterile)	5 (0.2%)	10 (0.4%)	
Dissection without aneurysm formation	33 (1.6%)	33 (1.3%)	
Dissection with aneurym formation	22 (1.1%)	21 (0.8%)	
Obstruction intraluminally	114 (5.5%)	146 (5.8%)	
Obstruction wall pathology	607 (29.4%)	903 (35.9%)	
Obstruction by external compression	12 (0.6%)	17 (0.7%)	
AV-malformation	2 (0.1%)	0 (0.0%)	
Source of emboli w/o pathology of the vessel wall	0 (0.0%)	1 (0.0%)	
Tumor	2 (0.1%)	3 (0.1%)	
Endoleak	73 (3.5%)	75 (3.0%)	
Clinical Problem			< 0.001
N-Miss	3	4	
No problem	1114 (54.1%)	1204 (47.6%)	
Symptomatic	138 (6.7%)	132 (5.2%)	
Bleeding	152 (7.4%)	148 (5.9%)	
Local swelling, inflammation or displacement	17 (0.8%)	21 (0.8%)	
Pathologic AV-fistula	0 (0.0%)	1 (0.0%)	
Acute Ischemia	78 (3.8%)	120 (4.7%)	
Distal embolisation	9 (0.4%)	6 (0.2%)	
Chronic relative ischemia	360 (17.5%)	626 (24.8%)	
Chronic critical ischemia	193 (9.4%)	269 (10.6%)	
Sex			0.009
N-Miss	1	3	
Male	1660 (80.5%)	1954 (77.3%)	
Female	403 (19.5%)	574 (22.7%)	
Age (years)			0.119
N-Miss	3	1	
Mean (SD)	71.6 (9.6)	71.1 (10.4)	
Range	17.0 - 97.0	13.0 - 96.0	
Complication at Discharge			0.137

	2022 (N=2064)	2023 (N=2531)	p value
N-Miss	272	290	
No	1157 (64.6%)	1497 (66.8%)	
Yes	635 (35.4%)	744 (33.2%)	
Clavien Dindo at Discharge			0.095
N-Miss	272	290	
Grade 0 - No Complication	1157 (64.6%)	1497 (66.8%)	
Grade I	75 (4.2%)	113 (5.0%)	
Grade I disability	13 (0.7%)	16 (0.7%)	
Grade II	244 (13.6%)	263 (11.7%)	
Grade II disability	23 (1.3%)	24 (1.1%)	
Grade IIIa	30 (1.7%)	39 (1.7%)	
Grade IIIa disability	3 (0.2%)	3 (0.1%)	
Grade IIIb	116 (6.5%)	153 (6.8%)	
Grade IIIb disability	15 (0.8%)	7 (0.3%)	
Grade IVa	43 (2.4%)	42 (1.9%)	
Grade IVa disability	12 (0.7%)	4 (0.2%)	
Grade IVb	6 (0.3%)	11 (0.5%)	
Grade IVb disability	1 (0.1%)	4 (0.2%)	
Grade V - Death	54 (3.0%)	65 (2.9%)	
30d Reconstruction patency			< 0.001
Yes	1245 (60.3%)	1344 (53.1%)	
No	60 (2.9%)	66 (2.6%)	
Missing	759 (36.8%)	1121 (44.3%)	

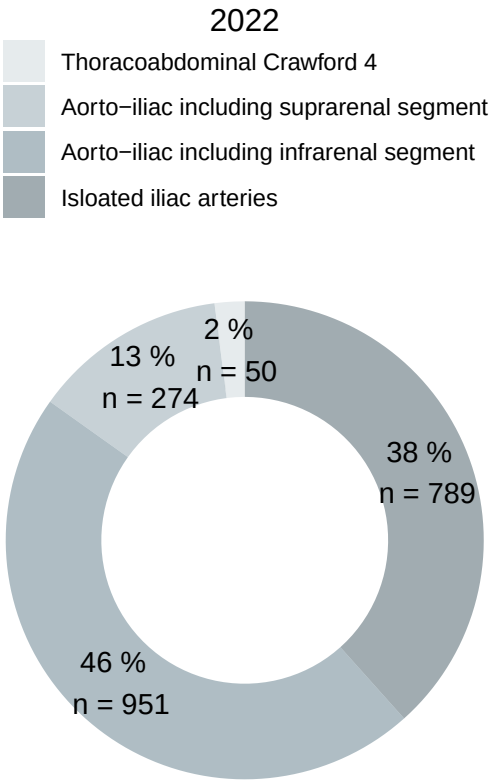
7.1.1 Treatment of the Abdominal Aorta and the Iliac Arteries - Year-on-Year Change

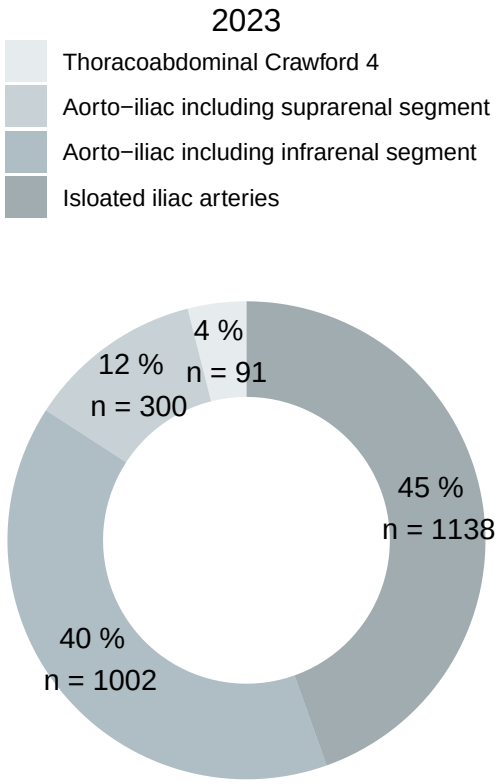


7.1.2 Treatment of the Abdominal Aorta and the Iliac Arteries in 2023 - National Overview

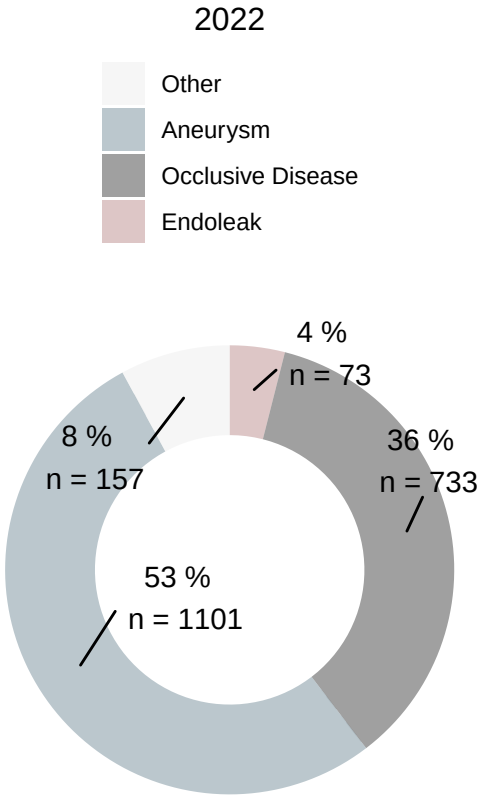


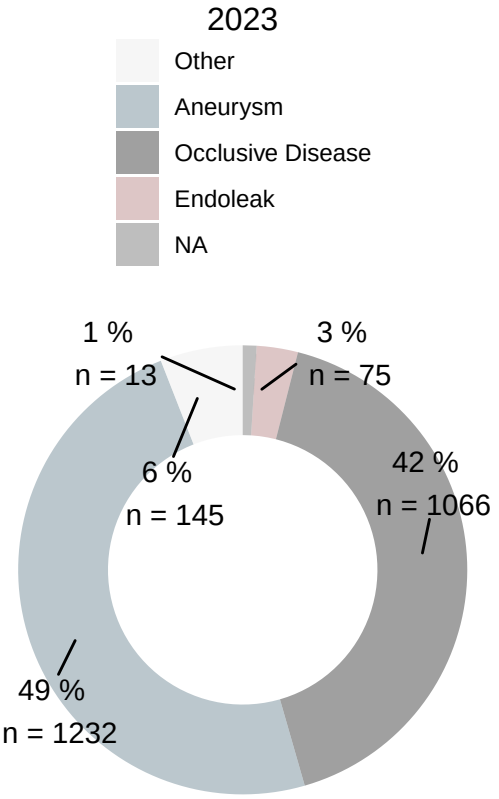
7.1.3 Treated Segments





7.1.4 Treated Pathologies





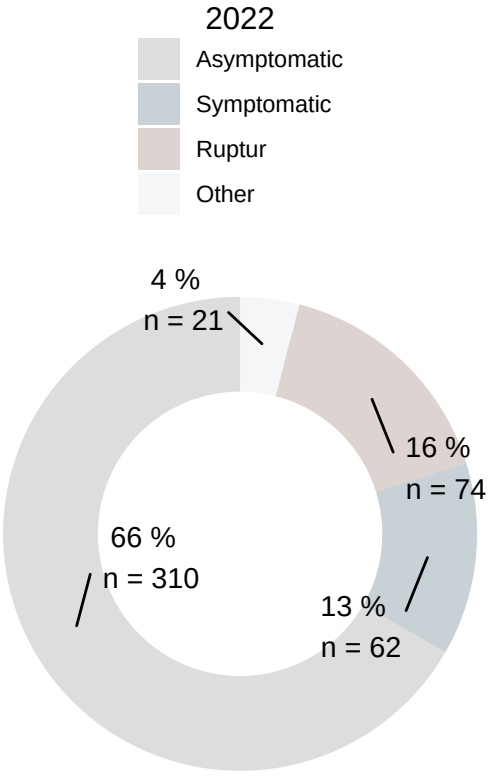
7.2 Open Repair for Aneurysms of the Abdominal Aorta and the Iliac Arteries

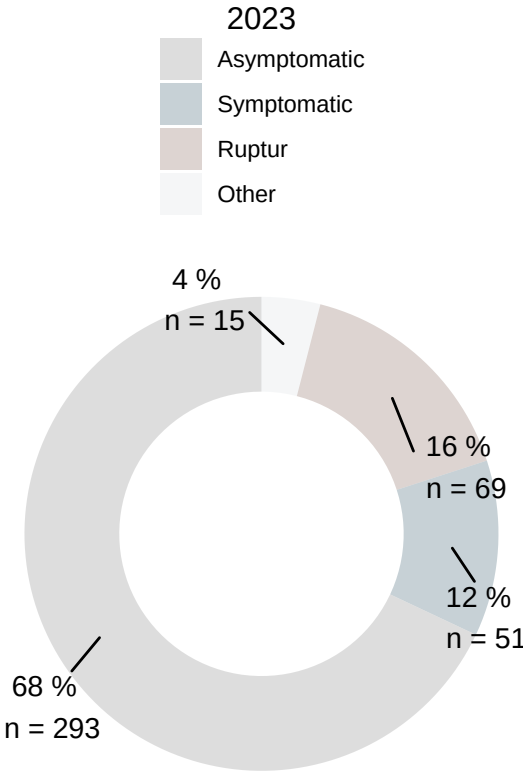
Table 8: OR for AAA and Iliacal Aneurysms

	2022 (N=467)	2023 (N=428)	p value
Segment			0.399
Thoracoabdominal Crawford 4	11 (2.4%)	5 (1.2%)	
Aorto-iliac including suprarenal segment	171 (36.6%)	167 (39.0%)	
Aorto-iliac including infrarenal segment	237 (50.7%)	220 (51.4%)	
Isloated iliac arteries	48 (10.3%)	36 (8.4%)	
Aneurysm Diameter (mm)			0.571
N-Miss	12	16	
Mean (SD)	60.0 (19.9)	59.3 (17.2)	
Range	0.0 - 150.0	0.0 - 113.0	
Leading Pathology			0.127
Vascular wall injury / pseudoaneurysm	32 (6.9%)	17 (4.0%)	
Aneurysm (true)	415 (88.9%)	392 (91.6%)	
Inflammatory aneurysm (sterile)	5 (1.1%)	9 (2.1%)	
Dissection with aneurym formation	15 (3.2%)	10 (2.3%)	
Clinical Problem			0.679
No problem	310 (66.4%)	293 (68.5%)	
Symptomatic	62 (13.3%)	51 (11.9%)	
Bleeding	74 (15.8%)	69 (16.1%)	
Local swelling, inflammation or displacement	11 (2.4%)	8 (1.9%)	
Acute Ischemia	1 (0.2%)	0 (0.0%)	
Distal embolisation	3 (0.6%)	0 (0.0%)	
Chronic relative ischemia	5 (1.1%)	5 (1.2%)	
Chronic critical ischemia	1 (0.2%)	2 (0.5%)	
Vascular Intervention			0.108
Vascular graft	148 (31.7%)	143 (33.4%)	
Bifurcated graft	193 (41.3%)	209 (48.8%)	
Complex bifurcated graft (Y + branches)	96 (20.6%)	57 (13.3%)	
Repair of vessel wall	6 (1.3%)	6 (1.4%)	
Mural desobliteration w/wo patch	9 (1.9%)	3 (0.7%)	
Luminal desobliteration (e.g. embolectomy)	2 (0.4%)	1 (0.2%)	
Fenestration (only in dissections)	1 (0.2%)	0 (0.0%)	
Sealing	5 (1.1%)	5 (1.2%)	
Therapeutic occlusion of vessels	4 (0.9%)	2 (0.5%)	
Resection of av-malform	0 (0.0%)	1 (0.2%)	
De-/rebranching	2 (0.4%)	0 (0.0%)	
Imaging	1 (0.2%)	1 (0.2%)	
Sterility			0.670
N-Miss	1	3	
Infected or presumably infected	19 (4.1%)	15 (3.5%)	
Sterile operation	447 (95.9%)	410 (96.5%)	
Previous Interventions			0.539
N-Miss	10	15	
No previous intervention at the same location	417 (91.2%)	381 (92.3%)	
Planned consecutive intervention	3 (0.7%)	1 (0.2%)	
Revision within 30d - inhouse complications	2 (0.4%)	5 (1.2%)	
Revision within 30d - extern complications	2 (0.4%)	2 (0.5%)	
Redo	33 (7.2%)	24 (5.8%)	
Conversion			0.429
N-Miss	12	11	

	2022 (N=467)	2023 (N=428)	p value
No Conversion	435 (95.6%)	403 (96.6%)	
Conversion	20 (4.4%)	14 (3.4%)	
Sex			0.364
Male	408 (87.4%)	365 (85.3%)	
Female	59 (12.6%)	63 (14.7%)	
Age (years)			0.099
Mean (SD)	70.3 (9.1)	69.3 (9.5)	
Range	17.0 - 90.0	13.0 - 89.0	
Complication at Discharge			0.847
N-Miss	32	31	
No	233 (53.6%)	210 (52.9%)	
Yes	202 (46.4%)	187 (47.1%)	
Clavien Dindo at Discharge			0.821
N-Miss	32	31	
Grade 0 - No Complication	233 (53.6%)	210 (52.9%)	
Grade I	26 (6.0%)	30 (7.6%)	
Grade I disability	4 (0.9%)	5 (1.3%)	
Grade II	92 (21.1%)	79 (19.9%)	
Grade II disability	11 (2.5%)	7 (1.8%)	
Grade IIIa	7 (1.6%)	4 (1.0%)	
Grade IIIa disability	2 (0.5%)	1 (0.3%)	
Grade IIIb	16 (3.7%)	25 (6.3%)	
Grade IIIb disability	5 (1.1%)	2 (0.5%)	
Grade IVa	15 (3.4%)	13 (3.3%)	
Grade IVa disability	4 (0.9%)	1 (0.3%)	
Grade IVb	3 (0.7%)	2 (0.5%)	
Grade IVb disability	1 (0.2%)	1 (0.3%)	
Grade V - Death	16 (3.7%)	17 (4.3%)	
30d Reconstruction patency			< 0.001
Yes	354 (75.8%)	269 (62.9%)	
No	2 (0.4%)	0 (0.0%)	
Missing	111 (23.8%)	159 (37.1%)	

7.2.1 Indication for Open Repair of the Abdominal Aorta and the Iliac Arteries





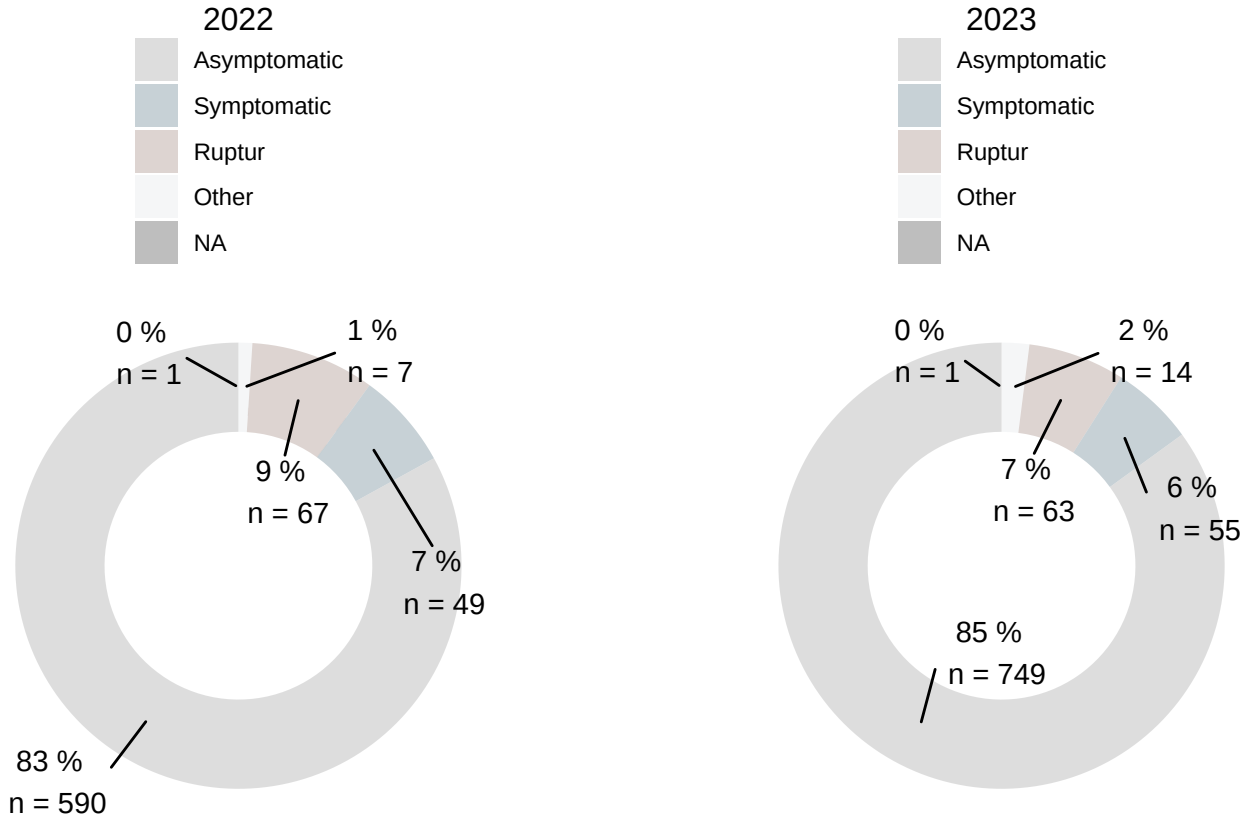
7.3 Endovascular Repair for Aneurysms of the Abdominal Aorta and the Iliac Arteries

Table 9: Endovascular Repair for AAA and Iliacal Aneurysms

	2022 (N=714)	2023 (N=882)	p value
Segment			0.001
Thoracoabdominal Crawford 4	25 (3.5%)	69 (7.8%)	
Aorto-iliac including suprarenal segment	54 (7.6%)	79 (9.0%)	
Aorto-iliac including infrarenal segment	501 (70.2%)	563 (63.8%)	
Isloated iliac arteries	134 (18.8%)	171 (19.4%)	
Maximum Diameter			0.864
N-Miss	27	33	
Mean (SD)	54.9 (15.7)	54.8 (16.1)	
Range	0.0 - 187.0	0.0 - 120.0	
Pathology			0.778
Vascular wall injury / pseudoaneurysm	48 (6.7%)	61 (6.9%)	
Aneurysm (true)	659 (92.3%)	809 (91.7%)	
Inflammatory aneurysm (sterile)	0 (0.0%)	1 (0.1%)	
Dissection with aneurym formation	7 (1.0%)	11 (1.2%)	
Clinical Problem			0.457
N-Miss	1	1	
No problem	590 (82.7%)	749 (85.0%)	
Symptomatic	49 (6.9%)	55 (6.2%)	
Bleeding	67 (9.4%)	63 (7.2%)	
Local swelling, inflammation or displacement	2 (0.3%)	3 (0.3%)	
Pathologic AV-fistula	0 (0.0%)	1 (0.1%)	
Acute Ischemia	0 (0.0%)	2 (0.2%)	
Distal embolisation	2 (0.3%)	1 (0.1%)	
Chronic relative ischemia	3 (0.4%)	5 (0.6%)	
Chronic critical ischemia	0 (0.0%)	2 (0.2%)	
Vascular Intervention			0.239
Vascular graft	100 (14.0%)	107 (12.1%)	
Bifurcated graft	476 (66.7%)	562 (63.7%)	
Complex bifurcated graft (Y + branches)	87 (12.2%)	143 (16.2%)	
Repair of vessel wall	3 (0.4%)	7 (0.8%)	
Isolated dilatation (PTA/Stent)	24 (3.4%)	34 (3.9%)	
Mural desobliteration w/wo patch	1 (0.1%)	0 (0.0%)	
Sealing	17 (2.4%)	19 (2.2%)	
Therapeutic occlusion of vessels	5 (0.7%)	8 (0.9%)	
De-/rebranching	0 (0.0%)	2 (0.2%)	
Imaging	1 (0.1%)	0 (0.0%)	
Material			< 0.001
Biological Material	2 (0.3%)	1 (0.1%)	
Synthetic Material for Vessel wall	670 (93.8%)	847 (96.0%)	
Coils, Plugs, etc	29 (4.1%)	34 (3.9%)	
No material	13 (1.8%)	0 (0.0%)	
Sterility			0.015
N-Miss	3	2	
Infected or presumably infected	7 (1.0%)	1 (0.1%)	
Sterile operation	704 (99.0%)	879 (99.9%)	
Previous Interventions			0.490
N-Miss	14	10	
No previous intervention at the same location	642 (91.7%)	817 (93.7%)	

	2022 (N=714)	2023 (N=882)	p value
Planned consecutive intervention	26 (3.7%)	24 (2.8%)	
Revision within 30d - inhouse complications	4 (0.6%)	5 (0.6%)	
Revision within 30d - extern complications	1 (0.1%)	0 (0.0%)	
Redo	27 (3.9%)	26 (3.0%)	
Conversion			0.255
N-Miss	22	33	
No Conversion	682 (98.6%)	830 (97.8%)	
Conversion	10 (1.4%)	19 (2.2%)	
Sex			0.825
N-Miss	0	1	
Male	614 (86.0%)	761 (86.4%)	
Female	100 (14.0%)	120 (13.6%)	
Age (years)			0.731
N-Miss	1	1	
Mean (SD)	75.5 (7.6)	75.4 (8.2)	
Range	48.0 - 93.0	45.0 - 96.0	
Complication			0.126
N-Miss	61	77	
No	489 (74.9%)	574 (71.3%)	
Yes	164 (25.1%)	231 (28.7%)	
ClavienDindo			0.587
N-Miss	61	77	
Grade 0 - No Complication	489 (74.9%)	574 (71.3%)	
Grade I	25 (3.8%)	44 (5.5%)	
Grade I disability	4 (0.6%)	8 (1.0%)	
Grade II	58 (8.9%)	81 (10.1%)	
Grade II disability	6 (0.9%)	6 (0.7%)	
Grade IIIa	15 (2.3%)	15 (1.9%)	
Grade IIIa disability	1 (0.2%)	2 (0.2%)	
Grade IIIb	26 (4.0%)	38 (4.7%)	
Grade IIIb disability	1 (0.2%)	3 (0.4%)	
Grade IVa	6 (0.9%)	12 (1.5%)	
Grade IVa disability	2 (0.3%)	0 (0.0%)	
Grade IVb	2 (0.3%)	5 (0.6%)	
Grade V - Death	18 (2.8%)	17 (2.1%)	
30-Day Patency			< 0.001
Yes	456 (63.9%)	482 (54.6%)	
No	48 (6.7%)	37 (4.2%)	
Missing	210 (29.4%)	363 (41.2%)	

7.3.1 Indication for Endovascular Repair of the Abdominal Aorta and the Iliac Arteries



7.4 Open Repair for Occlusive Disease of the Abdominal Aorta and the Iliac Arteries

Table 10: OR for Aortoiliac Occlusive Disease

	2022 (N=254)	2023 (N=261)	p value
Segment			0.722
Thoracoabdominal Crawford 4	4 (1.6%)	5 (1.9%)	
Aorto-iliac including suprarenal segment	28 (11.0%)	34 (13.0%)	
Aorto-iliac including infrarenal segment	122 (48.0%)	113 (43.3%)	
Isloated iliac arteries	100 (39.4%)	109 (41.8%)	
Pathology			0.357
Dissection without aneurysm formation	7 (2.8%)	6 (2.3%)	
Obstruction intraluminally	64 (25.2%)	84 (32.2%)	
Obstruction wall pathology	180 (70.9%)	169 (64.8%)	
Obstruction by external compression	3 (1.2%)	2 (0.8%)	
Clinical Problem			0.385
No problem	18 (7.1%)	15 (5.7%)	
Symptomatic	5 (2.0%)	6 (2.3%)	
Bleeding	1 (0.4%)	0 (0.0%)	
Local swelling, inflammation or displacement	0 (0.0%)	3 (1.1%)	
Acute Ischemia	16 (6.3%)	22 (8.4%)	
Distal embolisation	0 (0.0%)	2 (0.8%)	
Chronic relative ischemia	130 (51.2%)	134 (51.3%)	
Chronic critical ischemia	84 (33.1%)	79 (30.3%)	
Vascular Intervention			0.369
Vascular graft	68 (26.8%)	66 (25.3%)	
Bifurcated graft	65 (25.6%)	83 (31.8%)	
Complex bifurcated graft (Y + branches)	41 (16.1%)	27 (10.3%)	
Repair of vessel wall	0 (0.0%)	2 (0.8%)	
Isolated dilatation (PTA/Stent)	5 (2.0%)	6 (2.3%)	
Mural desobliteration w/wo patch	57 (22.4%)	62 (23.8%)	
Luminal desobliteration (e.g. embolectomy)	17 (6.7%)	14 (5.4%)	
Imaging	1 (0.4%)	1 (0.4%)	
Material			0.166
Autologous Material Only	5 (2.0%)	11 (4.2%)	
Biological Material	23 (9.1%)	30 (11.5%)	
Synthetic Material for Vessel wall	177 (69.7%)	186 (71.3%)	
Coils, Plugs, etc	5 (2.0%)	2 (0.8%)	
No material	44 (17.3%)	32 (12.3%)	
Sterility			0.681
N-Miss	0	1	
Infected or presumably infected	4 (1.6%)	3 (1.2%)	
Sterile operation	250 (98.4%)	257 (98.8%)	
Previous Interventions			0.104
N-Miss	0	2	
No previous intervention at the same location	216 (85.0%)	213 (82.2%)	
Planned consecutive intervention	0 (0.0%)	5 (1.9%)	
Revision within 30d - inhouse complications	4 (1.6%)	10 (3.9%)	
Revision within 30d - extern complications	1 (0.4%)	1 (0.4%)	
Redo	33 (13.0%)	30 (11.6%)	
Conversion			0.465
N-Miss	3	12	
No Conversion	234 (93.2%)	236 (94.8%)	

	2022 (N=254)	2023 (N=261)	p value
Conversion	17 (6.8%)	13 (5.2%)	
Sex			0.833
Male	172 (67.7%)	179 (68.6%)	
Female	82 (32.3%)	82 (31.4%)	
Age (years)			0.779
Mean (SD)	64.8 (10.0)	64.6 (11.0)	
Range	22.0 - 93.0	21.0 - 92.0	
Complication			0.787
N-Miss	29	34	
No	130 (57.8%)	134 (59.0%)	
Yes	95 (42.2%)	93 (41.0%)	
ClavienDindo			0.071
N-Miss	29	34	
Grade 0 - No Complication	130 (57.8%)	134 (59.0%)	
Grade I	6 (2.7%)	9 (4.0%)	
Grade I disability	1 (0.4%)	0 (0.0%)	
Grade II	46 (20.4%)	28 (12.3%)	
Grade II disability	2 (0.9%)	3 (1.3%)	
Grade IIIa	1 (0.4%)	7 (3.1%)	
Grade IIIb	22 (9.8%)	26 (11.5%)	
Grade IIIb disability	4 (1.8%)	0 (0.0%)	
Grade IVa	7 (3.1%)	8 (3.5%)	
Grade IVa disability	1 (0.4%)	0 (0.0%)	
Grade IVb	1 (0.4%)	2 (0.9%)	
Grade IVb disability	0 (0.0%)	2 (0.9%)	
Grade V - Death	4 (1.8%)	8 (3.5%)	
30-Day Patency			0.598
Yes	146 (57.5%)	139 (53.3%)	
No	2 (0.8%)	3 (1.1%)	
Missing	106 (41.7%)	119 (45.6%)	

7.5 Endovascular Repair for Occlusive Disease of the Abdominal Aorta and the Iliac Arteries

Table 11: Endovascular Repair for Aortoiliac Occlusive Disease

	2022 (N=512)	2023 (N=839)	p value
Segment			0.374
Thoracoabdominal Crawford 4	3 (0.6%)	4 (0.5%)	
Aorto-iliac including suprarenal segment	2 (0.4%)	6 (0.7%)	
Aorto-iliac including infrarenal segment	49 (9.6%)	60 (7.2%)	
Isloated iliac arteries	458 (89.5%)	769 (91.7%)	
Pathology			0.185
Dissection without aneurysm formation	26 (5.1%)	27 (3.2%)	
Obstruction intraluminally	50 (9.8%)	62 (7.4%)	
Obstruction wall pathology	427 (83.4%)	734 (87.5%)	
Obstruction by external compression	9 (1.8%)	15 (1.8%)	
Source of emboli w/o pathology of the vessel wall	0 (0.0%)	1 (0.1%)	
Clinical Problem			< 0.001
N-Miss	2	2	
No problem	103 (20.2%)	58 (6.9%)	
Symptomatic	16 (3.1%)	9 (1.1%)	
Bleeding	3 (0.6%)	4 (0.5%)	
Acute Ischemia	57 (11.2%)	96 (11.5%)	
Distal embolisation	4 (0.8%)	2 (0.2%)	
Chronic relative ischemia	219 (42.9%)	482 (57.6%)	
Chronic critical ischemia	108 (21.2%)	186 (22.2%)	
Vascular Intervention			0.001
N-Miss	1	0	
Vascular graft	35 (6.8%)	16 (1.9%)	
Bifurcated graft	15 (2.9%)	17 (2.0%)	
Complex bifurcated graft (Y + branches)	2 (0.4%)	3 (0.4%)	
Repair of vessel wall	1 (0.2%)	1 (0.1%)	
Isolated dilatation (PTA/Stent)	445 (87.1%)	773 (92.1%)	
Mural desobliteration w/wo patch	3 (0.6%)	2 (0.2%)	
Luminal desobliteration (e.g. embolectomy)	6 (1.2%)	14 (1.7%)	
Sealing	2 (0.4%)	2 (0.2%)	
Therapeutic occlusion of vessels	0 (0.0%)	1 (0.1%)	
Imaging	2 (0.4%)	10 (1.2%)	
Sterility			0.274
N-Miss	1	2	
Infected or presumably infected	5 (1.0%)	4 (0.5%)	
Sterile operation	506 (99.0%)	833 (99.5%)	
Previous Interventions			0.334
N-Miss	1	3	
No previous intervention at the same location	432 (84.5%)	678 (81.1%)	
Planned consecutive intervention	9 (1.8%)	20 (2.4%)	
Revision within 30d - inhouse complications	16 (3.1%)	21 (2.5%)	
Revision within 30d - extern complications	2 (0.4%)	3 (0.4%)	
Redo	52 (10.2%)	114 (13.6%)	
Conversion			0.036
N-Miss	5	27	
No Conversion	489 (96.4%)	798 (98.3%)	
Conversion	18 (3.6%)	14 (1.7%)	

	2022 (N=512)	2023 (N=839)	p value
Sex			0.034
N-Miss	1	2	
Male	363 (71.0%)	548 (65.5%)	
Female	148 (29.0%)	289 (34.5%)	
Age (years)			0.188
N-Miss	2	0	
Mean (SD)	70.1 (9.5)	69.3 (10.6)	
Range	40.0 - 97.0	19.0 - 96.0	
Complication			0.015
N-Miss	142	140	
No	244 (65.9%)	511 (73.1%)	
Yes	126 (34.1%)	188 (26.9%)	
ClavienDindo			0.413
N-Miss	142	140	
Grade 0 - No Complication	244 (65.9%)	511 (73.1%)	
Grade I	13 (3.5%)	24 (3.4%)	
Grade I disability	2 (0.5%)	3 (0.4%)	
Grade II	33 (8.9%)	54 (7.7%)	
Grade II disability	4 (1.1%)	7 (1.0%)	
Grade IIIa	6 (1.6%)	11 (1.6%)	
Grade IIIb	41 (11.1%)	58 (8.3%)	
Grade IIIb disability	3 (0.8%)	2 (0.3%)	
Grade IVa	9 (2.4%)	6 (0.9%)	
Grade IVa disability	3 (0.8%)	3 (0.4%)	
Grade IVb disability	0 (0.0%)	1 (0.1%)	
Grade V - Death	12 (3.2%)	19 (2.7%)	
30-Day Patency			0.027
Yes	211 (41.2%)	384 (45.8%)	
No	7 (1.4%)	25 (3.0%)	
Missing	294 (57.4%)	430 (51.3%)	

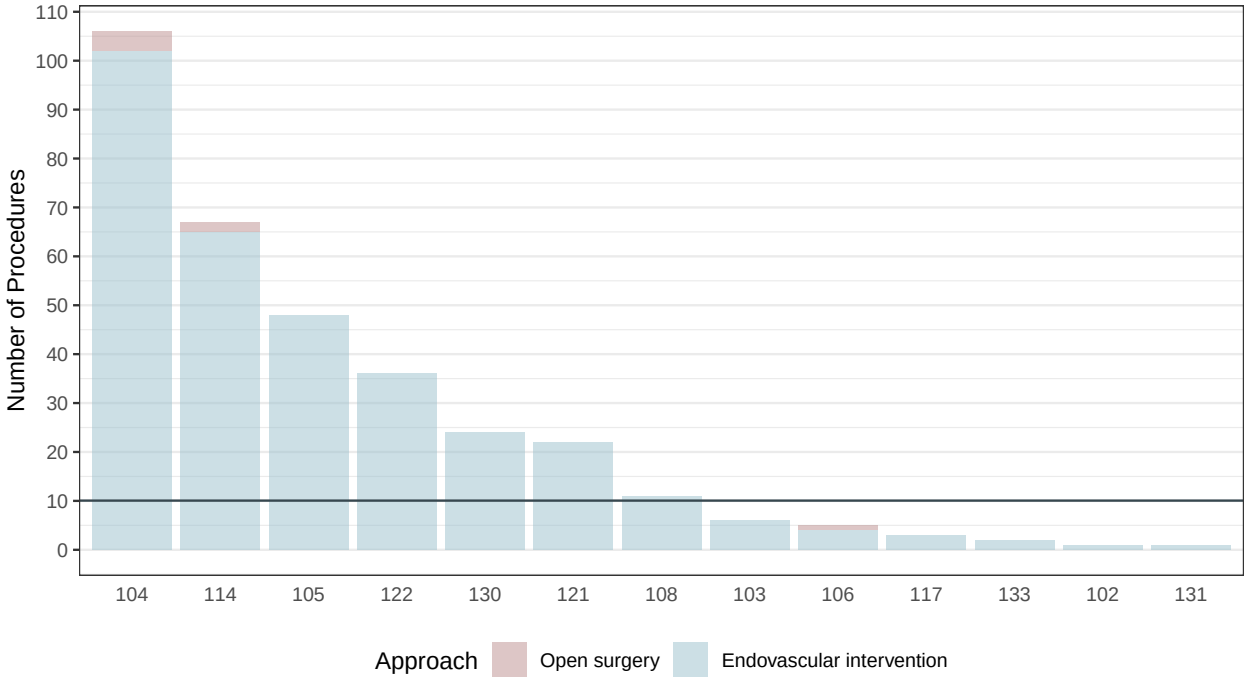
8 Surgery of the Thoracic Aorta

Table 12: Surgery of the Thoracic Aorta

	2022 (N=212)	2023 (N=332)	p value
Segment			0.699
Thoracoabdominal Crawford 1	20 (9.4%)	37 (11.1%)	
Thoracoabdominal Crawford 2	29 (13.7%)	35 (10.5%)	
Thoracoabdominal Crawford 3	14 (6.6%)	17 (5.1%)	
Ascending aorta including aortic arch	4 (1.9%)	11 (3.3%)	
Aortic arch and descendens	29 (13.7%)	49 (14.8%)	
Descending aorta	116 (54.7%)	183 (55.1%)	
Approach			0.002
Open surgery	16 (7.5%)	7 (2.1%)	
Endovascular intervention	196 (92.5%)	325 (97.9%)	
Pathology			0.339
N-Miss	0	1	
No vascular pathology	1 (0.5%)	3 (0.9%)	
Vascular wall injury / pseudoaneurysm	30 (14.2%)	40 (12.1%)	
Aneurysm (true)	79 (37.3%)	124 (37.5%)	
Dissection without aneurysm formation	45 (21.2%)	48 (14.5%)	
Dissection with aneurym formation	45 (21.2%)	89 (26.9%)	
Obstruction intraluminally	1 (0.5%)	0 (0.0%)	
Obstruction wall pathology	1 (0.5%)	1 (0.3%)	
Obstruction by external compression	0 (0.0%)	1 (0.3%)	
AV-malformation	0 (0.0%)	1 (0.3%)	
Deep venous insufficiency	1 (0.5%)	0 (0.0%)	
Source of emboli w/o pathology of the vessel wall	0 (0.0%)	2 (0.6%)	
Tumor	1 (0.5%)	5 (1.5%)	
Endoleak	8 (3.8%)	17 (5.1%)	
Clinical Problem			0.240
N-Miss	0	1	
No problem	133 (62.7%)	239 (72.2%)	
Symptomatic	48 (22.6%)	58 (17.5%)	
Bleeding	23 (10.8%)	27 (8.2%)	
Local swelling, inflammation or displacement	4 (1.9%)	4 (1.2%)	
Acute Ischemia	3 (1.4%)	2 (0.6%)	
Chronic relative ischemia	0 (0.0%)	1 (0.3%)	
Chronic critical ischemia	1 (0.5%)	0 (0.0%)	
Vascular Intervention			0.464
Vascular graft	159 (75.0%)	247 (74.4%)	
Bifurcated graft	6 (2.8%)	16 (4.8%)	
Complex bifurcated graft (Y + branches)	32 (15.1%)	52 (15.7%)	
Repair of vessel wall	3 (1.4%)	4 (1.2%)	
Isolated dilatation (PTA/Stent)	1 (0.5%)	5 (1.5%)	
Sealing	9 (4.2%)	6 (1.8%)	
Therapeutic occlusion of vessels	1 (0.5%)	1 (0.3%)	
De-/rebranching	0 (0.0%)	1 (0.3%)	
Imaging	1 (0.5%)	0 (0.0%)	
Sterility			0.035
Infected or presumably infected	6 (2.8%)	2 (0.6%)	
Sterile operation	206 (97.2%)	330 (99.4%)	
Sex			0.266

	2022 (N=212)	2023 (N=332)	p value
N-Miss	2	1	
Male	133 (63.3%)	225 (68.0%)	
Female	77 (36.7%)	106 (32.0%)	
Age (years)			0.056
Mean (SD)	71.1 (9.4)	69.3 (11.7)	
Range	31.0 - 91.0	17.0 - 94.0	
Complication			0.118
N-Miss	9	7	
No	92 (45.3%)	170 (52.3%)	
Yes	111 (54.7%)	155 (47.7%)	
ClavienDindo			0.103
N-Miss	9	7	
Grade 0 - No Complication	92 (45.3%)	170 (52.3%)	
Grade I	14 (6.9%)	31 (9.5%)	
Grade I disability	3 (1.5%)	1 (0.3%)	
Grade II	35 (17.2%)	50 (15.4%)	
Grade II disability	5 (2.5%)	15 (4.6%)	
Grade IIIa	5 (2.5%)	6 (1.8%)	
Grade IIIb	27 (13.3%)	25 (7.7%)	
Grade IIIb disability	5 (2.5%)	1 (0.3%)	
Grade IVa	5 (2.5%)	9 (2.8%)	
Grade IVa disability	1 (0.5%)	2 (0.6%)	
Grade IVb	0 (0.0%)	2 (0.6%)	
Grade IVb disability	0 (0.0%)	1 (0.3%)	
Grade V - Death	11 (5.4%)	12 (3.7%)	
30-Day Patency			0.494
Yes	145 (68.4%)	213 (64.2%)	
No	3 (1.4%)	8 (2.4%)	
Missing	64 (30.2%)	111 (33.4%)	

8.1 Treatment of the Thoracic Aorta in 2023 - National Overview



9 Surgery of the Renovisceral Arteries

Table 13: Surgery of the Renovisceral Arteries

	2022 (N=414)	2023 (N=469)	p value
Segment			0.863
Renal arteries	168 (40.6%)	193 (41.2%)	
Visceral arteries	246 (59.4%)	276 (58.8%)	
Approach			0.002
Open surgery	167 (40.3%)	142 (30.3%)	
Endovascular intervention	247 (59.7%)	327 (69.7%)	
Pathology			< 0.001
N-Miss	0	2	
No vascular pathology	270 (65.2%)	230 (49.3%)	
Vascular wall injury / pseudoaneurysm	9 (2.2%)	19 (4.1%)	
Aneurysm (true)	21 (5.1%)	36 (7.7%)	
Inflammatory aneurysm (sterile)	0 (0.0%)	1 (0.2%)	
Dissection without aneurysm formation	12 (2.9%)	12 (2.6%)	
Dissection with aneurym formation	9 (2.2%)	1 (0.2%)	
Obstruction intraluminally	18 (4.3%)	50 (10.7%)	
Obstruction wall pathology	35 (8.5%)	89 (19.1%)	
Obstruction by external compression	7 (1.7%)	3 (0.6%)	
Tumor	9 (2.2%)	4 (0.9%)	
Endoleak	24 (5.8%)	22 (4.7%)	
Clinical Problem			0.002
N-Miss	0	3	
No problem	332 (80.2%)	338 (72.5%)	
Symptomatic	28 (6.8%)	24 (5.2%)	
Bleeding	11 (2.7%)	23 (4.9%)	
Local swelling, inflammation or displacement	9 (2.2%)	6 (1.3%)	
Acute Ischemia	21 (5.1%)	36 (7.7%)	
Distal embolisation	1 (0.2%)	1 (0.2%)	
Chronic relative ischemia	5 (1.2%)	27 (5.8%)	
Chronic critical ischemia	7 (1.7%)	11 (2.4%)	
Type of Intervention			< 0.001
Isolated main Procedure	94 (22.7%)	135 (28.8%)	
Main Procedure with additional Procedure	31 (7.5%)	61 (13.0%)	
Additional Procedure for Inflow Optimization	8 (1.9%)	7 (1.5%)	
Additional Procedure for Outflow Optimization	40 (9.7%)	20 (4.3%)	
Additional Procedure: De-/rebranching	241 (58.2%)	246 (52.5%)	
Sex			0.049
Male	319 (77.1%)	334 (71.2%)	
Female	95 (22.9%)	135 (28.8%)	
Age (years)			0.970
Mean (SD)	71.3 (10.3)	71.3 (11.4)	
Range	12.0 - 90.0	23.0 - 96.0	
Complication			0.131
N-Miss	35	34	
No	190 (50.1%)	195 (44.8%)	
Yes	189 (49.9%)	240 (55.2%)	
ClavienDindo			0.002
N-Miss	35	34	
Grade 0 - No Complication	190 (50.1%)	195 (44.8%)	

	2022 (N=414)	2023 (N=469)	p value
Grade I	15 (4.0%)	18 (4.1%)	
Grade I disability	9 (2.4%)	1 (0.2%)	
Grade II	64 (16.9%)	92 (21.1%)	
Grade II disability	1 (0.3%)	8 (1.8%)	
Grade IIIa	10 (2.6%)	7 (1.6%)	
Grade IIIa disability	6 (1.6%)	2 (0.5%)	
Grade IIIb	36 (9.5%)	53 (12.2%)	
Grade IIIb disability	8 (2.1%)	3 (0.7%)	
Grade IVa	14 (3.7%)	27 (6.2%)	
Grade IVa disability	5 (1.3%)	1 (0.2%)	
Grade IVb	7 (1.8%)	5 (1.1%)	
Grade IVb disability	0 (0.0%)	2 (0.5%)	
Grade V - Death	14 (3.7%)	21 (4.8%)	
30-Day Patency			0.520
Yes	231 (55.8%)	244 (52.0%)	
No	2 (0.5%)	3 (0.6%)	
Missing	181 (43.7%)	222 (47.3%)	

9.1 Treatment of the Renovisceral Arteries in 2023 - National Overview

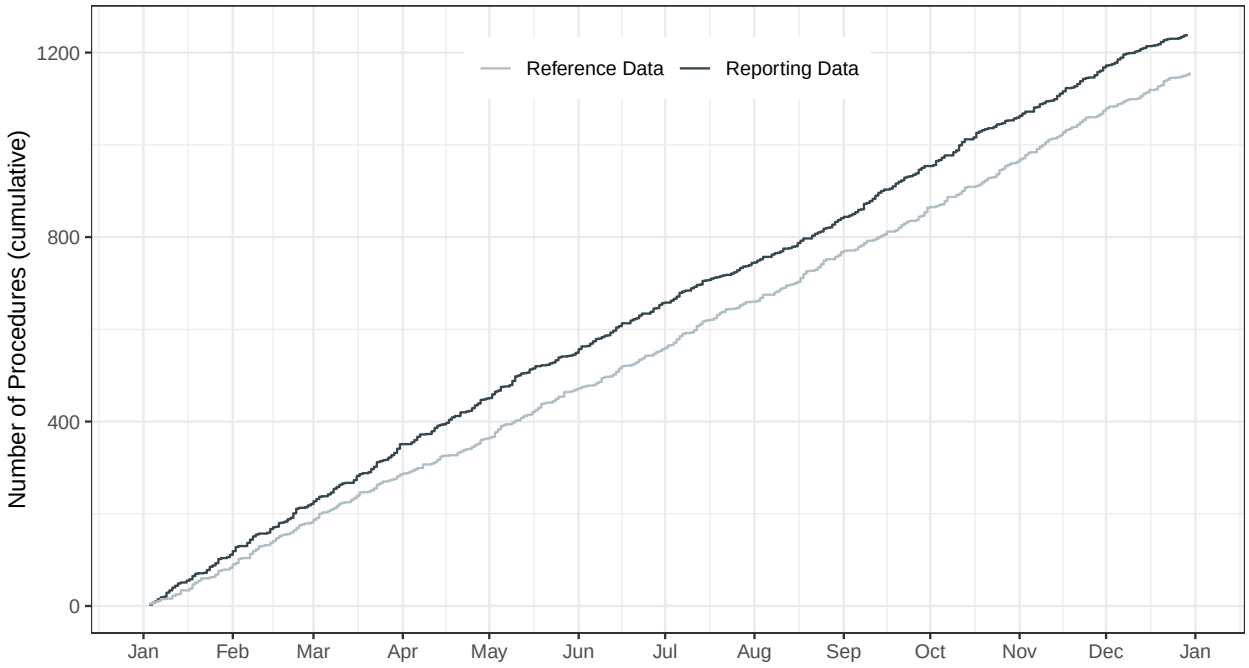
10 Treatment of the Femoral Bifurcation

Table 14: Surgery on femoral bifurcation

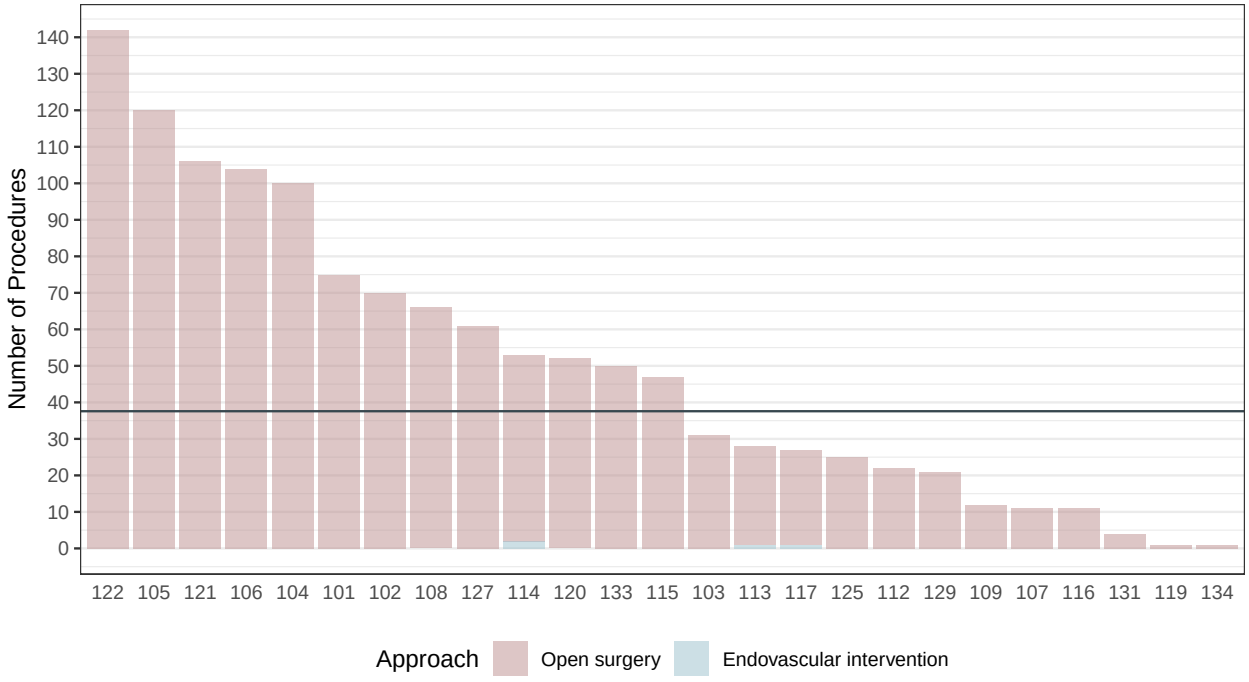
	2022 (N=1394)	2023 (N=1545)	p value
Pathology			0.020
N-Miss	3	26	
No vascular pathology	34 (2.4%)	13 (0.9%)	
Vascular wall injury / pseudoaneurysm	122 (8.8%)	155 (10.2%)	
Aneurysm (true)	42 (3.0%)	44 (2.9%)	
Inflammatory aneurysm (sterile)	1 (0.1%)	0 (0.0%)	
Dissection without aneurysm formation	15 (1.1%)	20 (1.3%)	
Dissection with aneurym formation	2 (0.1%)	1 (0.1%)	
Obstruction intraluminally	218 (15.7%)	224 (14.7%)	
Obstruction wall pathology	942 (67.7%)	1057 (69.6%)	
Obstruction by external compression	4 (0.3%)	1 (0.1%)	
AV-malformation	8 (0.6%)	4 (0.3%)	
Source of emboli w/o pathology of the vessel wall	1 (0.1%)	0 (0.0%)	
Endoleak	2 (0.1%)	0 (0.0%)	
Vascular Intervention			0.385
N-Miss	0	1	
Vascular graft	144 (10.3%)	156 (10.1%)	
Bifurcated graft	33 (2.4%)	47 (3.0%)	
Complex bifurcated graft (Y + branches)	10 (0.7%)	6 (0.4%)	
Repair of vessel wall	59 (4.2%)	80 (5.2%)	
Isolated dilatation (PTA/Stent)	1 (0.1%)	4 (0.3%)	
Mural desobliteration w/wo patch	1027 (73.7%)	1122 (72.7%)	
Luminal desobliteration (e.g. embolectomy)	97 (7.0%)	114 (7.4%)	
Sealing	9 (0.6%)	2 (0.1%)	
Therapeutic occlusion of vessels	7 (0.5%)	6 (0.4%)	
Resection of av-malform	2 (0.1%)	3 (0.2%)	
De-/rebranching	4 (0.3%)	3 (0.2%)	
Imaging	1 (0.1%)	1 (0.1%)	
Material			0.042
Autologous Material Only	37 (2.7%)	55 (3.6%)	
Biological Material	980 (70.3%)	1089 (70.5%)	
Synthetic Material for Vessel wall	216 (15.5%)	191 (12.4%)	
Coils, Plugs, etc	3 (0.2%)	6 (0.4%)	
No material	158 (11.3%)	204 (13.2%)	
Inflow Optimisation			0.086
N-Miss	419	362	
Same Approach	39 (4.0%)	65 (5.5%)	
Hyprid Approach	140 (14.4%)	195 (16.5%)	
No Inflow Optimization	796 (81.6%)	923 (78.0%)	
Outflow			0.411
N-Miss	420	363	
Same Approach	81 (8.3%)	118 (10.0%)	
Hyprid Approach	73 (7.5%)	88 (7.4%)	
No Outflow Optimization	820 (84.2%)	976 (82.6%)	
Sterility			0.078
N-Miss	10	2	
Infected or presumably infected	46 (3.3%)	71 (4.6%)	
Sterile operation	1338 (96.7%)	1472 (95.4%)	

	2022 (N=1394)	2023 (N=1545)	p value
Sex			0.459
N-Miss	0	3	
Male	932 (66.9%)	1011 (65.6%)	
Female	462 (33.1%)	531 (34.4%)	
Age (years)			0.762
N-Miss	2	0	
Mean (SD)	71.9 (10.8)	72.1 (10.9)	
Range	10.0 - 100.0	0.0 - 99.0	
Complication			0.069
N-Miss	280	221	
No	689 (61.8%)	866 (65.4%)	
Yes	425 (38.2%)	458 (34.6%)	
ClavienDindo			0.001
N-Miss	280	221	
Grade 0 - No Complication	689 (61.8%)	866 (65.4%)	
Grade I	35 (3.1%)	40 (3.0%)	
Grade I disability	11 (1.0%)	5 (0.4%)	
Grade II	99 (8.9%)	124 (9.4%)	
Grade II disability	10 (0.9%)	23 (1.7%)	
Grade IIIa	17 (1.5%)	25 (1.9%)	
Grade IIIa disability	1 (0.1%)	2 (0.2%)	
Grade IIIb	136 (12.2%)	138 (10.4%)	
Grade IIIb disability	25 (2.2%)	8 (0.6%)	
Grade IVa	40 (3.6%)	28 (2.1%)	
Grade IVa disability	4 (0.4%)	1 (0.1%)	
Grade IVb	6 (0.5%)	3 (0.2%)	
Grade IVb disability	0 (0.0%)	2 (0.2%)	
Grade V - Death	41 (3.7%)	59 (4.5%)	
30-Day Patency			0.459
Yes	633 (45.4%)	705 (45.6%)	
No	16 (1.1%)	26 (1.7%)	
Missing	745 (53.4%)	814 (52.7%)	

10.1 Treatment of the Femoral Bifurcation - Year-on-Year Change



10.2 Surgery on Femoral Bifurcation in 2023 - National Overview



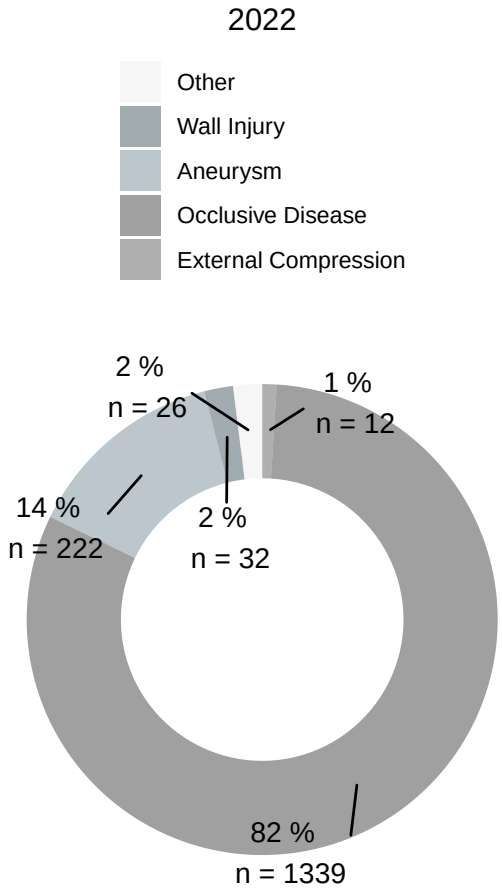
11 Treatment of Arteries of the Lower Extremity

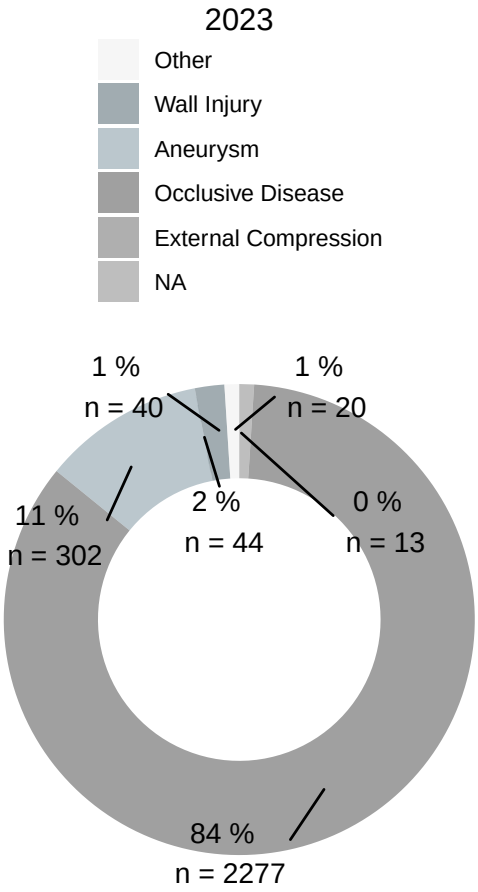
Table 15: Overview - Bypass Surgery of the Lower Extremity

	2022 (N=1631)	2023 (N=2696)	p value
Segment			< 0.001
Femoro-popliteal, supragenicular	471 (28.9%)	968 (35.9%)	
Isolated popliteal	139 (8.5%)	229 (8.5%)	
Femoro-popliteal, infragenicular	402 (24.6%)	550 (20.4%)	
Femoro-cural, infrapopliteal	299 (18.3%)	374 (13.9%)	
Popliteal trifurcation and crural-pedal	320 (19.6%)	575 (21.3%)	
Type of Intervention			0.005
Isolated main Procedure	781 (47.9%)	1229 (45.6%)	
Main Procedure with additional Procedure	561 (34.4%)	1073 (39.8%)	
Additional Procedure for Inflow Optimization	32 (2.0%)	44 (1.6%)	
Additional Procedure for Outflow Optimization	256 (15.7%)	346 (12.8%)	
Additional Procedure: De-/rebranching	0 (0.0%)	2 (0.1%)	
Additional Procedure: Diagnostic	1 (0.1%)	2 (0.1%)	
Approach			< 0.001
Open surgery	1210 (74.2%)	1526 (56.6%)	
Endovascular intervention	421 (25.8%)	1170 (43.4%)	
Material			< 0.001
N-Miss	14	11	
Autologous Material Only	622 (38.5%)	805 (30.0%)	
Biological Material	70 (4.3%)	107 (4.0%)	
Synthetic Material for Vessel wall	249 (15.4%)	414 (15.4%)	
Coils, Plugs, etc	184 (11.4%)	564 (21.0%)	
No material	492 (30.4%)	795 (29.6%)	
Sterility			0.070
N-Miss	9	5	
Infected or presumably infected	38 (2.3%)	89 (3.3%)	
Sterile operation	1584 (97.7%)	2602 (96.7%)	
Sex			0.650
N-Miss	1	3	
Male	1178 (72.3%)	1929 (71.6%)	
Female	452 (27.7%)	764 (28.4%)	
Age (years)			0.036
N-Miss	1	0	
Mean (SD)	72.1 (12.1)	72.9 (11.9)	
Range	19.0 - 99.0	0.0 - 103.0	
Complication			< 0.001
N-Miss	430	371	
No	667 (55.5%)	1580 (68.0%)	
Yes	534 (44.5%)	745 (32.0%)	
ClavienDindo			< 0.001
N-Miss	430	371	
Grade 0 - No Complication	667 (55.5%)	1580 (68.0%)	
Grade I	36 (3.0%)	67 (2.9%)	
Grade I disability	9 (0.7%)	14 (0.6%)	
Grade II	132 (11.0%)	199 (8.6%)	
Grade II disability	20 (1.7%)	27 (1.2%)	
Grade IIIa	26 (2.2%)	38 (1.6%)	
Grade IIIa disability	2 (0.2%)	8 (0.3%)	

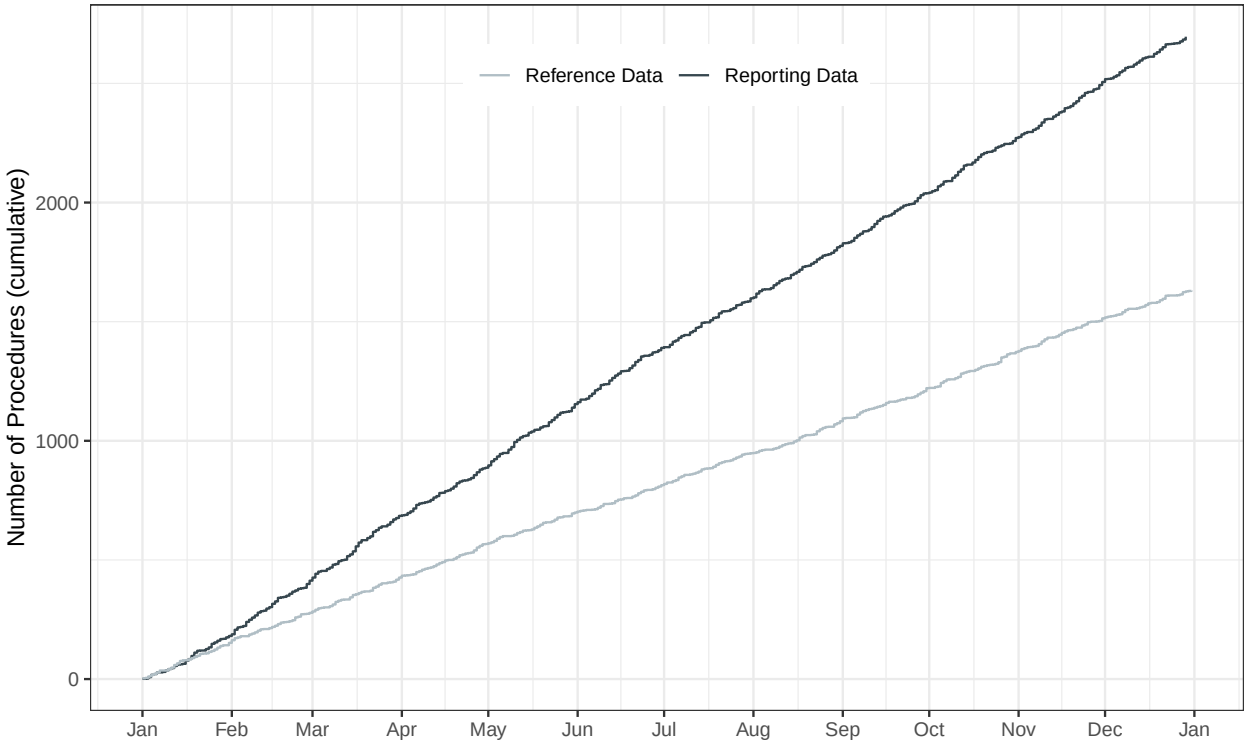
	2022 (N=1631)	2023 (N=2696)	p value
Grade IIIb	202 (16.8%)	276 (11.9%)	
Grade IIIb disability	30 (2.5%)	20 (0.9%)	
Grade IVa	40 (3.3%)	26 (1.1%)	
Grade IVa disability	3 (0.2%)	3 (0.1%)	
Grade IVb	13 (1.1%)	8 (0.3%)	
Grade IVb disability	1 (0.1%)	0 (0.0%)	
Grade V - Death	20 (1.7%)	59 (2.5%)	
30-Day Patency			0.604
Yes	762 (46.7%)	1302 (48.3%)	
No	48 (2.9%)	77 (2.9%)	
Missing	821 (50.3%)	1317 (48.9%)	

11.0.1 Treated Pathologies at the Lower Extremities (excluding Femoral Bifurcation)

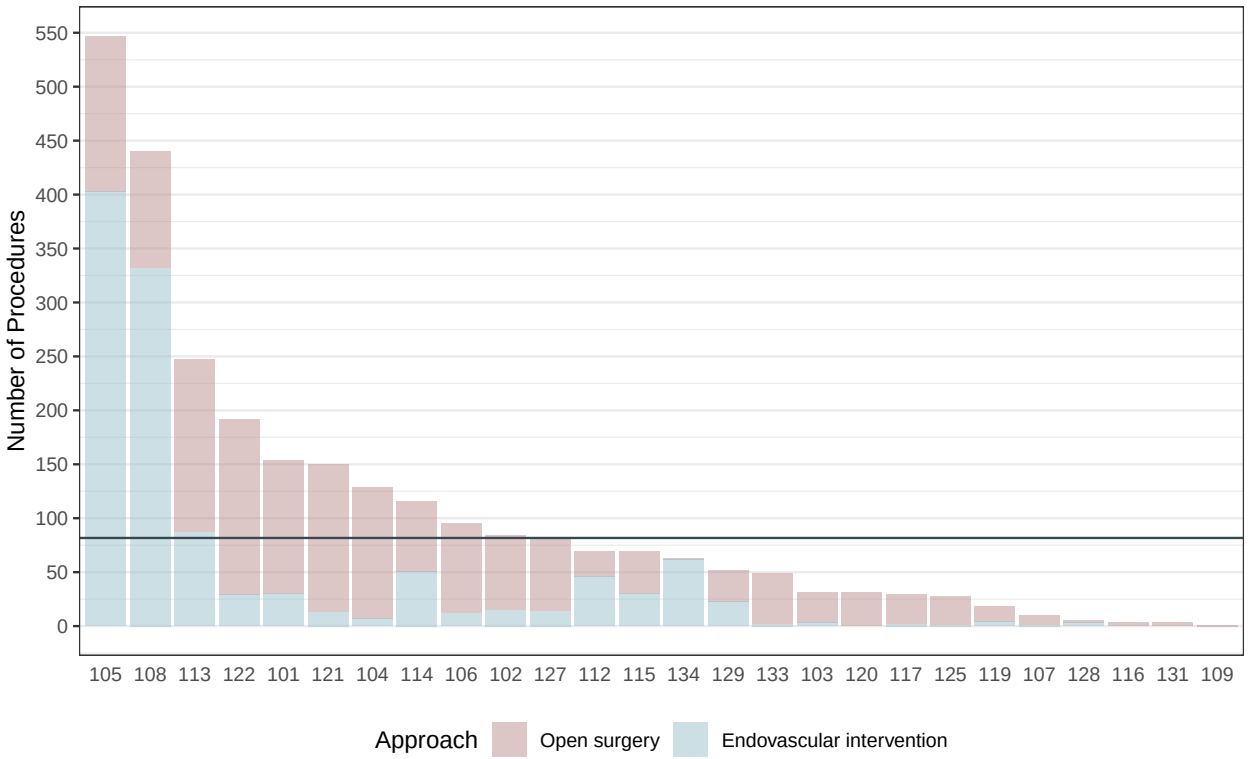




11.0.2 Treatment of Arteries of the Lower Extremity - Year-on-Year Change



11.0.3 Surgery Arteries of the Lower Extremity in 2023 - National Overview



11.1 Surgery on the supragenicular femoro-popliteal Arteries

Table 16: Surgery on the supragenicular femoro-popliteal Arteries

	2022 (N=471)	2023 (N=968)	p value
Pathology			< 0.001
N-Miss	0	13	
No vascular pathology	3 (0.6%)	8 (0.8%)	
Vascular wall injury / pseudoaneurysm	12 (2.5%)	13 (1.4%)	
Aneurysm (true)	32 (6.8%)	33 (3.5%)	
Inflammatory aneurysm (sterile)	0 (0.0%)	1 (0.1%)	
Dissection without aneurysm formation	2 (0.4%)	3 (0.3%)	
Dissection with aneurym formation	1 (0.2%)	0 (0.0%)	
Obstruction intraluminally	96 (20.4%)	127 (13.3%)	
Obstruction wall pathology	320 (67.9%)	766 (80.2%)	
Obstruction by external compression	1 (0.2%)	1 (0.1%)	
AV-malformation	4 (0.8%)	2 (0.2%)	
Tumor	0 (0.0%)	1 (0.1%)	
Vascular Intervention			< 0.001
N-Miss	0	1	
Vascular graft	153 (32.5%)	224 (23.2%)	
Bifurcated graft	0 (0.0%)	2 (0.2%)	
Complex bifurcated graft (Y + branches)	1 (0.2%)	0 (0.0%)	
Repair of vessel wall	2 (0.4%)	3 (0.3%)	
Isolated dilatation (PTA/Stent)	230 (48.8%)	628 (64.9%)	
Mural desobliteration w/wo patch	20 (4.2%)	12 (1.2%)	
Luminal desobliteration (e.g. embolectomy)	55 (11.7%)	79 (8.2%)	
Extramural deblockage	1 (0.2%)	0 (0.0%)	
Sealing	1 (0.2%)	1 (0.1%)	
Therapeutic occlusion of vessels	1 (0.2%)	1 (0.1%)	
Resection of av-malform	1 (0.2%)	6 (0.6%)	
De-/rebranching	3 (0.6%)	2 (0.2%)	
Imaging	3 (0.6%)	9 (0.9%)	
Material			< 0.001
N-Miss	3	3	
Autologous Material Only	83 (17.7%)	135 (14.0%)	
Biological Material	21 (4.5%)	23 (2.4%)	
Synthetic Material for Vessel wall	102 (21.8%)	190 (19.7%)	
Coils, Plugs, etc	118 (25.2%)	373 (38.7%)	
No material	144 (30.8%)	244 (25.3%)	
Inflow Optimisation			0.398
N-Miss	110	146	
Same Approach	29 (8.0%)	49 (6.0%)	
Hyprid Approach	6 (1.7%)	12 (1.5%)	
No Inflow Optimization	326 (90.3%)	761 (92.6%)	
Outflow			0.153
N-Miss	111	146	
Same Approach	17 (4.7%)	24 (2.9%)	
Hyprid Approach	8 (2.2%)	11 (1.3%)	
No Outflow Optimization	335 (93.1%)	787 (95.7%)	
Sterility			0.532
N-Miss	1	0	
Infected or presumably infected	14 (3.0%)	35 (3.6%)	
Sterile operation	456 (97.0%)	933 (96.4%)	

	2022 (N=471)	2023 (N=968)	p value
Sex			0.996
N-Miss	1	0	
Male	317 (67.4%)	653 (67.5%)	
Female	153 (32.6%)	315 (32.5%)	
Age (years)			0.523
Mean (SD)	72.6 (11.5)	73.0 (11.1)	
Range	30.0 - 96.0	0.0 - 99.0	
Complication			< 0.001
N-Miss	191	171	
No	177 (63.2%)	615 (77.2%)	
Yes	103 (36.8%)	182 (22.8%)	
ClavienDindo			< 0.001
N-Miss	191	171	
Grade 0 - No Complication	177 (63.2%)	615 (77.2%)	
Grade I	12 (4.3%)	20 (2.5%)	
Grade I disability	0 (0.0%)	2 (0.3%)	
Grade II	28 (10.0%)	66 (8.3%)	
Grade II disability	3 (1.1%)	7 (0.9%)	
Grade IIIa	4 (1.4%)	12 (1.5%)	
Grade IIIa disability	0 (0.0%)	2 (0.3%)	
Grade IIIb	36 (12.9%)	54 (6.8%)	
Grade IIIb disability	1 (0.4%)	1 (0.1%)	
Grade IVa	9 (3.2%)	7 (0.9%)	
Grade IVa disability	1 (0.4%)	1 (0.1%)	
Grade IVb	1 (0.4%)	0 (0.0%)	
Grade V - Death	8 (2.9%)	10 (1.3%)	
30-Day Patency			0.014
Yes	166 (35.2%)	419 (43.3%)	
No	10 (2.1%)	19 (2.0%)	
Missing	295 (62.6%)	530 (54.8%)	

11.2 Surgery on the popliteal Artery

Table 17: Surgery on the popliteal Artery

	2022 (N=139)	2023 (N=229)	p value
Pathology			0.034
Vascular wall injury / pseudoaneurysm	10 (7.2%)	7 (3.1%)	
Aneurysm (true)	94 (67.6%)	156 (68.1%)	
Dissection without aneurysm formation	0 (0.0%)	4 (1.7%)	
Obstruction intraluminally	13 (9.4%)	18 (7.9%)	
Obstruction wall pathology	13 (9.4%)	39 (17.0%)	
Obstruction by external compression	7 (5.0%)	4 (1.7%)	
AV-malformation	2 (1.4%)	1 (0.4%)	
Vascular Intervention			0.013
Vascular graft	105 (75.5%)	173 (75.5%)	
Bifurcated graft	1 (0.7%)	0 (0.0%)	
Repair of vessel wall	0 (0.0%)	3 (1.3%)	
Isolated dilatation (PTA/Stent)	10 (7.2%)	38 (16.6%)	
Mural desobliteration w/wo patch	3 (2.2%)	2 (0.9%)	
Luminal desobliteration (e.g. embolectomy)	11 (7.9%)	7 (3.1%)	
Extramural deblockage	6 (4.3%)	2 (0.9%)	
Sealing	1 (0.7%)	1 (0.4%)	
Therapeutic occlusion of vessels	0 (0.0%)	2 (0.9%)	
Resection of av-malform	1 (0.7%)	1 (0.4%)	
Imaging	1 (0.7%)	0 (0.0%)	
Material			0.008
N-Miss	0	1	
Autologous Material Only	93 (66.9%)	129 (56.6%)	
Biological Material	7 (5.0%)	8 (3.5%)	
Synthetic Material for Vessel wall	11 (7.9%)	41 (18.0%)	
Coils, Plugs, etc	2 (1.4%)	15 (6.6%)	
No material	26 (18.7%)	35 (15.4%)	
Inflow			0.485
N-Miss	78	89	
Same Approach	2 (3.3%)	8 (5.7%)	
Hyprid Approach	0 (0.0%)	2 (1.4%)	
No Inflow Optimization	59 (96.7%)	130 (92.9%)	
Outflow			0.142
N-Miss	78	89	
Same Approach	8 (13.1%)	10 (7.1%)	
Hyprid Approach	0 (0.0%)	5 (3.6%)	
No Outflow Optimization	53 (86.9%)	125 (89.3%)	
Sterility			0.821
Infected or presumably infected	2 (1.4%)	4 (1.7%)	
Sterile operation	137 (98.6%)	225 (98.3%)	
Sex			0.591
Male	124 (89.2%)	200 (87.3%)	
Female	15 (10.8%)	29 (12.7%)	
Age (years)			0.046
Mean (SD)	68.8 (14.3)	71.5 (11.4)	
Range	19.0 - 95.0	18.0 - 95.0	
Complication			0.601
N-Miss	28	12	
No	82 (73.9%)	166 (76.5%)	

	2022 (N=139)	2023 (N=229)	p value
Yes	29 (26.1%)	51 (23.5%)	
ClavienDindo			0.112
N-Miss	28	12	
Grade 0 - No Complication	82 (73.9%)	166 (76.5%)	
Grade I	4 (3.6%)	13 (6.0%)	
Grade I disability	4 (3.6%)	3 (1.4%)	
Grade II	2 (1.8%)	10 (4.6%)	
Grade II disability	2 (1.8%)	2 (0.9%)	
Grade IIIa	2 (1.8%)	2 (0.9%)	
Grade IIIa disability	0 (0.0%)	2 (0.9%)	
Grade IIIb	7 (6.3%)	14 (6.5%)	
Grade IIIb disability	4 (3.6%)	0 (0.0%)	
Grade IVa	3 (2.7%)	2 (0.9%)	
Grade V - Death	1 (0.9%)	3 (1.4%)	
30-Day Patency			0.810
Yes	84 (60.4%)	142 (62.0%)	
No	1 (0.7%)	3 (1.3%)	
Missing	54 (38.8%)	84 (36.7%)	

11.3 Surgery on the infragenicular and crural Arteries

Table 18: Surgery on the infragenicular and crural Arteries

	2022 (N=1021)	2023 (N=1499)	p value
Segment			< 0.001
Femoro-popliteal, infragenicular	402 (39.4%)	550 (36.7%)	
Femoro-cural, infrapopliteal	299 (29.3%)	374 (24.9%)	
Popliteal trifurcation and crural-pedal	320 (31.3%)	575 (38.4%)	
Pathology			0.006
N-Miss	0	7	
No vascular pathology	7 (0.7%)	4 (0.3%)	
Vascular wall injury / pseudoaneurysm	10 (1.0%)	24 (1.6%)	
Aneurysm (true)	94 (9.2%)	111 (7.4%)	
Inflammatory aneurysm (sterile)	1 (0.1%)	1 (0.1%)	
Dissection without aneurysm formation	5 (0.5%)	2 (0.1%)	
Obstruction intraluminally	411 (40.3%)	523 (35.1%)	
Obstruction wall pathology	486 (47.6%)	804 (53.9%)	
Obstruction by external compression	4 (0.4%)	8 (0.5%)	
AV-malformation	2 (0.2%)	10 (0.7%)	
No vascular pathology / vascular access or diagnostic procedures)	0 (0.0%)	1 (0.1%)	
Source of emboli w/o pathology of the vessel wall	0 (0.0%)	4 (0.3%)	
Tumor	1 (0.1%)	0 (0.0%)	
Vascular Intervention			< 0.001
Vascular graft	549 (53.8%)	683 (45.6%)	
Bifurcated graft	3 (0.3%)	6 (0.4%)	
Complex bifurcated graft (Y + branches)	5 (0.5%)	3 (0.2%)	
Repair of vessel wall	2 (0.2%)	10 (0.7%)	
Isolated dilatation (PTA/Stent)	139 (13.6%)	425 (28.4%)	
Mural desobliteration w/wo patch	50 (4.9%)	49 (3.3%)	
Luminal desobliteration (e.g. embolectomy)	263 (25.8%)	312 (20.8%)	
Extramural deblockage	3 (0.3%)	1 (0.1%)	
Therapeutic occlusion of vessels	1 (0.1%)	2 (0.1%)	
Resection of av-malform	2 (0.2%)	2 (0.1%)	
Creation of a therapeutic AV-fistula	0 (0.0%)	1 (0.1%)	
De-/rebranching	0 (0.0%)	1 (0.1%)	
Imaging	4 (0.4%)	4 (0.3%)	
Material			< 0.001
N-Miss	11	7	
Autologous Material Only	446 (44.2%)	541 (36.3%)	
Biological Material	42 (4.2%)	76 (5.1%)	
Synthetic Material for Vessel wall	136 (13.5%)	183 (12.3%)	
Coils, Plugs, etc	64 (6.3%)	176 (11.8%)	
No material	322 (31.9%)	516 (34.6%)	
Inflow Optimisation			0.130
N-Miss	298	342	
Same Approach	98 (13.6%)	122 (10.5%)	
Hyprid Approach	14 (1.9%)	20 (1.7%)	
No Inflow Optimization	611 (84.5%)	1015 (87.7%)	

	2022 (N=1021)	2023 (N=1499)	p value
Outflow			0.043
N-Miss	299	342	
Same Approach	68 (9.4%)	106 (9.2%)	
Hyprid Approach	44 (6.1%)	42 (3.6%)	
No Outflow Optimization	610 (84.5%)	1009 (87.2%)	
Sterility			0.084
N-Miss	8	5	
Infected or presumably infected	22 (2.2%)	50 (3.3%)	
Sterile operation	991 (97.8%)	1444 (96.7%)	
Sex			0.887
N-Miss	0	3	
Male	737 (72.2%)	1076 (71.9%)	
Female	284 (27.8%)	420 (28.1%)	
Age (years)			0.157
N-Miss	1	0	
Mean (SD)	72.3 (12.0)	73.0 (12.4)	
Range	19.0 - 99.0	0.0 - 103.0	
Complication			< 0.001
N-Miss	211	188	
No	408 (50.4%)	799 (60.9%)	
Yes	402 (49.6%)	512 (39.1%)	
ClavienDindo			< 0.001
N-Miss	211	188	
Grade 0 - No Complication	408 (50.4%)	799 (60.9%)	
Grade I	20 (2.5%)	34 (2.6%)	
Grade I disability	5 (0.6%)	9 (0.7%)	
Grade II	102 (12.6%)	123 (9.4%)	
Grade II disability	15 (1.9%)	18 (1.4%)	
Grade IIIa	20 (2.5%)	24 (1.8%)	
Grade IIIa disability	2 (0.2%)	4 (0.3%)	
Grade IIIb	159 (19.6%)	208 (15.9%)	
Grade IIIb disability	25 (3.1%)	19 (1.4%)	
Grade IVa	28 (3.5%)	17 (1.3%)	
Grade IVa disability	2 (0.2%)	2 (0.2%)	
Grade IVb	12 (1.5%)	8 (0.6%)	
Grade IVb disability	1 (0.1%)	0 (0.0%)	
Grade V - Death	11 (1.4%)	46 (3.5%)	
30-Day Patency			0.940
Yes	512 (50.1%)	741 (49.4%)	
No	37 (3.6%)	55 (3.7%)	
Missing	472 (46.2%)	703 (46.9%)	

12 Access Surgery

Table 19: Dialysis Access Surgery

	2022 (N=1174)	2023 (N=1431)	p value
SGG OP Code			< 0.001
N-Miss	1	0	
Abolition of AV-Shunt	49 (4.2%)	65 (4.5%)	
Amputation of toe	1 (0.1%)	0 (0.0%)	
Angiography	6 (0.5%)	12 (0.8%)	
Brachio-cephalic fistula	238 (20.3%)	240 (16.8%)	
Cimino-Brescia fistula	146 (12.4%)	206 (14.4%)	
Dialysis fistula other location	22 (1.9%)	42 (2.9%)	
Intervention in brachial arteries	12 (1.0%)	116 (8.1%)	
Other AV-Shunt (others)	123 (10.5%)	144 (10.1%)	
Other vascular access (incl. Catheter)	8 (0.7%)	0 (0.0%)	
Revasc for acute arterial occlusion	1 (0.1%)	1 (0.1%)	
Septic vascular surgery	1 (0.1%)	0 (0.0%)	
Surgery on angiodysplasia	0 (0.0%)	1 (0.1%)	
Surgery on occlusion of upper extremity	0 (0.0%)	4 (0.3%)	
Tabatiere fistula	15 (1.3%)	27 (1.9%)	
Temporary av-fistula (venous thrombectomy)	0 (0.0%)	1 (0.1%)	
Thrombectomy AV-Shunt	63 (5.4%)	75 (5.2%)	
Venous dialysis catheter	487 (41.5%)	497 (34.7%)	
Venous transposition	1 (0.1%)	0 (0.0%)	
Complication			0.691
N-Miss	672	521	
No	449 (89.4%)	820 (90.1%)	
Yes	53 (10.6%)	90 (9.9%)	
ClavienDindo			0.028
N-Miss	672	521	
Grade 0 - No Complication	449 (89.4%)	820 (90.1%)	
Grade I	8 (1.6%)	8 (0.9%)	
Grade I disability	3 (0.6%)	4 (0.4%)	
Grade II	5 (1.0%)	13 (1.4%)	
Grade IIIa	10 (2.0%)	7 (0.8%)	
Grade IIIb	13 (2.6%)	49 (5.4%)	
Grade IIIb disability	2 (0.4%)	1 (0.1%)	
Grade IVa	3 (0.6%)	3 (0.3%)	
Grade IVa disability	2 (0.4%)	0 (0.0%)	
Grade IVb disability	1 (0.2%)	1 (0.1%)	
Grade V - Death	6 (1.2%)	4 (0.4%)	
30-Day Patency			< 0.001
Yes	40 (3.4%)	129 (9.0%)	
No	4 (0.3%)	19 (1.3%)	
Missing	1130 (96.3%)	1283 (89.7%)	

12.1 Catheters versus AV-Fistula/Shunts

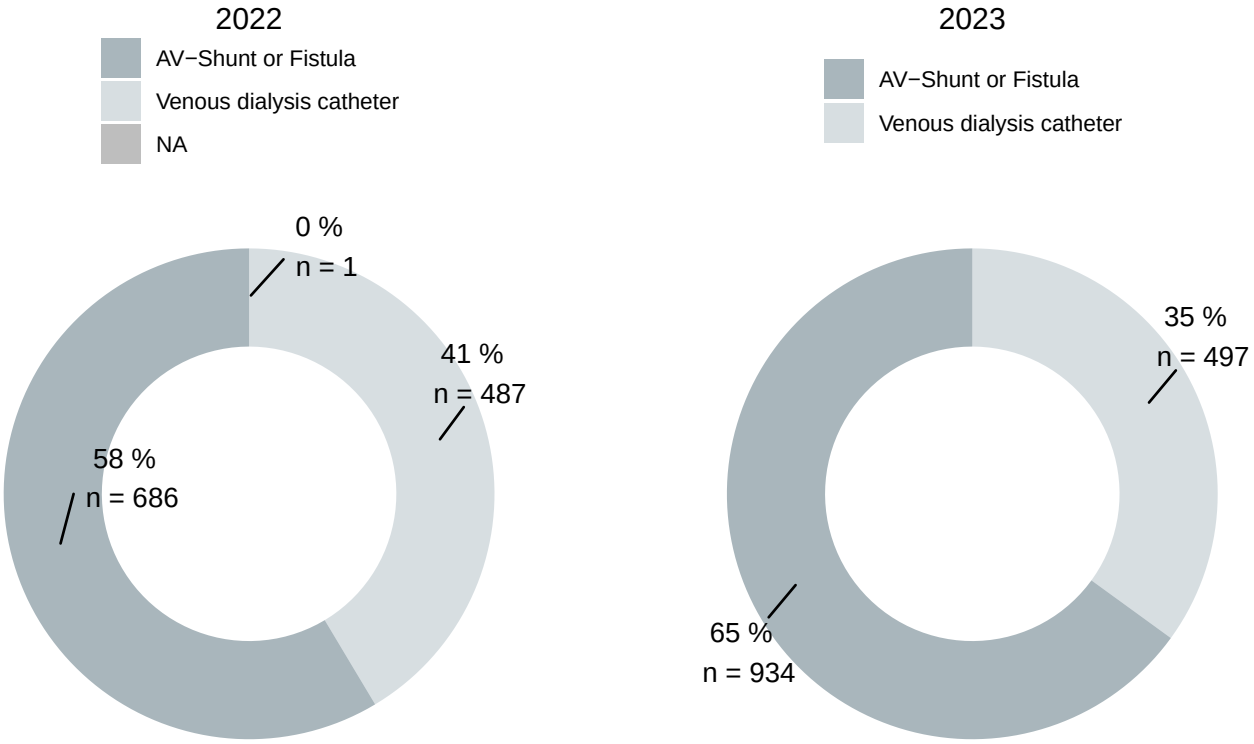


Table 20: AV-Fistula or AV-Shunt

	2022 (N=686)	2023 (N=934)
Vascular Intervention		
N-Miss	13	5
Vascular graft	52 (7.7%)	71 (7.6%)
Repair of vessel wall	26 (3.9%)	21 (2.3%)
Isolated dilatation (PTA/Stent)	28 (4.2%)	137 (14.7%)
Mural desobliteration w/wo patch	15 (2.2%)	9 (1.0%)
Luminal desobliteration (e.g. embolectomy)	69 (10.3%)	99 (10.7%)
Extramural deblockage	0 (0.0%)	3 (0.3%)
Sealing	1 (0.1%)	1 (0.1%)
Therapeutic occlusion of vessels	51 (7.6%)	64 (6.9%)
Resection of av-malform	11 (1.6%)	9 (1.0%)
Creation of a therapeutic AV-fistula	404 (60.0%)	496 (53.4%)
De-/rebranching	8 (1.2%)	12 (1.3%)
Imaging	8 (1.2%)	7 (0.8%)
Segment		
N-Miss	4	0
Brachial artery	17 (2.5%)	22 (2.4%)
Cubita and forearm	21 (3.1%)	9 (1.0%)
Arteries of wrist	6 (0.9%)	18 (1.9%)
Subclavian vein axillary vein	0 (0.0%)	1 (0.1%)
Arm veins	5 (0.7%)	3 (0.3%)
Forearm	257 (37.7%)	279 (29.9%)
Wrist	43 (6.3%)	96 (10.3%)
Cubital forearm	240 (35.2%)	248 (26.6%)
Upper arm	92 (13.5%)	251 (26.9%)
Leg	1 (0.1%)	7 (0.7%)
Material		
N-Miss	24	7
Autologous Material Only	255 (38.5%)	294 (31.7%)
Biological Material	28 (4.2%)	33 (3.6%)
Synthetic Material for Vessel wall	98 (14.8%)	154 (16.6%)
Coils, Plugs, etc	5 (0.8%)	27 (2.9%)
No material	276 (41.7%)	419 (45.2%)
Pathology		
N-Miss	10	17
No vascular pathology	514 (76.0%)	569 (62.1%)
Vascular wall injury / pseudoaneurysm	20 (3.0%)	18 (2.0%)
Aneurysm (true)	18 (2.7%)	14 (1.5%)
Inflammatory aneurysm (sterile)	0 (0.0%)	1 (0.1%)
Dissection without aneurysm formation	0 (0.0%)	1 (0.1%)
Obstruction intraluminally	78 (11.5%)	132 (14.4%)
Obstruction wall pathology	34 (5.0%)	49 (5.3%)
Obstruction by external compression	1 (0.1%)	1 (0.1%)
AV-malformation	3 (0.4%)	0 (0.0%)
No vascular pathology / vascular access or diagnostic procedures)	5 (0.7%)	130 (14.2%)
Source of emboli w/o pathology of the vessel wall	3 (0.4%)	1 (0.1%)
Tumor	0 (0.0%)	1 (0.1%)
Sterility		
N-Miss	14	0
Infected or presumably infected	5 (0.7%)	15 (1.6%)

	2022 (N=686)	2023 (N=934)
Sterile operation	667 (99.3%)	919 (98.4%)
Age (years)		
N-Miss	0	2
Mean (SD)	67.0 (13.7)	65.7 (14.4)
Range	2.0 - 91.0	0.0 - 92.0
Sex		
N-Miss	1	4
Male	449 (65.5%)	593 (63.8%)
Female	236 (34.5%)	337 (36.2%)
Complication		
N-Miss	363	293
No	303 (93.8%)	583 (91.0%)
Yes	20 (6.2%)	58 (9.0%)
ClavienDindo		
N-Miss	363	293
Grade 0 - No Complication	303 (93.8%)	583 (91.0%)
Grade I	3 (0.9%)	5 (0.8%)
Grade I disability	1 (0.3%)	3 (0.5%)
Grade II	0 (0.0%)	9 (1.4%)
Grade IIIa	5 (1.5%)	4 (0.6%)
Grade IIIb	10 (3.1%)	36 (5.6%)
Grade V - Death	1 (0.3%)	1 (0.2%)
30-Day Patency		
Yes	29 (4.2%)	114 (12.2%)
No	2 (0.3%)	18 (1.9%)
Missing	655 (95.5%)	802 (85.9%)

13 Treatment of Deep Veins

Table 21: Treatment of Deep Veins

	2022 (N=53)	2023 (N=59)	p value
Segment			0.429
Deep pelvic veins	8 (15.1%)	10 (16.9%)	
Vena cava inferior	12 (22.6%)	6 (10.2%)	
Vena cava superior	0 (0.0%)	1 (1.7%)	
Subclavian vein axillary vein	1 (1.9%)	2 (3.4%)	
Arm veins	3 (5.7%)	1 (1.7%)	
Deep leg veins including femoral bifurcation	27 (50.9%)	35 (59.3%)	
Portal vein	2 (3.8%)	4 (6.8%)	
Pathology			0.334
N-Miss	0	1	
No vascular pathology	3 (5.7%)	0 (0.0%)	
Vascular wall injury / pseudoaneurysm	21 (39.6%)	18 (31.0%)	
Aneurysm (true)	0 (0.0%)	2 (3.4%)	
Obstruction intraluminally	20 (37.7%)	26 (44.8%)	
Obstruction wall pathology	1 (1.9%)	1 (1.7%)	
Obstruction by external compression	3 (5.7%)	2 (3.4%)	
AV-malformation	0 (0.0%)	2 (3.4%)	
Source of emboli w/o pathology of the vessel wall	0 (0.0%)	1 (1.7%)	
Tumor	5 (9.4%)	6 (10.3%)	
Vascular Intervention			0.332
Vascular graft	7 (13.2%)	5 (8.5%)	
Repair of vessel wall	16 (30.2%)	23 (39.0%)	
Isolated dilatation (PTA/Stent)	3 (5.7%)	3 (5.1%)	
Mural desobliteration w/wo patch	2 (3.8%)	0 (0.0%)	
Luminal desobliteration (e.g. embolectomy)	15 (28.3%)	25 (42.4%)	
Sealing	1 (1.9%)	0 (0.0%)	
Therapeutic occlusion of vessels	3 (5.7%)	2 (3.4%)	
Resection of av-malform	1 (1.9%)	0 (0.0%)	
Creation of a therapeutic AV-fistula	2 (3.8%)	1 (1.7%)	
De-/rebranching	2 (3.8%)	0 (0.0%)	
Imaging	1 (1.9%)	0 (0.0%)	
Sterility			0.189
Infected or presumably infected	2 (3.8%)	6 (10.2%)	
Sterile operation	51 (96.2%)	53 (89.8%)	
Sex			0.648
Male	31 (58.5%)	37 (62.7%)	
Female	22 (41.5%)	22 (37.3%)	
Age (years)			0.913
Mean (SD)	56.6 (19.9)	56.2 (17.3)	
Range	18.0 - 93.0	17.0 - 92.0	
Complication			0.252
N-Miss	15	8	
No	24 (63.2%)	26 (51.0%)	
Yes	14 (36.8%)	25 (49.0%)	
ClavienDindo			0.214
N-Miss	15	8	
Grade 0 - No Complication	24 (63.2%)	26 (51.0%)	
Grade I	1 (2.6%)	3 (5.9%)	

	2022 (N=53)	2023 (N=59)	p value
Grade II	3 (7.9%)	8 (15.7%)	
Grade II disability	2 (5.3%)	1 (2.0%)	
Grade IIIb	4 (10.5%)	10 (19.6%)	
Grade IVa	0 (0.0%)	2 (3.9%)	
Grade V - Death	4 (10.5%)	1 (2.0%)	
30-Day Patency			0.009
Yes	5 (9.4%)	15 (25.4%)	
No	0 (0.0%)	4 (6.8%)	
Missing	48 (90.6%)	40 (67.8%)	

14 Treatment of Varicosis

Table 22: Surgery on Superficial Veins

	2022 (N=2302)	2023 (N=3777)	p value
SGG OP Code			< 0.001
Combination of 11A to 11D	152 (6.6%)	121 (3.2%)	
Crossectomy with stripping (VSM or VSP or VSAA)	298 (12.9%)	493 (13.1%)	
Endovenous varicosis treatment	951 (41.3%)	1353 (35.8%)	
Isolated native crossectomy or revision	101 (4.4%)	128 (3.4%)	
Isolated stripping of VSM or VSP	32 (1.4%)	52 (1.4%)	
Perforator ligation	157 (6.8%)	280 (7.4%)	
Ulcus treatment with plastic reconstruction	4 (0.2%)	10 (0.3%)	
Varicosis vein dissection	607 (26.4%)	1340 (35.5%)	
Sex			0.134
N-Miss	1	0	
Male	977 (42.5%)	1530 (40.5%)	
Female	1324 (57.5%)	2247 (59.5%)	
Age (years)			0.456
N-Miss	0	14	
Mean (SD)	54.0 (15.1)	54.3 (14.6)	
Range	0.0 - 93.0	14.0 - 95.0	
Setting			< 0.001
N-Miss	4	4	
Outpatient	1801 (78.4%)	3166 (83.9%)	
Inpatient	497 (21.6%)	607 (16.1%)	
Complication			0.854
N-Miss	1550	2868	
No	737 (98.0%)	892 (98.1%)	
Yes	15 (2.0%)	17 (1.9%)	
ClavienDindo			0.087
N-Miss	1550	2868	
Grade 0 - No Complication	737 (98.0%)	892 (98.1%)	
Grade I	1 (0.1%)	0 (0.0%)	
Grade I disability	2 (0.3%)	0 (0.0%)	
Grade II	10 (1.3%)	11 (1.2%)	
Grade IIIb	0 (0.0%)	5 (0.6%)	
Grade IVa	2 (0.3%)	0 (0.0%)	
Grade V - Death	0 (0.0%)	1 (0.1%)	

15 Amputations and other Soft Tissue Procedures

Table 23: Amputations and other non-vascular procedures

	2022 (N=3546)	2023 (N=3871)	p value
Procedure			0.010
N-Miss	23	19	
Amputation of finger of hand	1 (0.0%)	0 (0.0%)	
Amputation of hindfoot	7 (0.2%)	5 (0.1%)	
Amputation of lower leg	148 (4.2%)	180 (4.7%)	
Amputation of metatarsus	205 (5.8%)	188 (4.9%)	
Amputation of thigh	59 (1.7%)	38 (1.0%)	
Amputation of toe	502 (14.2%)	605 (15.7%)	
Compartment Decompression abdominal	23 (0.7%)	24 (0.6%)	
Compartment Decompression thoracic	2 (0.1%)	1 (0.0%)	
Fasciotomy	127 (3.6%)	143 (3.7%)	
Hip disarticulation	1 (0.0%)	0 (0.0%)	
Pacemaker Explantation	3 (0.1%)	1 (0.0%)	
Pacemaker Implantation	2 (0.1%)	0 (0.0%)	
Port Explantation	133 (3.8%)	122 (3.2%)	
Port Implantation	357 (10.1%)	410 (10.6%)	
Surgery on lymphatic drain disorder	15 (0.4%)	13 (0.3%)	
Through-knee amputation	11 (0.3%)	4 (0.1%)	
Ulcus treatment with plastic reconstruction	4 (0.1%)	10 (0.3%)	
Wound closure (2° or Thiersch)	327 (9.3%)	359 (9.3%)	
Wound Debridement w/o NPWT	514 (14.6%)	642 (16.7%)	
Wound Debridement with NWPT	1082 (30.7%)	1107 (28.7%)	
Sex			0.886
N-Miss	1	1	
Male	2322 (65.5%)	2541 (65.7%)	
Female	1223 (34.5%)	1329 (34.3%)	
Age (years)			0.378
N-Miss	0	2	
Mean (SD)	70.1 (13.4)	70.4 (13.3)	
Range	16.0 - 100.0	0.0 - 103.0	
Complication			0.092
N-Miss	1310	1261	
No	1027 (45.9%)	1262 (48.4%)	
Yes	1209 (54.1%)	1348 (51.6%)	
ClavienDindo			< 0.001
N-Miss	1310	1261	
Grade 0 - No Complication	1027 (45.9%)	1262 (48.4%)	
Grade I	41 (1.8%)	54 (2.1%)	
Grade I disability	7 (0.3%)	5 (0.2%)	
Grade II	202 (9.0%)	287 (11.0%)	
Grade II disability	32 (1.4%)	52 (2.0%)	
Grade IIIa	24 (1.1%)	31 (1.2%)	
Grade IIIa disability	2 (0.1%)	3 (0.1%)	
Grade IIIb	551 (24.6%)	520 (19.9%)	
Grade IIIb disability	108 (4.8%)	52 (2.0%)	
Grade IVa	146 (6.5%)	115 (4.4%)	
Grade IVa disability	12 (0.5%)	6 (0.2%)	
Grade IVb	7 (0.3%)	37 (1.4%)	

	2022 (N=3546)	2023 (N=3871)	p value
Grade IVb disability	2 (0.1%)	5 (0.2%)	
Grade V - Death	75 (3.4%)	181 (6.9%)	

16 R Session Info

R version 4.2.3 (2023-03-15) on macOS Monterey 12.5.1

Table 24: Package Names and Versions

Package	Version
RColorBrewer	1.1-3
ggrepel	0.9.3
markdown	1.5
arsenal	3.6.3
kableExtra	1.3.4
survival	3.5-7
survminer	0.4.9
cowplot	1.1.1
jtools	2.2.1
ggpubr	0.6.0
lubridate	1.9.2
forcats	1.0.0
stringr	1.5.0
dplyr	1.1.4
purrr	1.0.1
readr	2.1.4
tidyr	1.3.0
tibble	3.2.1
ggplot2	3.5.0
tidyverse	2.0.0