

Outcomes of Thoracoabdominal Aortic Aneurysm (TAAA) Repair in Patients with and without Peripheral Vascular Disease

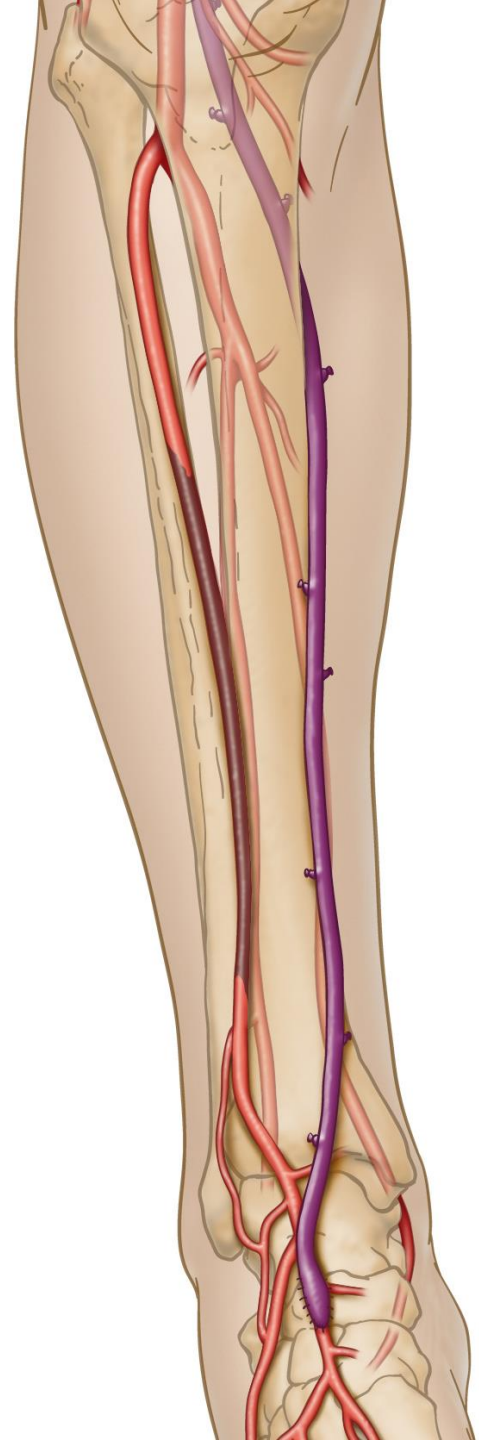
2024 AATS Aortic Symposium

Background

- **Peripheral vascular disease (PVD) is a significant health concern because it affects the blood vessels outside the heart and brain, commonly affecting the lower extremities.**
 - **Reduction of the blood flow to the extremities**
 - **Higher risk of heart attack, stroke, and infection**
 - **Physical limitations and a lower quality of life**
 - **Prevalence has doubled over the past 30 years**
- **It is important to determine outcomes associated with PVD due to its impact on length and quality of life, and its challenges to healthcare systems.**
- **We aimed to investigate outcomes of thoracoabdominal aortic aneurysm (TAAA) repair in patients with and without PVD, which are poorly understood.**

Objectives

- The purpose of this study was to investigate the relationship between peripheral vascular disease (PVD) and TAAA repair
- We investigated how patients with and without PVD differed in terms of the following:
 - Preoperative factors
 - Operative details
 - Early outcomes



Methods

- Retrospective, single-practice analysis
- 3772 patients who underwent TAAA repair (1990-2023)
 - 891 with PVD
 - 2881 without PVD
- PVD was broadly defined as the presence of symptoms, need for intervention, or amputation
- Univariate analysis was used to compare the two groups to identify differences in preoperative factors, operative details, and early outcomes

Definitions:

Adverse events include **operative mortality** (within 30 days or final hospital discharge, including transfer) or **persistent** (ie, present at discharge or death) **stroke, paraplegia, paraparesis, or renal failure necessitating dialysis**

Preoperative Factors

- Patients with PVD had higher incidence of **comorbid atherosclerotic conditions**
 - Hyperlipidemia, CAD, cerebrovascular disease, CKD, and COPD
- Patients without PVD had higher incidence of **genetic disorder**

Variable	Without Peripheral Vascular Disease (n=2881)	With Peripheral Vascular Disease (n=891)	P value
Age, y	66 [56-73]	69 [64-75]	<.001
Male	1815 (63.0)	540 (60.6)	.2
Genetic disorder	371 (12.9)	36 (4.0)	<.001
Hyperlipidemia	806 (28.1)	381 (42.8)	<.001
CAD	921 (32.0)	407 (45.7)	<.001
Cerebrovascular disease	398 (13.8)	261 (29.3)	<.001
CKD	1020 (35.4)	445 (49.9)	<.001
COPD	1229 (42.7)	503 (56.5)	<.001
Diabetes	227 (7.9)	87 (9.8)	.1

Values are n (%) or median (Quartile 1, Quartile 3). CAD, coronary artery disease; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease.

Preoperative Factors

- Patients with PVD were more likely to be **former tobacco users**
- Patients without PVD were more likely to have **never used tobacco**

Variable	Without Peripheral Vascular Disease (n=2881)	With Peripheral Vascular Disease (n=891)	P value
Active tobacco user	821 (28.5)	261 (29.3)	.6
Former tobacco user	1329 (46.1)	526 (59.0)	<.001
Never used tobacco	652 (22.6)	92 (10.3)	<.001
Unknown tobacco use	79 (2.7)	12 (1.3)	.02

Values are n (%)

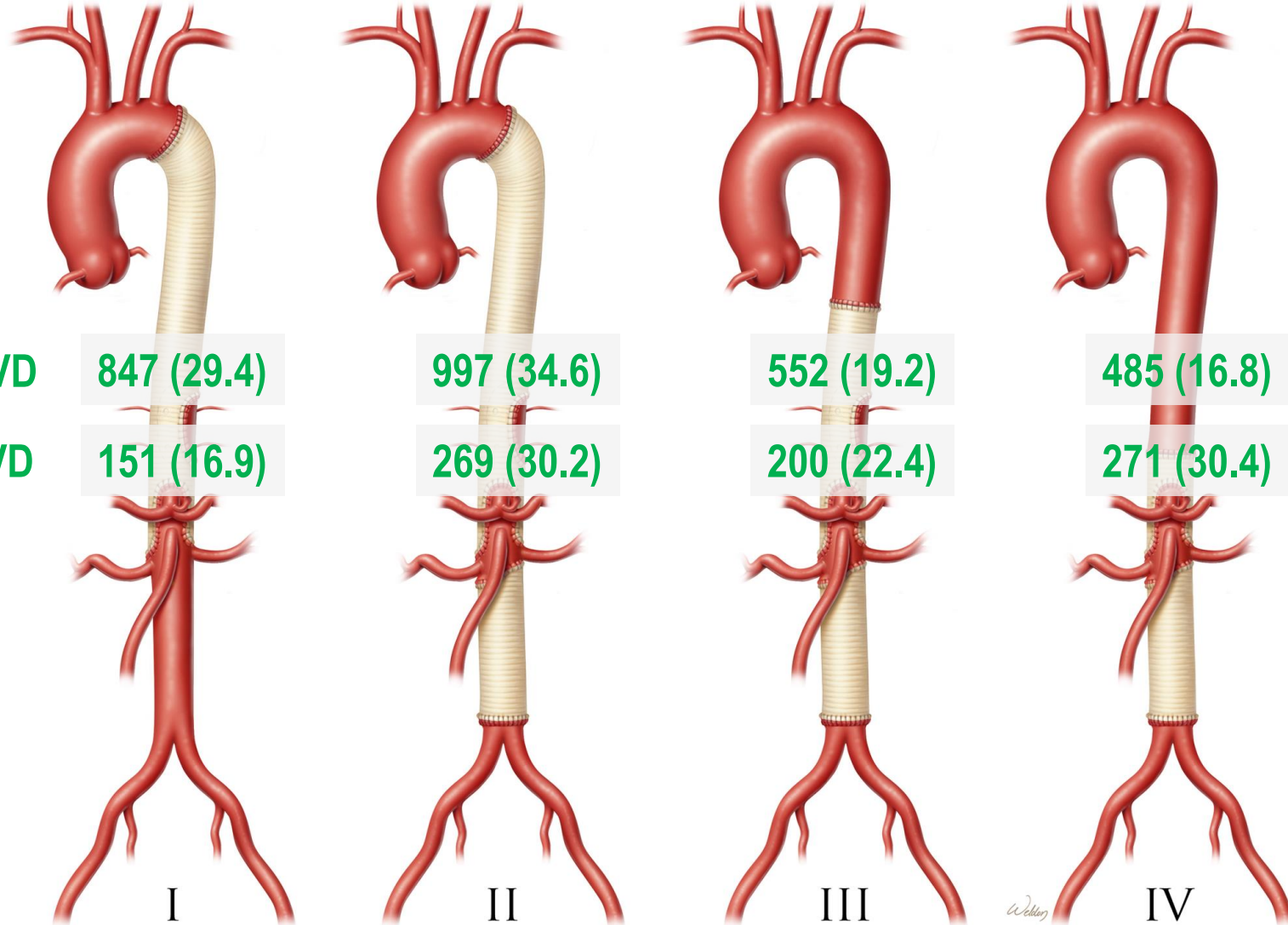
Preoperative Factors

- **No difference** in whether patients were **symptomatic** between the groups
- **Patients without PVD had more severe presentations of**
 - **Chronic aortic dissection**
 - **Rupture**

Variable	Without Peripheral Vascular Disease (n=2881)	With Peripheral Vascular Disease (n=891)	P value
Symptomatic	1859 (64.5)	557 (62.5)	.3
Chronic aortic dissection	1055 (36.6)	173 (19.4)	<.001
Rupture	198 (6.9)	35 (3.9)	.001

Values are n (%)

Operative Details By Extent



Patients without PVD:
More extent 1 repairs

P-value <.001

Patients with PVD:
More extent 4 repairs

P-value <.001

Operative Details

- Patients with PVD:
 - Higher rate of **elective** procedures
 - Increased management of visceral/ renal arteries via **endarterectomy, stenting, or bypass**
 - Underwent **cerebrospinal fluid drainage** more often
- Patients without PVD:
 - Increased **aortic clamp time**
 - More **segmental artery reattachment**

Variable	Without Peripheral Vascular Disease (n=2881)	With Peripheral Vascular Disease (n=891)	P value
Elective	2128 (73.9)	726 (81.5)	<.001
Reoperation	727 (25.2)	244 (27.4)	.2
Aortic clamp time, m	52 [39-69]	49 [38-64]	.01
Segmental artery reattachment	1559 (54.1)	370 (41.5)	<.001
Cerebrospinal fluid drainage	1371 (47.6)	472 (53.0)	.005
Endarterectomy, stenting, or bypass	1155 (40.1)	497 (55.8)	<.001
Endarterectomy	605 (21.0)	363 (40.7)	<.001
Stenting	169 (5.9)	147 (16.5)	<.001
Bypass	799 (27.7)	281 (31.5)	.03

Values are n (%) or median (Quartile 1, Quartile 3). Our approach to the use of surgical adjuncts varies by the extent of repair; we routinely use cerebrospinal fluid drainage in extent I and II TAAA repair; its use is selective in extents III and IV TAAA repair based on patient-specific factors that signal enhanced risk.

Early Outcomes

Variable	Without Peripheral Vascular Disease (n=2881)	With Peripheral Vascular Disease (n=891)	P value
Adverse event*	415 (14.4)	157 (17.6)	.02
Operative mortality	243 (8.4)	82 (9.2)	.5
Persistent stroke	59 (2.0)	32 (3.6)	.009
Spinal cord deficit	262 (9.1)	110 (12.3)	.004
Persistent paraparesis	55 (1.9)	23 (2.6)	.2
Persistent paraplegia	78 (2.7)	32 (3.6)	.2
Delayed paraplegia	61 (2.1)	30 (3.4)	.03
Pers. renal failure (dialysis)	178 (6.2)	59 (6.6)	.6
Length of hospital stay, d	12 [9-17]	12 [9-17]	.8

Values are n (%) or median (Quartile 1, Quartile 3). Spinal cord deficit includes both transient and persistent cases of paraplegia and paraparesis. *Composite variable.

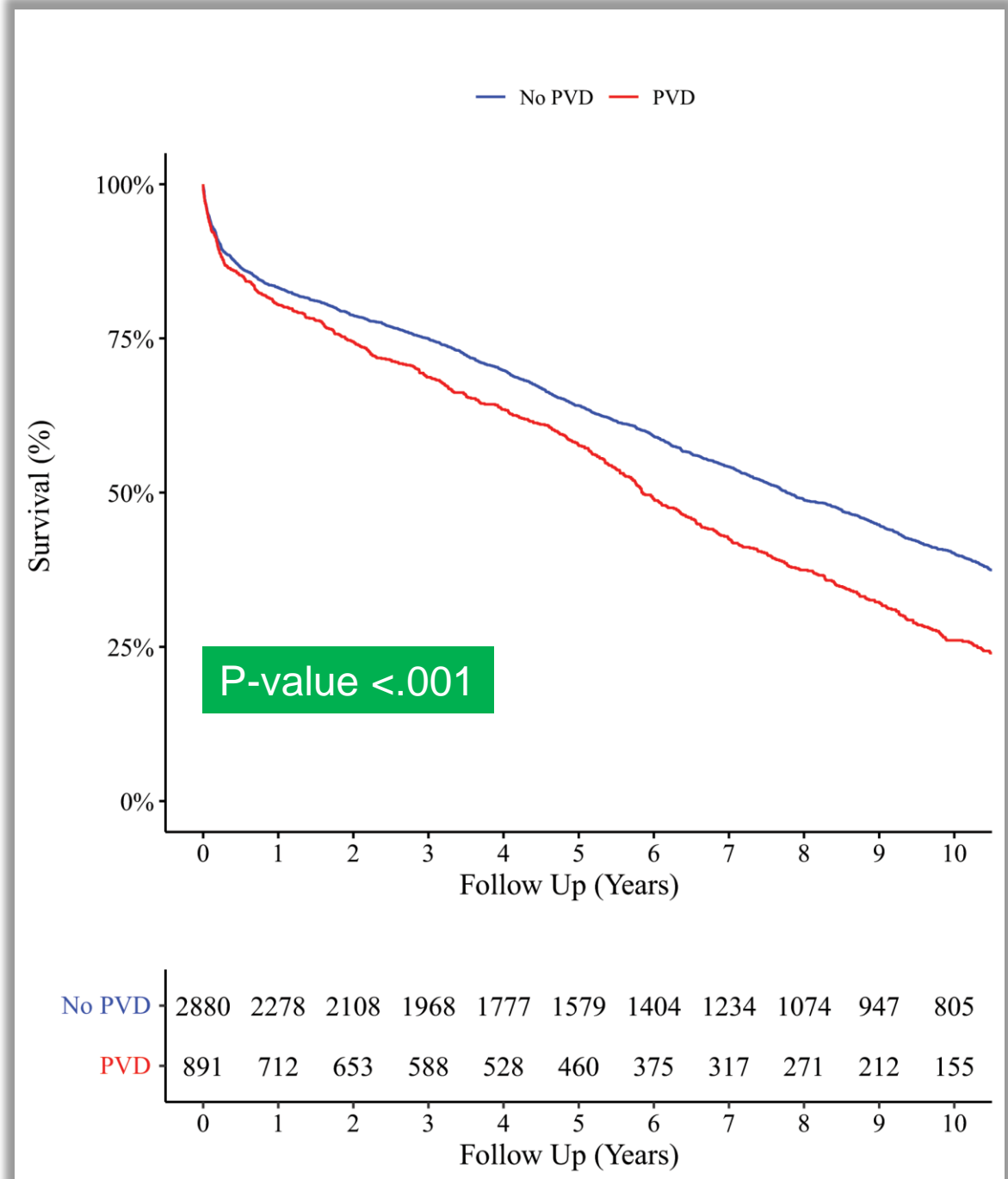
- Patients with PVD had a **higher rate of adverse event composite**
 - Higher rate of **persistent stroke**
 - Higher rate of **spinal cord deficit, much of which are transient deficits**
- There was **no difference in operative mortality** between patients with and without PVD

Late Outcomes

- There was a statistically significant difference in the survival curves for those with PVD compared to those without PVD
 - Patients **with PVD** had **diminished survival** during the follow up period

Time	Without Peripheral Vascular Disease (n=2881)	With Peripheral Vascular Disease (n=891)
1	83.2 ± 7.1	80.5 ± 1.3
5	64.1 ± 9.3	57.7 ± 1.7
10	40.1 ± 10.0	26.1 ± 1.6

Values are % estimates ± standard error



Conclusions

PVD is associated with less extensive repair of TAAA (ie, extent IV)

- Patients without PVD had a higher incidence of genetic disorder and chronic aortic dissection versus patients with PVD
- Patients with PVD had a higher incidence of atherosclerotic disease that commonly co-occurs with TAAA, as compared to those without
- Patients with PVD were less likely to present with symptoms or with rupture

PVD is associated with greater operative complexity in TAAA repair

- Surgeons managed visceral or renal arteries via endarterectomy, stenting, or bypass more often in those with PVD. Manipulation of these vessels during surgery may increase the risk of plaque disruption, embolization, or thrombosis, potentially causing adverse event such as stroke
- Cerebrospinal fluid drainage was used more often in patients with PVD despite fewer extent I repairs, implying the perceived risk is greater

PVD can contribute to more adverse events following TAAA repair

- Patients with PVD had higher rates of certain complications, particularly persistent stroke and spinal cord deficits
- Individuals with PVD may have a reduction in collateral circulation limiting the ability of the body to compensate for changes in blood flow during surgery
- PVD identification allows risk stratification and mitigation

Thank you!