Supplementary material

Polok K, Biccard BM, Chan MTV, et al. Mortality and major postoperative complications within 1 year after vascular surgery: a prospective cohort study. Pol Arch Intern Med. 2024; 134: 16645. doi:10.20452/pamw.16645

Table S1. Participating centres

CONTINENT	COUNTRY	NUMBER OF PATIENTS
Africa	South Africa	134
Asia	India	16
Asia	Hong Kong	97
Asia	Malaysia	5
Australia	Australia	74
Europe	France	239
Europe	Poland	865
Europe	Spain	146
Europe	UK	310
North America	Canada	468
North America	USA	123
South America	Brazil	107
South America	Colombia	52
South America	Peru	5

Table S2. Baseline characteristics of patients with available 30-day and 1-year follow-up.

Characteristics	Number of patients with available 30-day follow-up, (N=2630)	Number of patients with available 1-year follow-up, (N=2534)
Age, y; mean (SD)	68.2 (9.7)	68.2 (9.8)
45-54	235 (8.9%)	228 (9.0%)
55-64	718 (27.3%)	689 (27.2%)
65-74	928 (35.3%)	895 (35.3%)
75-84	648 (24.6%)	624 (24.6%)
≥85	101 (3.8%)	98 (3.9%)
Male sex	2040 (77.6%)	1960 (77.3%)
Body mass index, kg/m^2	25.8 (23.2 to 29.0)	25.8 (23.2 to 29.0)
Frailty	221 (8.5%)	215 (8.6%)
Comorbidities		
Coronary artery disease	1001 (38.1)	963 (38.0%)
Recent high-risk coronary artery disease	54 (2.1)	49 (1.9%)
Congestive heart failure	214 (8.1%)	204 (8.1%)
Previous DVT/PE	110 (4.2%)	104 (4.1%)
Previous cerebrovascular event	521 (19.8%)	507 (20.0%)
Atrial fibrillation	179 (6.8%)	170 (6.7%)
Hypertension	1986 (75.5%)	1912 (75.5%)
Peripheral vascular disease	1773 (67.4%)	1713 (67.6%)

Chronic obstructive pulmonary disease	697 (26.5%)	677 (26.7%)
Diabetes	675 (25.7%)	651 (25.7%)
Preoperative estimated glomerular filtration rate, mL/min/1.73 m^2		
>60 45-60 30-44 <30	1707 (69.6%) 376 (15.3%) 252 (10.3%) 116 (4.7%)	1653 (69.9%) 357 (15.1%) 244 (10.3%) 112 (4.7%)
Medications <24 hours prior to surgery		
Acetylsalicylic acid	750 (28.6%)	723 (28.6%)
ACE inhibitors	1084 (41.3%)	1064 (42.1%)
Beta-blockers	981 (37.4%)	943 (37.3%)
Statins	1679 (64.1%)	1621 (64.2%)
Medications <7 days prior to surgery		
Acetylsalicylic acid	1675 (63.8%)	1617 (63.9%)
ACE inhibitors	1459 (55.5%)	1410 (55.7%)
Beta-blockers	1072 (40.8%)	1029 (40.6%)
Statins	1943 (73.9%)	1869 (73.8%)
Type of anaesthesia General Neuraxial Others	 1551 (59.0%) 990 (37.7%) 84 (3.2%)	 1479 (58.5%) 966 (38.2%) 84 (3.3%)

Type of surgery Thoracic aorta reconstruction	78 (3.0%)	76 (3.0%)
Aorto-iliac reconstruction	643 (24.4%)	629 (24.8%)
Peripheral vascular reconstruction	1200 (45.6%)	1149 (45.3%)
Extracranial cerebrovascular surgery	433 (16.5%)	412 (16.3%)
Endovascular aortic repair	301 (11.4%)	293 (11.6%)
Urgent/emergent surgery	131 (5.0%)	130 (5.1%)

Footnote: Data are presented as n (%) unless otherwise indicated.

Abbreviations: ACE, angiotensin converting enzyme; DVT, deep vein thrombosis; PE, pulmonary embolism

* Number of patients with 2 types of vascular procedures = 23, Number of patients with 3 types of vascular procedures = 1.

Supplementary Table S3. The incidence of 30-day complications stratified by the type of vascular surgery.

Complication	Thoracic aorta repair (n=79)	Aorto-iliac reconstruction (n=645)	Peripheral vascular reconstruction without aortic cross-clamping (n=1206)	Extracranial cerebrovascular surgery (n=434)	EVAR (n=302)	All patients (n=2641)	Median time to event in the entire cohort; days (IQR)
MINS analysis	*n=79*	*n=645*	*n=1206*	*n=434*	*n=302*	*n=2641*	-
Complete 30-day follow-up	*n=78*	*n=643*	*n=1200*	*n=433*	*n=301*	*n=2630*	-
MINS	23 (29.1%)	204 (31.6%)	268 (22.2%)	67 (15.4%)	79 (26.2%)	**633 (24.0%)**	**2.0 (1.0 to 3.0)**
Sepsis	11 (14.1)	66 (10.3)	49 (4.1)	9 (2.1)	9 (3.1)	**140 (5.3)**	**6.0 (3.0 to 11.0)**

Infection without sepsis	7 (9.0)	39 (6.1)	85 (7.0)	5 (1.2)	18 (6.2)	**152 (5.8)**	**10.0 (5.0 to 19.0)**
AKI with dialysis	3 (3.8)	14 (2.2)	4 (0.3)	0 (0.0)	4 (1.4)	**25 (1.0)**	**3.0 (2.0 to 5.0)**
BIMS	29 (37.2)	305 (47.4)	259 (21.6)	30 (6.9)	52 (17.8)	**662 (25.2)**	**1.0 (1.0 to 1.0)**
New, clinically important atrial fibrillation	3 (3.8)	28 (4.4)	9 (0.7)	5 (1.2)	3 (1.0)	**47 (1.8)**	**3.0 (3.0 to 5.0)**
Death	5 (6.4)	32 (5.0)	28 (2.3)	7 (1.6)	3 (1.0)	**73 (2.8)**	**11.0 (7.0 to 18.0)**
Myocardial infarction	7 (9.0)	78 (12.1)	88 (7.3)	27 (6.2)	24 (8.2)	**223 (8.5)**	**1.0 (1.0 to 2.0)**
Non-fatal-cardiac arrest	1 (1.3)	7 (1.1)	3 (0.2)	1 (0.2)	0 (0.0)	**12 (0.5)**	**3.5 (1.0 to 4.25)**

Stroke	1 (1.3)	6 (0.9)	6 (0.5)	11 (2.5)	1 (0.3)	**25 (1.0)**	**4.0 (1.0 to 7.0)**
Congestive heart failure	3 (3.8)	25 (3.9)	10 (0.8)	5 (1.2)	4 (1.3)	**47 (1.8)**	**4.0 (2.5 to 6.5)**
Venous thromboembolism	1 (1.3)	6 (0.9)	7 (0.6)	1 (0.2)	1 (0.3)	**16 (0.6)**	**8.0 (3.75 to 18.0)**
Cardiac revascularisation	1 (1.3)	7 (1.1)	6 (0.5)	6 (1.4)	2 (0.7)	**22 (0.8)**	**10.0 (8.0 to 16.0)**
Amputation	1 (1.3)	6 (0.9)	75 (6.2)	0 (0.0)	0 (0.0)	**81 (3.1)**	**11.0 (7.0 to 18.0)**

Footnote: Frequency is presented as n (%) and time to event as median (interquartile range). MINS rate pertains to the entire cohort. The frequency of 30-day complications is described in patients with available 30-day follow-up (n=2630). Number of patients with 2 types of vascular procedures = 23, Number of patients with 3 types of vascular procedures = 1.

Abbreviations: AKI, acute kidney injury; BIMS, bleeding independently associated with mortality after noncardiac surgery; EVAR, endovascular aortic repair; MINS, myocardial injury after noncardiac surgery.

Supplementary Table S4. Troponin assays and their association with MINS incidence

Troponin assay	Number of centres	Number of patients	MINS incidence
hsTnT	12	1510	342 (22.6%)
Both hsTnT and non-hsTnT	8	662	165 (24.9%)
non-hsTnT	8	469	126 (26.9%)

Supplementary Appendix 1. Outcomes definitions

1. Mortality – All cause mortality.

2. Bleeding independently associated with mortality after noncardiac surgery (BIMS) was defined as bleeding that resulted in a drop in hemoglobin to <70 g/L, transfusion of ≥1 unit of packed red blood cells, or death.

3. Myocardial injury after non-cardiac surgery (MINS) was defined differently depending on troponin assay:

a) In patients who had a 4th generation Troponin T measurement, the diagnostic criteria for MINS were an elevated postoperative Troponin T (i.e., ≥30 ng/L) judged as resulting from myocardial ischemia (i.e., no evidence of a non-ischemic etiology causing the troponin elevation), without the requirement of an ischemic feature (i.e., ischemic symptom, ischemic electrocardiography finding, new or presumed new wall motion abnormality on echocardiography, or new or presumed new fixed defect on radionuclide imaging).

b) In patients who had a 5th generation Troponin T an elevated postoperative hsTnT (20 to <65 ng/L with an absolute change ≥5 ng/L or an hsTnT ≥65 ng/L) judged as resulting from myocardial ischemia, without the requirement of an ischemic feature.

4. Myocardial infarction was defined according to the Third Universal Definition of Myocardial Infarction. The diagnosis of myocardial infarction required any one of the following criterion:

1. A typical rise of troponin or a typical fall of an elevated troponin detected at its peak post surgery in a patient without a documented alternative explanation for an elevated troponin (e.g., pulmonary embolism). This criterion also requires that 1 of the following must also exist:

A. ischemic signs or symptoms (i.e., chest, arm, neck or jaw discomfort; shortness of breath; pulmonary edema)

B. development of pathologic Q waves present in any two contiguous leads that are ≥ 30 milliseconds

C. ECG changes indicative of ischemia (i.e., ST segment elevation [≥ 2 mm in leads V1, V2, or V3 OR ≥ 1 mm in the other leads], ST segment depression

[≥ 1 mm], or symmetric inversion of T waves ≥ 1 mm) in at least two contiguous leads

D. coronary artery intervention (i.e., PCI or CABG surgery)

E. new or presumed new cardiac wall motion abnormality on echocardiography or new or presumed new fixed defect on radionuclide imaging

2. Pathologic findings of an acute or healing myocardial infarction

3. Development of new pathological Q waves on an ECG if troponin levels were not obtained or were obtained at times that could have missed the clinical event

5. Sepsis was defined as a clinical syndrome defined by the presence of both infection and a systemic inflammatory response. Systemic inflammatory response required ≥2 of the following factors: core temperature >38º C or <36º C; heart rate >90 beats per minute; respiratory rate >20 breaths per minute; white blood cell count >12 x 10^9/L or <4 x 10^9/L.

6. Infection without sepsis was defined as a pathologic process caused by the invasion of normally sterile tissue or fluid or body cavity by pathogenic or potentially pathogenic organisms. Infection without sepsis had to fulfill the definition of infection without fulfilling the definition of sepsis.

7. Stroke was defined as a new focal neurological deficit thought to be vascular in origin with signs and symptoms lasting >24 hours.

8. Venous thromboembolism was a composite of deep venous thrombosis and pulmonary embolism. Deep venous thrombosis of the leg or arm – The diagnosis of deep venous thrombosis required any one of the following:

i. a persistent intraluminal filling defect on contrast venography;

ii. non-compressibility of one or more venous segments on B mode compression ultrasonography; or

iii. a clearly defined intraluminal filling defect on contrast enhanced CT.

Pulmonary embolus – The diagnosis of pulmonary embolus required any one of the following:

i. a high probability ventilation/perfusion lung scan;

ii. an intraluminal filling defect of a segmental or larger artery on a helical computed tomography (CT) scan;

iii. an intraluminal filling defect on pulmonary angiography; or

iv. a positive diagnostic test for deep venous thrombosis (e.g., positive compression ultrasound) and one of the following: non-diagnostic (i.e., low or intermediate probability) ventilation/perfusion lung scan, or a non-diagnostic (i.e., subsegmental defects or technically inadequate study) helical CT scan.

9. Congestive heart failure was defined as a presence of at least one of the following clinical signs (i.e., an elevated jugular venous pressure, respiratory rales/crackles, crepitations, or presence of S3) and at least one of the following radiographic findings (i.e., vascular redistribution, interstitial pulmonary edema, or frank alveolar pulmonary edema). **Note from the Authors:** This definition pertains to both acute and acute on chronic congestive heart failure.

10. New clinically important atrial fibrillation was defined as new atrial fibrillation that resulted in angina, congestive heart failure, symptomatic hypotension, or that required treatment with a rate controlling drug, antiarrhythmic drug, or electrical cardioversion.

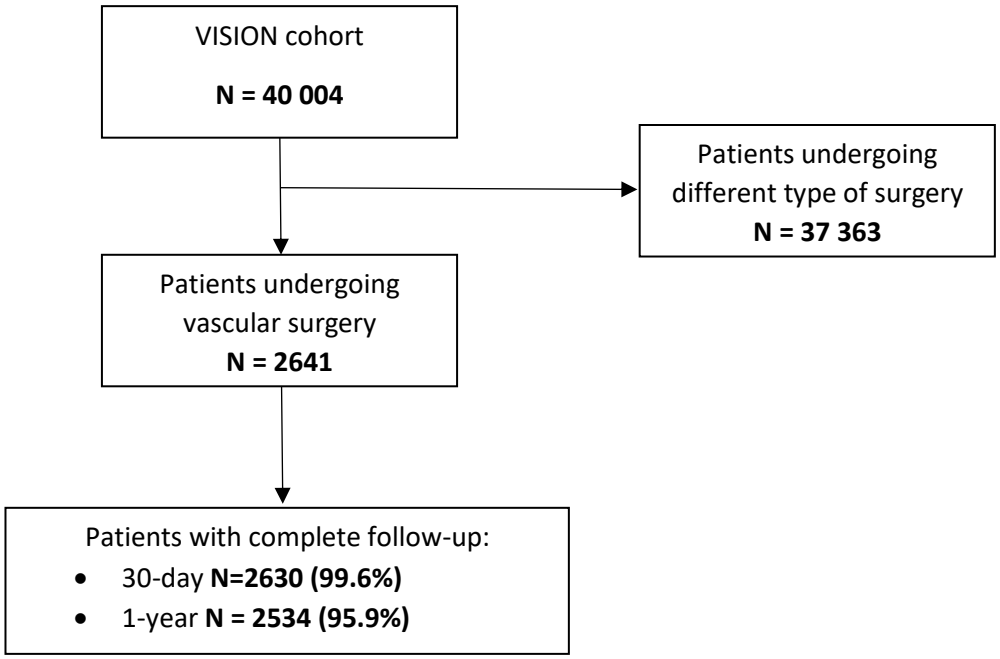
11. Acute kidney injury with new dialysis was defined as an acute kidney injury that resulted in new dialysis defined as the use of a hemodialysis machine or peritoneal dialysis apparatus.

12. Nonfatal cardiac arrest was defined as successful resuscitation from either documented or presumed ventricular fibrillation, sustained ventricular tachycardia, asystole, or pulseless electrical activity requiring cardiopulmonary resuscitation, pharmacological therapy, or cardiac defibrillation.

13. Amputation surgery referred to an amputation procedure subsequent to initial surgery

14. Cardiac revascularization was defined as a percutaneous coronary intervention or coronary artery bypass graft surgery procedures subsequent to initial surgery

Figure S1. Study flow-chart



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