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GERMAN AORTIC CENTER HAMBURG

How Does The ASA-Score And Sarcopenia Influence SCI Risk After Endovascular TAAA repair?

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VEITH SYMPOSIUM Connecting The Vascular Community 51st

Tuesday – Saturday, November 19-23, 2024

Disclosures

- Consultant: Cook Medical, Philips, Getinge, Terumo Aortic, Arterica
- Research-grants: Cook Medical, Philips, Terumo Aortic, Medtronic
- Travel-grants: Cook Medical, Getinge, Philips
- Speaking fees: Cook Medical, Philips, Getinge
- Shares: Mokita-Medical, Arterica
- IP: Cook Medical, Terumo Aortic, Mokita Medical
- Royalties: Cook Medical, Terumo Aortic
- Devices and Techniques in this presentation are not approved by the FDA

SCI in Complex Endovascular Aortic Repair

Extended coverage (TAAA I-IV):

- All SCI: 4.5 - 20.5%
- Grade 3 SCI (Paraplegia): 2.0-2.9%
- Permanent Grade 3: 1.5%
- Elective vs. Urgent: No significant difference

Locatelli, et al. J Vasc Surg. 2023; 78:883-91.
Nana, et al. 2024; J Vasc Surg. 2024;79:457-68.e2.
Abdelhalim, et al. J Vasc Surg. 2023; 78:854-62.

Risk Factors For SCI

- Extend of aortic coverage
- Intraoperative blood loss
- Early and later experience
- Sarcopenia
- Degenerative aneurysms
- Persistent neuromonitoring changes

Bisdas, et al. J Vasc Surg. 2015;61:1408-16.
Spanos, et al. J Vasc Surg. 2019;69:357-66.
Tenorio, et al. 2021; Ann Surg. 2021;276:1028-34.
Nana, et al. Eur J Vasc Endovasc Surg. 2023;65:503-12.
Potter, et al. J Vasc Surg. 2024;80:656-64

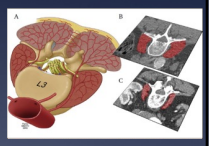
Sarcopenia Definition

- Progressive and generalized skeletal muscle disorder
- More common among older adults
- Low muscle quality and quantity
- Severe sarcopenia → poor physical performance
- Associated with falls, fractures, mortality

Kirk, et al. Age Ageing. 2024;48:16-31
Cruz-Jentoft, et al. Age Ageing. 2024;48:16-31

Detection Of Sarcopenia

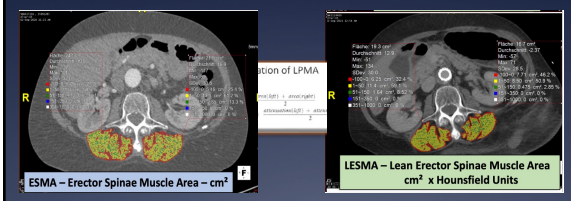
- Questionnaires (SARC-F)
- Physical tests (grip strength, Chair stand test)
- Imaging studies [Dual-energy X-ray Absorptiometry (DXA) or Bioelectrical Impendance Analysis (BIA)]



- Lumbar muscle cross-sectional area by CT or MRI

Cruz-Jentoft, et al. Age Ageing. 2019;48:16-31

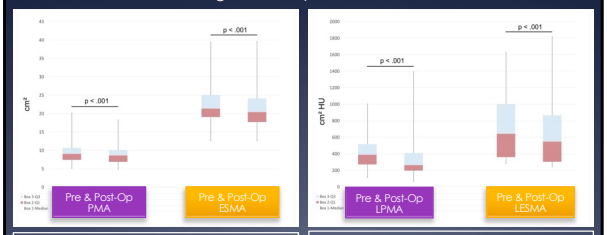
Psoas & Erector Spinae Muscle Area



Kärkkäinen, et al.J Vasc Surg. 2021;73:1178-88
Enzmann, et al. J Vasc Surg. 2024;Under Review.

Muscle Loss After F/BEVAR

Hamburg Data: 103 patients with TAAA



PMA & ESMA decreased after F/BEVAR (p<.001)

LPMA & LESMA decreased after F/BEVAR (p<.001)

Enzmann, et al. J Vasc Surg. 2024. Under Review.

Sarcopenia & Complex Aortic Repair

Metanalysis including 1 092 patients managed [illegible] epair

- Preoperative sarcopenia did n[illegible]
- Significantly higher 1[illegible] patients (25% vs 13%)

• Heterogenic sarcopenia definitions
• Different cut-off values

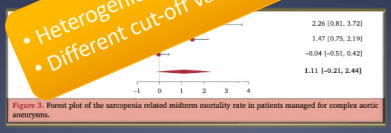


Figure 3. Forest plot of the sarcopenia related midterm mortality rate in patients managed for complex aortic aneurysms.

Nana et al. 2023; Eur J Vasc Endovasc Surg 65:503-12

Sarcopenia & SCI

- Retrospective study of 257 F/BEVAR patients
  - Total Psoas Muscle Area associated with 30-day SCI

Alenezi, et al. Carciovasc Interv Radiol. 2021;44:376-83.

- Metanalysis with mixed population (F/BEVAR and OSR)
  - SCI higher in sarcopenic patients (19% vs. 7%) independent of TAAA extend

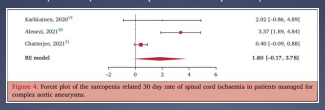


Figure 4. Forest plot of the sarcopenia related 30 day rate of spinal cord ischaemia in patients managed for complex aortic aneurysms.

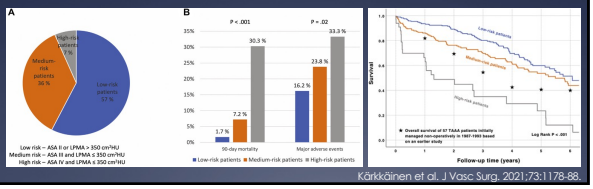
Nana et al. 2023; Eur J Vasc Endovasc Surg 65:503-12

Sarcopenia & ASA As Predictors Of Mortality

Psoas muscle area and attenuation are highly predictive of complications and mortality after complex endovascular aortic repair

Jussi M. Kärkkäinen, MD, PhD,[1,2] Gustavo S. Oderich, MD,[1] Emanuel R. Tenorio, MD, PhD,[1] Kavuru Pather, MD,[1] Niku Oksala, MD, PhD, DSc(med),[3,4] Thanila A. Macedo, MD,[1] Terri Vrtiska, MD,[1] Barend Mees, MD, PhD,[5] and Michael J. Jacobs, MD, PhD[5,6] *Rochester, Minn; Kuopio and Tampere, Finland; Houston, Tex; Maastricht, The Netherlands; and Aachen, Germany*

- Single center 2007-2019; n=504
- F/BEVAR for pAAA & TAAA
- LPMA& ASA combined risk groups



Kärkkäinen et al. J Vasc Surg. 2021;73:1178-88.

Sarcopenia & ASA As Predictors Of SCI

The Association of Sarcopenia and ASA Score to Spinal Cord Ischemia in Patients Treated With the t-Branch Device

Tilo Kölbel, PhD[1], Petroula Nana, PhD[1], Jose I. Torrealba, MD[1], Giuseppe Panuccio, MD[1], Christian-Alexander Behrendt, MD[1], and Konstantinos Spanos, PhD[1,2]

- Single center 2018-2020; n=80
- TAAA: 72.5%
- TAAA I-III: 42.5%
- Urgent repair 46%
- Mortality (30d) 14%
- SCI (grade 1-3) 15%

Table 1. Baseline Characteristics, Including Thoracoabdominal Aneurysm Stratification and Associated Comorbidities.

Patients' characteristics	Value
Age	71
Male	50
Aneurysm diameter (mm)	68.6±16.0
Aneurysm type	
Thoracoabdominal	58
Type I	9
Type II	16
Type III	9
Type IV	17
Type V	7
Para-/juxtarenal	22
Ischemic heart disease	25
Hypertension	65
Dyslipidemia	19
Smoking	29
Chronic obstructive pulmonary disease	20
Diabetes mellitus type II	6
PAD	3
CVD	4
Chronic kidney disease	24
Previous aortic intervention	36
Body mass index (kg/m²)	25.7
Psoas muscle area (cm²)	7.9±2.8
Psoas muscle attenuation (HU)	34.3±11.6
LPMA (cm²/HU)	271.7±143.0

Kölbel, et al. J Endovasc Ther. 2023; Online ahead of print.

Patient Stratification

A

Group 1 (n=18):
LPMA > 350cm²HU

Group 2(n=35):
LPMA 200-350cm²HU

LPMA

Group 3(n=27):
LPMA < 200cm²HU

Kölbel, et al. J Endovasc Ther. 2023; Online ahead of print.

LPMA As Predictor Of SCI

A

LPMA stratification	Group 1 (n=18)	Group 2 (35)	Group 3 (n=27)	P <.05
Baseline characteristics				
Age	64.3	72.1	75.5	0.02
BMI	26.4	25.7	24.5	0.6
Male sex	17	26	11	0.001
Aneurysm diameter	6.8	6.6	7.1	0.68
Medical History				
Ischemic heart disease	5	9	11	0.45
Hypertension	14	29	22	0.78
Dyslipidemia	5	8	6	0.9
Tobacco use	6	13	9	0.9
Diabetes type II	0	5	6	0.12
Chronic kidney disease	3	13	8	0.34
Peripheral arterial disease	4	4	1	0.15
Previous aortic intervention	9	14	13	0.78
Early main outcomes				
Mortality	2	2	8	0.32
SCI	1	5	6	0.28

Kölbel, et al. J Endovasc Ther. 2023; Online ahead of print.

B LPMA & ASA As Predictor Of SCI

Patients' risk classification with ASA-LPMA	Low (28)	Medium (16)	High (36)	P Value (<.05)
Age	67.1±2	72.1±8	73.5±6	0.04
BMI	26.3±4	24.2±4	25.5±5	0.33
Sex	24	10	16	0.003
Spinal drainage	19	10	25	0.88
Early outcomes				
Mortality	3	2	7	0.59
SCI	1	2	9	0.049

- *SCI: 3.5% low vs. 12.5% moderate vs. 25% high (p=.049)*
- *Multivariate: moderate risk group related to SCI (p=.04)*

Kölbel, et al. J Endovasc Ther. 2023; Online ahead of print.

Summary

- Patients with ASA score I-II or LPMA > 350cm²HU, are at low risk for SCI after BEVAR with t-Branch
- Combination of ASA & LPMA may identify a higher risk group for SCI
- Further data needed