## CORRESPONDENCE

### Re. "Effect of Low Skeletal Muscle Mass on Post-operative Survival of Patients With Abdominal Aortic Aneurysm: A Prognostic Factor Review and Meta-Analysis of Time to Event Data"

Antoniou *et al*. are to be commended for drawing together the results of the current literature on the potential role of sarcopenia following abdominal aortic aneurysm (AAA) repair.[1] They analysed the effects of low skeletal muscle mass (SMM) on outcomes after elective open and endovascular AAA repair.

Several methodological challenges were highlighted in the paper; however, attempts to address these were limited. The authors derived hazard ratios from survival curves or log rank tests for meta-analysis. Therefore, the results were unable to be adjusted for confounding variables, specifically age, sex, and height, which have been shown to influence both muscle mass and outcomes after AAA repair.

Similar to previous findings, the meta-analysis found that those with low SMM were significantly older.[1–3] Therefore, the conclusions derived may reflect an older cohort and should not be generalised. SMM has also been shown to be lower in women, who incidentally, have a higher mortality after AAA repair. However, only three studies included in the analyses stratified groups according to sex.[3–5] This may have resulted in a higher proportion of women in the low SMM group, which raises further questions about the generalisability of the conclusions reached. Furthermore, the heterogeneity in the standardisation of measurements, namely by height, of SMM has also not been addressed. It remains ambiguous whether there is a need to standardise measurements as opposing results were reported by studies using standardised and non-standardised measurements of SMM.[3,6,7] Acquiring data sets from the respective authors and performing a uniform analysis to minimise methodological variations would have enabled meaningful interpretation of heterogenous data.

The apparent reduced survival with low SMM may be explained by these methodological limitations; therefore, the results should be interpreted with caution.

### REFERENCES


1 Antoniou GA, Rojoa D, Antoniou SA, Alfahad A, Torella F, Juszczak MT. Effect of low skeletal muscle mass on post-operative survival of patients with abdominal aortic aneurysm: a prognostic factor review and meta-analysis of time-to-event data. *Eur J Vasc Endovasc Surg* 2019;**58**:190–8.

2 Lo RC, Schermerhorn ML. Abdominal aortic aneurysms in women. *J Vasc Surg* 2016;**63**:839–44.

3 Waduud MA, Wood B, Keleabetswe P, Manning J, Linton E, Drozd M, et al. Influence of psoas muscle area on mortality following elective abdominal aortic aneurysm repair. *Br J Surg* 2019;**106**:367–74.

4 Drudi LM, Phung K, Ades M, Zuckerman J, Mullie L, Steinmetz OK, et al. Psoas muscle area predicts all-cause mortality after endovascular and open aortic aneurysm repair. *Eur J Vasc Endovasc Surg* 2016;**52**:764–9.

5 Hale AL, Twomey K, Ewing JA, Langan EM, Cull DL, Gray BH. Impact of sarcopenia on long-term mortality following endovascular aneurysm repair. *Vasc Med* 2016;**21**:217–22.

6 Indrakusuma R, Zijlmans JL, Jalalzadeh H, Planken RN, Balm R, Koelemay MJW. Psoas muscle area as a prognostic factor for survival in patients with an asymptomatic infrarenal abdominal aortic aneurysm: a retrospective cohort study. *Eur J Vasc Endovasc Surg* 2017;**55**:83–91.

7 Lee JS-J, He K, Harbaugh CM, Schaubel DE, Sonnenday CJ, Wang SC, et al. Frailty, core muscle size, and mortality in patients undergoing open abdominal aortic aneurysm repair. *J Vasc Surg* 2011;**53**:912–7.



Alexander D. Jones*
*The Leeds Vascular Institute, Leeds General Infirmary, Leeds, UK*

Mohammed A. Waduud
*The Leeds Vascular Institute, Leeds General Infirmary, Leeds, UK*
*The Leeds Institute of Cardiovascular and Metabolic Medicine, School of Medicine, University of Leeds, Leeds, UK*

*Corresponding author. The Leeds Vascular Institute, Leeds General Infirmary, Great George Street, Leeds LS1 3EX, UK.
*Email-address:* alexander.jones9@nhs.net (Alexander D. Jones)


Available online 30 August 2019



https://doi.org/10.1016/j.ejvs.2019.07.037
DOI of original article: https://doi.org/10.1016/j.ejvs.2019.03.020

---

### Understanding Sarcopenia: 10 Types of People

"There are only 10 types of people in the world: those who understand binary, and those who don't."
Mathematical joke

Thank you for the opportunity to respond to the letter by Jones and Waduud. Our colleagues made some excellent points that we would like to respond to and comment on. It seems that the problem is conceptual rather than methodological.

Firstly, we would like to emphasise that our goal was to assess the skeletal muscle mass (or a surrogate marker thereof), not sarcopenia, as a prognostic factor.[1] We tried to be consistent with correct terminology despite source

papers using the term "sarcopenia" interchangeably with low skeletal muscle mass. Sarcopenia is an age related loss of skeletal muscle mass and function. It is recognised now as a disease and has its own International Classification of Diseases-10 code. It is not an equivalent of the radiologically measured surrogates of the muscle mass. Low skeletal muscle mass on the other hand is an essential component not only of sarcopenia, but also cachexia associated with chronic disease or cancer. This implies that not every patient with low muscle mass is strictly sarcopenic.

Several thresholds for low radiologically assessed skeletal muscle mass have been published, often based on relatively small cohorts not allowing for generalisation of findings.[2,3] We agree with Jones and Waduud that since muscle mass in healthy subjects correlates with age and sex (and also ethnicity), it would be very difficult to apply these thresholds if these factors are not accounted for. It is also strange that height adjustment is used in many papers. The European Working Group on Sarcopenia in Older People (EWGSOP) does not make any recommendations on adjustment for body size.[4] Derstine *et al*.[5] published cut off values for both height adjusted and non-adjusted low muscle mass and both can probably be used interchangeably. We postulate that sex, age, and ethnicity adjusted cut offs would be far more useful.

Secondly, retrospective analyses of patients treated for aneurysmal disease are tainted with a significant selection bias. It is therefore quite possible that together with inadequate assessment/adjustment of skeletal muscle mass, this factor is also responsible for the variable effect of low skeletal muscle mass on outcomes.

In an attempt to circumvent such constraints, we applied random effects models of meta-analysis and performed sensitivity and subgroup analyses, which did not demonstrate significant differences in effect estimates. Unfortunately, the reports do not present coefficients from Cox proportion hazards regression models, so that Cox hazard ratios adjusted for common confounders can be put in inverse variance meta-analysis models. Meta-analysis of individual patient instead of aggregate data in prognosis research would provide a way of baseline (prognostic) factors being adjusted for consistently across studies, prognostic models being generated and validated, and multiple individual level factors being examined in combination.[6]

Our meta-analysis based on the available evidence cannot give definite answers. However, it can inform researchers of developments and assists in designing future research. We fully support Jones and Waduud's conclusion that presented results should be interpreted with caution.

## REFERENCES


1 Antoniou GA, Rojoa D, Antoniou SA, Alfahad A, Torella F, Juszczak MT. Effect of low skeletal muscle mass on post-operative survival of patients with abdominal aortic aneurysm: a prognostic factor review and meta-Analysis of time-to-event data. *Eur J Vasc Endovasc Surg* 2019;**58**:190–8.

2 Hamaguchi Y, Kaido T, Okumura S, Kobayashi A, Shirai H, Yao S, et al. Proposal for new selection criteria considering pre-transplant muscularity and visceral adiposity in living donor liver transplantation. *J Cachexia Sarcopenia Muscle* 2018;**9**:246–54.

3 Jones KI, Doleman B, Scott S, Lund JN, Williams JP. Simple psoas cross-sectional area measurement is a quick and easy method to assess sarcopenia and predicts major surgical complications. *Colorectal Dis* 2015;**17**:O20–6.

4 Cruz-Jentoft AJ, Bahat G, Bauer J, Boirie Y, Bruyère O, Cederholm T, et al. Writing Group for the European working Group on sarcopenia in older people 2 (EWGSOP2), and the Extended Group for EWGSOP2. Sarcopenia: revised European consensus on definition and diagnosis. *Age Ageing* 2019;**48**:16–31.

5 Derstine BA, Holcombe SA, Ross BE, Wang NC, Su GL, Wang SC. Skeletal muscle cutoff values for sarcopenia diagnosis using T10 to L5 measurements in a healthy US population. *Sci Rep* 2018;**8**:11369.

6 Riley RD, Lambert PC, Abo-Zaid G. Meta-analysis of individual participant data: rationale, conduct, and reporting. *BMJ* 2010;**340**:c221.



Maciej T. Juszczak
*Birmingham Complex Aortic Team, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK*

Francesco Torella
*Liverpool Vascular & Endovascular Service, Liverpool, UK*
*School of Physical Sciences, University of Liverpool, UK*
*Liverpool Cardiovascular Service, Liverpool, UK*

George A. Antoniou*
*Department of Vascular & Endovascular Surgery, The Royal Oldham Hospital, Pennine Acute Hospitals NHS Trust, Manchester, UK*
*Division of Cardiovascular Sciences, School of Medical Sciences, University of Manchester, Manchester, United Kingdom*

*Corresponding author. Surgical Offices, Phase 1, The Royal Oldham Hospital, Rochdale Road, Oldham OL1 2JH, UK.
*Email-addresses:* antoniou.ga@hotmail.com, Georgios.Antoniou@pat.nhs.uk (George A. Antoniou)


Available online 6 September 2019



https://doi.org/10.1016/j.ejvs.2019.07.038

---

## Endovenous Thermal Ablation for Incompetent Saphenous Veins With an Aneurysm Close to the Junction: Useful or Not?

We were interested to read the article by Hamann et al., entitled "Safety and effectiveness of endovenous thermal ablation for incompetent saphenous veins with an aneurysm close to the junction".[1] However, we have some questions.

Firstly, there were possibly insufficient numbers, and high ligation was included in the treatment, which makes the advantages and results of radiofrequency therapy in such patients questionable. One report by Harlander-Locke *et al*. pointed out that for larger diameter veins, radiofrequency