

2022 Best Research Poster Award



Psoas muscle density is a simple and effective marker of general surgery risk:

A meta-analysis

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INTRODUCTION

A simple and effective approach to assessing patients' surgical risk is required to reduce harm from surgical under- and over-treatment.

Sarcopenia describes a progressive and generalised loss of muscle mass with age.

A number of systematic reviews have demonstrated an association between sarcopenia and general surgical complications and mortality.

Different approaches to measuring sarcopenia are reported in the literature.

- Psoas muscle density (PMD) and psoas muscle area (PMA; which is often indexed to the patient's height-squared; PMA/H²) are based on the density and area of the psoas muscle at the L3 spinal level.
- Total skeletal muscle density (SMD) and indexed total skeletal muscle area (SMA/H²) are based on the density and area of the total skeletal muscle cross-section at the L3 spinal level.
- SMD and SMA/H² are more difficult and time consuming measures to make than PMD or PMA/H².

Prior research has not examined which approach to measuring sarcopenia is the simplest and most effective predictor of surgical outcomes.

Identifying the simplest and most effective sarcopenia measurement required to generate quality prognostic information would allow sarcopenia measures to be used effectively in surgical risk assessments.

Aim

To identify which radiological sarcopenia measurement correlates most closely with general surgical morbidity and mortality.

METHOD

- PubMed (including Medline) were searched on 25/8/2020
- Search terms were: 'Sarcopenia' AND ('General Surgery' OR 'Abdominal Surgery')
- Inclusion criteria included: presenting the no. patients assessed for sarcopenia, no. with sarcopenia, the sarcopenia measurement used, type of surgery, no. complications and deaths (for sarcopenic and non-sarcopenic patients)
- 50 papers were included, data was extracted and pooled according to surgical outcome and sarcopenia measurement type
- Odds ratios (OR) with 95% confidence intervals (95%CI) were calculated for each study to describe the odds of sarcopenic patients experiencing complications or mortality, compared to non-sarcopenic patients
- Data was pooled to determine which approach to measuring sarcopenia correlated most strongly with major complications and mortality
- Funnel plots were used to check for publication bias
- Heterogeneity was addressed using random effects models, as well as sub-set analyses to better understand the sources of heterogeneity.

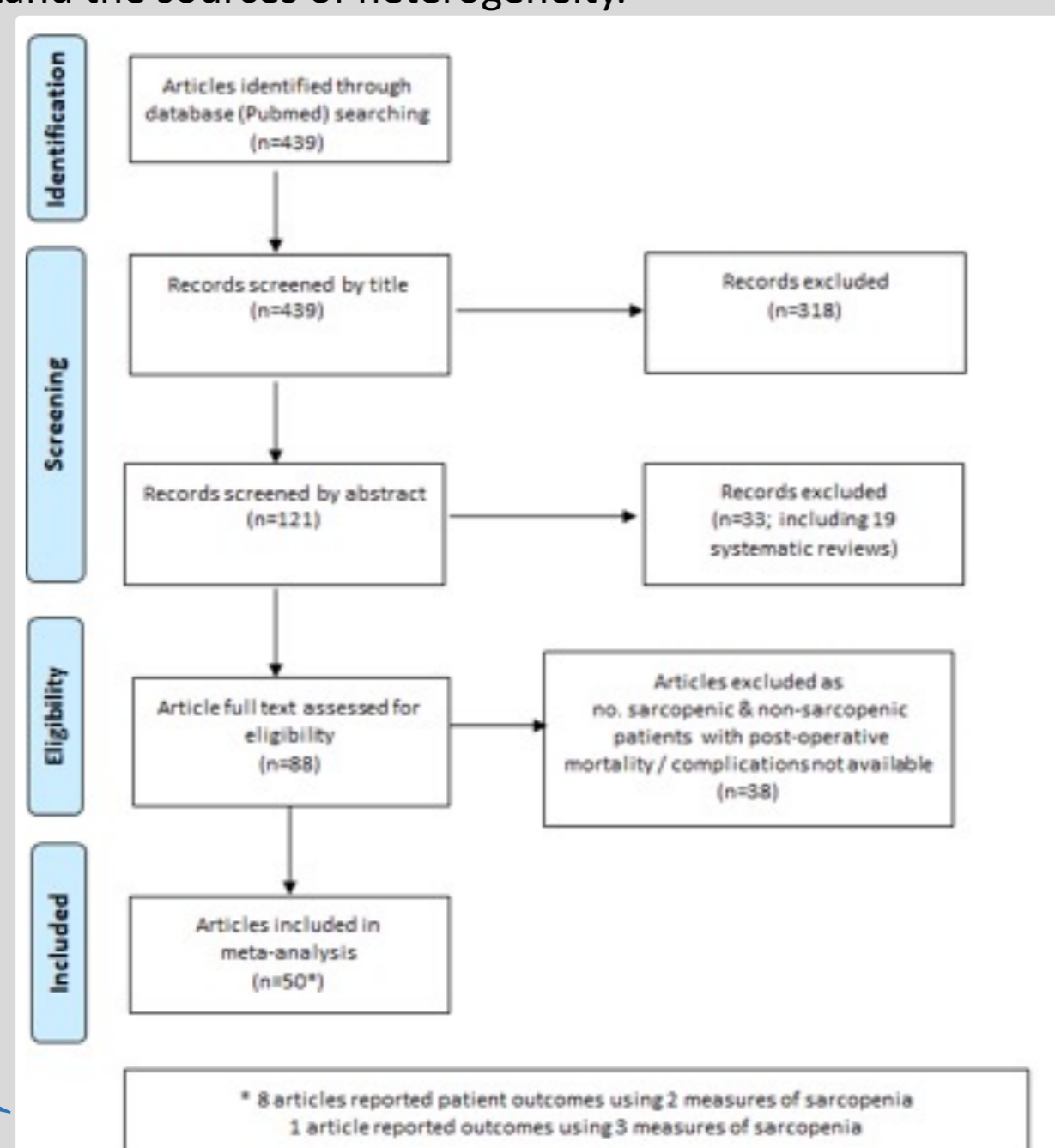


Fig. 1. PRISMA diagram showing how the article inclusion and exclusion criteria were applied

RESULTS

- Sarcopenia was strongly correlated with post-operative mortality (OR:3.6, 95%CI 2.7-4.9) and major complications (OR:1.4, 95%CI 1.1-1.9).
- Separating the sarcopenia measures by type revealed that PMD was the strongest predictor of mortality (OR:9.5, 95%CI 2.7-4.9) and major complications (OR:3.7, 95%CI 1.8-7.9).
- PMA indexed to patient height-squared (H²) was also correlated with mortality and major complications, but the effect sizes were smaller.
- Total skeletal muscle area-based measures (SMD and SMA/H²) demonstrated a small correlation with mortality and no correlation with major complications (p<0.05).

	Mortality OR (95% CI)	Major complications OR (95% CI)
All sarcopenia measures	3.6 (2.7 – 4.9)	1.4 (1.1-1.9)
PMD	9.5 (4.4-20.6)	3.7 (1.8-7.9)
PMA/H ²	4.2 (2.6-6.7)	1.9 (1.1-3.4)
SMD	2.8 (1.1-7.5)	1.2 (0.7-1.96)
SMA/H ²	2.6 (1.6-4.1)	1.1 (0.7-1.6)

Table 1. The relationship between sarcopenia measured using different approaches and post-operative patient outcomes. Bold typeface indicates statistical significance

DISCUSSION

PMD is the simplest approach to measuring sarcopenia. This meta-analysis suggests PMD also has the largest effect size when predicting mortality and major complications following general surgical operations.

PMA/H² also correlated with mortality and major complications, however with smaller effect sizes than PMD.

SMD and SMA/H² are more complex measurements to make. SMD and SMA/H² both had a significant relationship to mortality, however with a smaller effect size than PMD or PMA/H². SMD and SMA/H² did not demonstrate a statistically significant correlation to major complications.

CONCLUSIONS & SIGNIFICANCE

There is a clear link between sarcopenia and mortality and major complications following general surgery

Assessing sarcopenia using PMD provided the strongest prognostic information both when predicting mortality and major complications. PMD is also the simplest of the sarcopenia measurements to make. These results suggest it is also the most effective.

Further research investigating how sarcopenia measured using PMD correlates with surgical outcomes across different surgical cohorts, with different demographic features and co-morbidities is needed.