2022 Best Research Poster Award

Barwon Health

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Psoas muscle density is a simple and effective predictor of elective colorectal surgical outcomes: A cohort study

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INTRODUCTION

Sarcopenia describes a progressive and generalised loss of muscle mass with age. A number of systematic reviews have demonstrated that sarcopenia is correlated to the risk of mortality and major complications following general surgical operations.

A number of approaches to measuring sarcopenia have been reported in the literature. Which approach to measuring sarcopenia provides the best prognostic information has not been established.

My systematic review and meta-analysis (also presented in this poster session) indicates that using psoas muscle density (PMD) to measure sarcopenia provides the best information to predict general surgical mortality and major complications. The meta-analysis did not enable direct comparison between the sarcopenia measures, or comparison with long term survival.

This poster describes a cohort study conducted using the University Hospital Geelong Colorectal database.

AIM

To determine which psoas muscle sarcopenia measure correlates best with major complications, peri-operative mortality, and long term survival following elective colorectal surgery

METHOD

The University Hospital Geelong Colorectal database was accessed with ethics approval. Complications, peri-operative mortality and long-term survival were included in the database along with their routine pre-operative CT scans. Data and CT scans for patients seen from 2002-2014 were extracted.

At the L3 spinal level, the psoas muscle cross-sectional area and average density were measured. This provided data for PMD and PMA sarcopenia measures to be assessed.

Patients' anaesthetic and allied health records were also accessed to obtain height and weight data – enabling calculation of PMA/H^2 and PMA/BSA.

Pearson correlations analysed the relationship between each of the sarcopenia measures. Logistic regression was used to assess the relationship between sarcopenia measures and major complications, and peri-operative mortality. Kaplan-Meier survival curves were used to compare long term survival between patients assessed as sarcopenic and non-sarcopenic across the different sarcopenia measures. Results were considered statistically significant if P<0.05.

RESULTS

PMA correlated closely with PMA/H^2 (R^2=0.95) and PMA/BSA (R^2=0.94). PMD showed no correlation with other measures of sarcopenia (R^2=0.15-0.23).

Sarcopenia assessed using PMD was associated with major complications (OR 0.96, 95%CI 0.94-0.99), and peri-operative mortality (OR 0.90, 95%CI 0.85-0.96).

Defining sarcopenia as the lowest 25th percent of PMD measurements was associated with median survival of 5.0 years (95%CI 4.3-5.6 years) compared with median survival of non-sarcopenic patients using PMD (6.0 years, 95%CI 5.6-6.4 years, P<0.05)

PMA sarcopenia was associated with a reduced long-term survival (4.8 years (95%CI 4.1-5.5) vs 6.1 years (95%CI 5.8-6.5 years) for non-sarcopenics) (P<0.05). PMA sarcopenia was not associated with peri-operative mortality or major complications.

PMA/H^2 and PMA/BSA were not found to have statistically significant relationships with major complications, peri-operative mortality, or long term survival.

None of the sarcopenia measures correlated with minor complications.

Sarcopenia measurement	Minor complication		Major complication		Death	
	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
PMD (HU)	OR 0.998 (0.978 - 1.019)	0.882	**OR 0.963 (0.938-0.989)**	**0.006**	**OR 0.903 (0.847 - 0.962)**	**0.002**
PMA (mm2)	OR 1.000 (1.000 - 1.000)	0.976	OR 1.000 (1.000 - 1.000)	0.795	OR 1.000 (0.999 - 1.001)	0.914
PMA/H2 (mm2/m2)	OR 1.000 (0.999 - 1.001)	0.857	OR 1.001 (0.999 - 1.002)	0.482	OR 0.999 (0.995 - 1.004)	0.737
PMA/BSA (mm2/m2)	OR 1.000 (0.999 - 1.001)	0.644	OR 1.000 (0.999 - 1.002)	0.437	OR 1.000 (0.997 - 1.003)	0.823

Table 1. Association between sarcopenia measured using different approaches and Colorectal surgical outcomes, University of Geelong Hospital patients 2002-2014

Unit of radiological density	Median survival of sarcopenics	Median survival of non-sarcopenics	Statistical significance
PMD (HU)	**5.0 years (95%CI 4.3-5.6)**	**6.0 years (95%CI 5.6-6.4)**	**P=0.021**
PMA (mm2)	**4.8 years (95%CI 4.1-5.5)**	**6.1 years (95%CI 5.8-6.5)**	**P<0.001**
PMA/H2 (mm2/m2)	5.4 years (95%CI 4.6-6.1)	6.0 years (95%CI 5.6-6.4)	P=0.069
PMA/BSA (mm2/m2)	5.0 years (95%CI 4.4-5.6)	6.0 years (95%CI 5.6-6.4)	P=0.217

Table 2. Association between sarcopenia measured using different approaches and University of Geelong Hospital patient survival following Colorectal surgery 2002-2014

*Bold typeface indicates statistical significance

CONCLUSION & SIGNIFICANCE

PMD is a simpler measure of sarcopenia to use than PMA, PMA/H^2, or PMA/BSA.

PMD also appears to be the best predictor of operative risk for this cohort.

These findings support the conclusions of my meta-analysis, indicating that PMD is the most promising marker of sarcopenia for use in surgical risk assessments.

Further research is needed to investigate the effectiveness of PMD as an operative risk predictor in different surgical cohorts, with different demographic features, co-morbidities and surgery types.