2022 Best Research Poster Award

Barwon Health

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Psoas muscle density correlates with Colorectal surgery outcomes – can measurements be further simplified?

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INTRODUCTION

Sarcopenia describes a loss of muscle mass with age. A number of systematic reviews have demonstrated a link between sarcopenia and surgical complications. The importance of accurate surgical risk assessment will continue to have a major impact as the population ages and co-morbidities increase.

A number of sarcopenia measures are in use. It has not been established which sarcopenia measure is the most effective marker of operative risk. A meta-analysis and a cohort study conducted as part of a wider body of work has demonstrated psoas muscle density (PMD) to be a simple and effective marker of general surgical and elective colorectal surgical risk respectively.

PMD is typically measured at the L3 spinal level by carefully circumscribing the psoas muscle. It is important not to include extraneous tissue as surrounding vertebral bone and fatty tissue has markedly different radiodensity to the psoas muscle.

We hypothesised that PMD could be measured by a representative ellipse within the psoas muscle (PMDe). This would reduce the risk of including extraneous tissue. This would also simplify measurement and reduce the time taken - both important in enabling clinical implementation of sarcopenia assessment.

Aim

The aim was to identify a novel, simpler approach to measuring PMD for sarcopenia assessment

METHOD

Following ethics approval, the University Hospital Geelong Colorectal database was accessed. This database included peri-operative complications and mortality.

Routine pre-operative CT scans were accessed for 432 patients seen from 2002-2014. PMD was measured in the traditional manner at the L3 spinal level, by circumscribing the entire psoas muscle cross-section. PMDe was measured from the density of a representative ellipse within the psoas muscle.

Pearson correlations were used to analyse the relationship between PMD and PMDe. Logistic regression was used to analyse the relationship of both PMD and PMDe with major complications and mortality. Results were considered statistically significant when $P<0.05$.

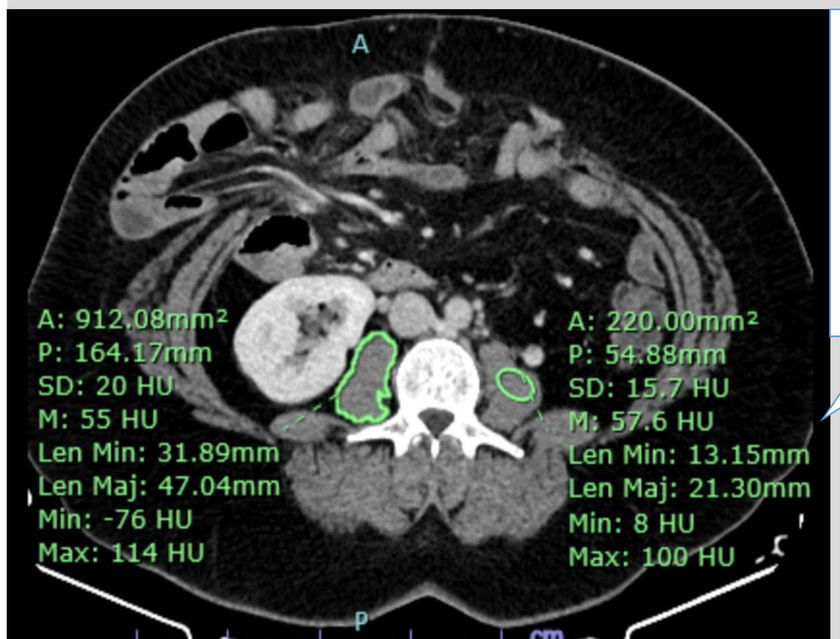

Fig. 1. L3 cross-section showing PMDe measurement of the left Psoas muscle and PMD measurement of the right Psoas muscle

RESULTS

PMDe correlated with PMD (R^2=0.818).

Not having sarcopenia as measured by PMD or PMDe was protective against mortality (OR 0.90, 95%CI 0.85-0.96; and OR 0.93, 95%CI 0.87-0.99 respectively).

Not having PMD or PMDe sarcopenia was also protective against major complications (OR 0.96, 95%CI 0.94-0.99; and OR 0.96, 95%CI 0.94-0.99 respectively).

Neither PMD nor PMDe was correlated with minor complications.

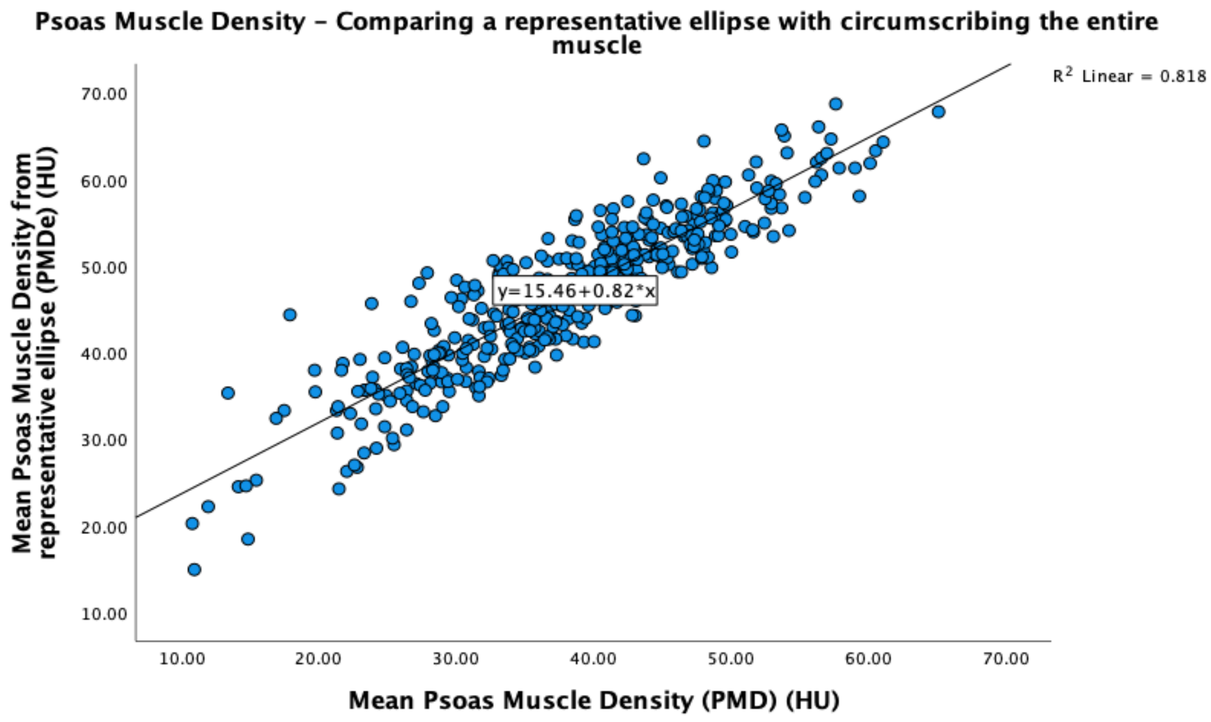

Fig. 2. Scatter graph demonstrating the correlation between PMD and PMDe (R^2=0.818)

Sarcopenia measurement	Minor complication		Major complication		Death	
	OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
PMDe (HU)	1.005 (0.983 - 1.029)	0.646	**0.962 (0.935 - 0.990)**	**0.008**	**0.928 (0.873 - 0.988)**	**0.018**
PMD (HU)	0.998 (0.978 - 1.019)	0.882	**0.963 (0.938-0.989)**	**0.006**	**0.903 (0.847 - 0.962)**	**0.002**

Table 1. Association between radiological sarcopenia measurement and colorectal surgical outcomes for patients seen at University Hospital Geelong 2002-2014. Bold typeface indicates statistical significance

DISCUSSION AND CONCLUSION

PMDe is a simplified measure of sarcopenia. PMDe is strongly correlated with PMD.

PMD and PMDe both correlated with mortality and major complications following colorectal surgery in this patient cohort. While PMDe has a smaller effect size than PMD when assessing its correlations with major complications and mortality, these correlations were still statistically significant. This indicates that PMDe may help inform surgical risk assessments.

Further research in different populations is required to determine whether PMDe can be implemented into clinical sarcopenia assessments.