The effects of age and skeletal muscle wasting on endovascular interventions for chronic mesenteric ischemia

Alice P. Alexander MHS, Andrew H. Smith MD PhD, Ahmed A. Sorour MD, Jarrad Rowse MD, Francis J. Caputo MD, Levester Kirksey MD, Sean P. Lyden MD, Jon G. Quatromoni MD

INTRODUCTION

- Chronic mesenteric ischemia (CMI) is a wasting condition characterized by inadequate nutritional intake and systemic inflammation of a malperfused gut.
- The impact of frailty on outcomes of intervention for CMI has not been investigated.
- This study sought to evaluate the effect of lean skeletal muscle mass and age, two principal markers of frailty, on outcomes of mesenteric stenting for CMI.
- We investigated the use of lean psoas muscle area (LPMA, product of psoas muscle cross-sectional area and attenuation) as a surrogate marker for frailty.

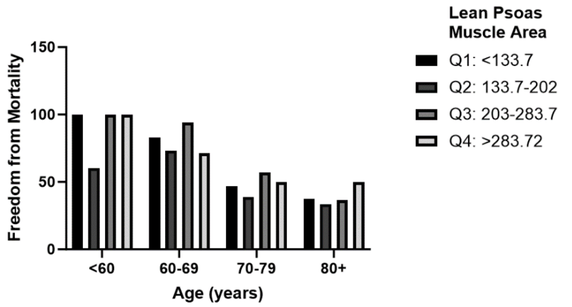
METHODS

- Retrospective review of consecutive patients who underwent stenting for CMI at the Cleveland Clinic between 2006 and 2020.
- All patients with preoperative computed tomography angiography (CTA) were included.
- Preoperative LPMA was calculated at the L3 spinous process in the arterial phase CTA.
- Primary outcomes were midterm mortality and symptom recurrence.

RESULTS

- 183 patients (126 female, 57 male; mean age 73 years, range 18-94).
- Follow up at 2, 3, and 5 years.
- LPMA was significantly associated with mortality in univariable analysis (HR 0.73, 95% CI 0.57-0.95, p=0.017).
- The survival difference between the lowest quartile (Q1) and the highest quartile (Q4) of LPMA was:
    - 67.3% Q1 vs. 87.8% Q4 at 2yrs
    - 62.5% Q1 vs. 87.8% Q4 at 3yrs
    - 57.7% Q1 vs. 82.7% Q4 at 5yrs
    - (HR 0.47, 0.24-0.94)
- Age and female gender were significantly associated with low LPMA.
- Complete adjustment for age and other confounding factors eliminated the effect of LPMA on mortality (p=0.90).
- Age (HR 0.96, 0.94-0.98, p=0.001) and hyperlipidemia (HR 0.44, 0.24-0.77, p=0.005) remained significantly associated with mortality.
- LPMA had no effect on symptom recurrence.

Figure 2



Stratification of patients by LPMA quartile showing relationship with age, LPMA, and mortality. A mild protective effect against mortality can be observed with increased LPMA in each age group.

CONCLUSIONS

- Age and female gender were associated with low LPMA
- When adjusted for confounding factors, LPMA had no independent effect on mortality or symptom recurrence.
- In contrast to other vascular and non-vascular studies, low LPMA alone does not appear to negatively impact outcomes of stenting for CMI.
- The diminished efficacy of intervention for CMI with advanced age is a novel finding which requires further investigation.
- This suggests that other factors beyond frailty may play a more critical role in determining the success of intervention for CMI, or that frailty alone is insufficient of a predictor for an intervention that targets a population already prone to being frail.

Table 1

Outcome	Variable	Level	N	Event (%)	Year 2	Year 3	Year 5	HR (95% CI)	p-value
Mortality	Lean psoas muscle area - Quartile	Q1: < 133.7	45	18(40)	67.3 (52.2, 86.7)	62.5 (46.6, 83.7)	57.7 (41.4, 80.3)	1.00	0.16
		Q2: 133.7 - 202	46	20(43)	82.5 (70.6, 96.5)	79.0 (66.0, 94.4)	57.6 (41.4, 80.2)	0.60 (0.31, 1.16)	.
		Q3: 203 - 283.70	46	13(28)	85.3 (73.9, 98.4)	69.0 (53.6, 88.8)	61.4 (43.6, 86.4)	0.55 (0.27, 1.13)	.
		Q4: > 283.72	46	15(33)	87.8 (78.3, 98.5)	87.8 (78.3, 98.5)	82.7 (70.1, 97.5)	0.47 (0.24, 0.94)	.

Time to mortality analysis of continuous psoas measures by quartile. 183 patients were arranged into quartiles of average LPMA. There is some evidence of LPMA being associated with lower risk of mortality, but the overall comparisons are not significant.