

ASSESSMENT OF CT-BASED MUSCLE AND ADIPOSE PHENOTYPES FOR PREDICTION OF PERI-OPERATIVE OUTCOMES IN HEAD AND NECK CANCER



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INTRODUCTION

Sarcopenia (substantial loss of muscle mass and function) is associated with many adverse health outcomes, including mortality. Automated abdominal CT based muscle measurements are a widely accepted sarcopenia biomarker and may better inform peri-operative risk than historical nutritional markers.

We hypothesize an association of abdominal CT based muscle and adipose tissue phenotypes with peri-operative complications and increased length of stay (LOS) among head and neck cancer patients undergoing surgical resection.

METHODS AND MATERIALS

A retrospective review of prospectively collected data from 168 patients with squamous cell carcinoma (SCC) of the oral cavity, oropharynx, hypopharynx, or larynx who underwent staging PET/CT followed by surgical resection between 2010 and 2014.

A student t –test was used to compare continuous variables. A logistic regression model was fit to predict complications and a general linear regression model was fit to predict LOS.

OUTCOMES AND MEASURES

Patients were analyzed separately by sex. From each patient’s PET/CT, a single axial CT image at the C3 vertebral level was selected for automated muscle cross-sectional area (CSA) analysis (Slice-O-Matic software; TomoVision). Hounsfield unit (HU) thresholds (-29 to +150) were utilized for muscle and (190 to -30) for fat.

All automated L3 CSA outputs were reviewed by an attending radiologist and manual adjustments were performed when necessary.

Post-operative complications included both systemic complications (e.g. stroke, myocardial infarction) and wound-related complications. LOS was divided into the following 2 groups: group 1 (LOS 1-10); group 2 (LOS 11 or more days).

RESULTS

Table 1

MALE (n=132)	LOS group 1 (n=92)	LOS group 2 (n=40)	P value
Muscle area mean	150.2 ± 28.5	139.5 ± 24.8	0.0294
SAT area mean	135.4 ± 105.6	110.4 ± 60.3	0.4457
VAT area mean	148.1 ± 105.6	166.2 ± 121.9	0.4502
Total fat area mean	148.1 ± 105.6	166.2 ± 121.9	0.4502

Table 2

FEMALE (n=36)	LOS group 1 (n=22)	LOS group 2 (n=14)	P value
Muscle area mean	112.0 ± 16.7	101.5 ± 20.4	0.1102
SAT area mean	196.2 ± 128.9	210.4 ± 117.2	0.7305
VAT area mean	133.4 ± 87.7	120.3 ± 69.6	0.7305
Total fat area mean	133.4 ± 87.7	120.3 ± 69.6	0.7305

DISCUSSION

Males (n=132): Patients experiencing adverse post-operative events (n=99) had a mean L3 muscle CSA of 148.07cm² compared to 154.21cm² (p=0.05) among patients without complications (n=33). LOS group 1 (n=92) mean L3 CSA was 150.69cm² while LOS group 2 (n=40) mean L3 muscle CSA was 141.22cm² (p=0.055).

Females (n=36): patients experiencing adverse post-operative events (n=21) had a mean L3 muscle CSA of 107.41cm² (p=0.16) among patients without complications (n=15). LOS group 1 (n=22) mean L3 CSA was 111.40cm² while LOS group 2 (n=14) mean L3 muscle CSA was 101.46cm² (p=0.133).

Patients with lower subcutaneous adipose tissue (SAT) CSA were more likely to suffer complications (p=0.04) and to experience increased LOS (p=0.0175). There were no significant associations between total, visceral, or intermuscular adipose tissue CSA outcomes.

CONCLUSION

Lower subcutaneous adipose CSA predicted perioperative complications and increased LOS in our cohort. Lower L3 muscle CSA was associated with increased complications among males. Males and females with longer LOS exhibited lower L3 muscle CSA, though these differences were not statistically significant.

REFERENCES

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Figure 1

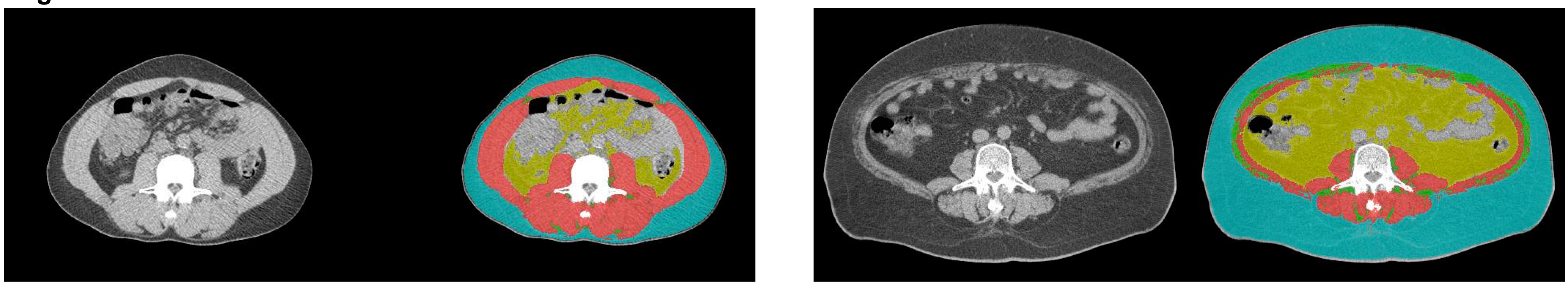


Figure 1: Images above represent a screen shot of the Slice-O-Matic software. Image on the left is an example of a patient with average CSA and average SAT. Image on the right represents a patient with sarcopenia with large amount of SAT.