

# Novel Use of Pre-Operative CT-Measured Adipose Tissue Indices to Predict Postoperative and Survival Outcomes Among Patients Undergoing Radical Cystectomy



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## INTRODUCTION

- Obesity has been linked with increased risk of many cancers but its influence on risk of urothelial carcinoma of the bladder (UCB) is not well established.
- In this study, we examined the relationship between obesity and morbidity and mortality following radical cystectomy for UCB management.
- Study Objectives:
  - (1) Influence of obesity on postoperative length of stay (LOS) and perioperative complications.
  - (2) Influence of obesity on overall survival (OS) and disease specific survival (DSS) following radical cystectomy (RC).

## MATERIALS & METHODS

- Retrospective chart review of RC performed at a single tertiary care center from 2000-2012.
- Among this group, 202 patients were selected for this study.
- The primary outcomes of interest were postoperative length of stay and perioperative complications using Clavien-Dindo classification.
- OS and DSS were secondary outcomes of this study.
- Obesity was described using BMI and was quantified using CT measures of visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT). Image J software was used to capture adipose tissue at the level of the umbilicus.
- Covariates of interest included: age, gender, BMI, tumour stage, smoking status, Charlson score, and type of chemotherapy received.
- Primary analysis
  - Linear regression was used to assess influence of VAT and SAT on LOS and Clavien-Dindo complications adjusting for CCI score, gender, and smoking status.
- Secondary analysis
  - Cox proportional hazards model was used to assess the influence of VAT and SAT levels on OS and DSS (not shown).
- All tests were 2-sided and with a statistical significance set at  $p < 0.05$ .

## RESULTS

TABLE 1: Summary statistics for patients with bladder cancer managed with radical cystectomy.

Variables	
<b>Patients, n (%)</b>	202
Male	154 (76.2)
Female	48 (23.8)
<b>Median age, years (IQR)</b>	70 (60-78)
<b>Smoking status, n (%)</b>	
Smokers	119 (58.9)
Non-smokers	55 (27.2)
Smoking status unknown	28 (13.9)
<b>BMI group, n (%)</b>	
<25 kg/m <sup>2</sup> (Healthy weight)	66 (32.7)
25 - <30 kg/m <sup>2</sup> (Overweight)	85 (42.1)
30 - <35 kg/m <sup>2</sup> (Obese)	36 (17.8)
>35 kg/m <sup>2</sup> (Severely obese)	11 (5.4)
BMI unknown	4 (2.0)
<b>Median VAT area, cm<sup>2</sup> (IQR)</b>	165 (114-223)
<b>VAT area, cm<sup>2</sup> (%)</b>	
<150	87 (43.1)
150-200	43 (21.3)
>200	72 (35.6)
<b>Median SAT area, cm<sup>2</sup> (IQR)</b>	233 (182-316)
<b>SAT area, cm<sup>2</sup> (%)</b>	
<150	31 (15.3)
150-200	37 (18.3)
>200	134 (66.3)
<b>Tumour stage, n (%)</b>	
<pT2	59 (29.2)
pT2	44 (21.8)
>pT2	99 (49.0)
<b>30-day CD complications, n (%)</b>	
No complication	78 (38.6)
Grade I-II	92 (45.5)
Grade III-V	30 (14.9)
Complication data unknown	2 (1.0)
<b>Median length of stay, days (IQR)</b>	9 (7-12)
<b>Median follow-up, months (IQR)</b>	37 (27-54)
<b>Median Charlson comorbidity index (IQR)</b>	6 (5-8)
<b>Adjunct therapy, n (%)</b>	
No adjunct therapy	122 (60.4)
Neoadjuvant chemotherapy	22 (10.9)
Adjuvant chemotherapy	35 (17.3)
Salvage chemotherapy	14 (6.9)
Primary chemotherapy and radiation	9 (4.4)

TABLE 2: LOS and Complications data

VAT	$\beta$ -coeff / OR	95%CI	p-value
<b>Length of Stay</b>	0.0233	0.0002-0.0463	
<b>Grade III-V CD</b>	1.004	0.999-1.008	

SAT	$\beta$ -coeff / OR	95%CI	p-value
<b>Length of Stay</b>	0.0159	-0.0024-0.0342	
<b>Grade III-V CD</b>	1.004	1.001-1.008	

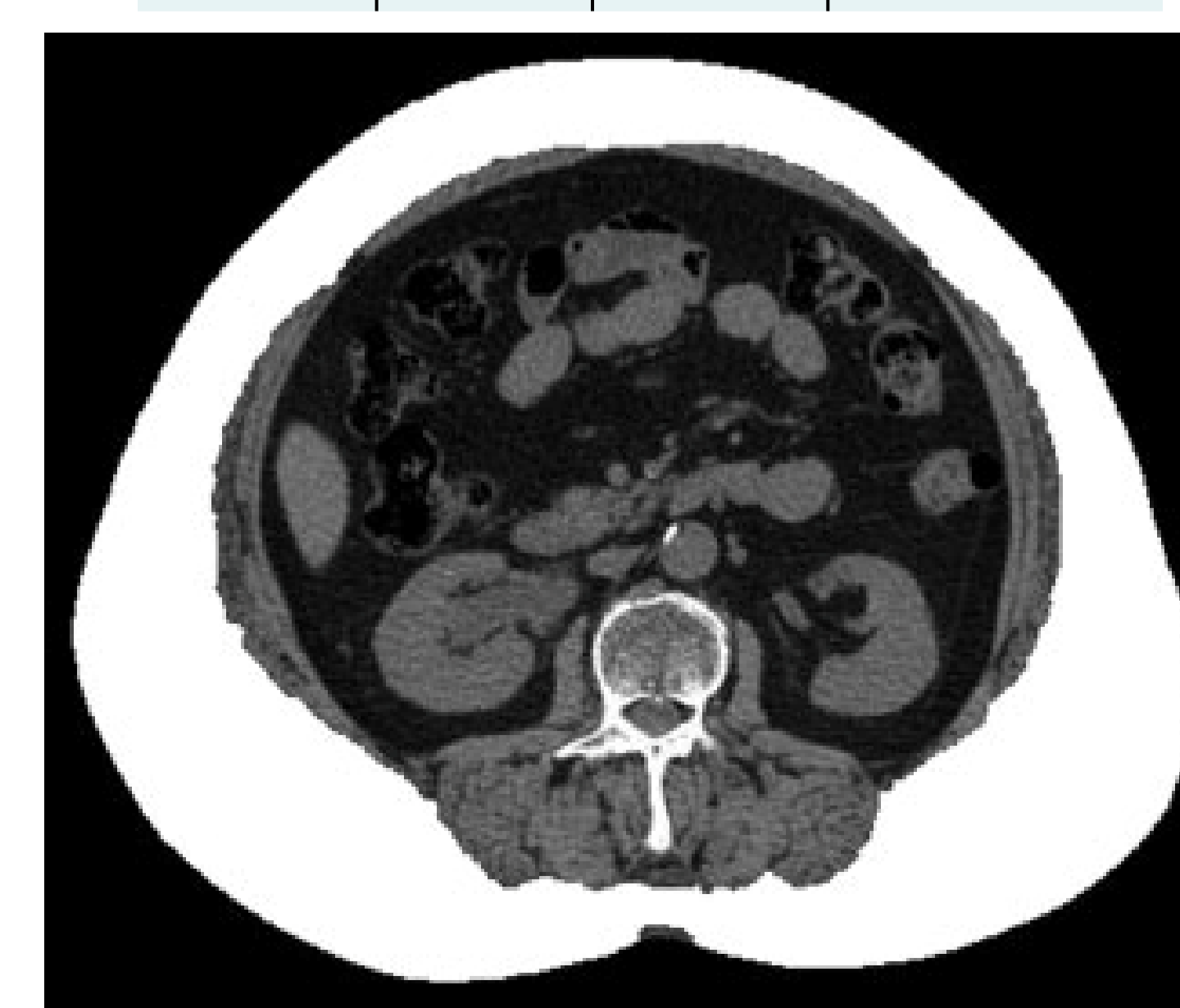


FIGURE 1: CT measurement of VAT (left) and SAT (right) displayed in white.<sup>1</sup>

## RESULTS

- There were 154 males enrolled in this study (76.2%) with an average age of 70 (IQR 60-78).
- 119 patients had smoked cigarettes (58.9%) and 43 (21%) died from bladder cancer while 65 (32%) died from all causes.
- 40% of patients received chemotherapy with 28% receiving neoadjuvant or adjuvant chemotherapy.

### Perioperative Outcomes

- Median length of stay was 9 days (IQR 7-12)
- Median follow-up was 37 months (IQR: 27-54)
- VAT was predictive of longer LOS ( $\beta$ -coeff 0.0233, 95% CI 0.0002-0.0463) while SAT was predictive of more serious post-operative complications (OR 1.004, 95% CI 1.001-1.008).

### Survival Outcomes

- Zach to insert survival data for OS
- Zach to insert survival data for DSS

### Limitations

- Lack of complete patient CT data led to smaller study cohort
- Retrospective nature of study
- Single slice CT

## CONCLUSIONS

- VAT and SAT were predictive of increased length of stay and serious postoperative complications (CD grade III-V), respectively.
- Due to the use of CT staging prior to radical cystectomy, VAT and SAT may provide more reliable measures of obesity risk than BMI.

## REFERENCES

1. Shuster A, Patlas M, Pinthus JH, Mourtzakis M. *Br. Journal of Rad.* 2012; 85; 1-10. [Figures 3a and 3b in original work]