Arterial calcification as a prognostic factor on CT in women with endometrial cancer

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IMPERIAL

INTRODUCTION

Background

- Endometrial cancer (EC) has been increasingly diagnosed at younger ages.
- This may be linked to the global obesity epidemic, which is a long-standing modifiable factor associated with EC pathogenesis.

Problem

- Arterial calcification is linked to adverse outcomes in conditions such as cardiovascular disease, chronic obstructive pulmonary disorder, and stroke.
- Its role in cancer prognosis remains under-researched, albeit showing significant promise.

Aim

- The purpose of this study was to evaluate the association of arterial calcification on survival outcomes in women with endometrial cancer (EC).
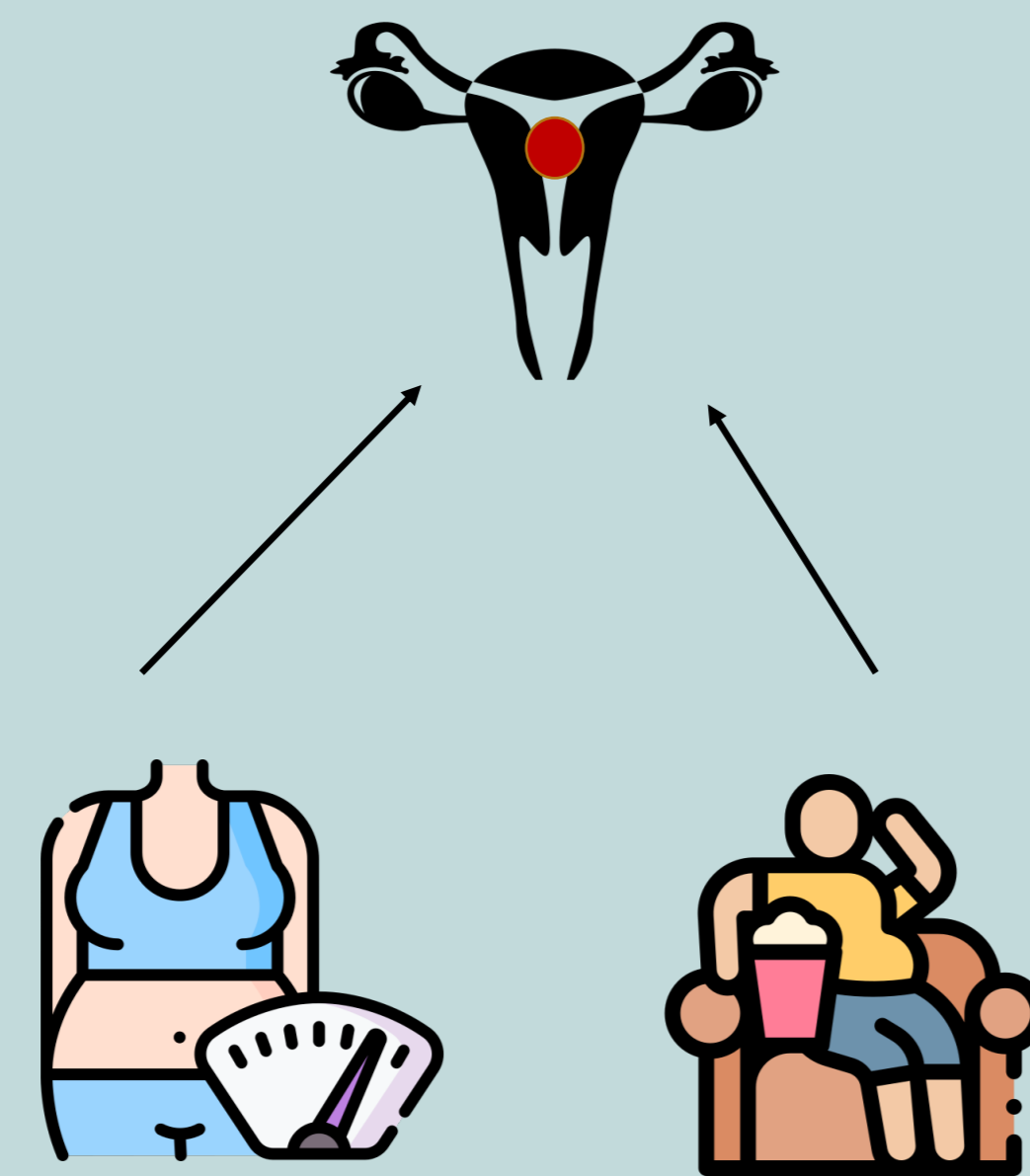
HOW WILL THIS CHANGE PRACTICE

Hypothesis

1. The presence and/or degree of arterial calcification will reduce survival probabilities in patients with EC.

2. Higher degrees of calcification will correlate with worse survival outcomes.

3. Arterial calcification may not impact survival in patients with high risk cancer but may impact patients with low risk cancer.

The importance of understanding the impact or degree of arterial calcification:

- Reduce progression of metabolic syndrome through implementation of of lifestyle interventions aimed at mitigating sedentary behaviours and improving dietary habits.

- Improve overall health and well-being and holds the potential to reduce the progression of atherosclerotic disease, thus indirectly improving survival outcomes in endometrial cancer.

MAIN FINDINGS

1. Association between arterial calcification and survival outcomes

- **Abdominal aorta:** Significant correlations between progression free survival (PFS) (p = 0.0047) and overall survival (OS) (p=0.0035) and the degree of abdominal aorta calcification.
  - Severe calcification (n=61) (>50% circumference) did worse overall [p=0.0035]

- **Pelvic regions:** Patients with moderate calcification in the right pelvic side (n=41) (>25-<50% circumference) did worse overall (p=0.015).

- **Coronary arteries:** Progression free survival was most significantly correlated to the presence of calcification (p = 0.0011) in the coronary arteries.

2. Univariate and multivariate analysis

		Univariate				Multivariate		
	n	HR	95% CI	p-value	n	HR	95% CI	p-value
Age	412	2.370	1.523 – 3.687	<0.0001*	394	2.1169	1.314 – 3.410	0.002*
Stage	404	0.273	0.194 – 0.385	<0.0001*	394	0.4138	0.281 – 0.610	<0.0001*
Grade	401	4.895	3.304 – 7.252	<0.0001*	394	3.253	2.092 – 5.056	<0.0001*
Calcification of Abdominal Aorta	262	2.140	1.403 – 3.264	0.0004*	394	0.277	0.837 – 2.481	0.187
Calcification of Right Pelvis	206	1.676	1.165 – 2.410	0.0054*	394	0.271	0.763 – 2.206	0.337
Calcification of Left Pelvis	192	1.531	1.071 – 2.187	0.0194*	394	0.267	0.398 – 1.133	0.135
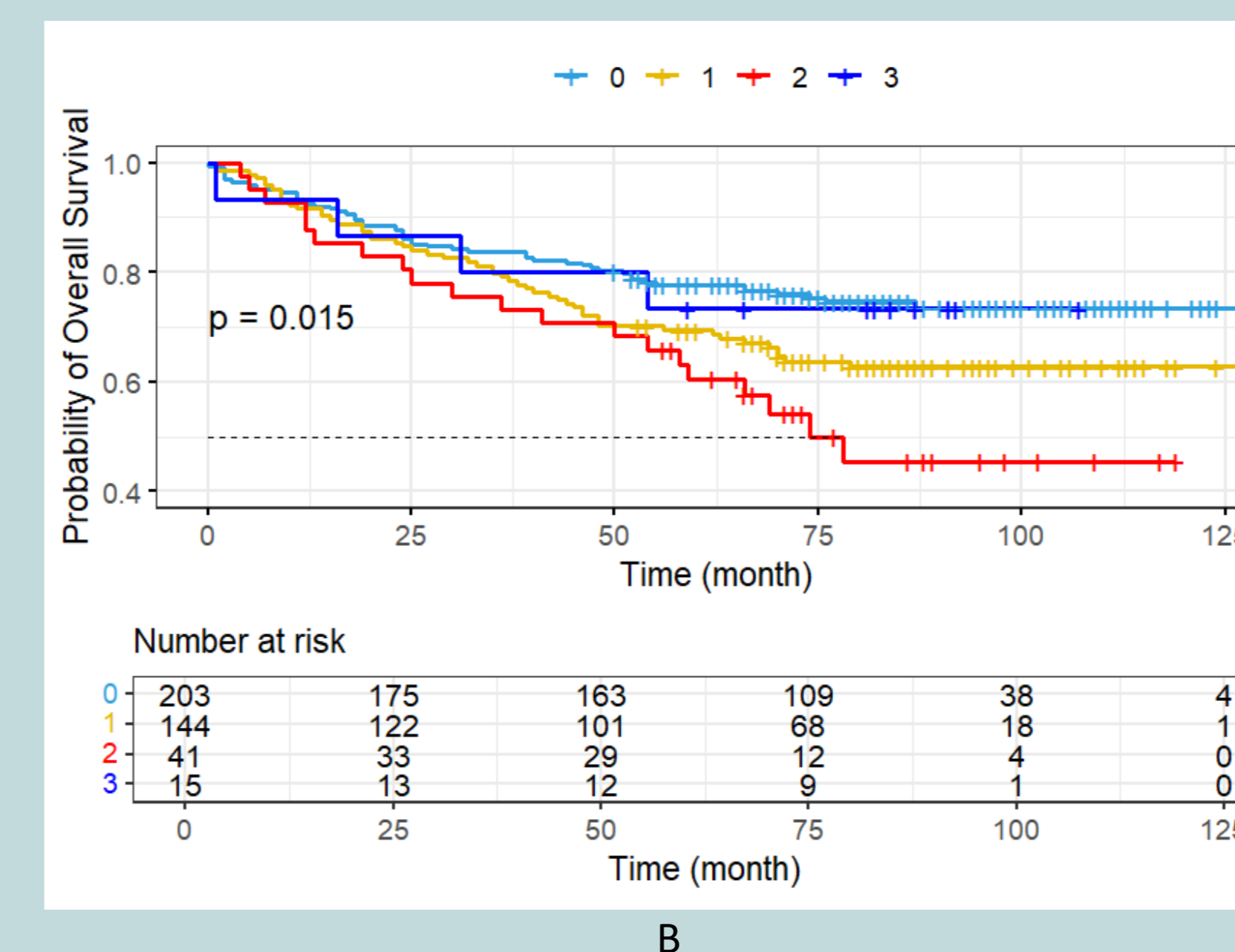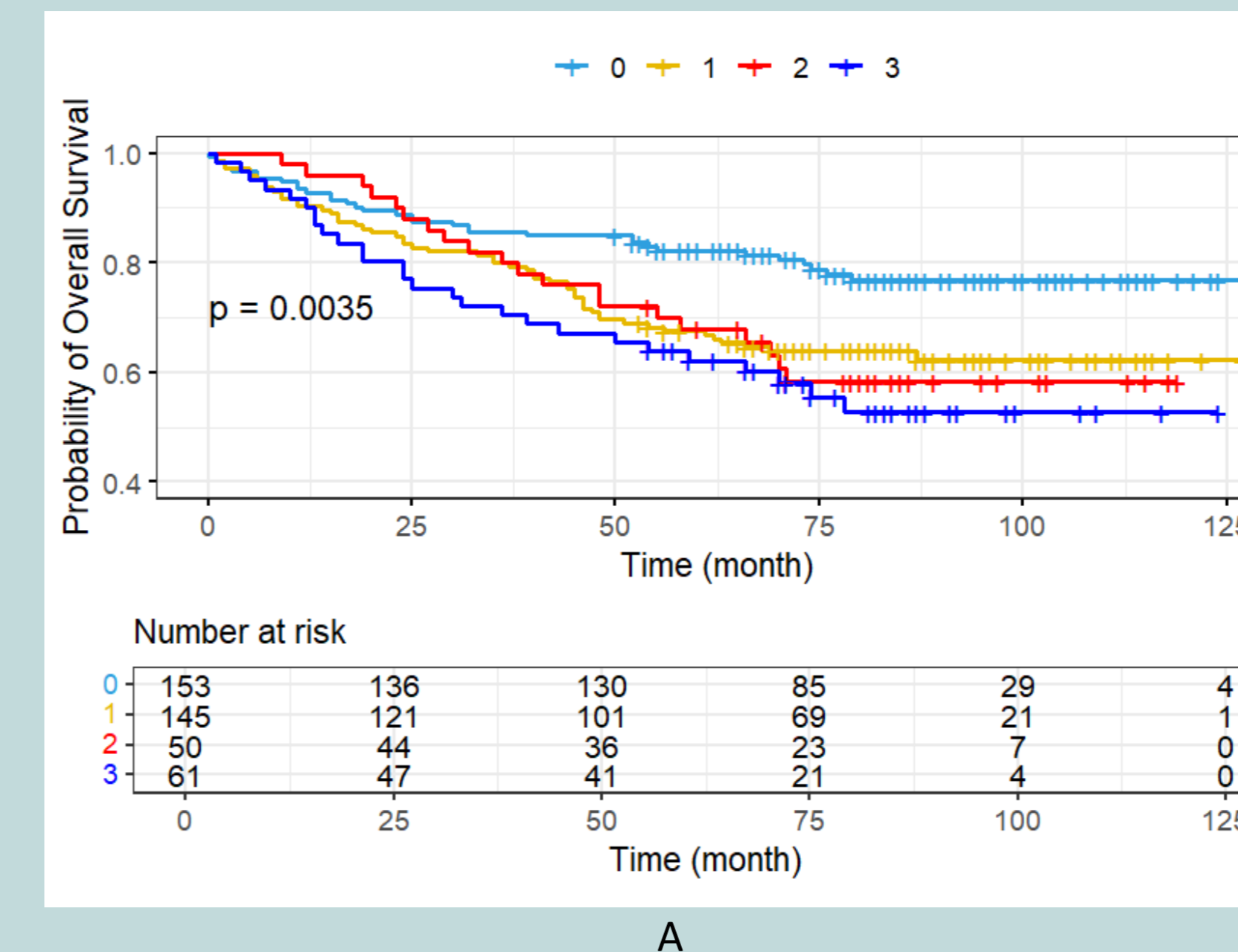
Figure 1: Kaplan-Meier curves demonstrating association between extent of calcification and overall survival (A) Abdominal Aorta (B) Right Pelvis. Analysis was performed on n=419 patients, with any absent scan fields not being accounted for in analysis.

419 Patients
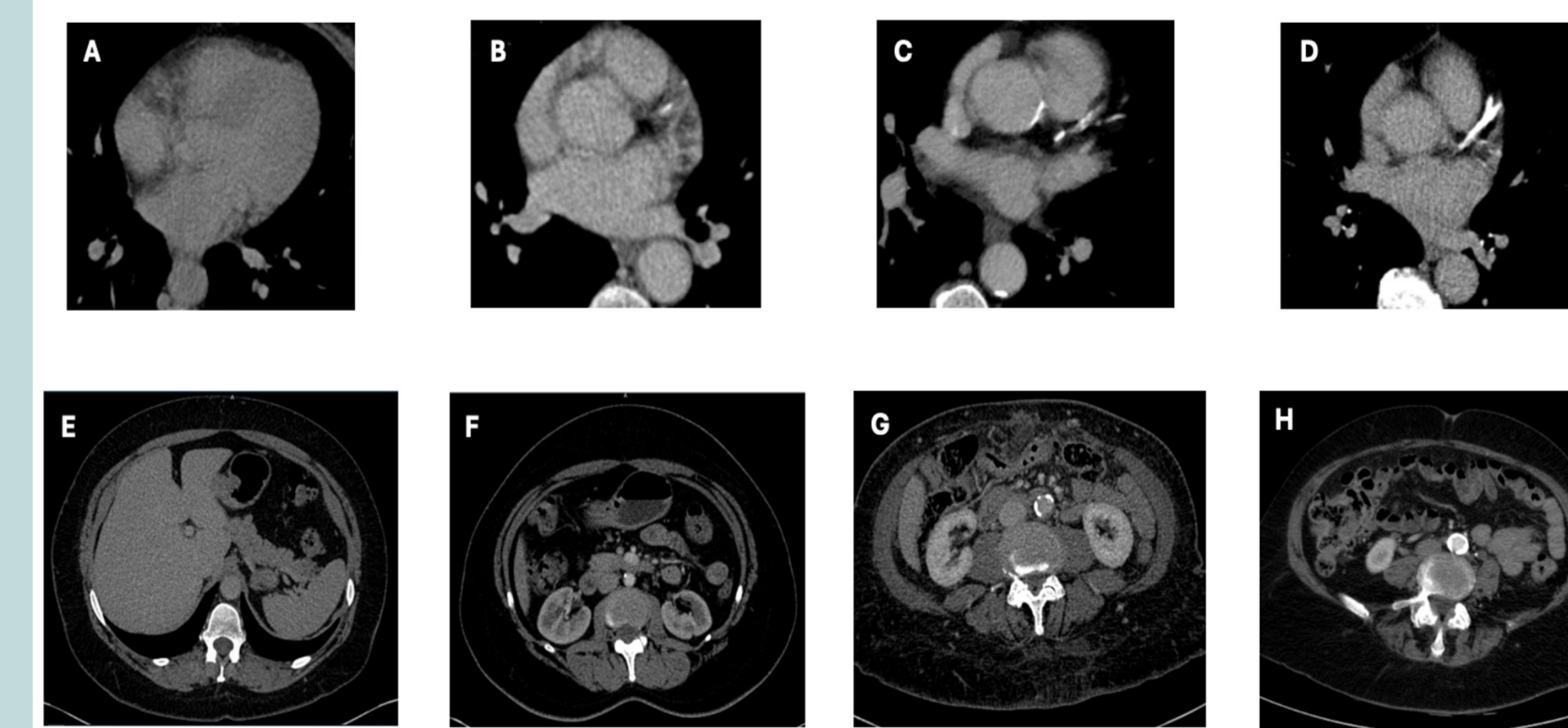
Figure 2: Images show examples of selected areas assessed for degree of calcification in different patients on enhanced contrast portal venous phase computed tomography scans. Images show 0 (no calcification) to 3 (severe calcification) in the coronary arteries (A-D), abdominal aorta (E-H)

3. Inter-reader agreement

Abdominal aorta - excellent test-retest reliability [ICC = 0.92; 95% CI 0.88 – 0.94, p<0.001]

Right pelvic side - good test-retest reliability [ICC = 0.85; 95% CI 0.78 – 0.90, p<0.001]

Left pelvic side – good test-retest reliability [ICC = 0.82; 95% CI 0.74 – 0.88, p<0.001]

Coronary artery - moderate test-retest reliability [ICC = 0.62; 95% CI 0.47 – 0.73, p<0.001]

METHODS

Study Type
- Single-centred retrospective analysis of 419 EC patients reviewed in the specialist gynaecology multidisciplinary meetings at Hammersmith Hospital from 2012 to 2018.

Protocol
- Eligible portal venous computed tomography (CT) scans were scored for arterial calcification which include: coronary arteries, descending thoracic aorta, abdominal aorta, and both iliac arteries.
- Clinical data were collected including date of death, if applicable.

Score	Degree of calcification	Circumference calcification (%)
0	None	0
1	Mild	> 0 to < 25
2	Moderate	> 25 to < 50
3	Severe	> 50

Statistical Analysis
- Inter-rater reliability was conducted on 100 randomly selected patients.
- Kaplan-Meier (KM) curve analyses were performed to determine the relationship between survival and arterial calcification.
- Statistical analysis was performed using R software.

CONCLUSION

o To our knowledge, this study was the first to confirm the link between arterial calcification and worse survival in EC.

o Abdominal aorta calcification showed the best correlation with survival outcomes.

o Detection of arterial calcification on regular scans could prompt lifestyle intervention to reduce progression of atherosclerotic disease.

o Further large-scale studies should include additional areas for assessment, such as aortic arch, as well as analysis of immune markers.

REFERENCES