

Evaluating CT aortogram requests and pre-test risk stratification in suspected acute aortic syndrome: a clinical audit

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INTRODUCTION

Acute aortic syndrome (AAS), which includes aortic dissection, intramural haematoma and penetrating atherosclerotic ulcer is a rare but life-threatening cause of chest pain with an in-hospital mortality of up to 30% (1). Given the diagnostic challenge, CT aortography remains the modality of choice due to its speed, accessibility and high accuracy (2). This audit evaluates the diagnostic pathway for AAS in adult emergency department patients, focusing on the use of pre-test risk stratification and adherence to imaging protocols.

AIM

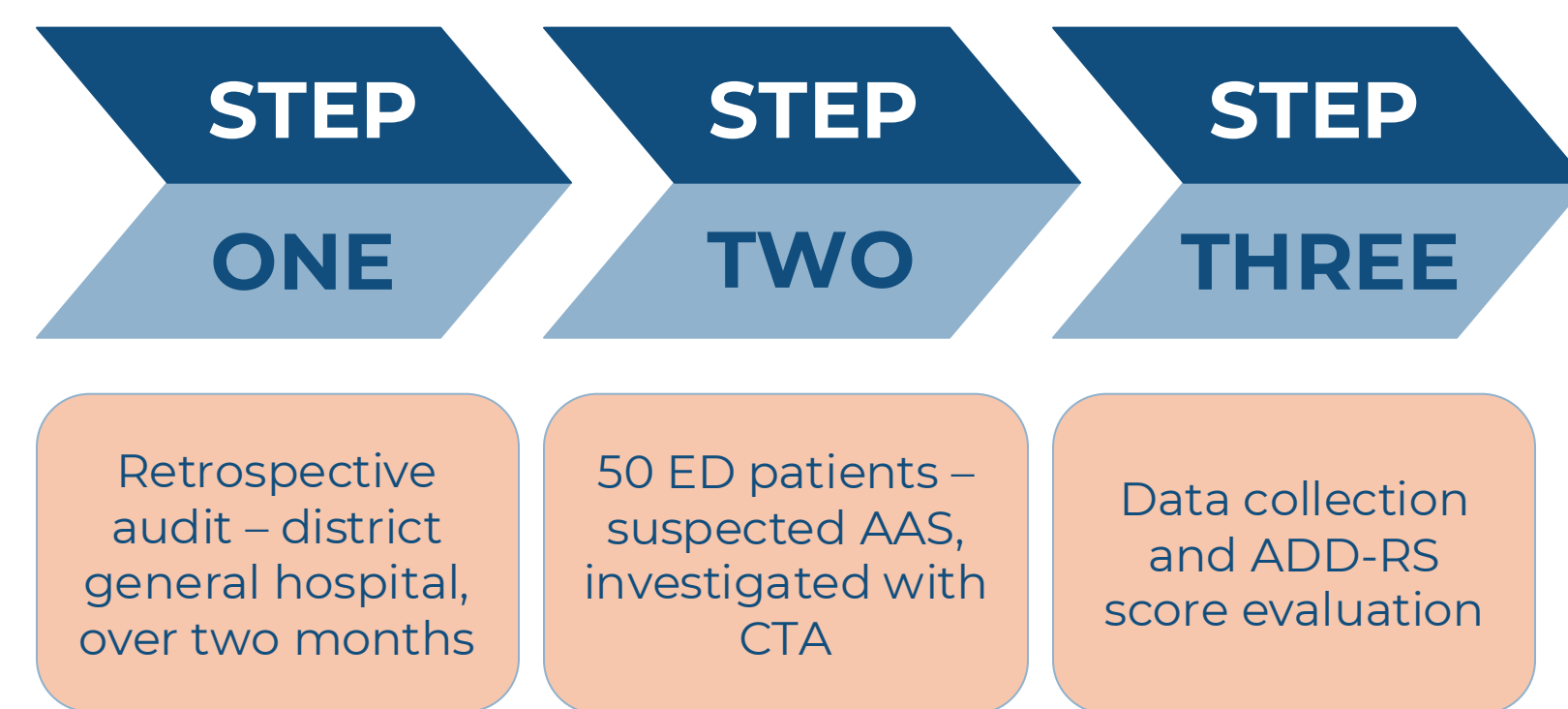
To evaluate the use of the Aortic Dissection Detection Risk Score (ADD-RS) in guiding CT aortogram requests for emergency department patients with suspected AAS. Additionally, to assess adherence to imaging protocols in establishing a definitive diagnosis.

STANDARDS

Audit standards as per RCEM, RCR and BSCI guidelines

- Imaging protocol: scans should include a non-contrast phase to detect intramural haematoma or calcified intimal flaps, an arterial phase with ECG gating to reduce motion artefact and coverage should be limited to thorax (from aortic arch to diaphragmatic sulcus) in the first instance, unless the patient is deemed high risk or has known disease (1).
- An ADD-RS >1 should proceed to investigation with a motion-free CTA whole aorta (1).
- An ADD-RS of 1 (any single high-risk feature) should proceed to motion-free CTA thoracic aorta (1).
- An ADD-RS >1 or an ADD-RS equal to 1 AND a d-dimer >500ng/mL should prompt an ECG gated CT whole aorta (3).
- 75% of patients in whom aortic dissection is suspected and have a D-dimer requested should also have evidence of pre-test calculation of the ADD-RS (3).

METHOD



A single-centre retrospective audit reviewed 50 emergency department patients who underwent CTA for suspected AAS over two months at a district general hospital.

Data collected included clinical history on CT referral, CT protocol, cannula site, D-dimer, BP and HR control in confirmed cases, documentation of high-risk features in medical notes and diagnosis.

The ADD-RS score and ideal CT protocol were also evaluated as per the BSCI guidelines.

RESULTS

33 patients were identified as low risk based on the clinical history provided on CT referral and as such should not have been scanned without further information or clinical discussion. One patient who scored as low risk had abnormal findings on a CT carotid scan and therefore proceeded to CT aorta.

17 patients were identified as intermediate risk; of these, 16 should have undergone thoracic CT (instead of whole aorta). One of the intermediate risk patients had evidence of perfusion deficit (severe left leg pain with absence of dorsalis pedis pulse) which warranted investigation with CT whole aorta.

None of the patients were classified as high risk using ADD-RS.

Of the 50 CT aortograms reviewed, only two confirmed AAS (one type A dissection and one penetrating aortic ulcer). This reflects a 4% positivity rate for CTA, aligning with the <5% pick up rate reported in the DASHED study (2024) of a large UK-based observational cohort (4). These findings support the critical diagnostic role of CT aortograms in suspected AAS, where timely identification despite low prevalence is essential given the potentially life-threatening consequences of missed diagnoses.

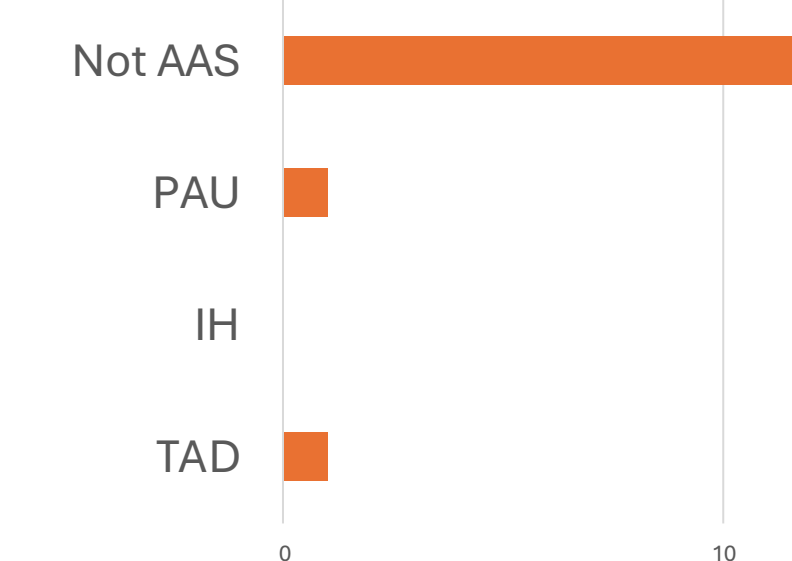


Figure 1: CT Aortogram outcomes in ED patients with suspected AAS
PAU – penetrating aortic ulcer, IH – intramural hematoma, TAD – type A dissection

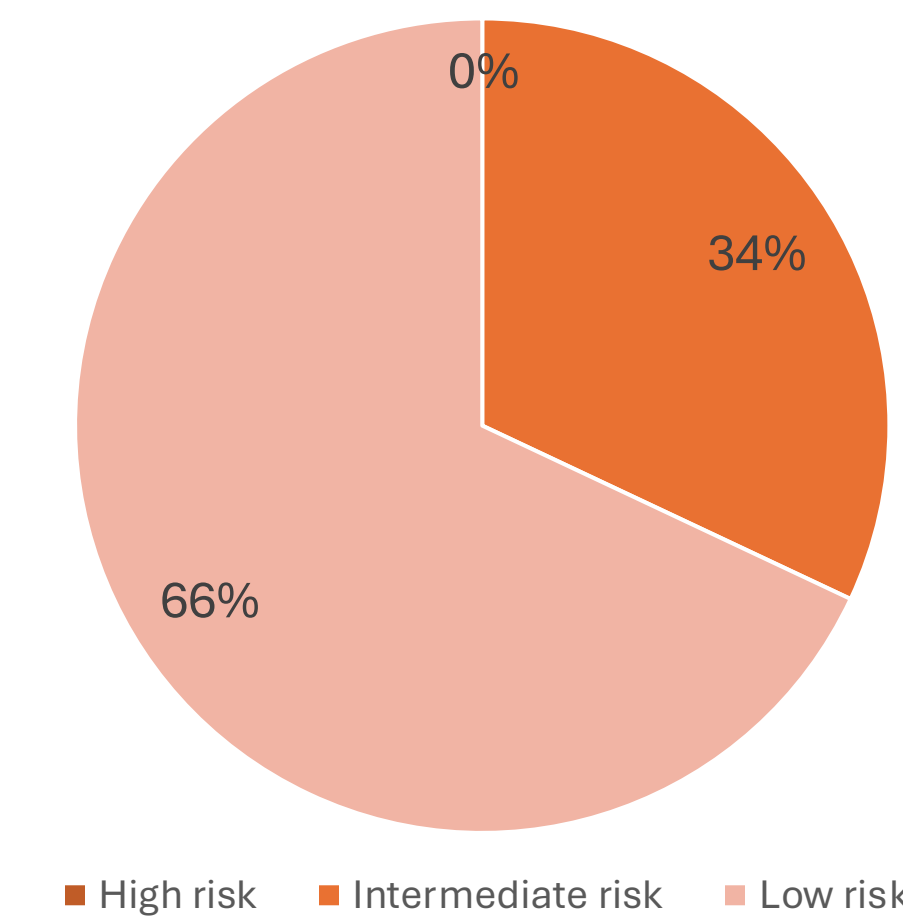


Figure 2: Distribution of high, intermediate and low ADD-RS in 50 ED patients with suspected AAS

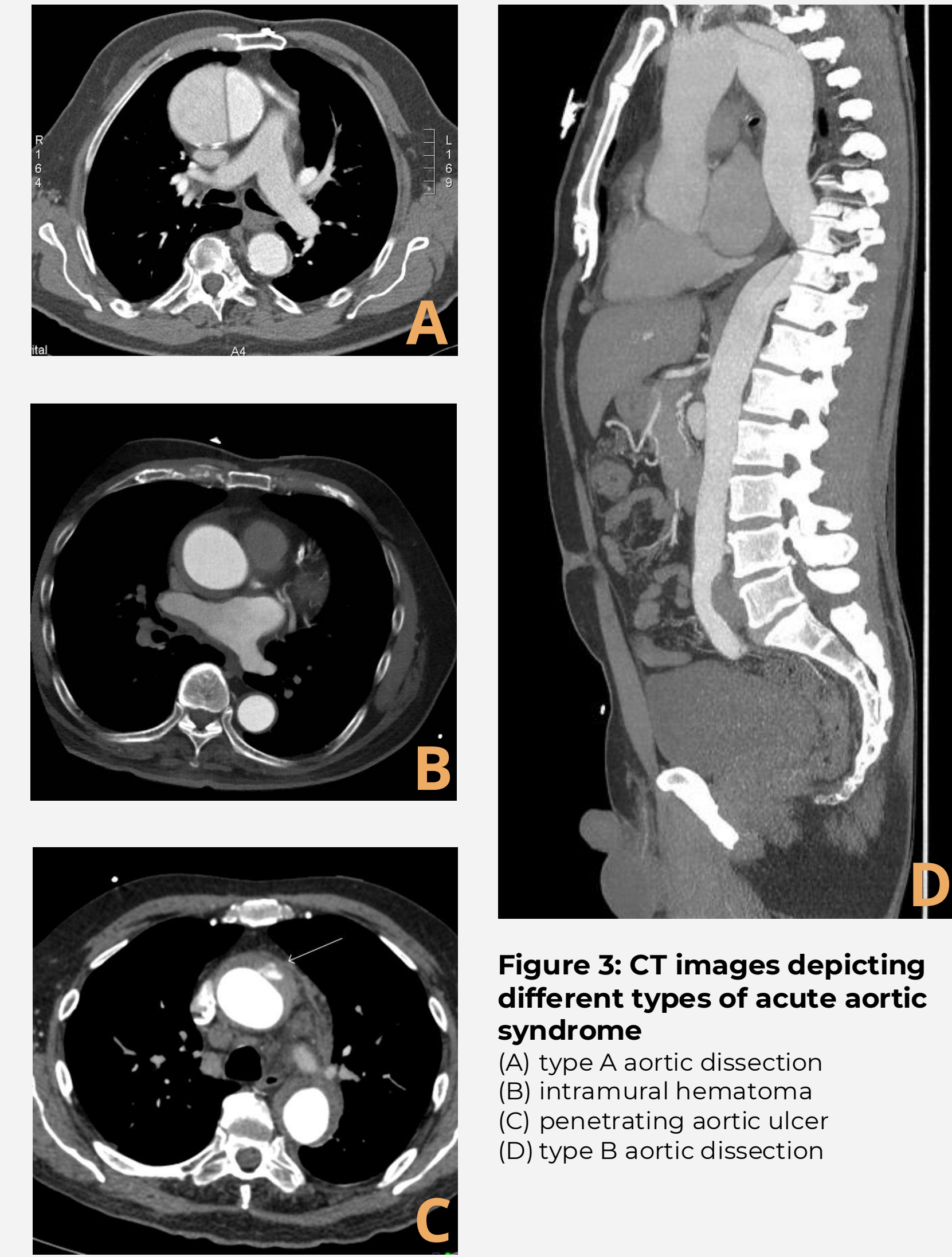


Figure 3: CT images depicting different types of acute aortic syndrome
(A) type A aortic dissection
(B) intramural hematoma
(C) penetrating aortic ulcer
(D) type B aortic dissection

ACTION PLAN

- Feedback loop – share audit findings and learning points at departmental governance meetings (ED and radiology) to highlight the importance of accurate clinical information on CT referral so that the vetting radiologist can choose the correct CT aorta protocol.
- Education and awareness – targeted teaching sessions for ED clinicians on the use of ADD-RS and imaging indications to improve confidence in risk stratification and reduce unnecessary imaging in low-risk patients.
- Documentation improvement – introduce a mandatory ADD-RS field in the electronic request form for CT aortograms to ensure pre-test scoring is consistently performed and recorded.
- Re-audit in 2 months to assess improvement in documentation of ADD-RS and diagnostic yield of CT aortograms.

Next steps

To incorporate the ADD-RS scoring tool into routine practice and local imaging protocols, which would in turn promote standardised decision-making and strengthen adherence to national guidelines.

CONCLUSION

The first audit cycle has demonstrated that a significant proportion of patients were low risk and that based on the clinical details provided in the CT requests, imaging was not indicated.

Documentation gaps and limited use of the ADD-RS pre-test scoring tool suggest a need for improved clinical risk stratification. This will be addressed through targeted education, protocol reinforcement and mandatory pre-test scoring. These measures aim to optimise imaging protocol decisions, improve resource stewardship and strengthen compliance with national standards.

A planned re-audit will assess the impact of these interventions on CT aortogram utilisation and the appropriateness of scan requests.

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