Audit of CT aortogram yield in evaluation of suspected Acute Aortic Syndrome

Nikhil Nair, Geethu Punnen, Huma Khosa, Neelam Saleem, Mohd Shadab Siddique

NHS Bedfordshire Hospitals NHS Foundation Trust

INTRODUCTION AND AIM

Acute Aortic Syndrome (AAS) comprises aortic dissection, intramural haematoma and penetrating atherosclerotic ulcer. AAS often present as diagnostic enigmas in the ED, leading to potentially fatal misdiagnoses. Given these challenges, the **CT Aortogram (CTA)** remains the diagnostic modality of choice. (1)

To optimize the use of **CT Aortogram (CTA)**, emergency care physicians at **Bedford Hospital**, a vascular referral centre, developed an **AAS Pathway of Care** guideline in January 2021.(2) **RCR best practice guidelines** (Jan 2024) for diagnosing thoracic aortic dissection closely mirrors the Bedford hospital guideline.

This audit evaluates CTA yield before and after the Pathway of care guideline's implementation. We hope that results from this audit would predict potential nationwide impact of the RCR guidelines published in January 2024.

Pathway of care guidelines, Bedford Hospital, Jan 2021

AAS must be considered in adults with risk factors such as Hypertension, Genetic Aortic Syndromes, Aortic Valve Disorders, pre-existing aortic disease, smoking etc. presenting with:

- Sudden onset of intense 'sharp,' 'tearing,' or 'ripping' pain in the neck, back, chest, or abdomen
- Sudden numbness or weakness in any limb or limbs,
- Unexplained collapse

'Plus One Rule': If a patient has chest pain **plus one or more other remote symptoms:**

- Leg pain or weakness/numbness, Back pain, pulse deficit or focal neurological deficit

AUDIT STANDARDS

Audit standards were derived from the results of a large retrospective study of 5287 patients published by Meng et al in 2019 evaluating CTA yield for suspected AAS (3).

INDICATORS AND TARGET

AAS incidence – 5.9 %
Significant alternative diagnosis – 4.9 %
Overall diagnostic yield of CTA – 10.8 %
Target - 95% compliance with indicators

MATERIALS AND METHODS

Retrospective Audit of index presentations of patients to the Emergency Department with suspected AAS diagnosis.

1st audit round – January 2020 - January 2021 (n = 182)

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January 2021: Implementation of a clinical care pathway guideline for AAS.

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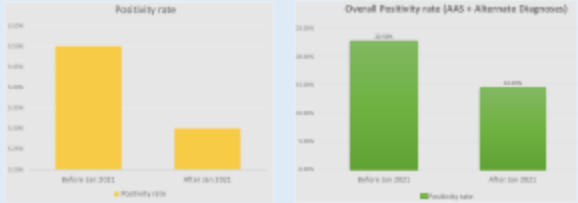
2nd audit round – February 2021 - February 2022 (n = 301)

RESULTS AND DISCUSSION

	No of patients	Positivity rate	Significant alternative diagnosis	Overall diagnostic yield
1st round	182	5.5 % (10 cases)	17%	22.5%
2nd round	301	5.3 % (16 cases)	9 %	14.3%

OBSERVED IMPACT – post guideline implementation

- **Number of CTAs performed - 65.4% increase**
- **Positivity rate for AAS - 3 % overall decline**
- **Positivity rate of CTA for identifying cause of presentation - 8.2% decline**



Decline in positivity rate of AAS, alternative diagnosis and overall diagnostic yield after guideline implementation as compared to the first phase of audit (prior to guideline implementation.)

The target positivity rate for AAS of 5.6 – 5.9 % was not achieved in both phases – however 6 extra cases were identified in the second phase (16 vs 10 AAS cases) following guideline implementation which translates into '6 extra lives saved ' and 60 % increase in mean annual incidence of AAS .

Contrary to expectations of achieving the originally proposed targets, the drop in all parameters after guideline implementation was attributable to the sheer increase in the number of CTAs.

Alternative diagnosis

- Significant alternative diagnosis was found in 11% cases with overall diagnostic yield being 17%.
- Thoracic /cardiac causes were the most common of alternative diagnosis

CONCLUSIONS

- 60 % increase in mean annual incidence of AAS (16 vs 10 cases) detected on CTA post guideline implementation
- Massive increase in CT departmental workload (65.4%)
- Contrary to expectations, decline in positivity rate for AAS and overall diagnostic utility of CTA's post guideline implementation
- Improving AAS detection while managing the increased CT workload is essential
- **Considering the similarities between the local guidelines and RCR guidelines, the results of this audit can be seemingly extrapolated to the impact of using clinical referral criteria based on the RCR guidelines.**

LIMITATIONS

- Missed AAS diagnosis on CTA due to interpretation or technical errors was not considered.
- Non-contrast CT chest and ECG gating was not part of the CTA protocol.
- Review was restricted to the diagnostic pathway.

ACTION PLAN AND RECOMMENDATIONS

- **Optimising CTA utilisation** requires clear patient selection criteria. Standardised national guidelines for early AAS assessment and management will guide care pathways.
- **Incorporating protocol changes such as** non-contrast chest CT and ECG gating in accordance with RCR guidelines, will reduce errors and enhance AAS detection.
- **Raising awareness** and using a **checklist-based approach for alternative diagnoses** in acute cases will improve overall diagnostic accuracy.

REFERENCES

1. Wasanivavalagi SW, Bhat S, Schreve F, Milsom P, Bergin CJ, Jones PG. Trends in computed tomography aortography and acute aortic syndrome in an emergency department within Aotearoa New Zealand. Emerg Med Australas. 2022 Oct;34(5):769-778. doi: 10.1111/1742-6723.13974. Epub 2022 Apr 12. PMID: 35415971; PMCID: PMC9790442.

2. Acute Aortic Dissection Pathway of Care – Clinical guideline published on Intranet within Bedford Hospital site. January 2021

3. Meng J, Mellnick VM, Monteiro S, Patlas MN. Acute Aortic Syndrome: Yield of Computed Tomography Angiography in Patients with Acute Chest Pain. Canadian Association of Radiologists Journal. 2019;70(1):23-28. doi:10.1016/j.carj.2018.10.011