Do patients presenting with Stroke get timely and appropriate investigations?

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INTRODUCTION

Stroke is a common condition, with 1 in 6 of the UK population having a stroke during their lifetime. It is the 3rd biggest cause of death in Scotland and 2/3 of stroke survivors are left with some form of disability. Early diagnosis of the type and aetiology of stroke can significantly reduce morbidity and mortality. This means it is vital to have the correct imaging performed within an appropriate time frame. This is aided by effective communication between clinical and imaging departments, often through regular multidisciplinary team meetings (MDTMs).

We used national guidelines to audit the timing and appropriateness of imaging in patients presenting to our centre with clinical signs and symptoms of stroke.[1] In particular, we assessed the time taken to undergo initial CT brain scan, the proportion who underwent subsequent MRI brain, and the timing and appropriateness of further cerebrovascular imaging, including carotid Doppler Ultrasound and CT angiography (CTA).

METHODS

Data were collected from all patients that presented with clinical suspicion of stroke to Royal Alexandra Hospital, Paisley from July to August 2018. Presenting symptoms, physical and imaging findings and final diagnosis were collated from imaging and clinical records. Based on these we categorised patients as anterior or posterior circulatory infarct, haemorrhage, TIA or stroke mimic with each having its own individual investigative pathway.

In our centre we utilise CT brain as primary diagnostic imaging and MRI brain in subsequent clinically selected patients and we aim to have this completed in 24 hours. Similarly we use Doppler Ultrasound as our primary investigative test for carotid disease and CTA for confirmation of Doppler abnormality or for assessment of the posterior circulation in selected patients. We aim to have this completed in 48 hours as per national guidelines.

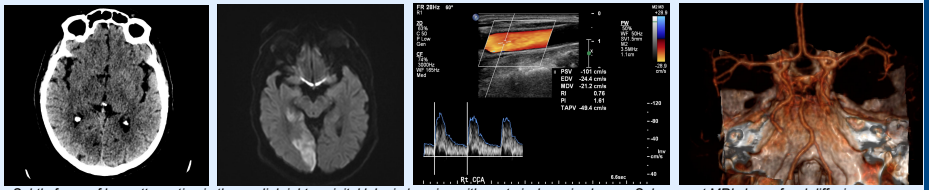
RESULTS

A total of 118 patients were included in our audit and sub-categorised as to final diagnosis as:
anterior circulation stroke (55), posterior circulation stroke (11), haemorrhagic stroke (5), TIAs (15), and stroke mimics (32) (including urinary/respiratory tract infections, falls and vertigo).

106 out of 107 patients had CT brain as primary investigation within 24 hours (the remaining patient underwent MRI within 24 hours) to completely satisfy national standard (subsequently reduced to 12 hours).

Of the 55 patients with final diagnosis of anterior circulation stroke:
- 33 had abnormalities on CT to confirm nature of acute stroke. 9 went on to have an MRI brain because of atypical physical findings
- 22 patients did not have any findings on presentation CT of which 18 underwent MRI
- 16 (44%) underwent US within 48 hours, 20 outwith this. 6 patients went on to CTA; only 2 (33%) performed within 48 hours.

Of the 11 patients with posterior circulation stroke:
- 6 had abnormalities on presentation CT of which 2 had confirmatory MRI
- 5 had a "normal" CT brain and all who were able to had MRI subsequently
- Neurovascular imaging by CTA was performed in 4 (36%) ; only 1 within 48 hours
- 3 patients had US doppler of their carotids not entirely explained by clinical presentation or timing of confirmatory MRI.



Subtle focus of hypoattenuation in the medial right occipital lobe in keeping with acute ischaemic change. Subsequent MRI shows focal diffusion restriction within the region, in keeping with right posterior circulation territory ischaemia.
Carotid Doppler Ultrasound is a useful technique in assessing for surgical grade stenosis in the carotid arteries.
3D Recon of CTA performed to assess for Carotid artery disease, performed in patients presenting with posterior circulation symptoms.

DISCUSSION

In our centre, patients presenting with symptoms of stroke undergo diagnostic CT brain scanning promptly.
It is clear, however, that improvements need to be made in time taken to perform neurovascular imaging. 53% of patients who underwent Doppler Ultrasound had their scan performed more than 48 hours after presentation. Only 20% of patients undergoing CTA had their scans within this timeframe. Similarly improvements could be made in choosing the optimal neurovascular imaging – this review noted 3 of 11 patients with posterior circulation symptoms undergoing unnecessary Doppler Ultrasound scans.

Improvements could also be made in patient selection and timing of MRI studies to confirm and clarify stroke diagnosis. By reducing the number of these more complex and time consuming examinations, we could target those who will benefit from them most with earlier imaging. This will reduce unnecessary investigations such as US for posterior strokes and stroke mimics. Whilst we may be able to reduce the number of MRIs by performing later or repeat CT scans [(3)] we are constrained by both legal regulations which call for radiation exposure to be kept to "As Low As Reasonably Achievable" and the requirement to establish an early diagnosis, especially given the dreadful statistic that only 1 in 10 patients in Scotland eligible for thrombolysis achieves it. [(4)]

RECOMMENDATIONS

This audit was discussed between members of the Stroke MDTM. In addition to repeat audit, it suggested:
- Ensuring excellent performance in timeous diagnostic CT brain maintained, especially given reduction of standard to 12 hours.
- Reserving MRI for patients under the age of 75 in whom there is clinical uncertainty as to nature of stroke with regard CT findings or if features of posterior circulation stroke.
- Better access to MRI for stroke patients with early dedicated slot
- More rapid MRI eg. by utilizing Siemens GOBrain© protocol (5)
- Better targeting of patients to Doppler Ultrasound or CTA
- Better education of referring clinicians and justifying radiologists by audit poster and educational seminar

REFERENCES

1. SIGN Guideline 108 - Management of patients with stroke or TIA. Date accessed: September 2018
2. Smajlović D, Sinanović O. Sensitivity of the neuroimaging techniques in ischemic stroke. Med Arh. 2004;58(5):282-4
3. NICE Guideline 128 - Stroke and transient ischaemic attack in over 16s: diagnosis and initial management. Date accessed: May 2019
4. The Stroke Association "State of the Nation Report"
5. https://www.siemenshealthineers.com/magnetic-resonance-imaging/magnetom-world/clinical-corner/protocols/neurology-neurography/gobrain-protocols