

Decompressive Hemicraniectomy in Malignant Middle Cerebral Artery (MCA) Infarction

Salford Royal 
NHS Foundation Trust

University Teaching Trust

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Who should read this document?

Clinical staff involved in the assessment, management and treatment plans for patients admitted with acute anterior circulation stroke under the Comprehensive Stroke Centre (CSC) based at Salford Royal hospital. Separate (complementary) policies will apply at the Primary & District Stroke Centres (Stepping Hill and Fairfield General hospitals) as agreed through the Operational Delivery Network (ODN).

The protocol is intended to support and guide clinical decision making in line with national guidance.

Key Practice Points

Patients with middle cerebral artery (MCA) infarction who meet ALL of the criteria below may be considered for decompressive hemicraniectomy:

- Within 48 hours of stroke onset
- Clinical deficits indicating infarction in the MCA territory
- Total National Institute of Health Stroke Scale (NIHSS) 15 or more
- Drowsy (NIHSS component 1a score ≥ 1)
- Imaging evidence of >50% MCA territory infarction with or without additional infarction in the territory of the ipsilateral anterior or posterior cerebral artery
- If MR imaging used, >145cc infarct volume on DWI

Patients should ideally be referred within 24 hours of onset of symptoms with the intention to operate within 48 hours of stroke onset.

Exclusion criteria:

- Short life expectancy (<3years)
- Pre-existing disability (pre-morbid modified Rankin Scale*[mRS] >1)
- Two fixed dilated pupils
- Major medical or neurological co-morbidity (expected to worsen outcome)

****modified Rankin scale – see appendix***

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Background/ Scope/ Definitions

Patients with a large MCA infarction are at high risk of developing brain swelling and death from secondary pressure on the brainstem (coning) – the malignant MCA syndrome.

There are some data (high quality, small studies – n=205, 4 studies) to inform the decision as to whether neurosurgical intervention in the form of hemicraniectomy may be appropriate.

Hemicraniectomy in this situation should be seen as having the potential to save life rather than a treatment that will prevent disability.

- For survival in any condition NNT is 2 patients
- For survival with mRS \leq 3 NNT is 4 patients
- Dominant hemisphere infarction DOES NOT preclude surgery
- Treatment with thrombolysis or IA thrombectomy DOES NOT preclude surgery

What is new in this version?

This is a new guideline.

Guideline

All eligible patients for whom the possibility of hemicraniectomy has been discussed and is acceptable to them / their representative:

1. Will be closely monitored on the Hyperacute Stroke Unit (HASU) with:
 - Usual stroke care according to protocols
 - Hourly neurological observations
 - Hourly GCS and NIHSS 1a
2. Where there is a drop in GCS by 1 point OR increase in NIHSS 1a by 1, urgent medical review is indicated with consideration of immediate brain CT scanning.
3. Where GCS and NIHSS remain stable – CT brain scan will be repeated at 12-24 hours.
4. Where repeat CT scan suggests increased area affected by stroke or compression of lateral ventricle or antero-septal midline shift of \geq 3mm, then refer to the on-call neurosurgical team (via pager). Refer to the flow sheet in the appendix for guidance on repeat imaging. Should

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intervention threshold not be met on the 24 hour scan continue monitoring to 48h and re-scan if the clinical criteria are met.

Standards

Standards 1&2 are in keeping with national guidance and compliance will be measured via national audit process.

Standards 3&4 are locally derived from interpretation of the best available (RCT) evidence and will be audited locally prospectively.

Explanation of terms

Explained in body text.

References and Supporting Documents

National clinical guideline for stroke (fifth edition). Royal College of Physicians 2016 <http://www.rcplondon.ac.uk/resources/stroke-guidelines>

Diagnosis and initial management of acute stroke and transient ischaemic attack – Clinical Guidelines CG68 2008. <http://guidance.nice.org.uk/CG68>

Vahedi K, Hofmeijer J, Juettler E et al. Early decompressive surgery in malignant infarction of the middle cerebral artery: a pooled analysis of three randomised controlled trials. *Lancet Neurology* 2007;6(3):215-222

Juttler E, Unterberg A, Woitzik J et al. Hemicraniectomy in older patients with extensive middle-cerebral-artery stroke. *NEJM* 2014;370(12):1091-100

Roles and responsibilities

The guideline will be distributed and publicised via the Trust clinical governance framework.

Candidacy for hemicraniectomy will be considered in all patients and reviewed at the post-take ward round.

The stroke team will be responsible for identification and monitoring of patients at risk of malignant MCA infarction and will counsel patients and their families / carers accordingly. The potential need for and role of hemicraniectomy should be discussed early in the admission where this might be a consideration and will inform the decision as to whether to refer for neurosurgical opinion.

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The stroke team will be responsible for care and monitoring of patients at risk of malignant MCA infarction. As and when such patients are identified the stroke team will alert the on-call neurosurgical team and discuss the potential need for intervention. This will allow time for consideration such that where intervention is necessary this can be done appropriately. (per protocol).

The neurosurgical team will consider patients on a case-by-case basis in the light of current evidence and guidelines and in accordance with the known and explored wishes of the patient and their families / carers.

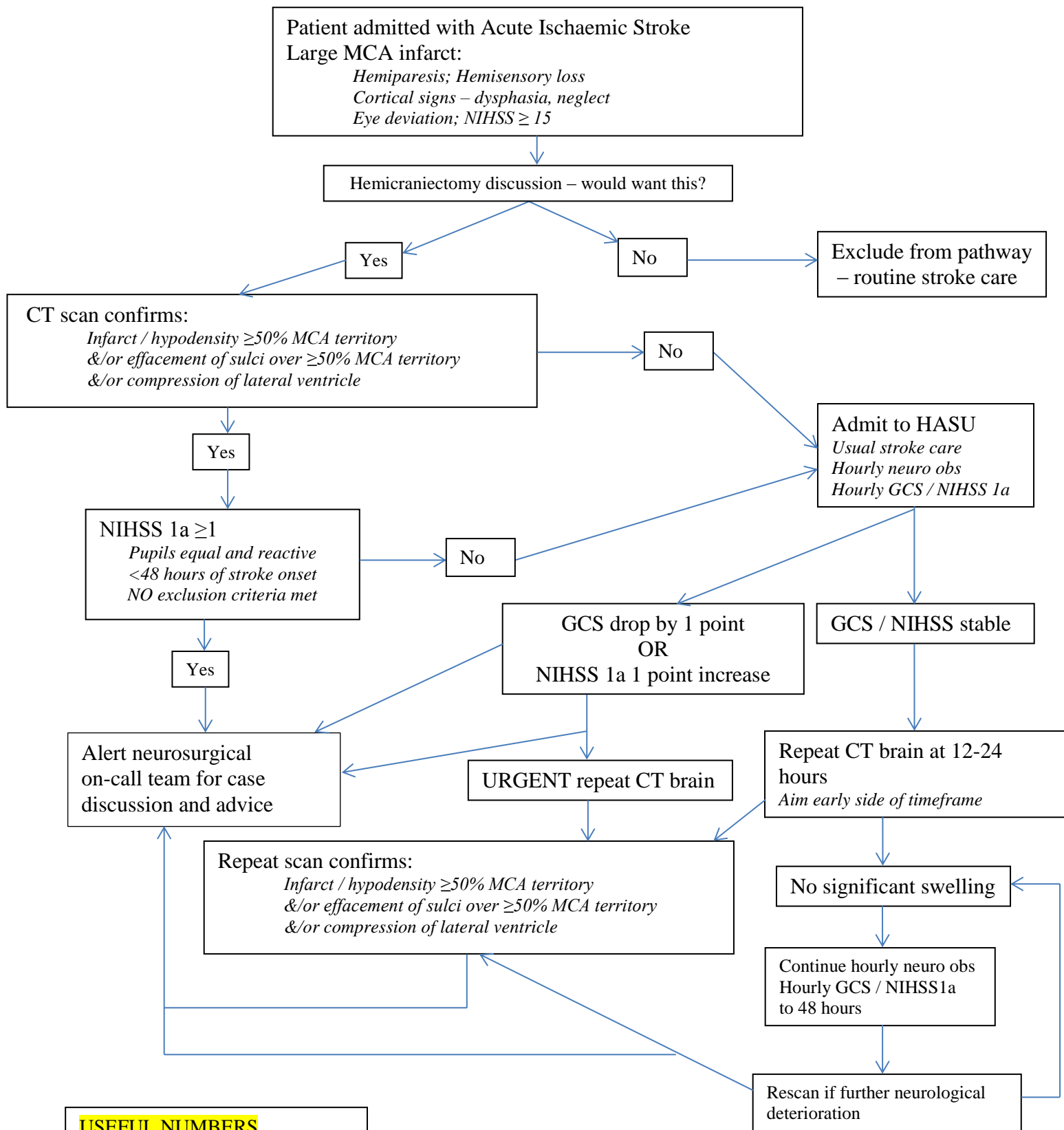
Post-operatively patients will go to level 2 or 3 care under the care of the neurosurgical team.

From level 2 or 3 care patients will be transferred to the HASU - UNLESS they have a tracheostomy in situ in which case they will transfer to a neurosurgical ward under the care of the neurosurgical team with daily review by the stroke team.

Patients will be transferred back to their base hospital once stable for ongoing post-stroke care once perioperative care complete, according to clinical need.

The neurosurgical team will arrange a separate admission for cranioplasty ≥ 3 months from initial surgery.

Appendix 1:



USEFUL NUMBERS

Stroke Baton Phone:
0161 206 0070

Neurosurgical Registrar on-call:
07623 500478

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Appendix 2:

Modified Rankin scale

Score	
0	No symptoms at all
1	No significant disability despite symptoms; able to carry out all usual duties and activities
2	Slight disability; unable to carry out all previous activities but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention

Appendix 3:

Inclusion criteria – the following questions must answer ‘YES’:	
Has the patient had an ischaemic stroke within the last 48 hours?	
Is the NIHSS score ≥ 15 ?	
Are they usually independent? (mRS ≤ 1)	
Is there imaging evidence of $>50\%$ MCA territory infarct \pm ACA/PCA?	
Would hemicraniectomy be acceptable to them?*	
Exclusion criteria – the following questions must answer ‘NO’:	
Do they have a short life expectancy (<3 years)?	
Are their pupils fixed / dilated?	
Is there a major co-morbidity that would compromise outcome?	

**full discussion will be needed with patient where able, involving their next of kin / representative*

Appendix 4:

NIHSS Chart

Category	Score/Description	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time
		Initials	Initials	Initials	Initials	Initials
1a. Level of Consciousness (Alert, drowsy, etc.)	0 = Alert 1 = Drowsy 2 = Stuporous 3 = Coma					
1b. LOC Questions (Month, age)	0 = Answers both correctly 1 = Answers one correctly 2 = Incorrect					
1c. LOC Commands (Open/close eyes, make fist/let go)	0 = Obeys both correctly 1 = Obeys one correctly 2 = Incorrect					
2. Best Gaze (Eyes open - patient follows examiner's finger or face)	0 = Normal 1 = Partial gaze palsy 2 = Forced deviation					
3. Visual Fields (Introduce visual stimulus/threat to pt's visual field quadrants)	0 = No visual loss 1 = Partial Hemianopia 2 = Complete Hemianopia 3 = Bilateral Hemianopia (Blind)					
4. Facial Paresis (Show teeth, raise eyebrows and squeeze eyes shut)	0 = Normal 1 = Minor 2 = Partial 3 = Complete					
5a. Motor Arm - Left 5b. Motor Arm - Right (Elevate arm to 90° if patient is sitting, 45° if supine)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement X = Untestable (Joint fusion or limb amp)	Left				
		Right				
6a. Motor Leg - Left 6b. Motor Leg - Right (Elevate leg 30° with patient supine)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement X = Untestable (Joint fusion or limb amp)	Left				
		Right				
7. Limb Ataxia (Finger-nose, heel down shin)	0 = No ataxia 1 = Present in one limb 2 = Present in two limbs					
8. Sensory (Pin prick to face, arm, trunk, and leg - compare side to side)	0 = Normal 1 = Partial loss 2 = Severe loss					
9. Best Language (Name item, describe a picture and read sentences)	0 = No aphasia 1 = Mild to moderate aphasia 2 = Severe aphasia 3 = Mute					
10. Dysarthria (Evaluate speech clarity by patient repeating listed words)	0 = Normal articulation 1 = Mild to moderate slurring of words 2 = Near to unintelligible or worse X = Intubated or other physical barrier					
11. Extinction and Inattention (Use information from prior testing to identify neglect or double simultaneous stimuli testing)	0 = No neglect 1 = Partial neglect 2 = Complete neglect					
TOTAL SCORE						