

1. Introduction

This guideline summarises expert consensus recommendations on the management of Incidental findings on Brain imaging. Due to an increasing frequency of undertaking brain imaging, incidental imaging abnormalities are often reported. This generates a significant amount of anxiety for clinicians and patients, and this guideline aims to support appropriate management of patients by general clinicians.

2. Scope

Applies to all clinicians involved in MRI brain requests.

3. Recommendations, Standards and Procedural Statements

See next page

Incidental Brain MRI findings

a guide for general clinicians in primary & secondary care

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DISCLAIMER: this guidance summarises consensus expert advice based on the literature. The clinician-in-charge remains responsible for the overall management of the patient in light of their presenting symptoms and signs, and clinical diagnosis.

CEREBROVASCULAR DISEASE

Small Vessel Disease

Cerebral small vessel disease, often described as small vessel disease or SVD, is very common and the incidence increases with age. If present the reporter should grade this as mild (Grade 1), moderate (Grade 2) or severe (Grade 3).

Mild/Grade 1 SVD

No treatment advised. If appearances are atypical (i.e. young patient) then advice may be given such as checking vascular risk factors. See “WHITE MATTER CHANGES including possible demyelination” below.

Moderate/Grade 2 or Severe/Grade 3 SVD

Considered clinically significant (stroke equivalent). The patient is eligible for secondary stroke prevention irrespective of symptoms, to be initiated by the clinician-in-charge. This includes the following to be considered on an individualised basis:

1. Clopidogrel 75mg once daily
2. Statin (to achieve target cholesterol: Total <4 and LDL <2)
3. Antihypertensive (to achieve target BP<140/90)
4. ECG to screen for AF

Infarcts

Acute infarcts are an uncommon finding and will be acted on promptly by the reporter. Stroke specialist advice should be sought urgently either via the Stroke oncall team (phone via switchboard), or by referral to the TIA clinic via PRISM (Primary Care) or PLEXIAS (secondary care).

Old infarcts are a common finding on brain imaging and are often known. The presence of old *incidental* infarcts should prompt a review of secondary stroke prevention by the referring clinician, including an ECG to screen for AF, and consideration of a 24-hour monitor to screen for PAF, if there are suggestive symptoms. Refer to Stroke Medicine if further advice required.

Micro-haemorrhages

These are small (less than or equal to 10mm⁴) bleeds and are not acute in the overwhelming majority of outpatient brain scans. They are only visible on MRI.

Although there are numerous causes the most common and clinically relevant are those in a distribution suggesting either hypertension or cerebral amyloid angiopathy:

1. **Hypertension:** Advice treat hypertension (Initial target BP <140/90, optimal <130/80)
2. **Cerebral Amyloid Angiopathy (CAA):** Refer if stroke or TIA symptoms; otherwise no specific treatment indicated (other than standard BP management).

If **atypical/unusual cause suspected**, the reporter will advise regarding follow up or referral.

- **If there are more than 5 micro-haemorrhages, AND patient is on anticoagulation** – this indicates an increased risk of intracranial bleeding and the referring clinician would need to review to consider (a) stopping anticoagulation, and (b) possibility of cardiology intervention e.g. Left atrial appendage occlusion (LAAO) [Please refer to UHL AF Guideline page 19 for more info](#)
- **If further advice is needed**, non-frail patients can be referred to the Cardiology AF clinic via PRISM, or if frail, seek Stroke opinion by referral to outpatient stroke services.

Note: Carotid Doppler is not indicated in asymptomatic patients. Symptomatic patients with neurological symptoms can be referred to the TIA clinic, via PRISM (where a Carotid Doppler will be undertaken if appropriate).

WHITE MATTER CHANGES including possible demyelination

White matter changes not felt to be typically vascular are a common finding as MRI is increasingly used and a source of anxiety for both the clinician and patient. The list of potential causes is long and in most cases a cause is not apparent on MRI (“nonspecific white matter hyper-intensities”).

Advice and guidance from neurology is suggested if there is concern.

The reporter will indicate if the distribution is typical for demyelination/MS, and advise accordingly, in line with the clinical picture provided:

- **If asymptomatic**, refer patient to Neurology service via PRISM for initial imaging review.
- **If recent neurological symptoms** felt to be related, call the on-call Neurology Specialty Trainee for review of images and advice on urgency of review, if needed.

DEVELOPMENTAL ABNORMALITIES

Pineal Cyst

A pineal cyst is a very common incidental finding within the pineal gland.

- **Typical** incidental pineal cysts in adults (regardless of size) – patients should be reassured and routine follow-up imaging is not usually required².
- **Atypical** pineal cyst - the reporter will comment and advise regarding follow up and/or referral e.g. a 1 year follow up scan (if appropriate) can be arranged by the clinician-in-charge.

Developmental Venous Anomaly (DVA)

A congenital malformation (some would say extreme developmental anatomical variation) comprising a dilated medullary vein which drains normal brain. They are common and if isolated are an incidental finding in the vast majority of cases. Solitary DVAs are very rarely associated with symptoms and have a benign clinical course³.

- **Typical** asymptomatic DVAs do not need to be treated.
- **Atypical** cases (eg if associated with cavernoma – see below) the reporter will comment and advise regarding follow up and/or referral.

Arachnoid Cyst

Arachnoid cysts are CSF-filled spaces located in the subarachnoid space and represent a common, benign finding in the vast majority of cases, even if very large.

- **Typical** asymptomatic arachnoid cysts do not need to be treated.
- **Atypical** cysts – the reporter will comment and advise regarding follow up and/or referral.

Cavernoma⁵

A cavernoma is made up of abnormal blood vessels in the brain and/or spinal cord and affects around 1 in 600 people. Cavernomas are also known as cavernous angioma, cavernous haemangioma or cerebral cavernous malformation. They can measure from a few millimetres to several centimetres.

Follow up and treatment will depend on symptoms (if any), size and location. If symptomatic, refer to neurology via advice and guidance.

Chiari Malformation and Cerebellar Tonsillar Ectopia

In adults Chiari I malformations are defined as migration of the cerebellar tonsils below the foramen magnum by >5mm⁹. Where the migration is <5mm, alternative terms used are tonsillar ectopia or low-lying tonsils.

Follow up will depend on whether symptoms are felt attributable and if the presence of a spinal cord syrinx should be excluded. Discuss with neurology via advice and guidance.

INTRACRANIAL ANEURYSMS

Unruptured intracranial aneurysms (UIAs) affect up to 3% of the adult population in most Western countries and most do not rupture⁷. The detection rate for GP direct access imaging will be lower as small aneurysms will not be picked up on plain CT/MRI.

Consensus opinion on the management of UIAs should be sought from a Neuro-vascular MDT, in light of risk of aneurysmal rupture, the risks of endovascular and surgical treatment, and the durability of intervention, considering the patient's age, comorbidities, lifestyle and personal wishes⁷. Please consider frailty status and explore patient wishes before referral.

To seek a specialist Neuro-vascular MDT opinion, the responsible clinician can email the Neuro-radiology specialist nurses at: Neuroradiology.SpecialistNurse@nuh.nhs.uk and they will provide an MDT proforma for completion and return to the MDT to enable discussion.

INTRACRANIAL TUMOURS

Although these may be the main concern of the patient, they are rare and the majority discovered on primary care imaging are benign/low grade. A recent audit of GP direct access scans for headache discovered 2 tumours (a low-grade astrocytoma and an incidental pituitary adenoma) in 562 scans (0.36%). New diagnosis of intracranial tumour did not exceed 1% in patients referred via the 2WW PRISM form.

Meningioma

Meningioma is the most common intracranial tumour in adults. The standard pathway is that these are discussed at the regional Neuro-oncology MDT (QMC Nottingham); and typically will be seen in clinic with 1 year follow up, to assess for any growth. Occasionally, these can be dismissed as incidental without further follow up/referral (eg really small, calcified in an older person, previous imaging reveals no growth) at the discretion of the reporter.

If **complicated**, more urgent action will be instigated by the reporter (e.g. large lesion, mass effect, oedema in the underlying brain).

Pituitary

Adenomas are usually incidental. Advice should be sought via **advice and guidance referral to endocrinology**. Most required dedicated pituitary MRI imaging.

Rathke cleft cysts are non-neoplastic cysts in the pituitary and usually incidental. Follow up and referral is usually not required.

If **atypical** features, the reporter will advise on the need for referral.

Schwannoma

Vestibular schwannomas (also called acoustic neuromas) are relatively common although small lesions will be missed on routine imaging. **Routine referral to ENT** is advised, unless more prompt action is suggested in the report.

Primary brain tumours are rare. Low grade lesions require referral to the regional Neuro-oncology MDT (QMC Nottingham) by the responsible clinician in primary or secondary care making the diagnosis. An additional MRI with contrast will be required (if not performed already).

More aggressive high grade brain tumours tend to present more acutely with focal neurological deficits, raised intracranial pressure and seizures. As such many are diagnosed in hospital rather than in primary care. Management usually involves the regional Neuro-oncology MDT (QMC Nottingham), MRI with contrast, and CT chest/abdomen/pelvis (to rule out primary), by secondary care.

SINUS DISEASE - SINUSITIS

Sinus disease is a very common extracranial finding reported in 13% of asymptomatic volunteers in one study, with a seasonal prevalence (more common February to April)⁶. Unless symptoms are typically sinus-related, a primary headache should not be readily attributed to sinus disease (a common misdiagnosis for migraine⁸). More severe sinus disease, as a plausible cause for headache, will usually attract a comment in the report and ENT referral may be appropriate.

INTRACRANIAL HYPERTENSION AND HYPOTENSION

Idiopathic Intracranial Hypertension (IIH, previously called benign intracranial hypertension) may be suggested by certain imaging findings although the diagnosis requires correlation with clinical signs such as papilloedema and CSF studies. Seek Neurology advice and guidance in the first instance.

Please note an “**empty sella**” is a common incidental finding of no clinical significance unless there are other features to suggest associated IIH or other structural abnormality.

Intracranial hypotension may be raised as a possibility due to the number of scans from primary care being for headache (typically relieved by lying down). The imaging strategy can be complicated and typically a contrast enhanced MRI is required if there are suggestive findings on routine scanning. Seek Neurology advice and guidance in the first instance.

REFERENCES

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3. The Presentation and Clinical Course of Intracranial Developmental Venous Anomalies in Adults: A Systematic Review and Prospective, Population-Based Study. Jennifer ML et al. *Stroke* 2009; 40 (6) 1980-1985
4. Update on Cerebral Small Vessel Disease: A Dynamic Whole Brain Disease. Shi Y and Wardlow JM. *Stroke and Vascular Neurology* 2016; 1: doi: 10.1136/svn-2016-000035 (open access).
5. Extensive and reliable information for patients and doctors can be found at cavernoma.org.uk
6. Incidental Findings on Brain MRI From 1000 Asymptomatic Volunteers. Katzman AL et al. *JAMA*. 1999; 282(1): 36-39.
7. Management of incidental unruptured intracranial aneurysms. Renowden S and Nelson R. *Practical Neurology* 2020; 20: 347–355.
8. Al-Hashel JY et al. Migraine misdiagnosis as a sinusitis, a delay that can last for many years. *J Headache Pain* 2013; 14, 97.
9. The Perplexity Surrounding Chiari Malformations – Are We Any Wiser Now? Hiremath SB et al. *AJNR* 2020.

Procedure / Process for xxxxxxxxxxxxxxxx	
No.	Action

4. Education and Training

No specific education or training required.

Discussion within Neuro-Radiology reporting group for awareness of this guideline and referring to this guideline in reports.

Link to be added to PRISM after consultation with Primary Care.

5. Monitoring and Audit Criteria

All guidelines should include key performance indicators or audit criteria for auditing compliance, if this template is being used for associated documents (such as procedures or processes) that support a Policy then this section is not required as all audit and monitoring arrangements will be documented in section 8 of the Policy.

Key Performance Indicator	Method of Assessment	Frequency	Lead
N/A			

6. Legal Liability Guideline Statement

See section 6.4 of the UHL Policy for Policies for details of the Trust Legal Liability statement for Guidance documents

7. Supporting Documents and Key References

See references in main document

8. Key Words

MRI, CT, brain imaging, incidental, aneurysm, tumour, benign, meningioma, cyst, pineal, infarct, bleed, haemorrhage, microbleed

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Author / Lead Officer:	Dr Amit Mistri – Consultant in Stroke Medicine; Acting Head of Neurology Dr David Swienton – Consultant Neuro-Radiologist		Job Title: n/a
Reviewed by:	Neurology Consultant body Stroke Consultant body Primary Care Representatives: Vivek Varakantam, Sulaxni Nainani, Andy Ahyow		
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