A secondary headache is one arising secondary to a condition known to cause headache. Primary headaches, although more common, are not life-threatening. Secondary headaches are more worrying as they can lead to serious complications. Over 90% of headaches seen in primary care are primary headaches, and fewer than 10% are secondary headaches.\(^1\)

The severity of the pain is not a distinguishing feature between primary and secondary headache, and secondary headache can occasionally mimic or exacerbate a primary headache.\(^1\)

The International Headache Society classification and diagnostic criteria can help physicians differentiate primary headaches (eg, tension-type headache, migraine, cluster) from secondary headaches (eg, those caused by infection or vascular disease).\(^2\)

### Diagnostic criteria for secondary headache\(^3\)

Headache - often without specific diagnostic features, in which:

- Another disorder known to be able to cause headache has been demonstrated.
- Headache occurs in close temporal relation to the other disorder and/or there is other evidence of a causal relationship.
- Headache is greatly reduced or resolves within three months of successful treatment or spontaneous remission of the causative disorder.

A completely new headache meeting these criteria is diagnosed as secondary, even if the headache resembles a particular primary headache type (for example, migraine).

Primary headaches that are made significantly worse in close temporal relation to a disorder known to cause headache can also be classed as secondary headaches. These patients can receive two diagnoses (both the primary headache and a secondary headache) if there is:

- Close temporal relation between the secondary cause and the change in the primary headache.
- Marked worsening of the primary headache.
- Evidence that the other disorder can aggravate primary headache as observed.
- Remission of the headache after cure of the other disorder.

Examples might include:

- If the patient has previously had migraine that becomes more frequent after head trauma.
- Medication-overuse headache, which is always an aggravation of a primary headache by medication use leading to pain receptor upgrade.

### Epidemiology

- Headache is the most common new neurological symptom seen by general practitioners and neurologists.\(^2, 4\)
According to lifetime prevalence studies of headache, the order of frequency (most to least common) is:

- Primary and secondary tension-type headaches (most common - quoted figures run close to 100% lifetime prevalence).
- Headache from systemic infection (63%).
- Migraine (16%).
- Headache after head injury (4%).
- Exertional headache (1%).
- Vascular disorders (1%).
- Subarachnoid haemorrhage (<1%).
- Brain tumours (0.1%).

Figures vary according to a variety of factors, including the population studied and the diagnostic criteria used. In one GP study, 77% of headaches were not given a diagnostic label, 24% were diagnosed as primary, and 6% as secondary headaches. It is suggested in this study that GPs experience difficulty in diagnosing headache presentations.

Types of secondary headache

Head and neck trauma
A variety of types of headache may occur after head and neck trauma, tension-type headache being the most common. Interestingly, post-traumatic headache appears to be less frequent in more severe head injuries. There is a higher risk of post-traumatic headache in women, and slower recovery from headache in the elderly. The classified types are:

- Acute and chronic post-traumatic headache.
- Acute and chronic headache attributed to whiplash injury.
- Headache attributed to traumatic intracranial haematoma.
- Headache attributed to other head and/or neck trauma.
- Post-craniotomy headache.

Cranial or cervical vascular disorder
Diagnosis is usually suggested by rapid, acute onset, the presence of neurological symptoms and the rapid remission of symptoms. In haemorrhagic strokes, the focal neurological symptoms and disturbance of consciousness overshadow the headache. It is important to be aware of the significance of a sudden, new headache, even if the patient has a primary headache disorder. The classified types are:

- Ischaemic stroke or transient ischaemic attack.
- Non-traumatic intracranial haemorrhage - eg, subarachnoid haemorrhage.
- Unruptured vascular malformation.
- Vasculitis - eg, temporal arteritis.
- Carotid or vertebral artery pain.
- Intracranial venous thrombosis.
- Other intracranial vascular disorders.
- Non-vascular intracranial disorder:
  - High cerebrospinal fluid (CSF) pressure.
  - Low CSF pressure.
  - Non-infectious inflammatory disease.
  - Intracranial neoplasm: in one study, the overall prevalence of headache in patients with brain tumours was 60%, but headache was the sole symptom in only 2%. Pain was generally dull, of moderate intensity, and not specifically localised.
  - Intrathecal injection.
  - Epileptic seizure.
  - Chiari malformation type I.
  - Syndrome of transient ‘headache and neurological deficits with cerebrospinal fluid lymphocytosis’ (HaNDL).
- Other non-vascular intracranial disorder.
**Substance or its withdrawal**
This category includes toxins and environmental pollutants, food allergies, caffeine and alcohol as well as therapeutic substances and drugs of misuse.

- Acute substance use or exposure (including, for example, carbon monoxide poisoning).
- Medication-overuse headache:
  - Headache as an adverse event attributed to chronic medication.
- Medication withdrawal including therapeutic medication, exacerbation of chronic headache during planned medication withdrawal, withdrawal of drugs of dependence.

**Infection**
- Intracranial infection.
- HIV/AIDS.
- Chronic post-infection headache.

**Disorder of homeostasis**
- Hypoxia and/or hypercapnia (obstructive sleep apnoea).
- Dialysis headache.
- Arterial hypertension.
- Hypothyroidism.
- Fasting.
- Cardiac cephalalgia.
- Other disorder of homoeostasis.

**Disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial or cranial structures**
- Disorder of the neck.
- Disorder of the eyes.
- Disorder of the ears.
- Sinusitis.
- Disorder of the teeth, jaws or related structures.
- Temporomandibular joint (TMJ) disorder. Most disorders of the skull (eg, congenital abnormalities, fractures, tumours, metastases) are usually not accompanied by headache. Exceptions of importance are osteomyelitis, multiple myeloma and Paget's disease of bone.
- Headache may also be caused by lesions of the mastoid, and by petrositis.

**Psychiatric disorder**
- Somatisation disorder.
- Psychotic disorder.

**Secondary causes of headache in children**
- Raised intracranial pressure.
- Hydrocephalus - eg, due to tumour.
- Cerebral oedema - including meningitis.
- Idiopathic (benign) intracranial hypertension.
- Vascular - including subarachnoid haemorrhage (rare in children) and childhood migraine.
- Cranial and local pathology:
  - Sinusitis.
  - Dental caries, abscesses.
  - Otitis media or externa.
  - Head and neck trauma.
  - Optic neuritis.
  - TMJ problems.
  - Glaucoma.
Presentation\textsuperscript{[7, 8]}

The onset of a new type of headache needs careful history taking and examination, keeping red flags in mind. The presentation of secondary headache will depend on the cause. Many of the serious causes of secondary headache give rise to symptoms and signs which make diagnosis easier.

Examination in secondary headache

The examination of secondary headaches follows the same principle as that for primary headache disorders, as also described in the separate article Headache.

Most dangerous secondary headaches suggest themselves by clues in the history and symptoms but even if the history sounds benign a clinical examination is essential. This will reassure the patient that their problem has been fully assessed, exclude signs and explanatory features of secondary headache, and detect red flags. If patients with headache are not thoroughly examined they are likely to feel that their worst fears have not been considered or excluded.

Conduct a general and then a focused examination, depending on the features of the headache described by the patient:

- The optic fundi should always be examined.
- Blood pressure measurement is recommended.
- Temporal artery palpation is essential in patients aged over 50 years.
- Perform a full neurological examination if focal neurological symptoms are present.
- Assess and record cognitive level if this is in any way disturbed.

Additional physical examination may be suggested from the history - for example:

- Fever and neck stiffness (meningitis).
- Scalp or temporal artery tenderness (giant cell arteritis).
- Examine the head and neck for muscle tenderness and stiffness.
- Painful red eye with dilated pupil (primary angle-closure glaucoma).
- Papilloedema (intracranial tumours, adult idiopathic intracranial hypertension).
- Fever (infections, systemic illness).
- Features of hypothyroidism.

Red flags in headache assessment

The following groups of symptoms and signs can be suggestive of headache of serious significance and in some cases suggest an urgent need for neuroimaging or other further investigation:

If an intracranial haemorrhage is suspected, head CT without contrast media is recommended. For most other dangerous causes of headache, magnetic resonance imaging or CT are acceptable.\textsuperscript{[2]}

Onset features

- New onset of, or change in, headache in patients who are aged over 50 years.
- Headache in patients who are aged under 5 years.
- Thunderclap: rapid time to peak headache intensity (seconds to five minutes) - same-day specialist assessment required.
- Headache waking the patient up (\textbf{NB}: migraine is the most frequent cause of morning headache).
- Headache precipitated by physical exertion or Valsalva manoeuvre (eg, coughing, laughing, straining).
- Headache onset with exertion or sex.
Neurological red flag features

- Headache onset with seizure or syncope (subarachnoid haemorrhage).
- Headache associated with altered conscious level, memory loss, altered cognitive state or change in personality.
- Focal neurological symptoms (eg, limb weakness, aura <5 minutes or >1 hour).
- Non-focal neurological symptoms (eg, cognitive disturbance).
- Abnormal neurological examination.

Headache features

- First or worst headache of the patient’s life.
- Headache that changes with posture.

Associated features

- Patients with risk factors for cerebral venous sinus thrombosis (including pregnancy).
- Jaw claudication or visual disturbance.
- New-onset headache in a patient with a history of HIV infection.
- New-onset headache in a patient with a history of cancer which can metastasise to the brain (or any history of cancer in a patient aged under 20 years).
- Symptoms suggestive of giant cell arteritis.
- Symptoms and signs of acute narrow-angle glaucoma.
- Vomiting without any other obvious cause.
- Headache after head injury or within 90 days of head injury (subdural in the elderly).
- Papilloedema.
- Immunosuppression.
- Headache associated with neurological deficit.
- Headache associated with visual disturbance or jaw claudication (temporal arteritis).
- Abnormal physical findings.
- Headache with fever, rash or neck stiffness.

In one study, altered consciousness, altered neurology and papilloedema correlated particularly highly with positive neuroimaging findings. In another study, age over 50 at diagnosis, altered consciousness and thunderclap headache correlated most highly with the occurrence of fatal headache.

Investigations

The difficulty lies in separating the very many non-serious headaches, which may nevertheless be severe, from the fewer but significant headaches, particularly those needing very urgent intervention. The presence of red flag symptoms or signs will help determine which headaches need further investigation.

The diversity of the list of causes of secondary headache means that many types of investigation could be appropriate in order to come to the right diagnosis. Careful and full history-taking is necessary to narrow this down to a focused list of differential diagnoses.

In general practice, the decision to refer for timely further investigation is likely to be more important than considering the many possible investigations.

Management

This will depend on the cause.

Further reading & references

3. International Headache Society Classification of Headaches ICHD II; Updated Web-based Version
7. Headache assessment; NICE CKS, May 2013 (UK access only)
8. Diagnosis and Management of Migraine, Tension-Type, Cluster and Medication-Overuse Headache; British Association for the Study of Headache (BASH) Guidelines, (2010 - reviewed 2014)
11. Headaches in over 12s: diagnosis and management; NICE Clinical Guideline (September 2012)

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