

# Clinical approach to patients with headache disorders



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## Headache

- 두통 환자들이 호소하는 두통 양상
  - 갑자기 터질 것 같아요.
  - 육싹 거리면서 토할 것 같아요.
  - 쥐어 짜는 것 같아요.
  - 쑤셔요.
  - 뒤통수가 찢릿 거려요.
  - 얼굴이 저려요.
  - 멍해요.
  - 눈이 빠질 것 같아요.
  - 무언가 짓누르는 것 같아요.
  - 모르겠어요. 아파요.

## Headache

- Headache
  - 1 yr prevalence : 45-70%, very common
  - 99% of headaches : primary headaches
    - Tension-type headache : 2nd most common disease in human
    - Migraine : 3rd most common disease in human

	Prevalence (both sexes)		Male prevalence		Female prevalence	
	Total (thousands)	Proportion of population (%)	Total (thousands)	Proportion of population (%)	Total (thousands)	Proportion of population (%)
Dental caries of permanent teeth	2 431 636	35.29%	1 194 051	34.37%	1 237 585	36.23%
Tension-type headache	1 431 067	20.77%	655 937	18.88%	775 131	22.69%
Migraine	1 012 944	14.70%	371 072	10.68%	641 873	18.79%
Fungal skin diseases	985 457	14.30%	516 167	14.86%	469 291	13.74%
Other skin and subcutaneous diseases	803 597	11.66%	417 129	12.01%	386 468	11.32%
Chronic periodontitis	743 187	10.79%	378 407	10.89%	364 780	10.68%
Mild hearing loss with perinatal onset due to other hearing loss	724 689	10.52%	386 147	11.11%	338 543	9.91%
Acne vulgaris	646 488	9.38%	311 349	8.96%	335 140	9.81%
Low back pain	632 045	9.17%	334 793	9.64%	297 252	8.70%
Dental caries of baby teeth	621 507	9.02%	352 085	10.13%	269 421	7.89%

- But ER.



Lancet 2012;380:2163-2196.

## Classification

1. Migraine
  2. Tension-type headache (TTH)
  3. Trigeminal autonomic cephalalgias (TACs)
  4. Other primary headache disorders
  5. Headache attributed to trauma or injury to the head and/or neck
  6. Headache attributed to cranial or cervical vascular disorder
  7. Headache attributed to non-vascular intracranial disorder
  8. Headache attributed to a substance or its withdrawal
  9. Headache attributed to infection
  10. Headache attributed to disorder of homeostasis
  11. Headache or facial pain attributed to disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial or cervical structure
  12. Headache attributed to psychiatric disorder
  13. Painful cranial neuropathies and other facial pains
  14. Other headache disorders
- 

## Secondary headache

- Not
    - Migraine
    - Tension type headache
    - Trigeminal autonomic cephalalgias
    - Other primary headache
  - CNS infection (meningitis, encephalitis)
  - Stroke (ischemic, hemorrhagic)
  - SAH, Aneurysm
  - Glaucoma
  - Temporal arteritis, Zoster neuralgia
  - Hypertensive encephalopathy
  - Tumor, SDH
-

## International Classification of Headache Disorders (ICHD)

- ICHD 1
  - 1998
  - Standard for headache diagnosis
  - Uniform terminology
  - Consistent operational diagnostic criteria for the entire range of headache disorders
- ICHD 2
  - 2004
  - Introduction of the concept of trigeminal autonomic cephalalgias
  - Several previously unclassified types of primary headache
- ICHD 3
  - 2013 (Beta version)
  - Modification

## How to classify

- Classification is hierarchical
  - Rough idea → More detailed diagnosis
- Each distinct type, subtype or subform of headache
  - Separately diagnosed and coded
  - Listed in the order of importance to the patient
- Probable, fulfillment of criteria
  - Probable migraine and infrequent episodic tension-type headache, Diagnosis??
- Experience a minimum number of attacks of (or days with) that headache
- Primary or secondary headache or both
  - Temporal relation
  - Causative disorder



## How to classify

- Diagnostic headache diary
  - Improves diagnostic accuracy
  - More precise judgement of medication consumption



### Migraine

Migraine without aura

Migraine with aura

Typical aura with migraine headache

Typical aura with non-migraine headache

Typical aura without headache

Familial hemiplegic migraine (FHM)

Sporadic hemiplegic migraine

Basilar-type migraine

Childhood periodic syndromes that are commonly precursors of migraine

Cyclical vomiting

Abdominal migraine

Retinal migraine

Complications of migraine

Chronic migraine

Status migrainosus

Persistent aura without infarction

Migrainous infarction

Migraine-triggered seizure

Probable migraine

Probable migraine without aura

Probable migraine with aura

Probable chronic migraine

Migraine with typical aura

Typical aura with headache

Typical aura without headache

Hemiplegic migraine

Familial hemiplegic migraine (FHM)

FHM 1

FHM 2

FHM 3

FHM, other loci

Migraine with brainstem aura

Episodic syndromes that may be associated with migraine

Recurrent gastrointestinal disturbance

Cyclical vomiting syndrome

Abdominal migraine

Benign paroxysmal vertigo

Benign paroxysmal torticollis

Chronic migraine

Complications of migraine

Status migrainosus

Persistent aura without infarction

Migrainous infarction

Migraine aura-triggered seizure

## Migraine

Migraine without aura

Migraine with aura

Migraine with typical aura

Typical aura with headache

Typical aura without headache

Migraine with brainstem aura

Hemiplegic migraine

Familial hemiplegic migraine (FHM)

Familial hemiplegic migraine type 1 (FHM1)

Familial hemiplegic migraine type 2 (FHM2)

Familial hemiplegic migraine type 3 (FHM3)

Familial hemiplegic migraine, other loci

Sporadic hemiplegic migraine

Retinal migraine

Chronic migraine

Complications of migraine

Status migrainosus

Persistent aura without infarction

Migrainous infarction

Migraine aura-triggered seizure

Probable migraine

Probable migraine without aura

Probable migraine with aura

Episodic syndromes that may be associated with migraine

Recurrent gastrointestinal disturbance

Cyclical vomiting syndrome

Abdominal migraine

Benign paroxysmal vertigo

Benign paroxysmal torticollis

## Tension-type headache (TTH)

Infrequent episodic tension-type headache

Infrequent episodic tension-type headache associated with pericranial tenderness

Infrequent episodic tension-type headache not associated with pericranial tenderness

Frequent episodic tension-type headache

Frequent episodic tension-type headache associated with pericranial tenderness

Frequent episodic tension-type headache not associated with pericranial tenderness

Chronic tension-type headache

Chronic tension-type headache associated with pericranial tenderness

Chronic tension-type headache not associated with pericranial tenderness

Probable tension-type headache

Probable infrequent episodic tension-type headache

Probable frequent episodic tension-type headache

Probable chronic tension-type headache



NO CHANGES

### Trigeminal autonomic cephalalgias (TACs)

Cluster headache

Episodic cluster headache

Chronic cluster headache

Paroxysmal hemicrania

Episodic paroxysmal hemicrania

Chronic paroxysmal hemicrania

Short-lasting unilateral neuralgiform headache attacks

Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT)

Episodic SUNCT

Chronic SUNCT

Short-lasting unilateral neuralgiform headache attacks with cranial autonomic syndromes (SUNA)

Episodic SUNA

Chronic SUNA

Hemicranial continua

Probable Trigeminal autonomic cephalalgia

Probable cluster headache

Probable paroxysmal hemicrania

Probable short-lasting unilateral neuralgiform headache attacks

Probable hemicrania continua

### Other primary headaches

Primary stabbing headache

Primary exertional headache → Primary exercise headache

Primary headache associated with sexual activity

Hypnic headache

Primary thunderclap headache

New daily-persistent headache (NDPH)

### Other primary headache disorders

Primary cough headache

Probable primary cough headache

Primary exercise headache

Probable primary exercise headache

Primary headache associated with sexual activity

Probable primary headache associated with sexual activity

Primary thunderclap headache

**Cold-stimulus headache**

Headache attributed to external application of a cold stimulus

Headache attributed to ingestion or inhalation of a cold stimulus

Probable cold-stimulus headache

Headache probably attributed to external application of a cold stimulus

Headache probably attributed to ingestion or inhalation of a cold stimulus

**External-pressure headache**

External-compression headache

External-traction headache

Probable external-pressure headache

Probable external-compression headache

Probable external-traction headache

Primary stabbing headache

Probable primary stabbing headache

**Nummular headache**

probable nummular headache

Hypnic headache

Probable hypnic headache

New daily persistent headache (NDPH)

Probable new daily persistent headache



## Key questions

- 두통이 언제 시작되었고, 얼마나 심한가?
- 과거에도 비슷한 두통이 있었나요?
- 두통 외에 다른 증상이 있나요?
- 과거 상병이나 약물은?



## History taking

- Quality : pulsating, stabbing, tightening, lancinating
- Mode of onset
- Severity
- first ever or chronic
- Frequency
- Other accompanied symptoms
  - Photophobia, phonophobia, nausea, vomiting
  - Lacrimation, unilateral coryza, hyperemia, edema, ptosis
  - Skin rash (Hutchinson's sign)
- Other associated symptoms
  - Fever
  - URI symptoms
  - Loss of consciousness or seizure
  - Neck pain
  - Diplopia, visual disturbance



Hutchinson's sign

## Neurologic exam

- Mental status
- Visual field defect
- Eyeball movement : horizontal, vertical, accommodation
- Light reflex and cranial nerve examinations
- Motor, sensory, cerebellar function
- Gait
- **Neck stiffness**
  - SAH
  - CNS infection

## SNOOP

SNOOP	Examples
Systemic symptoms	Fever, stiff neck, weight loss, rash, chills, night sweats
Secondary headache risk factors	HIV, cancer
Seizures	
Neurologic symptoms or abnormal signs	Confusion, impaired alertness, loss of consciousness, or focal signs
Onset	Sudden, abrupt, or first headache, triggered by a Valsalva maneuver or positional change
Older	>50 (ex. Giant cell arteritis)
Progression of headache	Change in attack frequency, severity, or clinical features
Positional change	Headache worsens with assuming an erect position or with recumbency
Papilledema	
Precipitating factors	Cough, exercise, sexual activity, Valsalva maneuver, or sleep

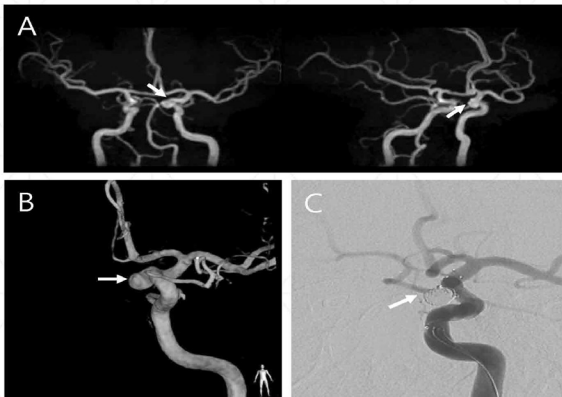
## Symptoms and signs

Symptoms and signs	Diagnosis
Neck stiffness	SAH or meningitis
Transient loss of consciousness	SAH (around 50% of cases), colloid cyst of the third ventricle
Epileptic seizure	SAH, other stroke, cerebral venous thrombosis (CVT), posterior reversible encephalopathy syndrome (PRES), reversible cerebral vasoconstriction syndrome (RCVS)
Focal neurological symptoms	SAH, other stroke, CVT, PRES, RCVS
Horner's sign or pulsatile tinnitus or tongue palsy	Dissection of the homolateral internal carotid artery
Unilateral mydriasis with or without other signs of third cranial nerve paralysis	Aneurysm compressing the third nerve
Patients avoiding lying flat	SAH, Intracranial hypertension syndrome, CVT, acute sinusitis
Patients avoid standing up	Intracranial hypotension, cerebellar stroke
Papilledema	Intracranial hypertension
Arterial hypertension	SAH, eclampsia, PRES, RCVS
Electrocardiographic abnormalities	SAH, myocardial infarction with ectopic pain
Asymmetrical blood pressure at upper limbs	Aortic arch dissection



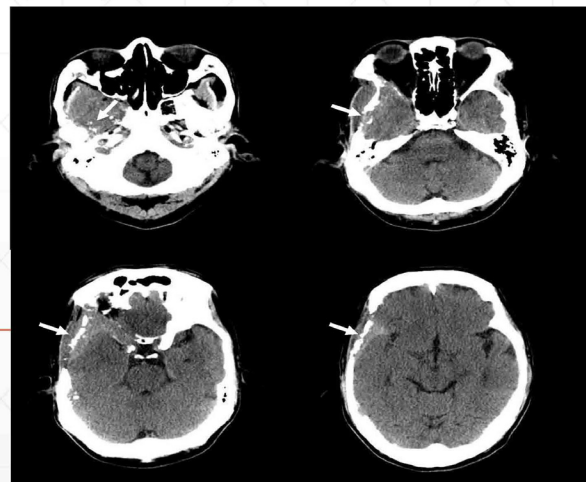
## Warning/Comfort signs

Table 1 Common warning signs and comfort factors that help differentiate primary and secondary headaches	
Red Flags/Warning Signs	Comfort Signs
<ul style="list-style-type: none"> <li>◦ Abrupt onset of headache</li> <li>◦ CNS hemorrhage</li> <li>◦ Reversible cerebral vasoconstriction syndrome</li> <li>◦ Mass lesion</li> <li>New headache pattern when                             <ul style="list-style-type: none"> <li>◦ ≤5 y old</li> <li>◦ Systemic infection</li> <li>◦ Congenital anomalies</li> <li>◦ ≥50 y old</li> <li>◦ Tumor</li> <li>◦ Giant cell arteritis</li> </ul> </li> <li>New onset or change in existing headache pattern                             <ul style="list-style-type: none"> <li>◦ Medication overuse</li> <li>◦ Mass lesion</li> <li>◦ CNS infection</li> </ul> </li> <li>Neurologic signs or symptoms                             <ul style="list-style-type: none"> <li>◦ Mass lesion; primary or metastatic</li> <li>◦ CNS infection</li> <li>◦ Connective tissue disease</li> <li>◦ Intracranial hypertension</li> </ul> </li> <li>Head or neck trauma                             <ul style="list-style-type: none"> <li>◦ Hemorrhage</li> <li>◦ Dissection</li> </ul> </li> <li>Fever                             <ul style="list-style-type: none"> <li>◦ Systemic infection</li> <li>◦ Meningoencephalitis</li> <li>◦ Tick borne diseases especially with history of joint inflammation</li> </ul> </li> <li>Weight loss                             <ul style="list-style-type: none"> <li>◦ Malignancy</li> <li>◦ Systemic disease</li> <li>◦ HIV</li> </ul> </li> <li>Systemic disease                             <ul style="list-style-type: none"> <li>◦ HIV</li> <li>◦ Inflammatory rheumatological disease</li> <li>◦ Hypertensive crisis</li> </ul> </li> <li>Pregnancy                             <ul style="list-style-type: none"> <li>◦ Toxemia</li> <li>◦ Pituitary apoplexy</li> </ul> </li> <li>Headaches triggered by exertion, sexual activity, cough, or Valsalva                             <ul style="list-style-type: none"> <li>◦ Mass lesion</li> <li>◦ Subarachnoid hemorrhage</li> <li>◦ Vertebral or carotid dissection</li> </ul> </li> <li>Postural headaches                             <ul style="list-style-type: none"> <li>◦ Lumbar puncture headache</li> <li>◦ Intracranial hypotension</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>◦ Established stable pattern of headache &gt;6 mo</li> <li>◦ Variability of headache location</li> <li>◦ Long-standing history of similar headache</li> <li>◦ Exacerbation with menses</li> <li>◦ Return to baseline function between headaches</li> <li>◦ Positive family history of primary headache disorder</li> <li>◦ Normal physical and neurologic examination</li> <li>◦ Consistently triggered by                             <ul style="list-style-type: none"> <li>◦ Hormonal cycle</li> <li>◦ Specific foods</li> <li>◦ Specific sensory input                                     <ul style="list-style-type: none"> <li>■ Light</li> <li>■ Odors</li> </ul> </li> <li>◦ Weather changes</li> </ul> </li> </ul>



Internal carotid aneurysm presenting as cluster-like headache

Headache attributed to calvarial metastasis presenting as paroxysmal hemicrania



## Neuroimaging : AAN guideline

- Neuroimaging recommendation for nonacute headache
  - Neuroimaging should be considered when:
    - ✓ Unexplained abnormal findings on the neurological examination
    - ✓ Atypical headache features or headaches not meeting strict criteria for migraine or other primary headache disorders
    - ✓ Additional risk factors for secondary headache such as immunodeficiency, infection, neoplasm, or autoimmune diseases
  - Higher likelihood of significant abnormality on neuroimaging, but absence did not lower the odds of this:
    - ✓ Headache worsened by Valsalva maneuver
    - ✓ Rapidly increasing headache frequency
    - ✓ History of dizziness or lack of coordination
    - ✓ History of subjective numbness or tingling
    - ✓ History of headache causing awakening from sleep

## Neuroimaging: necessary

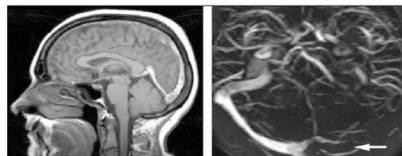
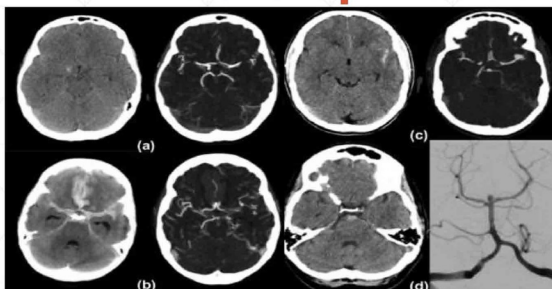
- Patient presenting to emergency rooms with headache and new abnormal neurological signs
- Patients presenting new sudden-onset severe headache
- HIV- positive patient, cancer patient, immunosuppressant patient
- Older than 50 year presenting with a new type of headache

## Thunderclap headache

- 갑자기 터질 것 같은 두통이 왔다가 사라져요.
- 이런 두통은 평생 처음이에요.
- Most important headache subtype
- Most severe headache subtype
- Most common headache that has variable causes
- Severe headache of instantaneous onset – one minute at the most
- Incidence
  - About **43 per 100,000** adults per year
  - About 120/8000 patients each year, in ER
- Nature
  - Last from minutes to several days
  - Location of type of pain : not specific
  - Start spontaneously or during performance of the Valsalva maneuver, exertion, sexual activity, emotional stress, bathing, or showering

BMJ 2012;345:e8557

## Thunderclap headache



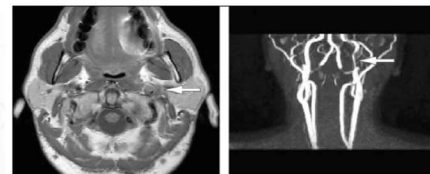
**Figure 1: Cerebral venous sinus thrombosis**  
Left: T1 weighted sagittal MRI reveals hyperintense signal within the superior sagittal sinus and straight sinus.  
Right: Magnetic resonance venogram reveals loss of flow signal secondary to thrombus in the central portion of left transverse sinus (arrow).

Lancet Neurol 2006;5:621-31

70% of SAH present primarily with headache, which has a thunderclap pattern in 50%

SAH is found in 11-25% of patients who present with thunderclap headache

Clin Radiol 2013;68:e103-e113



**Figure 2: Cervical artery dissection**  
Left: Axial FLAIR MRI reveals a false lumen and crescent sign in the left internal carotid artery (arrow). Right: Gadolinium bolus magnetic resonance angiogram reveals tapered stenosis of the mid-cervical portion of the left internal carotid artery.

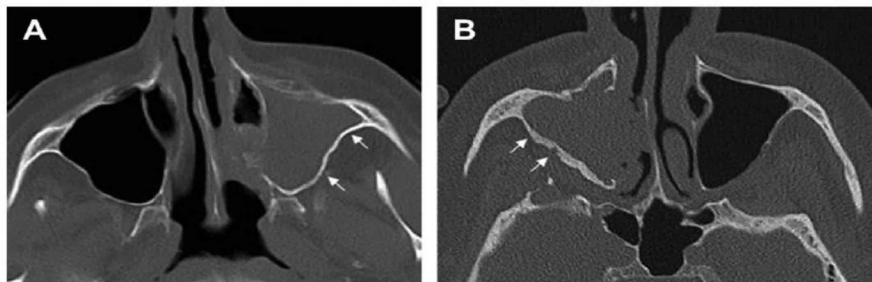
20% of dissection

## Thunderclap headache

Circumstances	Possible causes
Mild trauma	Cervical arterial dissection, intracranial hypotension
Intake of vasoactive substances	Illicit drugs cannabis, cocaine, ecstasy, amphetamines, lysergide Antidepressants SSRI, SNRI A sympathomimetics nasal decongestants, noradrenaline Migraine drugs triptans and ergot alkaloid derivatives → Reversible cerebral vasoconstriction syndrome (RCVS)
Dural puncture	Intracranial hypotension
Fever	Infectious disorders
Postpartum	RCVS, cerebral venous thrombosis, eclampsia
Ear, nose, and throat symptoms	Complicated sinusitis

## Imaging-Sinusitis

### ▪ Sinusitis

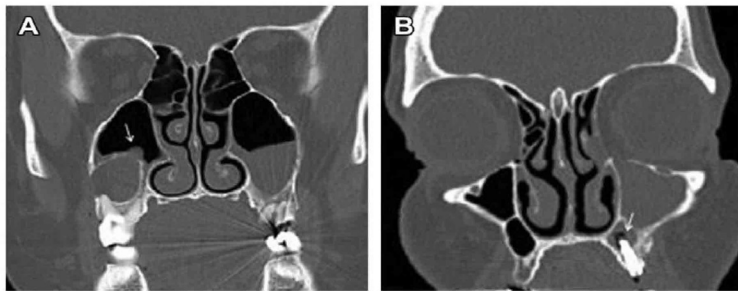


**Fig. 5.** Two different patients with chronic, complete obstruction of the maxillary sinus. Associated chronic inflammatory sclerosis and osseous thickening of the left maxillary sinus chamber walls are relatively mild in **A** (arrows), with more striking osseous thickening and sclerosis of the obstructed right maxillary sinus chamber walls in **B** (arrows), suggesting chronic inflammatory changes that have been present for a greater length of time.

*Otolaryngol Clin N Am* 2014;47:197–219



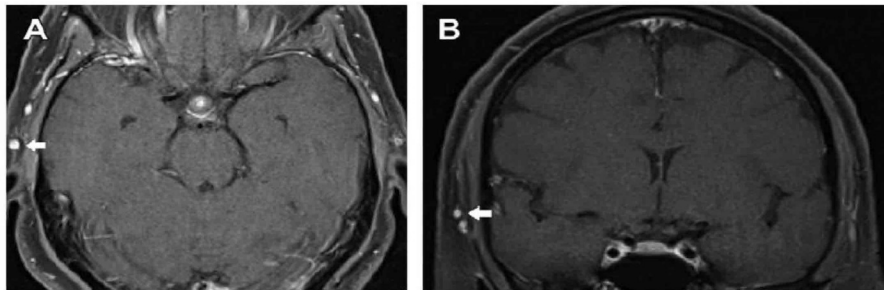
## Imaging-Odontogenic sinusitis



**Fig. 8.** Two coronal CT images from 2 different patients demonstrating an odontogenic cyst with perforation through the floor of the right maxillary sinus (arrow in A), and a root formed dental implant extending through the floor of the left maxillary sinus (arrow in B). Although the tip of these dental implants may often extend through the floor of the maxillary sinus, in this case there is air surrounding the tip of the implant and associated complete opacification with marked inflammatory changes of the overlying left maxillary sinus, suggesting odontogenic sinusitis.

*Otolaryngol Clin N Am* 2014;47:197–219

## Imaging-Giant cell arteritis



**Fig. 11.** Giant cell arteritis. (A) Axial T1-weighted postcontrast fat-saturated MRI of asymmetric thickening and enhancement of the right superficial temporal artery walls (arrow). There was no imaging evidence of intracranial vasculitis. (B) Coronal T1-weighted postcontrast fat-saturated MRI of asymmetric thickening and enhancement of the right superficial temporal artery walls (arrow). There was no imaging evidence of intracranial vasculitis.

*Med Clin N Am* 2013;97:243–265

## Imaging-Colloid cyst

- Often thunderclap and recurrent. There may be a reduced level or loss of consciousness. The headaches may improve in the supine position and are often located in the bilateral frontoparietal or frontooccipital regions



Fig. 10 Colloid cyst in a 23-year-old male with the insidious onset of headache. (Images courtesy of Lazlo Mecthtler, MD). Non-enhanced CT demonstrates a spherical hyperdense mass (arrow) within the anterior third ventricle and ventriculomegaly

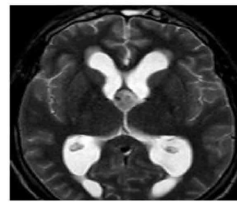
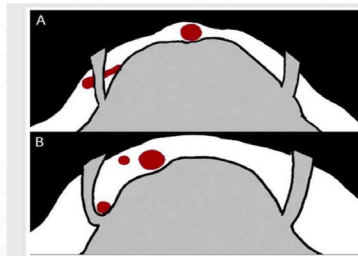


Fig. 12 Colloid cyst in a 23-year-old male with the insidious onset of headache. (Images courtesy of Lazlo Mecthtler, MD). T2-weighted imaging reveals subependymal CSF extension into the brain parenchyma. The cyst demonstrates mixed hypo- and hyperintensity, the "black hole" effect

*Curr Pain Headache Rep* 2015;19:30

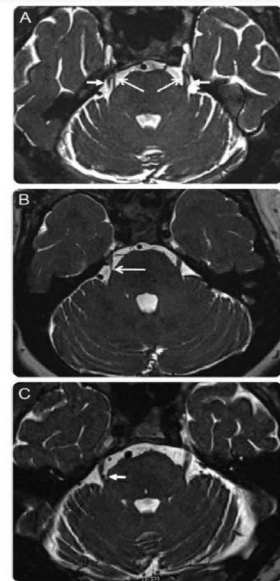
## Imaging-trigeminal neuralgia

- Neurovascular conflict with compression
  - Distortion
  - Dislocation
  - Distension
  - Indentation
  - Flattening
  - Atrophy



**FIGURE 3-4** Morphologic changes of the trigeminal root showing examples of classic right trigeminal neuralgia. Two schematic drawings show axial sections at the level of the trigeminal roots where gray indicates nervous tissue, red indicates arteries, and black indicates bone. Atrophy of the right trigeminal root caused by a crossing artery (A) and a downward loop of the superior cerebellar artery that provokes distortion of the right trigeminal root at its entry into the pons (B) can be seen.

*Neurology* 2016;87:220-228

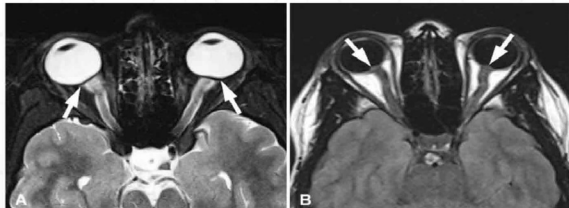


3D constructive interference in steady state MRI shows axial sections at the level of trigeminal nerve root entry into the pons. (A) Bilateral neurovascular contact without morphologic changes of the root in a patient with left trigeminal neuralgia (TN). Nerve (long arrow) and blood vessel (short arrows) appear hypointense surrounded by hyperintense CSF. Contact is seen at the root entry zone as well as mid-cisternal segment. (B, C) Morphologic changes exceeding mere neurovascular contact of the trigeminal nerve root are compatible with the diagnosis of classical TN. (B) Root atrophy in a patient with right TN. (C) Indentation and dislocation of the root in a patient with right TN (short arrow).



## Intracranial hypertension

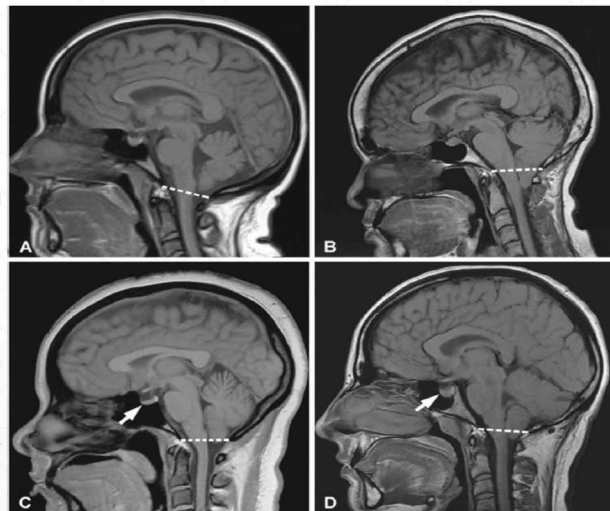
- Posterior globe flattening
  - Reflects the gradient between the perioptic CSF and the intraocular pressures
  - Sensitivity: 66%(43-85%)
  - Specificity: 98%
- Optic nerve head protrusion
  - Sensitivity: 36%(3-59%)
  - Specificity: 99%



A. Axial T2 fat-saturated scan shows flattening of the posterior globes (arrows) around the insertion of the optic nerve. B. There is protrusion of the optic nerve head into the vitreous cavity (arrows) on axial fluid-attenuated inversion recovery (FLAIR) image

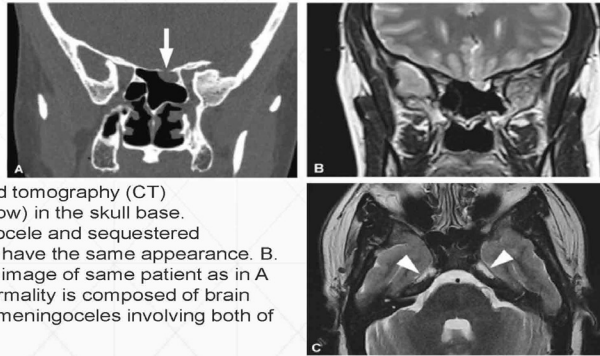
## CEREBELLAR TONSILLAR HERNIATION

Noncontrast T1 mid-sagittal magnetic resonance imaging (MRI) with dashed line (McRae line) from the basion to the opisthion, defining the foramen magnum. A. Normal position of the cerebellar tonsils with respect to the foramen magnum in an IIH patient. The inferior pole of the cerebellar tonsils normally lies at the level of or just above the foramen magnum. B. Chiari I malformation (CM1). CM1 is generally believed to be congenital and diagnosed on strict radiologic criteria, including downward extension of peg-shaped cerebellar tonsils at least 5 mm below the foramen magnum without mass or other cause of acquired tonsillar herniation. For borderline cases (tonsillar herniation  $\geq 3$  mm but  $< 5$  mm), the association with other radiologic findings commonly seen in CM1, such as syringomyelia or kinking of the cervico-medullary junction, help establish the diagnosis. C. Cerebellar tonsillar ectopia refers to the low-lying configuration of the tonsils, up to 2 or 3 mm below the foramen magnum. A partially empty sella (Category IV) is also present (arrow). D. CM1-like configuration of the cerebellar tonsils in a patient with IIH. Cerebellar tonsils extend to 10 mm below the foramen magnum. In addition, there is a partially empty sella, (Category III) (arrow).



## Meningocele

- Bony remodeling, CSF leak
- Through skull base foramina
  - Sphenoid sinus
  - Meckel's cave
  - Petrous apex



A. Coronal thin section computed tomography (CT) demonstrates a bony defect (arrow) in the skull base. Meningocele/ meningoencephalocele and sequestered secretions in the sphenoid sinus have the same appearance. B. Coronal T2 magnetic resonance image of same patient as in A shows that sphenoid sinus abnormality is composed of brain tissue. C. Axial T2 scan reveals meningoceles involving both of Meckel caves (arrows).

## MRI findings in population

**Table 1. Magnetic resonance imaging brain findings in a young, fit population (mean age: 20.5 years).**

Findings	%
Strictly normal	75.75
Normal variants	18.45
Arachnoid cysts	1.70
Vascular abnormality	0.51
Intracranial tumor	0.47
Type 1 Chiari malformation	1.7
Other abnormalities	2.17

**Table 2. Magnetic resonance imaging brain findings in the general population (mean age: 63 years).**

Findings	%
Normal	86.4
Asymptomatic brain infarction	7.2
Cerebral aneurysm	1.8
Benign primary tumor	1.6
Arachnoid cyst	1.1
Type 1 Chiari malformation	0.9
Other significant findings	1.0

*Expert Rev Neurother* 2013;13:263–273

## Conclusions

- Taking history including medical/social/previous headache Hx.
- Precise classification/Variable diagnostic possibilities
- Comprehensive neurologic examinations
- Neuroimaging, do not hesitate/Carefully consider whether imaging is necessary