图解脑疝

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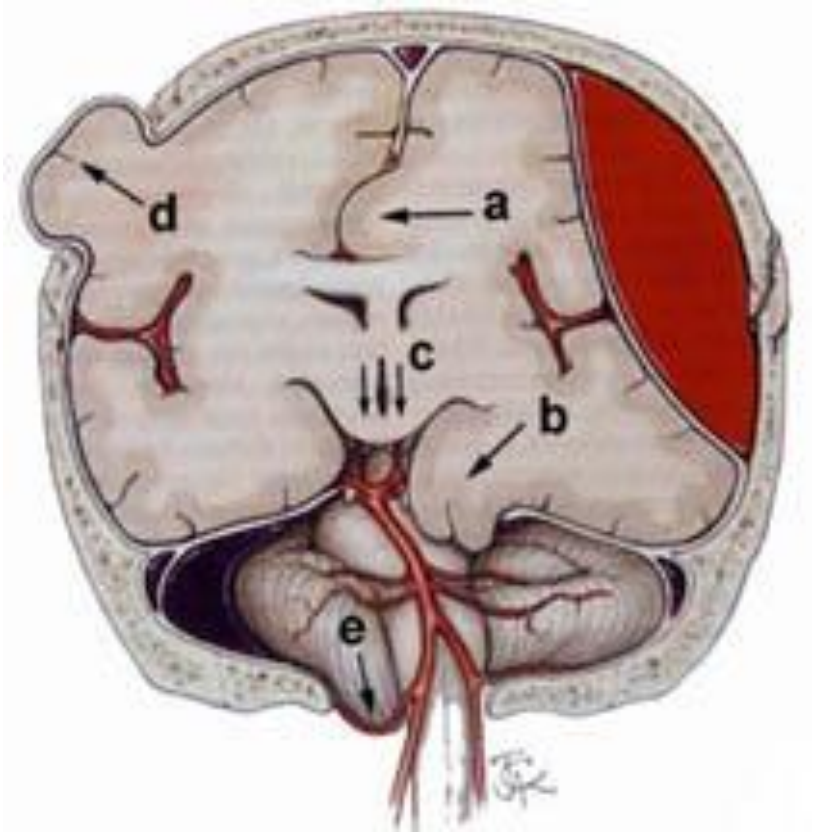
脑疝

- 是指在颅内压增高的情况下，脑组织通过某些脑池向压力相对较低的部位移位的结果，即脑组织由其原来正常的位置而进入了一个异常的位置。

脑疝的类型：

- a.大脑镰疝 ： 一侧大脑半球占位病变可使同侧扣带回经大脑镰下缘疝入对侧，胼胝体受压下移。
- 小脑幕切迹疝 b.前疝：也称颞叶沟回疝，是颞叶沟回疝于脚间池及环池的前部；②后疝：颞叶内侧部疝于四叠体池及环池的后部；f.小脑幕切迹上疝：后颅凹占位病变时，小脑上蚓部可向上疝入小脑幕切迹的四叠体池。
- c.中心疝：幕上压力增高，致使大脑深部结构及脑干纵轴牵张移位。
- d.颅外疝： 脑组织通过颅外缺损疝出。
- e.枕骨大孔疝 ： 后颅凹占位病变时，可致小脑扁桃体疝入枕骨大孔。
- g.蝶骨嵴疝：颅前凹和颅中凹的占位病变，由于病变部压力相对高一些，则额眶回可越过蝶骨嵴进入颅中凹，可颞叶前部挤向颅前凹。

示意图

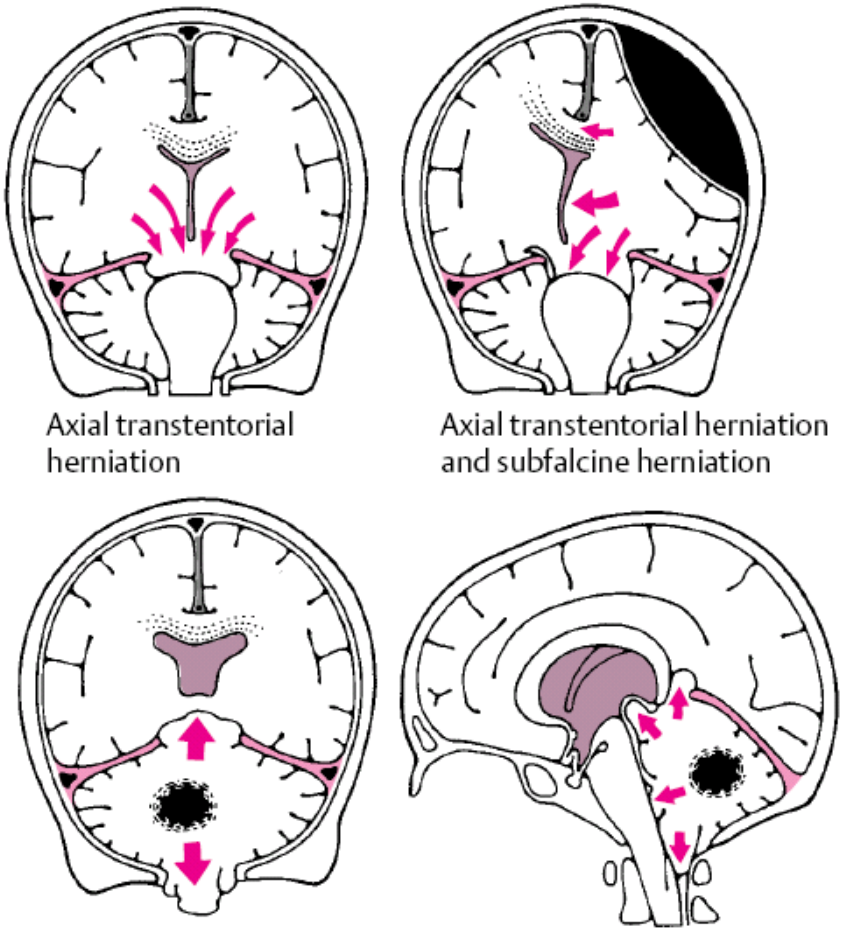


- a) subfalcial (cingulate) herniation ;镰下疝
- b) uncal herniation ; 钩疝
- c) downward (central, transtentorial) herniation ; 下行性小脑幕疝
- d) external herniation ; 颅外疝
- e) tonsillar herniation.扁桃体疝
- f) ascending transtentorial herniation (reversed tentorial)上行性小脑幕疝
- g) sphenoid herniation蝶骨嵴疝

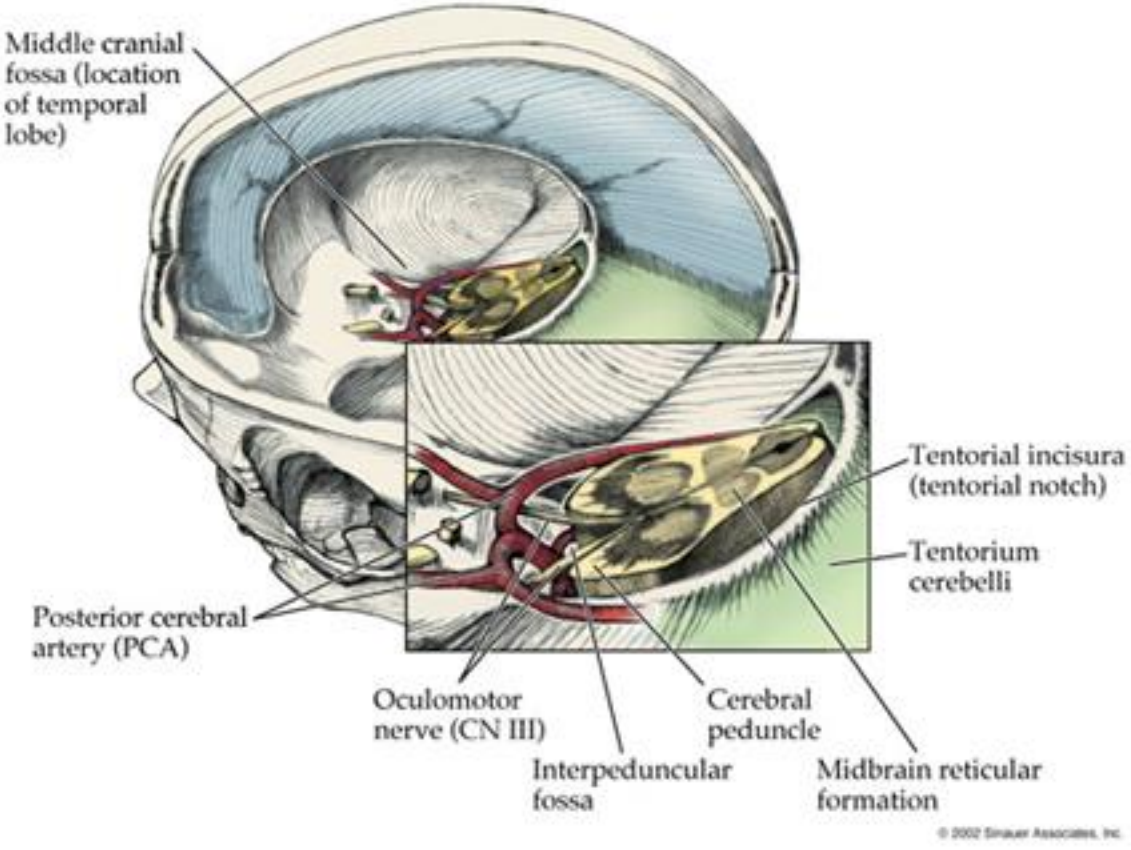
类型

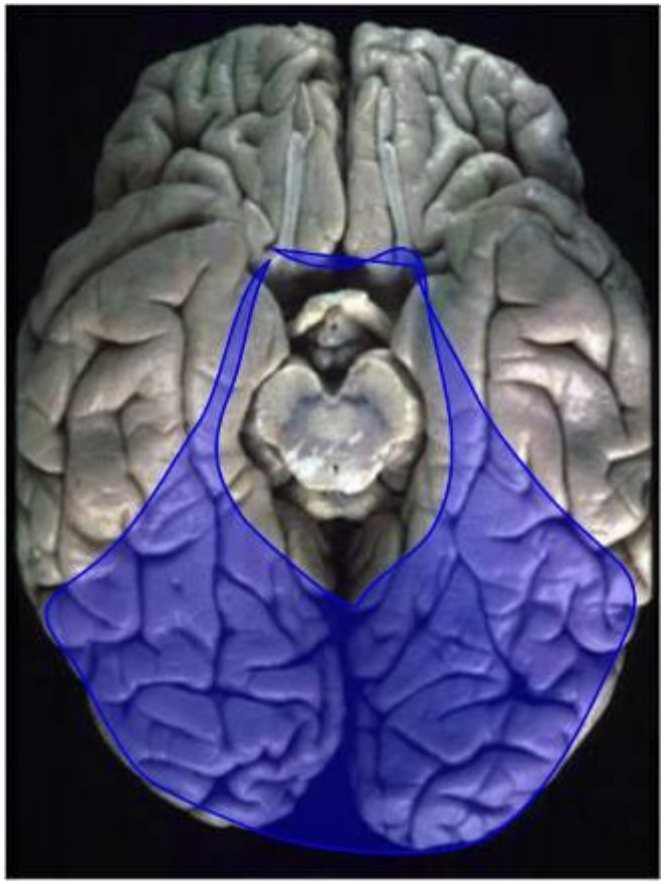
脑疝部位命名	别名	疝入脑组织命名
1．大脑镰下疝		扣带回疝
2．小脑天幕疝 前疝 后疝	小脑幕切迹疝、小脑幕下降疝 脚间池疝 环池疝，四叠体疝	 颞叶钩回疝 海马回疝
3．小脑幕孔中心疝		间脑
4．小脑幕孔上疝	小脑幕上疝	小脑蚓部疝
5．枕骨大孔疝		小脑扁桃体疝

示意图

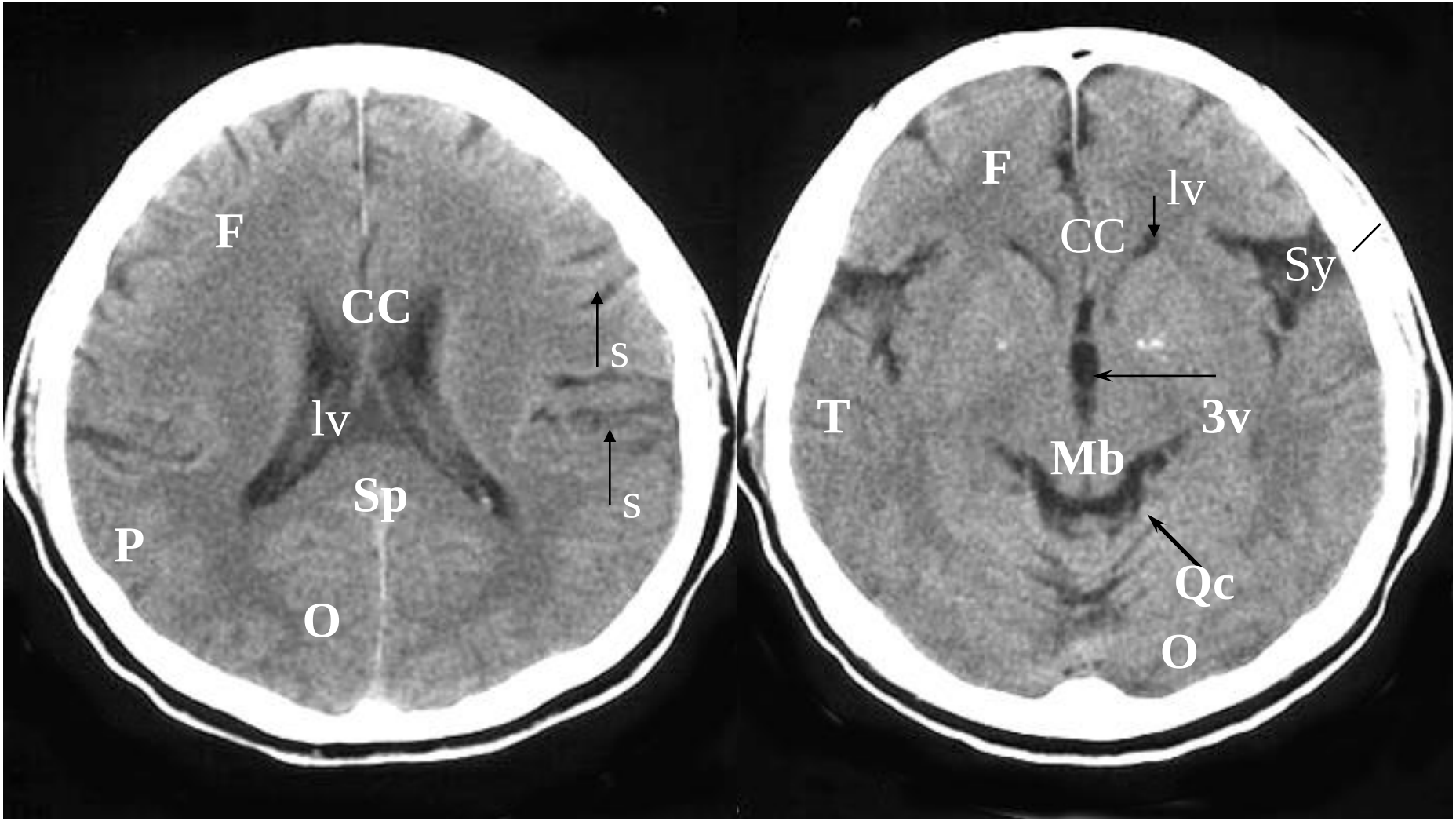

Axial transtentorial herniation
Axial transtentorial herniation and subfalcine herniation

解剖关系

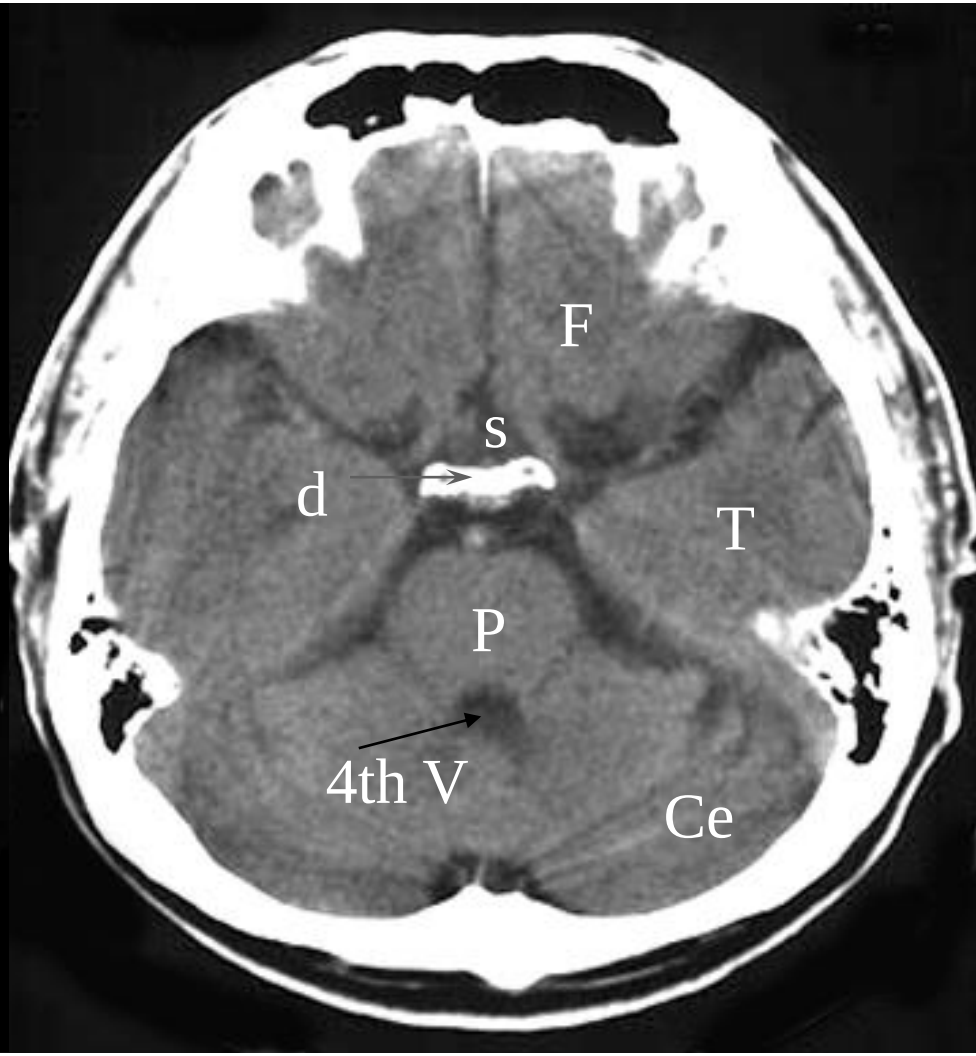

Middle cranial fossa (location of temporal lobe)
Tentorial incisura (tentorial notch)
Tentorium cerebelli
Posterior cerebral artery (PCA)
Oculomotor nerve (CN III)
Cerebral peduncle
Interpeduncular fossa
Midbrain reticular formation



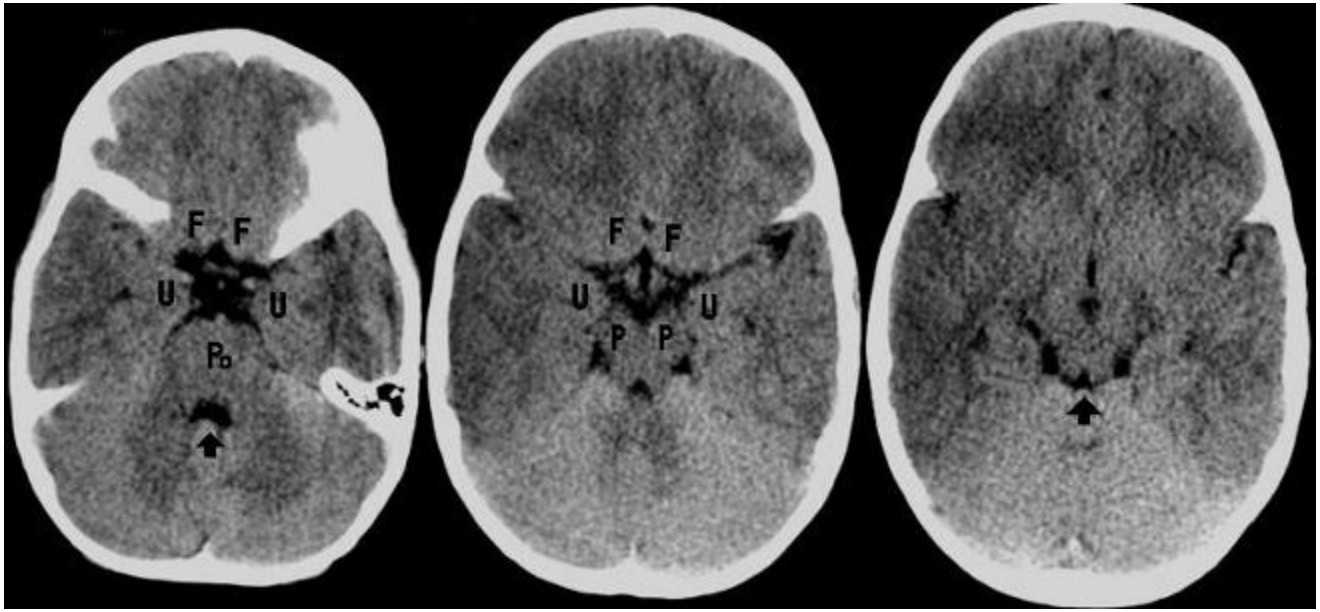
解剖关系



解剖关系

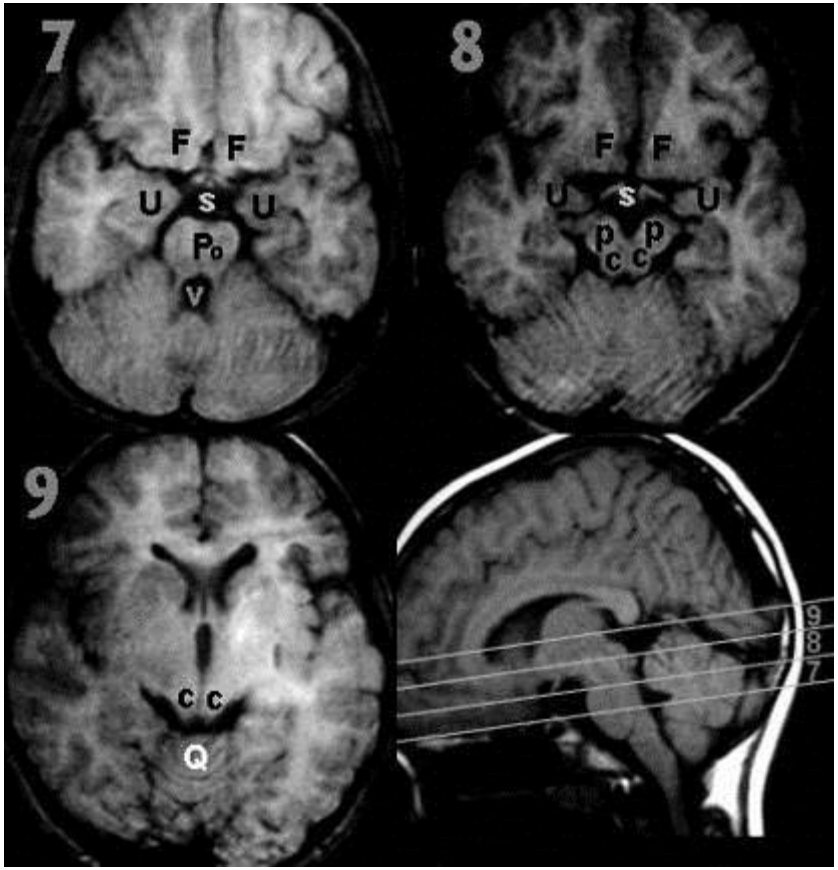


The suprasellar cistern & the quadrigeminal cistern



- The left and center images show the suprasellar cistern. Its anterior borders are formed by the frontal lobes (F). Its lateral borders are formed by the uncus (U) of the temporal lobes. The left image shows the 5-pointed star appearance of the suprasellar cistern where the posterior border is formed by the pons (Po). The black arrow points to the fourth ventricle. The center image shows a higher cut where the suprasellar cistern has a 6-pointed star appearance since the posterior border is formed by the cerebral peduncles (P) which have a central cleft.
- The right image shows the quadrigeminal cistern (black arrow). Note the "baby's bottom" appearance of its anterior border. When ICP is increased, the quadrigeminal cistern space is compressed or obliterated.

The suprasellar cistern & the quadrigeminal cistern.

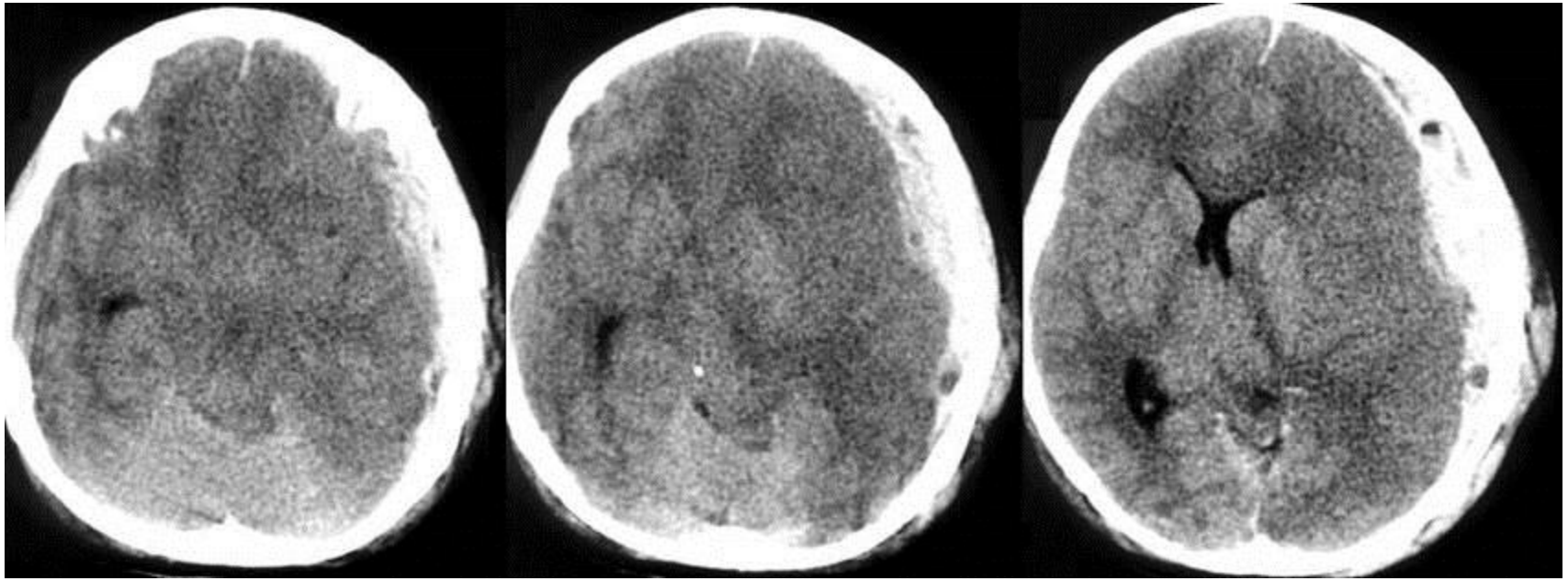


- The midline sagittal MRI scan shows the levels of the axial diagrams. The quadrigeminal cistern is located above (anterior to) the "Q" in the highest cut shown (number 9). The anterior border of the quadrigeminal cistern is formed by the superior colliculi (c). Image 8 (lower cut) also shows the quadrigeminal cistern. In this case, its anterior border is formed by the inferior colliculi (c). This gives the anterior border of the quadrigeminal cistern the appearance of a "baby's bottom". The quadrigeminal plate is comprised of the superior and inferior colliculi. The quadrigeminal cistern is posterior to this quadrigeminal plate, thus its anterior border may be formed by the inferior or superior colliculi.

镰下疝

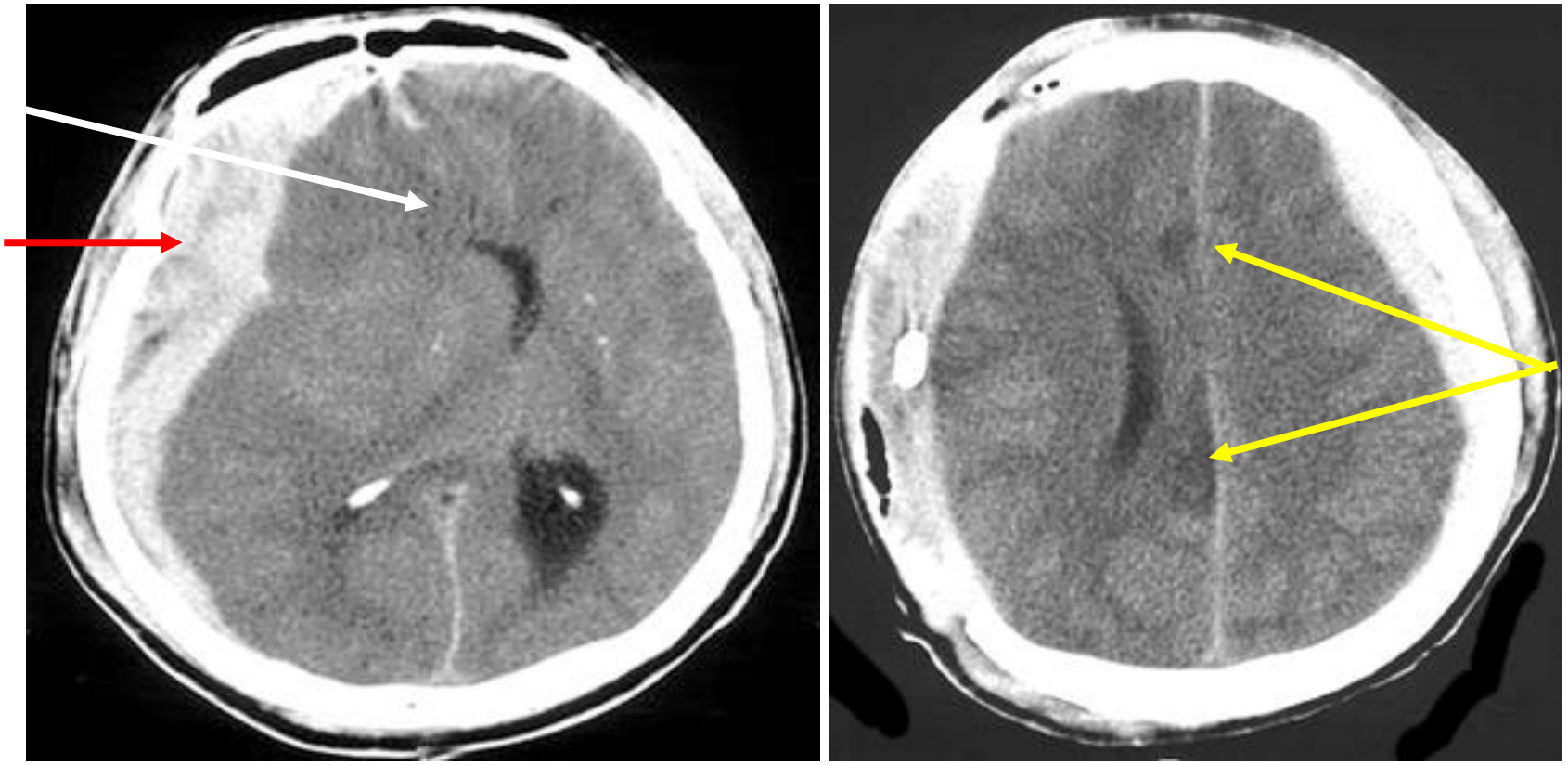
临床表现	影像所见	并发症
头痛 对侧下肢无力	同侧额角截断 大脑镰前份不对称 同侧侧脑室腔消失 透明隔移位	因大脑前动脉卡压到大脑镰上引起同侧ACA供血区梗塞 伴有其他疝

Subfalcine herniation (cingulate herniation) Transtentorial herniation



- The suprasellar cistern (left image) is obliterated. The quadrigeminal cistern is very compressed and pushed posteriorly (center image).
- A subdural hematoma with a midline shift is noted. There is central transtentorial and subfalcine herniation.

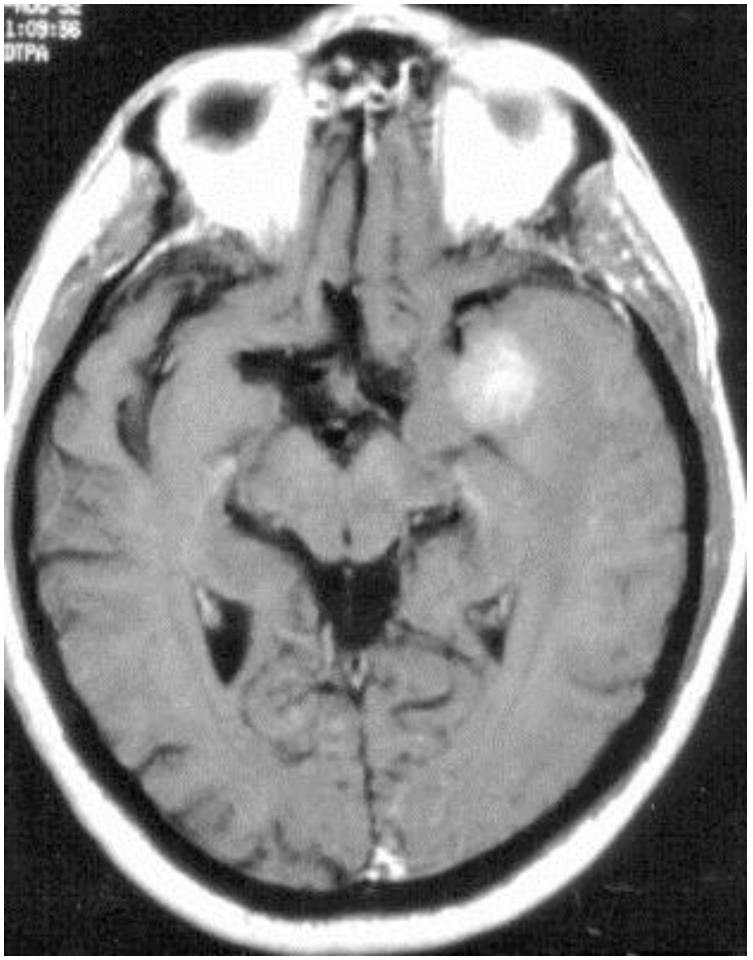
ACA供血区梗塞



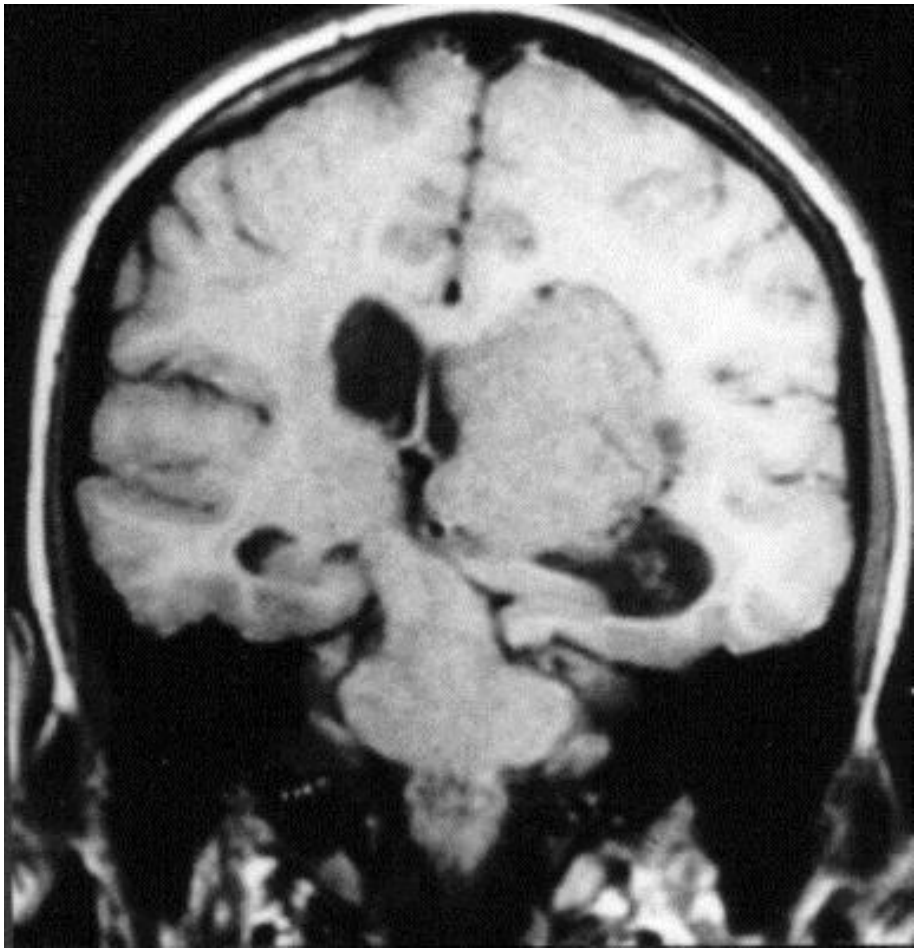
Uncal herniation

临床表现	影像所见	并发症
同侧瞳孔散大、眼动受限（动眼神经受压） 对侧偏瘫（同侧大脑脚受压） 有时颞叶疝压迹会导致同侧偏瘫（对侧大脑脚受压。假定位体征）	对侧颞角增宽 同侧环池增宽 同侧桥前池增宽 钩回进入鞍上池	大脑后动脉受压导致枕叶梗塞

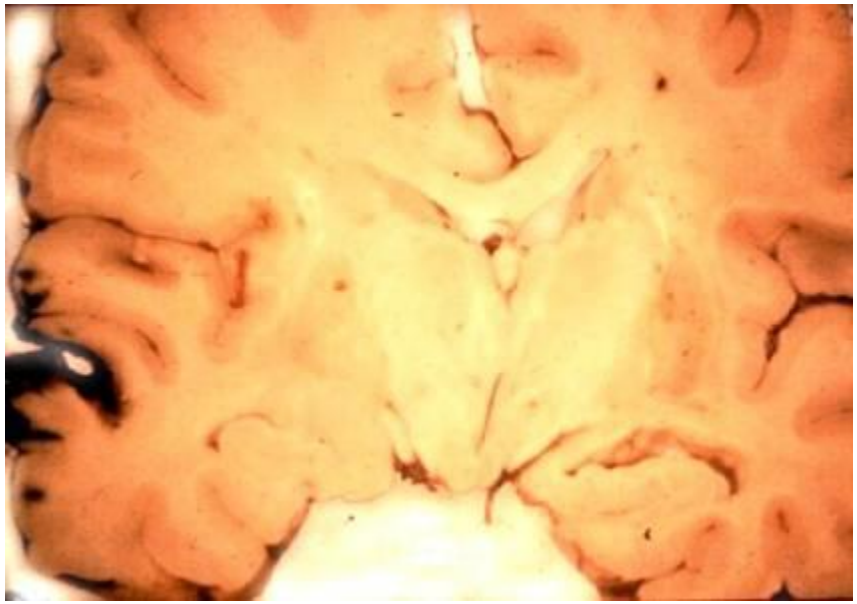
鞍上池缺角

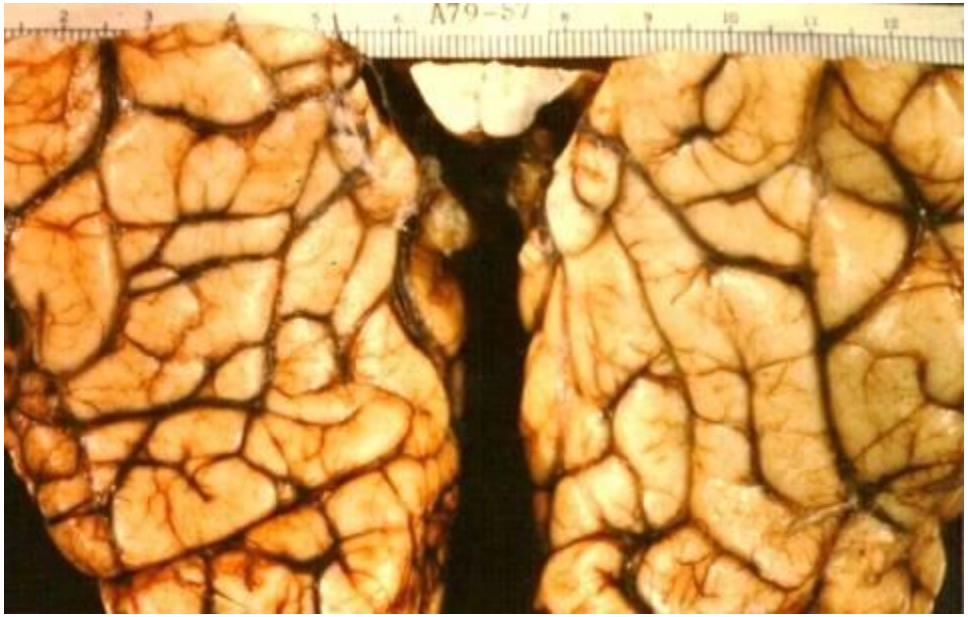


冠状位CT与MRI



海马旁回褶皱

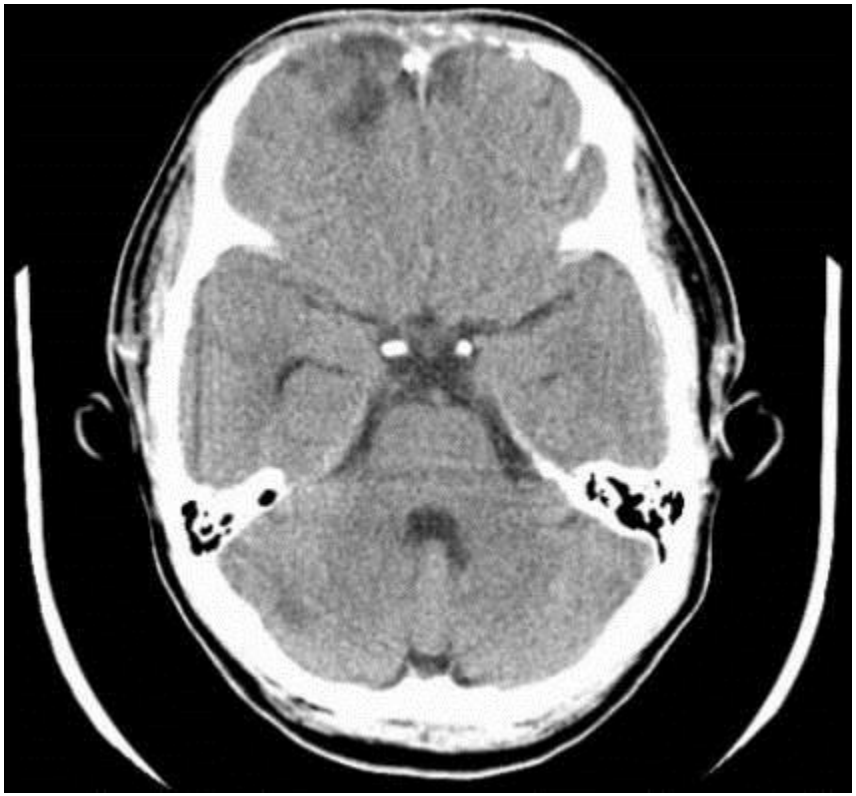


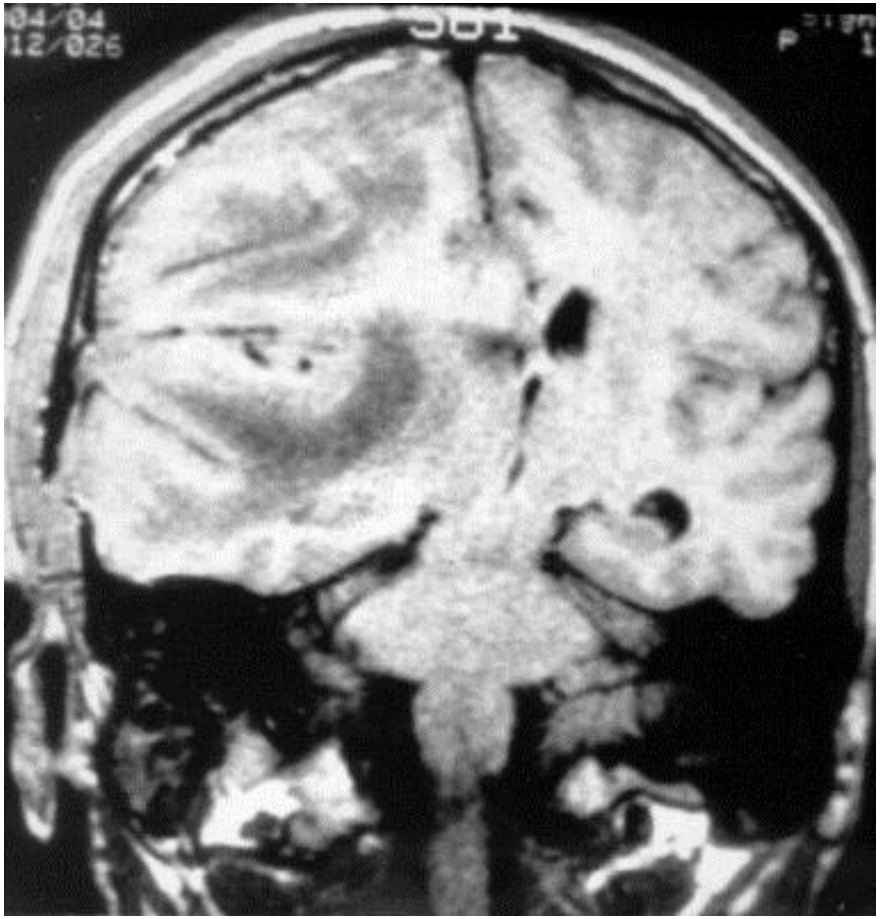


对侧颞角增宽

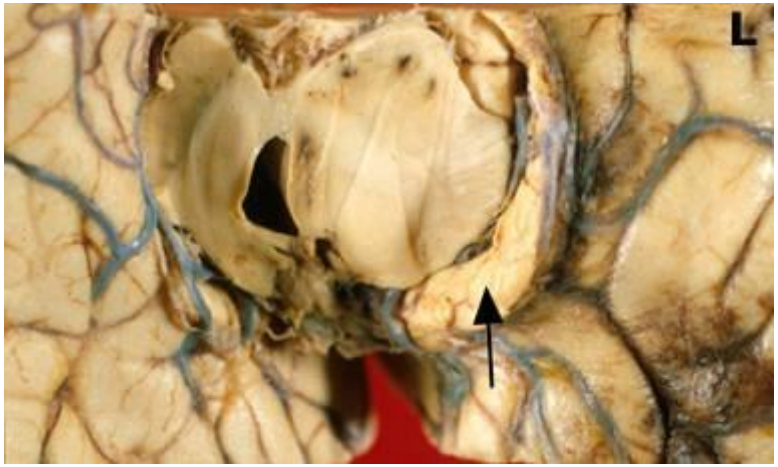
同侧桥前池增宽

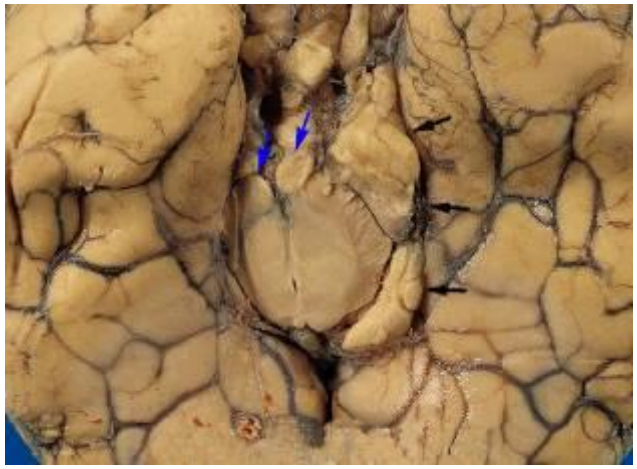
同侧环池增宽



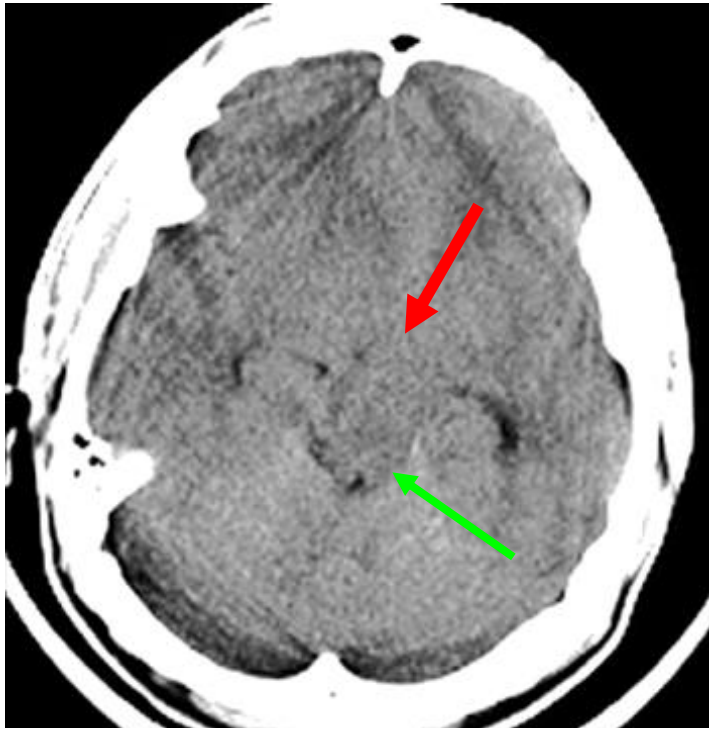


Uncal herniation



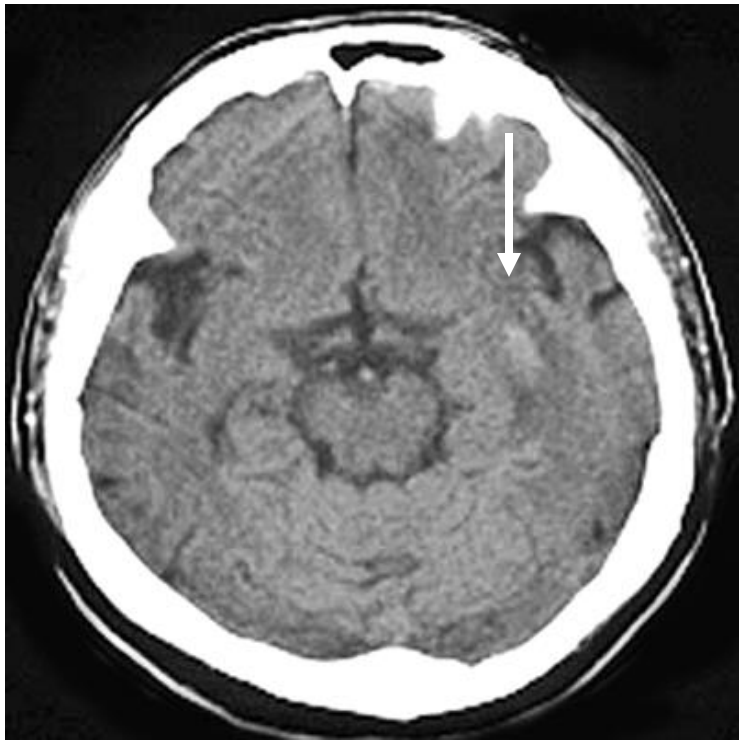


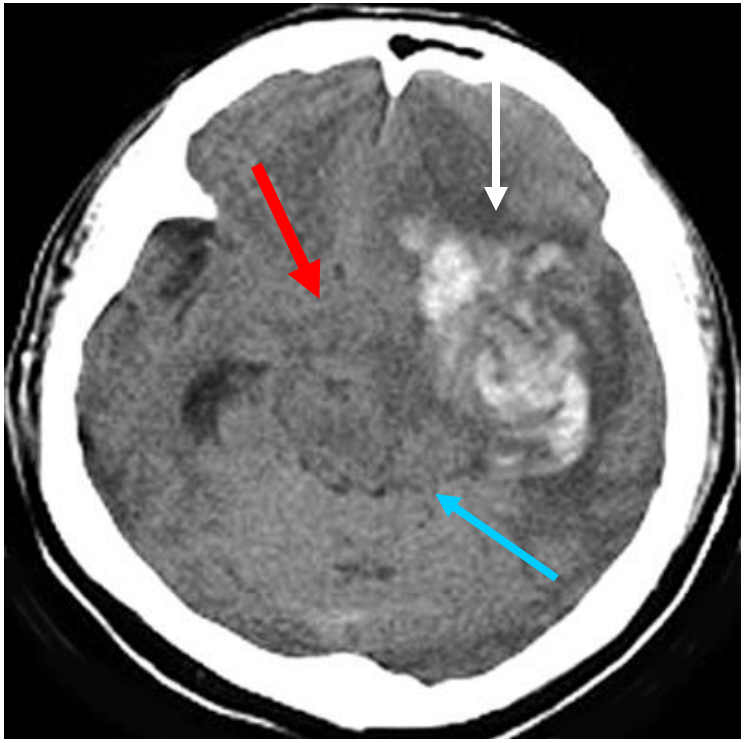
Uncal herniation



- obliteration of the suprasellar cistern (red arrow) and the quadrigeminal cistern (green arrow)

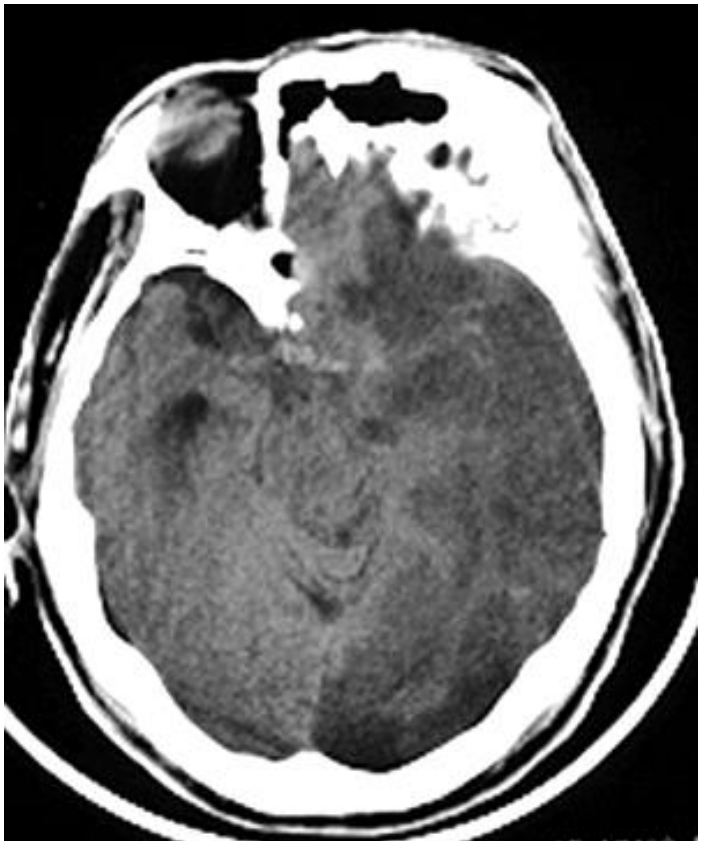
Uncal herniation





- The ipsilateral ventricle, sulci, fissures are compressed and obliterated, isappeared.
- obliteration of the suprasellar cistern(s) and quadrigeminal cistern(q)

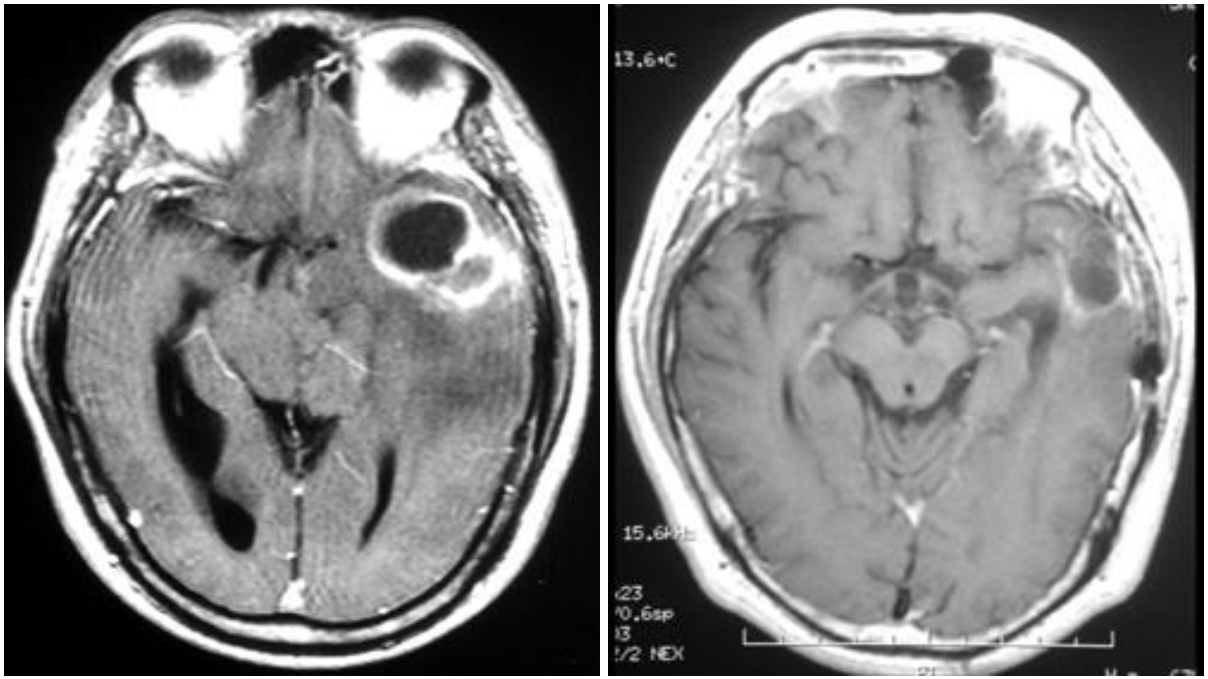
Uncal herniation



- Acute infarction
- 1st day

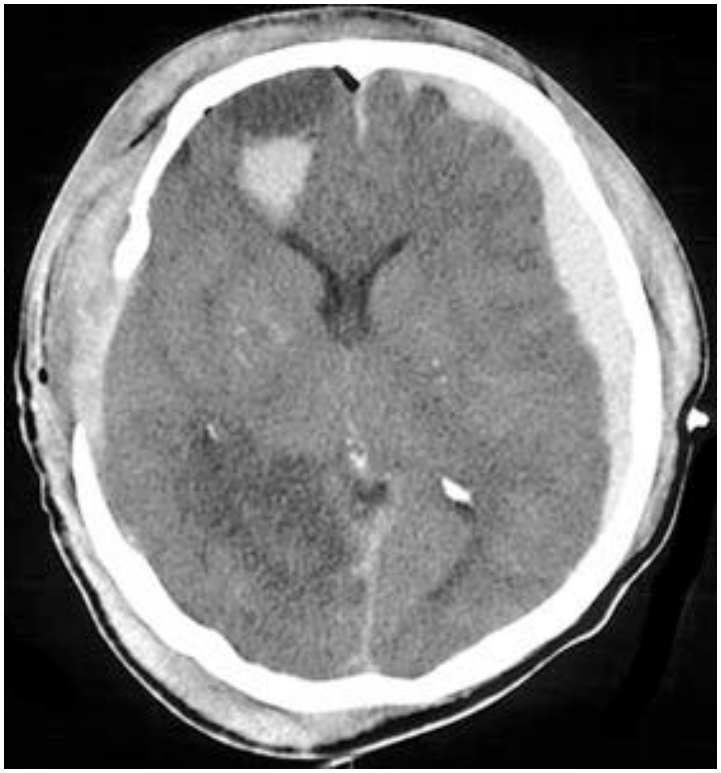
- Acute infarction
- 4th day

Uncal herniation



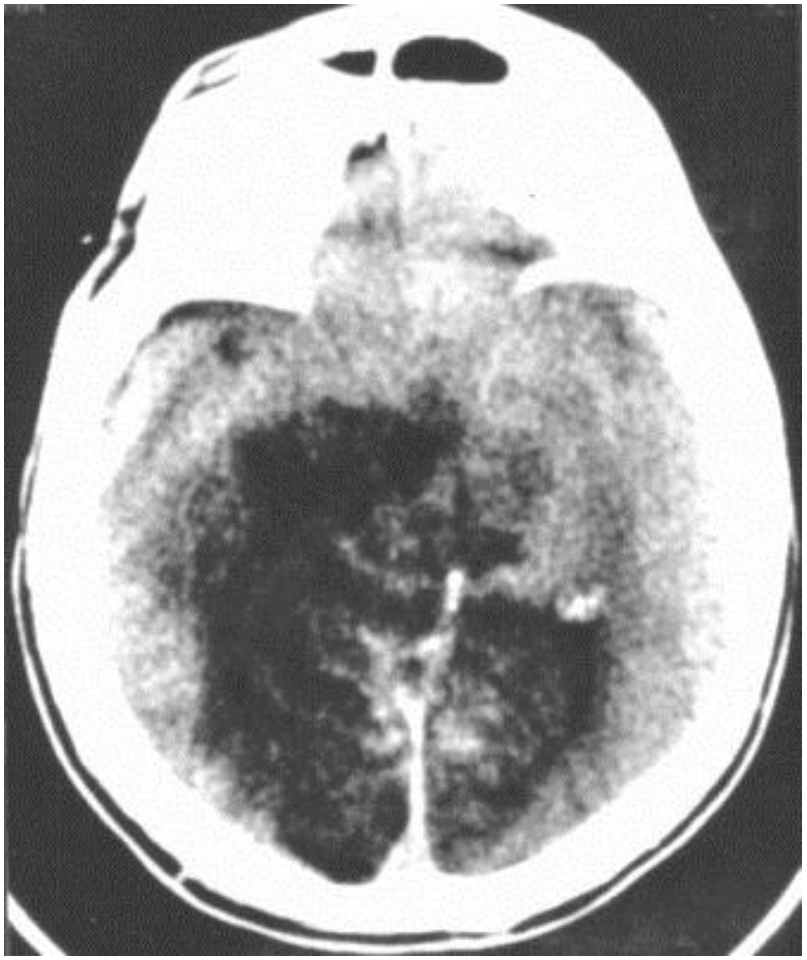
- Before surgery, a big GBM in the left temporal lobe with uncal herniation.
- After surgery, the GBM was removed, the suprasellar cistern and quadrigeminal cisterns are normal.

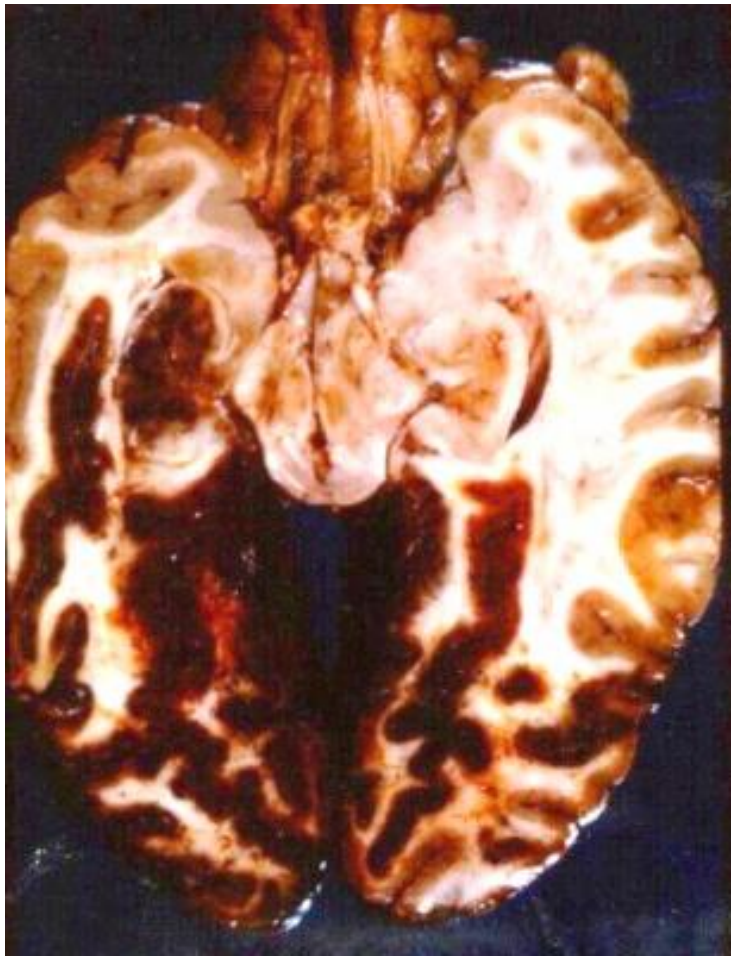
Uncal herniation



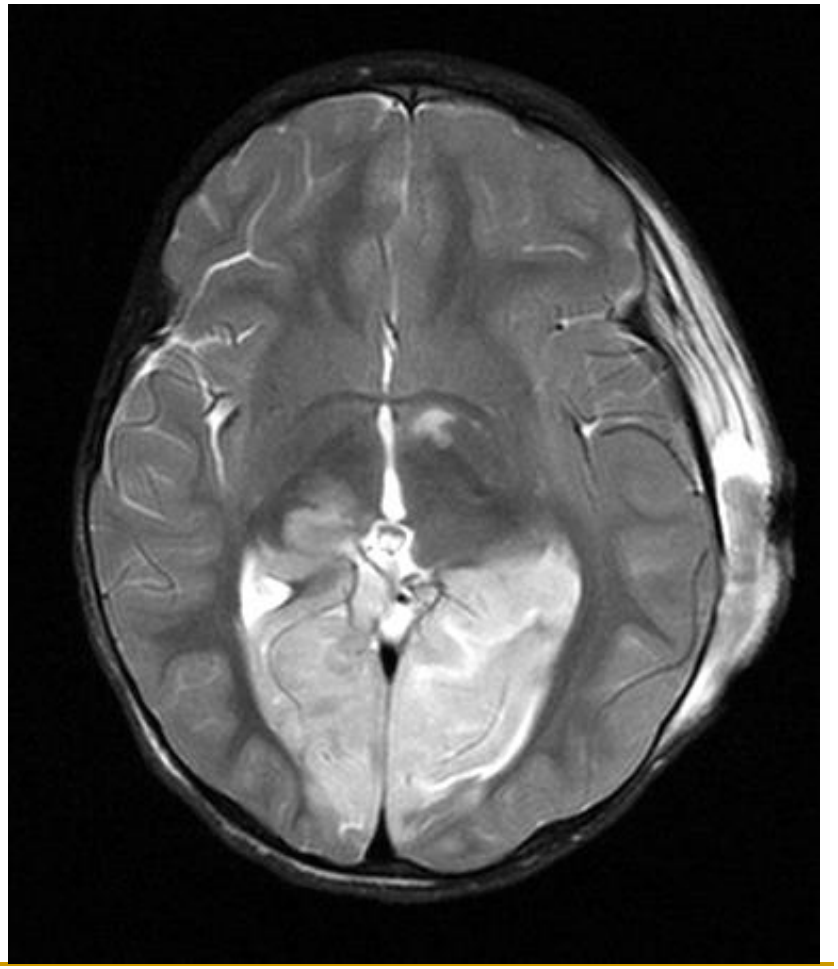
- Acute infarction of right posterior artery (PCA), this is a complication of uncal/transtentorial herniation, because the PCA was compressed by brain herniation.

双侧大脑后动脉梗塞



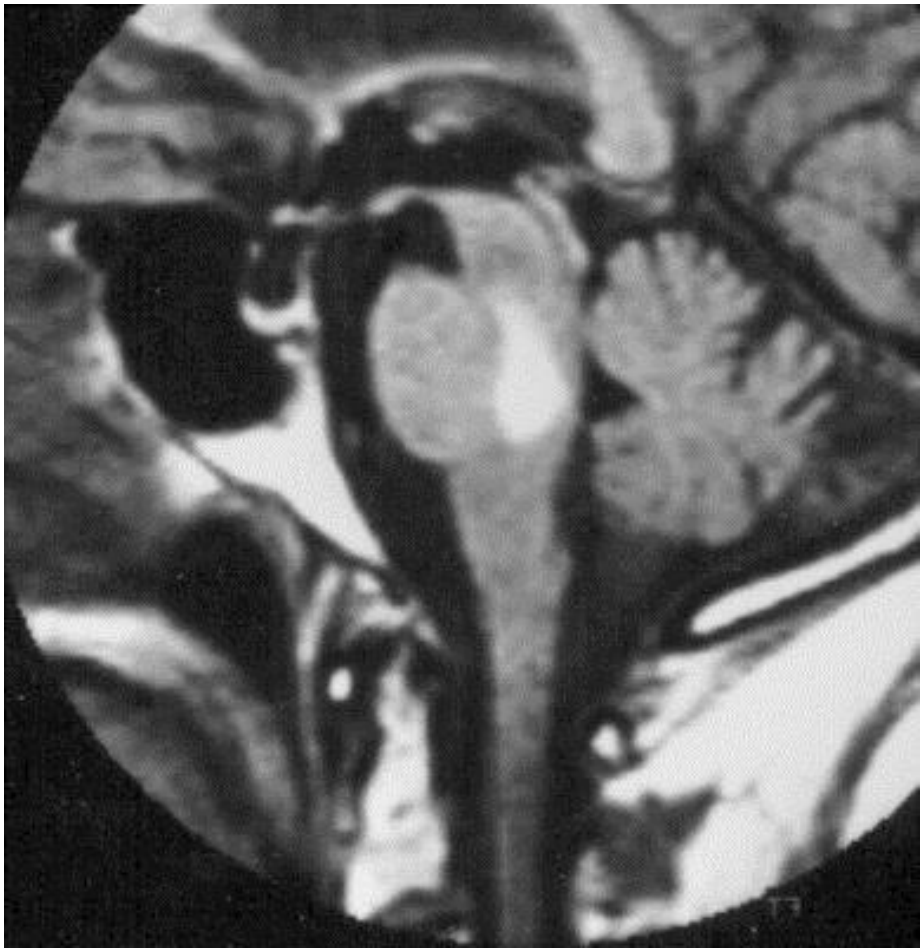


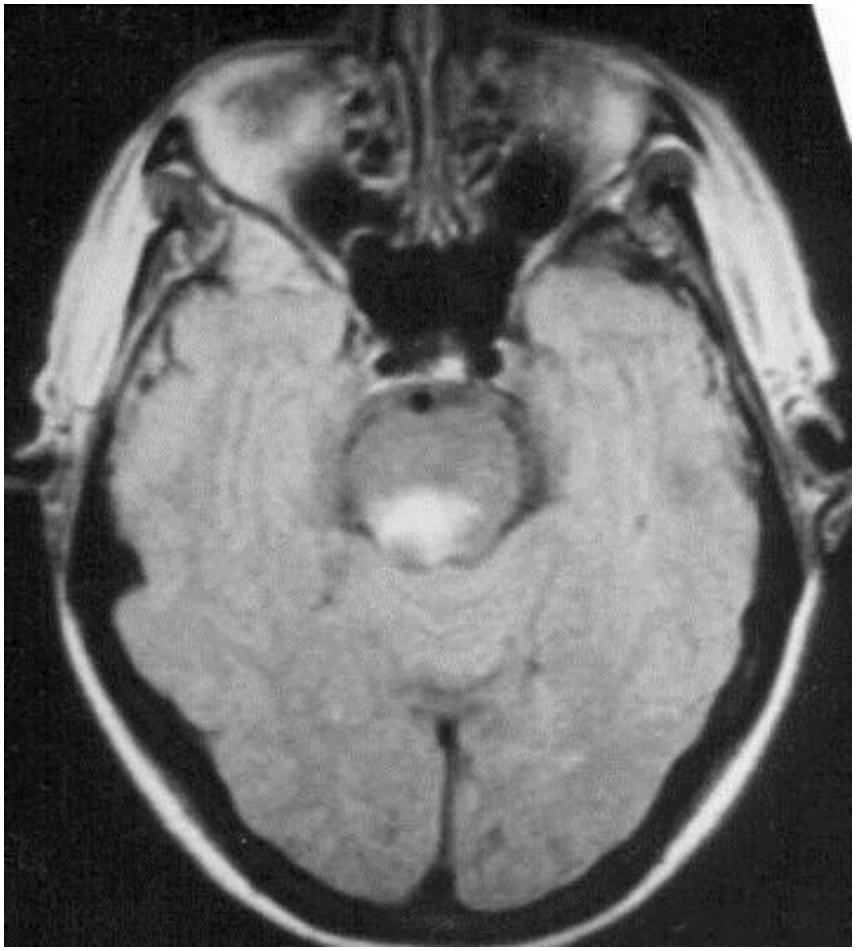
双侧大脑后动脉梗塞



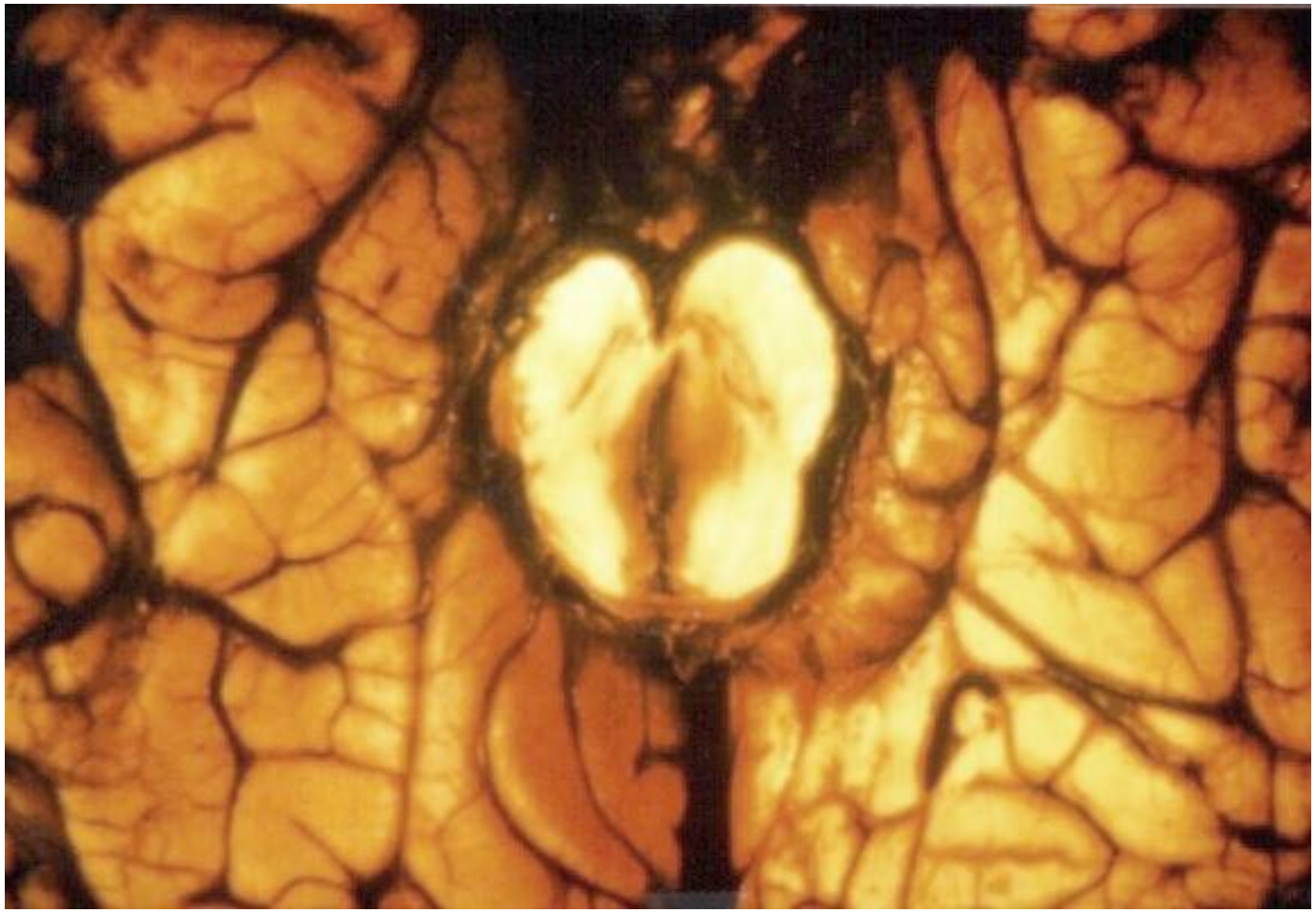
Durette hemorrhage

Durette hemorrhage

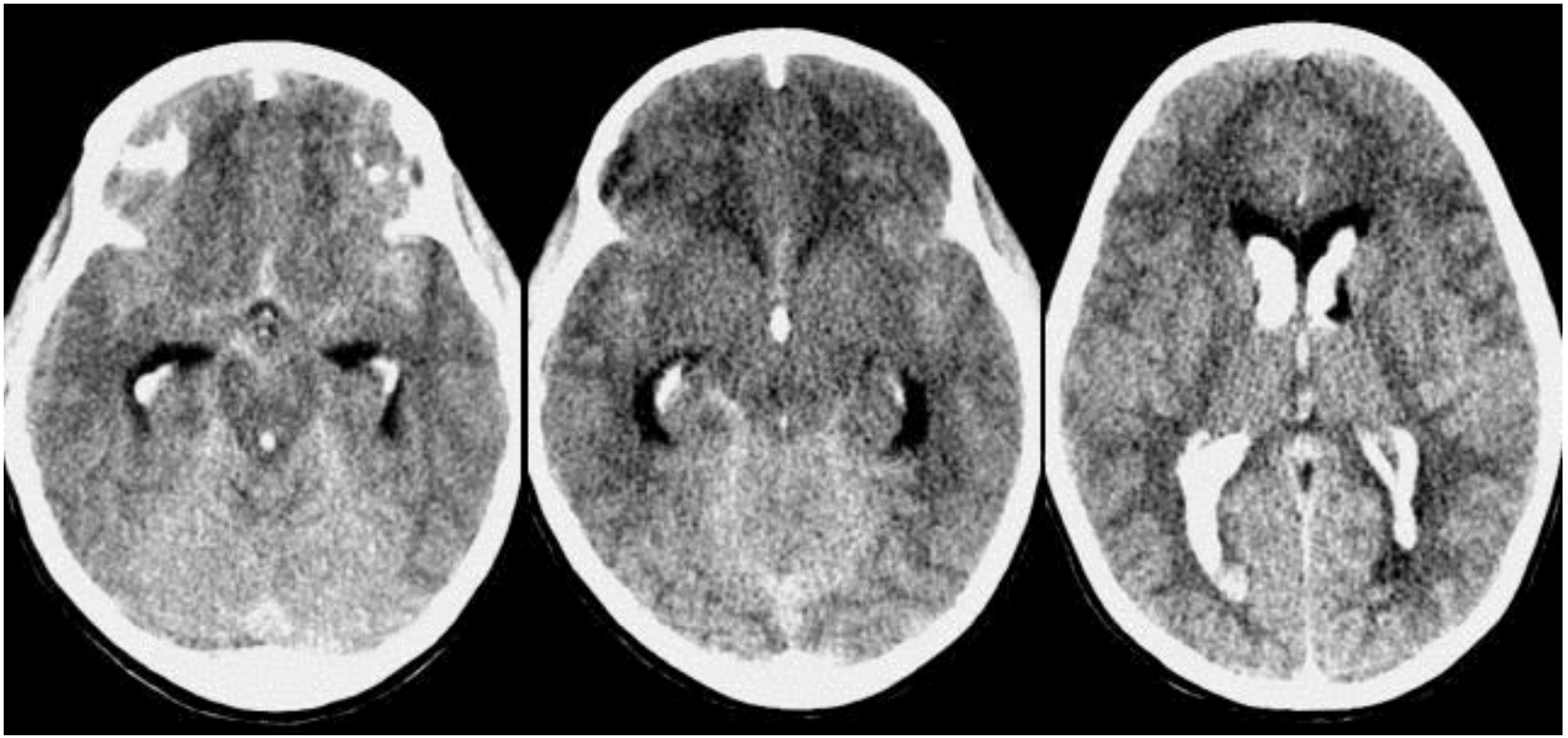




Kernohan's notch颞叶疝压迹

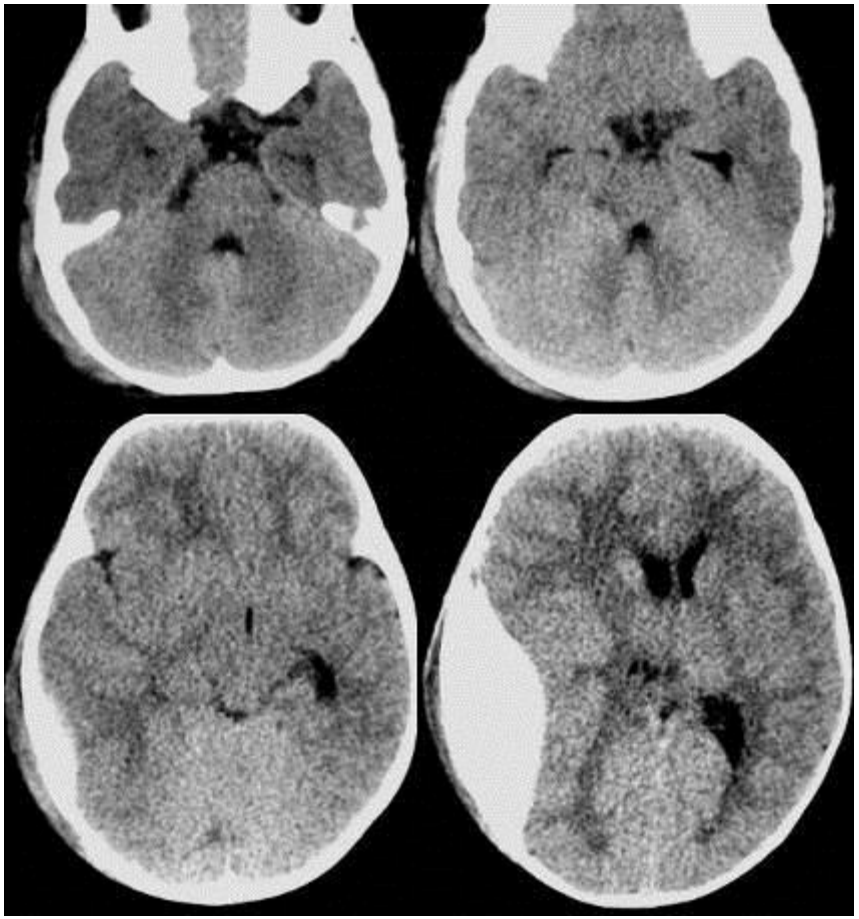


Uncal herniation



- When mass effects within or adjacent to the temporal lobe occur, the medial portion of the temporal lobe (uncus) is forced medially and downward over the tentorium. There is ipsilateral pupillary dilation. The uncus is pushed medially into the suprasellar cistern. There is bilateral uncal herniation. The suprasellar cistern is obliterated.

early uncal herniation

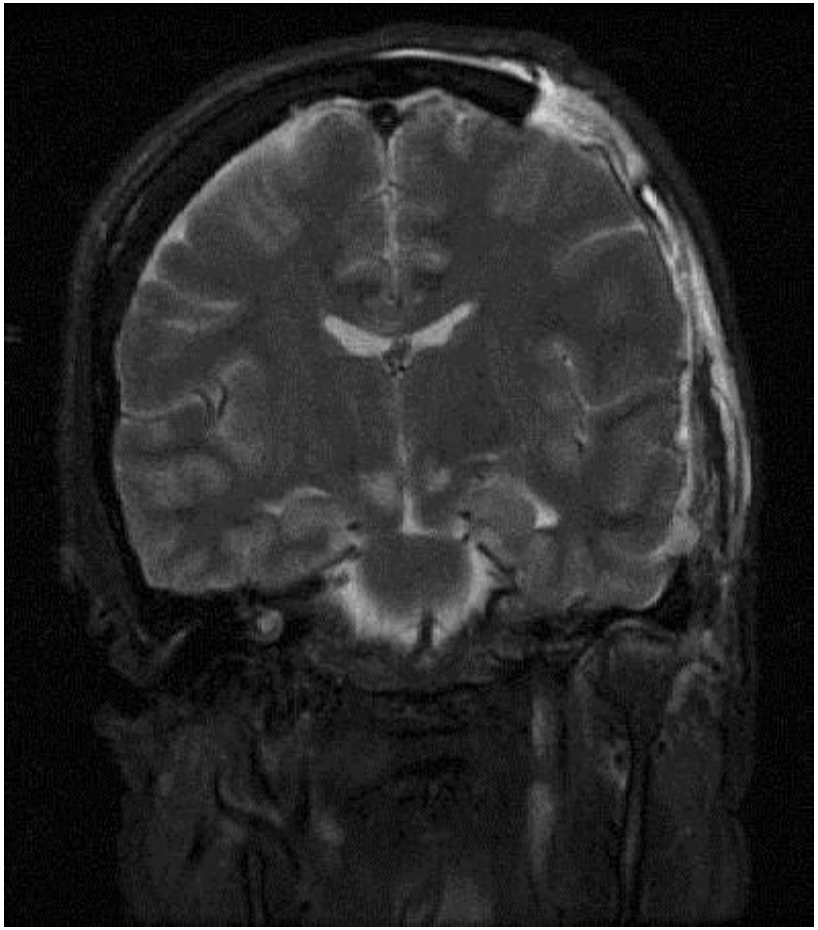


- The right uncus is pushing into the suprasellar cistern; early right uncal herniation.

中心疝

临床表现	影像所见	并发症
意识改变 呼吸模式改变 去皮层、去脑 小瞳孔		因脉络膜前动脉受压引起苍白球和视束梗塞

中心疝



Superior vermian herniation (ascending transtentorial herniation)

临床表现	影像所见	并发症
恶心 呕吐 意识障碍	中脑外观呈陀螺状 双侧环池变窄 四叠体池充满	因小脑上动脉受压引起梗塞 Galen静脉移位 脑积水 意识障碍迅速出现，并可能死亡

- 由于后颅凹的占位效应，小脑蚓和小脑半球通过小脑幕切迹向上移动

陀螺状外观

双侧环池变窄

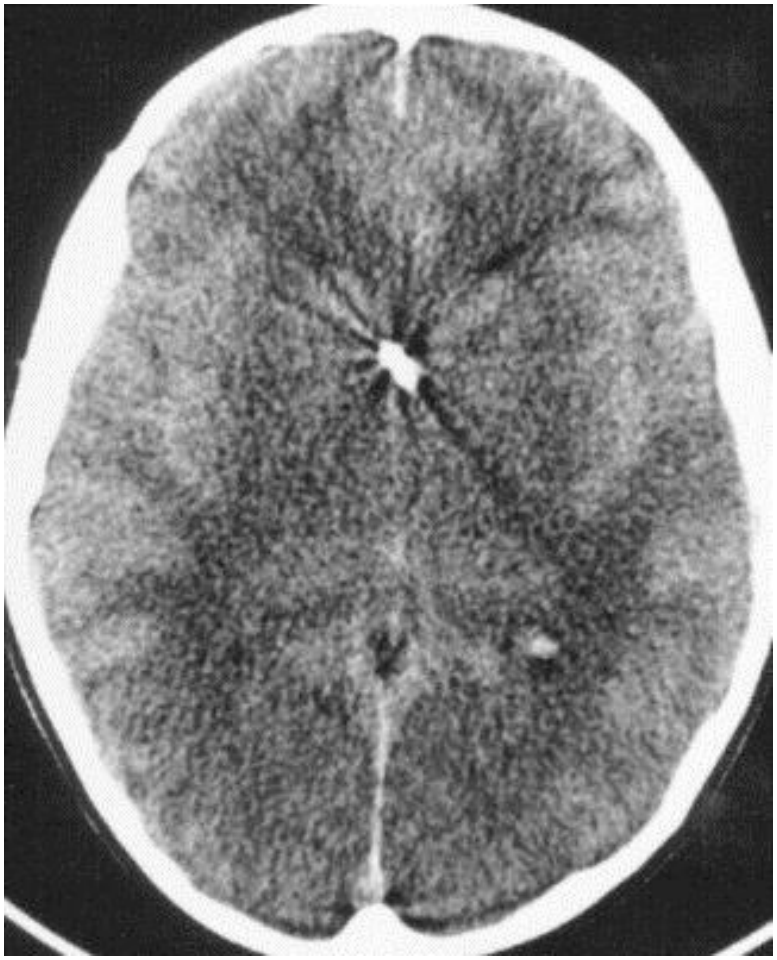
四叠体池充满

不露齿的微笑

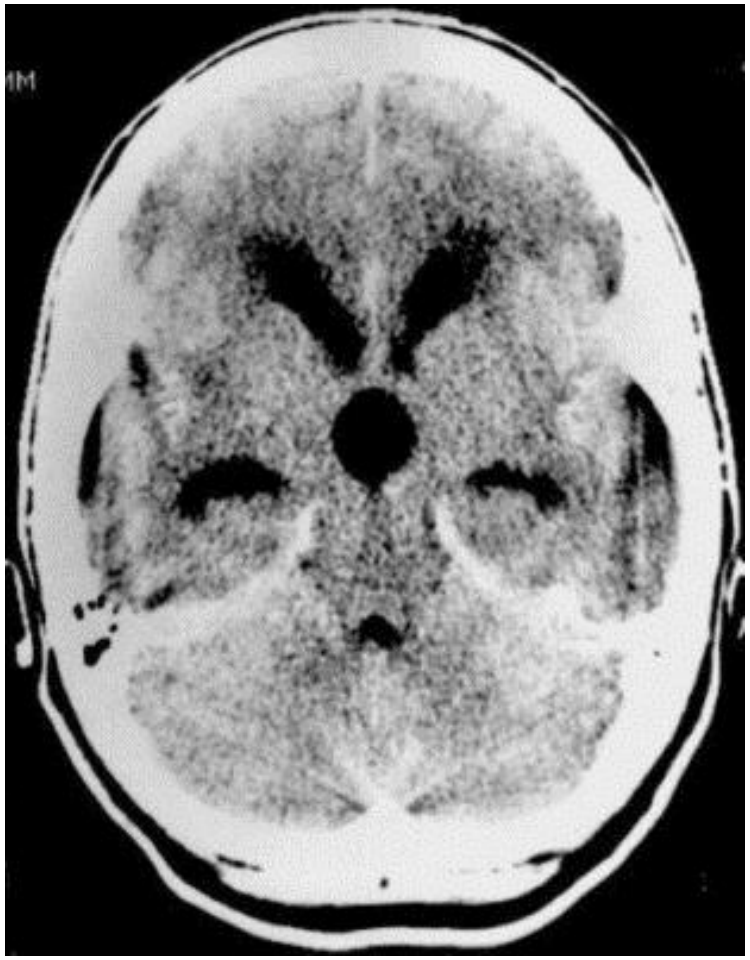
皱眉

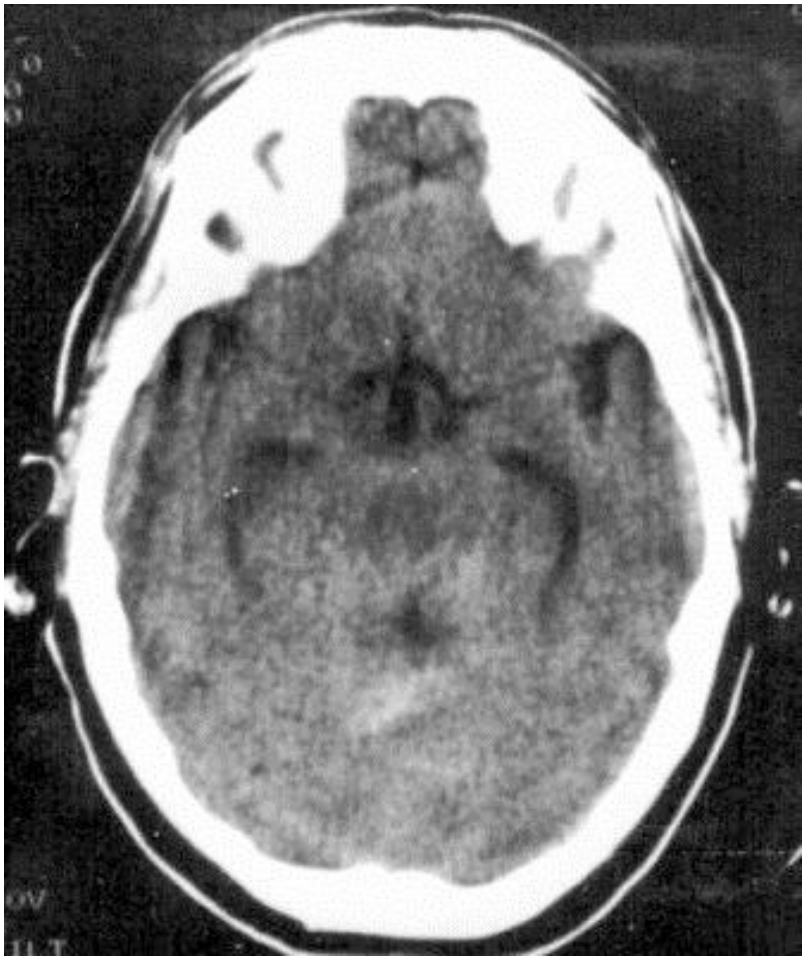
第一天的四叠体池和环池

第二天，四叠体池和环池消失

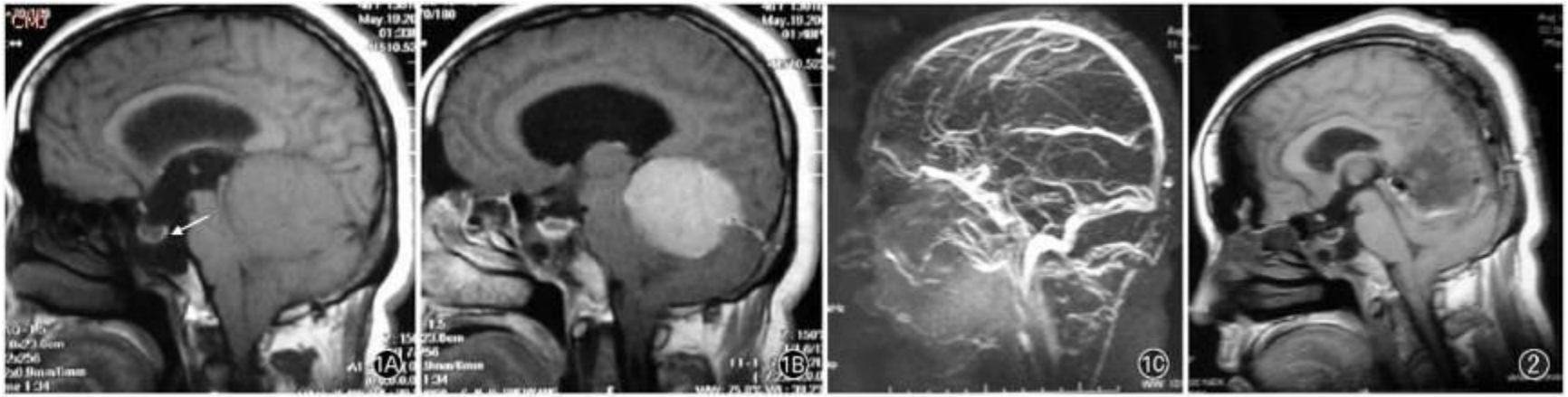


脑积水





ascending transtentorial herniation

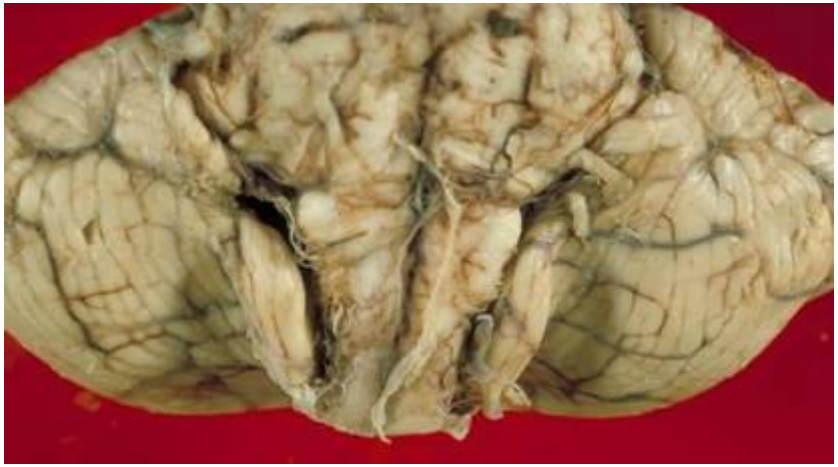


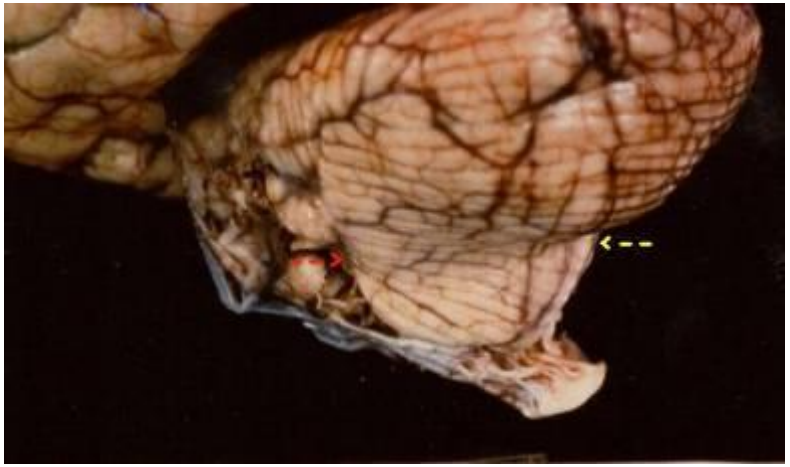
枕大孔疝

临床表现	影像所见	并发症
双侧上肢感觉减退 意识障碍	轴位像见到小脑扁桃体位于齿状突水平 矢状位见到小脑扁桃体低于枕大孔5mm（成人）或7mm（儿童）	小脑扁桃体出血性坏死 意识障碍和死亡

枕大孔疝

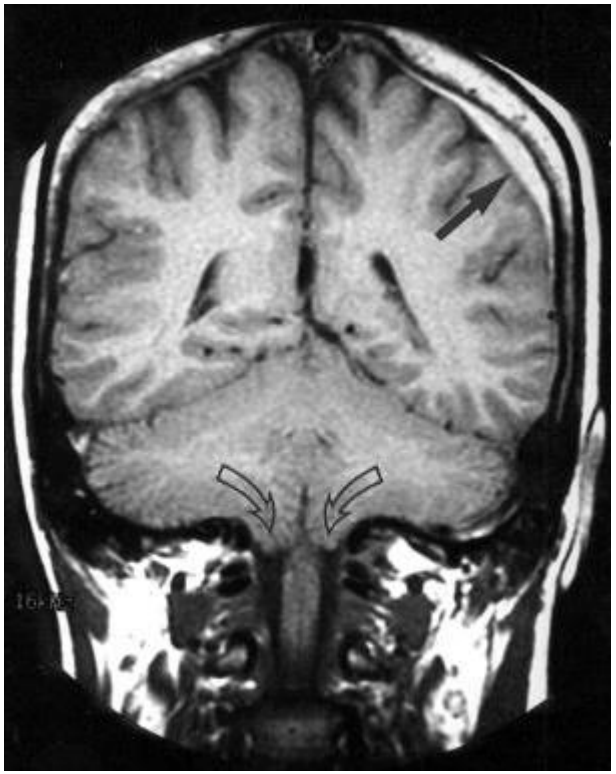
Tonsillar herniation





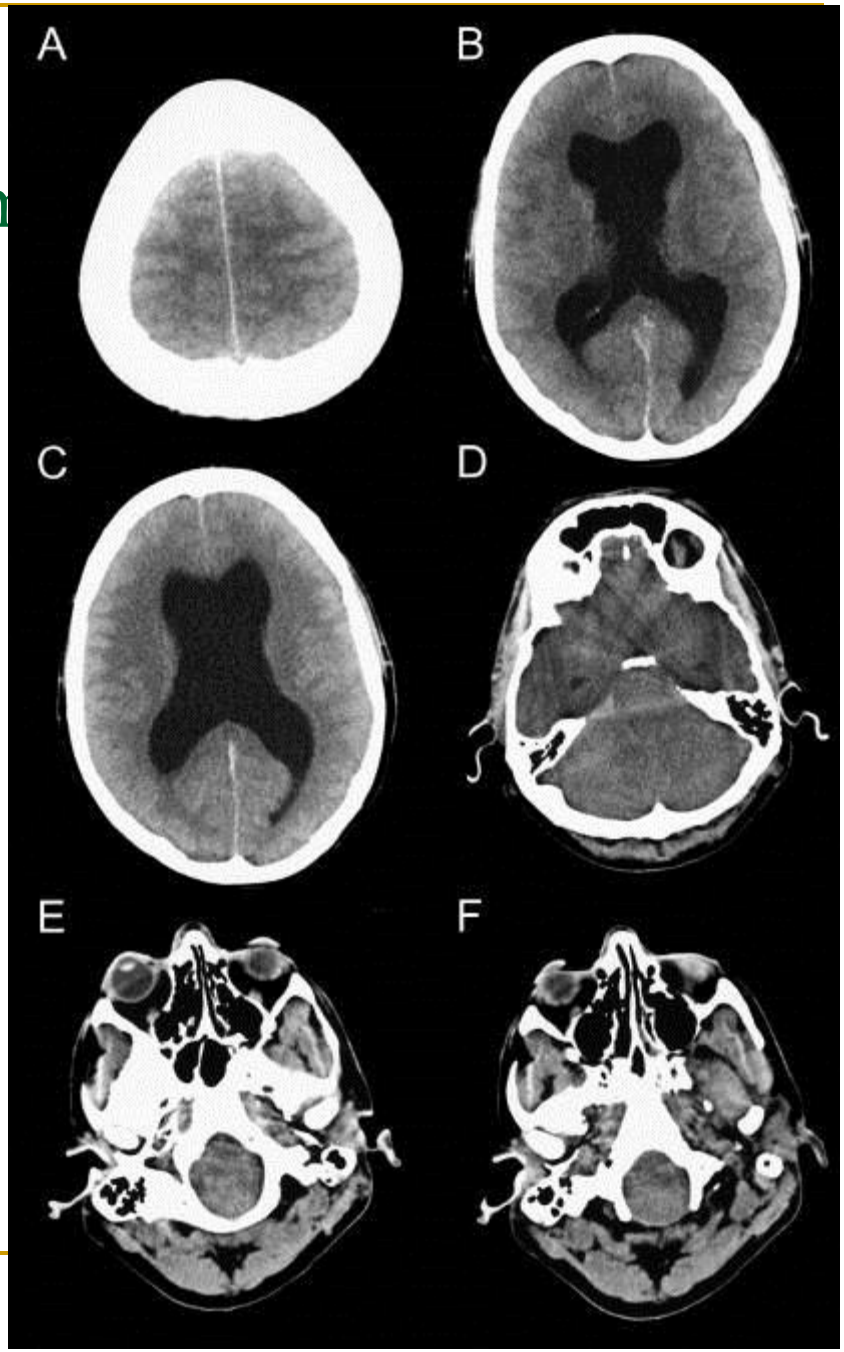
- In tonsillar herniation (rare), a mass effect in the posterior fossa causes the cerebellar tonsils to herniate inferiorly through the foramen magnum compressing the medulla and upper cervical spinal cord. Conscious patients complain of neck pain and vomiting. They may have nystagmus, pupillary dilatation, bradycardia, hypertension and respiratory depression. Early tonsillar herniation is difficult to recognize in an unconscious patient. It may not be evident on CT scan since axial views cannot see the pathology well. It is best seen on sagittal MRI. Clinically changes in vital signs may be the only clinical clue in an unconscious patient.

Tonsillar herniation

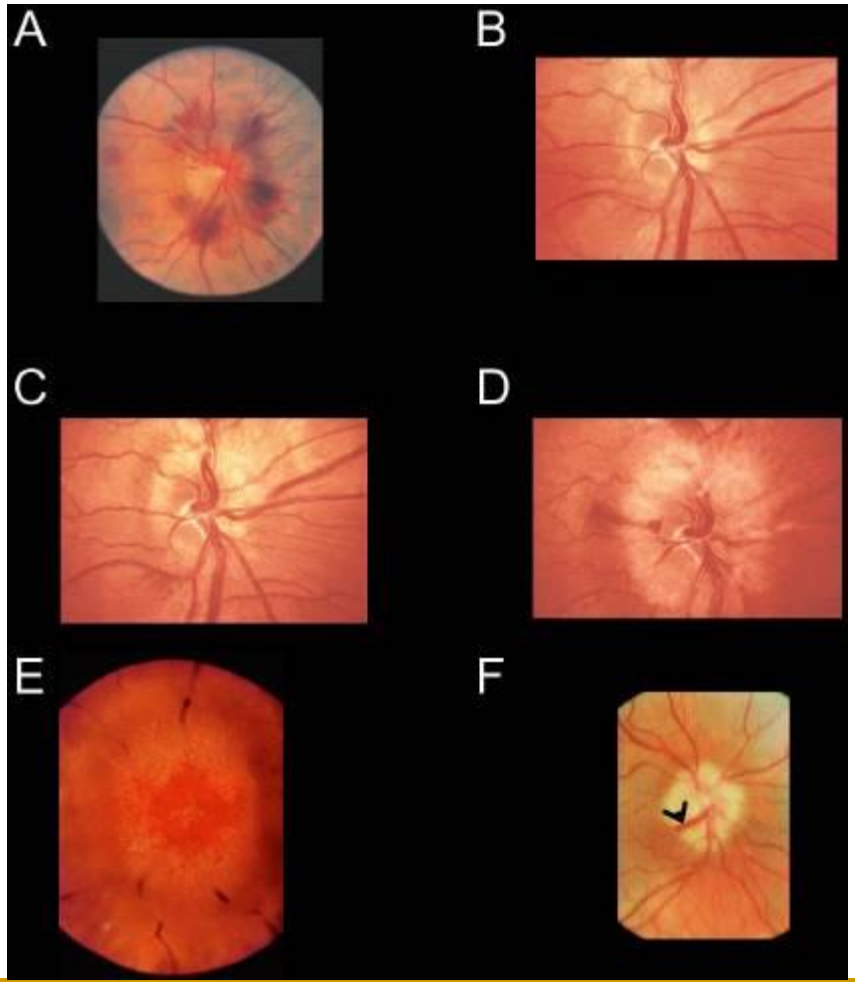


a male patient in his 30's
stem herniation after con

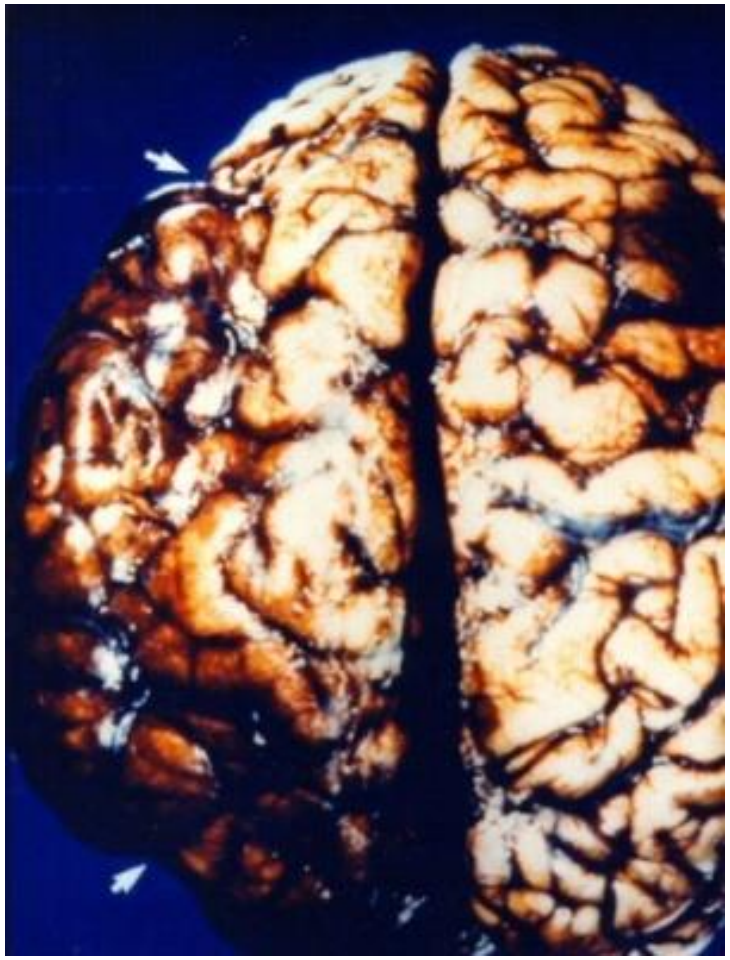
- The CT shows (A) loss of the rostral cerebral sulci suggesting increase in ICP, (B) and (C) a large hydrocephalus with widening of both temporal horns. The grey matter can still be differentiated from the white matter, but all sulci are lost. This suggests that the brain oedema is of relative recent onset and massive tissue ischaemia has not yet occurred. (D) Compression of the fourth ventricle with dilatation of the third ventricle and the caudal aspect of both temporal horns. This is observed with considerable brain oedema and obstructive hydrocephalus. (E) Herniation of the medulla and pons into the foramen magnum. (F) The tonsils are located at the level of the dens which is a good indicator for foramen magnum herniation.

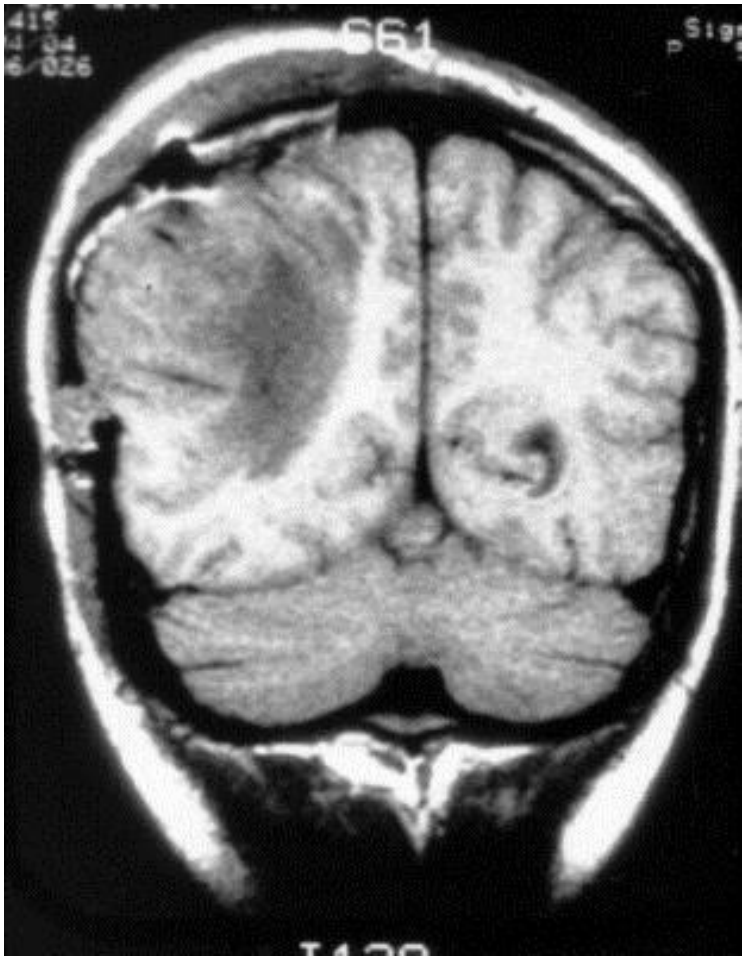


- (A) The disc shows florid hemorrhages with relatively little swelling, indicating a rapid, dramatic increase in CSF pressure. Progressive changes of optic disc oedema are seen in a patient with an intracranial tumour who declined treatment (B-D). (B) Early nerve fiber dilatation is seen particularly superiorly, inferiorly and nasally. (C) This increases and venous engorgement develops. (D) Temporal nerve fiber dilatation and swelling of the disc increases and hemorrhages appear. (E) In gross chronic disc oedema the normal retinal vasculature is masked and dilated superficial capillaries are observed. (F) In atrophic optic disc oedema nerve fibers are eventually destroyed and the optic disc without viable nerve fibers does not swell. This patient had longstanding benign intracranial hypertension. Retinochoroidal venous collaterals are present (black arrowhead).



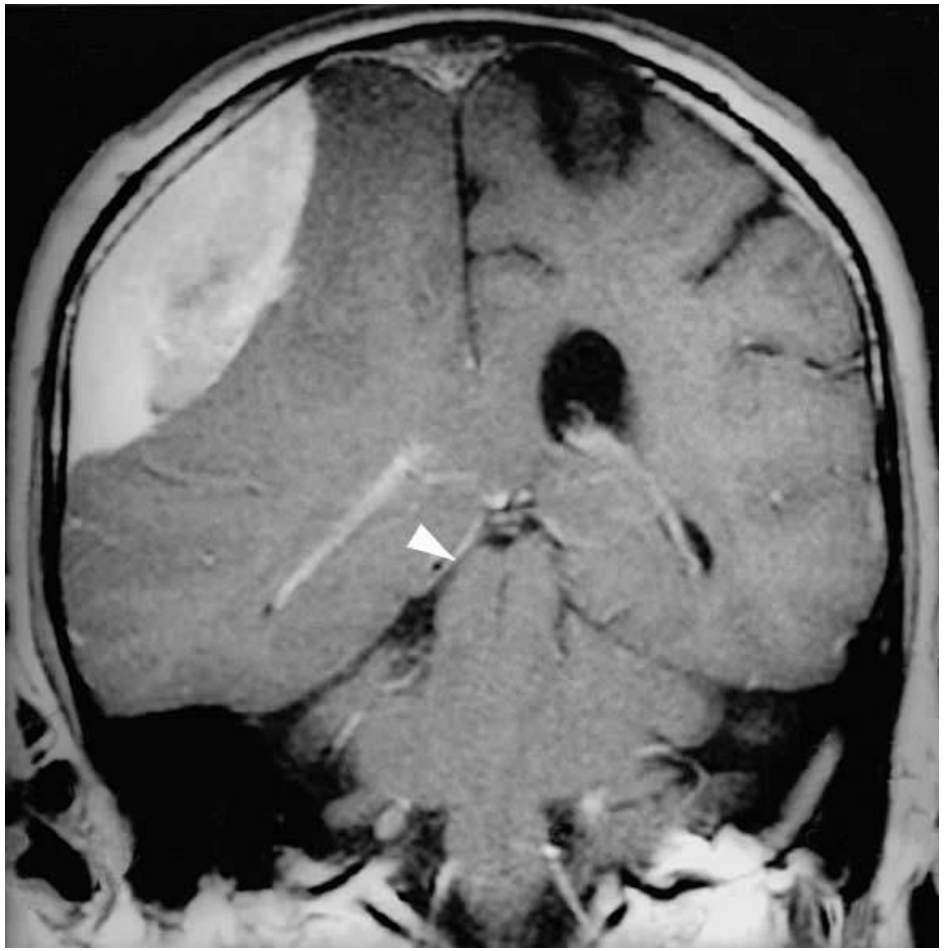
颅外疝





核磁选择

- 1. Subfalcine herniation. This is best seen on coronal MR images.
- 2. Descending transtentorial herniation (uncal herniation, hippocampal herniation). best seen on coronal images, but the compression of the brainstem is best observed on axial T2-WI.
- 3. Ascending transtentorial herniation. The sagittal imaging plane is preferred.
- 4. Cerebellar tonsillar herniation. Sagittal and coronal imaging planes are preferred.

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HEAD
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FCf
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小结

- 占位效应引起的脑组织移位
- 影像上识别脑疝的关键是看脑池的变化