Fourth Ventricle: Pathology—Non-Tumors

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1. Blake's Pouch cyst

Pathology, the FALSE answer is:

A. It is also known as the rudimental fourth ventricular tela choroidea.
B. It represents persistence with expansion of Blake's Pouch.
C. It normally regresses during the fifth to eighth gestational weeks.
D. Persistence is due to failed perforation of the foramen of Luschka.
E. There is posterior ballooning of the inferior medullary velum.

Answer D

- It is caused by a failure of the regression of Blake's Pouch secondary to the non-perforation of the foramen of Magendie.

2. Blake's Pouch cyst

Pathology, the FALSE answer is:

A. During embryogenesis, foramina of Luschka opens later than Magendie.
B. Foramina of Luschka tries to compensate for the CSF outflow to the cisterns.
C. The cyst balloons posteriorly into the cisterna magna.
D. Cerebellar vermis is well developed.
E. The cyst does not communicate with the fourth ventricle.

Answer E

- Blake's Pouch cyst communicates with the fourth ventricle.

3. Blake's Pouch cyst.

Clinical Presentation, the FALSE answer is:

A. It is a rare entity seen among young age patients.
B. It was previously classified as a part of the Dandy–Walker continuum.
C. Hydrocephalus is not a feature of this condition.
D. Some remain asymptomatic for the rest of their lives.
E. CSF shunting has good outcome.

Answer C

- When symptomatic, patients present with impaired neurological symptoms and progressive hydrocephalus with symptoms such as headache, vomiting, blurred or double vision.

4. Blake's Pouch cyst

Radiological features, the FALSE answer is:

A. Triventricular hydrocephalus.
B. Infra- or retrocerebellar localization of the cyst.
C. Well-developed nonrotated cerebellar vermis.
D. Cystic dilation of the fourth ventricle.
E. Some degree of compression on the medial cerebellar hemispheres.

Answer A

– Hydrocephalus usually involves the fourth ventricle and supratentorial ventricles producing classical tetra-ventricular hydrocephalus. Several articles stress on the presence of a tetraventricular hydrocephalus to make the diagnosis.

5. Mega cisterna magna, the FALSE answer is:

A. It is a normal variant, occurs in ~1% of all brains imaged.
B. It is a focal enlargement of the CSF-filled subarachnoid space.
C. Cerebellar atrophy is a common finding.
D. All the children undergo normal development.
E. It communicates with the fourth ventricle.

Answer D

– It is an incidental finding on neuroimaging, and no imaging follow-up is necessary as patients are usually asymptomatic. But there are now studies proving that it may affect movement ability, as well as adapting, social behavior, and language abilities during child development.

6. Arachnoid cyst.

The FALSE answer is:

A. Arachnoid cysts are benign developmental anomalies.
B. It communicates with adjacent ventricles and cisterns.
C. Occur in virtually all locations where arachnoid is present.
D. These are formed by splitting or duplication of the arachnoid membrane during the formation of the subarachnoid cisterns.
E. Commonly located in or adjacent to the Sylvian fissure, CP angle.

Answer B

– Arachnoid cyst normally does not communicate with the cisterns, ventricles. These are filled with CSF and exert pressure over the adjacent structures.

7. Arachnoid cyst.

The FALSE answer is:

A. Hydrocephalus is a common finding.
B. Symptoms are typically due to progressive brainstem compression.
C. Definitive treatment consisted of ventriculoperitoneal shunt.
D. Endoscopic fenestration is another treatment modality.
E. MRI flowmetry helps to delineate the flow of CSF, differentiates it from trapped fourth ventricle.

Answer C

- The definitive treatment for an arachnoid cyst in the fourth ventricle is complete surgical excision of the cyst via a median suboccipital approach.

8. Trapped fourth ventricle.

The FALSE answer is:

A. Observed in children after ETV for the treatment of hydrocephalus.
B. Blockage of both the outlets (Luschka and Magendie) and the inlet of the fourth ventricle at the level of the cerebral aqueduct.
C. Pressure in the fourth ventricle increases due to abnormal flow of CSF.
D. Brainstem compression and lower cranial nerve palsies.
E. Treatment includes shunts, endoscopic surgery, and foramen magnum decompression by fenestration of the trapped fourth ventricle.

Answer A

- The trapped fourth ventricle is a rare late complication seen in children after CSF diversion for the treatment of postinfectious or post-hemorrhagic hydrocephalus after with lateral ventricle shunting. Functional occlusion of the aqueduct is often related to over drainage with or without associated slit ventricles, and the occlusion of foramina is due to arachnoiditis secondary to infection or hemorrhage.

9. Dandy–Walker malformation.

Pathophysiology, the FALSE answer is:

A. Most common posterior fossa malformation with its enlargement.
B. Partial (hypoplasia) or complete agenesis of the cerebellar vermis.

C. Cystic dilatation of the fourth ventricle which is distorted.
D. The fourth ventricle is encased in a neuroglial vascular membrane.
E. Herniation of cerebellar tonsils >5 mm below the foramen magnum.

Answer E

- Herniation of cerebella tonsils is associated with Chiari malformation and not Dandy–Walker malformation.

10. Dandy–Walker malformation.

Clinical presentation, the FALSE answer is:

A. Most patients present in their first year of life.
B. The most common manifestation is macrocephaly.
C. Patients may be syndromic with malformations of the heart, face, limbs, and gastrointestinal or genitourinary system.
D. 90% of patients have some degree of mental retardation.
E. Hydrocephalus occurs in 70–90% of these cases.

Answer D

- 50% of patients with Dandy–Walker malformation have normal IQ and the rest of the 40–50% have some degree of mental retardation.

11. Dandy–Walker malformation.

MRI findings, the FALSE answer is:

A. Atresia of Magendie and Luschka.
B. Tentorium and torcular herophili are usually displaced downward.
C. Agenesis of the cerebellar vermis.
D. Enlarged posterior fossa cyst that communicates with the fourth ventricle.
E. Possible agenesis of the corpus callosum.

Answer B

- The DWM is a heterogeneous disorder characterized by hypoplasia and upward rotation of the cerebellar vermis, cystic dilation of the fourth ventricle, and an enlarged posterior fossa with upward displacement of the lateral sinuses, tentorium, and torcular heterophili.

12. Dandy–Walker malformation.

Treatment, the FALSE answer is:

A. In the absence of symptoms, DWM may be managed by follow-up only.
B. When symptomatic, ETV is an option where the aqueduct is patent.
C. Posterior fossa craniotomy with excision of obstructing membrane.
D. Ventriculoperitoneal (VP) shunt alone.
E. VP with cystoperitoneal shunting.

Answer D

- Shunting the lateral ventricles alone is contraindicated because of the risk of upward herniation with increased pressure in the posterior fossa.

13. Dandy–Walker malformation.

Prognosis, the FALSE answer is:

A. Despite the intervention, there are 12–50% mortality rates.
B. Prognosis largely depends upon the hydrocephalus, congenital abnormalities, and brain malformations.
C. The risk of seizure is 90–100%.
D. Fifty percent of children with untreated hydrocephalus die before age 3.
E. Around 20% will reach adult life.

Answer C

- The risk of epileptic seizures ranges from 15 to 30%.

14. Dandy–Walker Variant (DWV).

Characteristics, the FALSE answer is:

A. Less severe anomaly than Dandy–Walker malformation.
B. Mild vermian hypoplasia.
C. A small posterior fossa.
D. A small cystic cavity that communicates with the fourth ventricle.
E. Hydrocephalus is present (<30%) but not as commonly as in DWM.

Answer C

- The posterior fossa in DWV is of normal size. It is enlarged in DWM. Cystic cavities communicate with the fourth ventricle in both DMW and DWV.

15. Epidermoid cyst.

Clinical presentation, the FALSE answer is:

A. It compromises 0.2–1.8% of all primary intracranial lesions.
B. Less than 5% occur within the fourth ventricle.
C. Symptoms occur due to cerebellar compression.
D. Symptoms can include headaches, double vision, facial palsy, gait ataxia, hearing impairment, trigeminal neuralgia, and facial tics.
E. Patients often present in the first decade of life.

Answer E

– Association in the pediatric age is very unusual. These tumors grow very slowly by the gradual accumulation of normally dividing cells, and often sufficient time is required to reach a size large enough to cause clinical symptoms. Patients often present in the fourth decade of life.

16. Epidermoid cyst.

Investigations, the FALSE answer is:

A. MRI shows low signal intensity on T1WI and high on T2WI.
B. There is homogenous enhancement after gadolinium on T1WI.
C. CT shows homogeneously hypodense, circumscribed areas with no edema, no calcification.
D. The margin of the tumor is irregular with a "flowing" pattern of growth, no peritumoral edema and hydrocephalus.
E. There is abnormal restricted diffusion in DWI.

Answer B

– Epidermoid cysts do not show contrast enhancement in CT or MRI. They appear bright as they show restricted diffusion in DWI and thus, DWI helps differentiate them from the arachnoid cysts.

17. Epidermoid cyst.

Treatment, the FALSE answer is:

A. Complete total excision is always possible.
B. If the germinal capsule is adherent to the floor of the fourth ventricle, it is not excised.
C. The remnants should be devitalized to avoid spillage of keratinous material.
D. Intra-operative dispersion of cyst contents should be avoided to reduce the risk of aseptic meningitis.
E. Due to slow growth rate, it takes years to recur to a significant size.

Answer A

- Epidermoid cysts are very notorious as they grow around neurovascular tissues and sometimes are adherent to the floor of the fourth ventricle. In such cases, the capsule is left untouched to avoid morbidity and mortality. The goal here is to do the maximum safe resection.

18. Neurocysticercosis.

Characteristics, the FALSE answer is:

A. Should raise suspicion in certain geographic locations.
B. Often presents in multiple ventricular and parenchymal sites.
C. Cysts are mobile, tend to migrate within the ventricular system from time to time.
D. Among the ventricles, the third ventricle is the most common site of its occurrence.
E. Two types of cysticercosis are described-cellulosa (cyst with scolex) and racemose (cyst lacks scolex).

Answer D

- The fourth ventricle is said to be the favored site of intraventricular neurocysticercosis, probably due to the gravitational effect that favors the migration of the cysts from the superior cavities. It results in entrapment of the cysts within the fourth ventricle due to the small size of the outlet foraminae and can produce acute obstructive hydrocephalus and death in patients.

19. Neurocysticercosis.

Investigations, the FALSE answer is:

A. Immunological studies are neither sensitive nor specific.
B. Contrast-enhanced CT may not show enhancement.
C. MRI is the investigation of choice.
D. CSF flow study shows the intraluminal nature of the cyst.
E. Contrast-enhanced T1WI may not show enhancement.

Answer E

- Contrast-enhanced CT may not show enhancement, whereas the contrast-enhanced MRI exhibits enhancement, suggesting that MRI is more sensitive in detecting underlying ependymitis. The 3D-CISS-MRI sequence is used for the demonstration of an intraventricular cysticercus cyst—the scolex, cyst wall, and cyst fluid.