Cases:

1- Meningioma

2- Glioblastoma

3- Schwannoma

4- Multiple sclerosis

5- Hydrocephalus

6- Pyogenic meningitis

7- Brain abscess

8- Ruptured berry aneurysm

9- Alzheimer disease

Practical Pathology

*432 **Pathology** Team*

Done By: **Abdulrahman ArJ.**

Reviewed By: **Yara Al-Salloum & Rihaf Al-Gain**

CNS Block

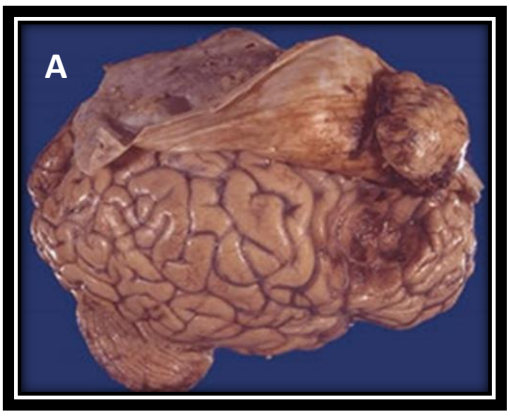
1- Meningioma

WHO grade 1 **Good prognosis**

It's a benign tumor, arising from the Dura (extra-axial). The signs and symptoms are caused by the compression to the underlying brain.

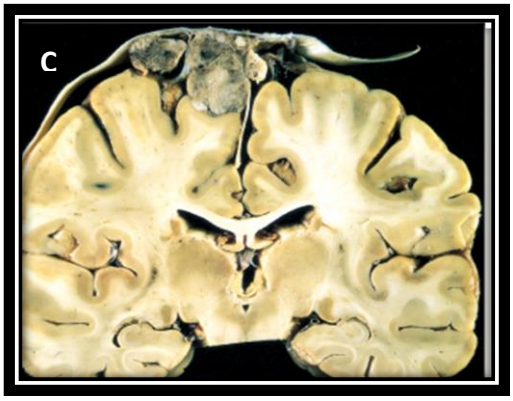
1- Gross (Macroscopic) Features:

(A)- **A rounded mass attached to the Dura** compress the underlying brain.
(Easily separated from it)



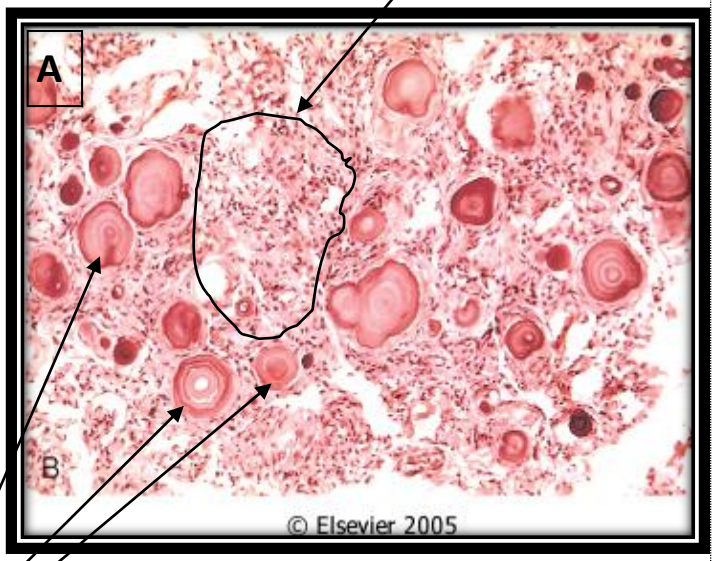
(B)- **Meningioma arising from the Dura (removed)** at the base of the skull

(C)- Parasagittal **multi-lobular meningioma attached and arise from the Dura** with compression of underlying brain.



The origin of the cells: Arachnoid meningiothelial cells

2- Histopathological features:



(A)(B):

1- **Whorled pattern of fibrocellular tissue.** (**Whorled pattern of spindle meningothelial cells .)** "the main description of the case"

(Cells arranged in wool ball shaped, seen better in section B)

2 - **Psammoma bodies**. (Calcified particles)

3 - Cells are oval, spindle shape or .elongated and lack mitosis

Where else can you see psammoma bodies?

Thyroid gland

Psammoma bodies

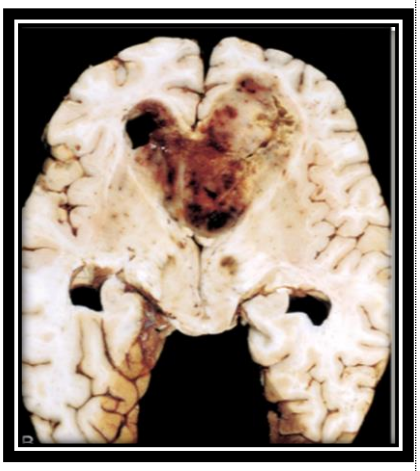
-Stain used: **H&E "Hematoxylin and Eosin stain". It's the gold standard stain in Histopathology .**

Extra: (not mentioned by the doctor)

The different histological patterns of meningioma are: Syncytial, fibroblastic, transitional, psammomatous, secretory

2- Glioblastoma multiforme

WHO grade 4 (malignant) **Poor prognosis**



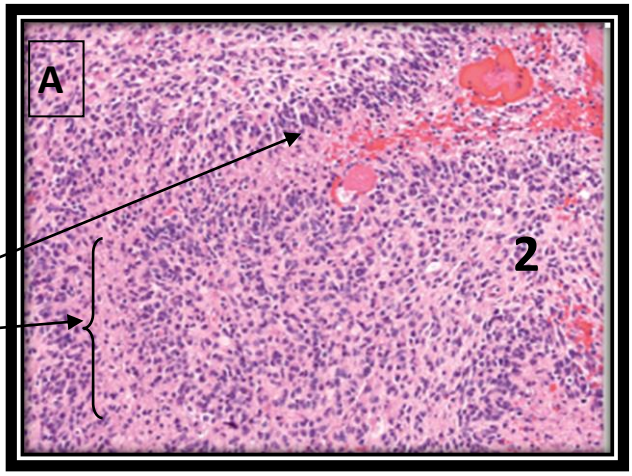
1- Gross (Macroscopic) Features:

- CT scan of a large tumor in the cerebral hemisphere showing:-
  - -signal enhancement with contrast material (Two lesions can show enhancement: Glioblastoma multiforme and abcesses)
  - -peritumoral edema
- **Necrotic**, **hemorrhagic** and **infiltrating mass** (Not well-circumscribed) in the cerebral hemisphere

*it's important to mention the location in every Gross description.

Very aggressive tumor: If it is diagnosed the patient will die within a few months

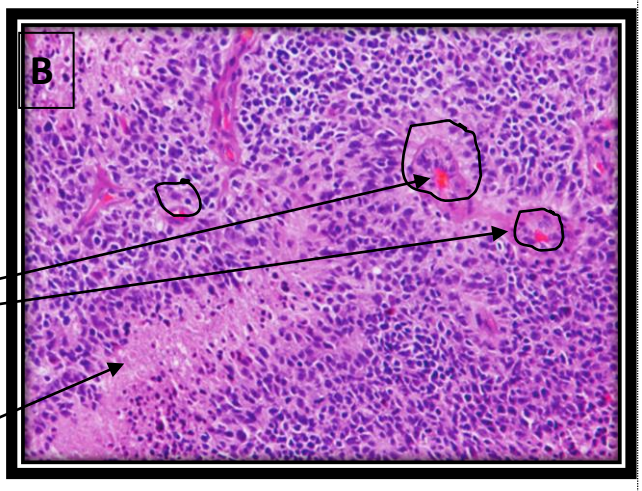
2- Histopathological features:



(A),(B):

1- Pseudo-palisading of malignant nuclei (Around the area of necrosis)
2- Foci of necrosis

3- Endothelial cells proliferation (Around the lumen of the capillary) (seen better in B)



Secondary glioblastoma is associated with P53 mutation
Primary glioblastoma is associated with EGFR mutation

The proliferation of the endothelial cells around the blood vessels

Necrosis

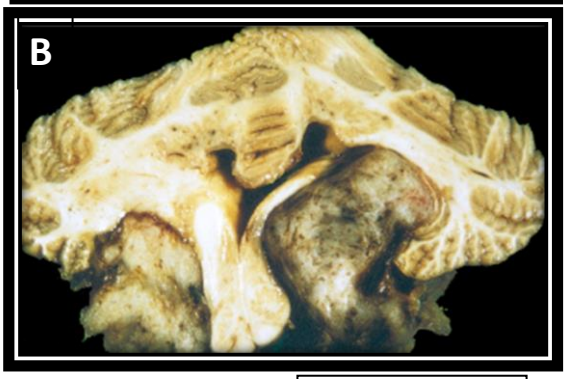
3- Schwannoma

A benign tumor. In the CNS, it often arise from the cerebellopontine angle affecting the eighth C.N. It can be cured by local excision.

1-Gross (Macroscopic) Features:

(A) Well circumscribed (defined) mass at the cerebello-pontine angle

(B) Bilateral eighth nerve mass (schwannoma).



What syndrome is suggested by such finding?

Bilateral acoustic (eighth) Schwannoma is associated with **NF2 (Neurofibromatosis Type 2 syndrome)**

2- Histopathological Features:

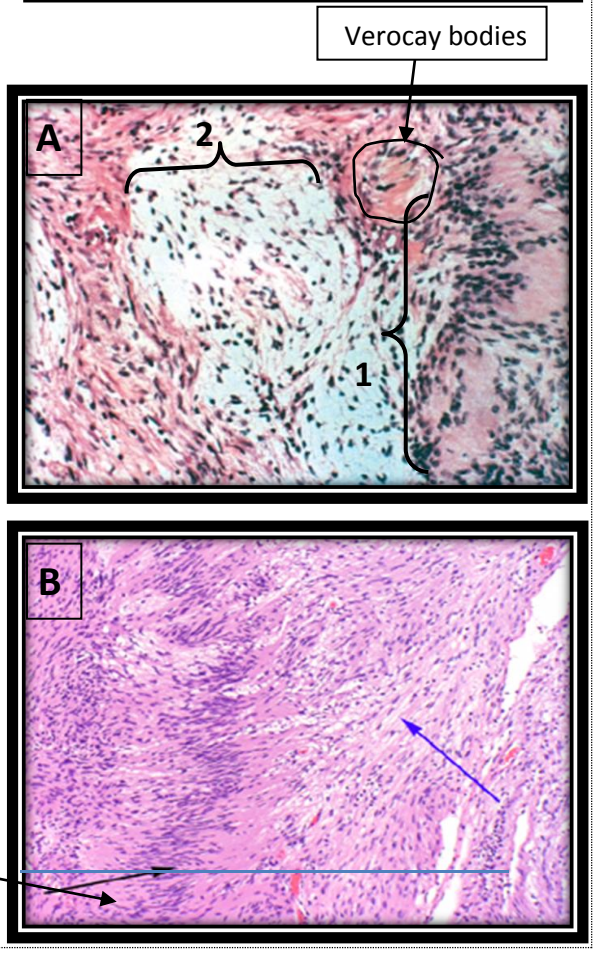
(A) 1-Cellular areas (Antoni A), including **Verocay bodies*** (far right)

2-looser, myxoid (less cellular) regions (Antoni B).
(Antoni A and B are seen better in low power)

(B) -Antoni A "Black arrow":
.Cellular (dense) areas
.Spindle shaped nuclei lined-up surrounding an eosinophilic material.

-Antoni B "Blue arrow":

Pale (loose) areas



Verocay bodies?!

A palisading (lined-up) nuclei, surrounding a pink eosinophilic material in Antoni A area.

4- Multiple sclerosis

A demyelination disease due to autoimmune factors.

1-Gross (Macroscopic) Features:

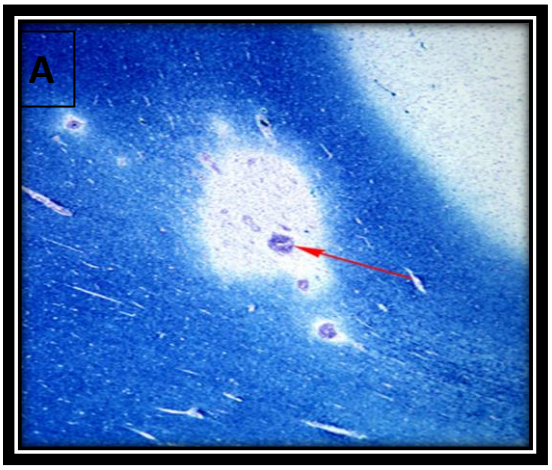
- **Brown** and hemorrhagic **peri-ventricular lesion**.
- slightly **dilated** and irregular **lateral ventricle**

2- Histopathological Features:

(A) 1-Demyelinated area which is seen as a pale area **using a (luxol fast blue/PAS) stain**, and a myelinated area which is dark blue.

2-mostly it's around a blood vessel (arrow).

3-in case of early lesion, it's associated with inflammatory cells



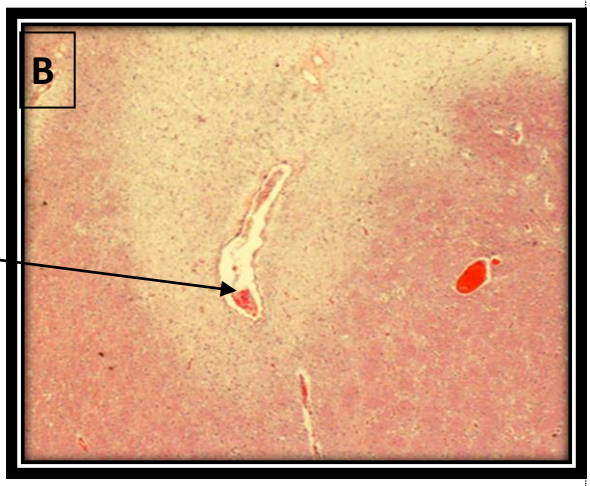
(luxol fast blue/PAS) stain:

A stain used to detect myelination **in early lesions**

(B) 1-Demyelinated area which is seen as a pale area **using (H&E) stain**. And **it's used in advanced lesions only** .

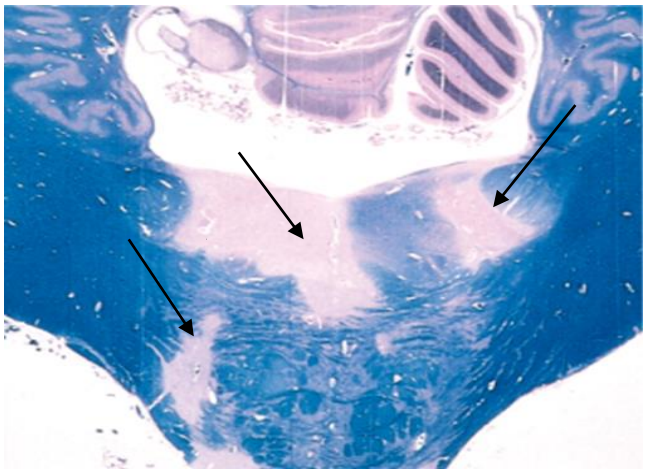
2- mostly it's around a blood vessel.

3-there is very little inflammation around the vein.



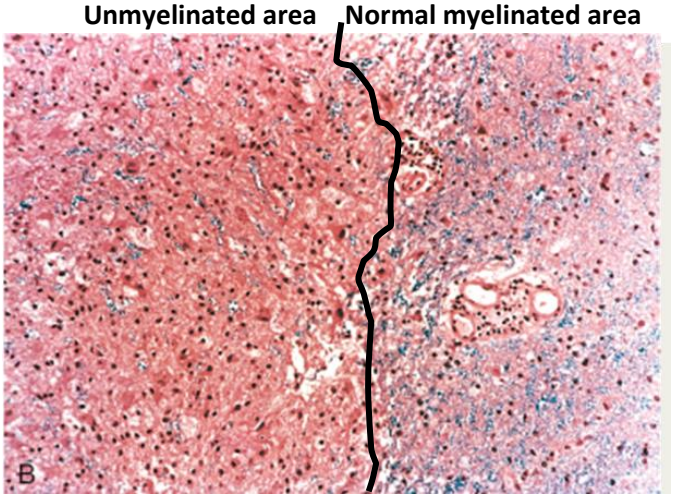
In advanced lesions, you can see the loss of myelin even without a special stain and only using the H&E stain. It is lighter pink than the normal white matter surrounding it.

Intermittent (discontinuous) unmvelinated areas

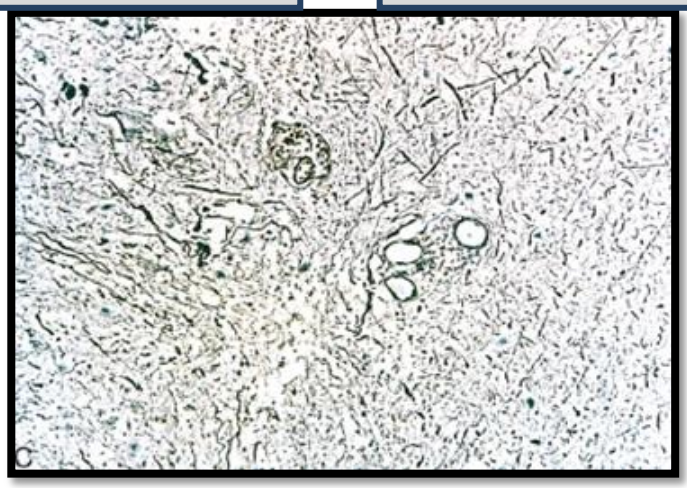


Unstained regions of demyelination (MS plaques) around the fourth ventricle (Luxol fast blue PAS stain for myelin).

Unmyelinated area Normal myelinated area



Myelin-stained section shows the sharp edge of a demyelinated plaque and perivascular lymphocytic cuffs. (H&E Stain)



Sections of the same lesion with Silver stain showing a preserved axons.

Preserved axons are shown with SILVER stain

What is the difference between demyelinating disease and degenerative disease?
Demyelinating is a disease of white matter
Degenerative is a disease of gray matter

- The key microscopic features of multiple sclerosis are:-

-Peri-vascular mononuclear inflammation (lymphocytes, plasma cells and macrophages)

-Loss of myelin and variable loss of oligodendrocytes (Demyelination)

-Relative preservation of axons

-Reactive astrogliosis (sclerosis).

- MS lesions do vary depending on their age:-

•

Early (Acute) Lesion:-

-characterized by perivascular mononuclear inflammation

- Myelin demyelination

- Astrogliosis is not yet profound

-Stain used: (luxol fast blue/PAS) stain

Advanced (Chronic) Lesions:-

- There are fewer inflammatory cells

- more Astrogliosis

- complete demyelination

-Stain used: the H&E stain

5- Hydrocephalus

Definition:

Accumulation of the CSF in the ventricular system.

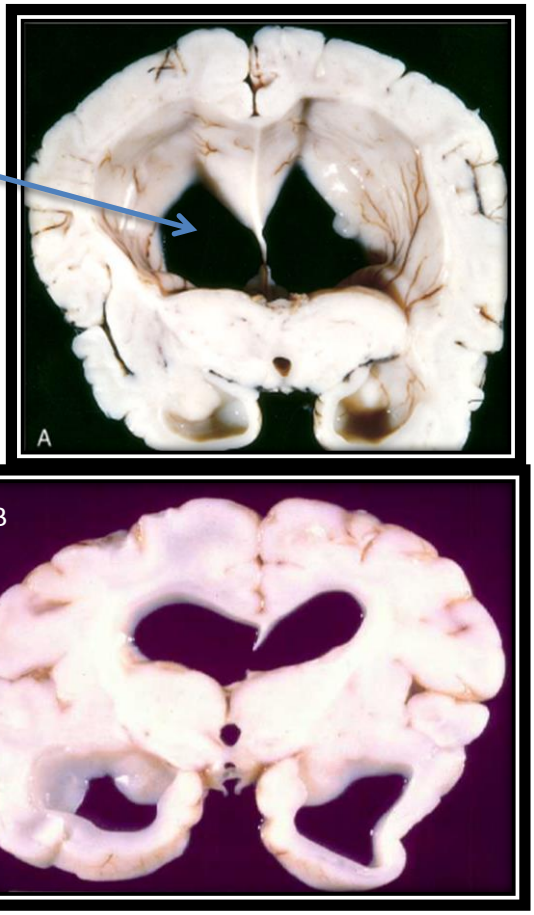
***Causes*:**

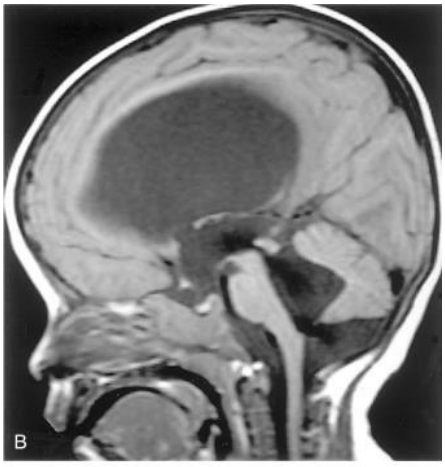
1- Excessive production from the choroid plexus (choroid plexus tumor)
2- Impaired resorption.
3- Obstruction of the CSF flow (obstruction of foramen of Monro or compressed aqueduct) by tumors.
4- secondary to brain atrophy
5- Meningitis

1-Gross (Macroscopic) Features:

(A) **Dilated lateral ventricles** seen in a coronal section through the midthalamus.

(B) Cross section of brain showing **marked dilatation of the ventricles**.





Mid-sagittal magnetic resonance image of a child with communicating hydrocephalus, involving all ventricles

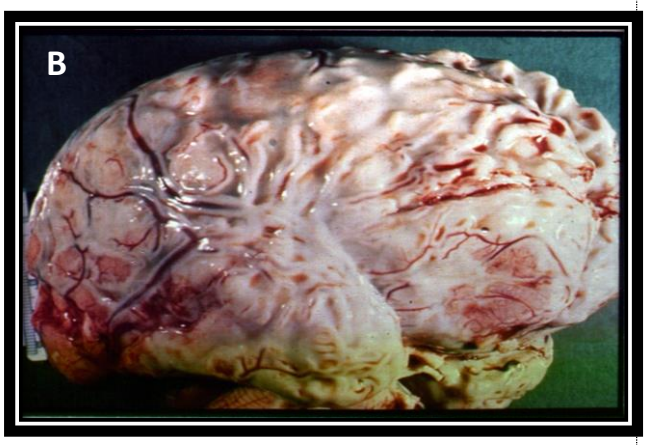
6- Pyogenic (Bacterial) meningitis

Bacterial infections are the most common cause

1-Gross (Macroscopic) Features:

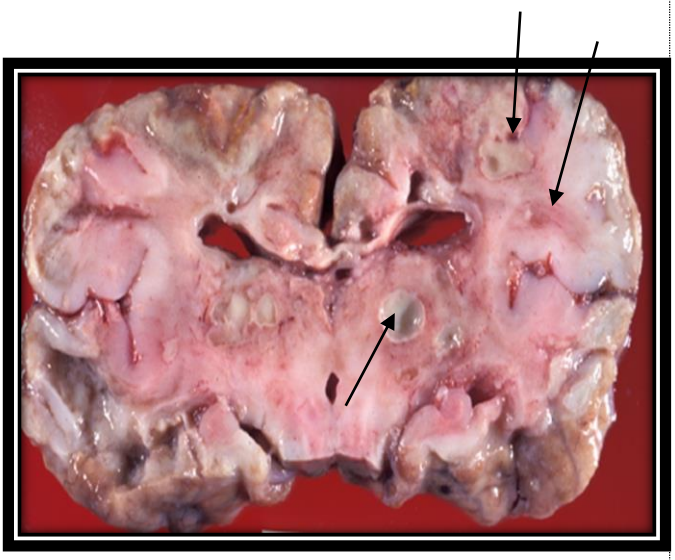
(A) A thick layer of **supurative exudate** covers the brain hemispheres and meninges

(B) A thick layer of **supurative exudate** covers the brain hemispheres, with **thickens Leptomeninges**



7- Brain abscess

1-Gross (Macroscopic) Features:



1- Multiple discrete lesions with central liquefactive necrosis

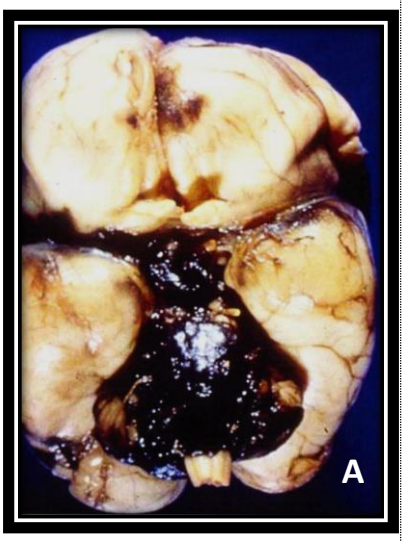
2- Fibrous capsule surrounding the necrosis.

3- Marked edema

What type of necrosis we see in the brain?
Liquefactive necrosis

8- Subarachnoid hemorrhage.

Caused by: Ruptured saccular (berry) aneurysm



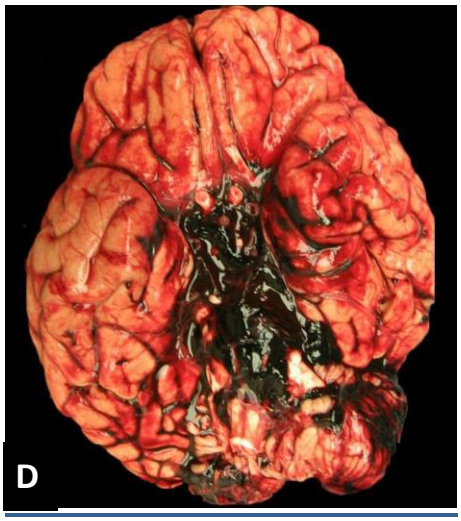
1-Gross (Macroscopic) Features:

(A) Extensive hemorrhage in the pons with extension to fill the fourth ventricle.

(B) Circle of Willis with an aneurysm of the anterior cerebral artery (arrow).

(C) Dissected circle of Willis to show large aneurysm

(D) Subarachnoid hemorrhage in the pons.



2- Histopathological Features:

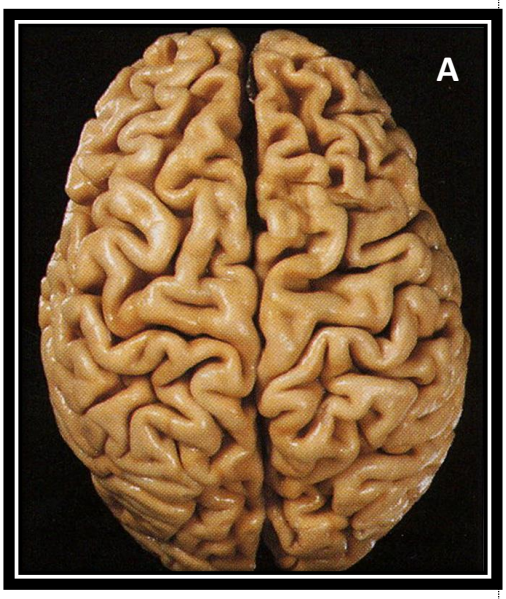
- Section through a saccular aneurysm showing the **hyalinized fibrous vessel wall**

Common site of saccular (berry) aneurysms in the circle of Willis: Anterior communicating artery (ACA)

9- Alzheimer disease

1-Gross (Macroscopic) Features:

(A) The brain of an AD patient shows **cortical atrophy** with **thin gyri and prominent sulci**.

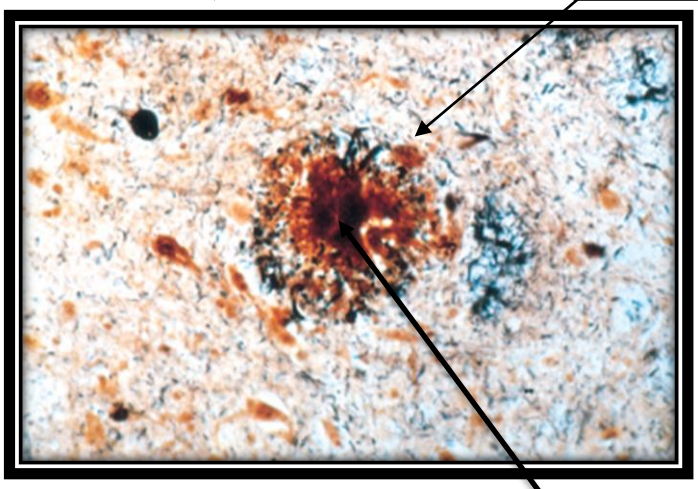


(B) AD with **cortical atrophy** (right hemisphere) with **deep and wide sulci and narrow gyri**

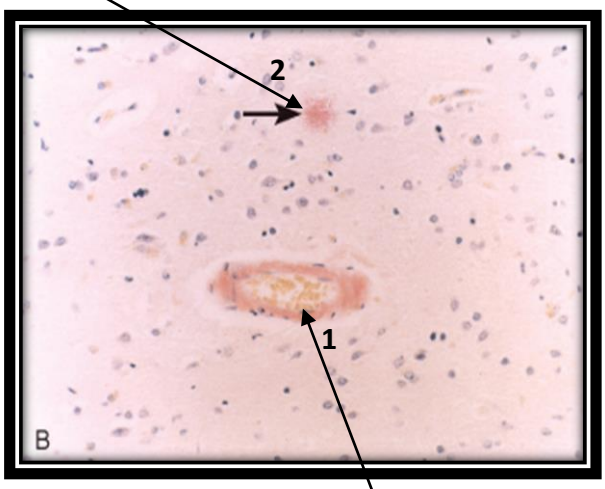
Main description: atrophied cortex with wide sulci and narrow gyri

2- Histopathological Features:

(Neuritic plaque – Neurofibrillary tangles – Amyloid Angiopathy)



Neuritic plaque with a rim of dystrophic neurites surrounding an amyloid core



1- Amyloid deposition in the blood vessels (Amyloid angiopathy)
2- Amyloid core of the neuritic plaque

Stain used: Congo red stain

Neurofibrillary tangles (arrow heads) are present within the neurons.

Neurofibrillary tangle within the neuronal cytoplasm.

Stain used: Silver stain

432 Pathology Team

Good Luck ^_^

PATHOLOGY TEAM LEADERS:

Ibrahim Abunohaiah

Roqaih Aldueb

اللهم إني استودعك ما قرأت و ما حفظت و ما تعلمت فرده عليَ عند حاجتي إليه انك على كل شيء قدير
If there is any mistake or feedback please contact us: 432PathologyTeam@gmail.com