NEUROPSYCHIATRY

Pathology Practical

Med435

Color Codes:

Very important

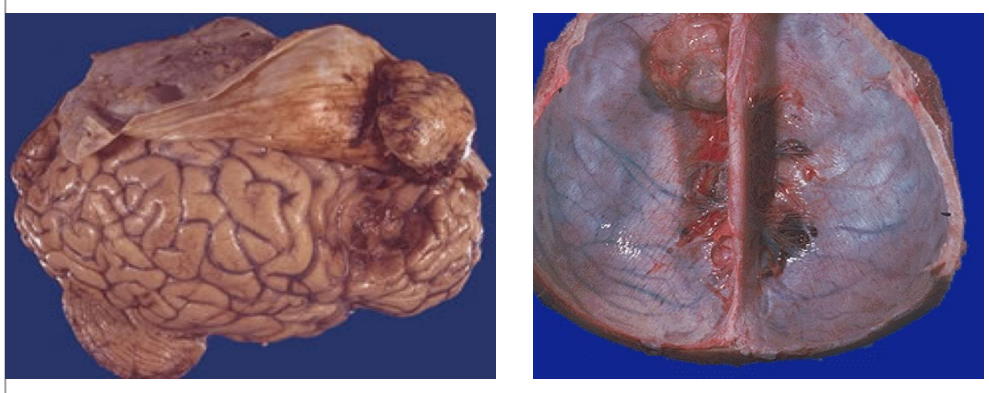
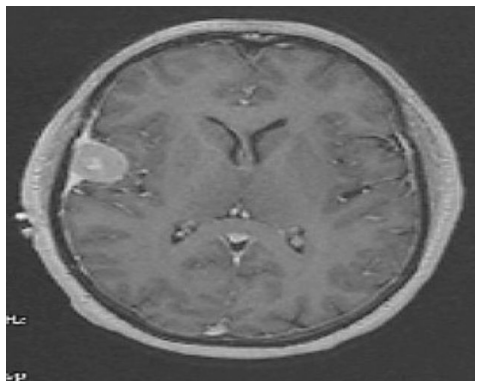
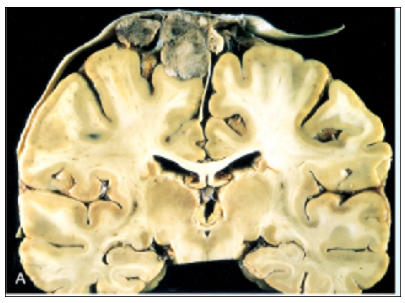
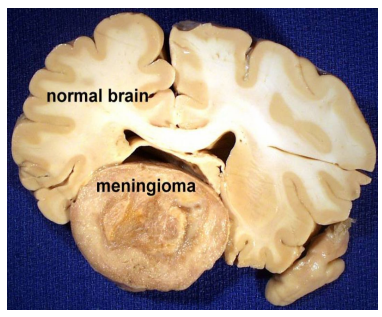
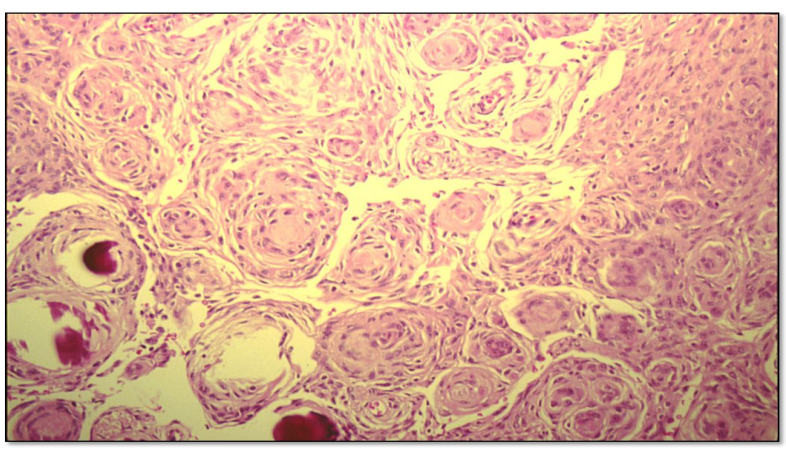
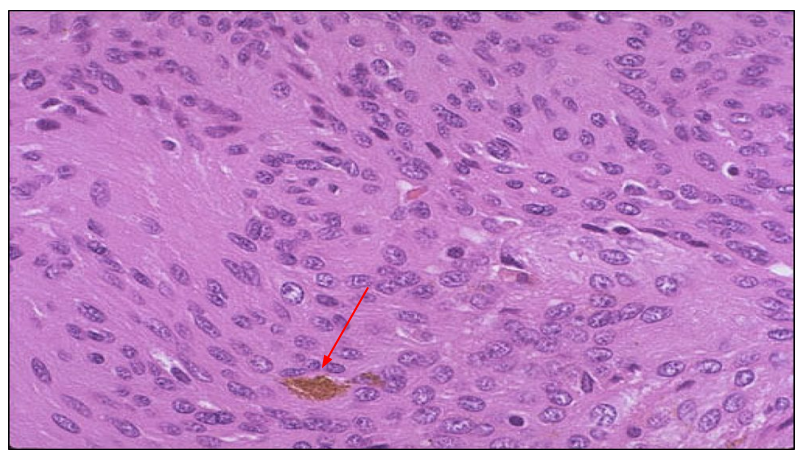
Males Doctor notes

Females Doctor notes

Case#1: Meningioma.

A 43- year old female complained of headache and **two attacks of seizures in the past 4 months,** Brain MRI revealed a 3 cm **extra-axial mass** in the parietal region. It was dural- based with mild edema in the surrounding brain tissue.

- What is your provisional diagnosis? Meningioma.
- Meningioma is a **benign tumor**, grade 1 arising from the meninges, they can rarely be more aggressive and invade
- What are the different types/grade of meningioma? 1. Benign (WHO I) 2. Atypical (WHO II/IV) 3. Anaplastic (WHO III/IV)
- Meningioma subtypes based on architecture: 1.Meningiomatous 2. Microcystic 3. Secretary 4.Psammomatous 5.Transitional 6. Syncytial "classical".
- Psammoma bodies can be present in any papillary malignancy: 1.Papillary thyroid carcinoma 2.Ovarian carcinoma.

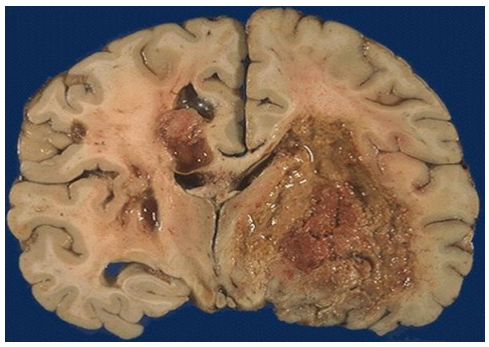
Gross	**MRI**
 **1.** Meningioma beneath dura compressing underlying cerebral hemisphere **2.** The picture of the right shows a slow growing tumor but may reach a large size before symptoms lead to detection.	 **1.** Mass lesion on the lateral convexity of the brain. **2.**Well-circumscribed extra-axial lesion. **3.** Dura-based lesion which is impinging on and compressing the brain.
Gross	**Gross**
 Parasagittal multilobular meningioma attached to the dura with compression of underlying brain.	 **1.** No areas of hemorrhage or necrosis **2.** Compressing but not invading the cerebral cortex.
Meningioma - Microscopic view LPF	
 **1.** Whorls of fibrocellular tissue **2.** Cells are oval, spindle shaped, or elongated and lack mitosis **3.** Psammoma bodies (spherical calcified particles)	 **1.** Plump pink cells **2.** Small brown granular hemosiderin (arrow) **3.** Calcified structure (psammoma bodies).

Case#2 Glioblastoma Multiforme.

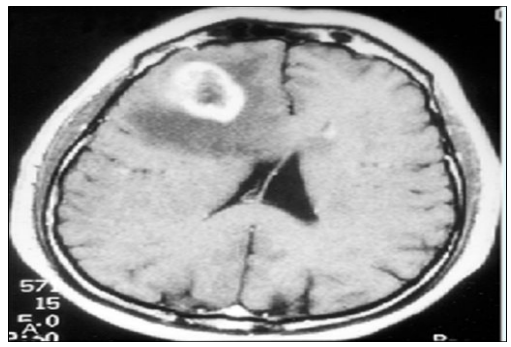
A 55 years old man complained of headache for the last 2 months. Brain MRI revealed a 3 cm frontal **intra-parenchymal space-occupying lesion** with rim enhancement on contrast studies.

- What is your provisional diagnosis ? **Glioblastoma Multiforme (GBM).**
- **This is the worst possible form of Glioma** ,the cells of a GBM can infiltrate widely, particularly along white matter tracts, and even through the CSF.
- **Gene mutated in low-grade astrocytomas: - IDH1**

Gross



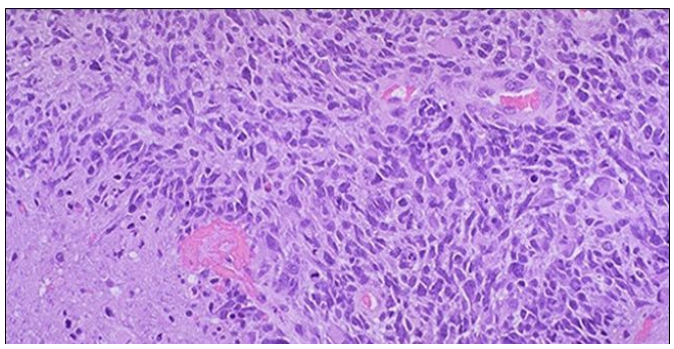
1. Large neoplasm occupying the cerebral hemisphere.
2.quite vascular with prominent areas of necrosis and hemorrhage
3.. Crossed the midline into the opposite hemisphere (infiltration).

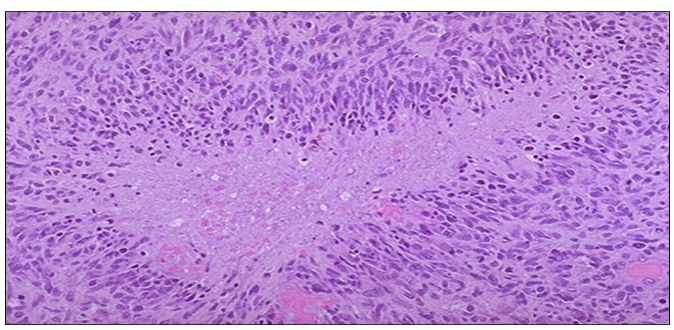


1. A CT of Large tumor in cerebral hemisphere showing signal enhancement with contrast material.
2. Pronounced peritumoral edema.
(When there is edema it means it's a fast growing tumor)

Microscope

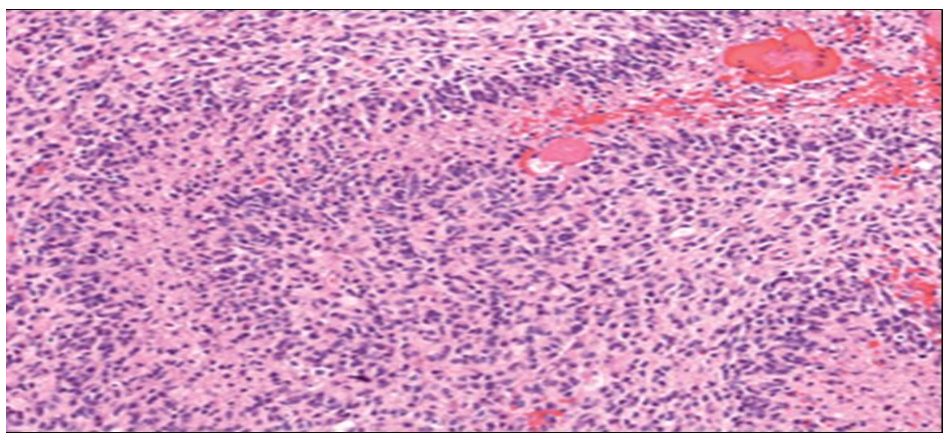
HPF





1. Marked cellularity.
2. Marked hyperchromatism and pleomorphism.
3. Prominent vascularity.
4. Pseudopalisading necrosis.
5. Neoplastic cells palisading around the necrosis.

LPF



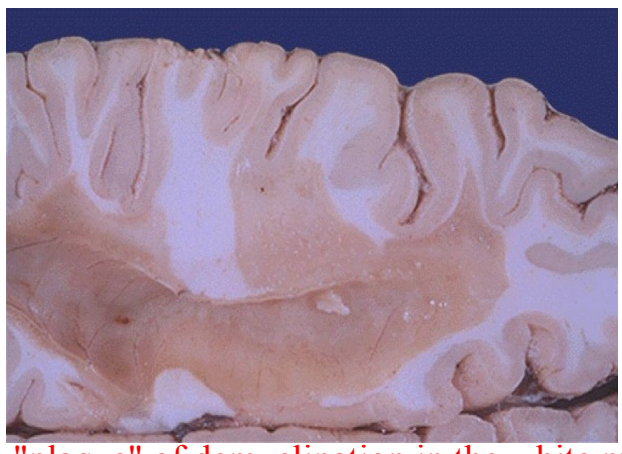
1. Marked cellularity.
2. Foci of necrosis with pseudopalisading of malignant nuclei "fence-like appearance".
3. Endothelial cell proliferation.

Case3#: Multiple sclerosis

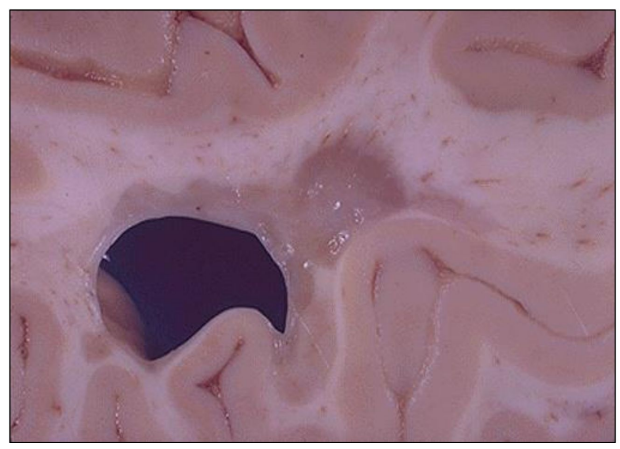
A 27 years old woman presents with a sudden onset of right sided **blindness** and weakness in her left leg. There is no history of trauma. However, she experienced a similar **episode 8 months ago** and was diagnosed as aseptic meningitis.

- What is your provisional diagnosis? **Multiple sclerosis**
- Definition: MS is a Demyelinating autoimmune disease**.**
- What are the key microscopic features of MS?
  1. Perivenous mononuclear inflammation (Lymphocytes, plasma cells and macrophages).
  2. Loss of myelin and variable loss of oligodendrocyte **3.** Relative preservation of axons **4.** Relative astrogliosis (sclerosis)
- **CSF findings:** Increase IgG that demonstrate oligoclonal bands on electrophoresis.
- **Possible etiologies for this condition:** 1. Genetic predisposition 2. Immuno mediated (CD4 cells) injury to myelin.
- Lesions can be seen with MRI scan but SCF samples are better to diagnose with.

Gross



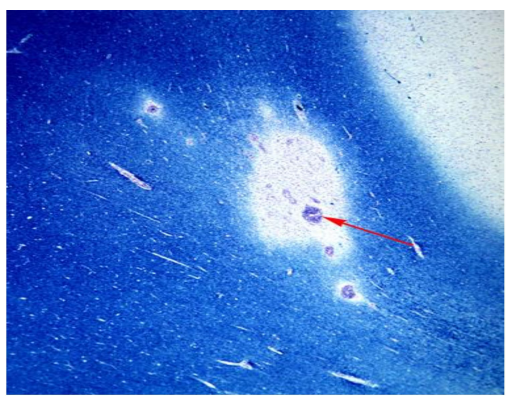
1. A large "plaque" of demyelination in the white matter.
2.lead to the clinical appearance of transient or progressive loss of neurological function.
3.The disease is multifocal and the lesions appear over time.



1. Demyelinating plaque lesion in white matter.

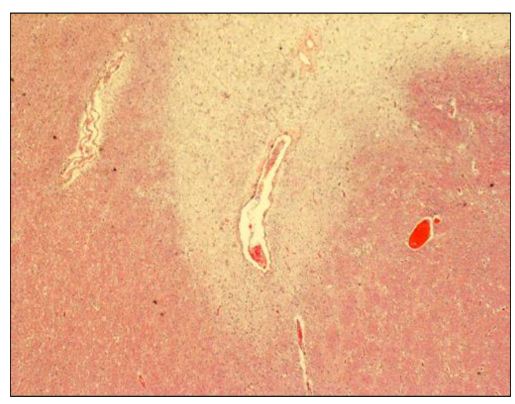
Microscope

Early MS plaque



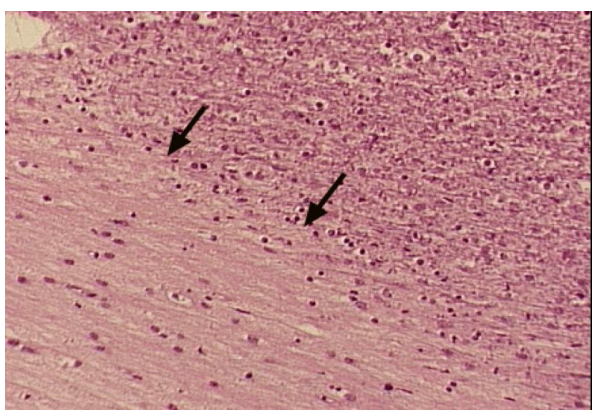
1. Myelin stain (luxol fast blue/PAS)
2. Plaque surrounding a small vein (arrow) showing early lesion of myelin loss surrounded by inflammatory cells.

Long standing MS (old) plaque



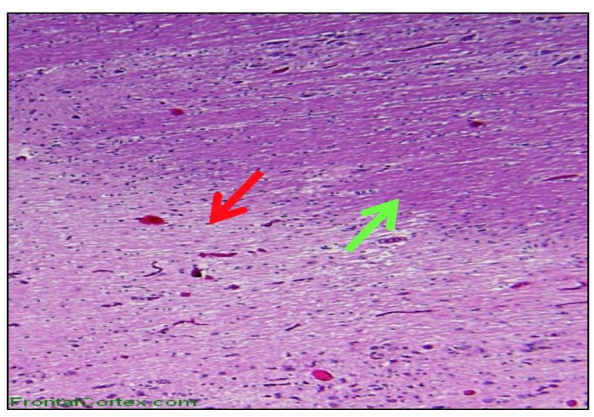
1. H&E stained sections
2. Lesion centered on a vein *"little inflammation"*
3. Myelin loss (lighter pink than the normal white matter surrounding it)

Older MS plaque



1. Pallor of plaque with almost no myelin
2. Decreased oligodendroglial nuclei and increased astrocyte nuclei

Inactivated MS plaque



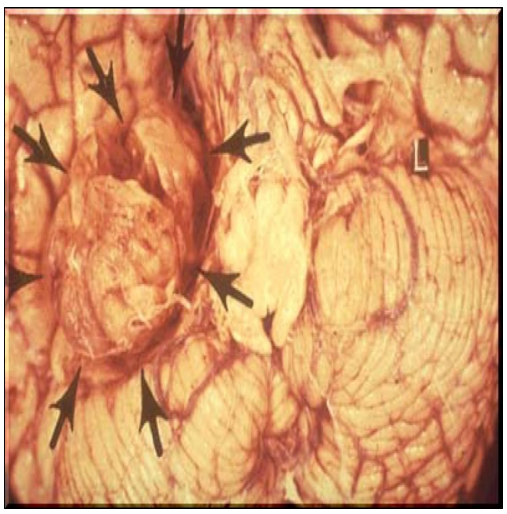
1. The border between the plaque – pale (red arrow) and normal neuropil.
2.darker (green arrow).
3.Pale plaque indicates a lack of myelin.

Case#4: Schwannoma.

A 39 years old man complains that he had noticed a progressive hearing loss over a 2 years period. Except for occasional headache, he has no other complaints .Evaluation discloses **severe sensorineural hearing loss of the left side** . MRI shows 1.5 cm. **mass at the left cerebellopontine angle.**

- What is your provisional diagnosis ? **Schwannoma**
- Acoustic tumors are benign tumors that can be removed, but usually not without damaging the eighth nerve and sometimes the facial nerve and brainstem.
- Bilateral acoustic schwannoma is associated with **NF2**
- **Acoustic schwannoma:** patient may present with hearing loss.
- Eighth nerve schwannoma and/or a glial tumor, think of neurofibromatosis type 2.

Schwannoma-Gross

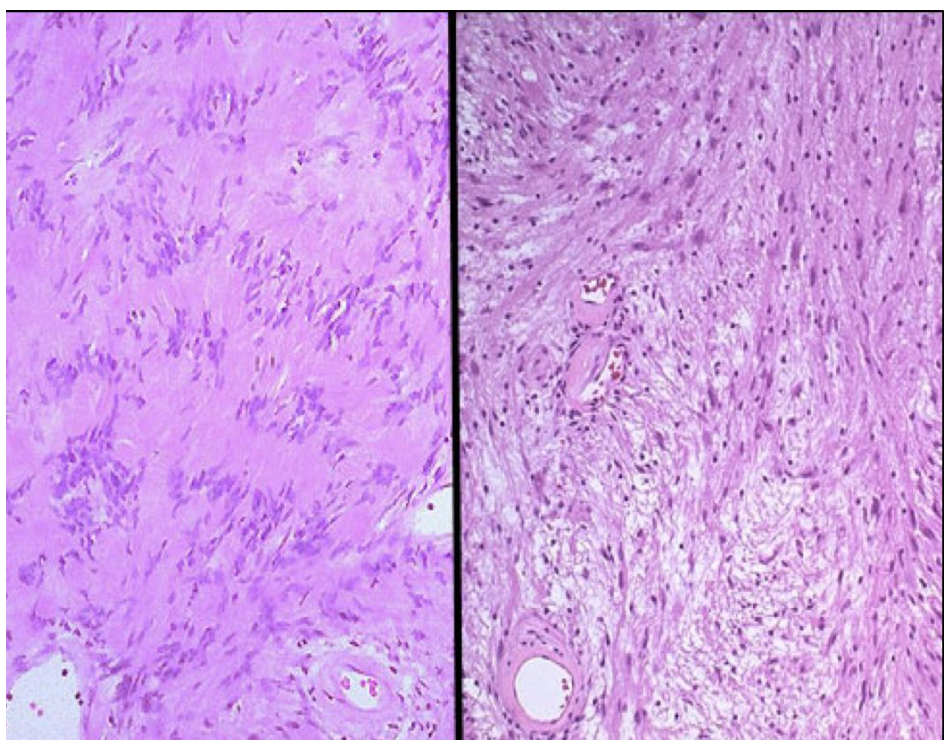


1. Nerve sheath tumor that is seen most frequently on the eighth nerve (acoustic neuromas), in which case, they occupy the **cerebello-pontine angle** (arrows).

Schwannoma-Cut Section

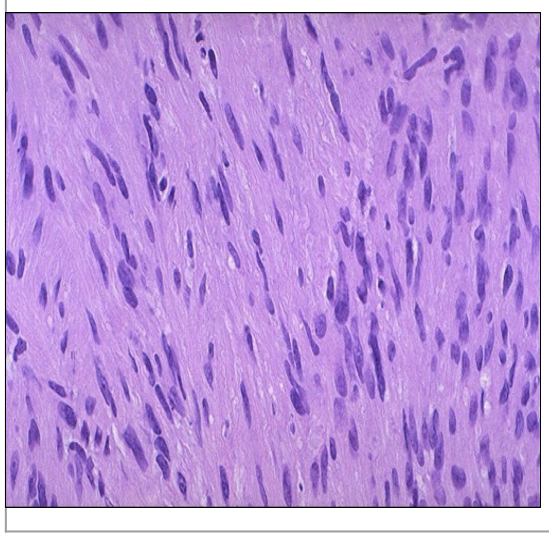
1. Fish flesh soft tan appearance similar to that of many mesenchymal neoplasms

Schwannoma-LPF Microscopy



1. Cellular Antoni A pattern on the left"more in this area".
2. Cellular Antoni B on the right side, with a looser stroma, fewer cells, and myxoid change.
2. Verocay bodies: Nuclear-free zones of processes that lie between regions of nuclear palisading.

Schwannoma-HPF Microscopy



The schwannoma is seen here at higher magnification.

Case#5 Hydrocephalus

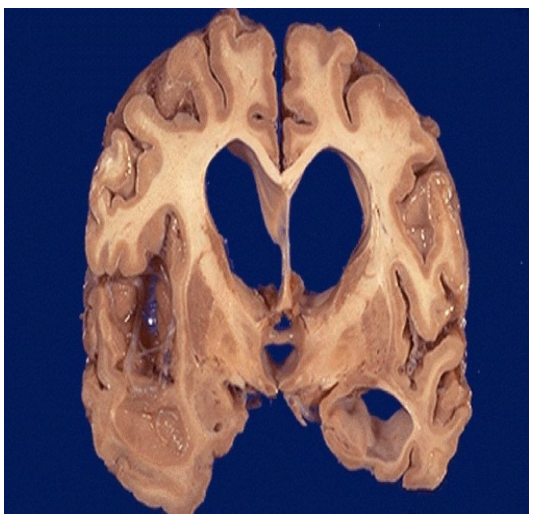
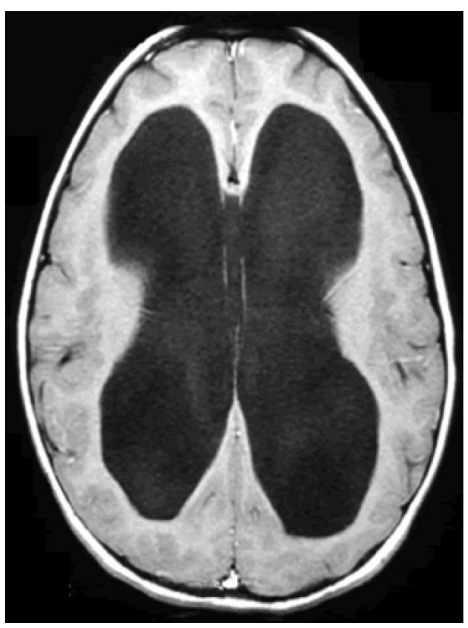
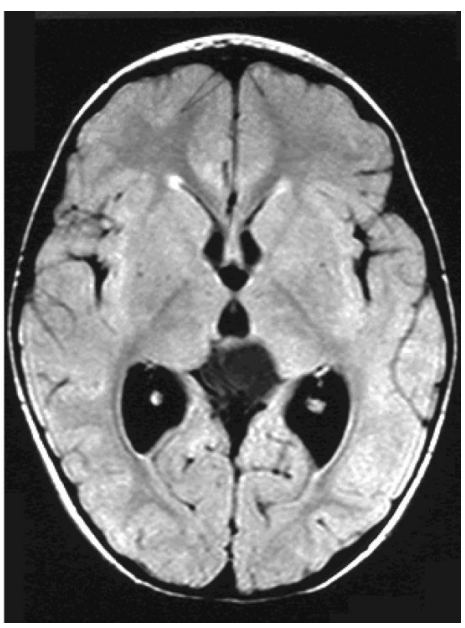
A 9 months infant was suffering from enlarged head size and admitted to hospital with convulsions, went into coma and died. Autopsy was done and the brain was large with dilated ventricles .

- What is your provisional diagnosis? Hydrocephalus
- What are some clinical features of this disease? Increased intracranial pressure (ICP), dilatation of the ventricles
- What are some causes of this disease? Obstruction of CSF flow, impaired absorption of CSF, excessive production
- What are the risk factors for this disease? Birth weight, maternal diabetes, male.

Hydrocephalus is an increased amount of CSF in intracranial spaces and spinal cord.

In infants it leads to enlarged ventricles. In Adults: it will compress the brain.

it can be classified into communicating and noncommunicating types.

Hydrocephalus-Gross	Hydrocephalus-MRI
 **1.** Marked dilation of the cerebral ventricles.	  (LEFT) **The large dark area on the left is the ventricles , made bigger by a buildup of CSF** (RIGHT) Normal image
Hydrocephalus-MRI	
 Mid Sagittal MRI of a child with communicating hydrocephalus, involving all ventricles. Dilated ventricles.	

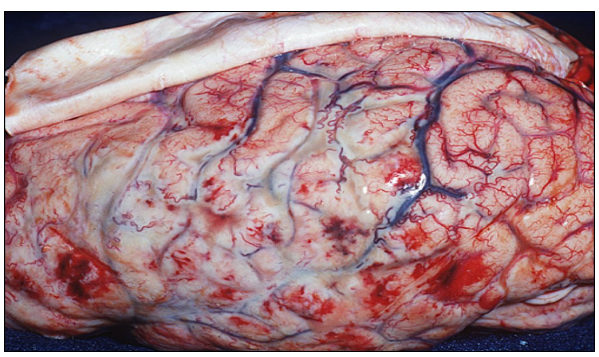
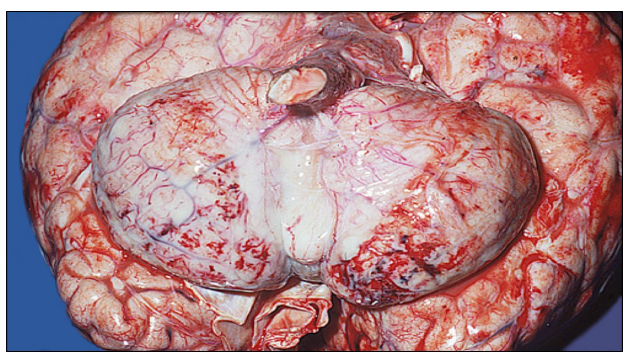
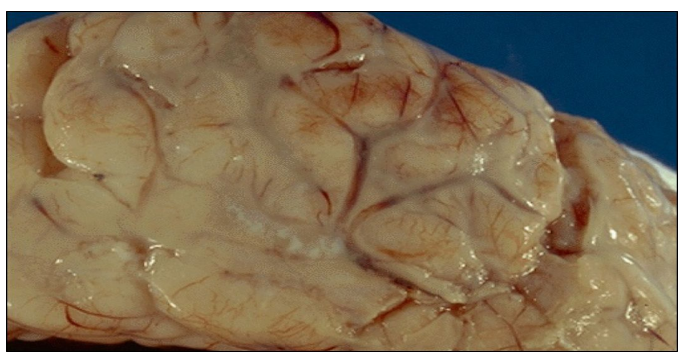
Case#6 pyogenic(Bacterial) Meningitis

4 years old child who was treated from otitis media and suddenly complained from headache, vomiting, fever and stiff neck. CSF was found to be **clouded** with abnormal **increase of neutrophils**, **increased protein and absence of sugar. Gram stain** of the CSF fluid showed **meningococci**.

- What is your provisional diagnosis ? Pyogenic (bacterial) Meningitis.
- What are the clinical features of this disease? **Headache**, **fever**, **stiff neck**, photosensitivity
- Etiological agents: **- Newborns:** 1. Group B Streptococcus 2. E. Coli 3. Listeria Monocytogenes
  - Infants & Children: 1. Strept. Pneumoniae 2. Neisseria Meningitidis 3. H.Influenzae **- Adults:** 1. Strept. Pneumoniae 2. Neisseria Meningitidis
- What are the possible CSF findings? 1. Increased neutrophils 2. Increased protein level 3. Decreased glucose level

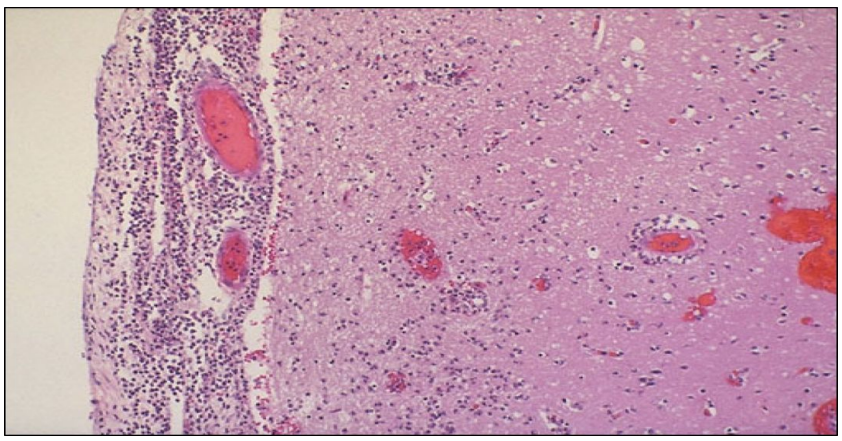
Pyogenic (bacterial) meningitis is the infection of the arachnoid membrane, subarachnoid space, and CSF.

Pyogenic (Bacterial) Meningitis-Gross

Creamy purulent exudate covering the cerebral hemispheres and settles along the base of the brain, around cranial nerves and the openings of the fourth ventricle.

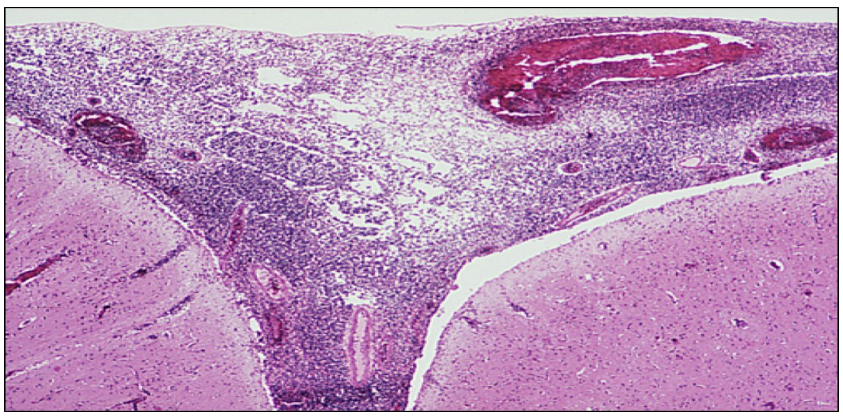
Pyogenic (Bacterial) Meningitis-LPF Microscopy



1. Intense inflammatory infiltrate going into brain parenchyma.
2. Neutrophilic exudate is seen involving the meninges at the left.
3. Prominent dilated vessels.
4. There is edema and focal inflammation (extending down via the Virchow-Robin space) in the cortex to the right.
This acute meningitis is typical for bacterial infection.

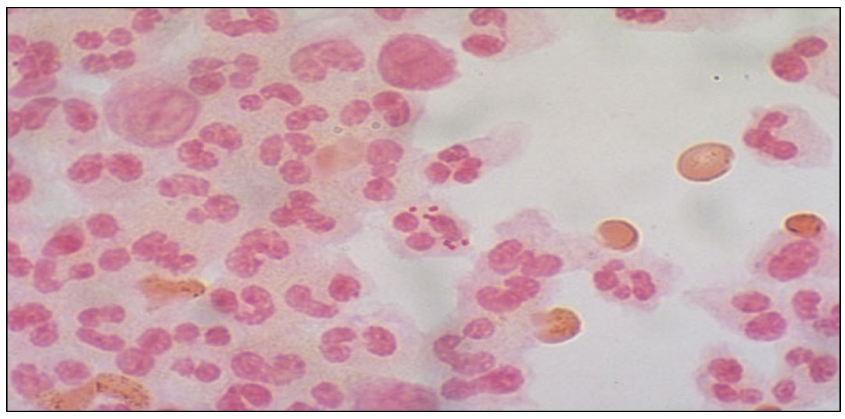
Virchow-Robin space is the space between arteries/veins in the pia matter.

Pyogenic (Bacterial) Meningitis-LPF Microscopy



Neutrophil infiltration in the subarachnoid space causing:
1. Cranial nerve damage resulting with cranial nerve deficits, invasion of leptomeningeal vessels.
2. Arteritis with thrombosis
3. Ischemic infarction
4. Phlebitis.

Pyogenic (Bacterial) Meningitis-CSF gram stain



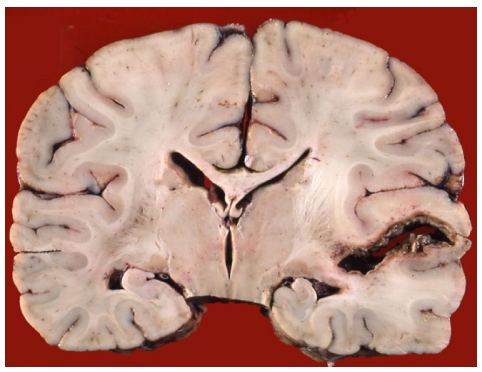
1. Gram negative diplococci within a neutrophil, typical for Neisseria meningitidis

Case#7 Cerebral Abscess

A 35 years old lady complains from otitis media , suddenly she suffers from headache and convulsions. Brain MRI reveals 5 cm. fluid filled cavity in the temporal lobe. Examination of the CSF shows increased pressure with **lymphocytes** and increased **protein** but there is **no change of sugar content**

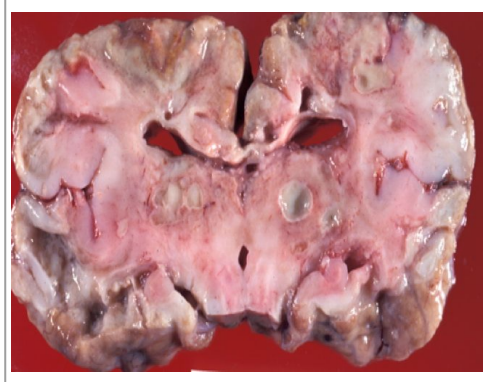
- What is your provisional diagnosis? Cerebral Abscess (chronic abscess with liquefactive necrosis)
- What are the clinical features? 1. Progressive focal neurologic deficits 2. Headache 3. Increased ICP 4. Vomiting 5. Confusion 6. Convulsions 7. Coma
- Etiological agents: in non immunosuppressed patients:- 1. Streptococci 2. Staphylococci
- Which stain can be used? Trichrome stain
- Cerebral abscess result from: 1- Hematogenous spread of bacterial infection 2- Direct penetrating trauma 3- extension from adjacent infection in sinuses.

Cerebral Abscess - Gross



1. Chronic abscess

Cerebral Abscess - Gross

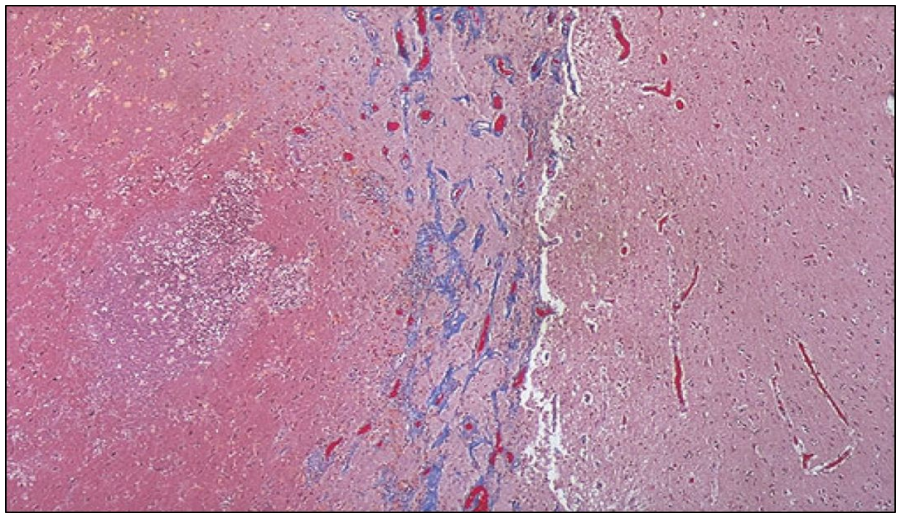


1. Covered with multiple foci of chronic abscess collection within the brain

Cerebral Abscess - Gross

1. Liquefactive center with localized collection of yellow pus surrounded a thin wall.

Cerebral Abscess - Microscopic view

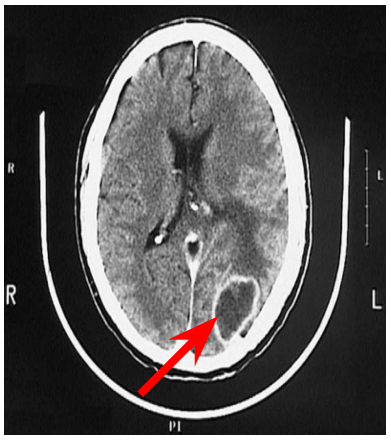


1. Fibrosis.**2.** Abscess (localize collection) **3.** Normal brain at the right **4.** trichrome stain demonstrates the light blue connective tissue in the wall of an organizing cerebral abscess.

Cerebral Abscess - MRI scan

This MRI scan of the head in transverse (axial) view demonstrates a small abscess in the brain (Red arrow) in a patient who had septicemia

Cerebral Abscess - CT scan



1. Abscess surrounded by edema in the brain (red arrow) in a patient who had septicemia.

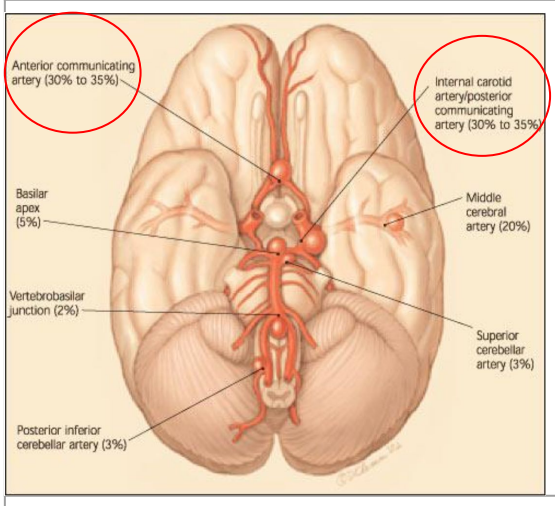
Capsule can be seen here

This CT scan of the head in transverse view demonstrates an abscess in the brain (red arrow) in a patient who had septicemia.

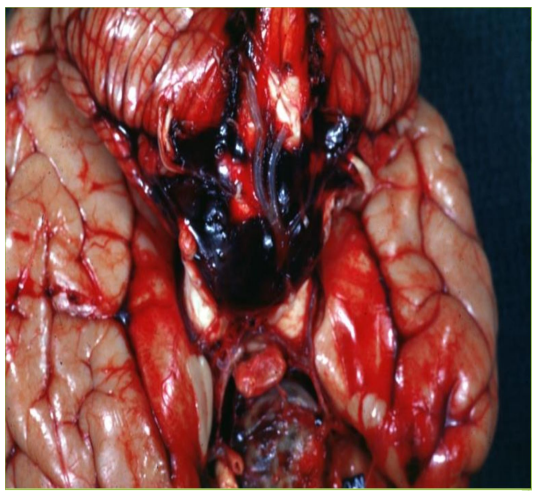
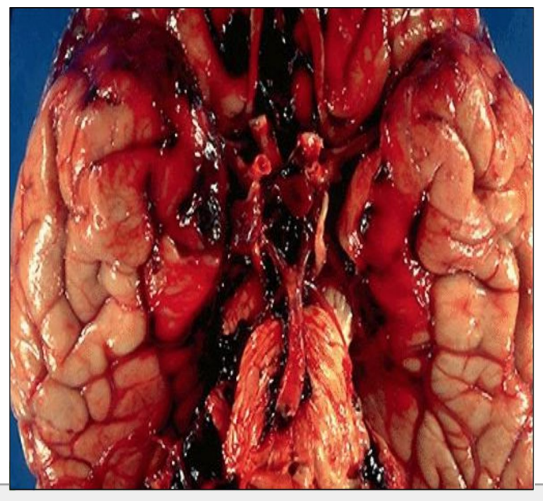
Case#8 Ruptured Berry Aneurysm causing subarachnoid hemorrhage.

A previously healthy 31-year-old woman experiences a **severe headache** and **loses consciousness** within an hour. An emergent head CT scan reveals **extensive subarachnoid hemorrhage at the base of the brain.** She is afebrile. A lumbar puncture yields cerebrospinal fluid with many red blood cells, but **no white blood cells.** The CSF protein is slightly increased, but the glucose is normal.

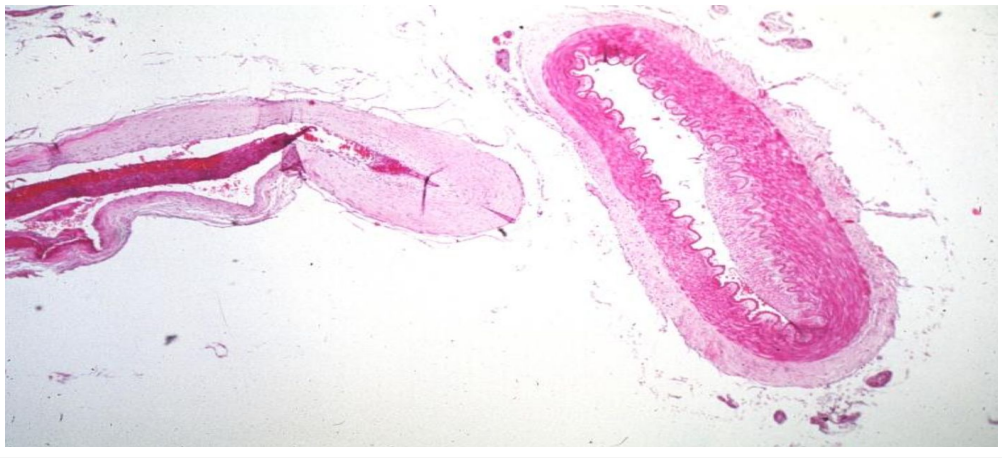
- What is your diagnosis ? **Ruptured Berry Aneurysm causing subarachnoid hemorrhage.**
- What is the most common site for a berry aneurysm?
  - Anterior communicating artery (MEN)
  - Junction of internal communicating artery with posterior communicating artery (WOMEN)
- **Polycystic Kidney disease** can be associated with berry aneurysm.
- **- Etiology of the aneurysmal dilation:** Atherosclerosis , Mycotic , Trauma , Dissection.

Common locations of intracranial aneurysms	Gross Circle of Willis – Berry aneurysms
 Saccular aneurysms most frequently form in first- and second-order arteries originating from the cerebral arterial circle (circle of Willis) at the base of the brain	 **1.** The circle of Willis has been dissected, and three berry aneurysms are seen **2.Multiple aneurysms** are seen in about **20-30%** of cases of berry aneurysm.

Circle of Willis: Ruptured Berry Aneurysm - gross

 **1.** Subarachnoid hemorrhage over the anterior surface of the of Pons, due to RUPTURE of a large aneurysm on the top.	 **1**. subarachnoid hemorrhage " due to the rupture of the aneurysm " is **more of an Irritant producing VASOSPASM** than a mass lesion. **2.**most of the time it's the **underlying cause of DEATH.**

Berry Aneurysm - LPF (section of basilar artery/adjacent portion)



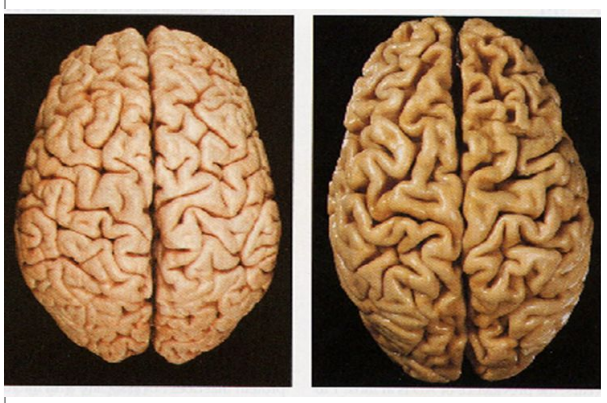
1. Aneurysmal dilatation of artery with lack of medial structures (muscular layer/elastic laminae) in wall of aneurysm.

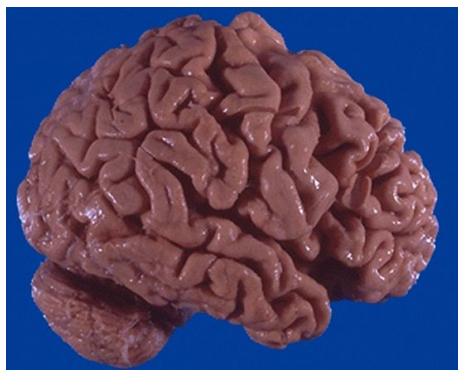
Case#9 Alzheimer's Disease

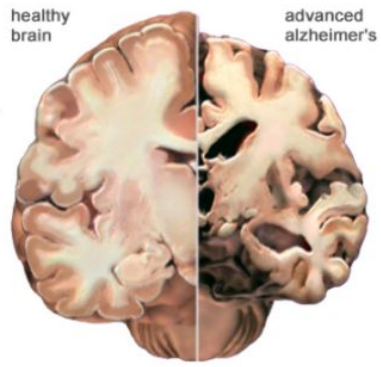
A 85 years old man complains of progressive **loss of memory**, **disorientation** and **alterations** in mood and behavior since 20 years. He was admitted to hospital because he was disabled and immobile and he died in hospital after one week of admission. Autopsy was done and the **brain cortex was found to be atrophied**.

- What is your provisional diagnosis? Alzheimer's disease
- The plaques can only be seen with **silver stain**.

Gross



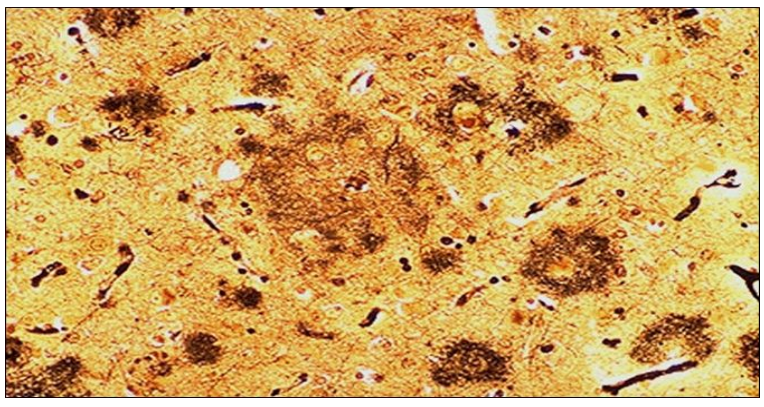




1. Variable Degree of Cortical atrophy with thin gyri and prominent sulci in the frontal, temporal, and parietal lobes. (Atrophy due to senile dementia of the Alzheimer's type)

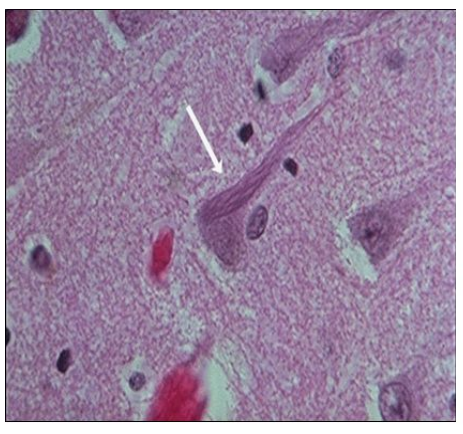
Microscopic: neuritic (senile) plaques, neurofibrillary tangles, and amyloid angiopathy.

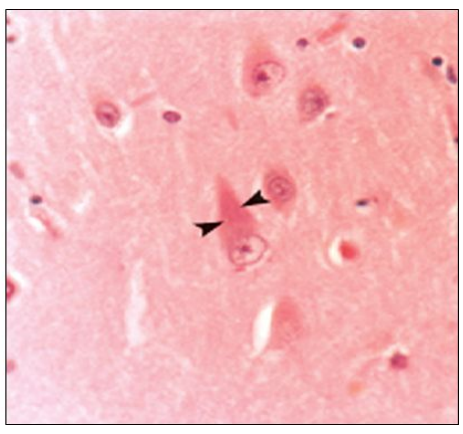
neuritic plaques (extracellular) LPF



1. Senile plaques: made up of degenerative presynaptic endings around with astrocytes and microglia.
-As seen here a case with many plaques of varying size.

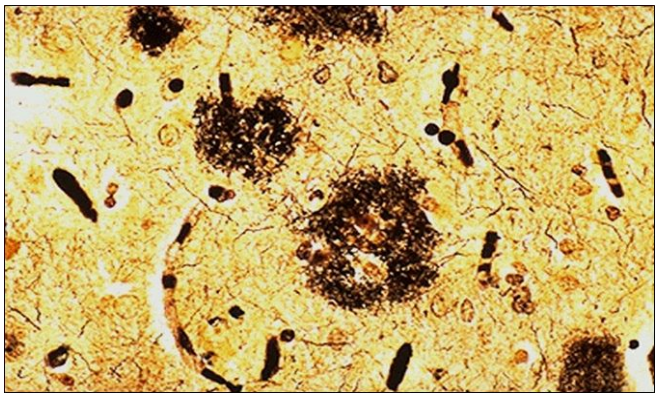
NEUROFIBRILLARY TANGLES (intracellular) HPF





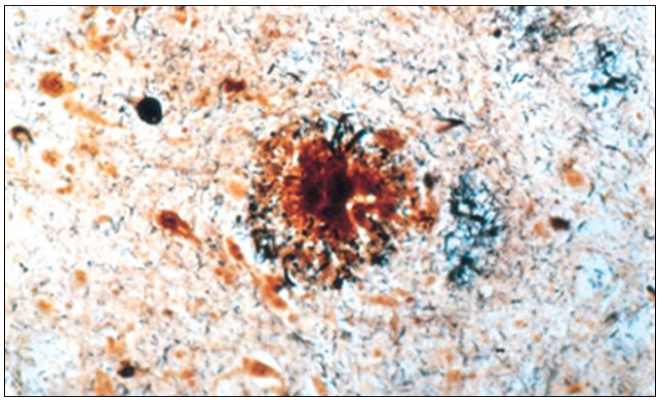
1. Neurofibrillary tangles within neurons made up of: cytoskeletal intermediate filaments.

neuritic plaques (extracellular) LPF



1. Such neuritic (senile) plaques are most numerous in the cerebral cortex and hippocampus.
2. This dementia is marked mainly by progressive memory loss**.**

neuritic plaques (extracellular) LPF



1. A neuritic (senile) plaque with a rim of dystrophic neurites surrounding an amyloid core.

Thank you for checking our work.

DONE BY:

Munerah alOmari

Hnan alAbdullah

Lulu alsoghaier

Sadeem alQahtani

Dalal alHozaimi

Wael alOud

الشكر الجزيل لكل من ساهم في مراجعة العمل في وقت قياسي:
عريب العقيّل، خولة العماري، نوف العبدالكريم، نجود الحيدري
نورة القحطاني، أفنان المالكي، دلال الحزيمي.

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