
"قالوا سبحانك لا علم لنا
إلا ما علمتنا
إنك أنت العليم الحكيم"
سورة البقرة آية (32)

Cerebrovenous stroke

(venous atherosclerosis and Cerebral hemorrhage)

By

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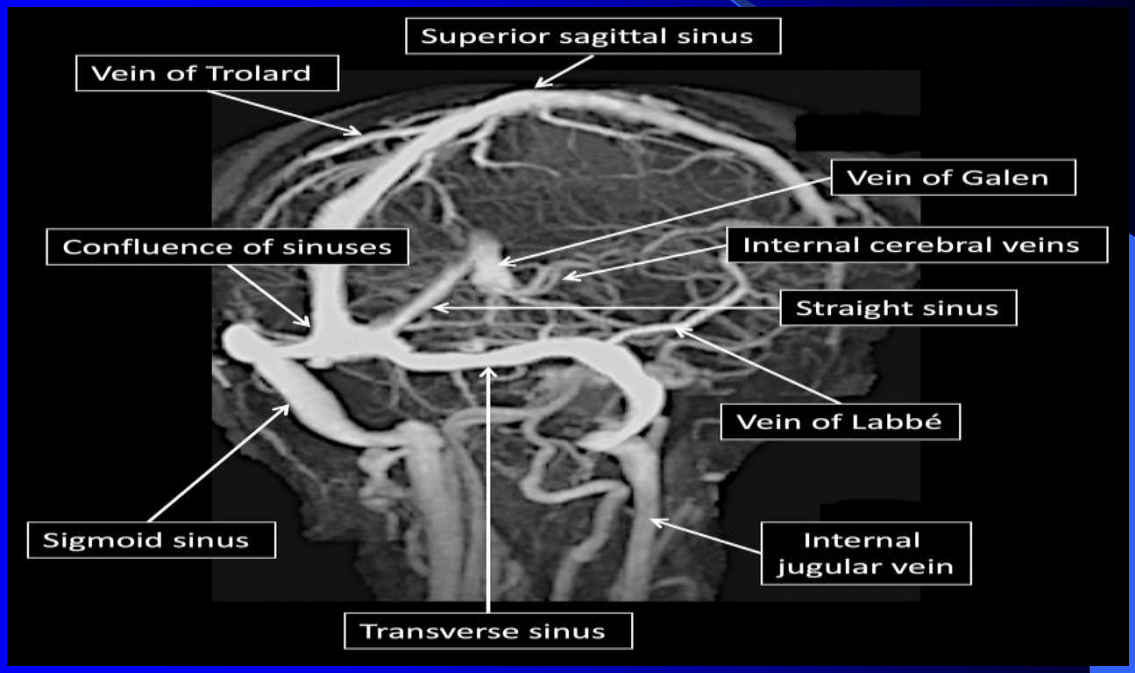
Objectives

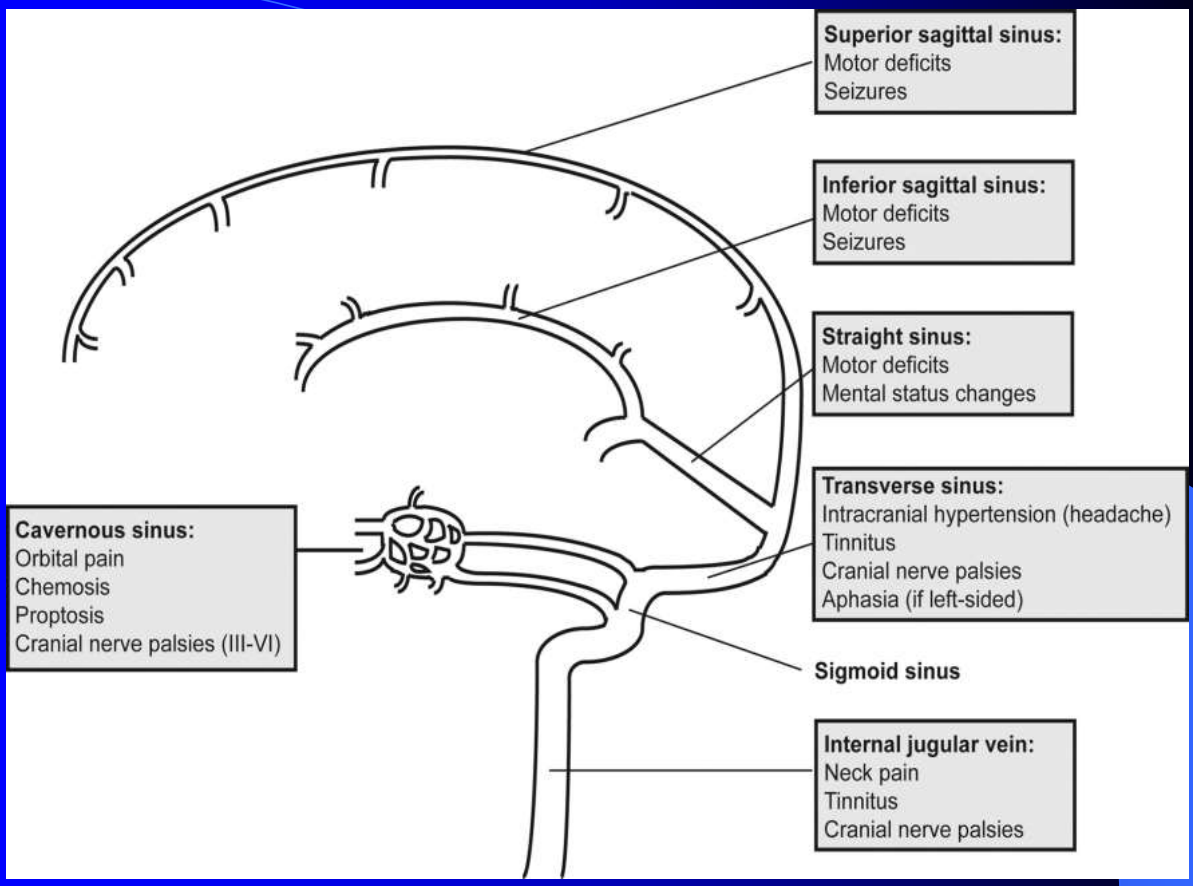
- Identify cerebrovascular stroke as arterial and cerebral venous atherosclerosis , etiology, risk factors, clinical picture and management.
- Identify hemorrhagic stroke; etiology and risk factors, clinical picture of intracerebral hemorrhage and management.
- Know etiology and risk factors, clinical picture of subarachnoid hemorrhage and management.
- Know short notes about subdural hematoma and epidural hematoma

Cerebral venous sinus thrombosis

- **Definition**
- Cerebral venous sinus thrombosis (CVST), cerebral venous and sinus thrombosis or cerebral venous thrombosis (CVT), is the presence of a blood clot in the dural venous sinuses (which drain blood from the brain), the cerebral veins, or both.

Anatomy and Pathophysiology





Etiology

Multiple risk factors contribute to the development of CVST.

- At least 1 risk factor was identified in over 85% of patients, and more than 50% had multiple risk factors.
- The condition often arises in the context of prothrombotic conditions, such as pregnancy, the postpartum period, or oral contraceptive pill (OCP) use.
- Nearly 60% of pregnancy-related strokes are attributed to CVST
- COVID-19 has also been linked to cerebral venous thrombosis (CVT), with 1 study identifying COVID-19 in 7.6% of all CVST

Etiology

- The International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT) reported genetic and acquired thrombophilia in 34% of patients with CVST.
- Inherited thrombophilias include deficiencies in protein C, protein S, and antithrombin, as well as the factor V Leiden mutation, the prothrombin gene mutation 20210, and hyperhomocysteinemia

Salient risk factors for CVST can be categorized as follows:

- Estrogen-related: Obesity, OCP use, pregnancy and puerperium, and estrogen-containing hormone replacement therapy (associated with an 8-fold increase in risk)
- Acquired thrombophilia: Antiphospholipid antibody syndrome, JAK2 mutations, myeloproliferative disorders, and autoimmune diseases
- Genetic thrombophilia: Protein C and protein S deficiencies, Factor V Leiden mutation, and prothrombin G20210A polymorphism
- Other provoking triggers: COVID-19 infection, otitis media, mastoiditis, dehydration, head injuries, compressive lesions affecting venous sinuses, and vaccine-induced thrombocytopenia

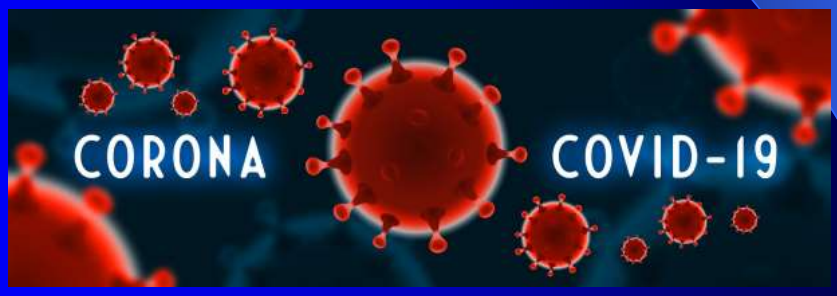
Conditions Associated With Cerebral Venous Thrombosis Predisposing

- Hypercholesterolemia
- Alchole
- Hyperhomocysteinemia
- Antiphospholipid antibodies present and antiphospholipid syndrome
- Autoimmune disease
- Anemia
- Malignancy
- Pregnancy and the puerperium
- Factor V G1691A polymorphism , Methylenetetrahydrofolate reductase (MTHFR) C677T polymorphism
- Prothrombin G20210A polymorphism
- Protein C deficiency or Protein S deficiency
- Antithrombin III deficiency
- Obesity
- Elevated factor VIII serum levels

Precipitating

- Glucocorticosteroids
- Trauma
- Infection (particularly central nervous system or ear and face)
- Surgical procedures
- Combined oral contraception pill treatment
- Vaccine-induced immune thrombotic thrombocytopenia
- L-asparaginase therapy
- All-transretinoic acid in acute promyelocytic leukemia24
- Lumbar puncture

Covid-19 and Cerebral Venous Thrombosis



Epidemiology

- CVST is a rare disorder, with an estimated annual incidence of 3 to 4 cases per million.
- Among pregnant women, the frequency of peripartum and postpartum CVST reaches approximately 12 cases per 100,000 deliveries, only slightly lower than that of peripartum and postpartum arterial stroke.
- Women experience CVST 3 times more often than men, likely due to sex-specific risk factors such as OCP use, pregnancy, the puerperium, and hormone replacement therapy.
- Recent studies have highlighted a marked female predominance among young adults, with 70% to 80% of cases occurring in women of childbearing age.

Clinical Presentation of Cerebral Venous Thrombosis

- **Isolated headache or increased intracranial pressure**
- **Focal neurologic presentations**
- **Subacute encephalopathy**
- **Cavernous sinus syndrome with multiple cranial neuropathies**

Investigations

- CT or MRI
- CT Venographay
- Cerebral angiography may demonstrate smaller clots than CT or MRI, and obstructed veins may give the "corkscrew appearance".
- Other investigations to detect risk factors

Treatment

- heparin or low molecular weight heparin in the initial treatment, followed by warfarin for 3-6 month
- Dehydrating measures
- In certain situations, anticonvulsants may be used to try to prevent seizures.
- In case of infections strong antibiotic is recommended.

Hemorrhagic Stroke

Definition of hemorrhagic stroke:

- Sudden hemorrhage into a part of the brain or into the subarachnoid space results in focal neurological deficits.
- Intracranial hemorrhage may occur in the brain parenchyma and it is called "**intra-cerebral hemorrhage**" or within the subarachnoid space and it is called "**subarachnoid hemorrhage**

Subarachnoid hemorrhage

Etiology and risk factors:

- **Intracranial aneurysm (80%) occurs in the 4th and 5th decades.**
- Angiomatous malformation occurs in the 2nd and 3rd decades.
- Head trauma,
- faulty use of anticoagulant therapy.

Clinical pictures

- **Age:** most cases occur in adult life but it has been described in infants and elderly.
- **Sex:** no sex predilection.
- **Prodromal symptoms:** are common and are in the form of bouts of severe headache and ophthalmoplegia
- **Onset:** is sudden.
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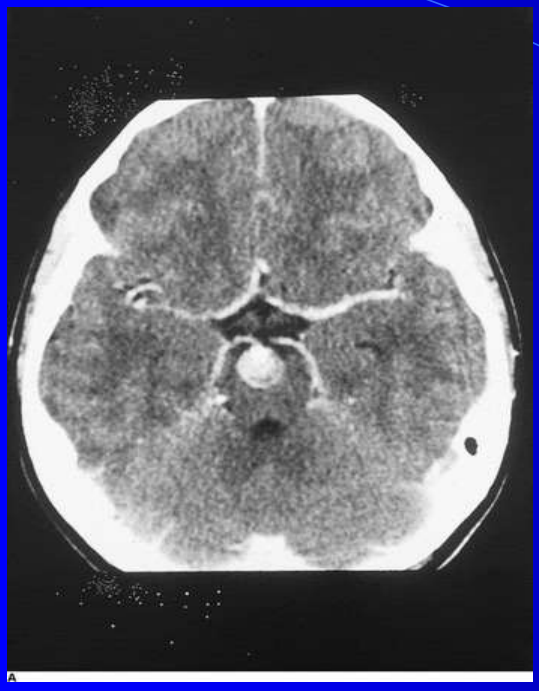
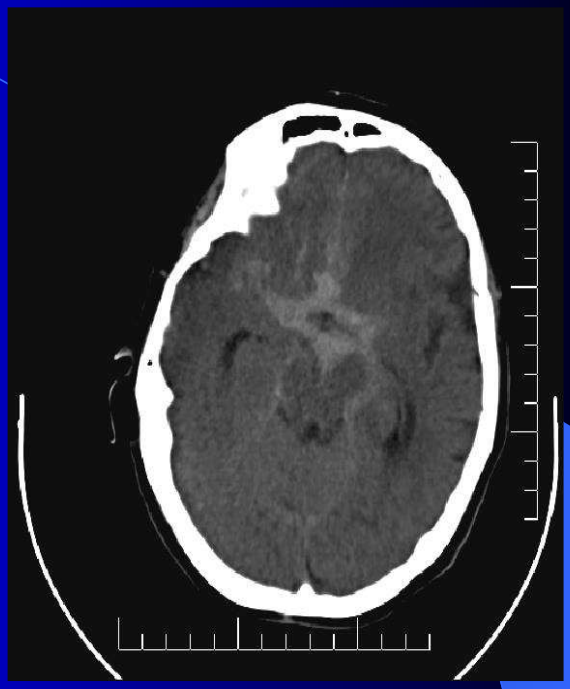
Clinical pictures

- Presents with an **acute-onset, intensely painful "thunderclap" headache,** often followed by **neck stiffness.**
- **Meningeal irritation**
- **Increased intracranial pressure**
- **Focal neurological manifestations**
- **Cranial nerve palsies:** especially III, IV and VI
- More than one-third of patients will give a history of a **"sentinel bleed"** days to weeks earlier marked by headache, neck stiffness, and nausea/vomiting due to a leaking aneurysm

Investigation

- Immediate head CT without contrast to look for blood in the subarachnoid space (Figure 1).
- Immediate LP to look for RBCs, xanthochromia (yellowish CSF due to breakdown of RBCs), ↑ protein (from the RBCs), and ↑ ICP.
- Four-vessel angiography should be performed once SAH is confirmed.
- Call neurosurgery





Treatment

- Prevent rebleeding (most likely to occur in the first 48 hours) by main- taining systolic BP < 150 until the aneurysm is clipped or coiled.
- Prevent vasospasm and associated neurologic deterioration (most likely to occur 5–7 days after SAH) by administering calcium channel blockers (CCBs) As nimodipine and cinnarizine and IV fluids, and pressors to maintain BP.
- Give antiepileptic drug as levitracetam for seizure prophylaxis.
- To control ICP by raising the head of the bed, instituting hyperventilation and dehydrating measures .

Intracerebral hemorrhage

- **Arterial causes:** aneurysm, hypertension or arteriosclerosis.

- **Capillary causes (petechial hemorrhage):** as in leukemia, purpura, faulty use of anticoagulants and antiplatelet aggregation substances as aspirin, septicemia and encephalitis.

Intracerebral hemorrhage

- **Venous causes:** as in venous sinus thrombosis and bleeding from arteriovenous malformations (AVMs) and cavernous hemangiomas).

- **The commonest causes and risk factors of cerebral hemorrhage are:** hypertension (70-90%), tumor and amyloid angiopathy (in the elderly)

Clinical pictures

- **Age:** usually between 40-70 years but may occur in young ages.
- **Sex: more common in males.**
- **Prodromal symptoms:** are probably related to elevated blood pressure (headache, vomiting, tinnitus and confusion).
- **Onset: usually sudden but may be rapid within hours in big hemorrhages.**

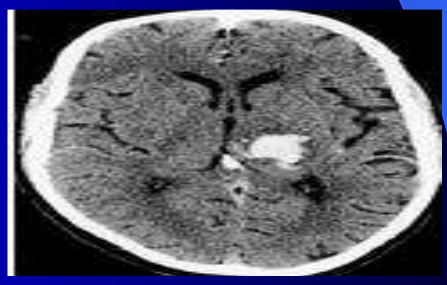
Clinical pictures

- **Commonest sites of hemorrhage are:** basal ganglionic (especially in hypertensive hemorrhage), capsular, thalamic, hemispherical and pontine.
- **Consciousness:** may be impaired.
- **The focal manifestations** depend on the site of the hemorrhage. However, hemiplegia is the commonest manifestations.
- **Convulsions:** focal or generalized is common in hemispherical hemorrhage and it may usher the onset of hemorrhagic stroke.

Pontine hemorrhage: results in bilateral destruction of ocular sympathetic fibers, pyramidal tracts and reticular formation. The main manifestations include: pin-point pupils, quadriplegia, deep coma and hyperpyrexia

Investigation

- Immediate non-contrast head CT (figure 2 and 3).
- Look for mass effect or edema that may predict herniation.



Treatment

- Similar to that of SAH.
- Elevate the head of the bed and institute anti- seizure prophylaxis.
- Surgical evacuation may be necessary if mass effect is present.
- Several types of herniation may occur, including central, uncal, subfalcine, and tonsillar

Subdural Hematoma

- Typically occurs following head trauma (usually falls or assaults) → rupture of bridging veins and accumulation of blood between the dura and arachnoid membranes. Common in the elderly and alcoholics.

Clinical pictures and examination

- Presents with headache, changes in mental status, contralateral hemiparesis, and ipsilateral pupillary dilation. Changes may be subacute or chronic. May present as dementia in the elderly.

Investigations

- CT demonstrates a crescent-shaped, concave hyperdensity that does
- not cross the midline .
- Tx: Surgical evacuation if symptomatic

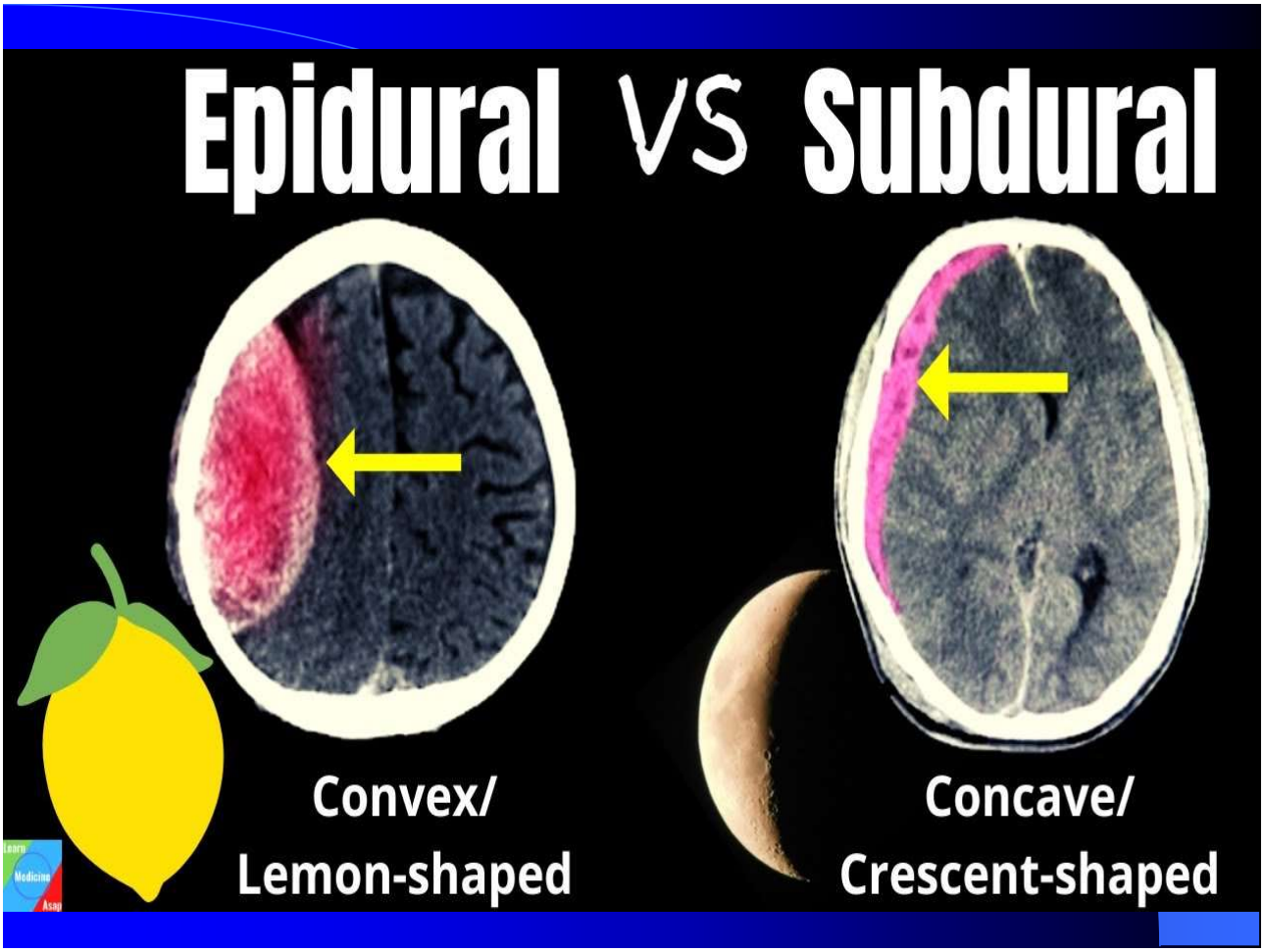
Epidural Hematoma

Usually a result of a lateral skull fracture → tear of the middle meningeal artery.

 Hx/PE: Immediate loss of consciousness → a lucid interval (minutes to hours) → coma with hemiparesis and, ultimately, a "blown pupil" (fixed and dilated ipsilateral pupil).

 Dx: CT shows a lens-shaped, convex hyperdensity limited by the sutures

 Tx: Emergent neurosurgical evacuation. May quickly evolve to brain herniation and death 2° to the arterial source of bleeding.


Epidural VS Subdural
Convex/
Lemon-shaped
Concave/
Crescent-shaped


THANK YOU