Central Nervous System (CNS) Diseases

Patients with neurologic diseases are at high risk during dental treatment for complications such as stroke, myocardial infarction (MI), adverse bleeding, altered consciousness, and infection. The dentist must be able to detect these patients, based on history

and clinical findings, refer them for medical diagnosis and management, and work closely with their physicians to develop dental management plans that will be effective and safe for these patients.

- ***Epilepsy***
- Epilepsy is a term that refers to a group of disorders characterized by chronic recurrent, paroxysmal changes in the neurologic function (seizures), altered consciousness, or involuntary movements caused by abnormal and spontaneous electrical activity in the brain.

- Seizures (fits) may be convulsive (i.e., accompanied by motor manifestations) or may occur with other changes in neurologic function (i.e., sensory, cognitive and emotional).

- Although seizures are required for the diagnosis of epilepsy, not all seizures imply epilepsy. Seizures may occur during many medical or neurologic illnesses, including stress, sleep deprivation, fever, alcohol or drug withdrawal, and syncope.
- **The cause of epilepsy is idiopathic in more than half of all patients. Other causes of fits include:**

- **Vascular abnormalities (cerebrovascular disease).**
- **Developmental abnormalities (cavernous malformation).**
- **Intracranial neoplasms (gliomas).**
- **Head trauma.**

- **Hypoglycemia**
- **Drug withdrawal.**
- **Infection and febrile illness (meningitis, encephalitis).**
- **Genetic conditions such as Down syndrome.**
- **Syncope and diminished oxygen supply to the brain also are known to trigger seizures.**

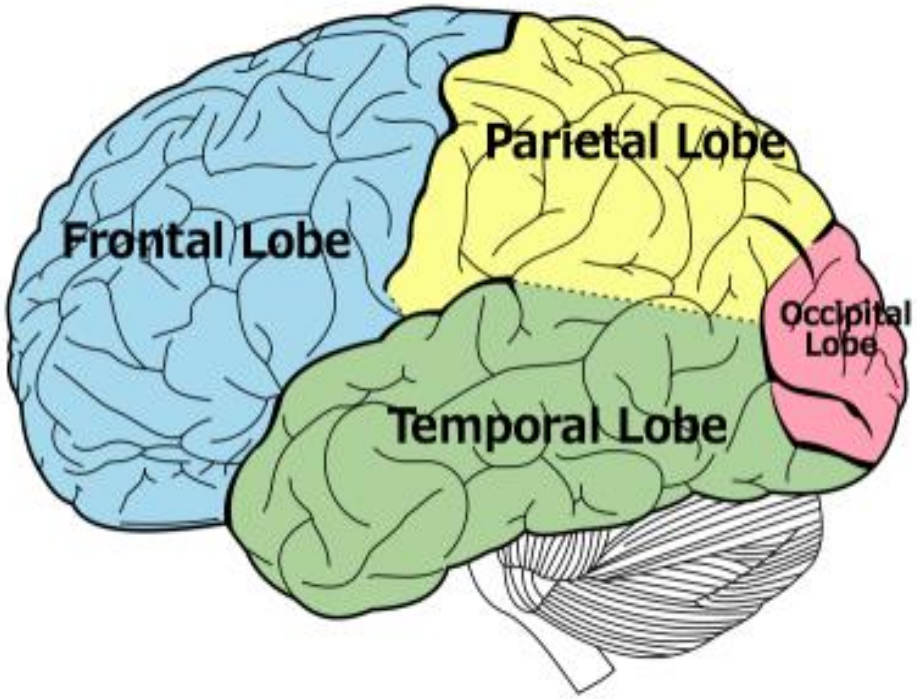
- Seizures sometimes can be evoked by specific stimuli like after exposure to flickering lights, music or a loud noise. During the seizure, blood becomes hypoxic and lactic acidosis occurs.

- **Classification of Epileptic Syndromes and Seizure Types**
- **Epileptic Syndromes**
- **Primary or Idiopathic**
- **Localization Related**
- - Benign epilepsy with centrotemporal spikes
- - Autosomal dominant nocturnal frontal lobe epilepsy
- **Generalized**
- - Juvenile myoclonic epilepsy
- - Juvenile absence epilepsy
- - Severe myoclonic epilepsy of infancy
- - Progressive myoclonic epilepsies
- - Generalized epilepsy with febrile seizures

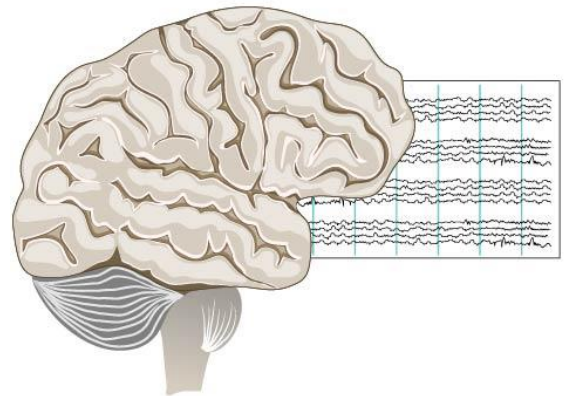
- **Secondary or Symptomatic**
- **Localization Related**
- - Mesial temporal lobe epilepsy
- - Neoplasm (primary, metastatic)
- - Infection (abscess, encephalitis, meningitis, syphilis, cysticercosis, Lyme disease, tuberculosis, fungal disease, herpes)
- - Vascular (stroke, transient ischemic attack, migraine, hemorrhage)
- - Developmental (migrational)
- - Perinatal
- - Traumatic
- - Degenerative (e.g., Alzheimer disease)
- - Immunologic (e.g., multiple sclerosis)
- **Generalized**
- - West's syndrome
- - Lennox-Gastaut syndrome
- - Tuberous sclerosis
- - Sturge-Weber syndrome

- **Seizure Types**
- **I. Partial (Focal, Local)**
- • Simple partial seizures
- • Complex partial seizures
- • Partial seizures evolving to secondarily generalized seizures
- **II. Generalized (Convulsive or Nonconvulsive)**
- • Absence seizures (petit mal)
- • Myoclonic seizures
- • Tonic-clonic seizures (grand mal)
- • Tonic seizures
- • Atonic seizures
- **III. Unclassified Epileptic Seizures**

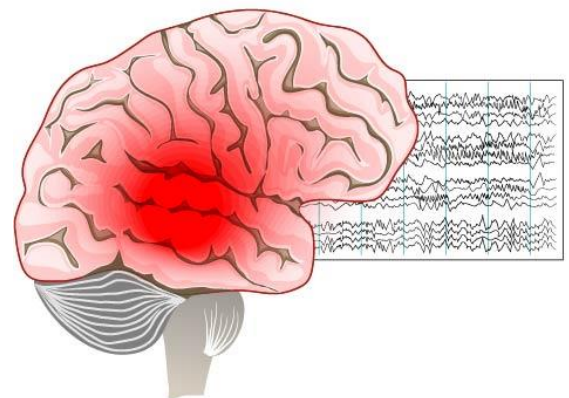
- Partial seizures are limited in scope (to a part of the cerebral hemisphere) and clinical manifestations and involve motor, sensory, autonomic, or psychic abnormalities.
- Partial seizures are subdivided into simple, in which consciousness is preserved, and complex, in which consciousness is impaired.
- Generalized seizures are more global in scope and manifestations.
- They begin diffusely, involve both cerebral hemispheres, are associated with alteration in consciousness, and frequently produce abnormal motor activity.



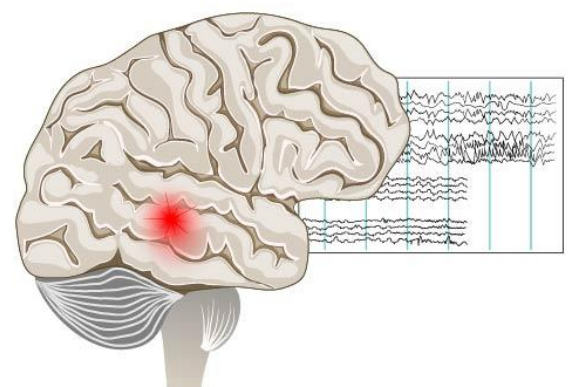
EPILEPSY



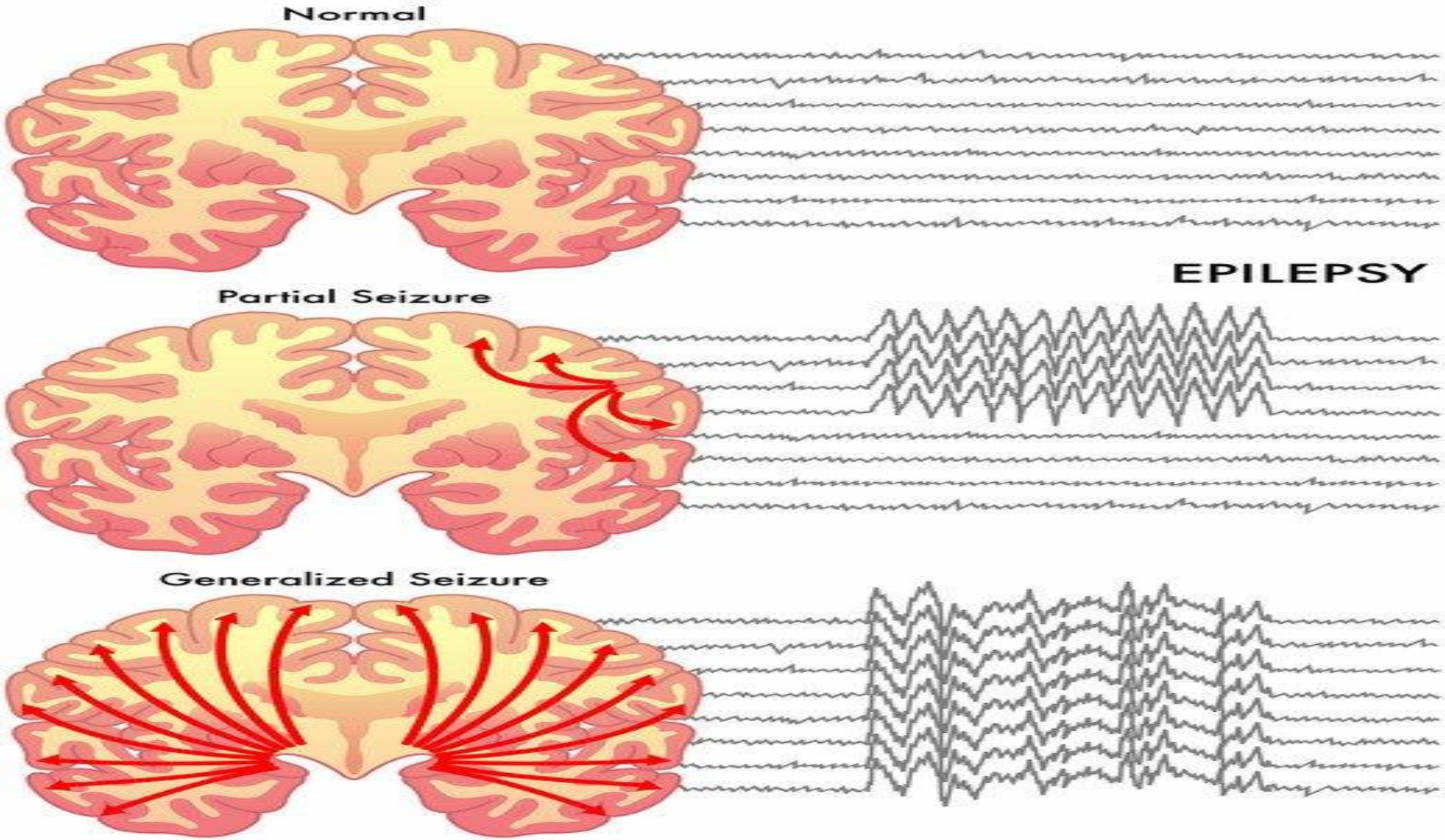
Healthy Brain



Generalized Epilepsy



Focal Seizure


Normal
EPILEPSY
Partial Seizure
Generalized Seizure

- ***Petit mal seizures:*** Most often come during childhood and are characterized by minimal or no movements (except for eye blinking) and an apparently blank stare, and brief sudden loss of awareness or of conscious activity; which may only last seconds.

- ***Grand mal (tonic-clonic) epilepsy:*** Usually begin in childhood, or sometimes at about puberty. There is a warning **(aura),** followed by loss of consciousness, tonic and clonic convulsions and finally a variably prolonged recovery



PETIT MAL SEIZURES

- MC occur during childhood
- Characterized by:
  - Minimal/no movements : may appear like a blank stare
  - Brief sudden loss of awareness/consciousness (few seconds)
  - Recur many times
  - Decreased learning (often thought to be daydreaming)



Absence / Petit Mal Seizures

- Absence seizures are the most common type of seizure in pre-school, primary and elementary age students
- characterized by brief stare, glazed look on the face, may appear to be day dreaming, unaware of their surroundings
- lasts just a matter of seconds, but may occur hundreds of times a day if left untreated
- student is unable to process any information during the time the seizure lasts, resulting in academic difficulty

Petit Mal Seizures or Absence

- Appear to be 'spacing out' or staring
- No warning
- Typically last just several seconds
- Can occur many times a day or in clusters, both of which interfere with a child's ability to learn and function.
- For example, is a student is reading he/she will stop then usually blink eyes a few times and resume reading
- Non-life threatening but important to diagnose and treat

- The **aura** may consist of a mood change, irritability, brief hallucination or headache. After the aura warning, the patient emits a sudden "epileptic cry" (caused by spasm of the diaphragmatic muscles) and immediately loses consciousness.

- The tonic phase consists of generalized muscle rigidity, pupil dilation, eyes rolling upward or to the side, and loss of consciousness. Breathing may stop because of spasm of respiratory muscles.

- This is followed by clonic activity that consists of uncoordinated beating movements of the limbs and head, forcible jaw closing, and head rocking.







- A serious acute complication of epilepsy **(especially the tonic-clonic type)** is the occurrence of repeated seizures over a short time without a recovery period, called ***status epilepticus,*** (a seizure lasting more than 5 minutes) which is particularly dangerous (the mortality can be up to 20%).
- Brain damage may result from cerebral hypoxia, when tonic and clonic phases alternate repeatedly without consciousness being regained and there can also be inhalation of vomit and saliva.
- This condition is most frequently caused by abrupt withdrawal of anticonvulsant medication or an abused substance, but may be triggered by infection, neoplasm, or trauma. Status epilepticus constitutes a medical emergency.



TONIC SEIZURE

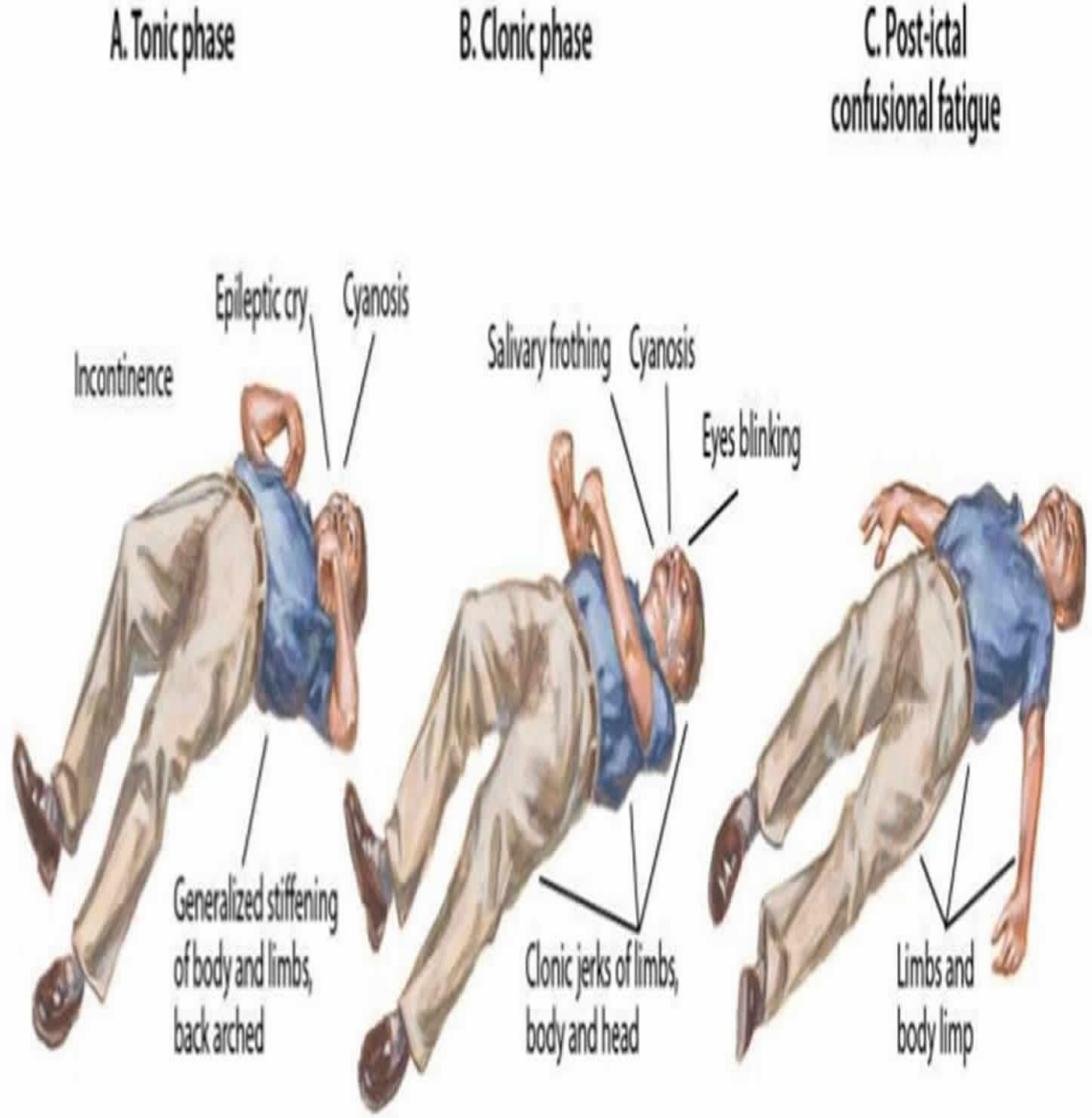
- sustained tonic muscle extension (stiffening).



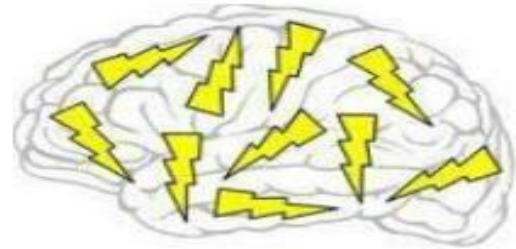
CLONIC SEIZURES

- sustained muscle contractions alternating with relaxation. (jerking)

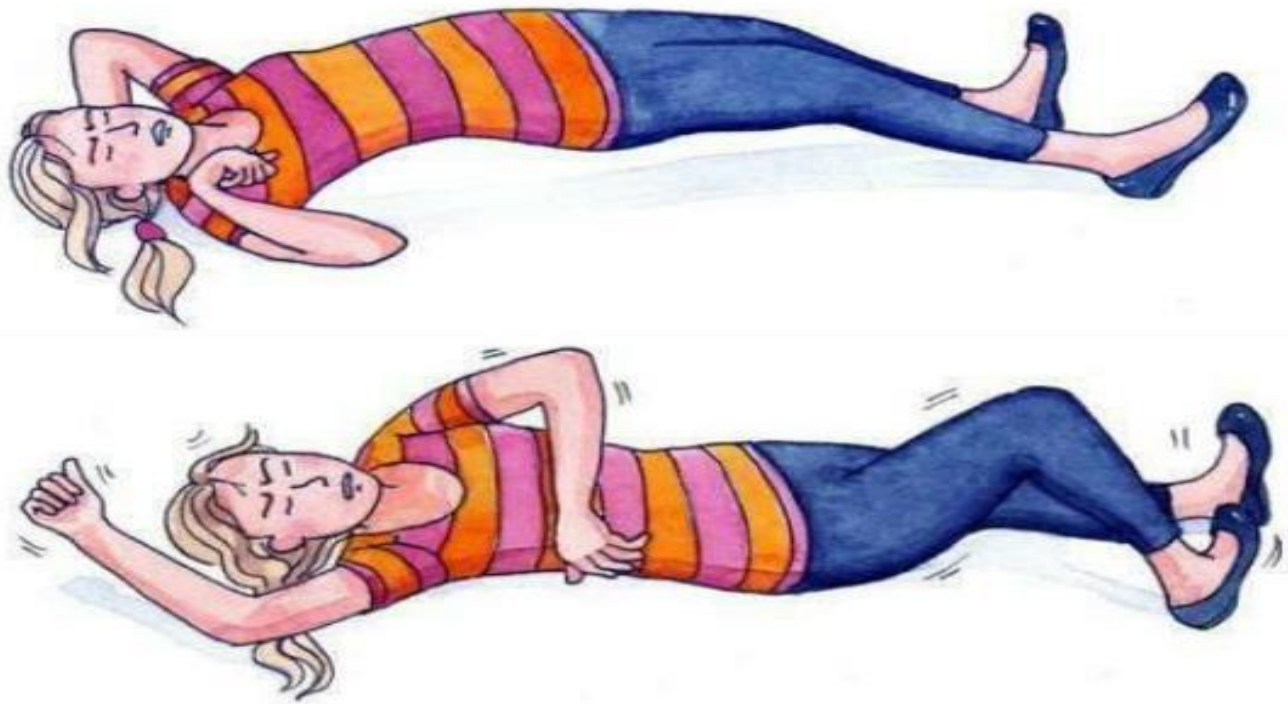
GENERALIZED TONIC- CLONIC SEIZURE



Tonic clonic seizures



Young Epilepsy



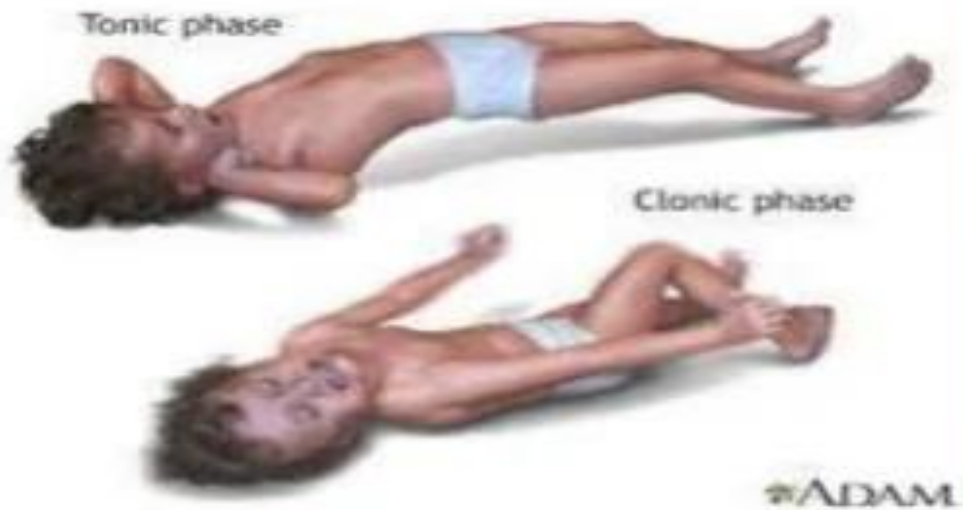
Tonic (stiffening)

Clonic (jerking)

GENERALIZED TONIC CLONIC SEIZURES

Key diagnostic features :

- ❑ Positive medical history for seizures
- ❑ AURA may be seen
- ❑ Loss of consciousness
- ❑ Seizure



Definitive treatment :

- ❑ Usually self limiting, lasting for 2-5 mins
- ❑ Place patient in supine position
- ❑ Prevent injury
- ❑ Remove all materials and instruments from mouth
- ❑ Maintain PABC on recovery
- ❑ If convulsions last for more than 5 mins , dial EMC
- ❑ In the mean time , administer DIAZEPAM 0.2 mg/kg IV

ACUTE HYPOGLYCEMIC ATTACK

Key diagnostic features :

- ❑ *Positive medical history of type 1(insulin dependent) diabetes mellitus in children*
- ❑ *Confused behavior*
- ❑ *Loss of consciousness*

- **Laboratory findings**
- The diagnosis of epilepsy generally is based on the history of seizures and an abnormal electroencephalogram (EEG). Other diagnostic procedures that are useful for ruling out other causes of seizures include:

- **CT, MRI, LUMBER PUNCTURE, SERUM CHEMISTRY PROFILES, AND TOXICOLOGY SCREENING**

- **Medical management**
- The medical management of epilepsy is usually based on long-term drug therapy. **Phenytoin (Dilantin), carbamazepine (Tegretol), and valproic acid (Depakene) are considered first line treatments.**
- These drugs act by reducing the frequency of seizures by elevating the seizure threshold of motor cortex neurons, depressing abnormal cerebral electrical discharge, and limiting the spread of excitation from abnormal foci.

- Phenytoin and carbamazepine are efficient at blocking sodium or calcium channels of motor neurons.

- Phenytoin, carbamazepine and valproic acid can cause bone marrow suppression, leucopenia, and thrombocytopenia, resulting in an increased incidence of microbial infection, delayed healing, and gingival and postoperative bleeding.

- Valproic acid can decrease platelet aggregation, leading to spontaneous hemorrhage and petechiae.

- **Adverse effects of phenytoin:** Gingival hyperplasia, increased incidence of infection, delayed healing, gingival bleeding (leucopenia), osteoporosis and Stevens-Johnson syndrome. {Metronidazole can interfere with phenytoin}.

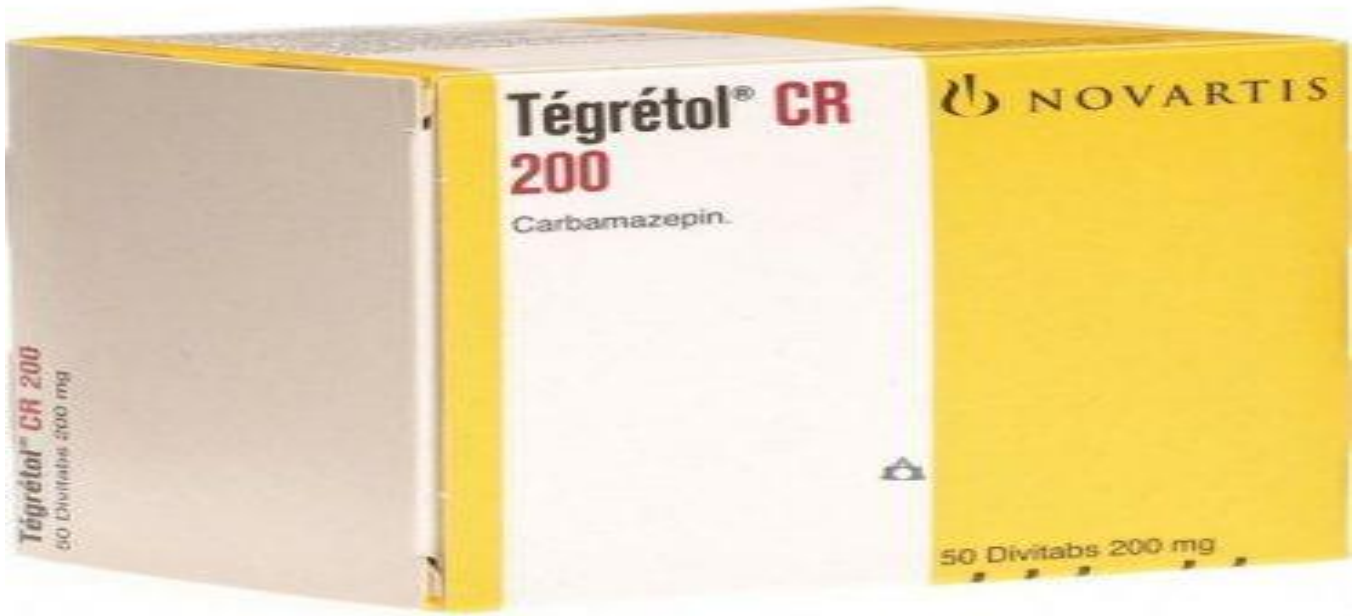
- **Adverse effects of carbamazepine:** Xerostomia, infection, delayed healing, ataxia, gingival bleeding (leucopenia and thrombocytopenia), osteoporosis, Stevens-Johnson syndrome.

- **Notes:**
- **Erythromycin** should not be administered to patients who are taking carbamazepine because of interference with metabolism of carbamazepine, which could lead to toxic levels of anticonvulsant drug.

- **Aspirin and NSAIDs** should not be administered to patients who are taking valproic acid because they can further decrease platelet aggregation, leading to hemorrhagic episodes.

- **No contraindication has been identified to the use of local anesthetics in proper amounts to these patients.**


®Tegretol CR
400
®Divitab
Karbamazepin 400 mg
Kontrollü salıveren
bölünebilir tabletler
NOVARTIS
20 ®Divitab
Antiepileptik


Tégrétol® CR
200
Carbamazepin.
NOVARTIS
50 Divitabs 200 mg
Tégrétol® CR 200
50 Divitabs 200 mg


Tegretol® 2%
carbamazepin.
NOVARTIS
100 ml syrup 2%
Tegretol® 2%
Tégrétol
NOVARTIS
100 ml syrup/sirop/jarabe

Identification of patient by history

- **Dental management**
- **Type of seizure**
- **Age at time of onset**
- **Cause of seizures (if known)**
- **Medications**
- **Frequency of physician visits (name and phone number)**
- **Degree of seizure control**
- **Frequency of seizures**
- **Date of last seizure**
- **Known precipitating factors**
- **History of seizure-related injuries**

- ***Provision of normal care: Well-controlled seizures pose no management problems***
- ***If questionable history or poorly controlled seizures, consultation with physician before dental treatment—may require modification of medications.***
- ***Attention to adverse effects of anticonvulsants; these include:***
- Drowsiness
- Slow mentation
- Dizziness
- Ataxia
- Gastrointestinal upset
- Allergic signs (rash, erythema multiforme)

- ***Possibility of bleeding tendency in patients taking valproic acid (Depakene) or carbamazepine (Tegretol) as the result of platelet interference—Pretreatment platelet function analyzer (PFA)-100; if grossly abnormal, consultation with physician.***

- ***Seizure management***
- **Preventive measures include:**
- Knowing the patient's history.
- Scheduling the patient at a time within a few hours of taking the anticonvulsant medication.
- Using a mouth prop. Removing dentures.
- Discussing with the patient the urgency of mentioning the aura as soon as it is sensed.
- If sufficient time occurs, 0.5 to 2 mg of lorazepam can be given sublingually, or 2 to 10 mg of diazepam can be given intravenously.

- **If the patient has a seizure while in the dental chair;**
- The primary task is to protect the patient and try to prevent injury.
- No attempt should be made to move the patient to the floor.
- The instruments and the instrument tray should be cleared from the area, and the chair should be placed in a supported supine position.
- The patient's airway should be maintained patent (Turn the patient to the side to avoid aspiration).
- Passive restraint should be used only, to prevent injury that may result when the patient hits nearby objects or falls out of the chair.

- **After the seizure**
- Oxygen 100% (if available).
- Maintenance of a patient airway.
- Mouth suction should be provided (to minimize aspiration of secretions).
- Discontinue dental treatment.
- Examine for traumatic injuries (lacerations, fractures). In the event of avulsed or fractured teeth or fractured appliance, an attempt should be made to locate the tooth or fragments to rule out aspiration.

- **In the event that a seizure becomes prolonged or is repeated (status epilepticus):**

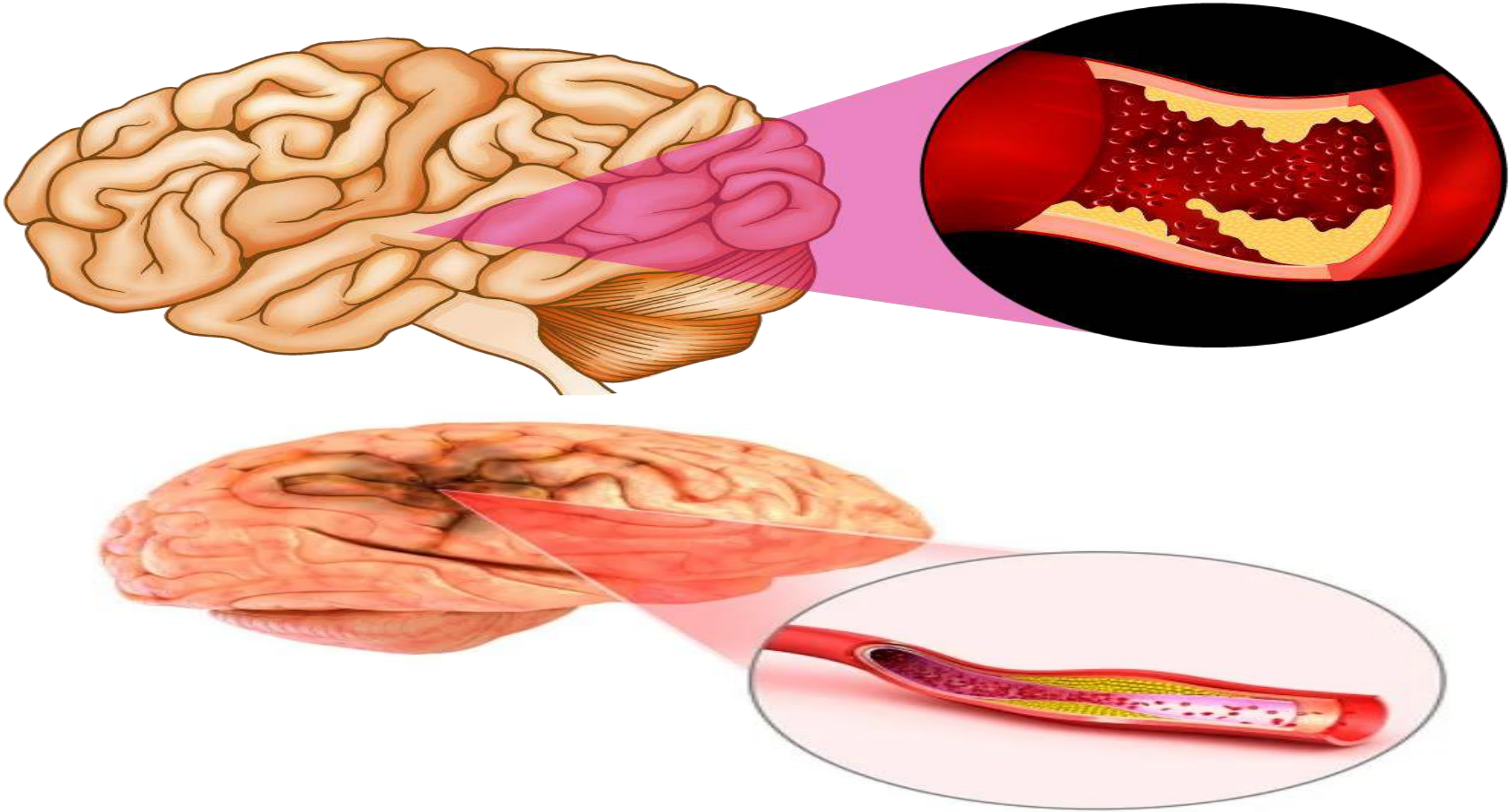
- Intravenous lorazepam (4 to 8 mg, or 10 mg diazepam, is generally effective in controlling it.
- Oxygen and respiratory support should be provided because respiratory function may become depressed.
- If the seizure lasts longer than 15 minutes, the following should be provided: IV access, repeat lorazepam dosing, phenytoin administration and activation of the emergency medical system.

• *Stroke (C.V.A):*

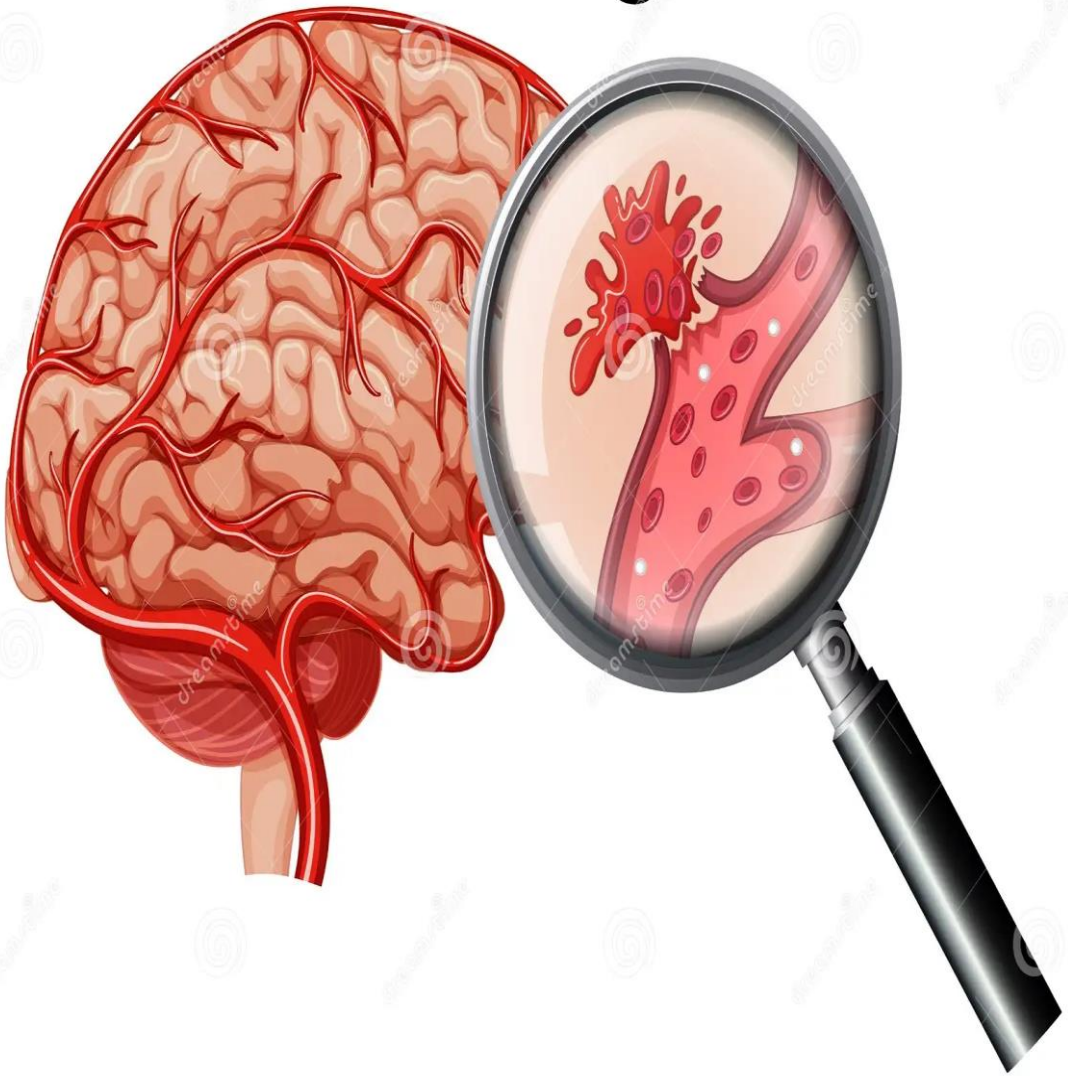
- Stroke is a generic term that is used to refer to a cerebrovascular accident—a serious and often fatal neurologic event caused by sudden interruption of oxygenated blood to the brain. This in turn results in focal necrosis of brain tissue and possibly death. Even if a stroke is not fatal, the survivor often is to some degree debilitated in motor function, speech, or mentation.

• Etiology

- Stroke is caused by the interruption of blood supply and oxygen to the brain as a result of ischemia or hemorrhage.
- **Ischemic stroke** (most common type): Induced by thrombosis or occlusion of a cerebral blood vessel by distant emboli. Its risk increased by atherosclerosis and cardiac pathosis (myocardial infarction, atrial fibrillation).
- **Hemorrhagic stroke:** Hypertension is the most important risk factor for intracerebral hemorrhagic stroke.

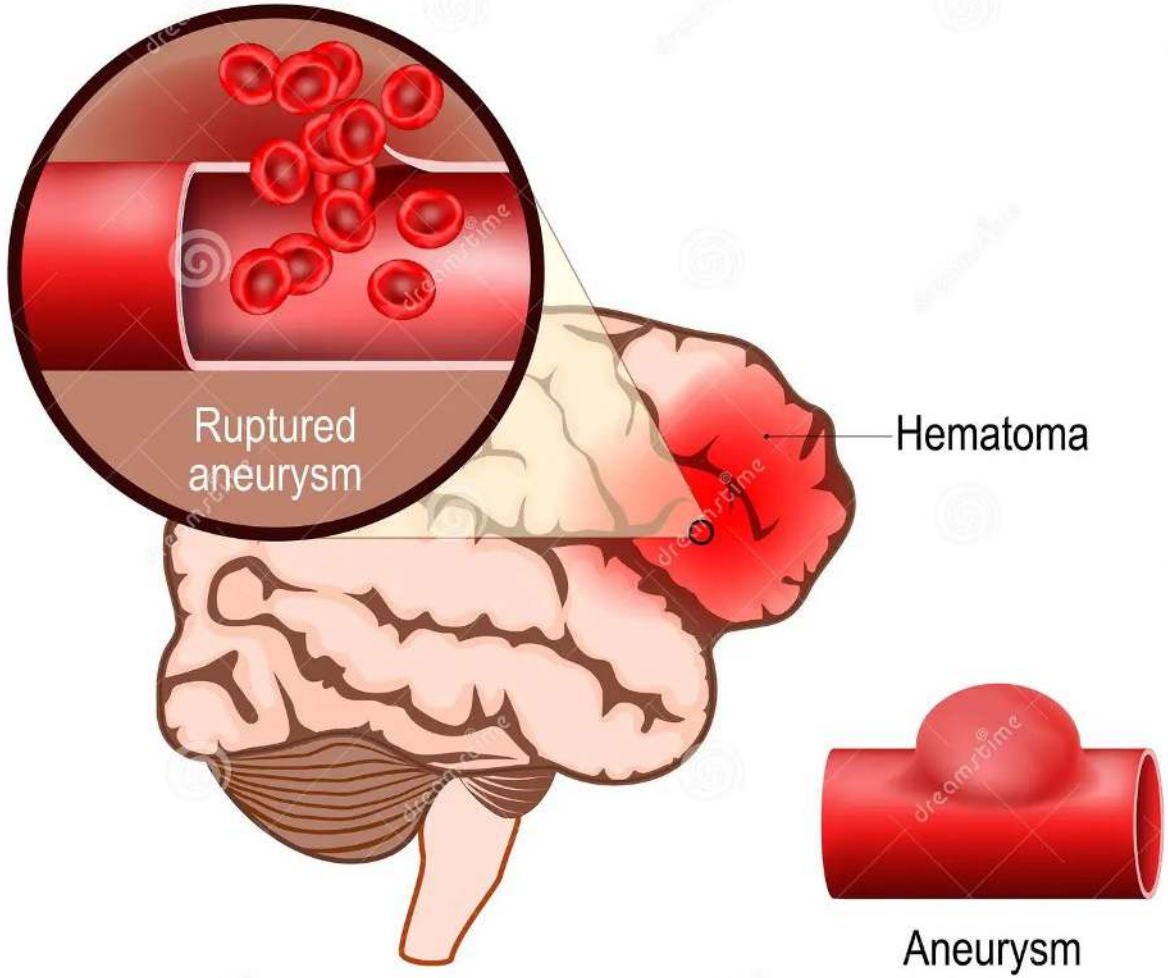


Hemorrhagic Stroke



dreamstime.com ID 124593916 © Dannyphoto80

Hemorrhagic stroke



- **Additional factors that increase the risk for stroke include:**
- The occurrence of transient ischemic attacks.
- Previous stroke.
- High dietary fat.
- Obesity and elevated blood lipid levels.
- Physical inactivity.
- Uncontrolled hypertension.
- Cardiac abnormalities.
- Diabetes mellitus.
- Heavy tobacco smoking.
- Increasing age.
- Periodontal disease

- **Four Events Associated with Stroke Are**:
- ***Transient ischemic attack (TIA):*** Is a "mini" stroke that is caused by a temporary disturbance in blood supply to a localized area of the brain. A TIA often causes numbness of the face, arm, or leg on one side of the body, weakness, tingling, and speech disturbances that usually last less than 10 minutes.
- ***Reversible ischemic neurologic deficit (RIND):*** Neurologic deficit recovers within 24 hours.

- **Signs and Symptoms**
- Familiarity with the warning signs and symptoms and the phases of stroke can lead to appropriate action that may be lifesaving.
-

- ***Stroke-in-evolution**:* In which the deficit has been present for several hours and continues to worsen during a period of observation.

- ***Completed stroke:*** Signs of stroke include hemiplegia, temporary loss of speech or trouble in speaking or understanding speech, temporary dimness or loss of vision, particularly in one eye (may be confused with migraine), unexplained dizziness, unsteadiness, or a sudden fall.

- **Laboratory Findings**
- Patients suspected of having had a stroke usually receive a variety of laboratory and diagnostic imaging tests to rule out conditions that can produce neurologic alterations, such as **diabetes mellitus, uremia, abscess, tumor, acute alcoholism, drug poisoning, and extradural hemorrhage.**

- **Laboratory tests often include urinalysis, blood sugar level, complete blood count, erythrocyte sedimentation rate, serologic tests for syphilis, blood cholesterol and lipid levels, chest radiographs, and electrocardiogram. Doppler blood flow, EEG, cerebral angiography, CT, and MRI, are important for determining the extent and location of arterial injury.**

- **Medical management**
- ***Prevention:*** This is accomplished by identifying risk factors in individuals (e.g., hypertension, diabetes, atherosclerosis, cigarette smoking) and attempting to reduce or eliminate as many of these as possible.

- Blood pressure lowering, antiplatelet therapy and statin therapy are primary stroke prevention methods

- ***Stroke Treatment:***
- 1.The immediate task is to sustain life during the period immediately after the stroke
- 2.The second task involves emergency efforts to prevent further thrombosis or hemorrhage, and to attempt to lyses the clot in cases of thrombosis or embolism.
- 3.After the initial period, efforts to stabilize the patient continue with anticoagulant medications such as heparin, coumarin, aspirin, and dipyridamole combined with aspirin (Aggrenox) in cases of thrombosis or embolism. Heparin is administered intravenously during acute episodes, whereas coumarin, dipyridamole, aspirin, subcutaneous low molecular weight heparin, or platelet receptor antagonists (ticlopidine) are employed for prolonged periods to reduce risk of thrombosis.
- 4. Corticosteroids may be used acutely after a stroke to reduce the cerebral edema that accompanies cerebral infarction. This can markedly lessen complications.
- 5. Surgical intervention may be indicated for removal of a superficial hematoma or management of a vascular obstruction.

- 6.Valium, Dilantin, and other anticonvulsants are prescribed in the management of seizures that may accompany the postoperative course of stroke

- 7. If the patient survives, the final task consists of institution of preventive therapy, administration of medications that reduce the risk of another stroke (statins and antihypertensive drugs), and initiation of rehabilitation (physical and speech therapy).

- **Dental Management**
- Identify risk factors. Hypertension*
- Congestive heart failure*
- Diabetes mellitus*
- TIA or previous stroke*
- Increasing age ≥75 years*
- Elevated blood cholesterol or lipid levels
- Coronary atherosclerosis
- Cigarette smoking
-

- ***Note***: Risk of stroke increases by a factor of 1.5 for each condition above indicated by*. Thus, having multiple risk factors listed above greatly increases the risk of a stroke.

- Encourage control of risk factors (referral to physician, if appropriate).
- 3. Obtain thorough history of stroke.

- Note date of event, current status, medical therapy, and any residual disabilities.
- Provide only urgent dental care during first 6 months after a stroke, TIA, or RIND.
- Avoid elective care in patients who have had recent TIAs or RINDs.

- Determine risk for bleeding problems in patients taking anticoagulant drugs, and minimize perioperative bleeding;

- Aspirin + dipyridamole (Aggrenox), ticlopidine (Ticlid); obtain pretreatment PFA100.
- Coumarin-Pretreatment INR 3.5. Higher levels require consultation with physician to reduce dose.
- Heparin (IV)—Use palliative emergency dental care only, or 6 to 12 hours before surgery, discontinue heparin and start another anticoagulant (e.g., coumadin) with physician's approval. Then, restart heparin after clot forms (6 h later).
- Heparin (subcutaneous, low molecular weight)—generally, no changes required.
- Use measures that minimize hemorrhage (atraumatic surgery, pressure, gelfoam, suturing), as needed.
- Have available noradrenergic hemostatic agents and devices (stents, electrocautery).

- 4. Schedule short, stress-free, midmorning appointments. Provide N20-02 inhalation as needed.
- 5. Monitor blood pressure and oxygen saturation.
- 6. Use minimum amount of anesthetic containing vasoconstrictor. (A local unesthetic with 1:100,000 or 1:200,000 epinephrine may be used in judicious amounts (>= 4 mL).
- 7. Avoid epinephrine in gingival retraction cord.
- 8. Recognize signs and symptoms of a stroke, provide emergency care, and activate emergency medical support system.
- 9. A prior stroke may require assistance for patient transfer to the chair, effective oral evacuation and airway management, and rigorous oral hygiene measures delivered by a health care provider.

- **Oral Manifestations and Complications**
- *A stroke-in-evolution*
- A patient may show all or any of the following;
- Slurred speech
- Weak muscles
- Difficulty in swallowing.

- *Complete stroke*
- Loss of or difficulty in speech
- Unilateral paralysis of the orofacial musculature
- Loss of sensory stimuli of oral tissues may occur

- The tongue may be flaccid, with multiple folds, and may deviate on extrusion.
- - Dysphagia
- - Difficulty in managing liquids and solids.
- - Patients with right-sided brain damage may neglect the left side. Thus, food and debris may accumulate around the teeth, beneath the tongue, or in alveolar folds.
- - Severe periodontal bone loss is associated with carotid artery plaques and increased risk for stroke.