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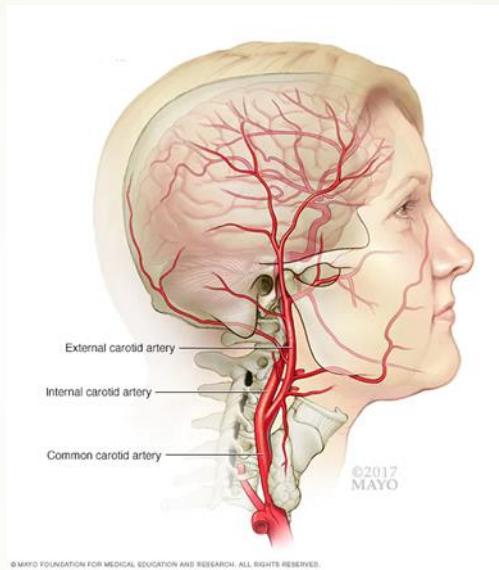
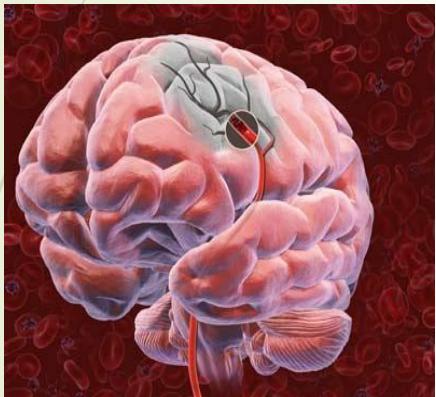


زنگی صحنه‌ی یکتاوی هنرمندی ماست
هر کسی نغمه خود خواند و از صحنه رود

صحنه سوسته به جاست
خرم آن نغمه که مردم بسازند به یاد



Diagnostic & Treatment of Acute Ischemic Stroke (AIS)



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University of Medical Sciences.*

A Stroke Is a Medical Emergency

Time Is Brain

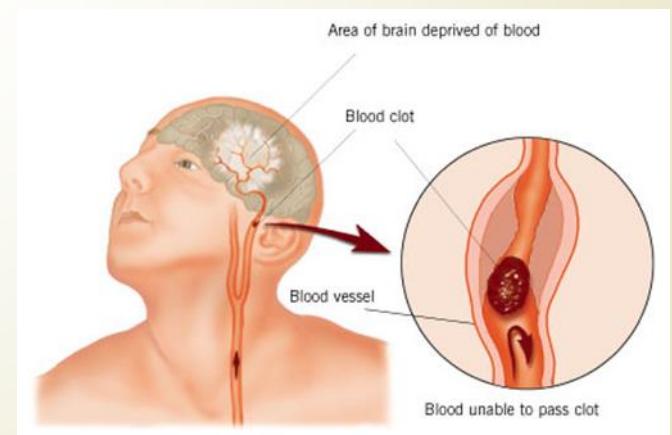
Time Is Critical



The goals of acute ischemic stroke management



- Proper maintenance of CPP
- Support ischemic tissue
- Prevent subsequent clot formation and recurrence of stroke



Stroke As a Medical Emergency

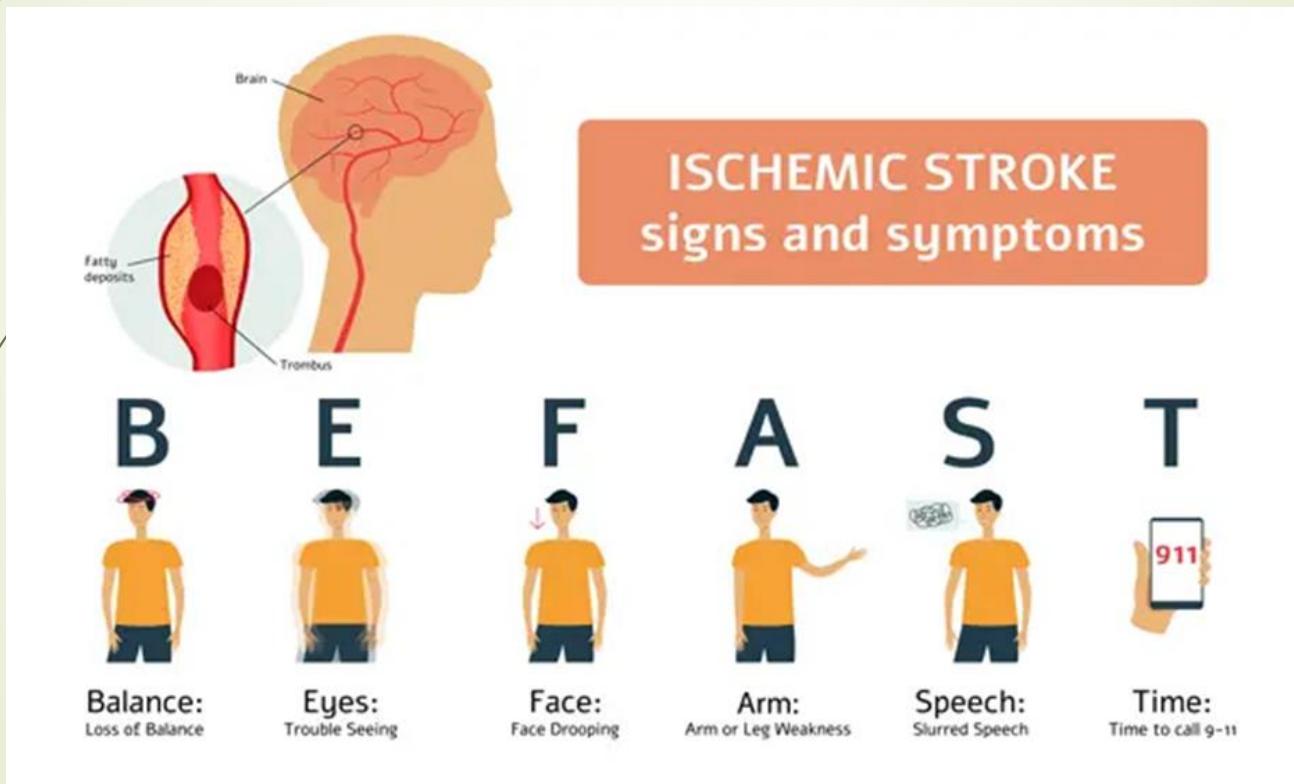
with Seven –Step chain of:



Stroke Chain of Survival

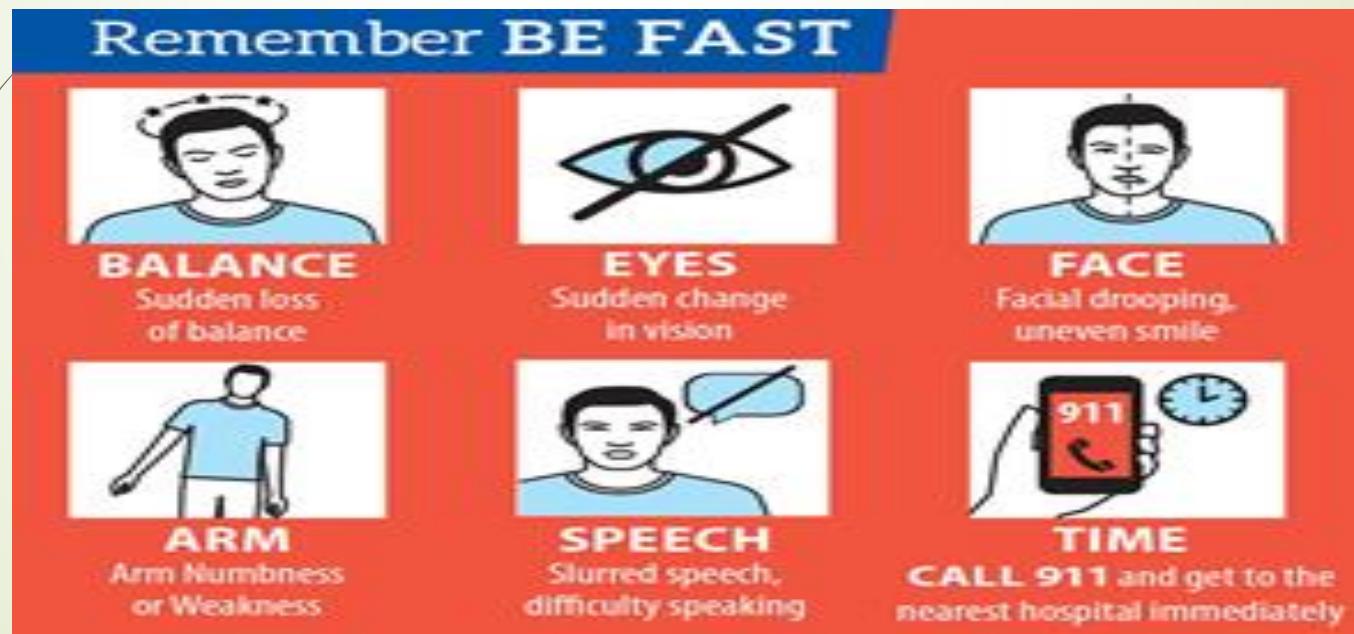
- 1. Detection** - Recognition of stroke sign/ symptoms
- 2. Dispatch** -Call 115, Priority EMS Dispatch
- 3. Delivery** -Prompt Transport/Hospital Notification
- 4. Door** - Immediate Ed Triage
- 5. Data** -Prompt ED Evaluation, Lab, Ct brain
- 6. Decision** -Diagnosis/Decision i.e. appropriate Rx
- 7. Drug** -Administration of appropriate drugs/other therapies

Initial Recognition of Stroke Event



Initial Recognition of Stroke Event

1. Detection Step



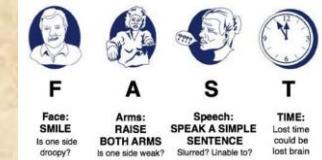


F

**Face:
SMILE**

Is one side
droopy?

FACE



وجود ضعف ناگهانی و یک طرفه در صورت که با معاینه زیر مشخص می شود: از بیمار خواسته می شود ابروهای خود را بالا ببرد، پلک های خود را بسته و فشار دهد، و یا دندانهاش را رویهم فشار دهد.

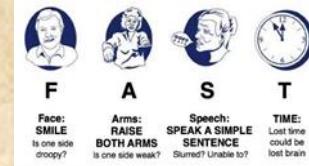
در هر کدام از این سه معاینه **عدم قرینگی** وجود داشته باشد بعنوان **معیار مثبت تلقی می گردد**



A

**Arms:
RAISE
BOTH ARMS**
Is one side weak?

ARM



ضعف ناگهانی و یکطرفه، حرکات نامتعادل و ناتمام یک بازو در مقایسه با دیگری.

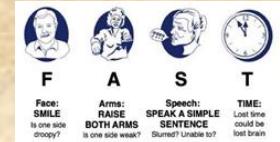
از بیمار خواسته می شود در حالت خوابیده و یا نشسته هر دو دست خود را با چشمان بسته همزمان بالا ببرد و به مدت ۱۰ ثانیه نگه دارد.

هر گونه **غیر قرینگی مثبت** تلقی می شود.

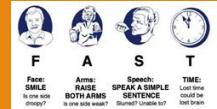
این معاینه برای اندام تحتانی هم در حالت خوابیده انجام می شود



SPEECH



هر گونه اختلال ناگهانی در بیان یا در درک گفتار (بریده بریده صحبت کردن، استفاده از کلمات نامناسب یا خاموش)



TIME

بروز هر یک از علائم فوق بصورت ناگهانی بوده و شروع این علایم کمتر از سه ساعت سپری شده باشد نیازمند اطلاع به دیسپچ جهت فعال کردن کد سما

► **زمان، عامل تعیین کننده اصلی درمان ترومبوالیتیک می باشد.**

زمان طلایی تجویز ترومبوالیتیک، از رویت اولین علائم در بیمار توسط خانواده ۴/۵ ساعت است که با توجه به شرایط بیمار این زمان کمتر خواهد شد.

طولانی ترشدن زمان شروع درمان خطر خونریزی و عوارض آن را افزایش می دهد

افتراق سکته مغزی ایسکمیک از هموراژیک در اورژانس پیش بیمارستانی مقدور نبوده و کلیه بیماران بایستی جهت درمان احتمالی ترومبوالیتیک در سریعترین زمان ممکن به بیمارستان واجد شرایط مناسب منتقل گردند.



TIME:
Lost time
could be
lost brain

Cincinnati Stroke Scale



Facial Droop

Normal:
Abnormal:

(have patient smile)

Both sides of face move equally
One side of face does not move
as well



Arm Drift

Normal:
Abnormal:

(have patient hold arms out for 10 seconds)

Both arms move equally or not at all
One arm drifts compared to the other,
or does not move at all



Speech

Normal:
Abnormal:

(have patient speak a simple sentence)

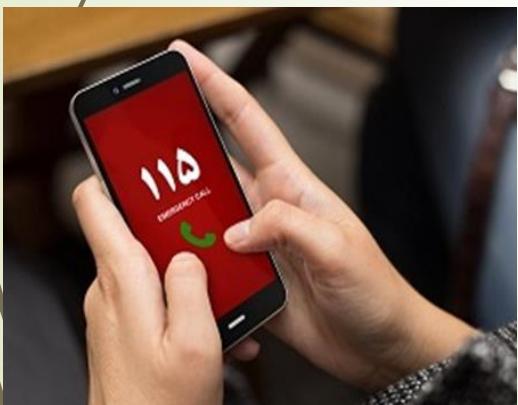
Patient uses correct words with no slurring
Slurred or inappropriate words, or mute

- Patients with **1 of these 3 findings** as a new event have a **72%** probability of an **ischemic stroke**.
- If all **3 findings** are present the probability of an **acute stroke** is more than **85%**

2. Dispatch Step



واحدی است که به صورت تمام وقت و فعال با حضور متخصصین بالینی رشته های پزشکی با اولویت متخصص طب اورژانس با دید جامع (جهت انجام فرایندهای تخصصی پزشکی از راه دور (از جمله مدیریت کد سما ، تله کاردیولوژی، مدیریت ترومما و بحران ها ،) که در مراکز ارتباطات مستقر می باشد.



کد سما: کد سکته مغزی اورژانس پیش بیمارستانی جهت مدیریت درمان بیماران با احتمال علائم FAST BE مثبت

3. Delivery Step

- ▶ Deliver the right patient
- ▶ to the right place
- ▶ in the right amount of time.

واحد: **MSCU** آمبولانس با مشخصات فنی تیپ C است که به منظور تشخیص، پایش، درمان و انتقال بیماران سکته حاد مغزی طراحی و تجهیز شده است

کد ۷۲۴ : خدمات در ۷ روز هفته و ۲۴ ساعت شبانه روز توسط بیمارستان های مشمول طرح برای بیمار با علا نم سکته حاد مغزی صورت می پذیرد.

مرکز درمانی ۷۲۴ : بیمارستانی است که واجد تیم استروک، دستگاه سی تی اسکن و شرایط تزریق ترومبوولیتیک می باشد.



4. Door Step

- ▶ Immediate Ed Triage
- Activate the stroke code
- Inform Team Stroke
- Inform the clinical laboratory



- ▶ هدف اصلی تریاژ در بیماران استروک، پایدارسازی سریع بیمار و تجویز سریع دارو در زمان مجاز می باشد زیرا هر ۱۵ دقیقه کاهش تاخیر در زمان درمان تقریبا ۱ ماه از زمان ناتوانی بیمار را می کاهد.
- ▶ هدف تریاژ اولیه: سکته را اثبات و معاینات اولیه را در کمتر از ۰۰ دقیقه انجام شود.
- ▶ جهت سرعت بخشیدن به تریاژ اولیه علائم اصطلاح BE FAST را به خاطر سپرده شود.

5. Data Step

► A. Prompt ED Evaluation

- Record the patient chief complaint
- Obtain minimum required patient demographics
- Estimated weight, anticoagulant use, and allergies (including to iodine contrast)
- Attach cardiac, blood pressure, and pulseoximeter monitors, Evaluate the ABCs , Need for immediate intubation
- Obtain vital signs (repeated every 15 minutes)
- 12 Lead ECG
- Glucose testing by Finger stick(treat if indicated)
- Oxygen via nasal cannula
- Obtain access IV (2 Large bore lines) , Consider a proximal IV suitable (heplock) for contrast administration to perform CTA
- Obtain stroke assessment to include National Institutes of Health Stroke Scale (NIHSS) Score, Glasgow coma scale(GCS)
-

CHART 22-1 National Institutes of Health Stroke Scale

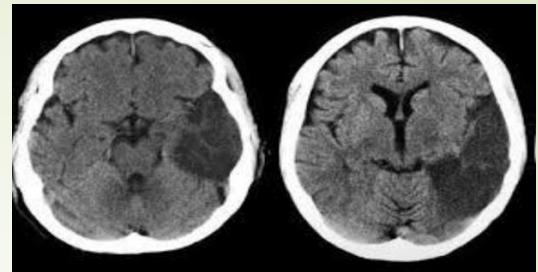
1a. Level of consciousness (LOC)		5. Motor arm	
Alert	0	No drift	0
Drowsy	1	Drift	1
Stuporous	2	Some effort against gravity	2
Coma	3	No effort against gravity	3
1b. LOC questions		No movement	4
Answers both correctly	0	Amputation, joint fusion (explain)	9
Answers one correctly	1		
Answers neither correctly	2		
1c. LOC commands		6. Motor leg	
Performs both correctly	0	No drift	0
Performs one correctly	1	Drift	1
Performs neither correctly	2	Some effort against gravity	2
2. Best gaze		No effort against gravity	3
Normal	0	No movement	4
Partial gaze palsy	1	Amputation, joint fusion (explain)	9
Forced deviation	2		
3. Visual		7. Limb ataxia	
No visual loss	0	Absent	0
Partial hemianopsia	1	Present in one limb	1
Complete hemianopsia	2	Present in two limbs	2
Bilateral hemianopsia	3		
4. Facial palsy		8. Sensory	
Normal	0	Normal	0
Minor paralysis	1	Mild to moderate loss	1
Partial paralysis	2	Severe to total loss	2
Complete paralysis	3		
		9. Best language	
		No aphasia	0
		Mild to moderate	1
		Severe	2
		Mute	3

The NIHSS is the most commonly used clinical tool for the assessment of AIS

NIH Stroke Scale Score	Stroke Severity
0	No stroke symptoms
1-4	Minor stroke
5-15	Moderate stroke
16-20	Moderate to severe stroke
21-42	Severe stroke

5. Data Step

► B. Prompt Lab, Ct brain



- Blood Specimens drawn for routine stroke laboratory tests :
 - ✓ prothrombin time (PT), INR ,partial thromboplastin time (PTT)
 - ✓ complete blood count, platelets , CRP , ESR
 - ✓ Renal function(creatinine, Bun), and blood glucose , electrolytes.
- Obtain a limited medical history, including contraindications to alteplase.
- Page the stroke team
- Review medical history and contraindications to alteplase
- continuous heart monitoring , Blood pressure ,heart rate, respiration rate , oxygen saturation , temperature monitoring,
- Actual patient weight determination,
- Rapidly prepare the patient for diagnostic studies (Immediate transfer to CT scan

Diagnostic Studies For Stroke

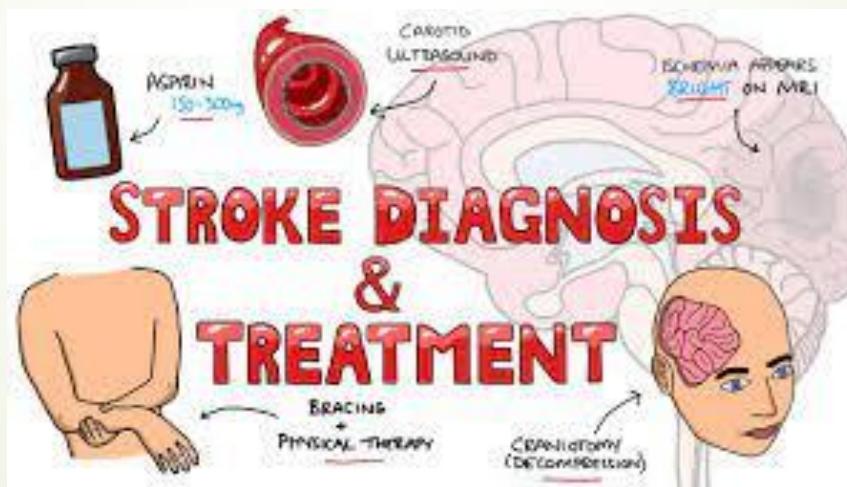
- ▶ Confirm that it is a stroke
- ▶ Identify the likely cause of the stroke
- ▶ Determine the location ,type, severity of the lesion within the brain
- ▶ The state of the blood flow through the vessel
- ▶ The state of the brain in the region of the symptoms
- ▶ Guide decisions about therapy

Diagnostic Studies For Stroke

- Diagnosis of Stroke
 - ✓ CT Scan
 - ✓ CT Angiography(CTA)
 - ✓ MRI/MRA
- Cardiac Assessment
 - ✓ ECG
 - ✓ Chest X-ray
 - ✓ Cardiac markers (troponin, CPK-MB)
 - ✓ Echocardiography(transthoracic/ transesophageal)
- Cerebral Blood Flow
 - ✓ Carotid Doppler
 - ✓ Transcranial Doppler
 - ✓ Cerebral Angiography
- Additional Studies
 - ✓ CBC,Platelets, BS, PT,INR, PTT, Electrolytes, Renal /Liver tests, lipid ,CSF Analysis

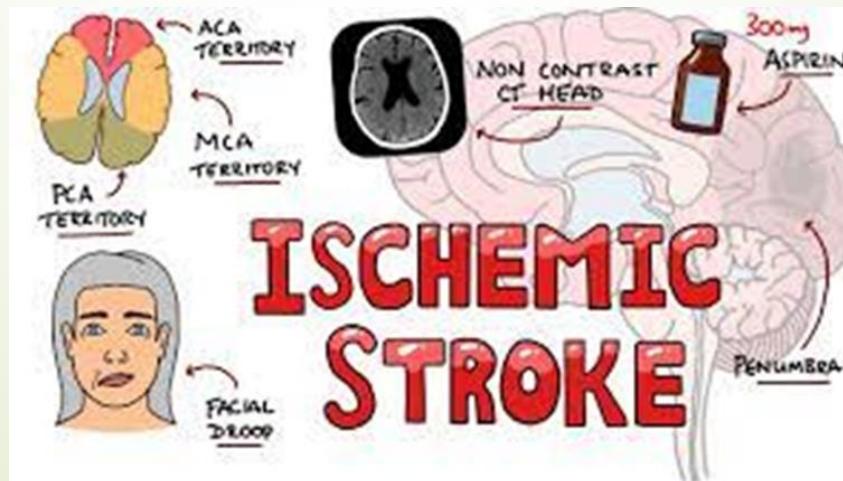
6. Decision Step

- Diagnosis/Decision i.e. appropriate Rx



7.Drug Step

- ▶ Administration of appropriate drugs/other therapies :
- ▶ Medical Management
- ▶ Mechanical Thrombectomy
- ▶ Surgical Management



7.Drug Step

- **Medical Management of Stroke**
 - **1.Thrombolysis and hyper acute management**
 - ✓ **Intravenous rt-PA**
 - ✓ **Intra-arterial Thrombolytic(IAT)**
 - **2.Antiplatelet Medications**
 - **3.Anticoagulation Medications**
 - **4.Statin treatment**
 - **5.Management of Hypertension**
 - **6.Lifestyle Modification**

Inclusion Criteria for Treatment with Intravenous tPA

- ▶ Clearly defined time of onset<4.5 h
- ▶ Measurable Stroke-related deficit on National Institutes of Health Stroke Scale(**NIHSS**)
- ▶ No Intracranial hemorrhage on CT



tPA Exclusion Criteria

- ▶ Minor or rapidly improving symptoms
- ▶ Seizure at stroke onset
- ▶ Other stroke or trauma within 3 months
- ▶ Major surgery within 14 days
- ▶ History of intracerebral hemorrhage
- ▶ Sustained BP $\geq 185/110$
- ▶ Suspicion of SAH
- ▶ Arterial puncture at noncompressible site within 7 days
- ▶ Received heparin within 48 hours and PTT elevated
- ▶ INR > 1.7
- ▶ Plt $< 100,000$
- ▶ Glc < 50 or > 400
- ▶ Severe stroke (NIHSS > 25)



Intensive care r-tpa (Pre-injection)

- ▶ Getting an accurate history
- ▶ Getting Conscious Consent
- ▶ Control vital signs
- ▶ If the SBP> 185 or DBP> 110 is at least 2 times at intervals of 5 minutes above this value and the heart rate is above 60 bpm, intravenous Labetalol 10 to 20 mg should be administered over one to two minutes. If the pressure is still high after 10 minutes, it can be repeated.
- ▶ Control of coagulation tests (pt, plt, INR)
- ▶ Identify any allergies to drugs or other contrast agents
- ▶ Installation of a safe secondary peripheral vessel
- ▶ Availability of oxygen and emergency devices



Enters Stroke patient before 3 hours without contraindication to rTPA

- ▶ Preparation of rtpA solution according to the protocol
- ▶ Using an infusion pump tPA is injected intravenously at a dose of 0.9 mg / kg, 10% of which is bolus and 90% of which is infused within one hour. The maximum dose is 90 mg.
- ▶ Immediate notification of BP> 175/100 to the physician
- ▶ Do not install Foley or NGT until ordered
- ▶ Perform neurological evaluation of the patient on an hourly basis
- ▶ Correct and complete report of the patient's condition to the next shift nurse
- ▶ Educate the patient and his family
- ▶ Aspirin 80 mg is given to the patient 24 hours after rtpa
- ▶ Clopidogrel 75 mg is given to the patient after 25 hours



NURSING MANAGEMENT IN THROMBOLYTIC THERAPY(the first 24 hours)

- Monitor vital signs for evidence of extra cranial bleeding (e.g., gastric hemorrhage).
- Monitor neurological signs for evidence of deterioration and increased intracranial pressure(ICP) that may be caused by intracerebral hemorrhage or increasing cerebral edema.
- Monitor for reperfusion injury!
- Monitor for bleeding at catheter site; bleeding may also be noted in urine or stool, or from mouth.
- Monitor coagulation studies and maintain in therapeutic parameters.

Hickey 2020

NURSING MANAGEMENT in the first 24 hours

- Complete bed rest for 24 hours
- NPO up to 24 hours
- Serum therapy
- Avoid venipuncture unless absolutely necessary
- Avoid piercing the skin for 24 hours
- Injectable metoclopramide in case of nausea and vomiting
- Apotel administration in case of headache and high temperature 37.5

Actions in the stroke unit(in the second 24 hours)

- CT or MRI
- Vital sign control and cardiac monitoring
- Continue serum therapy
- Oxygen therapy
- Tests control : BS, HBA1-C, Lipid-profile
- Blood pressure control
- Start anticoagulants or antiplatelets if indicated
- Carotid Doppler, CTA, CTA, MRA
- DVT prophylaxis
- Swallowing control

Intra Arterial Thrombolytic (IAT)

- ▶ NIHSS score>10 for patient selection criteria
- ▶ The window of therapy up to 6 hours.
- ▶ Drugs used include recombinant tPA reteplase (Retavase) or recombinant tPA alteplase(Activase)
- ▶ Treatment with IAT be initiated as long as 6/1/2 hours after symptoms onset .

Antiplatelets Medications

- ▶ Current Antiplatelet drugs include Aspirin ,Ticlopidine, Clopidogrel, Dipyridamole and a combination of dipyridamole and aspirin.
- ▶ Aspirin should not be considered as an alternative to thrombolytic therapy.
- ▶ Aspirin should not be administered until 24 hours after receive thrombolytic therapy .
- ▶ Most patients should receive aspirin with 48 hours of acute stroke .
- ▶ For patients allergic to Aspirin, Clopidogrel is used.
- ▶ ASA 50-325mg/day
- ▶ Clopidogrel 75 mg



Anticogulants Medications



- ▶ The most resent evidence **dose not support** the use of early IV anticoagulation to **improve outcomes** after acute ischemic stroke(**AIS**).
- ▶ Patients with paroxysmal or permanent atrial fibrillation should evaluated using the **CHADS Scale** and placed on anticoagulation
- ▶ Patients with cardiomyopathy and valve disease are at risk for recurrent stroke and may benefit from long term anticoagulations
- ▶ Anticoagulation with adjusted dose of warfarin(with a range of 2-3 INR) is recommended
- ▶ for patient unable to take oral anticoagulants, ASA 325 mg/day recommended



Statins Medications

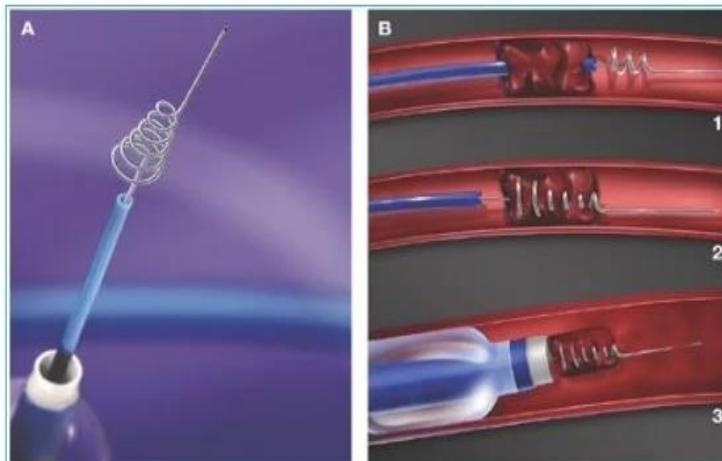
- ▶ Statin treatment may increase the risk of hemorrhagic extension
- ▶ Should not be prescribed in hyper acute stage
- ▶ Simvastatine 40 mg

2. Mechanical Thrombectomy

37

- FDA approved treatment for AIS using the Merci Retriever
- This tiny cork-screw like device to remove clots from an artery in the brain
- Inclusion criteria include:
 - ✓ With a diagnosis of Ischemic stroke
 - ✓ Older than 18 years of age
 - ✓ With an NIHSS score >8
 - ✓ Who are ineligible for IV Tpa or who fail IV Tpa
 - ✓ Arrive in the ED within 8 hours of symptoms

MERCI device

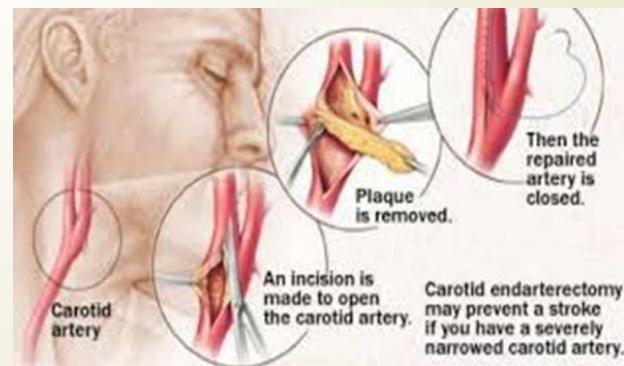


3.Surgical Management of Ischemic Stroke

- ▶ **Carotid Endarterectomy(CEA)**
- **Carotid Stenting(Endovascular Therapy)**
- **Percutaneous Transluminal Angioplasty(PTA)**
- **Cerebral Revascularization:**
 - ✓ External Carotid to Internal Carotid Bypass(EC-IC arterial bypass)
 - ✓ Superficial Temporal Artery –Middle Cerebral Artery Anastomosis(STA to MCA)
- **Decompressive Craniectomy**
 - ✓ Large vessel ischemic stroke ,particularly involving the MCA territory ,places patient at risk for edema & herniation
- **Laser Treatment**

Carotid Endarterectomy(CEA)

- **CEA** is a surgical procedure used to correct carotid stenosis ,used particularly when this causes symptoms which will lead to medical problems, such as transient ischemic attacks (TIA) or cerebrovascular accidents (CVA).
- Regardless of the symptoms, if a person's carotid artery is clogged by the plaque by **70% or greater**; treatment is required to prevent a stroke.
- **Endarectomy** is the removal of plaque from the artery walls.
- **Angioplasty and stenting (Endovascular)** of the carotid is an alternative treatment to a CEA.



Postoperative Risks Carotid Endarterectomy(CEA)

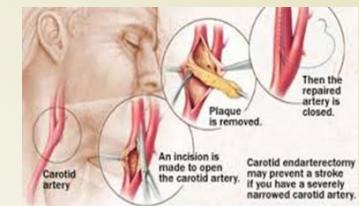
- ▶ Hemodynamic instability
- ▶ Hypotension and /or Hypertension
- ▶ Bradycardia
- ▶ Neurologic changes
- ▶ Bleeding
- ▶ Neck Hematoma
- ▶ Postoperative stroke
- ▶ Cardiac adverse events



Surgery of the Carotid Endarterectomy (CEA)

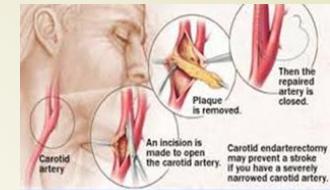
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- ▶ Prepare the patient for Doppler , MRA,Brain MRI or CTS
- ▶ Receive **Antiplatelet** agents (Aspirin ,Plavix)
- ▶ Giving **general** anesthesia OR local nerve block anesthesia
- ▶ Patient is placed in the **supine position** with neck slightly hyperextended and a shoulder roll placed on the side of the surgical procedure.
- ▶ Intraoperative EEG monitoring ,TCD , SEP used to detect Ischemia
- ▶ Incision is made along the border of the sternocleidomastoid muscle
- ▶ Hypoglossal nerve is identified for protection during surgery
- ▶ 0.5 ml of 2% lidocaine is used to anesthetize it and prevent bradycardia and hypotension during manipulation of the carotid
- ▶ Atheromatous plaque is dissected away from the wall of the artery

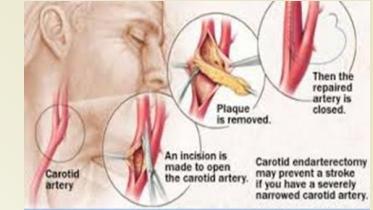


Postoperative Nursing Care of the Carotid Endarterectomy(CEA)

- Assess that airway is intact.
- ✓ Assess neck for edema and hematomas.
- ✓ Take note of any tracheal deviation, respiratory distress (stridor), drooling, and problems swallowing.
- ✓ Assess breath sounds.
- ✓ Call surgeon immediately for any airway issues.
- Assess incision for approximation of edges and any bleeding, drainage or redness.
- ✓ Assess for hematoma at neck
- ✓ Call if increase edema or grapefruit size hematoma.
- Assess Vital Signs as ordered.
- ✓ Due to manipulation of baroreceptors the carotid artery, BP control is very important and must be within normal parameters. **Call if SBP > 180 or DBP < 100.**
- ✓ Evaluate heart rhythm for any arrhythmias

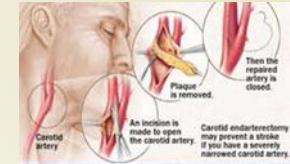


Postoperative Nursing Care of the Carotid Endarterectomy(CEA)



- Neuro checks will be done q 1 hour with VS X 2, q 2 hr. X 2, and then q 4 hr.
- During Neuro checks :
 - Assess for mental orientation and level of consciousness.
 - Assess Cranial Nerves :
 - ✓ Hypoglossal- ability to position tongue midline. If tongue deviates to one side, call the surgeon. Assess hypoglossal pharyngeal nerve for swallowing ability
 - ✓ Facial- Ask patient to smile and puff cheeks
 - ✓ Vagus- Ask the patient to speak, if unable to speak or speech is garbled, call surgeon.
 - ✓ Spinal Accessory- bilaterally raise arms and sustain for 3 seconds
 - ✓ pupillary reaction
 - ✓ Assess all four extremities for equal strength, movement, and sensation.

Nursing Care of the Carotid Endarterectomy(CEA)

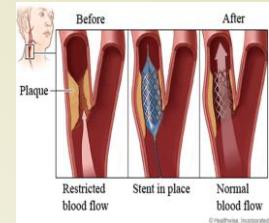


- Patients with local nerve block anesthesia may have numbness after surgery extending into the neck/throat area, shoulder and down to the nipple line on side of surgery. This should wear off in 6-8 hours after surgery.
- If the patient has a head ache after surgery due to reperfusion, give Tylenol. If not relief of headache within 1-2 hours of Tylenol (acetaminophen), call surgeon- this may be a sign of an intracranial bleed and will need an US of the neck and a CT of the head to r/o bleed.
- Surgeons do not want these patients to receive Lovenox(enoxaparin) until cleared by them. Administration of Lovenox is associated with high risk of bleeding which could cause respiratory compromise if hematoma develops at incisional site.
- ▶ Prior to discharge, have patient look into the mirror to see how much swelling is present in the neck area. Tell the patient to notify the surgeon immediately if the swelling enlarges

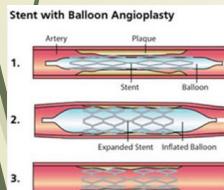
NURSING MANAGEMENT IN CAROTID ENDARTERECTOMY

- ▶ Monitor blood pressure and rigorously maintain within set parameters, usually about 150 mmHg systolic (hypertension predisposes to intracerebral hemorrhage, and hypotension to ischemic stroke); instability of blood pressure is common particularly in the first 12-24 hrs postoperatively, so expect to monitor and manage blood pressure frequently.
- ▶ Monitor for cardiac arrhythmias and evidence of myocardial ischemia (myocardial infarction is not uncommon).
- ▶ Monitor neurological signs frequently and observe for early signs of deterioration.
- ▶ Monitor for cranial nerve deficits (especially facial and vagal) as a result of surgery.
- ▶ Monitor for signs of intracerebral hemorrhage (increased ICP, new onset of neurological deficits).
- ▶ Monitor for vascular headache and seizures (hyperperfusion syndrome).
- ▶ Monitor for reperfusion injury!
- ▶ Maintain head of bed according to physician orders; because of vascular instability, the head of the bed may be flat for the first 24 hrs.
- ▶ Observe operative site for hemorrhage, hematoma, or tearing of suture site.

Carotid artery stenting (CAS)



- ▶ **CAS**, carotid artery stenting, is emerging as a viable treatment option for patients with high-grade carotid stenosis who are high-risk surgical candidates.
- ▶ **CAS**, a type of revascularization, is considered less invasive than CEA and is associated with a higher successful rate.
- ▶ **CAS** not only treats carotid stenosis effectively and reduces the incidence of stroke and myocardial infarction but also may increase the survival rate.
- ▶ Because CAS may lead to in-stent restenosis, an eluting stent has been developed to prevent this adverse event. However, the effectiveness of the eluting stent has yet to be adequately verified.
- ▶ As patients who receive CAS remain at risk of recurrent stroke, intravascular restenosis, TIA, and mortality, post-procedure medical and nursing care for this population must be appropriately applied in order to maximize the rate of long-term success. Therefore, we recommend that clinical physicians and nurses regularly evaluate and monitor post-CAS patients in order to prevent complications.
- ▶ Moreover, they should educate patients before discharge on post-CAS wound care and medicine-taking regimens as well as on the importance of smoking cessation, controlling blood sugar and blood pressure, exercising regularly, reducing body weight, maintaining a healthy diet, and controlling the risk factors of atherosclerosis in order to prevent the recurrence of complications.



Carotid artery stenting (CAS)

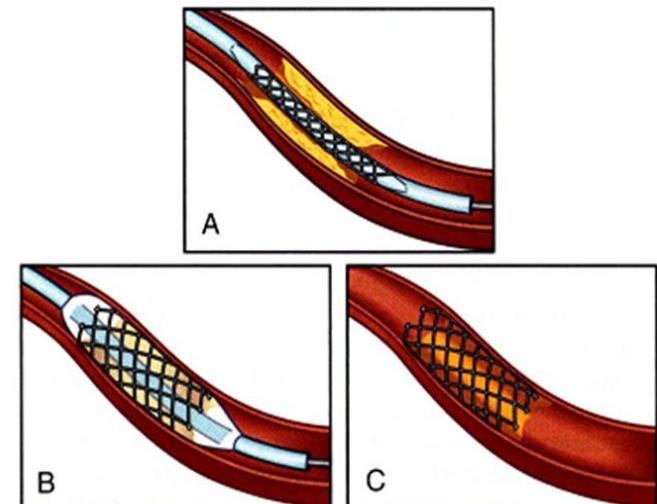
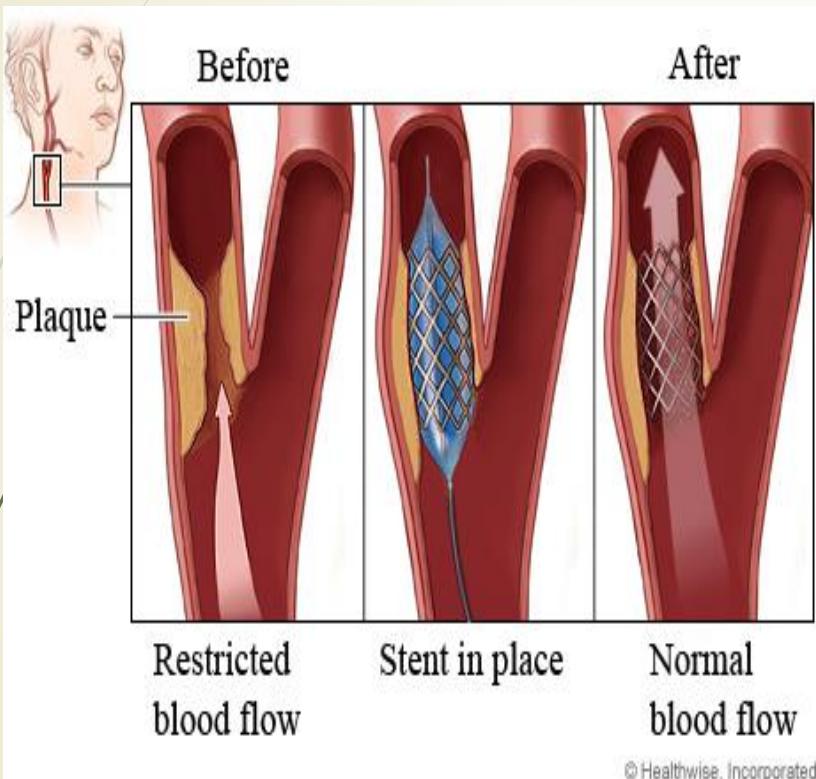


FIG. 57-5 Brain stent used to treat blockages in cerebral blood flow.
A, A balloon catheter is used to implant the stent into an artery of the brain.
B, The balloon catheter is moved to the blocked area of the artery and then inflated. The stent expands due to inflation of the balloon.
C, The balloon is deflated and withdrawn, leaving the stent permanently in place holding the artery open and improving the flow of blood.

stenting 0

Preprocedural Nursing Considerations

- ▶ Calculate time period between date of stroke and endovascular treatment; notify the physician if it is less than 1 month.
- ▶ Obtain baseline cranial CT scan to exclude intracranial hemorrhage especially in patients with recent stroke (less than 4 weeks); if hemorrhage is present, postpone the procedure
- ▶ Verify if consent was signed properly. Check patient's medical file.
- ▶ Exclude other etiologies causing stroke. Verify more than 60% carotid stenosis for symptomatic and more than 80% stenosis for asymptomatic patients. Notify any contraindications .
- ▶ Notify any renal insufficiency (creatinine greater than 2.0 mg/dl).
- ▶ Notify any coagulation abnormalities (platelet count, prothrombin time, and partial thromboplastin time). Check patient's medication regimen .
- ▶ Assess and document baseline neurological condition: Consciousness Verbal responses Motor (leg and arm) function Prep bilateral groin areas.
- ▶ Insert IV line and administer IV fluids.
- ▶ Prep monitoring of patient: oxygen saturation, ECG, and blood pressure

Post procedural Nursing Considerations

- ▶ Assist patient transfer from stretcher to bed without flexion of extremity.
- ▶ Keep femoral sheath in place for about 30 minutes; confirm unchanged neurological status before sheath removal.
- ▶ Perform patient assessment every 15 minutes, every 30 minutes, and hourly up to first 12 hours: Blood pressure, Heart rate, Neurological examination
- ▶ After sheath removal, monitor femoral access site for hematoma formation and assess peripheral pulses and the color distal to access at least four times within the first 12 hours.
- ▶ Closely monitor the patient for any signs and symptoms of post procedural complications:
 - Worsened neurological status (stroke and TIA)
 - Symptomatic bradycardia
 - Persistent hypotension Hyperperfusion syndrome
 - Hematoma in access site or retroperitoneal space
- ▶ In case of complications
 - Notify the physician.
 - Administer medication as ordered. Contact the radiology unit to obtain emergency CT or duplex ultrasonography scan if radiological confirmation is needed.
 - Be ready for emergency insertion of cardiac pacemaker.
 - Transfer the patient to intensive care unit.

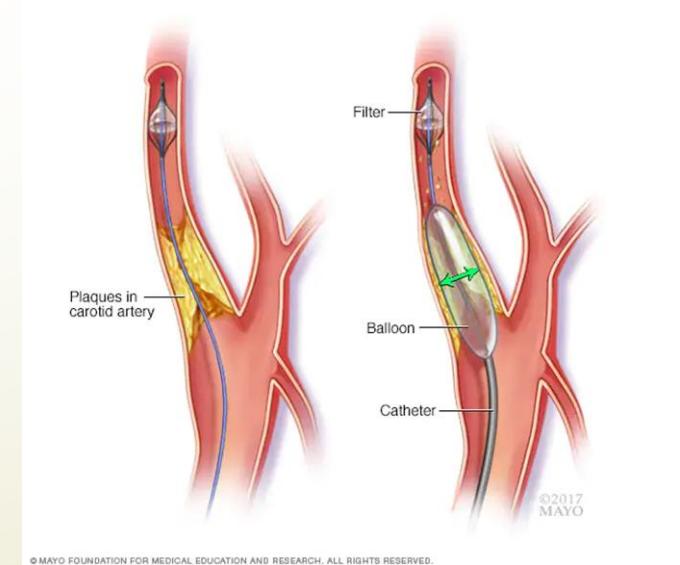
Carotid Artery Stenting (CAS) vs. Carotid Endarterectomy(CEA)

- ▶ In patients with symptomatic carotid stenosis, CAS is associated with a higher risk of stroke or death within 30 days of treatment than CEA.
- ▶ This extra risk is mostly attributed to an increase in peri procedural stroke occurring in patients ≥ 70 years.
- ▶ Beyond 30 days after treatment, CAS is as effective in preventing recurrent stroke as CEA.
- ▶ Combining procedural safety and long-term efficacy in preventing recurrent stroke, CAS is still associated with higher risks than CEA.

- ▶ In people with asymptomatic carotid stenosis, there may be a small increase in the risk of stroke or death within 30 days of treatment with CAS compared with CEA.
- ▶

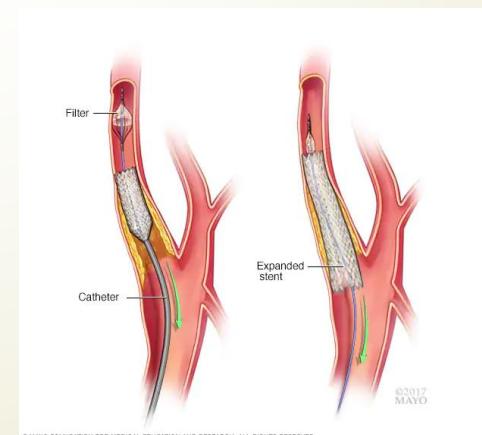
Carotid angioplasty

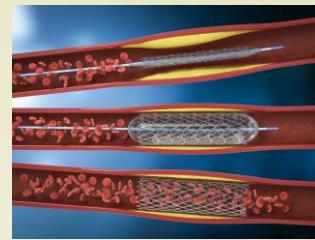
In carotid angioplasty, a long, hollow tube (catheter) is threaded through the arteries to the narrowed carotid artery in the neck. A filter is inserted to catch any debris that may break off during the procedure. Then, a tiny balloon at the end of the catheter is inflated to open the narrowed area.



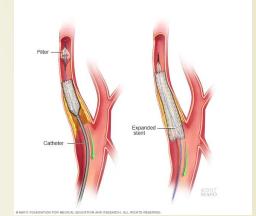
Carotid stenting

In carotid stenting, a long, hollow tube (catheter) is threaded through the arteries to the narrowed carotid artery in the neck. A metal mesh tube (stent) is inserted into the vessel to serve as a scaffold that helps prevent the artery from narrowing again. The catheter and the filter — which catches any debris that may break off during the procedure — are removed.





- The procedure involves temporarily inserting and inflating a tiny balloon into the clogged artery to widen the area so that blood can flow freely to your brain.
- Carotid angioplasty is often combined with another procedure called stenting.
- Stenting involves placing a small metal coil (stent) in the clogged artery.
- The stent helps prop the artery open and decreases the chance of it narrowing again. Carotid angioplasty and stenting may be used when traditional carotid surgery (carotid endarterectomy) isn't possible, or it's too risky



Contraindications to Elective CAS(carotid angioplasty and stenting)

- ▶ Contraindication to anticoagulant or antiplatelet therapy
- ▶ Uncorrected bleeding disorders
- ▶ Hemorrhagic transformation of cerebral ischemia on CT at the time of procedure
- ▶ Free-floating fresh thrombus inside the carotid lumen
- ▶ Occlusion of carotid artery
- ▶ Severe tortuosity in arcus aorta and carotid artery
- ▶ Extreme calcification within the carotid stenosis
- ▶ Early (not later than 4 weeks) CAS in patients with cerebral infarct on CT/MRIa
- ▶ Bradycardia less than 40/minute
- ▶ Renal insufficiency (due to using contrast media during CAS)



NURSING MANAGEMENT IN CEREBRAL ANGIOGRAPHY/STENT PLACEMENT

- ▶ Monitor vital signs for hemodynamic instability.
- ▶ Monitor for bleeding at catheter site; bleeding may also be noted in urine, stool, GI tract, or mouth.
- ▶ Monitor neurological signs for evidence of intracerebral hemorrhage and reperfusion injury!
- ▶ Monitor coagulation studies and maintain in therapeutic range using international normalizing ratio (INR) parameters

General supportive care in AIS



► Airway management

- Supplemental oxygen can be administered at a dose of 10-15 L/min if there is evidence of hypoxia by pulse oximetry
- should be intubated to avoid the risk of aspiration

► Hydration

- Patients with ischaemic stroke should be routinely hydrated with isotonic saline to ensure adequate perfusion to the ischaemic penumbra and may prevent infarct extension.

- Hypotonic solutions should be avoided as this may lead to increased cerebral oedema

► Increased intracranial pressure (ICP)

- The head of the bed should be elevated at 30 degrees.

- Administration of 0.5-1 g/kg of 20% mannitol as a bolus.

- Infusion of hypertonic saline solution (23.4%) be administered at a dose of 0.5–2.0 ml/kg as an alternative to mannitol especially in the setting of hypotension.

- Hyperventilation to a pCO₂ of 28-35 mmHg has also been employed as a measure in reducing ICP

► Blood pressure management

► Management of blood sugar

► Temperature control



A wide-angle photograph of a winter forest at sunset. The sky is filled with soft, pastel-colored clouds in shades of pink, orange, and yellow, transitioning into a darker blue at the top. In the foreground and middle ground, numerous tall evergreen trees are heavily laden with thick, white snow, their branches drooping under the weight. The ground is a smooth, pale expanse of snow. A few small, thin trees without snow are visible on the left side.

با شکر از توجه ممکن
شما

Reference

- Hinkle JL, Cheever KH. Brunner and Suddarth's textbook of medical-surgical nursing. Wolters kluwer india Pvt Ltd; 2018 Aug 30.Hickey Joanne V . 2020,Neuroscience nursing:
- Barker Ellen,2008,Neuroscience nursing: Spectrum of care.Third edition ,Mosbey
- Su SF, Su HY, Wu MS. Nursing Care of Patients With Carotid Artery Stenosis Who Receive Carotid Artery Stent. Hu Li Za Zhi. 2018 Dec 1;65(6):104-10.
- Oran NT, Oran I. Carotid angioplasty and stenting in carotid artery stenosis: neuroscience nursing implications. Journal of Neuroscience Nursing. 2010 Feb 1;42(1):3-11.
- Lopez AC, Roper LD. New techniques in carotid stenting. The Nurse Practitioner. 2008 Apr 1;33(4):43-7.
- Müller MD, Lyrer PA, Brown MM, Bonati LH. Carotid Artery Stenting Versus Endarterectomy for Treatment of Carotid Artery Stenosis. Stroke. 2021 Jan;52(1):e3-5.
- Ahn SH, Prince EA, Dubel GJ. Carotid artery stenting: review of technique and update of recent literature. InSeminars in interventional radiology 2013 Sep (Vol. 30, No. 03, pp. 288-296). Thieme Medical Publishers.
- Novitzke J. A patient guide to brain stent placement. Journal of vascular and interventional neurology. 2009 Apr;2(2):177.
- Byers S. Neuroscience Nursing Evidence-Based Practice [Book Review].2011
- Hickey J. Clinical practice of neurological & neurosurgical nursing. Lippincott Williams & Wilkins; 2020.