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A REVIEW ON ISCHEMIC STROKE

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ABSTRACT:

An ischemic stroke can be defined as the "amount of blood supply to the part of brain is reduced or interrupted. That it cause preventing brain tissue getting oxygen and nutrients. More than 700,000 people have stroke in each year in the united states . The diagnosis of stroke is changing by the initiate following evolving protocols, emergency management andnursing care to the effected patients. The therapeutic window for the patients follows thrombolytic and neuro-protective agents. Patient and family education on risk reduction must also be informed by the entire health care department.

KEY WORDS:

ischemic stroke, hemorrhage, carotid stenosis, alteplase, heparin.

STROKE:

WHO defined stroke as a clinical syndrome in which disturbance of cerebral function occursthat lasts more than 24hrs.stroke is classified broadly into 2 categories they are

1. Ischemic stroke
2. Hemorrhage stroke

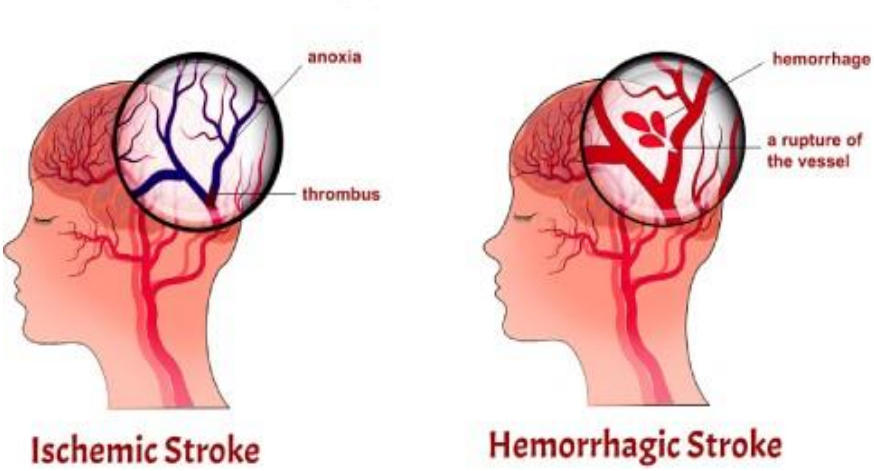

Fig: stroke

EPIDEMIOLOGY:

- Stroke is the second most common cause of mortality. It is also the third most common cause of disability globally.
- 68% - ISCHEMIC STROKE
- 32%- HAEMORRHAGIC STROKE

INTRODUCTION TO ISCHEMIC STROKE:

- Ischemic stroke is one of the three types of the stroke. In other words, it is also referred to asbrain ischemia and also as the cerebral ischemia.
- Generally, most of cases of stroke are diagnosed to be that of ischemic stroke. Approximatelyabout 87% the strokes are ischemic.
- Ischemic stroke is usually one in which the blood clots or the other particles block the bloodvessel in the brain.
- Plaques called as the fatty deposits can also be the cause of these blockages by the building up in blood vessels. Due to these blockages, there occurs a reduction in the blood flow and theoxygen supply to the brain which may lead to damage or the death of the brain cells. In case, there is no restoration of the circulation there occurs a complete damage of brain which is permanent.

CLASSIFICATION OF ISCHEMIC STROKE:

TOAST (Trail of acute stroke treatment) classified ischemic stroke into three categories:

- LARGE VESSEL STROKE
- SMALL VESSEL STROKE OR LACUNAR STROKE
- CARDIOEMBOLIC STROKE

✓ Thrombotic or embolic occlusion of major arteries of the brain like internal carotid artery,middle cerebral artery leads to large vessel stroke.

✓ Lacunar strokes are more often they are caused due to involvement of smaller or perforatingblood vessels supplying the deeper structures in brain.

RISK FACTORS:

MODIFIABLE:

- Hypertension

- Diabetes mellitus
- Obesity
- Hyperlipidemia
- Carotid stenosis
- Smoking
- Alcohol intake
- Lack of exercise
- Other cardio vascular disease

HYPERTENSION:

- High blood pressure >140/90 can damage blood vessels that supply blood to brain this leadsto decreased supply of blood to the brain (ischemia).

DIABETES MELLITUS:

- Diabetes can cause pathological changes in the blood vessels. High blood sugar levels can cause buildup of fatty deposits. These changes can lead to a blood clot in the blood vessels.If a clot travels to the brain, it causes to build up of stroke.

OBESITY:

- Obesity is the major cause of the following conditions

- High blood pressure
- Diabetes
- Metabolic disorders
- Sleep disturbances

- All of these medical conditions affect the circulatory system by constricting blood flow, increasing inflammation in the blood vessels. These blood vessels cannot pump sufficientamount of blood to the brain parts which further leads to stroke.

HYPER LIPIDEMIA:

- Increased lipid production can lead to elevated cholesterol levels (>70mmol/lit) in the blood.This leads to atherosclerosis in the blood vessels which causes decreased supply of blood to the brain.

SMOKING:

- Smoking increases risk of stroke by increasing blood pressure & reducing the percentage ofoxygen levels in the blood. Smoking also increases the stickiness of the blood clots.

ALCOHOL INTAKE:

- Regular consumption of alcohol raises the risk of ischemic stroke. Many researches has shown that alcohol contributes to a number of medical conditions that are risk factors forstroke like hypertension, DM, obesity, atrial fibrillation. A research has shown that atrial fibrillation can increase the risk of stroke by five times as it cause formation of blood clots inthe heart. If these clots move up into the brain through blood vessel, it can lead to stroke.

LACK OF EXERCISE:

- Lack of physical activity leads to build up of fatty material in the arteries, this leads to atherosclerosis. If the arteries which carry blood to brain are affected by atherosclerosis it canlead to stroke.

NON –MODIFIABLE:

- Age
- Sex
- Family history of stroke or TIAS
- Race

AGE:

- The risk of stroke increases with age over 70%of all strokes occur the age of 65 with aging, the vasculature which supplies blood to the brain undergo structural and functional alterations.
- This causes improper supply of blood to the parts of the brain which leads to ischemic stroke with aging, there is also risk of increase in the other risk factors that causediabetes, hypertension and atrial fibrillation.

SEX:

- ATRIA (anticoagulation and risk factors in atrial fibrillation) study has shown that womenhave higher risk i.e. 60-80%when compared with men.
- This research was done on group ofpopulation who were aged 50-80years.

FAMILY HISTORY:

- Stroke can be hereditary. Many research have shown that a positive family history as themajor risk factor at young age.

RACE:

- Most of the research studies have shown that blacks have an increased risk of strokecompared with the risk of stroke compared with whites. It is not clear why African Americans have an increased risk of stroke. But 2/3of black Americans have at least are riskfactor for stroke –hypertension, obesity, diabetes, stress, high cholesterol etc .

CLINICAL MANIFESTATIONS

The patients may experience the following :-

MUSCULAR:

- Difficulty walking
- paralysis with weak muscles
- stiff muscles

VISUAL:

- blurred vision
- sudden visual loss or temporary loss of vision in one eye

SPEECH:

- Difficulty in speaking
- Slurred speech or speech loss

LIMBS:

- Numbness or weakness.

SENSORY:

- Reduced sensation of touch.

OTHER SYMPTOMS:

- Balance disorder
- Headache
- Inability to understand
- Mental confusion
- Fatigue in whole body.

DIAGNOSIS:

1) PHYSICAL EXAMINIATION:

- Patients symptoms
- Medical history
- Blood pressure
- Blood vessels at the back of the eyes are checked

2) BLOOD TEST:

- To find out time taken for clotting of blood .

3) CT –SCAN

- The images of brain can show a tumour, stroke or other medical conditions.

4) ULTRA SOUND:

- Check the blood flow in the carotid arteries and to check for clots.

5) CEREBRAL ANGIOGRAM:

- Dyes are injected to get detailed view of brain and neck muscles visible under X-ray.

6) ECHO CARDIOGRAM:

- To check any sources of clots that could have travelled to the brain and lead to stroke.

MANAGEMENT:

- Patients should be sent to hospital to certain clinical and radiological diagnosis and to permitspecific acute treatment that reduce mortality and improve functional outcome. Irreversible ischemic brain damage evolves over hours.
- The ischemic stroke treatment is considered to be a multidisciplinary approach that it requiresthe critical care involvement.

PROTOCOL or APPROACH OF MANAGEMENT:

- Generally, in this approach there are 4 goals that need to be carefully understood
- Firstly, when evaluating a ischemic stroke we need to rule out the intracranial hemorrhage.
- Second, advising the acute treatment to start with thrombolytic agent and followed by the endovascular device therapies must be looked into, along with general supportive care shouldbe considered.
- Third, neurologic and acute medical complications of stroke must be taken care of.
- Lastly, pathophysiology and etiology must be considered and the treatment must be focusedon preventing recurrent ischemic stroke events.

ICU MANAGEMENT:

OXYGENATION AND VENTILATION:

Oxygen supplement must be required if a patient's saturation is less than 94% due to rapid the rapid detoriation of the neurologic condition and also the loss of consciousness along withthe impairment of reflexes which are known to maintain the airway. if there occurs a failure in recognition of airway loss it might result in complications.

BLOOD PRESSURE:

Blood pressure is most commonly elevated in acute phase of AIS. Severe hypertension couldprogress to hemorrhagic transformation of the infarct, hypertension encephalopathy as wellas cardiopulmonary and the renal complications.

According to the AHA/ASA guidelines the permissive goal of the blood pressure should beless than or equal to 220/120mmHg for the first 24-48 hours.

GLYCEMIC CONTROL:

Due to certain potential mechanisms such as – endothelial dysfunction, increased oxidative stress and impaired fibrinolysis the AIS is known to be associated with worse outcomes thanthat of the normoglycemia. It is generally considerable to treat the hyperglycemia in order to achieve the blood glucoselevels within the range of 140-180mg/dl and also to monitor closely tp prevent the hypoglycemia in patients with AIS.

The AHA/ASA in a current study stated that post endovascular therapy the blood pressure ofless than or equal to 180/105mmHg should be maintained.

CEREBRAL EDEMA:

Higher morbidity rates of about 80% are associated with large infarcts of MCA or ICA.

The patients with the large hemispheric infarcts are generally at an increased risk of cerebraledema and the neurologic deterioration which lead to 'malignant MCA infarction'.

REHABILITATION:

Early rehabilitation helps in the enhancement of the post stroke phase and also helps the patients to gain mechanisms for remaining disabilities. This rehabilitation has been proven toassociated with the better functional outcome.

NUTRITION:

The patients should be fed with the enteral feeding, it should be started within 48hours inorder to avoid malnutrition and protein catabolism.

TREATMENT OF ACUTE ISCHEMIC STROKE:

- Prior to 1990s, there were very limited treatment options and the only focus was on thesymptomatic management, secondary prevention and rehabilitation.
- There happens a revolution in the treatment of the AIS by the introduction of the two majorinnovations.
- Approval of the IV-tissue plasminogen activator in 1955 which continued to be a mainstaytreatment for about 2 decades. later in 2015 came the endovascular therapy.
- In regard with the ICU management, which aimed at optimizing the patient, revascularization and rehabilitation.

❖ **THROMBOLYSIS:**

tPA (tissue plasminogen activator) to dissolve the clots in the brain. You can only give thismedicine within 4 hours when symptoms was observed.

Examples: alteplase, reteplase, and Tenecteplase

- Thrombolysis is a procedure to dissolve or break up a blood clot.
- A blood clot can block blood flow to areas of your body and become life-threatening.
- Thrombolysis can return blood flow and reduce harm to areas such as your brain, heart, orlungs.
- Thought it being an effective treatment many of the patient do not receive it due to factors like – late arrival of the patient to the emergency department i.e. out of the window period.

❖ **ANTI PLATELET THERAPY:**

Anti platelets are highly effective for secondary preventions after stroke or TIA but primaryprevention of stroke controversial and reduce the CVS events.

ASPIRIN:

➢ The aspirin inhibits the cyclooxygenase irreversibly, this in turn will prevent the arachidonicacid conversion to thromboxane A2(which is a vasoconstrictor and platelet aggregation stimulator).
According to the international stroke trial, 300mg/day declined the occurrence of strokewithin the first 2 weeks.

CLOPIDOGREL:

➢ This drug irreversibly block the ADP receptors on the platelets and hence prevents thecascade formation resulting in the activation of GP IIb/IIa receptor. A dose of 75mg ofclopidogrel has been proven to be effective in the treatment.

➢ Anti platelets are highly effective for secondary preventions after stroke or TIA butprimary prevention of stroke controversial and reduce the CVS events.

❖ **ANTICOAGULNT THERAPY:**

➢ Some people may be offered an anti coagulant to help reduce their risk of developing newblood clots in their future.

➢ Anti coagulants prevent blood clots by changing the chemical composition of the blood in away that prevents clots from forming.

Examples:

➢ Warfarin
➢ Apixaban
➢ Dabigatran
➢ Rivaroxaban
➢ Heparin

WARFARIN:

- It is known to be a vitamin K antagonist.
- It generally acts on the clotting factors- II , VII , IX ,X and on the anticoagulant protiens Cand S.

DABIGATRAN

- It is said to be an oral anticoagulant which acts directly as a thrombin inhibitor.
- The FDA approved doses of dabigatran are only the 75mg and 150mg dosage strength.
- It is to be taken care of the note that dabigatran capsules should not be opened which inturnmay lead to increase risk of bleeding.

APIXABAN

- Another example of the direct thrombin

RIVAROXABAN

- Belongs to the class of oral anticoagulant which has been approved by the FDA in the recenttimes.

Heparin:

- This shows the anticoagulant effect by the inactivation of thrombin and activated factor X. this is in turn achieved by binding to anti thrombin. It has mean molecular weight of about15,000 Daltons.

GENRAL SUPPORTIVE CARE MEDICATIONS

ANTIHYPERTENSIVES

- In general, many patients have elevated blood pressure within the first 24-48 hours. Theantihypertensive agent should kept on hold until the diastolic pressure remains above 120mmHg or until the systolic blood pressure.
- Most commonly used drug in parenteral route is labetalol as it is easily titrated and have veryminimal vasodilator effect on the cerebral blood vessels.
- Thrombolytic treatment is avoided in those patients who have a systolic blood pressure above185mmHg or diastolic blood pressure above 110mmHg.

ANTIPYRETIC:

- The poor neurologic outcome has been associated with increase in the body temperature inassociation with the AIS.
- The antipyretic drug therapy is indicated for use when temperature is above 37.5degreeCelsius.

SURGERICAL PROCEDURES:

1. CAROTID ENDARTERECTOMY:

Removal of the blockages from the carotid artery is done using carotidendarterectomy.

Usually, a small incision is made in the neck region, then opened carefully the carotidartery and blockage is removed. The walls of the artery is reconstructed to ensure a smooth flow of the blood.

2. VASCULAR BYPASS SURGERY:

It is also known as the cerebral revascularization. This procedure provides new supplyof the blood which in turn prevents the stroke.

The diversion of blood is done by the neurosurgeon from the donor vessel to theoxygen lacking brain, due to this brain gains the ability to generate new blood vessels. This process is termed as Angiogenesis.

3. ENDOVASCULAR NEUROSURGERY:

In this procedure a small needle stick is inserted in the artery of the leg.

4. CAROTID ARTERY STENTING:

In involves the placing of the stent which has the ability to self expand inside thenarrowed artery.

This stent has the ability to hold the carotid artery open to the required widthsufficient for the good blood flow to the brain.

COMPLICATIONS:

Some of the common complications associated with AIS are:

- Brain edema – there may occur swelling in the brain after the stroke attack.
- Seizures- convulsions are caused in the brain due to abnormal electrical activity. Thesefindings are common in large stroke attacks.
- Clinical depression- this commonly occurs with the stroke which in turn causes unwantedemotional and the physical reactions.
- Bedsores- due to the low ability to move and the pressure on certain areas of the body dueto the immobility formation of the pressure ulcers.
- Deep vein thrombosis- formation of the clots in the veins of the legs due to theimmobility.
- Urinary tract infection- Due to the placing of the Foley catheter which helps in urinecollection the stroke patients are not capable of controlling the bladder function.
- Pneumonia – it occurs as a result of not being able to move as a result of stroke. Goingdown on wrong pipe may cause the aspiration pneumonia.

PREVENTION:

A meta analysis, of multiple treatment trails showed that of mean reduction in diastolic bloodpressure of 5-6%mm/hg.

Prevention of the stroke can be of two types;

1. Primary prevention

This normally aims at decreasing of the likelihood for having stroke by either decreasing chances of developing the risk factors.

- METHODS OF PRIMARY PREVENTION OF STROKE
  i. Mass strategy
  ii. High risk strategy
- RECOMMENDATIONS

Tobacco use

Counselling along with the drug therapy with the use of the nicotine replacementBuprepoin is advised for the active smokers.

Atrial Fibrillations

Long term oral anticoagulant therapy with the therapy of warfarin isrecommended to those with the valvular AF.

Patients with non-valvular AF, aspirin therapy might be considered.

Mitral stenosis

- Generally anticoagulation prior to embolic event, evevn in the sinus rhythm.

Sickle cell disease

- Stroke risk is reduced on use of the transfusion therapy proven to be effective.

Alcohol

- Heavy drinkers are advised to reduce or eliminate the alcohol consumption.

Life style management

- Healthy dietary habits , yoga and regular exercise along with maintaining the weight.

SECONDARY PREVENTION:

This criteria includes measures through which the risk of reccurence of the stroke inpatients would be decreased.

STRATIFICATION OF RISK

- Risk assessment is done for recurrent stroke and is categorized accordingly by a physician.

EVALUAION OF MODIFIABLE RISK

Patients should be evaluated for modifiable risk factors within one weekn of onset. Theyinclude:

- Hypertension
- Diabetes

- Dyslipidemia
- Smoking and alcohol
- Obstructive sleep apnea
- Atrial fibrillations

CONCLUSION:

Most of the people who are effected to the ischemic stroke is increasing day by day and thatis caused by the several sedentary life style habits. By the following regular medication andquit the sedentary habits is help in overcome the symptoms of ischemic stroke.

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