July-September 2018
Volume 15 Issue 3

ISSN 2222-5188

Info Medicus

The essence of medical practice

CONTENTS

Published by
Medical Services Department
ACI Limited

EDITORIAL

Dear Doctor,

Welcome to our 3rd issue of Info Medicus of 2018.

We aimed our services in different views and ways for medical professionals emphasizing on admirable quality. Our heartiest efforts embedded here for maintaining and enriching the quality by focusing updated researches, clinical knowledge and information regarding medical topics; all from authentic sources in order to maintain a valuable communication with you. From the very first time we are here to assist you which may be a contributing factor behind the strong bondage exists between us.

Polycystic ovary syndrome (PCOS) is one of the most common health problem of women that affects one in ten women of childbearing age. Women with PCOS have hormonal imbalance and metabolism problems that may affect their overall health and appearance and it is the common cause of infertility in women. Considering these facts, we have highlighted polycystic ovary syndrome in health care section.

Acute myocardial infarction is a disease which affects the patient in an extremely stressful way. It is described as a threat that leads to a life crisis in one's whole life. So, it is advisable to look for the required treatment immediately. That's why in the review article section, we have published management of acute myocardial infraction.

In addition, we have introduced a new section named "Disease consequence" which will be very informative. Besides these other sections are featured as well.

We appreciate your feedback regarding this issue. Your feedback will assist us to better meet your needs and to improve this service. On behalf of the editorial board we wish you a healthy, prosperous and successful life in the year ahead.

Thanks and regards

(Dr. S. M. Saidur Rahman)
Deputy General Manager
Medical Services Department

(Dr. Rumana Dowla)
Manager
Medical Information & Research

Consequence
of high blood pressure

American Heart Association | American Stroke Association

High blood pressure (HBP) can injure or kill.
When high blood pressure is uncontrolled, it can lead to:

STROKE
HBP damage arteries that burst or clog more easily

77% of people who have a first stroke have HBP

VISION LOSS
HBP can strain the vessels in the eyes

HEART ATTACK
HBP damages arteries that can become blocked

69% of people who have a first heart attack have HBP

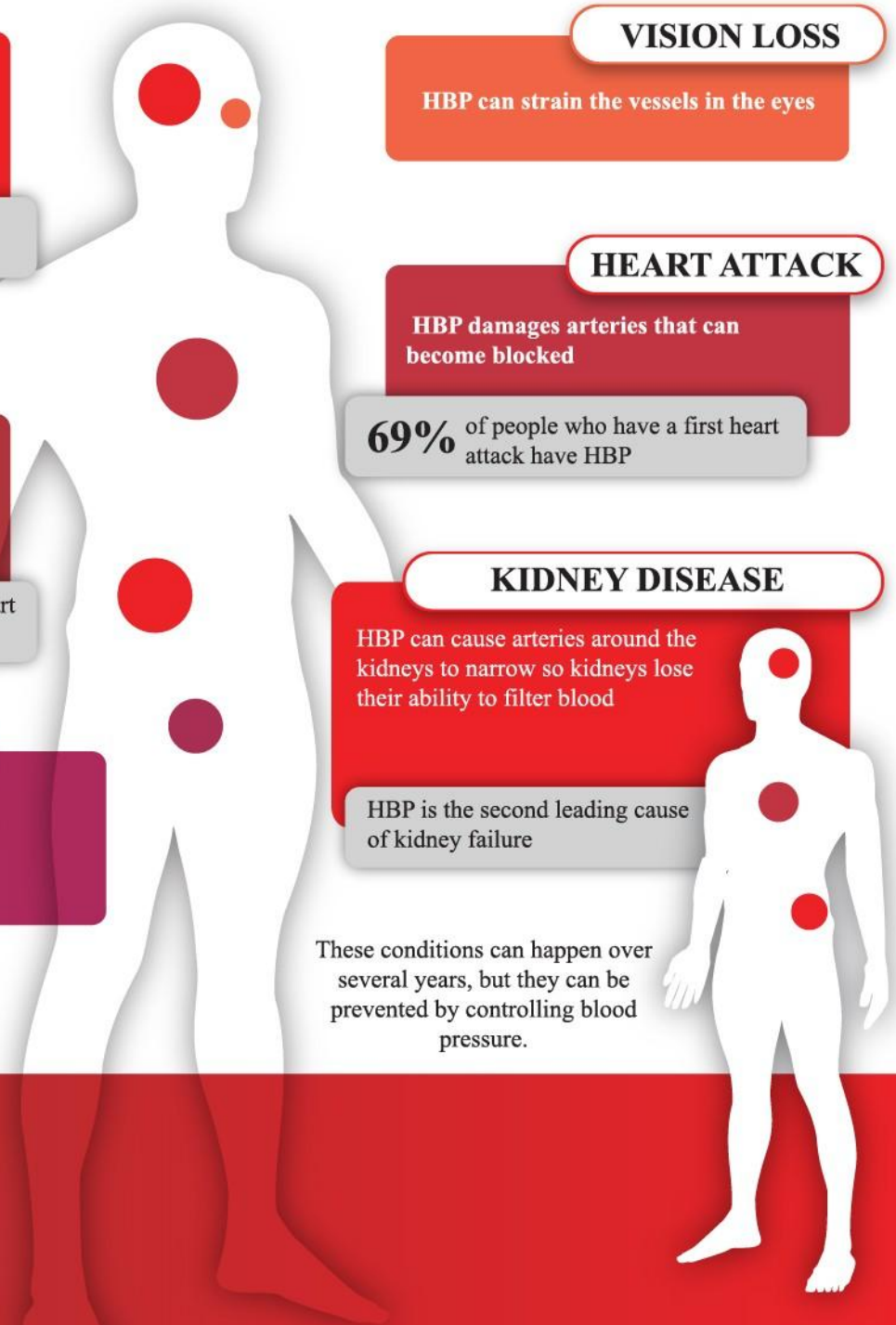
HEART FAILURE
HBP can cause the heart to enlarge and fail to supply blood to the body

77% of people with congestive heart failure have HBP

KIDNEY DISEASE
HBP can cause arteries around the kidneys to narrow so kidneys lose their ability to filter blood

HBP is the second leading cause of kidney failure

ERECTILE DYSFUNCTION
HBP leads to erectile dysfunction because of reduced blood flow throughout the body



These conditions can happen over several years, but they can be prevented by controlling blood pressure.

Reference: American Heart Association, 2014

Polycystic ovary syndrome

Polycystic ovary syndrome (PCOS), also known as the Stein Leventhal syndrome, is one of the most common endocrinopathies among women of reproductive age. An abnormality in the ovaries is the primary cause of the disorder, but additional agents, such as obesity and environmental factors, affect the development of individual symptoms. Polycystic ovary syndrome is one of the most common hormonal abnormalities in women of reproductive age and are a leading cause of infertility.

Causes

Although the cause of PCOS is not known, it appears that PCOS may be related to many different factors working together. These factors include insulin resistance, increased levels of hormones called androgens and an irregular menstrual cycle. Insulin resistance is a condition in which the body's cells do not respond to the effects of insulin. When higher levels of androgens are produced, the ovaries may be prevented from releasing an egg each month. Irregular menstrual periods can lead to infertility and in some women, the development of numerous small fluid filled sacs in the ovaries.

Symptoms

The symptoms vary from woman to woman. Some women have very few mild symptoms, while others are affected more severely by a wider range of symptoms. Some patients may be asymptomatic or they may have multiple gynecologic, dermatologic or metabolic manifestations. The symptoms are given in Table-1.

Table-1 Symptoms of PCOS

Irregular menstrual periods
Menstrual disorders can include absent periods, periods that occur infrequently or too frequently, heavy or unpredictable periods
Infertility
PCOS is one of the most common cause of female infertility
Obesity
Up to 80% of women with PCOS are obese
Hirsutism
It is a condition where there is excess growth of hair on the face, chest, abdomen or upper thigh. It affects more than 70% of women with PCOS

Diagnosis

PCOS is a syndrome, so there is no single diagnostic test. The diagnosis should begin with a thorough history and physical examination. Physicians should focus on the patient's menstrual history, any fluctuations in the patient's weight and their impact on PCOS symptoms. According to the Rotterdam criteria which is given in Table-2, diagnosis requires the presence of at least two of the following three findings.

Table-2 Rotterdam diagnostic criteria for PCOS

1. Hyperandrogenism
2. Ovulatory dysfunction
3. Polycystic ovaries

Hyperandrogenism: It can be diagnosed clinically by the presence of excessive acne, androgenic alopecia, or hirsutism or chemically, by elevated serum levels of total, bioavailable, or free testosterone or dehydroepiandrosterone sulfate.

Ovulatory dysfunction: It refers to oligomenorrhea (cycles more than 35 days apart but less than six months apart) or amenorrhea (absence of menstruation for six to twelve months after a cyclic pattern has been established).

Polycystic ovary: It is defined as an ovary containing 12 or more follicles measuring 2 to 9 mm in diameter or an ovary that has a volume of greater than 10 ml on ultrasonography. A single ovary meeting either or both of these definitions is sufficient for diagnosis of polycystic ovaries. However, ultrasonography of the ovaries is unnecessary unless imaging is needed to rule out a tumor or the patient has met only one of the other Rotterdam criteria for PCOS. Polycystic ovaries meeting the above parameters can be found in as many as 62% of patients with normal ovulation.

Investigations

The initial investigations recommended for diagnosis are given below:

- Pregnancy test
- Pelvic ultrasound
- Testosterone level
- Glucose intolerance test
- Lipid profile
- LH and FSH

Treatment

PCOS is a multifaceted syndrome that affects multiple organ systems with significant metabolic and reproductive manifestations. Treatment should be individualized based on the patient's presentation and desire for pregnancy. Goals for treatment (e.g., treating infertility, regulating menses for endometrial protection including hirsutism and acne) must account for the patient's preferences.

Lifestyle modification

Lifestyle modification is first line therapy for women who are overweight. A modest weight loss of 5% will reduce central obesity and insulin resistance and improve endocrinological abnormalities and menstrual irregularity and hence inprove ovulation. A calorie restricted diet is recommended for all patients with PCOS who are overweight. Ultimately, women who succeed in losing weight are more likely to achieve and have a healthier pregnancy.

Medications

Anovulation and infertility: Clomiphene or letrozole is recommended for ovulation induction. Recent studies suggest that letrozole is associated with higher live birth rates and ovulation rates compared with clomiphene in patients with PCOS.

Menstrual irregularity: Hormonal contraception such as oral contraceptive, dermal patch or vaginal ring are recommended as the initial medication for treatment of irregular menses. small studies have shown that metformin can restore regular menses up to 50% to 70% but oral contraceptives have been superior to metformin for regulating menses and lowering androgen levels. Prevention of endometrial hyperplasia from chronic anovulation may be accomplished either by progesterone derivatives, progestin containing oral contraceptives or the levonorgestrel releasing intrauterine system. Patient comfort and preference should be taken into acccount when treating irregular menses.

Hirsutism: The most effective first line therapy for hirsutism is oral contraceptives. Spironolactone 100 mg daily and flutamide 250 mg twice daily, are safe for patient use. Other therapies include eflornithine, electrolysis, or light based therapies such as lasers and intense pulsed light. Any of these can be used as monotherapy in mild cases or as adjunctive therapy in more severe cases.

Acne: Acne is common in the general population and in patients with PCOS. Hormonal contraceptives are first line medications for treating acne associated with PCOS and can be used in conjunction with standard topical acne therapy e.g., retinoids, antibiotics, benzoyl peroxide or as monotherapy. Antiandrogens, spironolactone, can be given as second line medications.

References: 1. BPJ, N. 12; P. 7-13

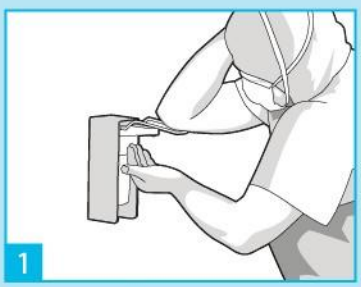
2. Adv. Clin. Exp. Med., 2017; Vol. 26, N. 2; P. 359-367

3. Am. Fam. Phy., July 15, 2016; Vol. 94, N. 02; P. 106-113

4. Ame. Col. of Obs. and Gyne., June 2017

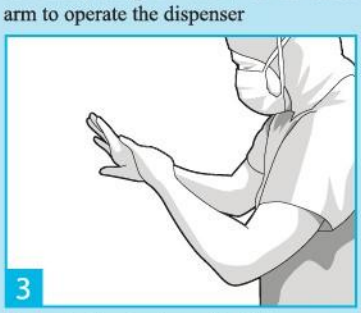
Surgical hand preparation technique

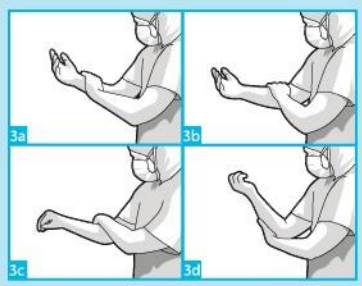
Health care associated infections are a threat to patient safety and the most common adverse events resulting from a stay in the hospital. Proper use of hand hygiene is a critical to the prevention of these infections, but compliance among health care workers is most often below 40%. Hand hygiene serves many purposes in the health care setting. It prevents both endogenous and exogenous infections in patients, contamination of the hospital environment with potential pathogens and cross-transmission of microorganisms between patients. When used in conjunction with the appropriate protective equipment, it also protects health care workers from the hazards of occupational infections.



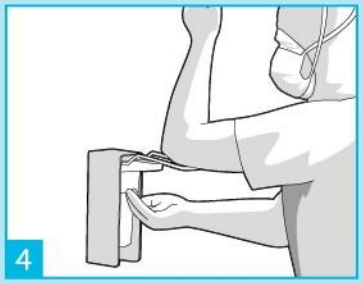
Put approximately 5 ml (3 doses) of alcohol based hand rub in the palm of the left hand, using the elbow of the other arm to operate the dispenser

Dip the fingertips of the right hand in the hand rub to decontaminate under the nails (5 seconds)

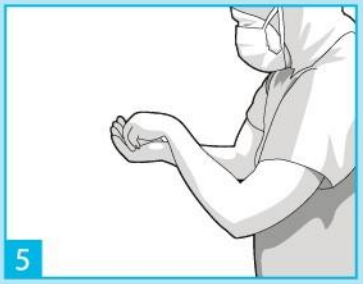




Smear the hand rub on right forearm up to elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the hand rub has fully evaporated (10 to 15 seconds)

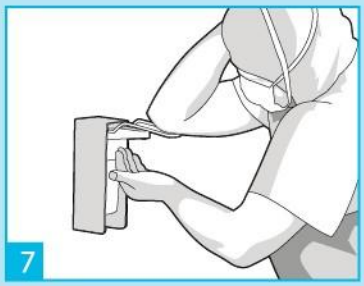


Put approximatly 5 ml (3 doses) of alcohol based hand rub in the palm of the right hand, using the elbow of the other arm to operate the dispenser

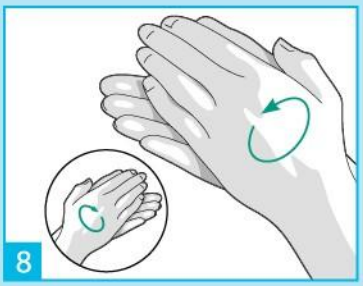


Dip the fingertips of the left hand in the hand rub to decontaminate under the nails (5 seconds)

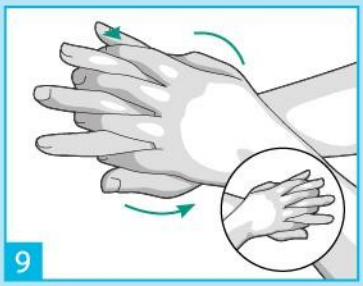
Smear the hand rub on the left forearm up the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the hand rub has fully evaporated (10 to 15 seconds)



Put approximately 5 ml (3 doses) of alcohol based hand rub in the palm of left hand, using the elbow of other arm to operate the distributor. Rub both hands at the same time up to wrists and ensure that all the steps represented in images 8 to 13 are followed (20 to 30 seconds)

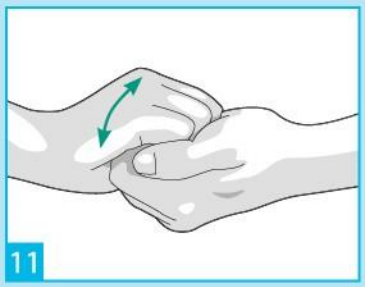


Cover the whole surface of the hands up to the wrist with alcohol based hand rub, rubbing palm against palm with a rotating movement

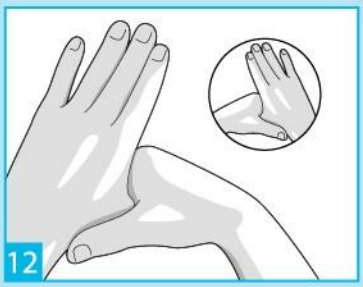


Rub the back of the left hand, including the wrist, moving the right palm back and forth and vice versa

Rub palm against palm, back and forth with fingers interlinked



Rub the back of the fingers by holding them in the palm of the other hand with a sideways back and forth movement



Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa

When the hands are dry, sterile surgical clothing and gloves can be donned

Repeat the above illustrated sequence (average duration, 60 sec) according to the number of times corresponding to the total duration recommended by the manufacturer for surgical hand preparation with an alcohol based handrub.

Reference: WHO Guidline on Hand Hygiene, 2009

Dengue fever complicated with Guillain Barré syndrome

Background

Dengue is an arboviral infection commonly presenting with fever, arthralgia, headache, and rashes. It is a major global public heath challenge. Neurological manifestations of dengue fever are rare but have been reported in the medical literature. Guillain Barré syndrome (GBS) is a demyelinating poly-neuropathy which frequently follows gastrointestinal or respiratory infections. Few cases of GBS have been causally linked to serologically confirmed dengue illness in the medical literature. Patients with dengue fever can develop acute flaccid paralysis as a complication. In regions where dengue is hyperendemic, screening for dengue illness may be important in patients presenting with acute flaccid paralysis.

Case presentation

A 60 year old man was admitted in April 2017 with a two days history of fever with arthralgia, myalgia, headache and generalized malaise. He complained of numbness and pain of the bilateral upper limbs and lower limbs, with weakness of both lower limbs. He was unable to walk as usual or get up from a squatting position. He could pass urine without difficulty and had no difficulty in breathing and coughing. He denied recent diarrheal, respiratory illness or recent vaccinations. He was previously apparently well with no significant comorbidities. On examination, he was conscious, rational, and had normal vital parameters. Cardiovascular, respiratory and abdominal examinations were normal. A limb examination revealed hypotonia and reduced power in the bilateral lower limbs. His lower limb tendon reflexes were absent with reinforcement and his upper limb reflexes were diminished. All his sensory modalities were intact. Although he had a good cough reflex, his neck muscle power was reduced. A cranial nerve examination was normal. On admission, his spontaneous tidal volume (STV) was 400 ml. A provisional diagnosis of Guillain Barré syndrome was made.

The complete blood count on admission showed a white cell count of 4.2×10^6 per µl, platelets of 166×10^3 per µl and a hematocrit of 40. With the compatible history, positive dengue

antigen, leukopenia and thrombocytopenia, a diagnosis of dengue fever was made. Serology results for HIV, hepatitis B and a throat swab for influenza were negative. Nerve conduction studies revealed grossly delayed nerve conduction in common peroneal and posterior tibial nerves. Ulnar nerve conduction was delayed with absent F waves. It was compatible with a severe demyelinating polyneuropathy. A cerebrospinal fluid study done later on day 11 of his illness showed albumin cytological dissociation (protein 70 g/dl, cell count lymphocytes 5 per cumm and no polymorphs). The patient was given intravenous immunoglobulins (IvIG) 0.4 g/kg/day on admission.

On the second day of hospital stay, he deteriorated neurologically. He was having poor respiratory effort with low neck muscle power and his spontaneous tidal volume dropped to 150 ml. He was electively paralyzed and intubated. He was ventilated for 3 days and intravenous immunoglobulins were administered for a total of 5 days. He made a remarkable recovery and was extubated on day 4 of IvIG. He was able to walk without support on discharge. The dengue illness of our patient followed an uncomplicated course without clinical or ultrasonic evidence of hemoconcentration. Lowest thrombocytopenia noted was 32×10^3 per µl on the fourth day of his illness. Transaminases were marginally elevated (AST > ALT). Both dengue virus specific immunoglobulin M (IgM) and immunoglobulin G (IgG) were positive on the sixth day of his illness. On discharge, the patient was fully recovered neurologically.

Discussion

Dengue fever is an arboviral infection classically presenting with fever, arthralgia, headache and rashes. Dengue virus belongs to the family flaviviridae and there are four serotypes referred to as DEN 1 to DEN 4. Dengue virus can cause a spectrum of disease varying from asymptomatic illness to dengue fever (DF) to the severe illness of dengue hemorrhagic fever (DHF). A case of Guillain Barré syndrome associated with a proven episode of dengue fever has been described. The patient needed ventilatory support following respiratory failure subsequent to GBS. Neurological complications are reported to occur in 0.5% to 6% of cases with dengue fever. GBS is an acute, frequently severe, mainly a demyelinating poly radiculopathy that is autoimmune in nature. Approximately 70% of cases of GBS occur 1 to 3 weeks following an acute respiratory or gastrointestinal infection. Cytomegalovirus, Epstein Barr virus, *Campylobactor jejuni,* Mycoplasma are commonly identified agents. GBS is an uncommon neurological sequel of dengue fever and the neurological picture induced by the dengue virus is similar to GBS caused by other infections. Chew et al.reported two cases of post dengue GBS; the first case was a with serologically confirmed dengue fever developing acute flaccid paralysis requiring assisted ventilation and the second case with bilateral facial nerve palsy without motor weakness. Both made a full recovery. Sharma et al. in 2011 reported a patient who presented with 3 days history of fever and weakness of all four limbs. Nerve conduction confirmed an acute motor sensory axonal type variant of GBS with thrombocytopenia and positive dengue serology. The patient improved with IvIG and supportive therapy.

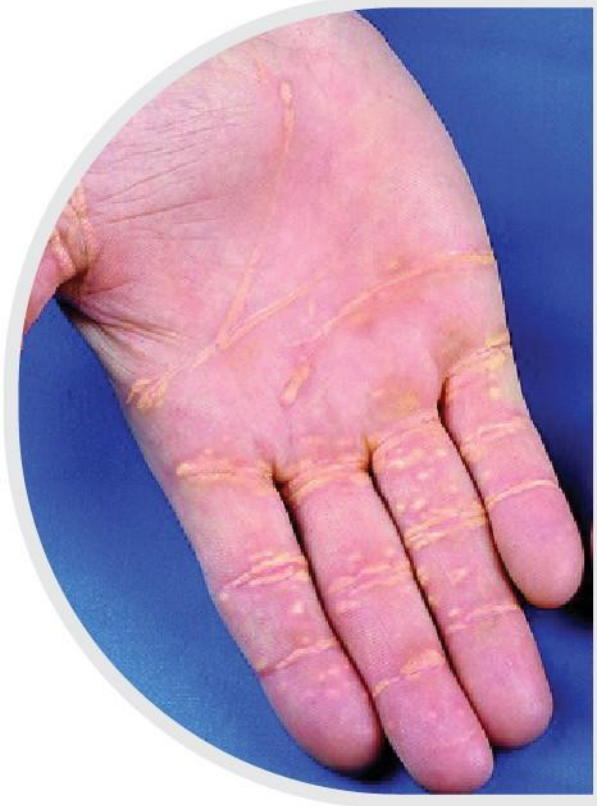
It is suggested that the clinical manifestations of GBS are the result of cell mediated immunological response to nonself antigens that misdirect to host nerve tissue. This is known as molecular mimicry. This immune injury can be directed toward the myelin or axons of peripheral nerves. Pro inflammatory cytokines that participate in the immune response of dengue fever may have an important role in the pathogenesis of GBS. Similarly, the patient described in the current case report developed the weakness while having the acute infection, suggesting that proinflammatory cytokines in the immune response of dengue would have a more important role than molecular mimicry as a postinfectious sequel in the pathogenesis of dengue fever.

In a meta-analysis of six phase 2 trials comparing plasma exchange to supportive care alone in GBS found that patients treated with plasma exchange had significantly better outcome measures including time to recover walking without aid, percentage of patients requiring artificial ventilation, duration of ventilation, full muscle strength recovery after 1 year, and severe sequel after 1 year. A randomized controlled trial on intravenous immunoglobulin (IvIG) in 1992 showed that IvIG is equally as effective as plasma exchange. This patient was treated with intravenous immunoglobulins (0.4 g/kg) for 5 days and showed a marked clinical improvement. In places, where dengue is hyperendemic, patients may present to healthcare solely with unusual neurological manifestations such as GBS, myelitis or myositis, and the possibility that they might harbor dengue illness must be borne in the mind of the physician.

Conclusions

Dengue fever can rarely present with various neurological manifestations. Thus this case report calls attention to the possibility of GBS may occur in association with dengue fever and the need to consider the possibility of dengue fever in a hyperendemic area in patients presenting with acute flaccid paralysis.

Reference: J. of Med. Cas. Rep., 2018; Vol. 12, N. 137



Xanthoma striatum palmare

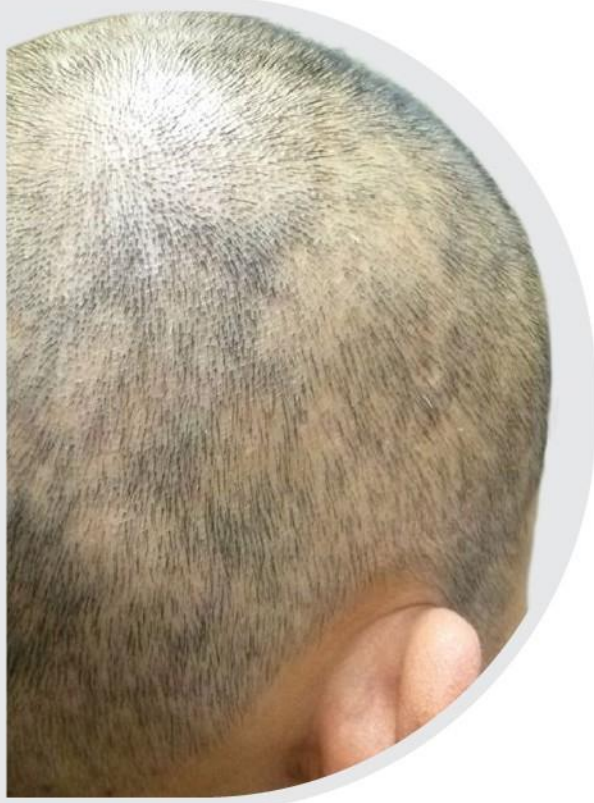
A 49 year old man was referred to the metabolic clinic for evaluation of severe hypercholesterolemia and xanthomas which were particularly prominent on the hands. The lesions were painful and affected the patient's everyday life. He had a 2 years history of biliary cirrhosis due to ischemic cholangiopathy. Laboratory evaluations showed a total cholesterol level of 970 mg/dl, a triglyceride level of 158 mg/dl, a low density lipoprotein (LDL) cholesterol level of 875 mg/dl and a high density lipoprotein (HDL) cholesterol level of 64 mg/dl. Treatment with LDL apheresis was started. Palmar xanthomas can also be seen in patients with type III hyperlipoproteinemia. Within 3 months after the initiation of weekly LDL apheresis, the lesions had almost disappeared and the patient reported substantial relief from pain and improvement in function. At follow up 10 years after presentation, the patient was in stable condition and was undergoing LDL apheresis every other week.

Reference: N. Eng. J. Med., May 10, 2018; Vol. 378, N. 19, P. e26

Moth-eaten alopecia

A 39 year old man presented with a three month history of progressive hair loss on his scalp. Five months earlier, he had a generalized rash that lasted for three weeks. Examination revealed multiple patches of nonscarring alopecia, giving the scalp hair a "moth-eaten" appearance. His skin and mucosa appeared normal. The results of a rapid plasma reagin test were positive (titre 1:64) and *Treponema pallidum* agglutination was positive, supporting a diagnosis of syphilitic alopecia. He was given benzathine penicillin G via intramuscular injection. Five weeks later, hair growth began. Although other concurrent clinical features of secondary syphilis e.g., roseola syphilitica, mucous patches, condylomata lata, and ophthalmologic and auditory findings may facilitate diagnosis, alopecia can be the only presenting feature of syphilis. The "moth-eaten" pattern is considered to be a pathognomonic manifestation of secondary syphilis. The alopecia usually resolves within three months of appropriate treatment for syphilis.

Reference: CMAJ., January 08, 2013; Vol. 185, N. 1, P. 61



Management of acute myocardial infarction

Introduction

Myocardial infarction (MI) is the irreversible necrosis of myocardium occurring as a result of critical imbalance between the coronary blood supply and myocardial demand. It occurs when the flow of blood to the heart is blocked. The blockage is most often due to formation of fat, cholesterol and other substances, which forms a plaque in the coronary arteries that supplies the heart. The plaque eventually breaks away and forms a clot. The interrupted blood flow can damage or destroy part of the heart muscle. Not all people who have myocardial infarction have the same symptoms or have the same severity of symptoms. Some people have mild pain, others have more severe pain. Acute myocardial infarction (AMI) with or without ST-segment elevation (STEMI or non-STEMI) is a common cardiac emergency with the potential for substantial morbidity and mortality. Acute myocardial infarction is an event of myocardial necrosis caused by an unstable ischemic syndrome. This review focuses on the initial presentation and in hospital management of AMI. In practice, the disorder is diagnosed and assessed on the basis of clinical evaluation, the electrocardiogram (ECG), biochemical testing, invasive and noninvasive imaging and pathological evaluation.

Pathophysiology

Acute myocardial infarction resulting from the rupture or erosion of an atherosclerotic plaque with thrombotic occlusion of an epicardial coronary artery and transmural ischemia. The size of the resulting infarction depends on the size of the ischemic area at risk, the duration and intermittency of coronary occlusion and the magnitude of residual collateral blood flow and the extent of coronary microvascular dysfunction. The progressive development of MI with the duration of coronary occlusion is largely species dependent due to differences in the innate collateral circulation but also in the innate resistance to myocardial ischemia. In humans 30% to 50% of the area at risk is still viable and therefore salvageable by reperfusion after 4 to 6 hours from the onset of anginal symptoms as estimated from magnetic resonance imaging (MRI) and biomarker analysis of myocardial salvage. Even after 12 hours of coronary occlusion, there is viable myocardium and interventional reperfusion can limit infarct size. Whereas reperfusion is mandatory in order to salvage ischemic myocardium from impending infarction, reperfusion also inflicts additional injury which is not only reversible as in stunning but also irreversible and manifests in increased infarct

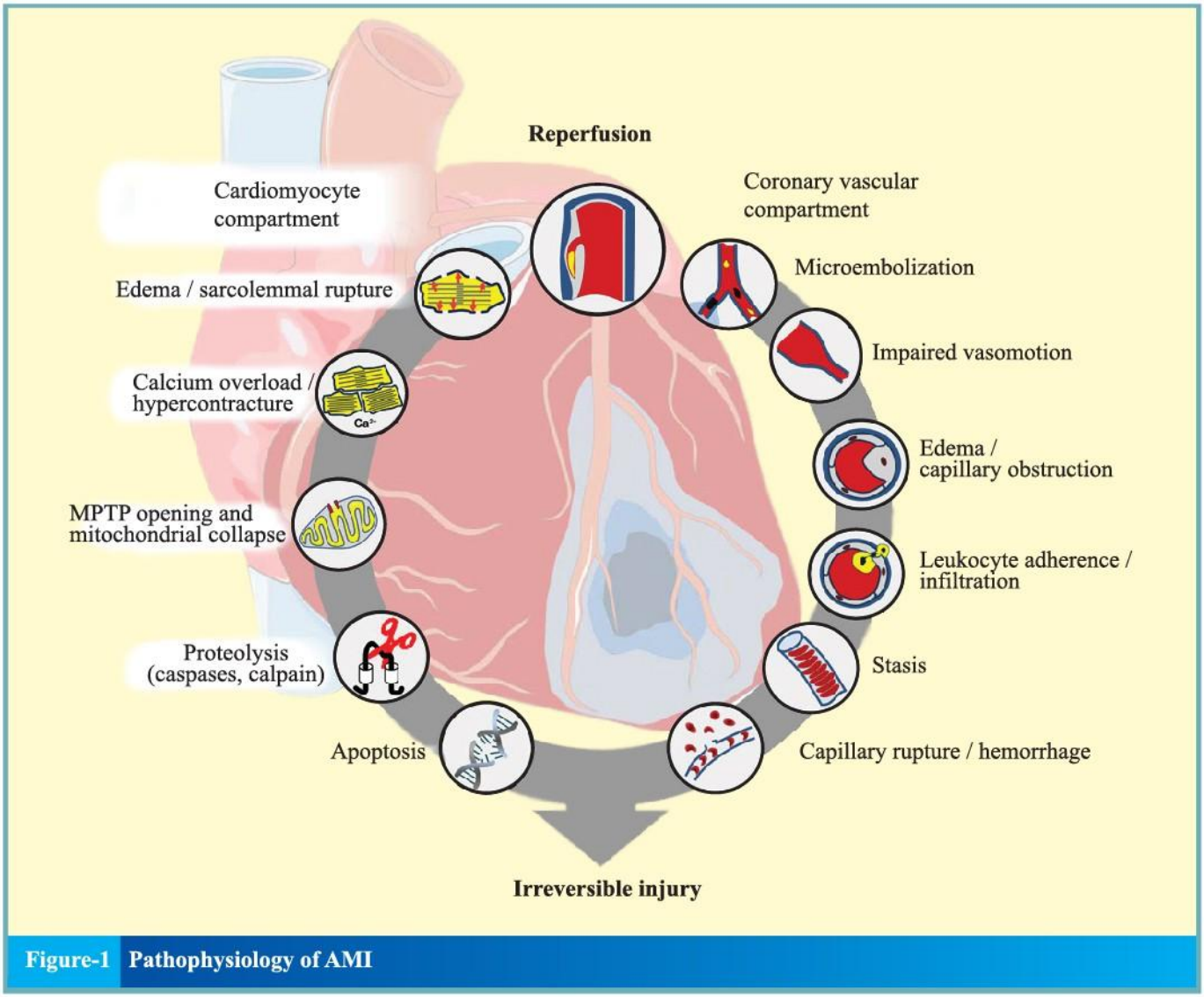


Figure-1 **Pathophysiology of AMI**

size and microvascular dysfunction. The existence of lethal reperfusion injury has long been debated but with the recognition of the post conditioning phenomenon, it has become unequivocally clear that reperfusion as such causes irreversible injury and that modification of reperfusion attenuates such injury. Morphologically, the infarcted myocardium is characterized by myofibrillar contraction bands, swollen or ruptured mitochondria, sarcolemmal rupture, microvascular destruction, hemorrhage and infiltrating leukocytes.

These histological signs reflect necrosis which typically becomes more manifest and is perhaps accelerated during reperfusion. Cellular calcium overload through reverse mode Na^+/Ca^{2+} exchange after sodium overload through the Na^+/H^+ exchanger, oscillatory release from and reuptake of Ca^{2+} into the sarcoplasmic reticulum with resulting uncoordinated and excessive myofibrillar contractions, digestion of cytoskeleton and sarcolemma by calpains and excess formation of reactive oxygen species (ROS) all contribute to necrotic cell death. Whereas necrosis is considered as an unregulated mode of cell death, more regulated modes of cell death also occur in infarcting myocardium.

The coronary circulation with atherosclerotic plaque rupture and superimposed thrombosis is not only the culprit of myocardial ischemia but after restoration of coronary blood flow it is also the target of ischemia or reperfusion injury A summary of pathophysiology is given in Figure-1.

Risk factors

There are some modifiable and non-modifiable risk factors which are responsible for developing myocardial infarction is given in Table-1.

Table-1 **Risk factors for MI**

Modifiable	Non-modifiable
Smoking	Age
Diabetes	Gender
Hypertension	Ethnicity
Hyperlipidemia	Family history
Obesity	
Lack of exercise	

Clinical presentation

Chest pain is the usual symptom which brings the patients to medical attention. Pain is severe, diffuse, retrosternal and radiates to arms or from jaws to umbilicus. Pain does not get relieved with sublingual nitrates or usual pain killers. It is often associated with eructations and retrosternal burning. Commonly patients mistake it for acid peptic symptoms and waste precious time with antacids. It is accompanied with vomiting, sweating and breathlessness. The pain needs to be distinguished from the following of acute severe chest pain.

Pericarditis: Pericarditis causes a steady substernal pain relatively rapid in onset, relieved by sitting forward and increases on recumbence. Radiation to the trapezius ridge is characteristic and highly specific for pericarditis. Presence of pericardial rub and pain characteristics usually help to distinguish pericarditis from myocardial infarction.

Aortic dissection: The abrupt onset of severe chest pain (tearing or stabbing) with changing location with maximum intensity at the onset, unlike crescendo pattern of infarct pain is suggestive of aortic dissection. Ascending aortic dissection produces pain in the anterior chest whereas interscapular or abdominal pain suggests involvement of descending aorta.

Pulmonary embolism: Chest pain in pulmonary embolism is attributed to either sudden distention of pulmonary artery and right ventricular ischemia mimicking angina or formation of pulmonary infarct with pleuritic pain.

Gastrointestinal causes: Gastrointestinal reflux disease presents as burning pain associated with supine or prone positions. Esophageal spasm can produce chest pain similar to angina. Patients with peptic ulcer disease can have epigastric or retrosternal severe pain and diaphoresis occurring 60 to 90 minutes after food.

Musculoskeletal causes: Costochondritis (Teitz syndrome) may produce localized pain which is reproducible on movement and palpation.

Diagnosis

Diagnosis of acute myocardial infarction has to be made early in the emergency triage since maximal mortality occurs within first hour and the benefits of all interventions are greater once these are instituted early. Diagnosis is easy and based on simple principals of good history, physical examination, early and complete 12 lead electrocardiogram, use of echocardiography, biochemical testing, invasive and noninvasive imaging. Subsequently biomarkers are also available for documentation and risk stratification. The other causes of acute severe chest pain should be kept in mind and ruled out from acute myocardial infarction .

Electrocardiogram (ECG)

ECG is generally the first investigation available for making a diagnosis in a patient presenting with acute severe chest pain. Tall T waves and ST elevation are the hallmarks of early presentation within minutes of onset of pain. The third change appearance of Q waves is delayed and seen after 6 hours of onset. Q waves denote significant myocardial necrosis. The initial changes of upright and tall T wave with concave upward ST segment elevation subsequently, gives way to T wave inversion and ST coving with convexity upwards over one day to one week. Q waves once the appear generally persist throughout life. T wave change is in larger area and it denotes ischemia, ST segment change is in lesser number of leads and denotes myocardial injury and Q waves overlie and denote central area of myocardial necrosis. Arrhythmias are common during early ECG specially frequent and complex VPC's and ventricular tachycardia in some. Inferior wall infarct patients often have sinus bradycardia early.

Shortly after occlusion of a coronary artery, serial ECG changes are detected by leads facing the ischemic zone as shown in Figure-2. First the T waves become tall, symmetrical, and peaked (grade I ischemia). Second there is ST elevation (grade II ischemia) without distortion of the terminal portion of the QRS. Third changes in the terminal portion of the QRS complex may appear (grade III ischemia).

The changes of infarction are generally seen in the leads overlying the infarct area. Thus, in inferior wall infarct changes are seen in leads II, III, aVF; in anterior infarct in lead V1-V4 and in anterolateral infarct in lead I, aVL and V5-V6. RV infarct is diagnosed by ST elevation in V3R and V4R.

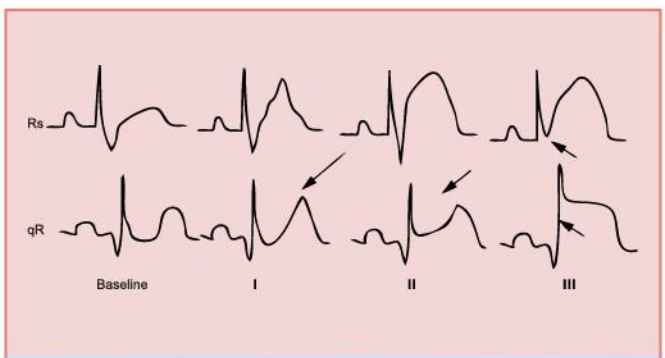


Figure-2 Serial ECG change in early AMI

Echocardiography

Echocardiography is helpful in the evaluation of chest pain, especially during active chest pain. The absence of LV wall motion abnormalities during chest pain usually but not always excludes myocardial ischemia or infarction and the presence of regional wall motion abnormalities helps in confirming the diagnosis. It helps in diagnosis and exclusion of AMI in patients with prolonged chest pain and nondiagnostic electrocardiographic findings.

Biomarkers

Cardiac biomarkers have conventionally being used for diagnosis of acute myocardial infarction. These have also been used in patients with NSTEMI and unstable angina for finding high risk individuals. Elevation of creatinine phosphokinase (CPK), CPK-MB and Troponins I and T occurs in all patients with myocardial necrosis that is seen in myocardial infarction. Serial CK-MB estimations were done earlier for estimation of infarct size before echocardiography. In periprocedural myocardial infarction, rise of CK-MB is important for diagnosing the infarction. In routine myocardial infarction elevation of CK-MB and troponins though done routinely only serves in documentation.

Myoglobin: Highly sensitive for cardiac necrosis. It is the first biomarker to rise with myocardial necrosis but since the specificity is less so now it is rarely used in clinical practice.

Creatine kinase (CK): Serum CK activity exceeds the normal range within 4 to 8 hours after the onset of STEMI and declines to normal within 2 to 3 days. Although the peak CK level occurs on average at about 24 hours, peak levels occur earlier in patients who have had reperfusion as a result of the administration of fibrinolytic therapy or mechanical recanalization as well as in patients with early spontaneous fibrinolysis. False positive results are seen in patients with muscle disease, alcohol intoxication, diabetes mellitus, skeletal muscle trauma, after vigorous exercise, convulsions, intramuscular injections, thoracic outlet syndrome, and pulmonary embolism. For this reason CK isoenzymes are considered more specific.

Creatine kinase isoenzymes: Three isoenzymes of CK exist (MM, BB, and MB). Extracts of brain and kidney contain predominantly the BB isoenzyme; skeletal muscle contains principally MM, but also contains some MB (1% to 3%), and cardiac muscle contains both MM and MB isoenzymes. The CPK-MB estimation is used for diagnosis of myocardial necrosis in acute coronary syndrome. The MB isoenzymes of CK can also be present in small quantities in the small intestine, tongue and diaphragm. Strenuous exercise, particularly in trained long distance runners or professional athletes, can cause elevation of both total CK and CK-MB.

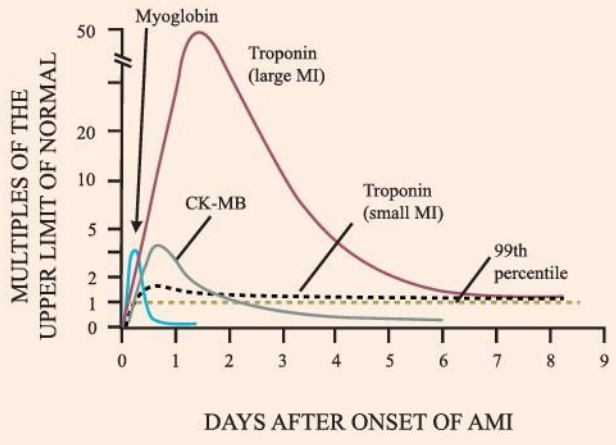


Figure-3 Time profile and limit of rise of cardiac biomarkers after AMI

Cardiac specific troponins: Cardiac specific troponins I (cTnI) and T (cTnT) accurately distinguish skeletal from cardiac muscle damage. The troponins are now considered the preferred biomarker for diagnosing MI. Other causes of raised troponins are injury to cardiac muscle. The cTnT assays are produced by a single manufacturer, leading to relative uniformity of cutoffs, whereas several manufacturers produce cTnI assays.

While CK-MB increases 10 to 20 fold above the upper limit the reference range, cTnT and cTnI typically increase more than 20 times above the reference range. Thus now Troponins are sensitive and specific markers for acute MI. CK-MB is useful now for diagnosing re-infarction as troponins remains elevated for a longer time is given in Figure-3 and Table-2 .

Management

Initial management

The management of acute myocardial infarction has improved dramatically over the past three decades and continues to evolve. An ECG should be done as soon as possible but should not be delayed in transferring to hospital. Cardiopulmonary resuscitation (CPR) and defibrillation (DC shock) should be started in the event of a cardiac arrest.

Table-2 Time window for elevation of biomarkers in AMI (in hours)

Biomarkers	Initial elevation	Peak elevation	Return to normal
Myoglobin	1-4	6-7 hours	24 hours
CK-MB	3-12	24 hours	48-72 hours
cTnI	3-12	24 hours	5-10 days
cTnT	3-12	12 hours-2days	5-14 days

Oxygen saturation should be monitored using pulse oximetry as soon as possible, ideally before hospital admission. Supplemental oxygen should be offered to people with oxygen saturation less than 94% or who are not at risk of hypercapnic respiratory failure and to people with chronic obstructive pulmonary disease who are at risk of hypercapnic respiratory failure.

Pain should be relieved with GTN sublingual or spray or an intravenous opioid 2.5 to 5 mg diamorphine or 5 to 10 mg morphine intravenously with an anti-emetic.

Aspirin 300 mg (dispersible or chewed) should be given orally. Blood tests should be taken for full blood count (FBC), renal function and electrolytes, glucose, lipids, clotting screen, C-reactive protein (CRP) and cardiac enzymes (troponin I or T). Thrombolysis is indicated if the time from the initial call to arrival at hospital is likely to be over 30 minutes.

When primary percutaneous coronary intervention cannot be provided within 120 minutes of ECG diagnosis, patients with an ST-segment elevation acute coronary syndrome (ACS) should receive immediate thrombolytic therapy.

Close clinical monitoring should be continued including symptoms, pulse, blood pressure, heart rhythm and oxygen saturation by pulse oximetry, oxygen therapy, pain relief and continuous ECG monitoring.

Medicine

Fibrinolytic drugs: Fibrinolytic drugs act as thrombolytics by activating plasminogen to form plasmin, which degrades fibrin and so breaks up the thrombi. Streptokinase and alteplase have been shown to reduce mortality. Reteplase and tenecteplase are also licensed for AMI. Streptokinase and alteplase are given by intravenous infusion. Reteplase and tenecteplase can be given by rapid bolus injection. The benefit is greatest in those with ECG changes that include ST-segment elevation and in patients with bundle branch block. The earlier the treatment is given, the greater the absolute benefit.

Alteplase, reteplase and streptokinase need to be given within 12 hours of symptom onset, ideally within one hour. Tenecteplase should be given as early as possible and usually within 6 hours of symptom onset. Bleeding complications are the main risks associated with thrombolysis. Contraindications for thrombolysis include patients with bleeding disorders or a history of recent hemorrhage, trauma, surgery or acute cerebrovascular event. Persistence of antibodies to streptokinase can reduce the effectiveness of subsequent treatment and so streptokinase should not be used again after the first administration.

Antithrombotic therapy without reperfusion therapy: In patients presenting within 12 hours after the onset of symptoms but reperfusion therapy is not given or in patients presenting after 12 hours, aspirin, clopidogrel and an antithrombin agent (heparin, enoxaparin or fondaparinux) should be given as soon as possible. For patients who do not receive reperfusion therapy, angiography before hospital discharge is recommended if no contraindications are present.

Antiplatelet agent: Long term low dose aspirin reduces overall mortality, non fatal re-infarction, non fatal stroke and vascular death. Clopidogrel in combination with low dose aspirin, is recommended for AMI with ST-segment elevation.

Clopidogrel monotherapy is an alternative when aspirin is contraindicated. Ticagrelor in combination with low dose aspirin is recommended by NICE for up to 12 months as a treatment option in adults with STEMI that cardiologists intend to treat with primary percutaneous coronary intervention (PCI). Warfarin (INR 2-3) or dabigatran can be considered for patients unable to take aspirin or clopidogrel.

Beta-blockers: When started within hours of infarction, beta-blockers reduce mortality, non fatal cardiac arrest and non fatal re-infarction. Unless contraindicated, the usual regime is to give intravenously on admission and then continue orally titrate upwards to the maximum tolerated dose. The calcium channel blockers diltiazem or verapamil can be used if a beta-blocker cannot be used but diltiazem and verapamil are contraindicated in patients with left ventricular dysfunction.

Angiotensin converting enzyme (ACE) inhibitors: These reduce mortality whether or not patients have clinical heart failure or left ventricular dysfunction. They also reduce the risk of non fatal heart failure. Titrate the dose upwards to the maximum tolerated or target dose. Measure renal function, electrolytes and blood pressure before starting an ACE inhibitor (or angiotensin-II receptor antagonist) and again within 1 to 2 weeks.

Cholesterol lowering agents: Ideally, initiate therapy with a statin as soon as possible for all patients with evidence of cardiovascular disease (CVD) unless contraindicated. Patients who have a left ventricular ejection fraction of 0.4 or less and either diabetes or clinical signs of heart failure should receive the aldosterone antagonist eplerenone unless contraindicated by renal impairment or hyperkalemia.

Surgery

Percutaneous coronary intervention: Patency of the occluded artery can be restored by percutaneous coronary intervention (PCI) or by giving a thrombolytic drug. Reperfusion by thrombolysis is often gradual and incomplete and may be inadequate.

There is a risk of early or late reocclusion and a 1% to 2% risk of intracranial haemorrhage. PCI is the preferred method. Compared with fibrinolysis, PCI results in less reocclusion, improved left

ventricular function and improved overall outcome including reduced risk of stroke. The classification of PCI are given in Table-3.

Table-3 Classification of PCI

Primary PCI
• PCI or percutaneous transluminal coronary angioplasty (PTCA) is regarded as superior to fibrinolysis in the management of AMI and is becoming increasingly available for initial patient care • Patients should receive a glycoprotein IIb/IIIa inhibitor to reduce the risk of immediate vascular occlusion and should also receive either unfractionated heparin, a low molecular weight heparin (eg, enoxaparin) or bivalirudin • Prasugrel in combination with aspirin is recommended as an option for preventing atherothrombotic events in adults with unstable angina, non-STEMI or STEMI having primary or delayed PCI • There is no evidence to suggest that primary stenting reduces mortality when compared with balloon angioplasty but stenting seems to be associated with a reduced risk of reinfarction and target vessel revascularisation • NICE therefore recommends that intracoronary stent implantation should be used in patients undergoing primary PCI
Facilitated PCI
• Facilitated PCI is the use of pharmacological reperfusion treatment delivered prior to a planned PCI • There is no evidence of a significant clinical benefit and so facilitated PCI is currently not recommended
Rescue PCI
• Rescue PCI is defined as PCI performed on a coronary artery which remains occluded despite fibrinolytic therapy • Rescue PCI is associated with a significant reduction in heart failure and reinfarction and a lower all cause mortality and so should be considered when there is evidence of failed fibrinolysis based on clinical signs and insufficient ST-segment resolution, if there is clinical or ECG evidence of a large infarct and if the procedure can be performed less than 12 hours after the onset of symptoms

Coronary bypass surgery: Only a few patients need a coronary artery bypass graft (CABG) in the acute phase but CABG may be indicated after failed PCI, coronary occlusion not amenable for PCI or the presence of refractory symptoms after PCI. It is also indicated in cardiogenic shock, or mechanical complications (e.g., ventricular rupture, acute mitral regurgitation or ventricular septal defect multivessel disease) and in patients with a non emergency indication for CABG (e.g., multisystem disease), it is recommended to treat the infarct related lesion by PCI and to perform CABG later in more stable conditions if possible.

Other treatment

- Heparin infusion is used as an adjunctive agent in patients receiving alteplase but not with streptokinase. Heparin is also indicated in patients undergoing primary angioplasty
- Prophylaxis against thromboembolism: if not already receiving heparin by infusion, then patients should be given regular subcutaneous heparin until fully mobile
- Insulin and glucose infusion followed by intensive glucose control with subcutaneous insulin for all people with type 1 and type 2 diabetes
- The routine use of nitrates, calcium antagonists, magnesium and high dose glucose, insulin and potassium infusion is not currently recommended during the acute phase of treatment of AMI

Lifestyle changes after an AMI

People should be advised to eat a mediterranean diet such as more fruits, vegetables and fish; less meat, butter and cheese. People should be physically active for 20 to 30 minutes in a day to the point of slight breathlessness. People who are not active should be advised to increase their exercise capacity in a gradual, step by step way. They should start at a level that is comfortable and increase the duration and intensity of activity as they gain fitness. People who smoke should be advised to quit smoking.

Conclusion

However, up to 50% of people who have an acute myocardial infarction die within 30 days of the event and over half of these deaths occur before medical assistance arrives or the patient reaches hospital. About one third of all deaths occur within the first hour, usually as the result of an acute fatal arrhythmia. Prognosis correlates with the degree of myocardial necrosis. Greater degrees of myocardial necrosis are associated with a worse prognosis. The degree of myocardial necrosis can be estimated by various factors e.g., the rise in serum troponin, degree and extent of ECG changes, degree of left ventricular dysfunction on echocardiography and other factors that may adversely affect prognosis such as hypertension, chronic kidney disease, anemia and diabetes.

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Blood test detects Alzheimer's before symptoms appear

A group of researchers is developing a blood test that can detect Alzheimer's disease before symptoms appear. Alzheimer's disease is always caught at a relatively late stage because symptoms develop slowly over a number of years. The only reliable methods of diagnosis are positron emission tomography (PET) brain scans and the analysis of cerebrospinal fluid (CSF). One of the hallmarks of Alzheimer's disease is an abnormal buildup of amyloid beta plaques in the brain. Amyloid beta is present in the healthy brain, but in individuals with Alzheimer's, the protein is folded incorrectly and accumulates. Amyloid plaques can begin developing 15 to 20 years before symptoms of Alzheimer's appear. This unhealthy protein forms the basis of the groundbreaking blood test. The blood test works using immuno-infrared sensor technology, based on an antibody, the sensor extracts all amyloid beta from the blood sample. The two versions of amyloid beta absorb infrared light at different frequencies allowing the researchers to measure the relative levels of healthy and unhealthy protein. To investigate whether the test worked, the team of scientists, from Ruhr University Bochum in Germany, took data from a bio finder cohort. This initial phase of the study yielded encouraging results, in individuals who showed subtle, early symptoms of Alzheimer's, the test detected changes in levels of amyloid beta that correlated with abnormal deposits visualized using brain scans. The obvious and vital next step was to see if abnormal amyloid beta levels could be detected in individuals before Alzheimer's symptoms developed. They assessed blood samples from 65 individuals who later went on to develop Alzheimer's disease. These blood samples were compared with 809 individuals who did not go on to develop the disease. On average, the blood test could detect Alzheimer's in individuals 8 years before clinical symptoms became apparent. It correctly diagnosed Alzheimer's in 70% of cases. The findings are exciting and will provide a welcome tool in the hunt for Alzheimer's treatments.

Reference: www.medicalnewstoday.com

Stem cell transplant helps stroke patients to walk again

The results of a small clinical trial offer hope for people with motor impairment following a stroke, after finding that an injection of adult stem cells into the brain restored motor function for such individuals, to the extent that some patients regained the ability to walk. Dr. Gary Steinberg, professor and chair of neurology at Stanford University School of Medicine in Palo Alto, CA and colleagues published their findings in a journal. Ischemic stroke is the most common form, accounting for around 87% of all strokes. Hemorrhagic stroke accounts for around 13% of all strokes. There are treatments available for stroke, such as tissue plasminogen activator (tPA), it works by dissolving the blood clot that is blocking blood flow to the brain. However, tPA needs to be administered within hours of stroke occurrence. If the treatment is not received in time, the chance of a full recovery from stroke is small. But in this new study, researchers found stem cell transplantation improved patients' recovery when administered up to 3 years after stroke. For this study, the team enrolled 18 individuals of an average age of 61 years who had experienced a first stroke 6 months to 3 years previously. All participants had motor function disability. Each patient underwent stem cell transplantation, which involved drilling a hole into the skull and injecting stroke damaged areas of the brain with SB623 cells. SB623 cells are mesenchymal stem cells (MSCs) that have been taken from the bone marrow of donors and modified to boost brain function. After the procedure, each patient was monitored through brain imaging, blood tests and clinical evaluations. Within a month, the researchers noticed that the patients started to show signs of recovery. Dr. Steinberg speculates that, soon after implantation, the SB623 cells secrete deposits near areas of the brain damaged by stroke and these boost reactivation or regeneration of nerve tissue, which improves motor function. One key benefit to using mesenchymal stem cells, according to the authors, is that they are not rejected by the immune system, despite them being derived from the bone marrow of donors. In this study, none of the participants received immunosuppressant drugs. Although it's still early days in stem cell research, these findings could potentially lead to life changing treatments for stroke patients in the future.

Reference: www.medicalnewstoday.com

HISTORY OF WORLD HEART DAY

World Heart Day was celebrated every year on the last Sunday of September month from the year it was established till 2010. It is an effective event established in 2000 and organized every year by the World Heart Federation since 2000. From the year 2011, it was started celebrating annually on 29th of September. World Heart Federation and its members actively involves in the celebration in order to spread the news about premature deaths from heart diseases and its risk factors (e.g., tobacco intake, lack of physical exercise, unhealthy diet and alcohol intake) to the common public. Through this campaign, several effective preventative measures are promoted in order to reduce the risk of cardiovascular diseases.

ADVANCING POSSIBILITIES

ACI Limited, 245 Tejgaon I/A, Dhaka 1208, Bangladesh
Website: www.aci-bd.com, Email: msd@aci-bd.com