



First Aid

First Aid is the process of carrying out the essential emergency treatment of an injury or illness in order to benefit the casualty. The casualty (patient) is then sent to a hospital or to a doctor for further treatment.

First Aid can be divided into two parts i.e. self help and first help. Self help is what the casualty can do for himself and first help means what other people (first aiders) can do for the casualty. In many instances the first form of assistance is provided by the casualty himself. Much can usefully be done by the patient himself in stopping bleeding (by direct pressure) and by limb elevation, supporting injured parts, covering of the wounds, summoning others for help and moving around by the injured person himself for emergency treatment, if possible. When the casualty is unconscious or unable to move, the first aid is provided by the first aider who is a person trained for the purpose or at least knowing the underlying principles of the first aid.

The first aider should remain calm and quiet and should maintain order as far as possible until the arrival of or reaching at emergency staff who will then assume control. He should be quick (but not hasty) in taking decisions. He should be tactful and polite in order to take help from onlookers regarding calling doctor, arranging ambulance, for shifting patient to a hospital or informing nearby police.

First aid Box : This is a small and handy kit contains the following articles at least -

- (a) Sterile gauze pieces
- (b) Adhesive Bandage (Band Aid)
- (c) Adhesives plasters / Leucoplast Tape of different sizes
- (d) Scissors and forceps
- (e) Antiseptics e.g. Dettol, Mercurochrome, Spirit etc.
- (f) Silver sulfadiazine ointment
- (g) Drugs e.g. Analgesics, antibiotics, packets of O.R.S. etc.
- (h) Surgical Gloves (Unsterile) of difference sizes
- (i) Crape Bandage of difference sizes
- (j) Triangular Bandage
- (k) Compressed Bandage of difference sizes

- (l) Surgical Cotton Roll
- (m) Eye Pad
- (n) Finger Dressing, Sterilized, small
- (o) Mouth to Mouth resuscitator
- (p) Wooden Splint
- (q) First Aid Pamphlet
- (r) First Aid Checklist

This kit should be kept in every home, schools, buses, factories, swimming pools, picture halls, and other public places in ready to use form for the emergency.

With the advancement in equipment, automobiles or mechanical technology and overcrowding problems, there is an increase in the number of accidents. Any time at any place accidents of varying degree can occur. Hence the knowledge of first aid is very useful in the presents times for savings our own life and the lives of others.

The help in the form of the first aid, needed by a victim varies from simple encouraging words to Cardio Pulmonary Resuscitation (CPR). Most of the times, accidents are the results of carelessness of human beings. Accidents can be prevented if due care and precautions are observed. The primary aim of the first aid treatment should be to preserve the life of the casualty. The order aim of the first aid can be to minimize the effects of the injury (prevention of complications), to relive pain and suffering and to arrange for the casualty to be taken to hospital or to a doctor for further treatment. The major principles of first aid are, careful evaluation of the situation, maintenance of respiration and functioning of heart, control of bleeding, prevention or management of shock, splinting of fractures and dressing of wounds.

CONTROL OF THE EMERGENCY SITUATION

On reaching at the site of casualty the first aider can obtain a brief history of accident from the patient or from the onlookers if the patient is unconscious. The casualty then should be examined for the following to identify the emergency priorities :

- (1) **General conditions of the patient** : Assess the general condition of the patients, serious injuries, minor injuries, children, elderly, disabled person or pregnant woman.

- (2) **Pulse** : If the pulse is weak and rapid it indicates severe bleeding. If the pulse is not felt it indicates cardiac arrest. Cardio Pulmonary Resuscitation (CPR) should be performed immediately in such patient.
- (3) **Respiration**: Check the breathing of the casualty, whether it is normal, slow or fast. When the patient cannot breathe, artificial respiration should be carried out at once, and this is continued till the arrival of medical aid. Irrespective of the method of artificial respiration, first a finger is inserted into the mouth and foreign body (e.g. stone, weeds, artificial denture etc.) if any is removed quickly and clothing around the chest and the neck is loosened. If the patient has been immersed in and inhaled water his body is placed in prone position (face downwards) with the hand lower than the chest and turned to one side to allow the water to flow out of the lungs and stomach. Mouth to mouth respiration should be given to such patient without delay.
- (4) **Colour of tongue, lips, conjunctiva and nails** : If the colour of tongue and lips is blue it indicates lack of oxygen. Pallor (whiteness) of the tongue, conjunctiva and nails indicates severity of bleeding.
- (3) **Bleeding** : Parts of the body particularly the ears, mouth and nose must be checked for bleeding.
- (4) **Burns** : In cases of burns, the cause, degree and site of the burns should be noted .
- (5) **Poisoning** : In suspected cases of poisoning, signs and symptoms should be observed carefully. The vomitus should be collected (if possible) for the identification of poison.

After the identification of the emergency priority, first aid / emergency treatment is given. The first aid and emergency treatment of some common conditions has been described in this chapter.

CHOKING

Blockade of the air passage is called choking, when an object is aspirated into pharynx, larynx or trachea, the airway of the victim is obstructed into partially or completely, causing acute respiratory distress. The foreign body (object) must be removed at once to allow oxygen to reach the lungs because inadequate oxygenation of the blood will result in extensive or fatal brain damage within a very few minutes. Death can occur due to complete blockade of air passage.

The object on which a victim chokes is most often a large piece of solid food, such as meat, fish bone, artificial tooth, coin, hard candy or a baboon. In adults choking frequently occurs at the dinner table.

Treatment : The foreign object is effectively expelled in many instances by forcing the air out of the victim’s lungs with such force, that the object is literally blown out of his airway by the outward rush of air. The victim spontaneously inhales as soon as his airway is cleared. This technique is known as the “Heimlich manoeuvre”. Some agencies, such as the New York State Department of Health, advocate a modification that includes vigorous slaps on the victim’s back.


SHOCK

Shock is a rapidly deteriorating syndrome caused by an inadequate capillary perfusion of vital tissues. If the condition is not treated properly it leads to death. In shock the cardiac output and blood pressure are generally but not necessarily low.

Shock has been divided into two categories. In *category I or vasodilatation shock* there is decrease in sympathetic activity and an increase in parasympathetic activity. Hence there is low vascular resistance leading to fall in blood pressure. The body temperature is also decreased. The *category II shock is also called vasoconstriction shock*. In this type there is an increase in sympathetic activity and decrease in parasympathetic activity. The total peripheral resistance is increased leading to high blood pressure.

In shock there is decrease in the functions of brain, kidney and heart leading to mental clouding, respiratory failure, decrease in urine output, cardiac arrhythmia and myocardial infarction.

TABLE	
Different types of shock and their etiology	
<i>Types of Shock</i>	<i>Etiology</i>
1. Cardiogenic shock	(a) Myocardial infarction (b) Low output cardiac failure (c) Cardiac dysrhythmia
2. Hypovolemic Shock	(a) Loss of blood due to hemorrhage (b) Loss of plasma due to burns (c) Severe dehydration due to diarrhea, vomiting,

 <p>Anaphylactic Hypoglycemic Hyperglycemic</p>	<p>heat stroke, diabetes insipidus or over use of diuretics.</p> <p>(a) Spinal cord injury (b) After spinal anesthesia (c) Drug induced due to drugs like Daunorubicin, Adriamycin etc.</p> <p>(a) Gram negative septicemia (b) Gram positive septicemia</p> <p>(a) Blockade of a main blood vessel (b) Pericardial tamponade (c) Pulmonary embolism (d) Dissecting aneurism of aorta</p> <p>(a) After injection of penicillin or serum (b) Hypoglycemia (c) Hyperglycemia</p>
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There are different causes for the development of this condition (see Table). According to the cause a shock can be Cardiogenic (due to heart disease like MI), hypovolemic (due to dehydration, loss of blood or plasma), neurogenic (due to pooling of blood in post capillary blood vessels as in shock after spinal anesthesia or spinal cord injury), bacteremic (due to severe infections), haemo-obstructive (due to blockade of a main blood vessel) and other types such as anaphylactic (seen after injection of penicillin), postoperative (after surgery), hyperglycemic or hypoglycemic shock (due to diabetes).

Emergency treatment of Shock : Place the patient in the supine position and elevate the legs to increase the venous return to the heart. The patient should be shifted as early as possible to a hospital.

To raise the blood pressure, dopamine is given by intravenous infusion. Oxygen inhalation is given to correct hypoxia. The use of corticosteroids is also recommended. Replacement of fluid (blood plasma or saline) is done if required. In anaphylactic shock adrenaline is the drug of choice and given in a dose of 500 -1000 µg/I.V. with an antihistamine (chlorpheniramine 10 -12 mg I.V.) and a corticosteroid (hydrocortisone 100 mg I.V.). In septic shock in addition to general measures and appropriate antibiotic is also given.

SNAKE BITE

Out of 3500 species of snakes only 250 are poisonous. The viper (except America) and Cobra (except Europe) are found in all parts of world including India. All sea

snakes are poisonous. A brief description of these three types of medically important, poisonous snakes is as follows :

1. **Cobras** : They belong to the family of Elapidae. They are terrestrial snakes having short fangs. Their venom is neurotoxic.
2. **Vipers** : They belong to the viperidae family. These snakes have long erectile fangs. The vipers can be of two types. The true Vipers, such as Russell's viper and carpet vipers belonging to the sub-family of Viperinae and Pit vipers such as rattle snakes belonging to the sub-family of cortalidae. Their venom is vasculotoxic.
3. **Sea snakes** : They belong to Hydrophidae family, having characteristic flattened tail and short fangs. The venom of sea snakes is myotoxic.

Clinical features of snakes bite In poisoning due to the cobra snake the patients feel sleepy, weakness of legs gradually develops into paralysis of legs. There is excessive salivation and vomiting. Due to paralysis to tongue and pharynx, there is difficulty in swallowing and speech, coma sets in and finally respiration ceases and heart stops.

In the viper poisoning the bite area is swollen and painful. There can be pain abdomen, vomiting, dilatation of pupil and often complete loss of consciousness. Body temperature is raised. There can occur hemorrhages from the gum, rectum or site of bite. The whole body becomes edematous. Death occurs due to shock and hemorrhage. In sea snakes bite, the early signs and symptoms are similar to cobra bite. Other sings include myalgia, myoglobinuria, paralysis of limbs and cessation of respiration .

First aid treatment of snake bite The first aid treatment is as follows :-

- (i) Assure the patient;
- (ii) Apply firm pressure over the bitten area to delay absorption of poison;
- (iii) Apply a broad firm bandage around the limb and on the bitten area. As much of the limb should be bandaged as is possible. The bandage should be tight enough to occlude the superficial veins and lymphatic channels but not the arteries or deep veins. Alternatively a ligature can be applied above the site of bite which should be loosened for 90 seconds after every 10 minutes. If bite is on an area other than the limbs, apply firm pressure over the site of the bite;
- (iv) Immobilize the limb to minimize the spread of venom;

- (v) Make a cross incision 1 cm long and 0.5 cm deep over each bite mark. Drainage of blood and lymph should be done from each cut by using a glass and rubber suction bulb for at least one hour;
- (vi) Clean the wound with sterile saline or water and cover it with a sterile dressing.

The patient should be shifted to a hospital as early as possible, where antsnake venom serum 20 ml is given intravenously immediately after sensitivity test. Further doses are repeated every six hours till symptoms disappear.

BURNS

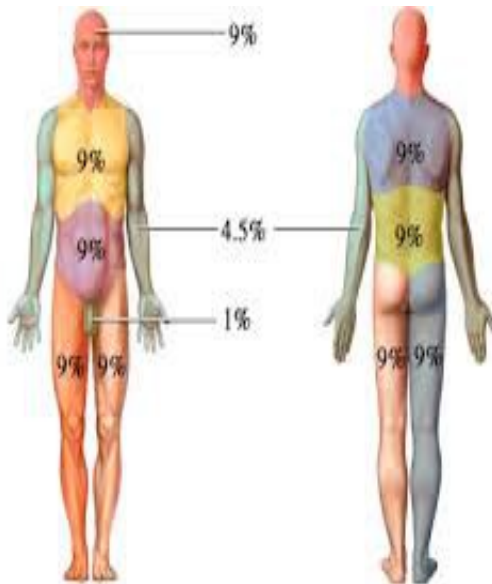
Burns are injuries caused by dry heat (fire, flames, hot metals), chemicals (strong acids, strong bases), electricity or radiation. Burns caused by hot liquids or steam are called scalds. The majority of burns occur in the home. Most of the times, burns are preventable. Burns may be superficial or deep depending upon whether the burns penetrates shallow or deeply, resulting in partial or complete skin loss. Small deep burns are much less serious than large area superficial burns. Since both burns and scalds produce similar types of injuries to the body tissues hence their first aid treatment is also similar. According to the severity the burns are classified into the following three categories :

1. **First degree burns** : These are manifested in the form of simple erythema or redness, swelling and tenderness . The epithelium in such burns is generally not dead.
2. **Second degree burns** : In these burns blisters appear in the area of erythema.
3. **Third degree burns** : In case of third degree burns the skin becomes dry, leathery and dead. These burns are the most painful.

Generally the burns are mixed. The deeper burns areas are surrounded by zones of superficial involvement.

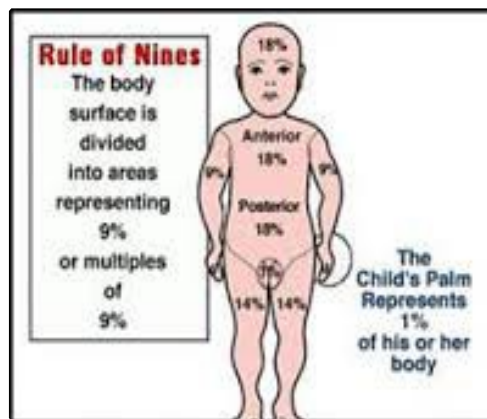
Percentage of burns - In adults the total percentage of body surface affected by burn can be calculated by the rule of nine. As explained in the Fig. 5-2, the head comprises 9% of surface area of the body, each upper extremity 9%, each lower extremity 18%, torso front or back 18% and the genitalia 1%. For infants and children conversion charts are available for adaptation.

In



case of minor burns involving less than 15% body surface area there are no or minimum chances of mortality. In case where more than 20% surface area of the body is involved the burns are considered extensive. Mortality is 50% in burns involving 50% body surface area while it is 90% in case of 75% involvement of body surface area, burns involving 90% body surface area are considered 100% fatal. Mortality is high in children well as elderly persons.

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Body Parts		Adult	Child
Head & Neck	1. Front	4.5 %	9 %
	2. Back	4.5 %	9 %
Trunk	1. Front		
	a. Upper	9 %	18 % (whole front)
	b. Lower	9 %	
	2. Back		
a. Upper	9 %	18 % (whole back)	
b. Lower	9 %		
Arms	1. Front	4.5 % (each)	4.5 % (each)
	2. Back	4.5 % (each)	4.5 % (each)
Feet	1. Front	9 % (each)	13.5 % (each)
	2. Back	9 % (each)	foot
Genitalia		1 %	1 %
TOTAL		100%	100%

Aims of First Aid Treatment for Burns :

The aims of the first aid treatment of burns are the following :-

1. Prevent further damage;
 2. Prevent infection;
 3. Minimize the effects of fluid loss from the burnt tissue;
 4. Reassure the burnt person; and
 5. Transport of the casualty to the hospital.
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1. **Prevent further damage** : Remove the cause of the burns from the casualty. Rescue the casualty carefully. Burns should be treated immediately by showering in cold water or by immersion in water which is cooler than body temperature. Cooling lessens the severity of the burn and relieves pain. Cooling should be continued until no further relief from pain is produced or withdrawal of cooling not lead to return of pain.
 2. **Prevent infection** : To prevent infection, the burnt area is quickly covered with a sterile dressing. Clean unused and well ironed handkerchiefs, sheets, or pillow covers are good enough for dressing. Do not use cotton wool for the dressing of burns. Burnt clothes are usually sterilized and stick to the skin - leave them in place. Do not burst the blisters and do not apply any lotion or grease over the area.
 3. **Minimize the effects of loss of fluid from the burnt tissue** : In burns of large areas the volume of fluid lost soon becomes serious. Conscious burned

casualties should be given drinks of water, weak tea or milk frequently until their hospitalization. If possible start intravenous infusion of saline.

4. **Reassure the burnt person** : The rescuer must remain calm and should make the casualty as comfortable as possible. Relieve the anxiety of the patient by assuring him that he is in good hands.
5. **Transport of the casualty to hospital** : Send the patient to the hospital without delay. The patient should be given fluids orally even during his journey to hospital.

First Aid Treatment of Burns and Scalds

1. Cool the area immediately which has been burnt or scalded by putting plenty of cold water or by putting clean cloth soaked in cold water. The cooling of the part prevents further damage by removing residual heat from the affected area.
2. Remove the clothing of the patient by cutting it around.
3. Keep the patient in lie down position.
4. Reassure the patient and do not disturb the blisters.
5. Cover the burnt area by large dressings or by clean bed sheet.
6. No antiseptic, lotion, oil, flour, butter, baking soda, or ink should be applied on the burn. Rather burn are should not be touched unless it is necessary.
7. Remove immediately from the body things like rings, bangles, belt boots etc. when limbs swell due to oedema, such articles may cause gangrene.
8. If the patient is conscious, give sips of water to him.
9. Take mother's assistance in managing a small child.
10. In case of chemical burns, wash the affected area with plenty of water until all chemical has been washed away.
11. In case of extensive burn, wrap the victim in a clean cloth , bed sheet or blanket and transfer to a hospital immediately.
12. In case of delay, in shifting the patient to a hospital I.V. saline drip or preferably Ringer lactate solution in order to prevent the patient from shock. A suitable analgesic is also given by I.V. route.

BURN DUE TO ELECTRICITY



This types of burns is possible when a parson comes in contact with faulty electrical instrument, naked live electric wires or atmospheric electricity i.e. lightning. In such type of burns the extent of tissue damage depends on strength of current, length and the types of current.

In case of alternate current (A.C.) the victim is thrown away from the source of current and there is less tissue damage due to burn but more physical injuries. In case of direct current (D.C.) the patient may remain stuck to the source of current unless the circuit is broken. The damage is more in case of D.C. The heat produced during the passage of current through the body produces deep burns.

First aid treatment :-

- Discontinue the circuit by putting off the switch.
- Separate the victim from the current site with the help of a wooden stick, bed sheet or rope. The first aider should not touch the patient during the above situation.
- If pulse is feeble or absent give Cardio Pulmonary Resuscitation (CPR).
- Give fluids to prevent shock.
- If burns are severe or extensive transfer the patient to a hospital.

POISONING

Cases of poisoning in India are common as poisons can be easily obtained and many poisonous plants grow wild e.g. datura, nux vomica, aconite etc. A poison is a substance which if introduced in the body or brought into contact with any part thereof, will produce ill health or death. The definition is unsatisfactory. Any drug in a large does can act as a poison.

Accidental poisoning : As the name suggests in this type of poisoning the poison is taken accidentally e.g. ingestion of kerosene or drugs by small children, snake bite etc.

1. **Suicidal poisoning** : In this type of poisoning the poison is consumed by the person himself by the intention to commit suicide. Copper sulphate, barbiturate etc. are used for this purpose.
2. **Homicidal poisoning** : In this type of poisoning the poison is given to the victim by some other person for the purpose of killing, arsenic, cyanide, datura seeds etc. are use for this purpose .

Any case of suspected homicidal poisoning must be examined by medical jurist or competent medical officer. The poisons can enter into the body by the following routes :

- ✓ **Oral** : Mostly the poisons are taken by oral route; drugs, strong acids, strong alkalis, kerosene and even the contaminated food enter the body through this route.
- ✓ **Inhalation** : Gases like carbon dioxide, carbon monoxide, ether, spray of insecticides enter the body through lung during inspiration.
- ✓ **Injection** : Persons belonging to medical profession and addicts take the toxic dose of a drug by injection narcotics, hypnotics and other poisonous substances are generally injected.
- ✓ **Skin** : Insecticides (organ phosphorus compounds) commonly enter into the body through skin during their spray in the fields. In cases of bites by dog, wild animals, snakes, bees or wasps the poison enter into the body through skin.

Treatment of poisoning

The treatment of poisoning case consists of the following steps :

1. Removal of unabsorbed poison the body;
2. Administration of antidote;
3. Elimination of poison by excretion; and
4. Symptomatic treatment.

TABLE
Common Poisons and their Specific Antidotes

S. no.	Name of the poisons	Recommended antidotes	Types of the antidote
1.	Arsenic, bismuth, mercury copper, gold and other heavy metals	BAL (Dimercaprol)	Physiological
2.	Lead, mercury, copper cobalt, cadmium, iron and nickel	EDTA (Ethylenedia- mine-tetra- acetic acid)	Chelating agent

Save Life (A Complete Solution of First Aid)

3.	Heavy metals	Penicillamine	Chelating agent of maximum efficiency
4.	Iron	Desferrioxamine	Chelating agent
5.	Organ phosphorus compounds	DAM (Diacetyl Monoxime) atropine sulphate	Cholinesterase reactivators, muscarine receptor blockers
6.	Opium	Naloxone hydrochloride	Competitive antagonist
7.	Cocaine	Amylnitrate	Dilator of blood vessels
8.	Digitalis	Lignocaine	Antiarrhythmic drug

Removal of unabsorbed poison in case of gas poisoning the patient must be shifted in fresh air area. If required artificial respiration or oxygen should be given. The poison applied locally should be washed by water or neutralizing chemicals. In cases of ingested poisons, gastric lavage should be done with the help of a stomach tube in a hospital. If stomach tube is not available then emetics viz. 15 gm of mustard powder in a glass of warm water can be used.

Administration of antidotes Antidotes are substances which counteract or neutralize the effects of poisons. For a particular types of poison a particular antidote is used .

When the nature of the poison is not known, a general antidote (G.A.) also called universal antidote is used. The *universal antidote* consists of the following substances :

1. Magnesium Oxide : 1 part

2. Tannic Acid : 2 parts

3. Activated Charcoal : 2 parts

Elimination of Poison by Excretion

Salicylates, sulphonamides and phenobarbitone can be easily excreted in alkaline urine. The urine can be made alkaline by the use of sodium bicarbonate. Amphetamine, quinine and quinidine can be easily excreted in acidic urine. Acidification of urine can be made by the use of ammonium chloride, arginine or lysine. Adequate diuresis can be made by the administration of ample amounts of fluids, tea or lemonade orally.

Thirty grams sodium sulphate with copious amount of water enhances the excretion of poisons in the stool.

Alcohols, long acting barbiturates, salicylates and lithium are effectively removed by peritoneal dialysis .

Symptomatic Treatment

It includes the general measures used to support the life of the patient. The symptoms should be treated on general lines. If respiration is depressed, pulmonary resuscitation should be done, if heartbeats are absent, cardiac resuscitation is performed. Similarly intravenous fluid infusion, oxygen inhalation and use of antibiotics is recommended according to the needs of the patients.

HEART DISEASES

Some of the heart diseases need immediate attention. The first aid treatment of such cardiac diseases is discussed here.

Acute Myocardial Infarction (Heart Attack)

This is one of the gravest and most important medical emergencies. The disease is most often due to deposition of cholesterol in the vessel wall supplying to heart. During acute myocardial infarction the patient feels very severe pain in the chest radiating into left arm and back. The other features include, restlessness, profuse perspiration or cyanosis. Sometimes the patient feels sudden difficulty in breathing.

The patient of Acute Myocardial Infarction (AMI) should be shifted to hospital as early as possible. During the pre-hospital phase following treatment should be given

- * Strict bed rest

- * Sublingually nitrates in the form of isosorbide dinitrate 5mg, available as tablet Sorbitrate is given. Nitrates dilate the coronary vessels and relieve pain.

- * Calcium channel blocker-nifedipine may also be useful to relieve pain. The drug is available as tablet Niacardia (5 mg) and given sublingually.

- * Analgesics like morphine sulphate in a dose of 10-15 mg or pethidine 75 to 100 mg may be given intramuscularly to relieve pain. To avoid vomiting, both morphine and pethidine injections should be combined with Promethazine (Phenergan) 25-50 mg.



* About two-third of all the deaths from AMI occur within first two hours of the event due to arrhythmia. For the prevention of this complication give 200 mg Lidocaine intramuscularly.

* If oxygen is available it should be given. Oxygen should be administered to all cases of AMI for first 24-48 hours.

Acute Left Heart Failure (LHF)

In left heart failure, the pulmonary venous pressure is increased due to inability of the left chambers of the heart to push forward all the blood received from the right heart. During the attack the patient feels breathlessness. Most of the attacks come during sleep. The respiratory secretions are increased and frothy with air giving rise to noisy respiration. The pre-hospital emergency treatment of LHF include the following :

- **Posture** :The patient should be made to sit in a chair. Lowering the legs reduces the venous return thereby decreasing the pulmonary congestion.
- **Narcotics** : Morphine sulphate is given intravenously in a dose of 3-5 mg.
- **Diuretics** :Coupled with narcotics a loop diuretic viz. furosemide is given intravenously slowly over 2-3 minutes.
- **Aminophylline** :This is given intravenously in a dose of 5 mg / kg slowly in 10 minutes, provided the systolic blood pressure of the patient is less than 100 mm of Hg.

Cardiac Arrest

This term is used for sudden and complete loss of cardiac function. The most common cause of cardiac arrest is ventricular fibrillation, within seconds of the onset of ventricular fibrillation the patient becomes unconscious. Respiration ceases and pulse disappears. Other causes of cardiac arrest include asystole and electromechanical dissociation. The condition is fatal unless treated promptly.

If a defibrillator is available then immediately a direct current shock is applied that may restore the sinus rhythm immediately. Since in country like India defibrillator is available in the big hospitals only and therefore under such circumstances Cardio Pulmonary Resuscitation (CPR) is performed to maintain the circulation and respiration.

CARDIO PULMONARY RESUSCITATION (CPR)

Cardio Pulmonary Resuscitation (CPR) is the most important first aid procedure to save the life of a patient. Every first aider should know the steps of CPR in order to perform it correctly. It is important even for doctors to learn this procedure.

Wherever we find an unconscious patient having no pulse CPR should be immediately performed. CPR is likely to be successful when cardiac arrest is due to

ventricular fibrillation particularly if this occurs as a result of an accident or in uncomplicated cases of myocardial infarction.

Commonly when people see someone unconscious, they try to revive the victim by giving him water, but remember that never give any types of liquid to an unconscious patient. The liquid given by mouth in an unconscious patient can go into his lungs and the victim may die due to choking. Never keep a pillow under the head of the unconscious person as this will block his breathing. Put pillows under the feet to raise the legs. Raised legs can supply us with 750 ml of blood. But never move a person if you suspect fracture as this could be harmful for the patient. After observing all these points CPR should be started immediately. CPR or Cardio Pulmonary Resuscitation consist of artificial respiration alongwith artificial circulation. The CPR can be done by ABC formula .

‘A’ stands for Airway First of all airway of patient should be opened and cleaned to make it patent. For this we should wrap an handkerchief or some piece of cloth on our two front fingers (fore finger and middle finger) together and clean the victim’s mouth thoroughly, taking out all the debris or secretions so that his breathing is not blocked. After cleaning the mouth, change the position of his face so that the airway is not blocked due to the tongue which can fall backward. To change the position of his face we should lift the person’s neck push his forehead backwards and keep him in this position with the chin facing upwards. In Fig. 5-3 methods of cleaning the mouth and the method to keep the airway open are shown.

‘B’ stands for Breathing Without food a person can survive for 70 days and without water he can live for 7 days but without oxygen person cannot survive for more than 3 minutes or 180 seconds.

If the breathing has stopped, then after clearing of the airway, immediately start giving mouth to mouth breathing, also known as artificial respiration. As shown in figure 5-4A pinch the nose of the patient with your one hand and breath in a lungful of air. Then tightly seal your mouth with the patient’s open mouth and breath out forcefully into him. Now move up, inhale more air from the atmosphere, again seal your mouth with patient’s mouth, pinch his nose and breath out into him forcefully. Go on repeating this procedure. At the same time you have to watch if the lungs of the patient are expanding and falling i.e. if the air you breath is going into the lungs of the victim or not. The air we breath in contains 20% oxygen while the expired air contains 16% oxygen. The oxygen present in the expired air is vitally important for the victim and is quite sufficient to restore his breathing. In an adult patient 12 breathings per minute should be given.

Mouth to Nose Respiration If we are unable to open the mouth of the patient due to fracture of the jaw or due to some other reason then we should start mouth to nose respiration in place of mouth to mouth respiration. For this seal your mouth to the patient’s nose and do the same procedure as in case of mouth to mouth respiration. Before starting the procedure, make sure that the patient’s mouth or lower jaw is not open.

‘C’ stands for Circulation or Cardiac Massage If on checking you find that the pulse of the patient is absent it means that heart is not functioning and the circulation of blood to the various body organs including brain has stopped. In such situation, immediately start giving him artificial circulation by doing cardiac massage.

Save Life (A Complete Solution of First Aid)

Cardiac massage is performed by pressing hard with both hands on the victim's chest two fingers above the lower end of sternum. At this area on the patient's chest you put your left hand. Now start pressing with the force of both your hands one above the other. Remember that you have to press at exactly the correct position and with the heel of your hand. Only the heel of your hand should make contact with the chest wall. While performing cardiac massage your arms should always be perpendicular to area of compression. On starting cardiac massage do not stop for more than 5 seconds and keep on doing this continuously, until ambulance or help comes. You have to press with such force that the chest gets pressed by 1.5 to 5 cm.

The pressure applied should always be 10 kg per sq cm or 20 lbs per sq inch. Release the force at once, after pressing, but do not remove your hands from the position. You have to press about 60 to 80 times per minute.

If the breathing and circulation both are absent you have to perform artificial breathing and artificial circulation together in a rhythmic manner. If you are alone performing CPR, then after every 15 compressions, give two mouth to mouth breathing. If two persons are performing CPR, one should do cardiac massage and the other should give mouth to mouth breathing. Here after every fifty compression, one mouth to mouth breathing should be given to the victim. While performing **cardiac massage in an infant** you just have to press his sternum (100 compressions per minute) with two fingers only to avoid excess of pressure. Press only by 2 cm while compressing the sternum.

You have to stop cardiac massage only when pulse returns in the neck.

HYPERTENSIVE EMERGENCIES

Severe and / or acute elevation in blood pressure (Diastolic above 130 mm of Hg) may occur or be associated with number of hypertensive emergencies. These can be (i) Cerebrovascular viz. intracranial hemorrhage, cerebral thrombosis; (ii) cardiac viz. acute left heart failure, acute coronary insufficiency; or (iii) other emergencies viz. severe epistaxis, hypertension after surgery etc. These clinical states are outside the purview of this book. The patient should invariably be hospitalized during such emergencies.

FRACTURES

A break or crack in a bone is called a fracture. This is caused by direct violence, or muscular action. Broadly the fractures can be classified as open or closed. An open fracture has a wound in case of a close fracture.

Types of Fractures

Fractures can be put under the following categories :

1.Simple Fracture : The bone is broken into two pieces and there is no open injury or wound around or near the fracture.

2.Compound Fracture : In this type of fracture the skin is torn by the broken bone which may protrude through the wound .

3.Complicated Fracture : In this type of fracture the surrounding structures e.g. muscles, blood vessels, nerve, joint capsule etc. are also damaged in addition to the break in the bone.

4. Comminuted Fracture : This type of fracture is characterized by breaking of bone into several fragments.

5. Depressed Fracture : In this type of injury, a piece of bone pressed down on the soft tissue.

6. Greenstick Fracture : In this type of fracture the bone is not completely broken. The incompletely broken bone bends at the site of injury resembling the incomplete splintered break in a green stick. Such type of fractures occur in children.

Signs and symptoms of Fracture

Following signs and symptoms are seen in case of a fracture :

- ✓ **History of injury.**
- ✓ **Pain at the site of injury.**
- ✓ **Unnatural mobility of the affected extremities.**
- ✓ **Loss of function.**
- ✓ **Bleeding at the site of injury in case of compound fracture.**
- ✓ **Pain aggravated by movement and there is often a grating that can be heard by examiner.**
- ✓ **There is swelling in the area of fracture.**

First Aid Treatment for Fractures

- _ Check the general condition of the patient
- _ Check the level of consciousness
- _ Check vital parameters such as, pulse respiration, blood pressure etc.
- _ Stop bleeding, if any
- _ Keep the patient warm
- _ Prevent further damage by immobilization. Support the injured part on some pillow or quilt. If possible a gentle traction can be applied to prevent sagging or angulations.

Usually the best way to stop movement from occurring in the arm is to fix it to the trunk. A fractured leg should be tied to other leg. Artificial rigid support by splint is needed if

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both the legs are broken. In limbs the site of the fracture together with the joint above and the joint below should be immobilized. Immobilization reduces pain also.

- _ Cover the open fracture with sterile dressing to prevent infection and also the bleeding.
- _ Transfer the casualty to a hospital.

Splints A splint is a support for a broken bone, consisting of a rigid material e.g. a wooden plank, a metal or a cardboard that has been padded properly. A splint should be rigid enough to support the injured part and to hold the fractured bones in position. Splint size should be sufficient to support the limb on which they are applied. Splints may be held in position and with the help of bandages or strips of clothing. Splint should not interfere with the circulation of the part of application.

FIRST AID TREATMENT OF COMMON INJURIES ABRASIONS

These are superficial injuries of skin caused by rubbing or scraping. In abrasion there is no breach in the continuity of the skin.

❖ First Aid Treatment

- ❖ _ Clean the area with antiseptic solution like Dettol or spirit.
- ❖ _ Give injection tetanus toxoid 0.5 ml I.M. stat and repeat it after 45 days.

BLEEDING (HAEMORRHAGE)

Severe loss of blood from the body is called hemorrhage. Approximately 5 litres of blood is present in the body. Hemorrhagic shock due to severe bleeding loss of more than 1 litre of blood may put the life of the patient in danger. Bleeding may lead to anaemia. The patient may go into a stage of hemorrhagic shock due to excessive blood loss. Bleeding may be internal or external.

Internal bleeding from stomach is indicated by the presence of blood in vomiting (Haematemesis). Frank blood is present in the stool in cases of bleeding from large gut. Bleeding from respiratory tract is indicated by the presence of blood in cough (Haemoptysis). A person may die due to internal bleeding without the escape of single drop of blood outside the body. Such patients should be transferred to a hospital as early as possible.

External bleeding may occur due to any superficial or external injury e.g. wound, cuts, accidents etc. In case of this type of bleeding remove the clothing from the affected part and apply direct pressure as shown in Fig. 5-9 over it by using dressings, bandages, handkerchief etc. In case of severe bleeding from a main vessel of a limb, the main supplying vessel is compressed against the bone. Any case of severe bleeding should be shifted to a hospital.

WOUNDS

A wound is any breach in the continuity of the skin or mucous membrane which arises from injury. Wounds are of three types :



1. **Incised wounds** : These are sharp cuts caused by sharp weapons like knife or sword.
2. **Lacerated wounds** : These wounds are caused by blunts objects such as hammer, stone etc . These wounds have irregular margins and are associated with the damage of the surrounding tissue.
3. **Punctured wounds** : These are caused by penetration of pointed and sharp weapons such as knife (Banki) or screw driver in the body. The depth of these wounds is generally greater. These wounds may be complicated by injury to internal organs.

First Aid Treatment of Wounds Clean the wound with sterile normal saline. Cover the wounds by applying dressings. If the wounds is bleeding, apply firm pressure over the wound after covering it with sterile dressing as shown in Fig. 5-9 and give injection tetanus toxoid as described above.

ELEMENTS OF MINOR SURGERY AND DRESSINGS

Minor surgery includes incision of boils, draining of wounds, applying simple sutures on a cut and application of dressings and bandages. Simple surgical operations e.g. Appendicectomy, vasectomy and tubectomy are presently also included in minor surgery.

A brief account of the elements of minor surgery and dressings is discussed here.

The elements of minor surgery include the following :

- ✓ Common Surgical Instrument;
- ✓ Glass and Plastic Instruments;
- ✓ Rubber Instruments;
- ✓ Suture material and surgical
- ✓ (suturing) needles; and
- ✓ Dressings

Common Surgical Instruments

The instruments commonly used during minor surgery are the following :



Towel clips The **DOYEN's Towel clip** is a short instrument having sharp pointed ends. The handles are joined at proximal end .

so it is a cross action clip. **The Backhaus Towel Clip** has curved sharp ends a ratchet catch but no cross action. The Mayo's towel clip is sharp like a

haemostat but has sharp pointed ends. The **Moynihan's tetra towel forceps** is somewhat like Mayo's towel clip differ in that it is longer, has a curvature in the shaft and has two teeth in each blade .It is used to fix the four cornered towels to the cut edges of skin during surgery, for isolation of operative field. The other towel clips are used to hold towel ends or the cloth sheets.

Sponge holding forceps It is having long handle with ratchet catch, and short blades with fenestrations and serrations. It is used to hold the swab at the time of preparation of skin before surgery and to hold deeply placed soft tissue .

Cheete's forceps This instrument has long handles with angulated blades. It is without ratchet. It is used for picking sterile instruments and swabs etc. at the time of surgery.

Haemostatic forceps (artery forceps) These have long blades with transverse serrations. Handles have rchettes. These forceps can be urged or straight. In size they can be small (Mosquito forceps) medium or large.

Indications They are used for catching a bleeding vessel for clamping and legating pedicles and for dressing of wound.

Dissecting forceps These are made of two steel blades joined at the root with a spring like action. The blades can be compressed by fingers to hold any tissue. They can be of two type.

Non-toothed or plain and toothed . The plain forceps is used for dissection of fine nature and to hold the delicate structure, for coagulating blood vessel etc. The toothed forceps is used to hold the skin, fascia, muscles etc. at the time of suturing.

Alli's tissue forceps It is a forceps having long handle with ratchet and medium sized blades having blunt teeth. It is used to hold soft tissue like muscle, fascia, peritoneum etc.

Babcock's tissue forceps It is having long handles. The blades are fenestrated and enclosed a space between them so that the tissue bulges through them and prevents slipping. The tips are blunt ridged. It is used to hold soft tissue, intestine, gall bladder etc.

Sinus forceps This forceps is having handle without ratchet. The blades are of medium size and have transverse serrations for about half an inch at the tip. It is used for opening an abscess .

Scissors These are the instruments available for cutting. A scissors has two handles without ratchet and two sharp edge cutting blades with blunt or pointed tip. The blades are

buttoned for movement at the time of cutting. The scissors can be curved or straight. Following type of scissors are available :

Curved scissors These are used mainly to divide ligature and sutures. It may be blunt or pointed.

Straight scissors These are used mainly to divide ligature sutures. It may be blunt or pointed.

Special type scissors Like Mayo's Scissors, Pott's Scissors, Lister's Scissors, are also available. The Lister's Scissors is used for cutting the bandages.

Bard parker scalpel The Scalpel is a sharp cutting instrument. It consists of a handle and a detachable blade. These blades and handle are of different sizes, each having specialized use. The table given below shows different size Bard parker handle and their corresponding size numbered blades with their specific use :

<i>Handle no.</i>	<i>Blade no.</i>	<i>Uses</i>
3/5	10	Stab incision in children
3/5	11	Stab incision in adults
3/5	12	Tonsillectomy, cardiovascular surgery
3/5	15	Plastic and Pediatric surgery
4	21	Skin incisions
4	23	Deeper incisions

Aneurysm needle or ligature carrier It is having an handle and a curved body with an eye and blunt tip. It is used to carry ligature during pedicle ligation and venesection.

Lumbar puncture needle It is a 9 cm long BD needle with a close fitting stylet. The hub of the needle has a groove in which fits a small knob on the hub of the styler. The distal end of the needle has a small bevel in which fits the obliquely cut end of the styler perfectly. The needle introduced between the 3rd and 4th lumbar vertebra. It is used for spinal anesthesia, examination of CSF, Intrathecal injection of drugs, Myelography and Quickenstedt's test.

Needle holder In look a needle holder is similar to an artery forceps. It has long handle with ratchet catch and the blades are short. The ratio of the length of the handle to blades is 4:1. The inner surface of each of the blade has a longitudinal groove and criss-cross serrations to make the grip on the needle stronger. Needle holder is used to hold a needle at the time of suturing.

Glass or Plastic Instrument

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The commonly used glass / plastic instrument in minor surgery are BD syringes with steel hypodermic needles.

Bectin dickenson syringes (B.D syringes) Generally are made up of glass. Now disposable plastic made syringes are also available. A syringe consists of a barrel and a piston. The barrel has a nozzle at one end at which the hypodermic needle made up of steel (available in different sizes) can be fitted .

B.D. syringes can be of the following types :

- ✓ *Tuberculin syringe* Its capacity is 1 ml, it is long and narrow having blue piston. The 1 ml has been divided and marked in 100 parts. It is used for Montoux test, allergy tests, intradermal injections and injection of insulin.
- ✓ *All glass syringes* These syringes are made up of glass, available in capacity of 2, 5,10 or 20 ml. They are used for different type of parenteral injections. They are also used for aspiration of fluids.
- ✓ *Leurlock syringe* It is a glass syringe having a locking system for the needle at the nozzle, so that the needle does not come out during use.

Rubber / PVC instruments

These include surgical gloves, urinary catheters Ryle's tube etc.

Surgical gloves These are thin rubber gloves available in different sizes. They are available in the sterilized disposable packing. Surgical gloves are worn in hands by the surgeon while doing any surgical procedure.

Urinary catheters A urinary catheter is a long piece of a tubing. It's one end is slightly dilated and has a terminal opening to be fitted in the reservoir bag. The another end of the catheter is closed but has a sub-terminal opening. A catheter is generally made of rubber. Nowadays two type of rubber catheters are used i.e. simple catheter and Foley's catheter a self retaining one. They are used to relieve retention urine, to safeguard urethra or bladder during surgery.

Ryles tube It is a PVC made, 105 cm long nasogastric tube available in 5 FG to 24 FG sizes. For use in children sizes of 4 to 8 are available. The proximal end of the tube has a terminal opening to which a syringe can be fitted for aspiration or injection. Its tip is blunt and has lead shoot and side openings. The tip through oesophagus is introduced into the stomach up to duodenum. It has four markings at 40 cm, 50 cm, 57 cm and sometime at 65cm. from the tip. It is used for preoperative preparation, gastric lavage, feeding, drug administration and for diagnostic purposes.

Suture Material and Surgical Needles

1. Sutures

This term is applied to any material used to sew, stitch or hold together tissue until healing occurs and artificial support is no longer necessary.

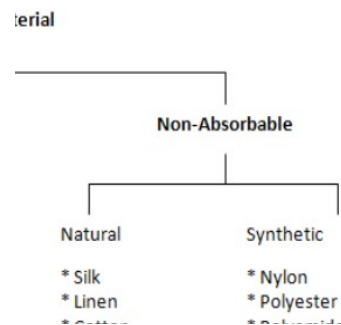
Kinds of sutures Sutures may be classified into absorbable or non absorbable. As the terms imply, they will either absorb or remain in the tissue. Many non absorbable materials used are not removed, but because of the nature of the material and its preparation, they remain inert in the body tissues and usually cause no reactions.

(A) **Absorbable**

(1) Surgical gut or catgut : There are two kinds of surgical guts, plain and chromic. The chromic has been processed to delay its absorption rate in the body.

(a) **Source :** Prepared from the sub-mucosa of sheep intestines.

(b) **Sizes :** Graded from a size 6-0 (very fine) to a size 3-0 (very heavy); the trend today is toward using finer sizes of suture material.



Depending upon nature of filament	
<i>Monofilament</i>	<i>Multifilament</i>
Polyamide	1. Polyester
Polypropylene	2. Polyamide
Polyethylene	3. Polyglycolide
Cotton	4. Polylactide
Catgut	5. Silk
Steel	6. Cotton
	7. Linen
	8. Steel

Depending upon nature of formation

Braided

Polyester
Polyamide
Polyethylene
Polylactide
Silk

Twisted

1. Cotton
2. Linen

Depending upon covering

Coated

Polyester
Polyglycolide
Polylactide
Polydoxanone
Catgut
Linen

Uncoated

1. Polyamide
2. Polypropylene
3. Polyethylene
4. Catgut
5. Collagen
6. Steel

(2) Collagen sutures : These sutures are made by extruding homogenized tendo Achilles of beef, cattle

- They are 100 % pure collagen
- They are also available in plain + chromic form
- Behaves similar to catgut
- Finer gauges are used in ophthalmic surgery as the tissue reaction is probably less than that of catgut.

(3) Other absorbable sutures infrequently used include :

(a) Ribbon gut : Prepared in wide strands rather than in thread like dimensions.

(b) Kangaroo tendon : Sized similarly to surgical gut (absorption rate approximately 60 days).

(c) Fascia lata : May be prepared from animal fascia or transplanted during operation from one part of patient's body to another.

(B) Non absorbable

(1) Natural

(a) Silk : Prepared from thread spun by silkworm larva in making its cocoon, may be twisted or braided, is graded according to size from a very fine (6.0) to a very coarse (4), may be dyed in various colours to facilitate easy identifications in tissue and also to distinguish sizes.

(b) Cotton : Manufactured from cotton plant. Graded according to sizes and may also be colour coded.

(c) Linen : It is made from flax of tree bark. It is cellulose in nature.

(2) Synthetic

(a) Polyester fibres (Mersilene)

(b) Nylon (Dermalon, Ethilon and Surgilon)

(3) Dermal

(4) Metallic suture materials

(a) Stainless steel

(b) Tantalum

(5) Umbilical tape : Used primarily to ligate large blood vessels.

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(6) Silver clips : Used primarily in controlling bleeding in surgery around inaccessible small blood vessels.

(7) Sink clips : Preloaded clip holders to facilitate skin closure.

(8) Other non absorbable suture materials infrequently used include :

(a) Horse hair

(b) Silkworm gut (prepared from un spun silk)

(c) Linen (from the flax plant)

Points to remember in suture technique

1. There should be a suture routine in each operating room; however, an allowance must be made for changes according to the needs of the patients and to the preference of the surgeon.
2. Usually prepare ligatures first, because they are the first sutures used. Then prepare the other sutures in the order in which they will be used as far as possible.
3. Be conservative and economical. Prepare sutures just prior to use.
4. Handle suture material as little as possible to prevent fraying of sutures.

II. Surgical Needles

There are many types of surgical needles. A needle chart is an excellent visual aid in assisting with the selection of needles for specific operations.

(a) Straight needle (b) Round shaft curved needle (c) Triangular shaft curved needle (d) Flat shaft curved needle.

Selection may vary according to patient's needs and surgeon's preference, as well as the number of sutures available with swaged-on needles. The basic components of surgical needles are :

(A) **Eye**

- (1) **Regular eyed :** threaded like ordinary sewing needle.
- (2) **Eyeless or swaged :** has already been referred to under atraumatic sutures. The advantages of this kind of needle and suture is that there is only one thickness to pull through the tissue as opposed to the regular eyed needle. This will prevent tissue trauma.
- (3) **French or spring eyed :** suture is slipped into a spring like eye. Main advantage of this type is that suture does not usually pull out of the needle or become unthreaded.

(B) **Point**

- (1) **Cutting** : used in tissue where cutting edge will facilitate introduction of needle into the tissue for example, the skin.
- (2) **Spear or triangular**
- (3) **Tapering** : used in soft tissue where cutting edge might injure or tear tissue; for example, the peritoneum.
- (4) **Trocar** : used in very tough tissue, for example, cartilage or the cervix of the uterus.
- (5) **Blunt** : used on liver or kidney.

(C) **Shaft or body**

- (1) **Straight** : used on surface work .
- (2) **Curved** : used inside for quick recovery of the point of the needle.

Good procedure in using surgical needles

1. Thread needle from inside curve toward outside assists in holding suture material in needle.
2. Straight needles are not used on needle holders.
3. Avoid placing needle holder over the eye of the needle.
4. Select needle strong enough and large enough for tissue in which it is to be used.
5. Account for each needle used during operation.
6. If a needle breaks, locate both pieces.
7. Discard atraumatic needles after use.



DRESSINGS

Surgical dressings or curatis is a term applied to a wide range of material used for the dressing of wounds. These materials act as coverings, protectives, absorbent and support for injured or diseased tissue. Dressings may be classified under the following hands :

- I. Primary wound dressings;
- II. Absorbents : Surgical cotton, surgical gauges;
- III. Bandages;
- IV. Adhesive tapes; and
- V. Protectives.

Primary Wound Dressings

Dressing is the material that is directly placed over the wound to absorb the secretions or discharge from the wound and to minimize maceration. Following dressings are used commonly :

Gauze compresses of suitable mesh and thickness are widely used as primary wounds dressings. The gauze compresses can adhere to the wound surface and therefore can produce pain and trauma during their removal.

Petroleum impregnated gauze has been widely used with the thinking that it is hydrophobic in character and it should not adhere. But this material can also produce maceration on wound surface during removal.

Non-adhering dressing keeping in view the comfort of the patient and prompt healing, following non-adhering dressings are preferred :

- (a) **Adaptic non-adhering dressing** : is a special type of gauze knitted from pure, regenerated cellulose and impregnated with a bland hydrophilic, O/W emulsion, in such a way that all pores remain open. This gauze generally does not adhere to wound surface and is useful in the dressing of burns open ulcers and skin graft.

Another type of non-adhering dressing consists of an absorbent pad faced with a soft plastic film having enough large openings to allow fluids to pass through, but do not allow adhesions to the wound. This dressings is available in the form of pads of many sizes with various backings including perforated adhesive tapes.

- (b) **Non-adherent coated open structured, non-woven facing fabric** : is still another non-adhesive dressing. It is used over various absorbent filler materials.

- (c) **Transparent non-adherent film dressings** : (e.g. Bioclusive and Tegaderm) have bacterial barrier properties and the wound can be observed without their removal as they are transparent. These dressings are gaining popularity nowadays.

ABSORBENTS

The materials use in the dressing to absorb the secretions of a wound are called absorbents. Absorbents consists of the surgical cotton and surgical gauzes.

SURGICAL COTTON

Cotton is the basic surgical absorbent. It is official purified cotton USP.

Non-absorbent cotton The raw cotton after mechanical cleaning of dirt is carded in layers and is used for paddings and coverings of unbroken surfaces. It is also used as cotton plugs in microbiology labs.

Absorbent cotton is prepared from the raw cotton fibre after removal of natural waxes, all impurities and foreign substances to render the fibres absorbent. The cotton is than treated with chemicals and washed with fresh water. The cotton is then dried after passing through ovens. Then by process of lapping cotton rolls are prepared. This cotton role is cut into uniform strips and automatically rolled into cotton balls. Beside the roll form the purified *cotton balls and cotton tipped applicators*. Absorbent balls made by surgical viscose-rayon fibres are also available. In comparison to cotton balls, these are better absorbents and also retain the shape better.

Non-absorbent bleached cotton is prepared by a special bleaching process and retaining the water repellent natural oils and waxes. This cotton is well adapted to well adapted to packing, padding and cushioning of dressings.

SURGICAL GAUZES

It is an absorbent material of sufficient tensile strength, require for dressings. It is official as absorbent gauze I.P.

Thread is made from raw cotton and than an open mashed cloth is woven. The cloth is bleached white and is made absorbent by a similar process adopted for absorbent cotton. Gauzes is classified according to its mash or number of threads per inch. For dressing required extra strength and greater protection close mashed gauze is required while for primary wound dressings, absorbent secondary dressings and for larger dressings, a softer and more absorbent open mashed gauze having more open structure is preferred.

Filamented gauze is a folded absorbent gauze, each layer of which is coated with a thin film of cotton or rayon to yields a greater volume to dressing with unusual softness and quick absorbability.

Non-woven surgical sponges consists of non-woven fabrics and are alternative for woven cotton gauze for use in wound cleaning or dressing and tissue handling sponges. These soft sponges have good absorptive power and generate less lint.

Medicated surgical gauze or Antiseptic gauze It is an old dressing material.

COMMONLY USED ANTISEPTICS FOR DRESSINGS

The most commonly used antiseptic gauze is the iodoform gauze containing 5% iodoform and is used as packing or drainage material. Some other common solutions in which the gauze is soaked before use have been discussed here.

- (1) **Acridflavin lotion (AF Lotion)** : The gauze piece soaked in this solution are applied over the wounds. The solution is prepared by mixing the following substances :

Acridflavin	200 mg
Spirit	75 ml
Sterile water	100 ml

- (2) **Eusol (Edinburgh University Solution)** : The solution consists of :

Bleaching powder	1.25 gm
Boric acid	1.25 gm
Calcium hydroxide	1.25 gm
Sterile water	ad 1000 ml

Dressing with eusol is preferred for wounds infected with pyogenic bacteria, due to liberation of nascent chlorine from the solution.

- (3) **Magsulf solution** : This solution is prepared by dissolving 25 gm of magnesium sulphate in 100 ml of sterile water. Magsulf dressing is having is having a hygroscopic action and hence is applied over unripe boils.

- (4) **Mercurochrome solution** : It consists of the following :

Merbromin	20 gm
Purified sterile water	350 ml
Acetone	100 ml
Neutralize alcohol	ad 1000 ml

The solution may be clarified by filtration after standing overnight.

Mercurochrome solution is applied over small cuts or abrasions. The solution is antiseptic in nature.

- (5) **Tincture benzoin** : It is prepared by percolating powdered benzoin in 90% alcohol in the following quantity :

Sumatra Benzoin	100 gm
90% alcohol	ad 1000 ml

The tincture is applied locally for its antiseptics, astringent and protective actions, on small cuts and abrasions. Tr. Benzoin seal is applied by a fine layer of cotton soaked in the benzoin tincture, to stop bleeding to a cover wound.

- (6) **Tincture iodine** : The tincture iodine consists of the following :

Iodine	2 gm
Sodium iodide	2.4 gm
Diluted alcohol	ad 100ml

Tincture iodine is used as antiseptic. It is applied on the skin over the area to be operated. It is never applied on the skin of such area which is devoid of adipose tissue e.g. scrotum and areola of the breast.

OTHER ABSORBENTS

These are as follows :

- 1) **Salvage-edge gauze strips** : These are strips of width $\frac{1}{4}$ to 2 inches used for packing or drainage of a wound. These are no loose threads in the strips and they may be medicated (with 5% iodoform) or un-medicated.
- 2) **Gauze pads or sponges** : These are available in various sizes. They consists of sterilized surgical gauze folder in a manner so that there are no loose fibres or threads that may get entrapped in the wound.
- 3) **X-Ray detectable gauge pads:** These are gauze pads treated with barium sulphate or some other material to make it radio opaque.
- 4) **Composite absorbent dressings:** These dressing are made of layers of absorbent gauze of non-woven febric with cotton, rayon, non-woven fabric or tissue paper filled in a suitable arrangement in between the layers.
- 5) **Sanitary napkins (obstetrical pads, maternity pads, V pads)** : These are useful because of their high fluid holding capacity. They are made of non-woven fabric supported by an open mesh scrim. The sides and outer surface of these napkins are made of water repellent material.
- 6) **Eye pads** : These pads are specially designed in a manner to comfortable cover the eye. They are made up of non-woven fabric and are supplied in sterile packs.

BANDAGES

Bandages are applied over the dressing to hold them in place by providing pressure or support. Following are the commonly used bandages :

Common gauze roller bandage is made from type 1 absorbent gauze. The bandage is free of loose threads and available in different sizes.

Muslin bandages These are quite strong and are used in situation where common gauze bandage is not sufficient to provide adequate strength or support.

Elastic bandages Following are the commonly used elastic bandages :

- (a) **Woven elastic bandages** : These bandages are composed of elastic webbing and contain rubber threads. They are useful in providing good support and pressure.

- (b) **Crepe bandages** : These contain no rubber threads but they can be extended to roughly twice their length. The bandages can fit tightly and conform to the skin and joints surfaces yet allowing a limited movements and the circulation is not impaired. They are used for bandaging sprain and varicose veins.
- (c) **Conforming bandage** : This new type bandage is easy to use and readily conforms to all body contours. The bandage cling to itself and prevents slipping. The edges of the bandages are not rough. It is made from two piles of specially processed high quality cotton gauze folded to the centre.

High block bandage : This bandage is made up of six layers of crimped cotton gauze. It provides protection to wound dressing and also have absorbent properties.

Triangular bandage : This bandage is prepared by cutting bleached muslin diagonally. It is useful as first aid for head dressing, as sling and as temporary splints for broken bone.

Orthopaedic bandage : These bandages are used for the treatment of fractures. Gauzes impregnated with plaster of Paris are still the most commonly used material. In these days synthetic cast material or plastic sheets are available. These are hardened by cooling or chemical reaction.

Stockinette bandage : This bandage is soft and stretchable and readily conforms to the shape to which it is applied. This is used to cover the skin prior to the application of the orthopaedic bandage.

Cast paddings : These are applied to the skin before the application of the cast. These are absorbent and permit the skin to breathe.

ADHESIVE TAPES

Two types of adhesive tapes are available :

- (a) **Rubber based adhesive tapes; and**
- (b) **Acrylate adhesive**

Rubber based adhesives tapes are cheaper and are used in such situation where greater adhesiveness and strength of backing is required.

Acrylate adhesives are hypoallergenic in nature. They are not affected by heat and light or other environmental factor and therefore have long shelf life. They are non-occlusive and do not cause over-hydration in the stratum corneum. Acrylate adhesives are commonly use in operative and post operative procedures where the trauma to the skin is to be kept the minimum.

PROTECTIVES

Protectives include the various impermeable materials intended to be used adjunctively with other dressing components to prevent the loss of moisture or heat from a wound site or to protect clothing or bed liners from wound exudates. The introduction of adhesive film dressings adds a significant new dimension to the concept of protectives.

Film dressings These are acrylate adhesive coated on a transparent moisture vapour permeable plastic film. These are directly applied on wound surface. This type of dressing is a protective since it is impervious for bacteria and water but provide passage for moisture vapours from the wound site. Film dressings are not recommended for infected or profusely exudative wounds. They do represent as alternative for dressing many clean, scanty draining wounds of various types in which epithelial regeneration is going on.

Traditional protectives These include protectives employed to cover wet dressings and hot or cold compresses. The protectives in common use are plastic sheeting and waxed or plastic coated paper. Rubber sheet in a rubber coated cloth is used as covering of bedding. Nursery sheeting is coated on one side only and is used as covering for bedding of children.

