JHARKHAND RAI UNIVERSITY
RANCHI

LAB MANUAL

PRINCIPLES OF BIOELECTRICAL MODALITIES - II

BPT IV

List of Practical

1. To study the application of IFT Techniques
2. To study of safety application of SWD
3. To study techniques of method of application used in ultrasound therapy
4. To examine the experimental techniques for administering cryotherapy
5. To observe various Electromyography procedure
6. To study the methods of application of Wax Bath Therapy
7. To study techniques and method of application of LASER

Practical-01

Aim: To study the application of IFT technique.

Objective: The objective is to develop proficiency in electrode placement, selecting appropriate electrode types, determining dosage and customizing treatment duration for individual patient.

Methods of Application:

Methods of application depending upon: -

→ Area to be treated.

→ Extent of effect required whether deep on superficial Methods of application are:

1. Quadripolar

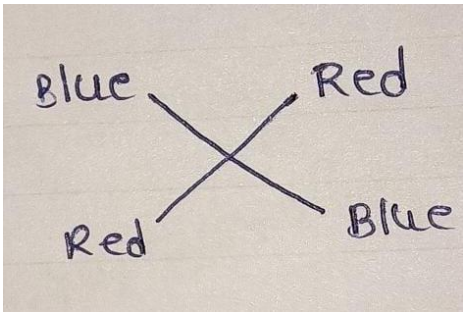
- ❖ Static interference
- ❖ Vector / Scanning / dynamic interference

2. Bipolar

1. Quadripolar-

i. Four electrodes are used in two pairs which.is color-coded (Red and blue).
ii. Useful for larger areas.

Placement: Placed diagonally opposing to one another Diagonal pattern to produced deep effect that is 100% modulation and greatest amplitude. Used for deeper effect.



#Static Interference: -

→ Area in which IFT is set up remains Stationary.

→ It gives clover leaf appearance when two medium Frequency meet.

→ always make 45° angle.

→ It is use for localize pain.

#Vector Scanning Dynamic interference: -

→ It is used in defuse kind of pain. And when the accuracy of the lesion within the Static interferential field with doubtful.

→ Advantage of interferential field is that specific areas of the tissue and any depth can be treated.

→This is achieved by rhythmically increasing and decreasing amount of the current applies between one pair of electrodes, while simultaneously decreasing. And increasing the other. Generally over period of several seconds or 10 of seconds.

→So, when one current goes up other goes down and vice-versa

→ used for spasm and back pain.

→ Movement occur in rotating or shifting and covey full area.

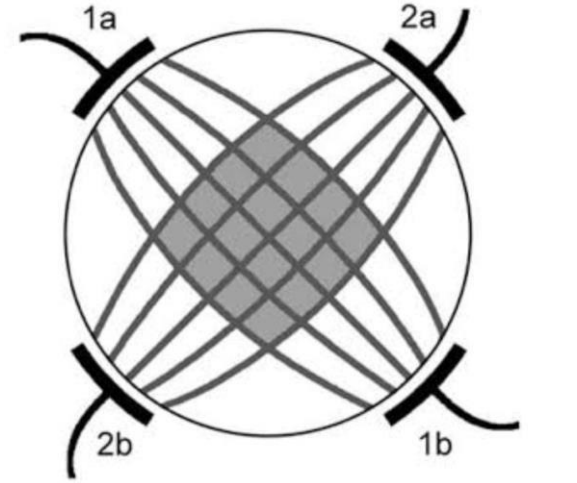


Fig-Quadripolar

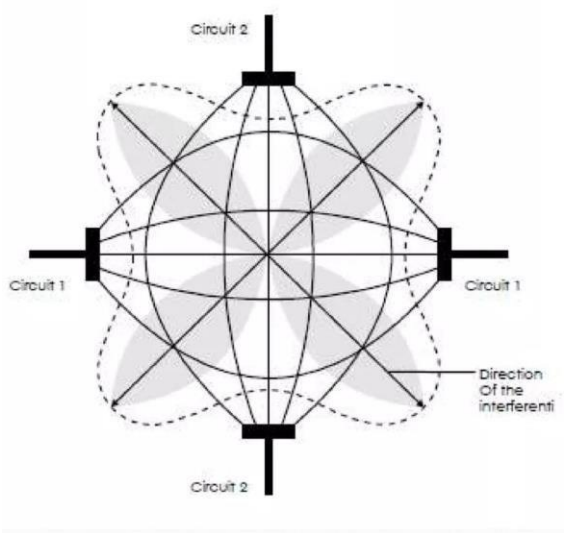


Fig-clover leaf appearance

2) Bipolar: -

→ Also known as pre-modulated.

→ It has the advantage that is easier to apply as only two electrodes are need.

→ If two electrodes are used one of each pair.

→ Placement: placed diagonally, opposite to one another so that treatment lies between.

→ Interference occurs throughout the reason between two electrodes

→ Useful for small areas.

→ produces superficial effect i.e. more sensory Stimulation than four pole technique.

→ The bipolar application has been found most commonly It is easier and ensures 100% modulation.

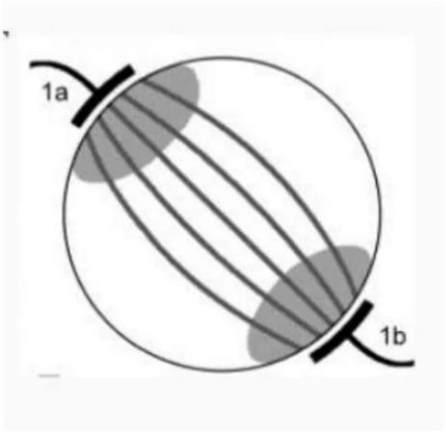


Fig -bipolar interference

Electrode placement: -

- Electrode positioning should ensure adequate coverage of the area for stimulation.
- Correct and proper positing should ensure of electrode is important for effective and purposeful delivery and it depends upon.
    (i) Size of electrode
    (ii) Distance of placement of electrode.
    (iii) Types of placements of electrode.

Types of electrodes:

- Commonly used pad electrode.
- Self-adhesive
- Pad - electrode with sponge covey.

Dosage:

1. Intensity

2. Duration

3. Area to be treated

- For larger area a current of higher intensity is required of vice-versa. Produce therapeutic effect.
- When applying on rhythmic mode, intensity is gradually increased fill patient feels comfortable.
- For acute cases, low intensity with shorter time (once twice a week).
- Sub-acute and chronic, High intensity with larger time three to four times in a week.

Techniques of application: -

- Patient should be comfortable position.

- Skin is prepared as for low frequency stimulation through washed and apply ultrasonic jel if any skin lesions.

- Site of treatment area is accurately located.

- Set treatment frequency.

- Get the patient verbal feedback about sensation and rise intensity with regular interval

- After the completion of the session, get Feedback about the treatment.

- Maintain patient's record and fix next appointment.

Performa of the patient- (Stress incontinence).

Incontinence is rather a symptom than a disease. A Common neurological cause of incontinence is damage to cerebral cortex with damage to normal bladder inhibition. Stress incontinence is common in females due to weakness of pelvic Hoor muscles.

1. Firstly, we will be receiving the patient like,

Good morning, I am your physiotherapist and going to treat you, please, cooperate with me during, the treatment and wait until I go through your case sheet.

→History taking on going through the case sheet:

- History of present illness.
- Name of patient
- Age
- Sex
- History of past illness
- Treatment
- History
- Social and occupational history
- Prognosis of treatment

Chief complaint:

- Involuntary Leakage of urine with Physical activities such as coughing, Pressurize bladder
- Leaking wine when lift something heavy
- Leaking urine when feel a sudden urge to urinate.

Checking for general contraindications:

- Hyperpyrexia / Fever

- Hypertension

- Epileptic Patients

- Cooperative Patients

- Mentally Retarded Patients.

Checking for local contraindications:

-Open wounds

-Hairy surface

-Metal in the part

-Hypersensitive skin

-Loss of sensation.

Preparation of trays:

- Treatment tray - mackintosh, lint pads, pad on plate electrodes, leads, Straps, Cotton, gel, etc.
- Skin resistance lowering tray: Saline water, soap, cotton, Vaseline, towels, etc.

Preparation of apparatus:

-check whether all the knobs aye at zero

-checking the pins of the plug and check whether the switch is twined off

-check the insulation of the wire

-check whether the switch in the stimulator is working.

Correct positioning of the patient:

-Patient must be comfortably placed in supine lying position with hip and knee flexed.

-Part to be treated mast be exposed and should be at adequate distance from the modality.

Correct positioning of physiotherapist:

- Position of physiotherapist should be in closed vicinity of the patient and appropriate reachable distance from modality

- Correct placing of pads and electrodes: The electrodes are placed over the Lower, abdomen and over inner thigh so as to produce good strong. Contraction of the pelvic f1oor.

- Regulating the current: Frequency of 1-100 HZ rhythmic is used. At low frequencies a twitch is produced, between 5 and 20 Hz a partial tetany and 30 to 100 Hz.tetanic contraction occurs.

- Sensory Stimulation. It is claimed that the rapid getwyn of the tone of pelvic floor muscles occurs when treated with interferential therapy) due to stimulation of both voluntary and Smooth muscle fibeys. It has advantage over Faradic current stimulation that faradic Currents can only stimulate voluntary components. Also, feel of current is much reduced in intertrential therapy.

Practical -02

Aim: - To study the safety implication of SWD.

Objective: The objective is to develop proficiency in type of electrode, size of electrode, spacing of electrode and application of SwD testing of machine and dosage.

#Short Wave Diathermy: -

Short wave diathermy is the use of high frequency electromagnetic waves of the frequency between 102 and 108Hz and a wavelength 30 and 3 m to generate heat in the body tissues. It the deepest form of heat available to the physiotherapist.

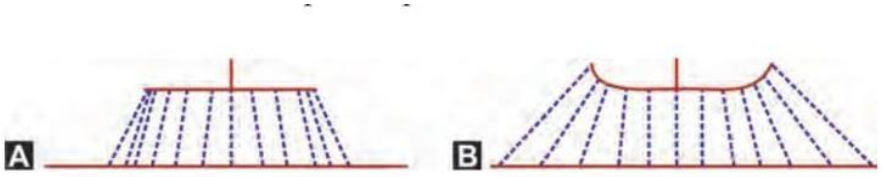
The therapeutically and frequencies and wavelength are 27.12 MHz and 11 m commonly. The less common frequencies and wavelength are 40.68 MHz and 1.5m and 13.56 MHz and 22m.

#Type of Electrodes: -

These are various types of electrodes. Electrode could be pad electrodes, plate electrodes and disk electrodes. Each electrode consists of a metal plate surrounded by some form of insulating material.

One type of electrode consists of a thin malleable metal plate covered with a rubber pad. This has an advantage to get moulded according to the body pad. Electrodes of the type are separated from the skin by perforated felt pad and them position is maintained by weight of the body part should be avoided as this may crack the plate inside and may hamper the blood supply. The insulating felt pad is perforated. So that it contains a small quantity of air inside, which is generally preferably the best spacing material. Thus, it has a disadvantage of not having completely air spacing between the pad and the body.

Another type of electrode consists of thick rigid metal plate coated with a thin layer of Insulating material made up of rubber or plastic. The property of an electric charge is that it concentrates at the edges of a conductor than at anywhere else. Thus, these plates are frequently-Convex at the edges which provides a more than even electric field than a flat disk. These plate electrodes are held at a distance from the skin by an adjusting device, thus provides. Air as an insulating material which i's mast preferable one third type of an electrode is disk type electrode.



Figs 4.4A and B: Electric fields produced by Flat (A) and (B) Convex electrodes

These are having a transparent plastic cover within which a metal plate is present. These electrodes are commonly circular in shape, but special shape can be used for irregular areas. The position of metal plate inside the disk can be adjusted. It is advisable to leave small gap between the covey and the skin to allow for the better circulation of the air.

#Size of Electrode: -

1. If the two electrodes are different sizes, they will behave as a capacitor of different sized" plates. The different quantities of electricity are required to charge them to the same potential this puts an uneven load to the machine. The change will concentrate on the part of larger electrode which lies opposite to the smaller electrode."

2. If the electrodes are little larger than the area treated, the outer part where than the Spread is greatest is deliberately not utilized. The part of the body to be heated sies in the central part of the field, which is more even. Foy treatment of the limbs, the electrodes should be larger than the diameter of the limbs and for trunk and back electrodes should be as larger as possible.

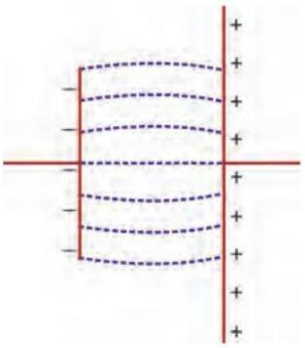


Fig. 4.5: Electrodes of different sizes

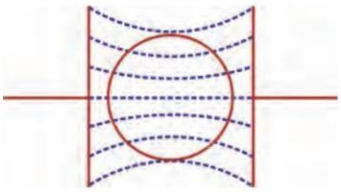


Fig. 4.6: Correct size of electrodes

3. If the diameter of the electrodes is smaller than that of the limbs, the lines of forces spread in the direction tissues, causing more heating of the superficial than of deep structure.

4. If the diameter of the electrodes is for larger than that of the diameter of the limb. Some of the lines of force bypass it completely and thus results in wastage of energy. Thus, as a general should be equal in size, and slightly larger than the area to be treated.

#spacing of electrodes:

1. If the distance between the plates is small and the material between them is of high dielectric. Constant the lines of forces spread as they passes between the plates of charged condenser.

2. When the distance between the electrodes is large the spreading out of the electric minimal while the use of spacing material of a low dielectric constant also limits the spread of the field.

3. When the electrodes spacing is narrow, the superficial tissues lies in the concentrated part of the field to the electrode are thus heated more than the deep tissues, where density of the field is less.

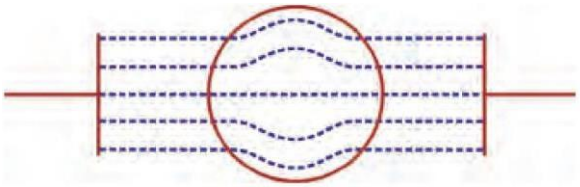


Fig. 4.7: Smaller electrodes

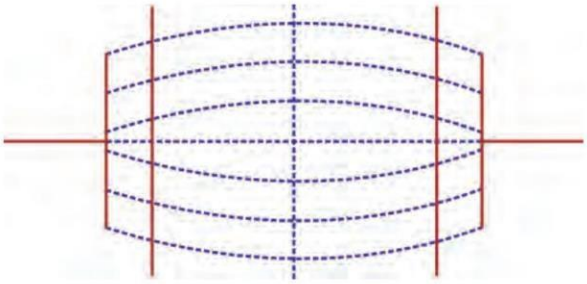


Fig. 4.11: Electrodes closer to the body

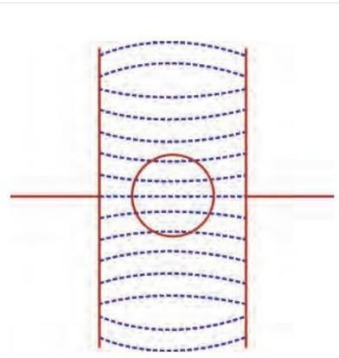


Fig. 4.8: Electrodes too large

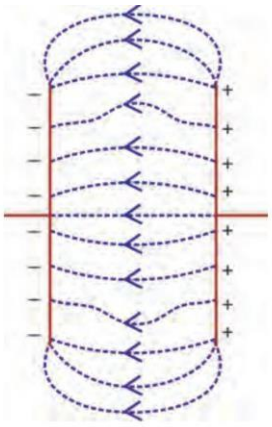


Fig. 4.9: Distance too small

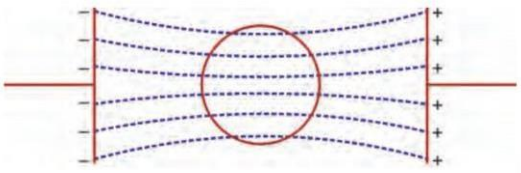


Fig. 4.10: Adequate distance

4. If the two electrodes are placed at unequal distance from the body, the one nearer to the body than the other then there is a greater heating effect under the closer electrode-than under the farther one. The lines of force under the farther electrode. Have a greater distance in which to spread before reaching the body than those undy the nearer one. They there tore covey a greater area of Skin and density is less than under the nearer electrodes. If the distance between two electrodes is less than width of two pads then the lines of the force will travel through pads. Only and do not produce heat in the body tissues. Thus, the spacing between the electrodes and the patient's body tissues should be as wide machine allows and the material between electrode and skin should be of low dielectric constant, aby being the most preferable one.

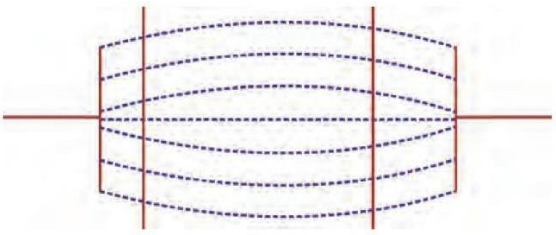
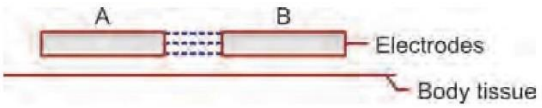


Fig. 4.12: Electrodes at uneven distance



Positioning of the electrodes: -

The positioning of electrodes is different toy different structures to be treated. It depends upon impedance of the structures and the line of electric field of the structures are of high impedance (fat and white fibrous tissue) the electrodes should be way arranged in such a that different tissues lies in series with each other, i.e. at right angles of electric field. If the structures are of low impedance. (Blood and muscles) the electrodes should be arranged in such a way that different tissues lie in parallel with each other and with electric field.

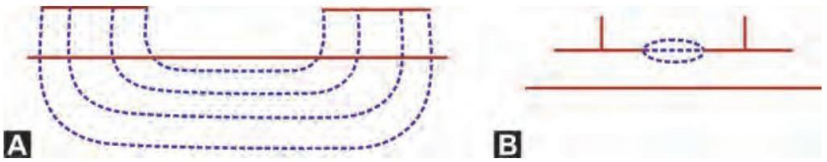
When treatment is to be given to the ankle joint, the electrodes should be placed on the medial and lateral sides, so that tissues lie in series with each other and heating the joint is obtained. If the electrodes are placed longitudinally, tissues lie parallel to the field and heating of blood vessels and muscles is obtained. In injuries of soft tissues, longitudinally method may be used, where soft tissues need heating,

* Common positioning of electrodes used are: -

1. **Coplanar Positioning of Electrodes:** -This method is used over large area of the body, e.g. spine and is also called parallel method of placement. it is important the distance between the electrodes should more than the total width of spacing otherwise e electric electro field will not pass through the tissues at all and will passing direct between the electrodes. This method particularly suitable for the superficial-Structures.

2. **Contra planar-Positioning of Electrodes: -**This method is used for those structures where through and through heating is required e.g. hip, shoulder joint. The electrodes are placed over the opposite aspects on anterior posterior aspect. This method is particularly suitable for deeper Structures on tissues.

3. **Monopolar method**: - only one electrode is placed over the treatment area and other electrode placed at a distance site or is not used at all. The electrode used produces a radial electric field. The density of electric field becomes less than as distance from the electrode increases and thus the heating is superficial



Figs 4.14A and B: Coplanar arrangement of electrodes:
(A) Correct spacing and (B) incorrect spacing

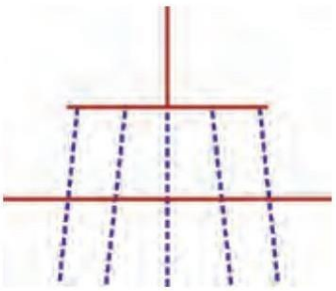


Fig. 4.15: Monopolar electrode with radial effect

4. Crossfire Technique: In this technique, halt 0f the treatment is given with the placement of electrodes in one direction. I.e. medial or lateral aspect and another half is used with the placement of electrode in other direction. I.e. or posterior aspect. This method anterior or commonly used for the treatment of the knee joint, sinuses (frontal maxillary and ethmoidal) and for pelvic organs.

#Dosage: -The treatment dosage should have an intensity that causes sufficient warmth (thermal dosage) of the tissues and the deviation of the treatment should be 20-30 min. The treatment may be given daily on an alternate day.

As a general rule, for the treatment of acute inflammation or any recent injury the intensity of the treatment should be Less but of the treed to frequently, i.e. twice daily. The current used may be that which produces mild warmth (mid them why con and may be reduced to the point at which no warmth is feet (sub thermal or a thermal). The duration of treatment is reduced to 5-10 minutes.

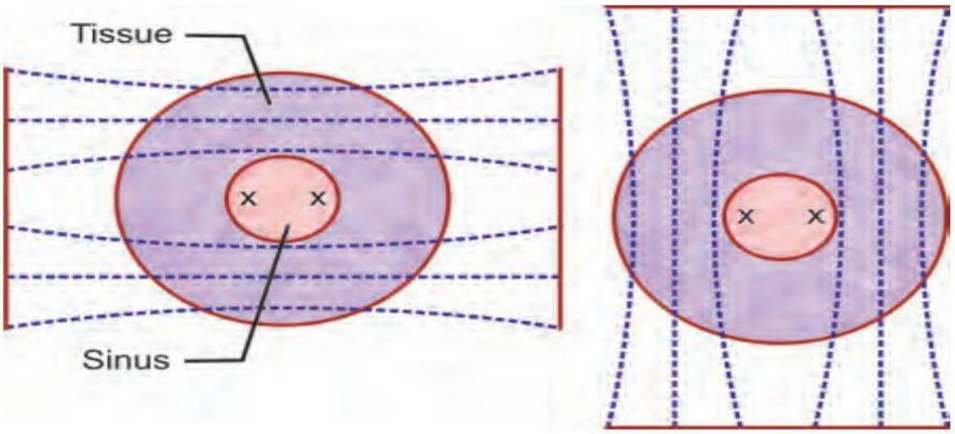


Fig. 4.16: Crossfire technique for sinus

Practical -03

Aim: To study the techniques of method & application used in ultrasound therapy.

Objective: -

The objective is testing of apparatus, application, direct contact method, water bath method, water bag method, Dosage and mode and duration.

Techniques and methods of Application: - Preparation of patient: -

- Skin should be washed and hairs should be removed.
- The nature of treatment, need for an area is all needs to couplant and stability. Be explained to the Patient. The duration of the treatment as well as any particular cooperation required is indicated.

Examination and Testing: -

Skin surface to be treated should be inspected; inflammatory skin conditions should he avoided.

Preparation of the part to be Relaxed: -

The couplant should be applied to the skin surface.

Setting up: -

- The patient should be in a comfortable position as Skill is needed to apply efficient ultrasound therapy
- Ensuring close contact appropriate movement and correct angle of the transducer at all times.
- This treatment head is placed on the skin before the output is turned on.
- This is to avoid damage to the transducer which can occur if the energy is reflected back in to transducer.
- Some machines have a monitoring system if the ultrasound energy reaching the tissues becomes much less than the set intensity.
- The output is greatly reduced, the timer stops and the operation is altered in some way.

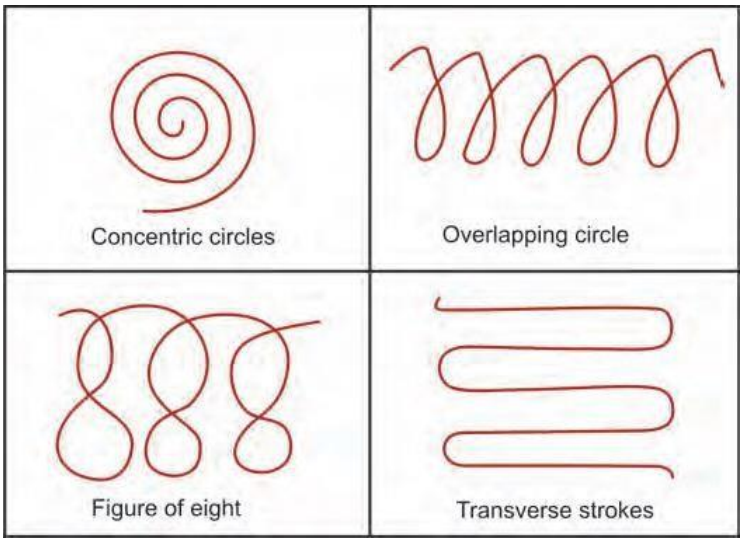
Instructions

The patient is asked to relax and to keep the part still and report if any increase of pain or other sensations immediately.

Application: -

- The treatment head is moved continuously over the Surface. While even pressure is maintained in order to iron and irregularities in the sonic field.
- The emitting surface must be kept parallel to the skin surface to reduce reflection and pressed sufficiently firmly to exclude any air.

- The rate of movement must be slow enough to allow the tissue to reform and thus rearrange in in complete contact with rigid treatment head but fast enough to prevent ‘hot spot’ developing when using a high intensity.
- The pattern of movement can be a series of overlapping parallel strokes, circles or figure of eight.



Termination: -

- The intensity is returned to zero either manually or automatically, before the transducer is removed from the water bath or tissue contact.
- The skin is cleaned of couplant or dried. The transducer should be cleaned after each use with a noncorrosive, nonabrasive antiseptic lotion

RECORDING: -

The following should be recorded;

• Machine Used

• Intensity

• Frequency

• Pulse Mode

• Insonation Time

• Couplant

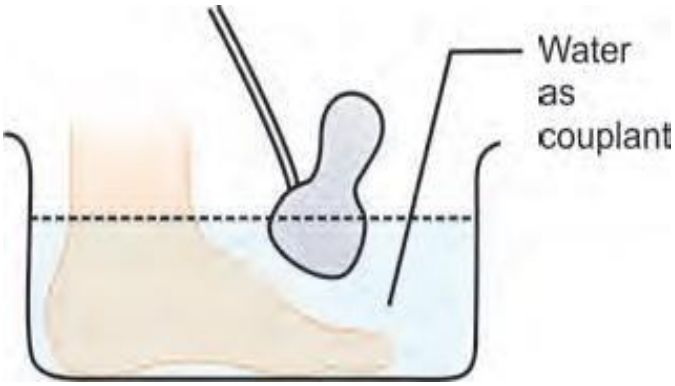
• Region and Area of Insonation

• Response of Treatment

Techniques of application: -

- **DIRECT CONTACT METHOD: -**
  If the surface to be treated is fairly regular, then a coupling medium is applied to the skin in order to eliminate air between the skin and the treatment head and transmit the ultrasonic beam from the treatment head to the tissues. The treatment head is moved in small concentric circles over the skin in order to avoid concentration at any one point, keeping the whole of the front plate in contact with the patient. This technique is suitable for areas up to three times the size of the treatment head. Large area should be divided and each area treated separately. The size of the area and its exact location should be specified on the treatment head

- **WATER BATH METHOD: -**
  When direct contact is not possible because of irregular shape of part or because of tenderness, a water bath may be used. As the part to be treated is immersed in water this can only reasonably be applied to the hand, ankle and foot.
  A water bath filled with degassed water is used, if possible. Ordinary tap water presents the problem that gas bubbles dissociate out from the water, accumulate on the patient skin and the treatment head, and reflect the ultrasound beam. If tap water has to be used, then the gas bubbles must be wiped from these surfaces frequently.
  The patient is seated and part is put in water of a comfortable temperature in such a position that it is suitably supported.
  The treatment head is placed in the water and held 1 cm from the skin and moved in small concentric circles, keeping the front parallel to the skin surface to reduce reflection to a minimum.
  If the patient's hand is to be immersed in the bath while the application is active, care should be taken to minimize exposure to any reflected or scattered ultrasound. This can be done by wearing a dry knitted glove inside a water-proof rubber or plastic glove.

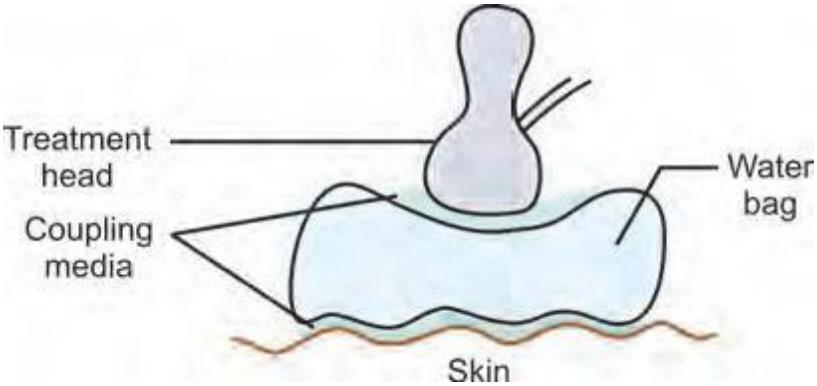


WATER BAG METHOD: -

Another method of applying ultrasound therapy to irregular surface which cannot conventionally be placed in a water bath is treated with a plastic or rubber bag filled with water forming a water cushion between the treatment head and the skin.

Rubber bag filled with degassed water can be used. All visible air bubbles should be squeezed out before knotting the neck of the bag to seal it. A coupling medium has to be placed both between the rubber bag and skin and between the rubber bag and the treatment head to eliminate any air.

The bag placed on irregular surface is then held with the help of patient or others. Treatment head is pressed firmly onto the bag so that a layer of water about 1 cm thick separates it from the surface (body). Inevitably, some bubbles will form and it is important to ensure that these are in the sides of the bag and not in the region transmitting the ultrasound. The treatment head is then moved over the surface of the bag. It does, however, present problems in terms of attenuation as many more interfaces have to be crossed by the ultrasound and rubber absorbs much of ultrasonic energy. To minimize the problem, condoms or thin balloons are more satisfactory because these are thin, cheap and easy to use.



Practical - 4

Aim: The aim of the experiment is to investigate the techniques for applying cryotherapy.

Objective: - The objective of the experiment is to analyse the outcomes of different cryotherapy application methods.

The various techniques that are used for administering cold are.

- Ice massage
- Ice towels
- Immersion in cold or cold whirlpool
- Ice packs or cold packs
- Evaporative cooling or vapo-coolant sprays
- Excitatory cold.

1. **Ice Massage:** In this technique, ice is placed in a polyethylene bag and applied over the body tissue. Ice cubes, crushed ice or flaked ice, etc., can be used. The ice bag is placed over the patient's tissue and the patient is not allowed to lie over the pack. The pressure of application should be minimal and the movement of the bag should be to and fro and circular. The ice can be placed over the body tissue for a period of 10-20 minutes.

2. **Ice Towels:** This is a popular method of application because there is little danger of producing an ice burn. Prepare the ice solution by filling a bucket or bowl with two parts of flaked or crushed ice to one part water in which two terry towelled are immersed. The surplus water is wrung from towel, leaving as much ice clinging to it as possible. It is then applied to the part being treated. The towels are changed after every 30 seconds to 2 minutes. Up to ten towels can be applied consecutively with total treatment time 0f 15-20 minutes.

3. **Immersion in cold or cold whirlpool:** The part of the body is immersed in cold water or a whirlpool in which temperature of water is lowered up to 0-10°C. Flaked ice or crushed ice is used in a solution with water to form slush. Extremities of the body can be effectively treated with immersion in the cold. The total duration of the treatment is around 10 minutes in which the patient can immerse in either for a single 10 minutes session or for a series of shorter immersions until accumulative total of 10 minutes have been reached.

4. **Ice packs or Cold packs:** Commercially used cold packs are used for administering cold. These cold packs contain special material which retains the cold like the silicate gel. These are available in various sizes and shapes. Different body parts are treated with different sizes and shapes of cold packs (Fig. 10.1). These packs are stored in a special refrigeration or freezer for at least 20 minutes to I hour before use (Fig. 10.2).

The main advantages of these cold packs are that they are reusable and can contour or Mold themselves according to the body part treated.

Fig. 9.2: Cold packs unit

Fig. 9.1: Cold packs

5. Evaporative cooling or Vapocoolants sprays: The use of Vapocoolants sprays is increasing nowadays. These are being used very commonly in sporting activities or athletic injuries. The commonly used sprays are fluoromethane or ethyl chloride. The jet of spray is usually applied from a distance of about 1 feet or 12 inches. Gentle stretch is applied to the tissues after application of Vapocoolants sprays.

6. Excitatory cold: The marked sensory stimulus of ice on the skin can be used to facilitate contraction of inhibited muscle. Ascertain the spinal root level supply (myotome) of inhibited muscle and find the area of skin which has same root supply (dermatome). The ice is stroked quickly three times over the dermatome and skin is then dried. This sensory stimulus passes via the peripheral nerve and enters the cord through posterior horn. It raises the level of excitation around the anterior horn cell [as acetylcholine (ACh) has connection with these

sensory fibers]. The increased excitation may supplement the patient's willing effort to make the muscle contract. This technique of "quick ice" is often a useful stimulus in aiding voluntary contraction of muscle.

Practical - 5

Aim: The experiment involves observing and comparing various electromyography (EMG) procedures to analyze their techniques and outcomes.

Objective: The objective of the experiment is to examine and compare different electromyography (EMG) procedures to understand their methodologies and applications.

EMG- Electromyography measures muscle response or electrical activity in response to nerves stimulation of the muscle.

The test is used to help detect neuromuscular abnormalities.

#For EMG of each muscle, the following steps should be followed.

- Select the muscle
- Instruct the patient how to contract and relax the muscle
- Identify the muscle while patient's contracting and relaxing the muscle.
- Locate the needle insertion point slightly away from the motor point.
- Insert the needle quickly while the muscle is related to minimise pain Sharp MOP, on minimal contraction confirm that the needle is in proper position.

#Preparing the patient

- Prior to the test patient should be briefly explained about the procedure.
- Wipe the skin over each puncture site with spirit.
- Through most patient tolerate the pain some may require oral analgesic.
- Selecting the muscle is done on the basis of clinical indication.
- Ideally muscle selected should be superficial easily palpated.

#Needle Insertion

- Prior to needle insertion muscle should be palpated during intermittent contraction to localise its border.
- Skin over the puncture site is made taught and needle inserted smoothly. When testing the small muscle needle inserted obliquely.

#Needle movement

- Needle is moved along a straight line into the muscle in sort step of 0.5 to 1mm.
- Needle is advanced in 5-30 such steps with briefs pause between each step.

#Instrumentation

- Electrodes
- Amplifier
- Filter
- Display Method

Electrodes

1. **Surface electrodes:**

- They are square/circular metal plates made up of platinum or silver. They are available in different sizes, typically 3-5mm in diameter.

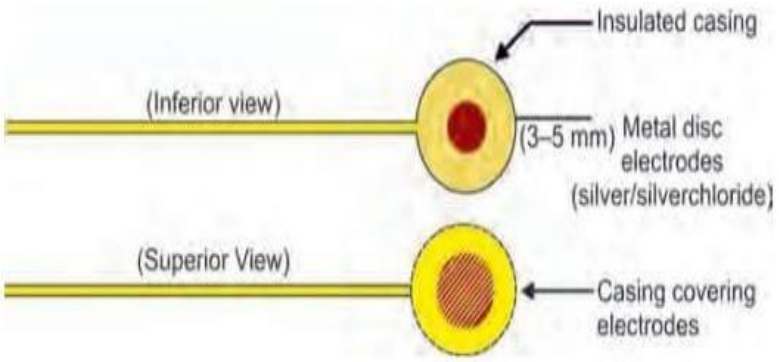


Fig. 11.2: Surface electrodes

- Gel is applied beneath the electrodes to facilitate the conductance.
- Used for recording in NCS. Kinesiological studies.

2. Needle Electrodes:

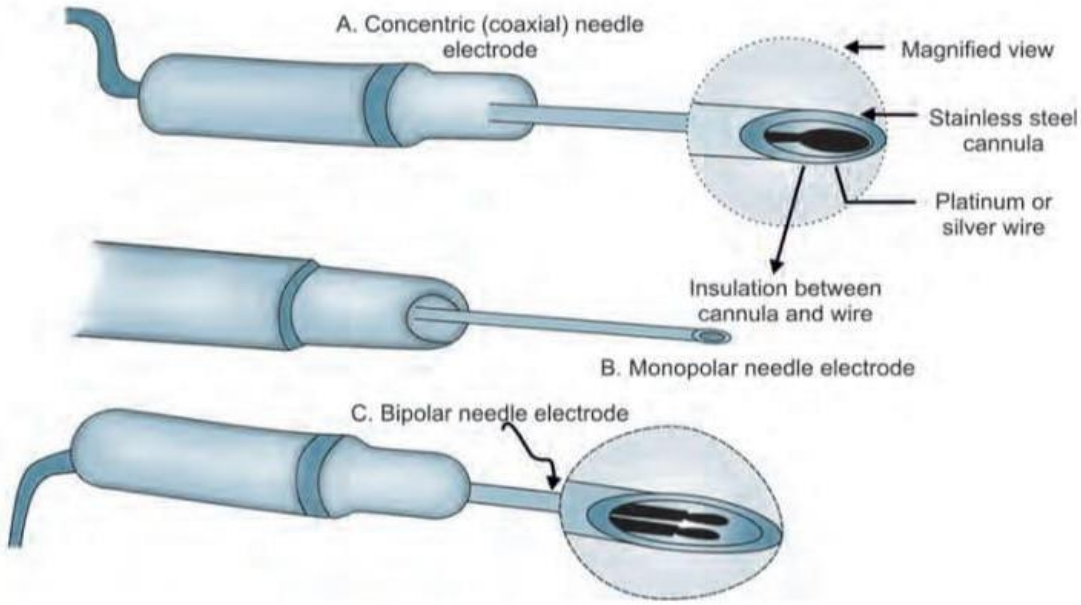
#Concentric Needle electrode-

- Mostly commonly used.
- 24–26-gauge needle with a fine wire in its lumen
- Bevelled tip gives an oval recording area of 125×580micrometre.
- Achieve electrode is reformed to shaft of the needle.

#Monopolar Needle electrode -

- 23–30-gauge Teflon -coated needle with a base hip of approx. 500 micrometres.
- Motor unit potential recorded are of slightly higher
- Advantage- less painful, cheaper.

Disadvantage- need an additional surface.



Figs 11.3A to C: Different types of needles electrodes

#Single fiber (SF) Needle electrode -

- Steel cannula of 0.5-0.6mm diameter
- 1-14 insulated platinum or silver wires are placed inside
- Electrodes are embedded in epoxy vein
- Records form a small area of 25 micrometre on the side opposite to level
- Recording area is reformed to shaft of the needle
- Disadvantage- cannot be used to study motor unit size.
- Used to study neuromuscular transmission abnormality and fiber density.

#Amplifier:

- Bioelectrical potential recorded will be in the range of 1uv to 1mv.
- Differential amplifier increases the amplitude of the desired response while rejecting unwanted noise.
- Amplifier ability to reject common signals is known as its common mode rejection ratio (CMRR). The higher the CMRR the better the rejection.

#Filter and Display Method -

~ Filter:

- They are used selectively attenuate the noise preserving the signal.
- Band pass filters extending from to the 10Hz to 10KHz
- Display; once the waveform is recorded and processed it is displayed for visual analysis.
- As the EMG potential have distinct auditory characteristics presenting them as audible also helps in differentiating various responses.

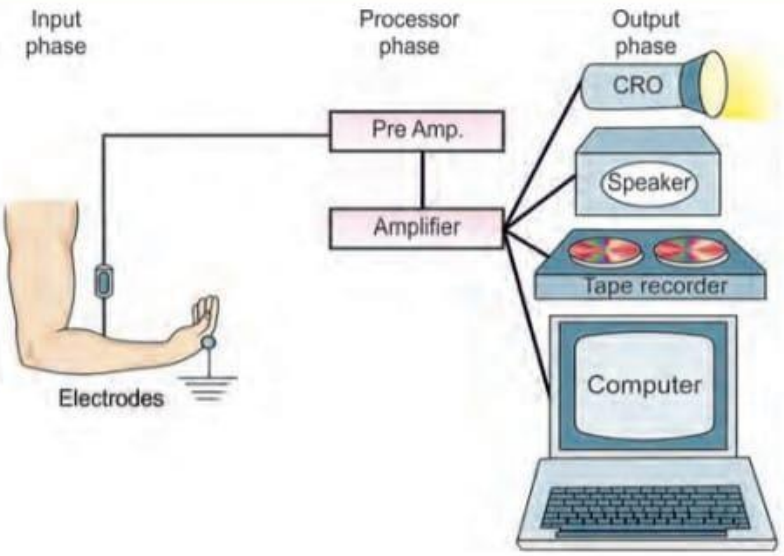


Fig. 11.5: The EMG recording system

 # Procedure

- Electrodes
- Skin will be cleaned
- Electrodes will be taped to the skin along the nerves that are being studied.

Stimulus-

- Small stimulus is applied (electric current) that activate nerves.

Current -

- The electrode will measure the current that travels down the nerve pathway.

 # Types of electrodes: -

- Active electrode: placed on the centre of the muscle belly (over the motor end plate).
- Reference electrode: placed distally about 3-4 cm from active electrodes (over tendon or bone).
- Ground electrode: in between active and reference electrode.
- #Stimulators: placed over the nerve that supplies the muscle cathode closest to the recording electrode

    ~ Current needed
    ~20-50mA for motor NCS
    ~5-30mA for sensory NCS

- Latency: Time interval between the onset of a stimulus and the onset of a response.
- Amplitude: The maximal height of the action potential.
- Conduction velocity: How fast the fastest part of the impulse travels.

#Precautions: -

- Bleeding hematoma and compartment syndrome
- Prosthetic joint and metal osteosynthesis.
- Implanted deep pain stimulator and vagal nerve stimulation
- Patient with prosthetic heart valves may have risk of infective endocarditis

Implantable Automatic Cardio-venter Refibrillator (IACR).

Practical - 6

Aim: To study the methods of application of Wax Bath Therapy

Methods

The part to be treated must be cleaned with soap and water. Moisture is to be soaked with towel. Position of the patient should be such that the part to be treated comes closer to the wax bath container. Before application one must ensure that there should be no moisture over the body tissues otherwise burn could occur. The warm wax is placed on body tissues by various techniques and the treatment is given for about 10–20 minutes.

Techniques of application

Various techniques used for the application of paraffin wax are as follows:

1. **Direct pouring method**: The molten wax is directly poured by a mug or utensil on the part to be treated and then wrapped around by a towel. The wax is allowed to Solidify for about 10–12 minutes. Several (4–6) layers can be made over the body tissues.

2. **Brushing method**: A brush of various sizes (4'' or 6") is used for the application of molten wax over the body tissues. Several coats (4–6) are applied over the body tissues and wax is allowed to solidify and wrapped over by a towel.

3. **Direct immersion or dipping method**: In this method, the body part to be treated is directly immersed into the container of paraffin wax and taken out. Once the wax solidifies, the part is again immersed to make another layer of paraffin wax and wrapped around by a towel.

4. **Toweling or bandaging method**: A towel or a roll of bandage is immersed in molten paraffin wax and then wrapped around the body part. Several layers can be made over the body part. This method is preferably used for treating proximal parts of the body.

Once the treatment is given by paraffin wax, it can be reused for the next session. Regular cleaning or changing of the wax is necessary to ensure good hygiene.

Practical – 7

Aim: To study techniques and method of application of LASER

Techniques of Application

The method of application of laser therapy is quite simple. Generally, the laser energy is emitted by a hand held applicator for therapeutic purposes. The gallium-arsenide laser contains the semiconductor or diode element at the tip of the applicator, whereas the Helium-neon laser contains their components inside the unit and delivers the laser light to the target area via a fiberoptic tube. This causes divergence of the beam. To administer the Laser for therapeutic purposes, two methods are generally used:

1. Grid method
2. Scanning method.

1. **The grid method**: The treatment area is divided into a grid each of 1 square cm. The hand held applicator should be in light contact with the skin and directly perpendicular to the target tissue. Each square cm is stimulated for a specific period of time.

2. **The scanning method**: No contact is made between the tip of the laser and the patient's skin. The tip of the applicator is held at a distance of 5 to 10 mm. Since the divergence of beam occurs, there is a decrease in the amount of energy applied as the distance increases.