Principles of application of SWD

The methods of applying SWD are :-

(1) Capacitor field Method / condensor Method
(2) Inductothermy / Inductive / Cable Method

- Capacitor field Method :-

* In this method the electrodes are placed on each side of the part to be treated separated from the skin by insulating material.

* The electrodes act as plates of capacitor while the patient's tissue together with the insulating material which separate them from electrodes form dielectric.

* When the high frequency current is applied rapidly, alternating charges are set up on the electrodes and give rise to a rapidly alternating electric field between them.

* The electric field influences the material which lie ~~wi~~ within it.

This causes oscillation of ions, rotation of dipoles and distortion of insulating materials.
All this constitute electric current and produces heat. This production

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of heat is primarily the effect of SWD.

* The passage of high frequency current in the tissue depends on both conduction and the degree of polarisation.

* Those tissues that have high dielectric constant are good conductors. (water and water containing tissues).

* The tissues with low dielectric constant ~~wi~~ have low thermal conductivity. eg → fat tissue.

* To provide sufficient energy for heating the tissues, it is necessary to concentrate the field in the particular area to be treated.

Spacing of Electrodes

1) 2-4 cm skin electrode distance

2) Wide spacing give more uniform field in the tissues

3) More heat per unit area is generated in the skin than in the deeper tissues.

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* Size of the Electrode

- A little larger than part to be treated to achieve uniform electric field to the tissues.

- Unevenly sized electrodes may concentrate the field under the smaller electrode.

* Positioning of electrode relative to tissue

- Electrodes parallel to skin surface so that skin electrode distance is as constant as possible.

- The electric field takes the shortest pathway and will preferentially pass through the material of least impedence.

- The distance b/w the electrodes must be greater than the combined skin electrode distance of the 2 electrodes Or the field will pass through the air between the electrodes rather than through the tissues.

- Uneven spacing leads to concentration of field at closest point.

* Nature of the tissues

- Where parallel paths are available

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the electric field passes through the tissues of high dielectric constant and conductivity like the water filled tissues such as muscles and blood vessels.

Method of Application of Capacitor field Method

The capacitor field method may be applied in different ways :-

1. **Contra - planar Method** → Electrodes are placed on opposite side of the part to treat deeply placed structures like joints.

2. **Co - planar Method** → Electrodes are placed on the same side of the part to treat more superficial structures.
eg → The Spinal musculature.

3. **Cross Fire Method** → Half the treatment is given with the electrodes in one contraplanar position and for the 2nd half the electrodes are repositioned at right angle. This technique

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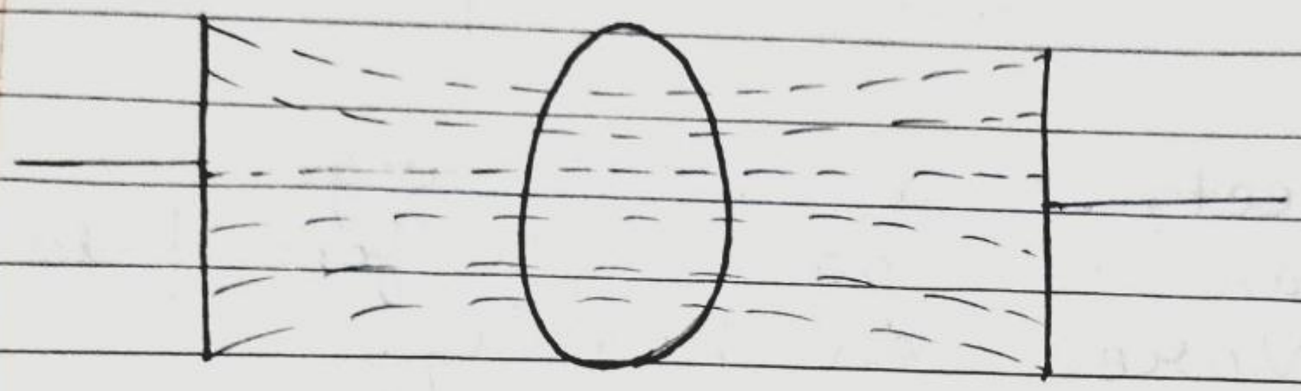
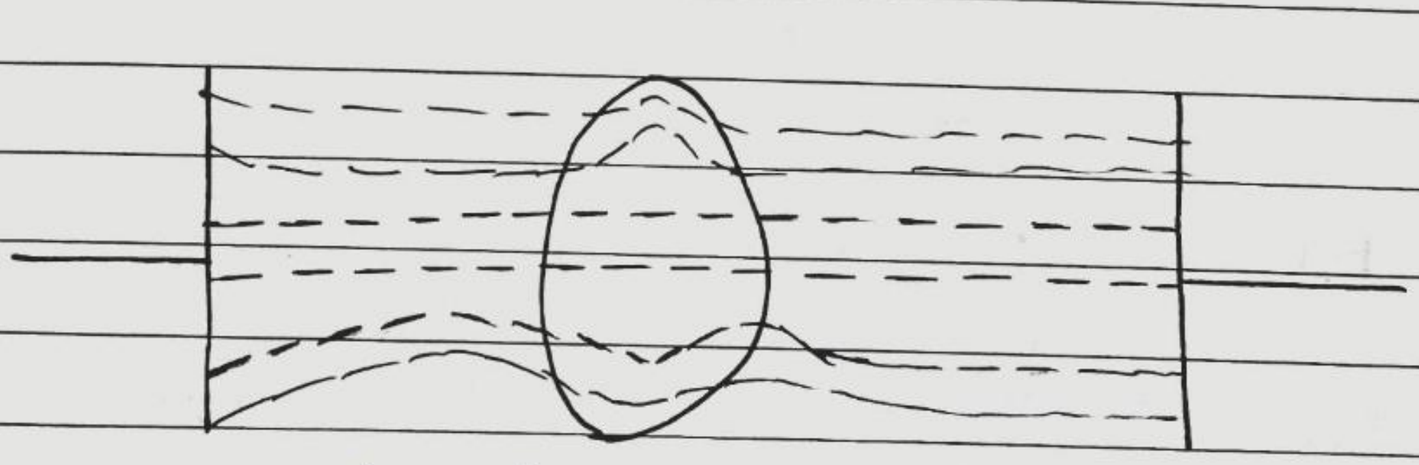
maybe used to achieve more uniform heating of the tissues and particula-rly for the walls of air filled cavities.

eg. → Para nasal sinuses.

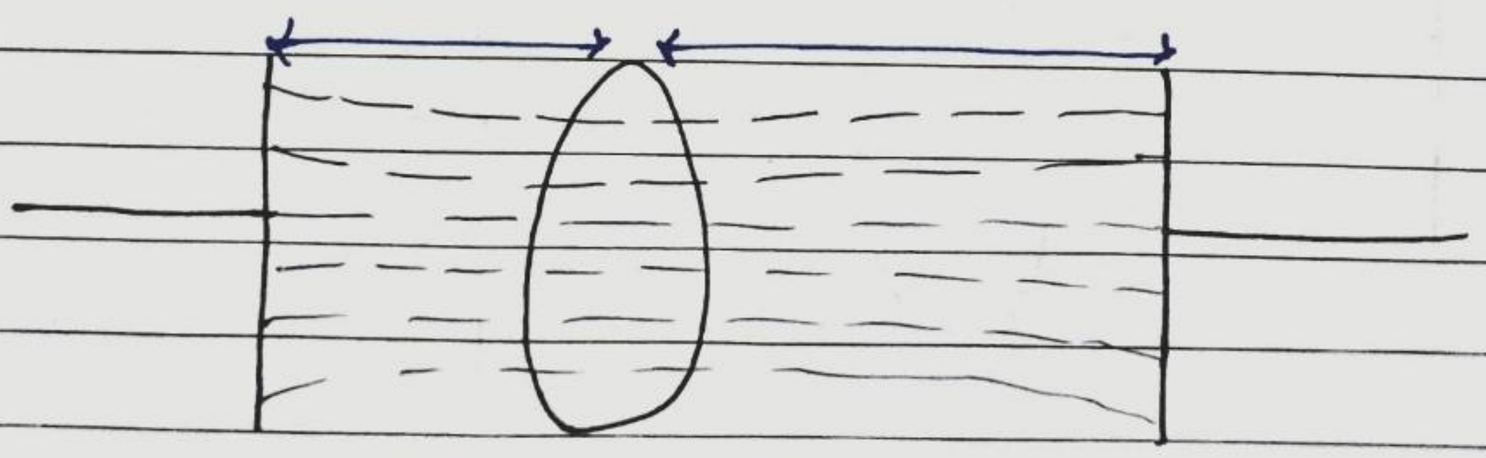
(a) SPACING OF ELECTRODE



Normal spacing electrode
→ Uniform field
→ More even heating



closely spaced electrode
→ Superficial heating



Unequal spacing
→ Superficial heating
Under closer electrode

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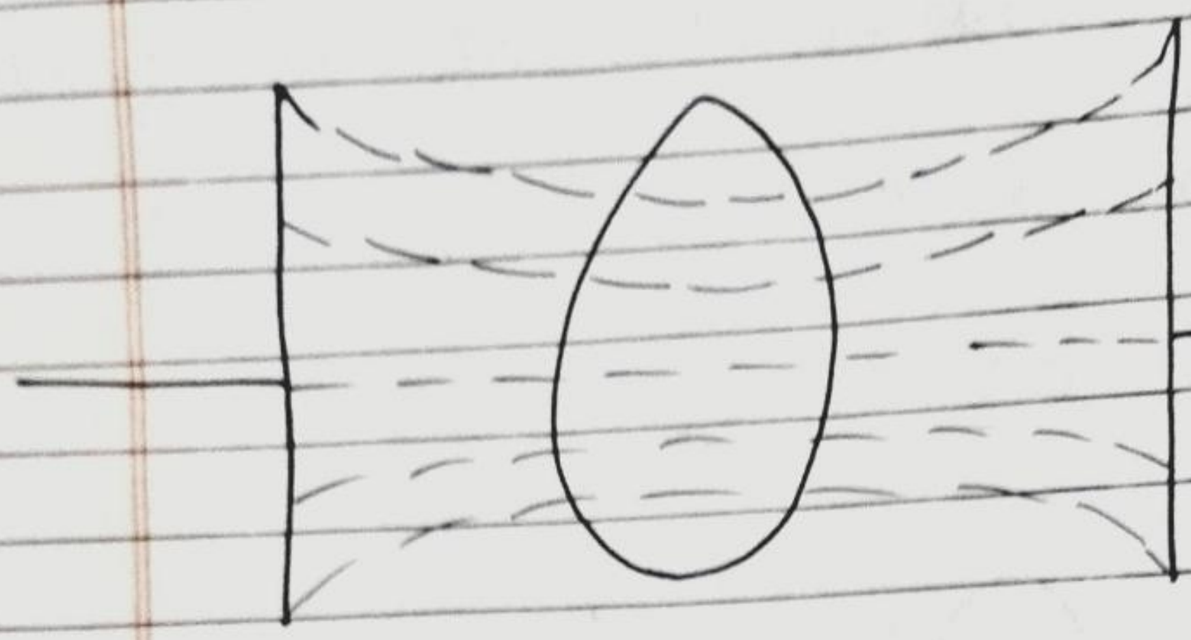
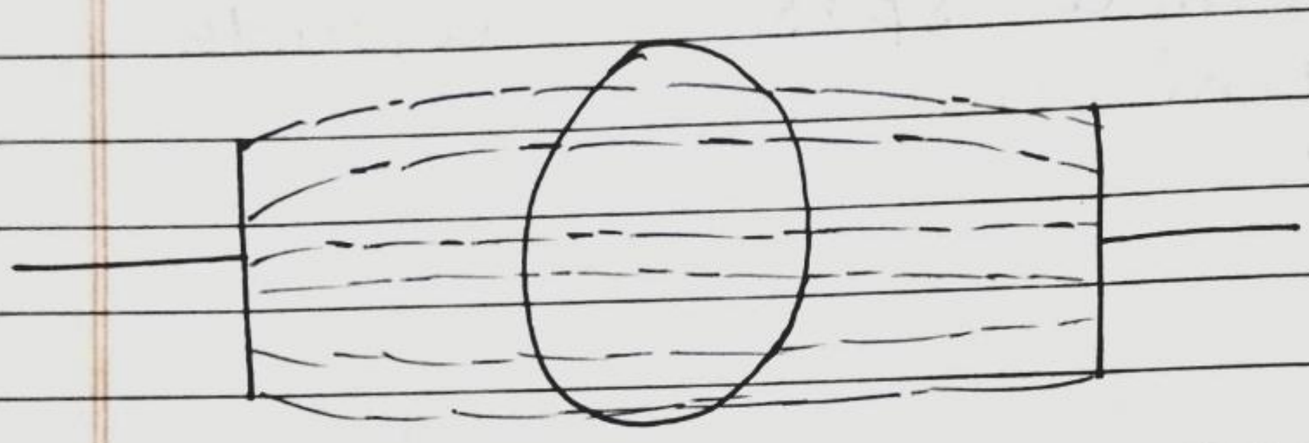
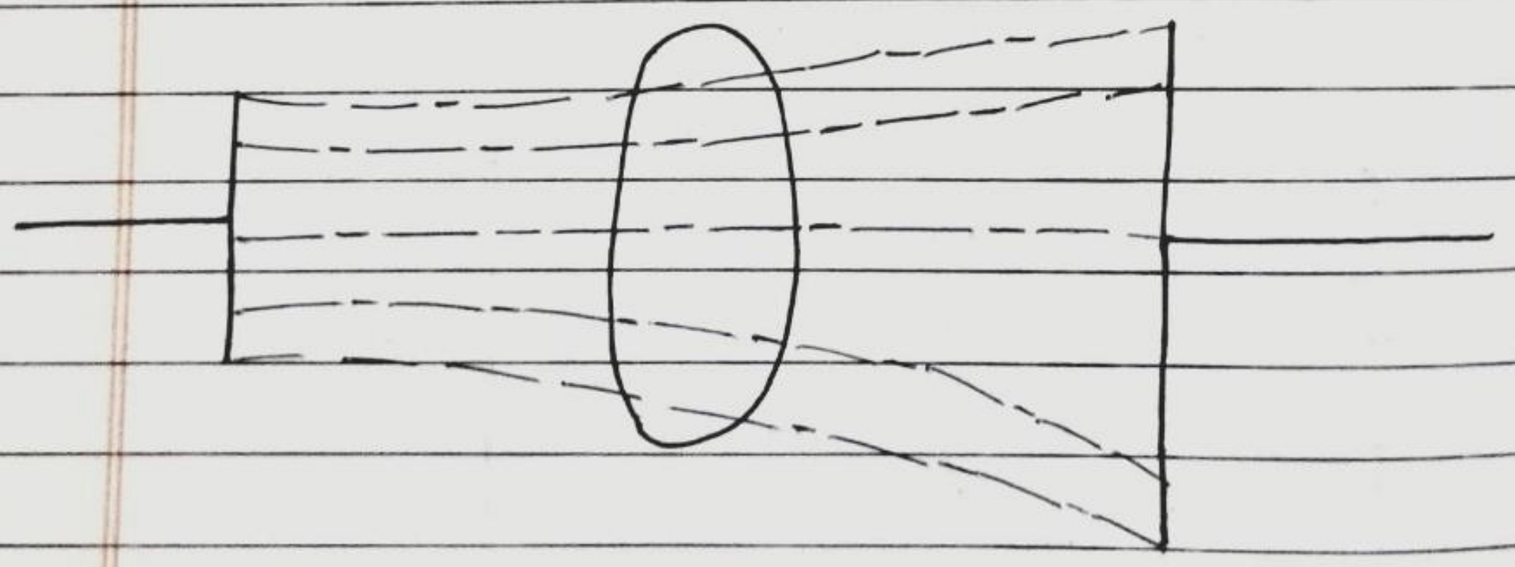
(b.) SIZE OF ELECTRODE



Electrode a little larger than body part — Uniform field
→ More even heating.



Electrode smaller than body part.
→ Superficial heating because field spreads out in tissues.



Different sized electrode
→ Superficial heating under smaller electrode.

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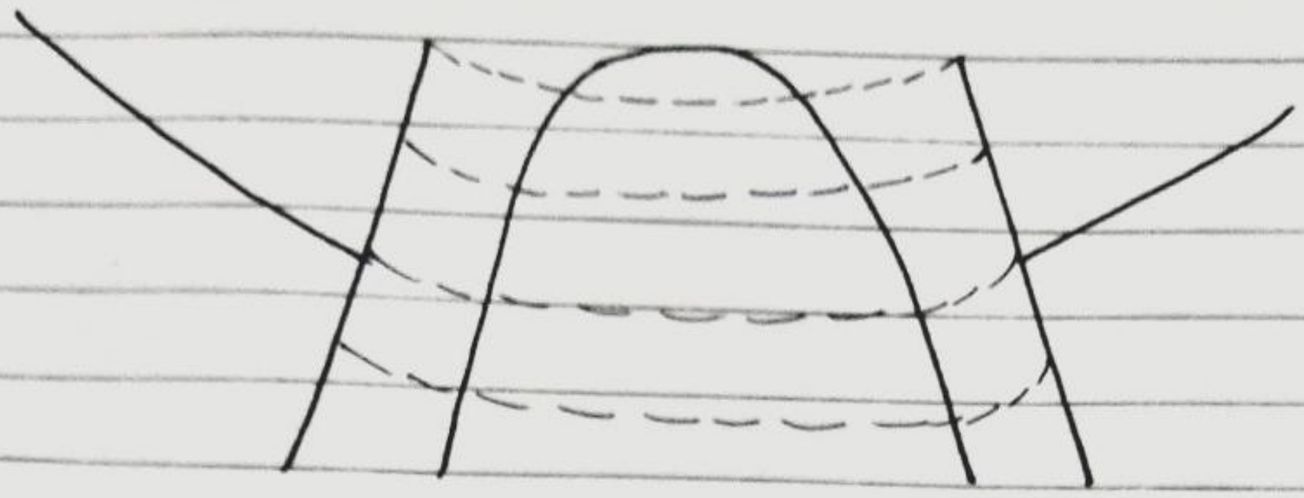
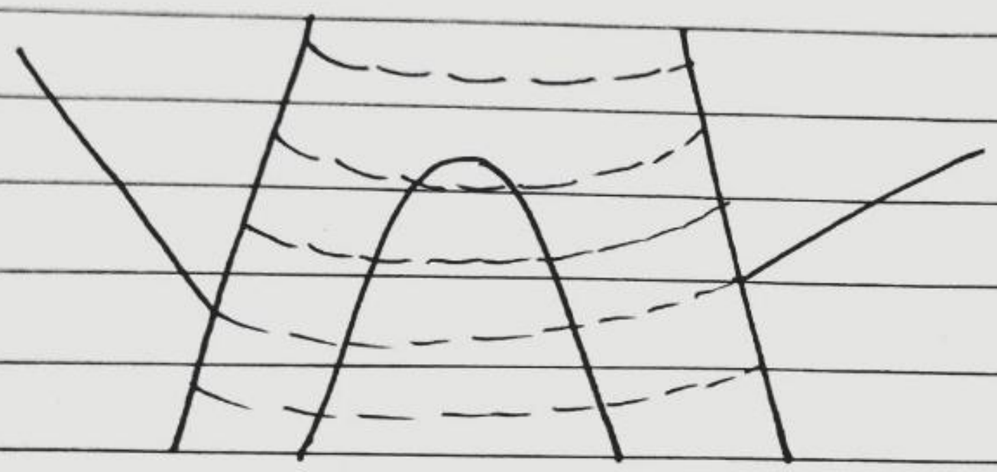
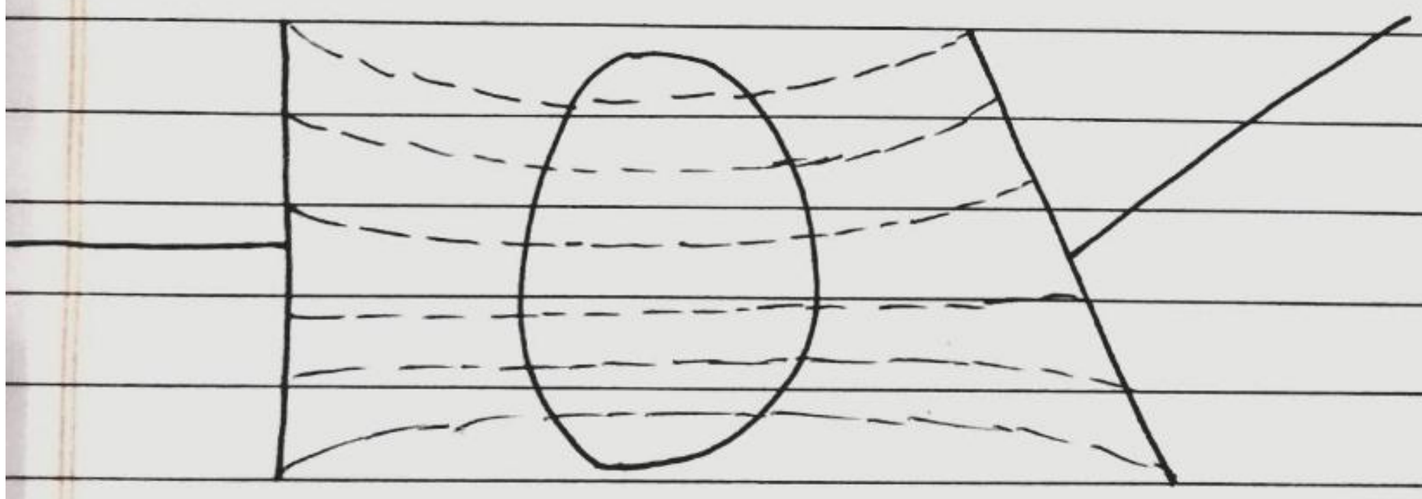


Electrodes parallel to skin surface.



Distance between electrodes less than combined skin - electrode distance

→ Most of the field passes through air space.



Electrodes not parallel to skin surface.

→ Superficial heating under closest part of electrode.

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